The Rookie Bookie

Presented by:
The Pascack Pi-oneers
FRC Team 1676

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I. Introduction

FIRST stands for For Inspiration and Recognition of Science and Technology. It is a global organization with participation of approximately 100 countries, 615,000 students and over 72,000 teams. It consists of four programs designed for kids from elementary to high school:

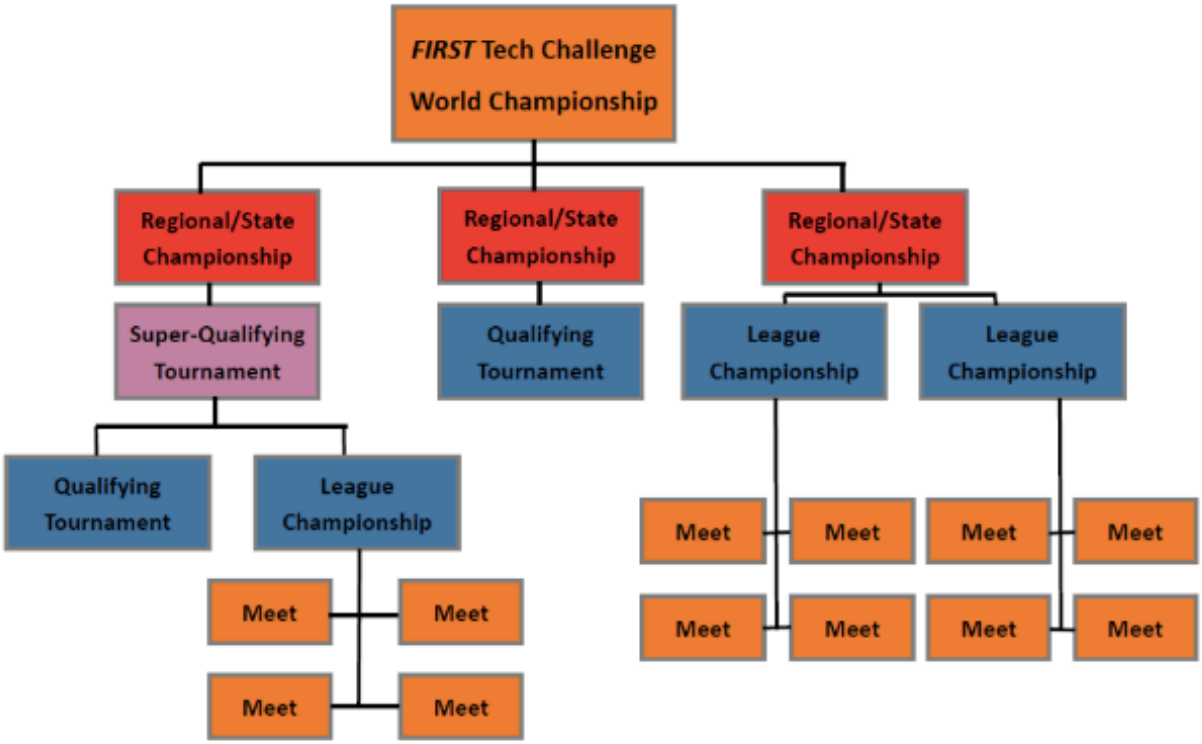
FRC - *FIRST* Robotics Competition - high school students age: 14-18
FTC - *FIRST* Tech Challenge - high school students age: 12-18
FLL - *FIRST* LEGO League - middle school students age: 9-14
FLL Jr. - *FIRST* LEGO League Junior - elementary school students age: 6-10

FIRST enables individual students to thrive in a team setting. Teams build a robot every year to execute a set of challenges set out by *FIRST*. The challenges and size of the robots vary from program to program. For FTC, the robots are 33 by 28 by 55 inches in starting position, and complete tasks on a 8 by 8 foot field. Teams also must create an Engineering Notebook that documents the design process of the robot and their sustainability/business plan.

When is the FTC Season?

Registration opens in May, when teams generally form in preparation for the upcoming season. *FIRST* announces the season's game in September, and teams begin to build their robots. Competition season can begin as early as October, but it typically starts around November and December for qualifying competitions, and higher-level competitions continue into April. After competition season, there are off-season events where teams can strategize, hone their skills, learn new technology, meet other teams, and most importantly- have fun!

FTC Competition Structure



The flowchart above from the *FIRST* website illustrates the various ways teams advance through the competition. Depending on your region, your team's first competition can be a meet, or a qualifying tournament. Some teams advance to league championships by competing at meets while others go straight to a qualifying tournament. Every team that advances from either super-qualifying, qualifying, or league championships have the opportunity to go to a regional/state championship to advance to the World Championship in either Detroit, Michigan or Houston, Texas.

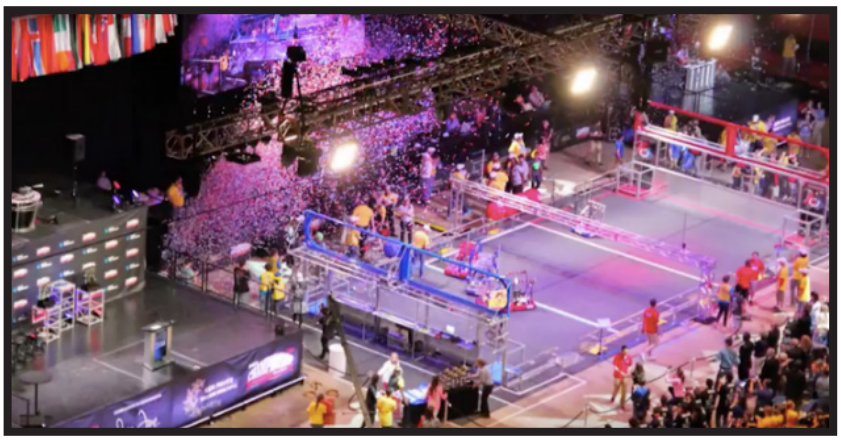


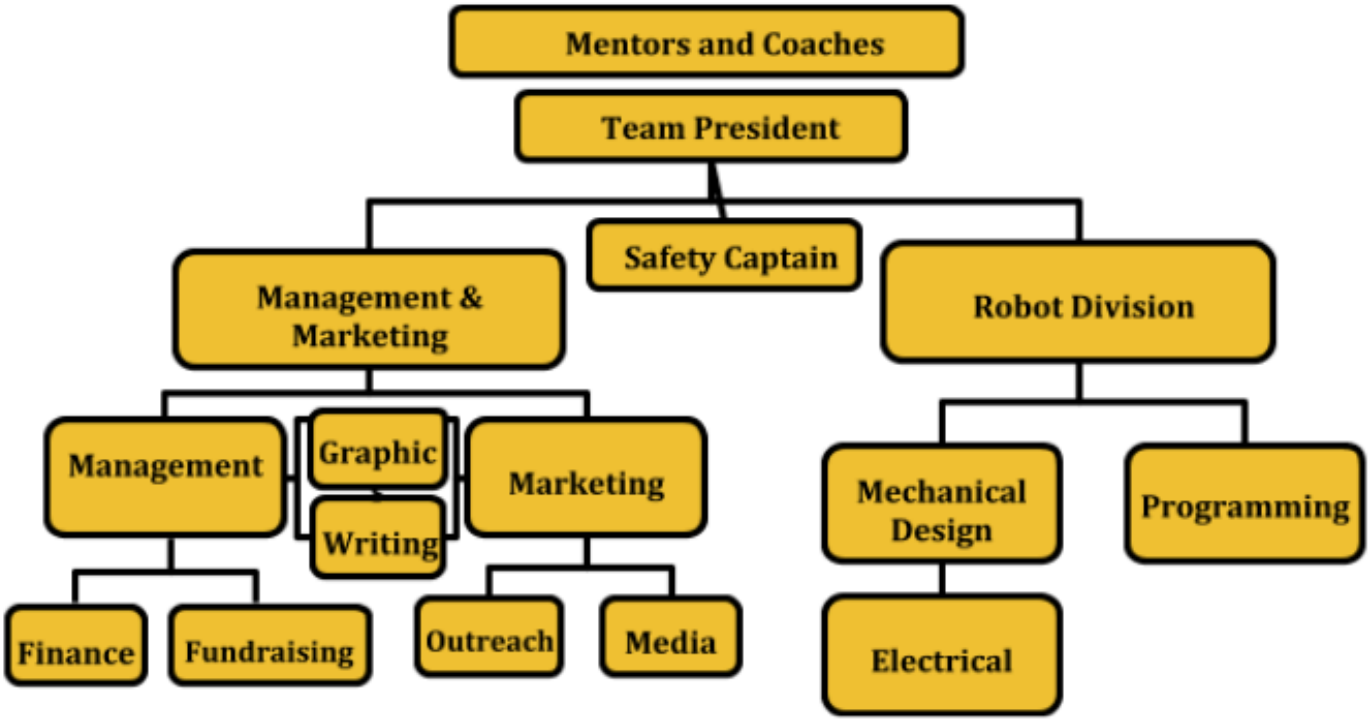
Photo by Team 1676

II.a. Leadership Guide

Team organization is the key to success. As a rookie team, a system of organization is essential for building a strong foundation for the team's future. The establishment of Divisions will allow for an even distribution of work.

Teams can be divided into two Divisions: Robot and Management & Marketing. For each individual Sub-Division, a student leader should be appointed to oversee all aspects and direct team members on their Sub-Division. Depending on the size of your team, you might see it necessary to separate or combine Sub-Divisions, or allow some members to work for more than one Sub-Division.

Sample Leadership Organization



Team President

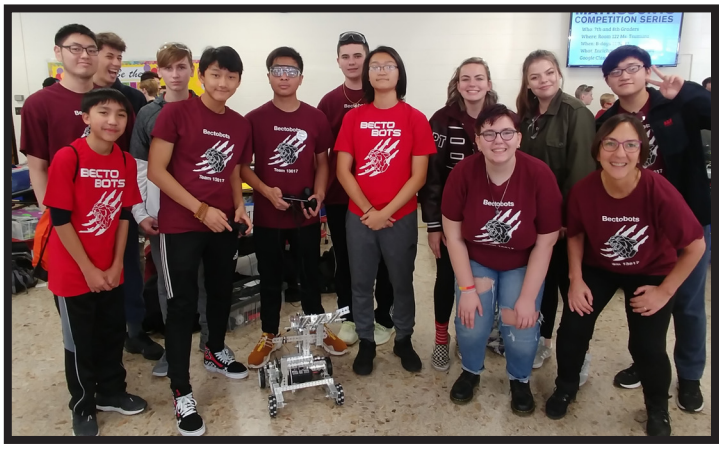
A team President acts as a overarching leader of the team. **This job and its responsibilities should not be passed on to a mentor; a qualified student must be chosen**. This position is vital for maintaining a student-led team. However, the President will partner with the mentors for guidance and assistance. The responsibilities of a President include:

- Organizing & leading team meetings with the mentors and coaches
- Ensuring steady and consistent progress is being made in every Sub-Division
- Acting as a link between Sub-Division leaders and the mentors/coaches
- Keeping students involved with the team
- Dividing work and choosing team Division and Sub-Division leaders

Robot Division

The Robot Division works to create a functional robot that is able to complete the goals presented by *FIRST* in order to perform well at the competition each year. Although it varies by team, at its core, the team only needs two Sub-Divisions for the robot.

- **Mechanical**
  - The Mechanical Sub-Division is responsible for designing the robot, the drive train, the chassis, and any additional parts specific to the game
    An important aspect of being on the Mechanical Sub-Division is wiring the robot, arranging electrical components, and ensuring all the wiring is done correctly. For large teams, Electrical can be its own Sub-Division.
- **Programming**
  - The Programming Sub-Division is responsible for programming the robot in autonomous and teleoperated modes. The code is written in Java using Android Studio. The programs can run through the Dashboard and the Robot Controller apps available on the Android phones from the Kit of Parts



Management & Marketing Division

The Management & Marketing Division is responsible for everything that does not relate to the building of the robot. For larger teams, this can be divided up into Sub-Divisions with individual leaders appointed to each group; for smaller teams, the Management & Marketing Division might have one leader that delegates each of these tasks to individuals or groups. The Management & Marketing Division's responsibilities include:

- **Management**
    - Finance
        - Finance is responsible for management of team funds
        - They organize all receipts/expenses
        - They create the team budget with income/expenses
        - They work with the Writing Sub-Division to apply for grants
        - They work with the Writing Sub-Division to fill out the Business Section of Engineering Notebook
    - Fundraising
        - Fundraising creates fun and interesting events to raise money for the team
            - Organize bake sales, car washes, sell spirit wear or any other type of event your team thinks of- be creative!
- **Marketing**
    - Outreach
        - Outreach arranges new, fun events that incorporate STEAM (Science, Technology, Engineering, Art, & Math) into the community and spread *FIRST*
    - Media
        - Media photographs all team events, regular team meetings, and progress of the robot
        - They create and uphold all social media platforms for the team by consistently posting about team activities and the events they are holding
        - They create video submissions for the Promote Award, and also create a record of team activities
        - They can create a website for the team
- **Graphic Design**
    - Graphic design creates a team shirt, team buttons, and a team logo
    - They help with the design and layout of the Engineering Notebook
    - They create brochures and handouts for the team

- Writing
    - Writers are responsible for the Team section and the Business section of the Engineering Notebook
    - Responsible for managing daily log of the Engineering Notebook
    - They create and write any team handout materials

Safety Captain

The Safety Captain is responsible for creating procedures and protocols to ensure the safety of everyone on the team, including:

- Establishing tool qualification testing, overseeing tool qualifications, and ensuring tool safety is enforced while working
- Establishing and maintaining safety rules during Build Season, Competition Season, and travel
    - Some example rules include:
        - Wear closed-toe shoes when in build area
        - Keep hair tied back when working on robot and with tools
        - Wear safety glasses in build area
        - Know of an emergency meeting place at all competitions and events
        - Have emergency contact information at all competitions
- Creating an injury plan (a plan that outlines what to do in case of an injury/emergency)
- Maintaining a first aid kit, understanding how to use it, ensuring all team members know its location
- Maintaining and upholding the 5S's of Safety. These are measures set in place to keep the workplace organized and efficient. The 5S's are:
    - Standardize
    - Shine
    - Store
    - Sustain
    - Set in order
    - https://www.ehstoday.com/safety/5s-workplaces-when-safety-and-lean-meet

II.b. Mentor Requirements

According to *FIRST*, "In *FIRST* Tech Challenge, it is important that mentors and students are equal and that the relationship is a partnership. Mentors should be willing to acquire some basic knowledge of programming and robot building. *FIRST* strongly encourages teams to invite people with backgrounds in engineering and programming to share their knowledge and experience."

- ***FIRST* Responsibilities**:
    - Create a *FIRST* account for your team
    - Create a Team Profile
    - Complete Youth Protection Screening (US/Canada Lead Coach/Mentors only)
    - Invite Team Members to "Join Team" through *FIRST* website
    - Register the team for the season
    - Register for local events
    - Find a build space and a place to store team materials
    - Purchase a Kit of Parts
        - An electronics kit, a control/communication kit, and a competition kit

- **Team responsibilities**:
    - Have basic building materials
        - Allen set
        - Deburring tool
        - Dremel tool or disk sander
        - Hex keys
        - Hand drills
        - Metal file
        - Pliers
        - Small screwdrivers
        - Wrench metric and SAE set
        - Zip ties
    - Electronics
        - Laptop to run your development tool
        - At least one power strip
        - An extension cord (optional)

- **Team Meetings**:
  - Create a meeting schedule & timeline for team goals
  - Facilitate team problem solving and brainstorming
  - Keep the team goal oriented
  - Ensure students develop mechanical skills without completing tasks for them
  - Work with the team's Safety Captain to maintain safety standards

II.c. Recruitment

Recruitment is a key part of maintaining a successful and sustainable team. There are many ways to inspire enthusiasm and accumulate members through your school and community:

- Present to your school's science/math classes
- Hold interest meetings before or after school
- Stress the benefits of engaging students in STEAM/*FIRST*
- Reach younger students that will look forward to joining the team
- Promote team through community events
- Create a recruitment flyer and distribute it throughout your school
- Place an ad in the local newspaper about your team

II.d. Engineering Notebook

According to *FIRST*, the Engineering Notebook documents "...the team's robot design and records the time spent doing research, outreach, team meetings, and plans for growth. This notebook includes the phases of the problem definition, concept design, system-level design, detailed design, test and verification, and production of the robot. These notebooks track a team from the beginning of the season and throughout the competition season. Judges review a team's engineering notebook to better understand the journey, design, and team as a whole."

View *FIRST*'s guidelines for the FTC Engineering Notebook here: https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/engineering-notebook-guidelines.pdf

The submission of The Engineering Notebook is a requirement for all FTC teams. It must be brought to all competitions. The Engineering Notebook must include:

- Sketches and explanations of all robot designs, team logos, parts, software updates, etc.
- Notes on discussions at team meetings, including team members' thoughts
- Dates on all pages
- Processes and obstacles of robot/team and their solutions/results

Format

Teams must have one or two binders no thicker than three inches. The notebook can be in an electronic or handwritten format:

- Electronic: must be printed and inserted into a binder, on front and back of each page
- Handwritten: spiral-bound, laboratory or documentation notebooks, must be in ink
  - To insert pictures or outside information into the notebook, tape the picture into the notebook and outline with permanent ink, to note that it was there in case it falls out. Put the corresponding page number on that inserted page
  - If there is an error, draw a single line through the incorrect data. Do NOT erase or use correction fluid. All corrections should be initialed and dated.

1. Front Cover

- Front cover must have:
  - Official team name and number
  - Name of school/address of team meeting place
  - Team logo (if available)
  - Optional: Use team colors
  - Optional: Use FTC logo
- One page summary on inside front cover
  - Concise version of your team's history
  - Bulleted highlights of your team's season
  - Team number
  - A Table of Contents with page numbers
  - List of pages your team would like judges to consider

2. Team Section

The Team Section allows the judges to get to know your team's story.

- **About Your Team**:
  - How, why, and when was your team created?
    - How was the team initiated?
    - Introduce each member of your team (no last names) with their position, grade, and how many years on the team
    - Explain what inspired people to initiate a team
    - Explain the story behind your team's name, logo, and colors
    - Include a timeline of your team's development since its creation
    - Discuss original sponsors
  - What is your team's mission?
    - Compose your team's mission statement
  - How are your team members benefiting from being a part of the team?
    - Some benefits might include learning STEAM skills, presentation skills, teamwork, leadership skills, management experience, andreal-life skills for college and employment
  - What are your team's goals?
    - Provide a plan for how your team will grow and develop in the next three years
  - How do you divide work within your team?
    - Include a team's leadership chart with the first names of your current team leaders, and explain the responsibilities of each Division and Sub-Division
  - What are your team's statistics?
    - Number of members on your team yearly
    - Grade-level distribution
    - Percentage of males/females
    - Graduation rate
    - Percentage of students that pursue STEAM in college/career

- **Outreach**
  - Community Outreach
    - Your team's impact on increasing STEAM/*FIRST* interest within your community
    - Events your team has done to contribute to the community
    - Include dates, times, flyers, and photos from your events
  - School Outreach
    - Recruitment of new members
    - Partnerships with other school clubs
    - Support from the school administration/Board of Education
  - *FIRST* Outreach
    - Team partnerships/collaborations
    - Team mentorships
    - Starting new teams
    - Include dates, times, and photos
    - Include letters/emails of communication and recognition

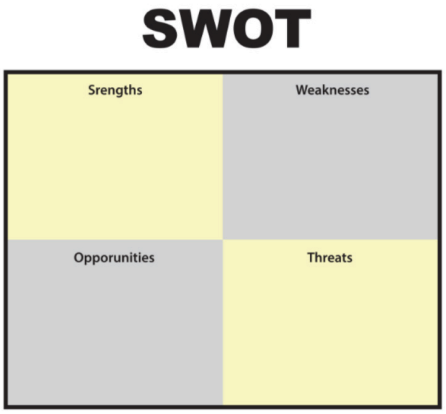
3. **Business Section**:

   According to *FIRST*, "The Business Plan can act as the backbone and guiding force for your team. This is a living document and may change based on challenges that may arise through the season, lessons learned, or new opportunities. Plan on revisiting this document a few times throughout the season to see if your team is on track of if a new direction is being taken, and modify your Business Plan accordingly."

The business section creates a detailed plan of how your team acquires/ manages resources and how these resources are sustained.
Sections to include are:

- **Finance**
  - Fundraising
    - Your team's fundraising efforts
    - Photos, Videos, Event flyers from fundraising efforts
    - Mention lessons learned from each effort - Was it worth the effort? How can it be improved? What went well?
    - Chart of revenue from each individual event
  - Sponsorship
    - Outreach
      - For example: Presentations to local businesses, school administration/Board of Education, community events
    - How did you relay information to potential sponsors?
    - What was successful, what was not, what did you learn?
    - Chart of all sponsors and their donations
  - Team Budget
    - Chart
      - Income: includes sponsorships, school support, and fundraising
      - Expenses: amount spent on supplies, parts, competition fees, travel, etc.
- **Sustainability**
  - Recruitment
    - What methods does your team use to recruit members?
    - How successful/unsuccessful have your recruitment efforts been?
    - How do you recruit new mentors?
  - Training Team members
    - What is your process to train members?
      - For example: do you hold training sessions?

- **SWOT Chart**
  - Analyzes Strengths, Weaknesses, Opportunities, and Threats
    - Strengths: positive aspects of a team
    - Weaknesses: areas for improvement
    - Opportunities: ways to overcome a weakness/threat
    - Threats: potential unfavorable situations



4. **Engineering Section**:

The Engineering Section documents the team's robot design and records the time spent on research, outreach, team meetings, and plans for growth. This documentation should include:

- Meeting Log
  - Dates and times of every meeting
  - Each page must be initialed by person logging information
  - All plans made and all ideas discussed at the meeting
    - Each meeting should be a new page, regardless if the previous page was filled or not
- Design Process
  - Show all prototypes, sketches, and initial designs of your robot
  - Explain the process of your robot's development throughout the season
  - Document all failures and obstacles you encountered
  - Discuss software development
  - Don't forget to mention how the robot changed during your competition season

- Strategic Design
  - How does the design of your the robot specifically relate to the robot challenges?
    - Explain in detail how each portion of your robot completes each task and why it is the most effective way to complete them
    - Include the process of how you came to the most effective way
- Final Product
  - Explain the function of all the elements in your robot
  - Discuss all the programs and sensors on your robot, and any changes during competition season

Engineering Notebook Questions

Your team journey goes beyond logging the day-to-day “here’s what we did” or “we met today.”

When logging entries make sure to answer:

- What is the agenda today and what are your goals?
- What decisions did your team make in forming the team, creating the robot, writing the program, the outreach projects, etc.?
- Why was it the logical choice? (Built specific robot element, coded the software that way, chose that group of individuals to outreach to, etc.?
- How did the decision impact your team, robot, or community?
- What is the next step?

Presentation Structure for Competition

All teams must present to judges. The entire team should be in the room, but the maximum is 15 people. If your team is larger than 15 people, choose the 15 most involved members. Talk about team highlights (both Non-robot and Robot). We recommend using the Engineering Notebook as a guideline.

1. Each team will be automatically assigned a 10-minute time slot
2. 4-5 min Presentation
    a. Take both the robot and the Engineering Notebook/s into the room with your team.
        i. You can give the Engineering Notebook to the judges or hold it, but the robot will be stationary on the table
    b. All team members in the room must be knowledgeable about all topics, but only speak about the ones they directly contributed to.
    c. Suggested flow of presentation (Should be practiced and order should be pre-set):
        i. Team Introduction
            1. Team history and origin
            2. Team organization
        ii. Robot
            1. Discuss the key features that make your robot special. You can also discuss an obstacle your team struggled with and then overcame.
        iii. Engineering Notebook
            1. Present your sketches, explain how your design developed over the course of the meetings, and explain the strategy behind the design..
        iv. Business and Sustainability
            1. Discuss highlights of your sustainability and business plan, such as sponsors, member recruitment, unique fundraising, or specific aspects of the plan that sets you apart from other teams.
        v. Outreach/Other
            1. Mention your team's community outreach or impact on the community.
3. 5 min Q&A
    a. Judges will end your session with a 5 minute Questions & Answer
        i. If they have more questions about your team, they will come to your pit

FTC Awards:

- **Individual**
  - **Dean's List**: two 10th or 11th grade students that are selected as model student leaders. This award is given to a student who has "led their teams and communities to increased awareness for *FIRST* and its mission."
  - **Compass Award**: Students may create a one minute video highlighting the mentor they nominated for the Compass Award. This award is given to a mentor that is "a beacon and leader in the journey of *FIRST* Tech Challenge."
- **Team**
  - **Robot**
    - **Rockwell Collins Design Award**: Given to the team with the most creative and innovative robot design. To win, teams should also have a detailed summary on how they arrived to their final robot and an explanation on how their robot was strategically designed.
    - **Think Award**: Given to a team that used science and mathematics to plan their robot design and described it in their engineering notebook. It must show a clear understanding of the design process.
    - **Design Award**: Awarded to a team with a functional and aesthetic robot, and a detailed design process, including drawings and sketches, in their engineering notebook.
    - **Control Award**: The Control Award celebrates a Team that uses sensors and software to increase the Robot's functionality on the field. This award is given to the Team that demonstrates innovative thinking in the control system to solve game challenges such as autonomous operation, improving mechanical systems with intelligent control, or using sensors to achieve better results on the field. The control component should work consistently on the field. The Team's Engineering Notebook must contain details about the implementation of the software, sensors, and mechanical control.

- **Non-robot**
  - **Connect Award**: This is awarded to a team that connects with professionals in the STEM field, as well as having a detailed Business section in their engineering notebook.
  - **Motivate Award**: This team embraces the culture of *FIRST* and clearly demonstrates what it means to be a team. This judged award celebrates the team that represents the essence of the *FIRST* Tech Challenge competition through team building, team spirit and displayed enthusiasm. This is a team who makes a collective effort to make *FIRST* known throughout their school and community, and sparks others to embrace the culture of *FIRST*.
  - **Promote Award**: The Promote Award is given to the team that is most successful in creating a compelling video message for the public designed to change our culture and celebrate science, technology, engineering and math. Teams must submit a one-minute long public service announcement (PSA) video based on the PSA subject for the season. The video must follow all the guidelines posted on the *FIRST* website. This award is only offered at some competitions, so research if you are going to a competition that is accepting submissions.
- **Robot and Non-Robot**
  - **Inspire Award**: This judged award is given to the team that embodies the challenge' of the *FIRST* Tech Challenge program. The team that receives this award is a strong ambassador for FIRST programs and a role model *FIRST* team. This team is a top contender for many other judged awards and is a "gracious" competitor. The Inspire Award winner is an inspiration to other teams, acting with Gracious Professionalism® both on and off the playing field. This team shares their experiences, enthusiasm, and knowledge with other teams, sponsors, their community, and the Judges. Working as a unit, this team will have showed success in performing the task of designing and building a robot.

- **Judges Award**: This award is up to the judges' discretion and can be given to any team, for any reason that warrants an award; it could be anything from an exemplary engineering notebook, to outreach, to strategic robot.

III.Finance

Grants

Grants are sums of money donated by corporations, governments, or other large organizations. They are especially useful for teams that need funding to sustain themselves before they begin gaining sponsors. There are grants available through *FIRST* and outside of *FIRST* for rookie teams. If your team is school-based, you can begin by researching grants for afterschool programs. Grants require filling out a form that describes the purpose of the funding. These are the typical requirements and responses:

- **Program Description**:
  - Try to tailor your point of view to the specific type of grant you are applying for (i.e. green initiative, healthy living, STEAM, etc.). Some grants have character limits, therefore you need to be concise and impress them with as few words as possible. Be sure to describe the *FIRST* program, as well as your specific team.
- **Biggest Budget Line Item(s)**:
  - Ex: travel expenses, robot expenses, tools
- **Other Funding Sources**:
  - Provide any additional sources of revenue in list format
- **Program Impact**:
  - Provide a short paragraph or two describing your program's effect on team members, statistics measuring the success of your program, and the short/long-term results you are aiming for.
- **Budget Overview**:
  - Here, you should state the cost to run your team annually, and your intentions for the money you are requesting. Insert a sentence or two to provide specifics on how their money will play into your overall budget.
- **How They Will be Recognized as a Sponsor**:
  - Assure them that your team will feature their name on your team shirt, robot side plates, team website, or elsewhere, based on the amount of money they donate.

- **Additional Comments**:
    - Occasionally, they will offer space to include any additional information that you feel would sway them that did not fit into any of the above categories. Examples include outreach, brochures in PDF and word document format.

Fundraising Efforts

To procure funds for the team and to help offset expenses, it is important to host various fundraising events, such as car washes, bake sales, and community events.

- **Bake sales**:
  1. Get school permission– request a day and a time slot
  2. Assign one mentor to supervise and one student Project Manager to take charge
     a. Send out a team email asking for donations of baked goods from students and parents
     b. Choose/Designate 5-6 student volunteers to work the bake sale
     c. Collect necessary materials (tables, napkins, money box, etc.)
  3. Advertise- make an announcement, send out an email, hang flyers before the bake sale
- **Restaurant Sponsored Events**:
  1. Check restaurant website for fundraising program
  2. Contact the restaurant manager about hosting a fundraising event
     a. Typically, teams receive 15-20% of profit from customers who present the event flyer (which is provided by the team and can be downloaded)
  3. Choose a date and time window
  4. Advertise your event
     a. Before: Post on social media, send throughout your school district, and hang flyers
     b. Contact the local newspaper about the event, if possible
     c. Send email reminders to team members and families two days in advance

- **Donations**

  Bring a donation jar to every team event. Be sure you know exactly what you are going to do with the money raised, to assure your donors that their contribution is going toward a good cause. Are they going to be used to buy your team t-shirts? Are they going to be used to support your trip to the World Championship? Have a plan!

- **School Support**

  It is helpful to establish a strong relationship with your school administration. To ensure school support from the beginning, meet with the administration of your school to explain the goals and what you would need to be successful, such as:

  - Workspace
  - Teacher mentors/coaches
  - A stipend for the coaches
  - Sponsorship

After the initial meeting, maintain and develop your relationship with your school district. Volunteer to participate in school events such as back-to-school nights, orientation for incoming students, and any others your school might host.

IV.a. Outreach

What is Outreach?

Outreach is your team's opportunity to bring the message of STEAM and *FIRST* to your community, school, and beyond. It can be as simple as taking your robot to community events and telling others about your team, or as complex as multi-year projects.

Finding events to participate in:

Check your town calendar/website and local online news outlets

- Parades, town days, community events, and charity events are held in most towns.
- To participate, contact your city/borough/town hall, and they will direct you to the right person.

Project and event creation:

1. Determine Purpose of Event
    a. Promoting *FIRST*, Fundraising, Recruitment, Spreading STEAM, etc.
2. Hold brainstorming sessions with entire team
3. Assign a student Project Manager for each event
    a. A Project Manager will facilitate organization and proper planning, a successful event. A Project Manager is a student who is responsible for the overall event, and designates specific tasks.

IV.b. Project Manager Guide

Outline For Project Manager

What are a project manager's duties?

- Plan projects and execute them
- Assist with gathering resources for the project
- Ensure that all delegated assignments and projects are being completed and progressing as planned
- Calculate a reasonable budget for each project

What qualities do project managers need?

- Efficient time and task management
- Strong leadership
- Ability to communicate and collaborate with others
- Flexibility/ability to perform all roles
- Work under pressure

What are the stages of planning an event?

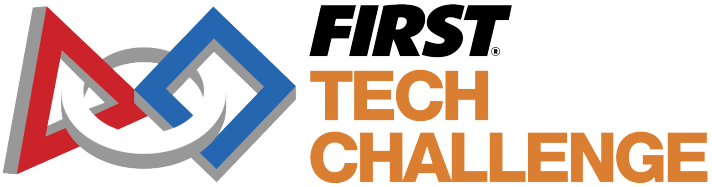
- Find a location
- Determine a time
- Who are your attendees?
- PR Materials
    - Flyers
    - Newspaper
    - Email sent out to community, team parents, schools
- Decide which teammates will be there to work the event
- Make a packing list
    - Cash box to make change if needed
    - Other items you may need to bring include: team shirts, your robot for a demonstration, team flyers, donation jar, information about *FIRST*
- Appoint a set-up crew and clean-up crew

Who are the Pascack Pi-oneers?

FIRST Robotics Competition Team 1676, The Pascack Pi-oneers, was established during the 2004-2005 season in Montvale, New Jersey. Team 1676 created this guide to help rookie teams learn to operate cohesively and and become self-sufficient.

If your team has any questions or concerns, please reach out!

FRC Team 1676:
www.team1676.com
Twitter: @FRCTeam1676
Twitter: The Arts in STEAM:
@theARTSinSTEAM
Facebook: FRC Team 1676
Instagram: @frcteam1676



www.firstinspires.org

For more information please contact:

The Pascack Pi-oneers, *FIRST* Robotics Competition Team 1676

The 2017 *FIRST* World Champions

www.team1676.com