4 *FIRST*® INNOVATION CHALLENGE PRESENTED BY QUALCOMM

4.1 Overview

In the *FIRST*® Innovation Challenge presented by Qualcomm, registered teams identify a real-world problem related to this season's theme *FIRST*® GAME CHANGERS^SM, powered by *Star Wars: Force for Change*, design a solution, build a business model, and deliver a pitch to compete with other *FIRST* Robotics Competition teams for judged awards and a chance to be one (1) of twenty (20) Finalist teams invited to the *FIRST* Global Innovation Awards powered by *Star Wars: Force for Change*, a multi-day experience where students showcase their innovations, participate in workshops, and receive mentorship from experts.

Science, technology, engineering, and math (STEM) have always been the catalyst for innovation that moves our world forward. As our societies continue to evolve and become more inclusive and connected, our sports - and the activities that make us physically and mentally strong - must change along with us. This means redefining where and how we move and play. We actively play and move for ourselves, but also with and as a community to attain optimum health. This means inventing and innovating places, ways, sports, tools, and concepts so people of all abilities and skill levels can thrive through active play and movement.

Think about it:

- In 2006, the Nintendo® slogan 'Experience a new way to play' took the world by storm as it introduced the Nintendo Wii. Game developers and engineers developed a revolutionary new game controller that worked in three dimensions and allowed users of all ages to be active while playing a video game. This solution won the Game Critics Awards for Best Hardware. When coupled with the new software and accessories, it had people off their couches engaging in everything from bowling and dance competitions to tennis and go-kart driving.
- For tracking athletic performance, the stopwatch was one of the few pieces of measuring technology available. Now, companies are refining wearable tech, but athletes have a rapidly growing number of sophisticated options from smart clothing to advanced wearable tech. These have ushered in a new age of performance tracking with metrics such as position, distance, velocity, and acceleration. Heads-Up Display (HUD) cycling glasses are an example of one piece of sports tracking equipment that helps cyclists make mid-ride adjustments when competing, not to mention enhances overall safety.

- In 2019, a *FIRST*® LEGO® League team invented a community sports field that used LED lights to light up fields in different patterns, allowing for the instant and seamless changing of demarcation lines for different types of sports play.

4.2   Challenge

Identify a problem or opportunity and design a solution to help people (or a community of people) keep, regain, or achieve optimum physical and/or mental health and fitness through active play or movement.

4.2.1   Criteria

Teams who participate in the *FIRST* Innovation Challenge:

- identify and define a problem or opportunity.
- brainstorm and design an innovation to seize the opportunity or solve the problem
    - The innovation can be entirely new and novel or may significantly improve an existing invention
- create a business model
- show and be evaluated on the soundness of the design
- develop and present a pitch for the innovation
    - Each team develops a two (2) minute business pitch, to be presented live
- use technology in either the solution development process and/or design
    - The use of technology in either the solution itself or the development of the solution will fulfill this requirement.

4.3   Submission Information

We encourage teams to let *FIRST* know if they are planning to participate as soon as possible by starting their application, but teams have until the deadline to submit their entry.

See Section 1.10 How to Submit and Section 1.11 Deadlines for additional details on how to submit. For the *FIRST* Innovation Challenge, teams are asked the following questions when they submit:

- two (2) contact emails (must be mentors)
- time zone
- project title
- project described in brief phrase (10-word limit)
- executive summary
    i.   Please describe the problem/opportunity the team is focusing on (200-word limit).
    ii. Please describe how the team proposes to solve the problem/opportunity (200-word limit).
    iii. What technology the team used (or planning to use) in the design or solution development? (This does not have to be a comprehensive list but will help align any specific technical expertise a judge may have to the judging GROUP) (100-word limit).

Think of the executive summary as a very brief overview; it does not mean the team needs to have all of the *FIRST* Innovation Challenge figured out! On the contrary, because the information

in the executive summary is only reviewed, it is expected that teams expand and iterate upon the solution between the submission deadline and interview.

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.

4.3.1 Additional Requirements for Semi-Finalists

The following requirements are *only* for advancing Semi-Finalist teams. Teams will be contacted by *FIRST* with instructions on how to submit, and additional requirements are due by 11:59pm Eastern time, April 21, 2021. These are in addition to the previously submitted requirements above:

- public project description (150-word limit)
- team logo
    - accepted formats include gif, jpg, jpeg, png
    - files must be no larger than 10 MB.
- A video of the team's business pitch
    - 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.

- a description of the innovation impact (500-word limit)
    - How does the team's innovation improve the lives of its users and how is it measured?
- a description of the design
    - How technology has been used in the design of the innovation (500-word limit)
    - (optional) description of the user experience of the innovation. (200-word limit)
- a description of the business model
    - How does the model work? How does it include factors/resources for implementation? (500-word limit)
    - (optional) How did feedback from experts and/or users inform the value proposition of the innovation and/or business model? (150-word limit)
- team description (150-word limit)

The following items are optional:

- the team cannot update or refine the answer to the technology question they made in the Executive Summary submitted earlier; the other two answers may be edited, and word counts are expanded to 350 for the problem and solution descriptions.
- up to 1 page (8.5 x 11 or A4) of supplemental documentation; we recommend this is used to illustrate any data, drawings, photographs to help show the design.
- an image of the innovation
  - 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.
- a video to show the design, for example CAD animation or prototype in action
  - Videos may not exceed 0:30 seconds.
  - 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.

4.4   Awards & Judging Logistics

4.4.1 Semi-Finalist Awards

Teams are required to submit the required information by the deadline and participate in an interview with *FIRST* Robotics Competition judges to be eligible for the award and advancement. Interviews are virtual and hosted on Microsoft Teams. A Microsoft Teams account is not required to join the call, but a free account can be used for remote interview practice. See Using Microsoft Teams for instructions. Teams who advance to become a Semi-Finalist in the Innovation Challenge receive both a physical award and designation as a:

- *FIRST* **Innovation Challenge Semi-Finalist**– Semi-Finalists are teams that achieve excellence across all above required criteria as described in the guidelines within a GROUP.

Multiple Semi-Finalists advance from each GROUP. See Section 4.6 Advancement for more details

4.4.2 Judging GROUPS

For the *FIRST* Innovation Challenge, teams are placed 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 compete against each other for judged awards and advancement. 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 (who have submitted for the *FIRST* Innovation Challenge by the deadline) to their GROUP is as follows:

1. Determine initial number of groups by assessing the number of teams who have opted-in to the *FIRST* Innovation 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 fewer than the minimum of 20 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.

4.4.3 Judging Guidelines

The below guidelines are used by judges evaluating the submission for the *FIRST* Innovation Challenge for advancement. Working in a team is a core tenet of *FIRST* and critical for successful innovation, the *FIRST* Innovation Challenge is not designed for individual participants. In each of the criteria, Judges specifically look for:

4.4.3.1 *Problem or Opportunity*

The submission has a clearly outlined problem or opportunity with supporting evidence.

- Evidence could include consultations with experts, data, applicable studies/theories, and /or team conducted user surveys.
- Teams should have a *fully* clear problem or opportunity.
- We recommend evidence be sourced from multiple, reputable sources.

4.4.3.2 *Business Model*

The business model includes a distinct value proposition, the feasibility of the model, and a description of factors/resources for implementation.

- Teams should demonstrate the validation of their value proposition with experts, potential users, or both.
- A specific tool or method to present their business model, such as the business model canvas, is not required.
- Teams should consider a wide variety of factors for implementation and we recommend the consideration of factors be from multiple perspectives.
- Teams may consider creating a full cost and revenue structure.

4.4.3.3 Innovation Impact

Each submission must show, the innovation impact, a deep understanding of how it creates impact by making life better.

- Teams tangibly demonstrate the expected impact of their innovation and how it adds value, either by volume, degree of impact, or both.
- Impact may be demonstrated through surveying, modeling, prototyping, or other methods.
- The impact will be sound and compelling.
- Teams may consider how their impact can be measured initially and/or over time.

4.4.3.4 Design

- The design has effective functionality and is overall comprehensive.
- The design accounts for reliability and user experience
- Teams can explain all underlying science, math, and/or theory in their design.
- Use of technology in the design and/or development process is sound and creative. Teams should use technology in the design process, the development, or throughout the project.
  - The design must be shown to the judges, but how it is shown is at the team's discretion. Teams may draw or use software to show a 2D or 3D representation of their design. A physical model is not required. If built, a photograph or video of it in use will fulfill the showing of the design.
  - Teams may consider building a prototype or have plans on how a prototype would be used to test and refine their design if one cannot be built.
  - Teams may consider incorporating an inclusive, universally accessible design.

4.4.3.5 Business Pitch

The team must present a two (2) minute live business pitch.

- Use of visuals is recommended. We recommend no more than eight (8) slides.
- A video may be a part of your pitch (such as a CAD animation or video of a prototype) but it should not include pre-recorded audio.
- See Section 4.5.1 The Business Pitch (2 min) for recommendations.

4.4.3.6 FIRST Innovation Challenge Emphasis

Team(s) who perform strongly *in each* of the above criteria areas are most likely to advance in the *FIRST* Innovation Challenge. Because learning the innovation process is essential to develop the critical thinking skills and creative problem-solving competencies of our future workforce, judges only look for elements described in Section 4.4.3 Judging Guidelines. Judges are not looking for the next big idea or disruptive innovation, i.e. they are not judging based on their predictive outcomes of your innovation. Although given a GAME CHANGERS[SM] mindset, it's likely that teams develop an idea just as competent as today's top innovators. Whether or not a team's solution is likely to go to market is not considered. What is important is concisely articulating all the outlined requirements.

4.4.4 Judging Process

- Teams must submit all content described in Section 4.3 Submission Information by the deadline as described in Section 1.11 Deadlines.
- Judge Advisors contact teams (via the email they supplied when submitting) to set up an interview with a panel of judges.

4.4.5 Interview Process

Teams who complete the *FIRST* Innovation Challenge submission receive a remote interview with a panel of Judges. We prefer team members presenting information to judging have access to a web camera and be on screen. 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 fifteen (15) minutes total; two (2) minutes for a pitch, three (3) minutes presentation by the team and the remaining time (at least ten (10) minutes) is used for questions and answers led by the Judges.
  - o The interview time begins after a one (1) minute buffer to allow all team members to be on the call
  - o See Section 4.5 Interview Details for details on what to prepare
- Teams are allowed and encouraged 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 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 team members are in the same physical location.

- At least one (1) adult team mentor **must** attend the interview.
  - o 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 improve their solution and skills. If the mentor provides any assistance during the interview, the Judges will respectfully remind the mentor of the rule.
- Interviews are conducted in English. Teams needing a translator or sign-language interpreter may include an additional person to act as that translator/interpreter. The translator/interpreter does not need to be a team member. For these teams, the duration of the interview is increased by three (3) minutes.

- 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.

4.5   Interview Details

4.5.1   The Business Pitch (2 min)

Participating teams receive educational webinars full of advice on the business pitch; participation is highly encouraged. Please see Section 4.9 Content Series – Innovation, Inspiration & Education for more details.

At the Finalist level, *FIRST* Innovation Challenge teams who advance to the *FIRST* Global Innovation Awards receive expert pitch advice from real-world entrepreneurs before their final judging and a 1:1 session with staff from one of the top social impact business incubators.

The pitch communicates the business model and is designed for an external stakeholder audience. Even though teams are delivering it to judges, it should have a compelling tone as is if were being delivered to an external audience, not just a judging panel.

The elements of a strong business pitch typically consist of an introduction of the problem and solution, an explanation of how it works, an overview of any competition for the business (if applicable), progress to date, validation (from experts/partners/data), an ask, and a closing.

We recommend the use of visuals in the pitch, especially if teams are communicating complex ideas or data; however, they are not required. If teams use a slide show, teams should not use more than eight (8) slides. A video may be a part of the pitch (such as a CAD animation or video of a prototype), however because the pitch is live, the video should not have pre-recorded explanative audio.

> It is not appropriate to ask any *FIRST* judges to fund your solution or participate in any online fundraising campaigns. Interested judges may be directed to your team's website or social media account for further information.

4.5.2   Uninterrupted Presentation (3 min)

The presentation is designed to communicate information to the judges on how the innovation matches the criteria. It can be given in any style (i.e. this can be creative and less formal than the pitch), and it should not be pre-recorded. Whereas the pitch focuses on the business model, this presentation should focus on articulating the impact and design of your innovation, as well as how the team used technology in its development and/or design. Teams may use drawings, photographs, CAD animations, model/prototype, or video to assist in this presentation. If teams use a video, it should not take more than 90 seconds and should not have pre-recorded explanative audio.

4.5.3   Judge's Question & Answers (Q&A, 10 min)

Judges use this time to ask questions they may have based on the pitch or presentation. Judges finish each live judging session with the question: Is there anything else you'd like us to know?

4.6   Advancement

The table below shows how many Semi-Finalists are chosen per GROUP depending on the number of teams that applied. Please note if there are fewer than 126 teams who submit for the *FIRST* Innovation Challenge, advancement to the Finalist level occurs directly. Semi-Finalists vie for 20 Finalist spots. Semi-Finalist teams are placed into new GROUPS of approximately 25 teams using the process described in Section 4.4.2 Judging GROUPS. A panel of different judges review these teams' innovation solution submissions; there is no live remote judging at the Semi-Finalist level.

Total Number of Teams	# of Semi-Finalists per GROUP
0 – 125	4 teams receive the *FIRST* Innovation Challenge Semi-Finalist Award and become Finalists
126 - 1000	4
1,001 - 1900	3
1901 - 3000	2

Twenty (20) *FIRST* Robotics Teams are chosen as Finalists and move on to compete at Section 4.7 The *FIRST* Global Innovation Awards power by Star Wars: Force for Change. Finalist teams are expected to continue to iterate and refine their work. The top twenty (20) Finalists are eligible for the Awards described in the *FIRST* Global Innovation Awards section.

4.7   The *FIRST*® Global Innovation Awards powered by *Star Wars: Force for Change*

Advancing *FIRST*® LEGO® League Challenge, *FIRST*® Tech Challenge, and *FIRST*® Robotics Competition teams showcase and celebrate their innovative solutions at the 2021 *FIRST*® Global Innovation Awards held June 28-30, 2021 at a remote event in front of *FIRST* Strategic Partners and a global audience of peers and industry leaders. Teams participate in judging, workshops, expert mentoring, and fun during a 3-day event that culminates in a live Awards Broadcast featuring the work of all Finalist teams. Teams vie for Awards within their own program only, not against teams in other programs.

Past *FIRST* Global Innovation Awards teams have received patents, brought products to market, won pitch competitions, received funding grants and university partnerships, and national press coverage.

Teams who participate are expected to have availability on June 28-30 for the majority of team members to be judged and participate in the remote event should they become one of the 20 Finalist teams. A stable internet connection and device are required for all Finalist team members who advance to the *FIRST* Global Innovation Awards.

4.7.1 *Preparing for the FIRST* Global Innovation Awards

The twenty (20) Finalist *FIRST* Robotics Competition Teams are provided with a separate judging guide to prepare for the *FIRST* Global Innovation Awards; however, the remote judging format follows the same format as the initial judging. Finalist teams should plan on being seen multiple times by judges for a longer duration to allow for longer Q&A.

Finalist teams may have additional non-judged requirements for the *FIRST* Global Innovation Awards, such as submitting materials for remote pits, updating their submission with additional written information and/or an Engineering Change notice to help judges understand the work in advance, and submitting answers to questions in the form of videos or images for use in our social media campaign, etc. A full calendar of due dates for these addition elements is provided to coaches of Finalist teams the third week in May.

Each program recognizes a *FIRST* Global Innovation Awards winner, two (2) runners-up, and one (1) award each for Business Model Design, Innovation Design, and Innovation Impact. The overall winner and the two (2) runners-up for each program are teams that achieve excellence across all criteria as described in the Section 4.4.3 Judging Guidelines.

Awards for Business Model Design, Innovation Design, and Innovation Impact look for particular excellence *just* in those respective criteria described in Section 4.4.3 Judging Guidelines. The overall *FIRST* Global Innovation Award winner and runners-up are determined by judges first and are not eligible for these Awards.

Finalist teams are asked to create a brief (30 second) public pitch for their *FIRST* Innovation Challenge. These pitches are made publicly available and family, fans, and the *FIRST* community can vote on their favorite. Three (3) Community Choice winners are recognized, one (1) from each *FIRST* program. Because this Award is based on a public vote, a team may win the Community Choice Award in addition to another Award at the *FIRST* Global Innovation Awards.

4.7.2 Timeline

- **April 21, 2021:** Deadline for Semi-Finalist teams to submit further requirements. (See Section 4.3 Submission Information)
- **May 7, 2021:** The 20 Finalists from each program for the *FIRST* Global Innovation Awards are chosen on or around this date. Teams should anticipate receiving an e-mail from *FIRST* at this time. In May and June, Finalists continue to iterate and refine their work.
- **June 28-30, 2021:** The 20 Finalist teams should be available for judging, workshops, and mentoring on these days to participate in the *FIRST* Global Innovation Awards remote event. Please note this event typically has a commitment of ~5 hours a day, with plenty of breaks and time of day dependent on time zone. Via our closed App platform, open just to coaches, team members and sponsors, teams also engage in a real-time activity feed and with each other. On June 25th and (the Friday before the event) and throughout, teams are given the opportunity to meet 1:1 or in small groups with other Finalist teams.

4.8   Intellectual Property Protection

FIRST cannot give legal advice. We work in collaboration with the USPTO in order to provide intellectual property education to all students, which is a critical part of innovation. Protecting the idea is an important part of any invention or innovation process. For the 20 teams that reach the Finalist level and advance to the *FIRST* Global Innovation Awards, *FIRST* encourages teams to file a United States provisional patent. Teams can learn more on the patent resource page of the *FIRST* Innovation Challenge webpage.

4.9   Content Series – Innovation, Inspiration & Education

As part of the *FIRST* Innovation Challenge presented by Qualcomm, *FIRST* will host a content series featuring conversations with innovators and essential tips teams can apply to succeed in the challenge.

Topics may include pitch advice, business model education, intellectual property, careers in innovation, product development, using CAD to show design, and more. The series will be a combination of informative webinars and live panel discussions featuring dynamic *FIRST* alumni and experts from our sponsors, allowing teams exclusive access to engage with real-world innovators and entrepreneurs.

Teams may access the content series and additional resources at the Innovation Content Series webpage.