3 GAME DESIGN CHALLENGE

3.1 Overview

The Game Design Challenge is an opportunity for teams to design a *FIRST* Robotics Competition game and compete against other teams for a chance to pitch their game to the *FIRST* Robotics Competition Game Design Team. Teams may include a specified Game Design Challenge ELEMENT (see Game Design Challenge ELEMENT for more details) that was included in each Kickoff Kit.

In addition to developing a game, each team that participates in the Game Design Challenge answers specific questions in their submission to be considered for awards and possible advancement. Teams may also include supplementary information with their submission and have the opportunity to elaborate on their game during an interview with *FIRST* Robotics Competition judges. Teams are expected to develop as complete a game as possible, at the same time creating a succinct presentation for judges to evaluate.

Winning game(s), or their elements, may inspire or be used as a future official *FIRST* Robotics Competition game! Although *FIRST* is likely to make modifications to any submitted concept, credit will be given to the associated team when the game/element is released.

3.2 Submission Information

See How to Submit and Deadlines for additional details on how to submit. For the Game Design Challenge, teams are asked to provide the following information when they submit:

- two (2) contact emails (must be mentors)
- time zone
- game name (text only, not a logo)
- image of the field
    - can be a sketch, a photo of a physical model, a CAD image, etc.
    - accepted formats include gif, jpg, jpeg, png
    - files must be no larger than 10 MB.
- game overview (500-word limit)
- description of notable field elements. (300-word limit)
- description of expected robot actions (300-word limit)
- if ELEMENT used, a description of how? (300-word limit)

> Although use of the Game Design Challenge ELEMENT is required for a team to be considered for the Concept Award, teams who choose not to use the ELEMENT will not be judged at a disadvantage to teams who choose to use it for any other award.

- Optional - a video providing additional information about the game.
    - Videos may not exceed two (2) minutes.

- Accepted formats include flv, m4v, mov, mp4, mpeg, mpeg4, mpg, ogm, ogx, swf, wmv. Most common codecs used in these containers are accepted, for a complete list of accepted container/codec pairs Supported Input Codecs and Containers.

> We recommend teams use a minimum resolution of 720p (1280x720px) when recording videos.
>
> There is no technical / theoretical limit to supported file size, however, the user's upload bandwidth is likely the limiting factor. 5GB uploads work fine on high-speed internet connections but could take several hours on an average broadband connection. The longer it takes to upload a video, the more likely there could be an interruption to network connectivity, and difficulties completing an upload.

- Optional – Supplementary information.
  - up to four (4) pages no larger than 8.5 in. x 14 in. (~21cm x 35cm) (may be in either portrait or landscape orientations)
  - Should be readable at 100% zoom
  - pdf is the only accepted file format
  - file must be no larger than 10 MB

> This page size is intended to allow for the default settings used by most word processors and slide decks. Teams may use whatever file type they like as long as the submission is uploaded as a pdf and it meets the above size requirements.

- Acknowledge that the game design concept is a unique creation by the team

> Most robotics competitions copyright their game materials. Judges are not expected to know every robotics game that exists, but teams should be mindful to not submit a game that is too similar or identical to a copyrighted game.
>
> *FIRST* wants to see creative solutions from teams. Teams shouldn't just take another robotics game, super-size it for *FIRST* Robotics Competition, make it 3 robots versus 3 robots, and call it a day. Show us your creativity!

Do not include links or redirects to additional content outside the bullets described above (e.g. include a link to webpage with additional images or content); such references will not be reviewed.

3.3 Design Considerations

Beyond submission requirements, there are no additional requirements for a game; however, top Game Design Concepts will maximize the following criteria:

- safe for teams, field crew, and spectators
- accommodate six (6) ROBOTS on the field simultaneously
- play on a field no larger than 30 ft. (~914 cm) wide x 74 ft. (~2255 cm) long x 20 ft. (~609 cm) tall
  - This includes the space where DRIVE TEAMS and HUMAN PLAYERS stand during matches, but does not include space for technicians, the scoring table, referees, etc.

- matches last between 1 minute 30 seconds (1:30) and 3 minutes (3:00)
- play with Robots that follow *FIRST* Robotics Competition Robot rules per the 2021 Game Manual (legal motors, battery, pneumatics, etc.) with the following exceptions:
    - R2, R3, and R4 are game specific and may be omitted or defined appropriately for your game. If they are defined, they do not have to take the exact same form as the 2021 rules.
        - ROBOT weight restrictions should not be less than 70 lbs. (~32 kg) or more than 125 lbs. (~56kg) (not including battery and BUMPERS)
        - ROBOT size requirements, should not require robots to be less than 18 in. (~ 46 cm) in any dimension
        - ROBOT maximum starting size, if specified, should consider robot transport to and from the field and robot shipping in crates, i.e. dimensions should be less than 47 in. (~119 cm) x 47 in. (~119 cm) x 54 in. (~137 cm). While starting robot size may exceed crate size, it should be backed by sound reasoning as to why it's important to the game and how teams are likely to meet the challenge of transporting the larger robot.
    - BUMPERS may be omitted if ROBOTS aren't able to contact their opponents.

For tips on what the *FIRST* Robotics Game Design Team thinks makes a good game, teams should look at the What Makes a Game "Good" activity in the Game Design Challenge Activities.

3.3.1 Game Design Challenge ELEMENT

Teams may choose to include the Game Design Challenge ELEMENT in their submission. It is generally not a requirement to use the ELEMENT, but it must be used in order to be considered for the Concept Award.

The ELEMENT is a chain. For the purposes of this challenge, the definition of chain is "a series of links or rings connected to or fitted into one another and used for various purposes (such as support, restraint, transmission of mechanical power, or measurement)."

Teams that chose to use the ELEMENT will be asked how they implemented it in their submission. Teams may choose to be creative when using the ELEMENT, so long as they can provide a solid logic as to how their "chain" fits the provided definition.

A sample of chain is included in each 2021 Kickoff Kit. The sample is zinc plated straight link coil chain from Fehr Bros Industries, Inc. Each sample is 3 ft. (~91 cm) long, is trade size 2/0, and is product code EGSLC2-0. Please note that the provided chain is an *example* of the ELEMENT. The exact specifications of chain (size, length, material, etc.) are not defined.

Figure 3-1 Game Design Challenge ELEMENT – Sample Chain. Photo courtesy: Fehr Bros Industries, Inc.

3.4 Awards & Judging Logistics

3.4.1 Awards

Teams are required to submit their Game Design Concept and participate in an interview with *FIRST* Robotics Competition judges to be eligible for awards. The official award guidelines can be found on the At Home Challenges Award Guidelines webpage. Interviews are virtual and held on a remote platform. The awards for this challenge are as follows:

- **Designer's Award** – Celebrates a team's outstanding success with the Game Design Challenge. The winner of this award should be a strong candidate for some other awards in this challenge.
    - To be eligible for this award a team is not required to use the Game Design Challenge ELEMENT.
- **Concept Award** – Celebrates a team that creates an interesting, realistic game concept.
    - To be eligible for this award a team is required to use the Game Design Challenge ELEMENT.
- **Imagery Award *in honor of Jack Kamen*** – In honor of Jack Kamen, Dean's father, for his dedication to art and illustration and his devotion to *FIRST*. This award celebrates attractiveness in visual aesthetic integration.
- **Creativity Award *sponsored by Rockwell Automation*** – Celebrates creativity that enhances the overall game design concept.
- **Engineering Design Award** – Celebrates the team that demonstrates sound engineering in the design process.
- **Rookie Design Award (optional)** - Celebrates the rookie team's outstanding success in the Game Design Challenge.

3.4.2 Judging GROUPS

For the Game Design Challenge, teams are divided into GROUPS and compete with other teams regardless of location (e.g. a team from Australia may be placed into the same group as a team from Michigan). All teams in a GROUP will compete against each other for judged awards. If a team is participating in multiple challenges, the GROUP they are placed in for INFINITE RECHARGE at Home, for example, may not be the same GROUP a team is placed in for the Game Design Challenge.

Teams are assigned to a GROUP by *FIRST* Headquarters. Once assignments are made, on or around Monday, March 8th, the GROUP is shown on the FRC Events webpage. Each GROUP has between 25-35 teams (with a target of ~30 teams), pending total number of teams participating.

The process used to assign teams to their GROUP is as follows:

1. Determine initial number of groups by assessing the number of teams who have opted-in to the Game Design Challenge by the deadline, divided by 30, and rounded up.
2. Rookie teams (2020 and 2021 Rookies) are assigned randomly, team by team, to GROUPS (i.e. team in GROUP A, team in GROUP B, team in GROUP C, etc, returning to GROUP A if necessary)
3. Step 2 is repeated with Veteran teams.
4. If any groups contain less than the minimum of 25 teams, a GROUP is dissolved, and the teams are redistributed into the remaining. This is repeated until all groups contain the minimum threshold of teams.

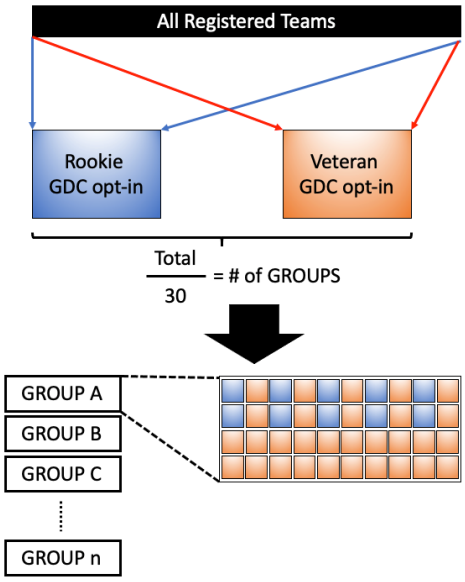

Figure 3-2 Game Design Challenge GROUPS

3.4.3 Judging Process

- Teams must submit all content described in Submission Information by the deadline as described in Deadlines.
- Judge Advisors contact teams (via the email they supplied when submitting) to set up an interview with a panel of judges.
- Judges 'spread the wealth' within this challenge so no team wins more than 1 (one) judged award for this challenge

3.4.4 Interview Process

Teams that complete the Game Design Challenge submission receive a remote interview with a panel of *FIRST* Robotics Competition judges. The default format is a video conference, but a call-in number can be provided if needed.

A Judge Advisor will contact the team's mentors identified in the team's submission with the team's assigned time slot. If that slot doesn't work for the team, they should inform the Judge Advisor as soon as possible.

For all At Home Challenges, interviews occur between Monday, March 15th and Sunday, April 11th.

- Interviews are limited to twelve (12) minutes total; up to seven (7) minutes for a presentation by the team and the remaining time (at least five (5) minutes) for questions and answers led by the judges.
    - The interview time begins after a one (1) minute buffer to allow all team members to be on the call
    - Please remember that judges review the team's submission prior to this interview. We encourage teams to present new information to the judges, rather than reiterating what was already submitted.
- Teams are allowed to share their screens and use video as part of their presentation
- Teams are allowed to have as many team members in the interview as they believe they need but teams are encouraged to create a succinct presentation for the judges. We recommend no more than 5 team members.

> We encourage all teams to be prepared to adapt to any technical difficulties by having multiple team members prepared to present all materials.
>
> Remember to put safety first with social distancing guidelines and compliance with local regulations if your students are in the same physical location.

- At least one (1) adult team mentor **must** attend the interview.
- Mentors are not allowed to provide any assistance during the interview. *FIRST* suggests this mentor provides feedback to the team after the interview based on observations and noting judges' questions. This feedback can be very valuable in helping teams hone their skills. If the mentor provides any assistance during the interview, the judges will respectfully remind the mentor of the rule.
    - **Exception**: If necessary, the mentor may provide translation services for students needing foreign language or sign language translation.
- Recording video, audio, or taking pictures (including screenshots) are prohibited during the interview.

> In addition to *FIRST* prohibiting recording, there may be other legal restrictions governing recording.

3.5 Advancement

All submissions from teams who received either the Designer's Award or the Concept Award will advance to a second round of judging. In the second round, judges (including members of the *FIRST* Robotics Competition Game Design Team) will review the submissions and select up to 20 entries to move into the final round. There are no interviews in the second round.

The teams selected to advance from the second round will present remotely to members of the *FIRST* Robotics Competition Game Design Team. These Finalists participate in an interview scheduled with HQ Game Designers between June 7th and June 18th, 2021.

The Game Design Team selects up to three (3) teams as winners of the competition from the group of Finalists. All submissions that advance to the final round are made public by *FIRST* and could have elements of their games be incorporated into a future *FIRST* Robotics Competition season!

> Any student who was considered a pre-college team member at the time of the original submission (no later than March 4th) will be considered a pre-college student if a team becomes a Finalist regardless of actual academic standing.

3.6 Activities

Developing a *FIRST* Robotics Competition game is a new challenge for teams. To help educate teams about the process, get started, and get over roadblocks, members from the Game Design Team put together Activities for teams. These Activities are entirely optional and do not act as a step-by-step process, they do not have to be completed in any particular order. Completion of the Activities is not part of the judging process.

Activities vary, and information ranges from helpful vocabulary, to norm setting, to how to process sets of great ideas and more. Please reference Game Design Activities for full details and content.