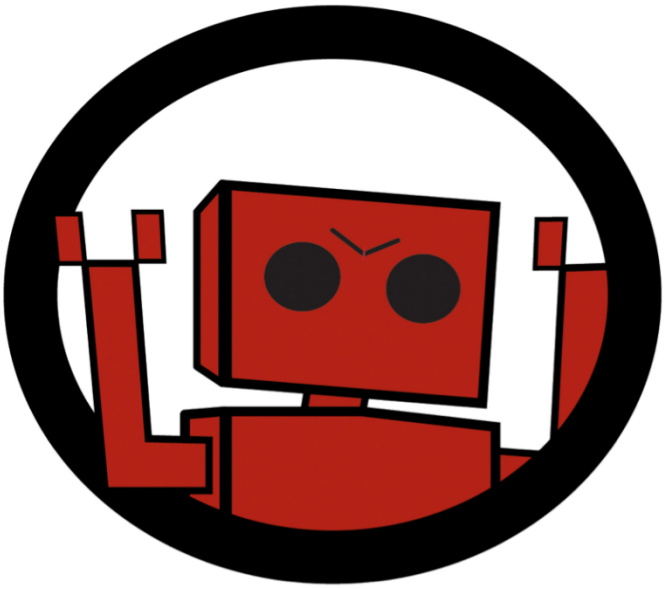
Mountaineer Area RoboticS

MARS 2614



2018 - 2019 Business Plan

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1. Executive Summary

Mountaineer Area RoboticS (MARS), FIRST® Team 2614, was founded in 2008 by five student members of a former three-time West Virginia (WV) state champion FIRST LEGO® League (FLL) team to continue the exploration of Science, Technology, Engineering, and Mathematics (STEM) education after moving on to their high school careers. MARS participates in robotics competitions under the umbrella organization, For Inspiration and Recognition of Science and Technology (FIRST), which was founded in 1989 to inspire young minds to participate in science and technology, while building both professional and life skills, promoting self-confidence, and increasing knowledge. FIRST provides programs for youth in grades K through 12. MARS competes in the FIRST Robotics Competition (FRC), which serves students in grades 9 - 12 and between the ages of 14 - 18. In addition, MARS sponsors and mentors teams in FIRST Tech Challenge (FTC), for students between the ages of 12-18, FIRST LEGO League (FLL), which serves students between the ages of 9 - 14; and teams in FLL Jr., which runs from ages 6 - 9.

The MARS program consists of youth from north-central West Virginia who dedicate themselves to a rapidly expanding, statewide robotics network. Through close partnerships with West Virginia University, NASA's IV&V Facility, 4-H, local school systems, and numerous corporate sponsors, MARS is providing engaging, educational opportunities and services to youth throughout the state. Since inception, MARS members have received many accolades, winning a variety of awards and earning berths to the FIRST World Championship nine out of ten years. In 2017, MARS won the World Chairman's Award, becoming a part of the FIRST Hall of Fame and securing a place at the World Championship indefinitely. Using robotics as a foundation, MARS encourages West Virginian students to pursue post-secondary education. Maintaining this mission is important because currently only ~20% of West Virginia high school students will earn an associate or baccalaureate college degree. This is considerably less than the West Virginia average of 26.5%. The team is extremely proud that 100% of MARS graduates have gone on to pursue college careers, many with a full or partial scholarship. The following pages will detail the MARS team history, mission and objectives, business strategy and goals, and an internal and external risk assessment for the year of 2019.

1.1 Legal Entity

MARS is a 501(c)(3) nonprofit organization offering sponsoring organizations the ability to make tax-deductible contributions to the team. Below is a list of the board members for Mountaineer Area RoboticS (MARS):

Chairman – Dr. Earl Scime
Vice Chairman – Steve Raque
Secretary/Treasurer – Ryan Utzman
Board Member – Herb Baker
Board Member – Mark Lusk
Board Member – Mark Tennant
Board Member – Sharda Mohammed
Board Member – Dr. Todd Hamrick

2. Strategic Focus

2.1 Vision

MARS strives to provide a purpose-driven, creative outlet for its students through FRC, while inspiring a change of culture in rural communities through outreach with FIRST and STEM programs.

2.2 Mission

By utilizing STEM programs through the MARS Plan, it is the mission of MARS to inspire youth in rural and underserved areas in West Virginia and around the world to pursue their creative and intellectual passions. MARS does this through community outreach and development of technical programs designed to instill superior practical life skills in students, including:

- Gracious Professionalism®.

- Teamwork.
- Leadership.
- Coopertition®.

MARS members also develop exceptional personal productivity skills such as:

- A strong work ethic.
- Time management techniques.
- Superior dedication and commitment to team and community.
- Highly developed organizational skills.

2.3 Diversity, Equity, and Inclusion Statement

MARS welcomes all people without regard to race, ethnicity, religion, national origin, sex, gender identity, sexual orientation, color ancestry, abilities, economic or family status, life situation, veteran status, or philosophy. We strive to be an inclusive environment for all individuals by advocating for and providing equal treatment to all.

2.4 Governing Values

The following are the values that form the culture and fabric of MARS. Team members and mentors are expected to display these values at all times as representatives of both FIRST and MARS.

- ***Self-Management*** - This is the team's primary governing value: all members (students and mentors alike) are expected to be in the right place, at the right time, with the right equipment, and the right attitude for the activity in question.
- ***Knowledge*** - MARS team members are expected to be familiar with all aspects of the MARS organization and its operations including: fundraising, community outreach, business planning, and technical expertise.
- ***Excellence*** - Team members are expected to complete tasks on time with a superior level of quality and workmanship. Everything the team produces is of high quality and contributes to the team’s ability to represent the FIRST community.

- ***Initiative*** - Team members can be relied upon to stay on task when supervision is absent. They can be relied upon to recognize work that needs to be done and complete unfinished tasks on their own initiative.
- ***Drive*** – Team members are often compelled by an inner force to succeed and achieve their highest potential.
- ***Courage*** – This is where self-confidence meets enthusiasm. MARS students are bold enough to explore new avenues, take risks, think outside the box and develop new solutions.
- ***Dedication*** – Students must have a willingness to pledge their time, skills, and labor to MARS during both the peak build season and the off-season.
- ***Safety –*** Students are expected to maintain a constant safe workplace and state of mind when participating in all events, competitions, and practices.
- ***Gracious Professionalism®*** - (a registered trademark of FIRST) Utilizing Gracious Professionalism, MARS encourages high-quality work, emphasizes the value of others, and respects individuals in their community. This is a vital skill in today's workforce.
- ***Coopertition®*** - (a registered trademark of FIRST) Coopertition is the concept and philosophy that members of any organization can and should help and cooperate with each other even in the face of competition. MARS excels in this through the utilization of Tucker Teams at competitions, which are explained in Section 3.4.5.

2.5 Keys to Success

In order to execute the MARS vision and mission statements, MARS considers the following to be essential keys to success for the program:

- ***Increasing the awareness of FIRST throughout the world*** - Increasing the recognition of FIRST throughout West Virginia and the world is vital to the success of youth. Consequently, it is important to increase awareness among community businesses and institutions, to build appreciation for FIRST and make it easier for MARS to garner local support for its activities.

- ***Cultivating Strong Leadership*** - To manage MARS, the program needs a strong student workforce and adult leadership team to ensure that the group is meeting its mission. By pulling from schools all over North-Central West Virginia, MARS encourages a variety of youth to get involved. MARS also maintains a steady alumni force who are able to mentor younger students and ensure continuation of the team's governing values. This leadership cultivation is the group's most vital key to success.
- ***Maintaining Adequate Funding*** - Competing in FIRST is an expensive proposition. MARS operates on a budget of about $80,000 per year. These funds provide year-round educational opportunities for team members, mentoring for other robotics programs, and community outreach activities (34 in 2018). Given these significant costs, adequate funding through sponsors, grants, and fundraising activities are equally as important as the group's workforce.
- ***Assisting in the Development of Robotics Programs Throughout the State*** - By sponsoring and mentoring teams from elementary, middle, and high school levels, MARS works to actively encourage and develop promising talent in these students. This allows students to strive for better opportunities after high school graduation.
- ***Being Successful in FRC Competitions*** – MARS gains respect and recognition through its strong competition presence. This success helps the team maintain its credibility as a mentor to other teams, as well as attract and retain adequate funding and sponsors.
- ***Equipping Students in WV with Experience*** - MARS teaches youth a variety of technical and personal development skills that motivate members to seek education past high school. In addition, sponsors and partners such as West Virginia University and NASA's IV&V Facility recognize the efforts made by these students and often aid them in entering post-secondary education.

2.6 Goals & Objectives

MARS is continually growing and evolving. Each year goals and objectives change slightly to reflect the team's transformation. To successfully attain these objectives, considerable forethought and preparation are essential. MARS makes goal adjustments each year. In 2016, following the new team structure plan (see Section 3.4.6), MARS created individual outreach Taskforce goals. This past year, the FTC and VEX Taskforces were combined due to the

similarity of programs. Also during 2016, MARS decided to change the previous five-year goal plan to a three-year goal plan. This allows goal formation to accommodate the four year student turnover and the team's frequent formation of new partnerships and initiatives. Below is the list of MARS' overall team objectives, as well as task force objectives for the next three years.

2.6.1 Overall Team Goals

Year One Goals (Ending in 2019)

- Establish at least one new high school robotics team in WV.
- Support or sustain new robotics teams in our area.
- Identify possible grants to increase annual revenue to levels capable of supporting international operations.
- Increase fundraising by 5%.
- Partner with sponsors to maintain current internships and develop one additional internship opportunity.
- Encourage and provide information for participation in the FIRST scholarship application program by December 1st.
- Maintain a 95% post-secondary education attendance rate.

Year Two Goals (FY Ending in 2020)

- Establish at least one new high school robotics team in WV.
- Support or sustain new robotics teams in our area.
- Increase funding by 5%.
- Encourage and provide information for participation in the FIRST scholarship application program by December 1st.
- Maintain a 95% post-secondary education attendance rate.
- Partner with sponsors to maintain current internships and develop one additional STEM internship opportunity.

Year Three Goals (FY Ending in 2021)

- Maintain a 95% post-secondary education attendance rate.
- Support or sustain new robotics teams in our area.

- Increase funding by 5%.
- Establish at least one new high school robotics program in WV.
- Encourage and provide information for participation in the FIRST scholarship application program by December 1st.
- Maintain current internships and develop one additional internship opportunity.

2.5.2 Individual Task Force Goals

FLL Jr. Taskforce:

Year 1 goals include:

- Send in FLL Jr. Taskforce members to help teams at local elementary schools.
- Establish pre-competition informal scrimmage for show-and-tell between teams to allow them to assist each other with new ideas and grow their own ideas.
- Increase presence of FLL Jr. teams at MARS hosted events.
- Encourage more interaction between FLL Jr. teams.
- Add small trophies to MARS FLL Jr. Expos.
- Send out a survey to coaches and team members post season to allow for modifications to current system of operations.
- Connect FLL teams with FLL Jr. teams for mentoring and team support.

Year 2 goals include:

- Improve competitions based on survey results.
- Connect FLL Jr. teams to assist one another with ideas and goals.
- Send out a survey to coaches and team members post season to allow for modifications to current system of operations.
- Reach out for opportunities for expanding FLL Jr. in elementary school curriculum.
- Expand connections between FLL and FLL Jr. teams.

Year 3 goals include:

- Improve competitions based on survey results.
- Connect FLL Jr. teams to assist one another with ideas and goals.

- Send out a survey to coaches and team members post season to allow for modifications to current system of operations.
- Reach out for opportunities for expanding FLL Jr. in elementary school curriculum.
- Expand connection between FLL and FLL Jr. teams.
- Grown upon our pre-competition informal scrimmage.

FLL Taskforce:

Year 1 goals include:

- Continue to support FLL teams by providing bi-weekly mentoring sessions and connecting them with MARS student mentors.
- Increase publicity for bi-weekly mentoring sessions.
- Continue FLL growth within WV through the NASA partnership.
- Assist in holding the 2019 biannual FLL Mountain State Invitational.
- Volunteer as referees and judges at multiple qualifiers and the state tournament.
- Invite local legislators and the WV Governor to MARS FLL events and state tournament.
- Advocate for the introduction of FLL-based curriculum into Monongalia County middle schools in partnership with NASA's IV&V Facility.
- Continue support of FLL teams at the WV School for the Deaf and the Blind.

Year 2 goals include:

- Continue support of state FLL network through funding and mentoring teams.
- Volunteer as referees and judges at multiple qualifiers and the state tournament.
- Improve the advertisement of bi-weekly FLL mentoring sessions, especially to new teams.
- Invite local legislators and the WV Governor to MARS FLL events and state tournament.
- Improve outreach plans to assist the growth of the program.
- Advocate for the introduction of FLL-based curriculum into Monongalia County middle schools in partnership with NASA's IV&V Facility.
- Enhance advertising campaign to spark interest in and grow state FLL.

- Continue state growth through the NASA partnership.
- Assist in holding the 2019 Mountain State Invitational.
- Continue to support advancement in school curriculum based on FLL values.
- Continue support of FLL teams in the WV School for the Deaf and the Blind.

Year 3 goals include:

- Continue support of state FLL network through funding and mentoring teams.
- Volunteer as referees and judges at several qualifiers and the state tournament.
- Invite local legislators and the WV Governor to MARS FLL events and state tournament.
- Improve outreach plans to assist the growth of the program.
- Advocate for the introduction of FLL-based curriculum into Monongalia County middle schools in partnership with NASA's IV&V Facility.
- Continue to support advancement in school curriculum based on FLL values.
- Continue support of FLL teams in the WV School for the Deaf and the Blind.
- Enhance advertising campaign to spark interest in and grow state FLL.
- Continue state growth through the NASA partnership.
- Assist in holding the 2021 biannual FLL Mountain State Invitational.

FTC/VEX Taskforce:

Year 1 goals include:

- Work with NASA to volunteer and host VEX/FTC Events, specifically the state tournaments.
- Set up FTC field at the MARS practice building and send an email to teams making sure that they know it is available for use.
- Send an email to VEX/FTC teams in West Virginia to make sure they know that MARS is available to aid them.

Year 2 goals include:

- Have a group of MARS students that understand and can aid VEX/FTC teams.
- Make that group into a "Tucker Team" style help desk for VEX/FTC events hosted in the state.

- Host a VEX/FTC Scrimmage with local teams.

Year 3 goals include:

- Host a statewide VEX/FTC Competition.
- Continue use of Tucker Team help desk for VEX/FTC.

FRC Taskforce:

Year 1 goals include:

- Continue the organizational structure for Tucker Teams at MARS-attended FRC regionals created last year, for maximum efficiency.
- Encourage teams that are interested in learning about or have assisted with Tucker Teams in the past to run their own help desks at regionals that MARS is not attending.
- Hold conferences at all MARS-attended FRC regionals, MARS-attended off-season competitions, and the 2018 World Championship to publicize Tucker Teams. Prepare a presentation and first draft of several print/online resources for educating teams on benefits and how to run their own Tucker Team help desks.
- Identify opportunities for new FRC teams around West Virginia. Target large cities, universities, and VEX/FTC teams that may be interested in transitioning to FRC.
- Develop materials/tutorials that help FRC teams get started and provide them with any help needed.
- Send emails to all rookie and second-year teams attending regional events with MARS, offering support/advice throughout build season and creating bonds before competing together.

Year 2 goals include:

- Hold the Tucker Teams conferences, formalize informational supplies and post resources to website. Reach out to teams across the country through social media and direct contact, and invite them to hold their own Tucker Teams help desks during the 2019 season.

- Continue to seek and develop opportunities for new FRC teams around West Virginia. Explore developing FRC teams internationally. Target large cities, universities, and VEX/FTC teams that may be interested in transitioning to FRC.
- Continue sending materials/tutorials to start new teams. Change them as needed.
- Send an email to all rookie and second-year teams attending regional events with MARS, offering support/advice throughout build season and creating bonds before competing together.

Year 3 goals include:

- Keep growing the national Tucker Teams network and update materials as necessary.
- Continue to seek and develop opportunities for new FRC teams around West Virginia and internationally. Target large cities, universities, and VEX/FTC teams that may be interested in transitioning to FRC.
- Continue sending materials/tutorials to start new teams. Change them as needed.
- Send an email to all rookie and second-year teams attending regional events with MARS, offering support/advice throughout build season and creating bonds before competing together.

Communications Taskforce:

Year 1 goals include:

- Solidify Task Force purpose and functions.
- Keep Sponsor Sheet up to date with our current sponsors and donations.
- Fine tune our presentation abilities and find opportunities to present to our communities and potential sponsors.
- Assign Sponsors to communications task force members to better our contact with them and ensure organization.

Year 2 goals include:

- Continue to keep Sponsor Sheet up to date with our current sponsors and donations.
- Fine tune our presentation abilities and find opportunities to present to our communities and potential sponsors.
- Assign Sponsors to communications task force members to continue our direct contact

with them and ensure organization.

Year 3 goals include:

- Continue to keep Sponsor Sheet up to date with our current sponsors and donations.
- Fine tune our presentation abilities and find opportunities to present to our communities and potential sponsors.
- Assign Sponsors to communications task force members to continue our direct contact with them and ensure organization.

2.6 The MARS Plan

In 2008, MARS created the "West Virginia Plan," which was a strategy for beginning new FIRST teams around the state. In 2013, this was renamed the "MARS Plan," as the team began to reach beyond state borders to share their vision of FIRST growth. The plan previously contained four main areas of focus when building a new team: community, partnerships, barriers, and sustainability.

In 2016, the MARS Plan was remodeled to be a more detailed and accurate description of the strategy which MARS implements when building new teams and taking part in general STEM outreach. The MARS plan now focuses on the five main areas of growth and involvement; Engage, Inspire, Sustain, Progression of Programs, and Creating Leaders and Innovators.

1. Engage: Community Presence and Visibility

The first step in this plan is to engage individuals, groups, and communities within our state through visibility. Sometimes our strategy is simply to appear at public events such as baseball games and parades in order to increase our visibility in our community. Through the years, we have found that it often takes just a single interaction to start an entire robotics program.

More often, however, we partner with local organizations to take part in STEM focused initiatives: STEM nights at schools, summer camps, museum science days, and festivals comprise the majority of our outreach events. In these settings, it is easier to talk face-to-face

with both youth and adults to help them discover that with little aid, everyone can follow their passions. For example, we participated in approximately five new STEM nights around the area through a partnership with the Children's Museum of West Virginia in the fall of 2015.

At every event, MARS provides general FIRST information (flyers, brochures, etc.) for the public, as well as stickers, buttons, and pens to increase FIRST visibility even more. At outreach events, MARS students demonstrate and make efforts to explain design decisions and systems of the capabilities of both our competition robots and our special outreach robot, Parade Bot; we also encourage participants to drive at least one of the robots.

We commonly include an interactive activity when there is a more hands-on component required for the event. In 2015 and 2016, our activity combined both a craft and the construction of a small robot referred to as "Doodle Bots" which drew with markers. Since "Doodle Bots" were so popular with our audience in the 2017 season, we developed a similar "Brush Bot" activity, with toothbrush heads controlled by vibrating motors, resembling Hexbugs. In 2017, we also created a "What's Inside a Robot?" visual tool that compares our Parade Bot to a human body. During the 2018 season we began a new outreach initiative that combines play-doh, electrical circuits and lights to help students learn about electric currents through a creative method.

During the year, our team attends approximately 50 outreach events around the state, including our FLL Jr., FLL, and FTC outreach efforts.

2. Inspire: Starting FIRST/STEM Teams

MARS stays in contact with parties that show interest in starting a robotics program. Through a delegated student or mentor we provide informational documents as well as contact information to interested individuals; we also provide instruction for coaches alongside our partners at NASA's IV&V Facility.

MARS' partnership with NASA began in 2012 when we approached and convinced their educational outreach program to use FIRST and robotics teams to promote STEM education. Since then, MARS has worked with NASA to create hundreds of robotics teams around the state.

MARS contributes direct funding as well as locating other potential sources of funding to sponsor these teams. We work with NASA's IV&V Facility and other partners such as the United Way of Monongalia and Preston Counties to provide as much funding as possible to aid interested groups in starting a robotics team.

3. Sustain: Mentoring and Supporting the Continuation of Teams and Programs

One of our most important projects is to work as closely as possible with other nearby FIRST teams. In order to help sustain these teams, we stay in constant contact with them. The main thrust of this goal is a mentorship program, which consists of three main parts: bi-weekly practices, MARS student point of contact, and a large email network.

I. A bi-weekly practice day at our facilities is one the mainstays of our sustainability plan. At these practices, teams can ask questions of our FLL veteran team members and coaches, use practice tables, and get help with any issues. These practices are also important in the development of networks within our local FLL community. By forging relationships with other teams in a large group "practice" setting, the concept of Gracious Professionalism becomes a standard method of operation for all the FLL teams. It also gives MARS students the ability to practice as FLL referees and judges for competitions around the state, so this benefits both the teams and MARS students.
II. MARS student points of contact also help us to stay connected to teams who need more personalized assistance or have questions that they need answered before the next large group practice. Sometimes our students communicate only through email, but many times MARS students become integral parts of their FLL team and attend their regular practices.
III. Finally, because of the often large distances between teams, our email "blasts" to teams has become a key way to keep everyone connected and engaged.

We also focus on team sustainability by ensuring FIRST events are well run. We volunteer as referees, event coordinators, and judges. We help to staff FLL, FTC, and VEX competitions all over our state so that teams in more remote areas are able to enjoy the thrill of competition without the burden of long distance travel.

Another key component of our sustainability plan is to encourage teams to forge partnerships with local resources such as businesses, schools and state/local governments. When a community's youth begin demonstrating their capabilities, it is not hard to convince these potential sponsors that this is a program worth investment. Many new teams that MARS supports began through connections developed over the last decade with other local organizations. These organizations often make FIRST part of their own outreach initiatives. Our partnerships with NASA's IV&V Facility and school administrations are good examples.

Finally, we provide travel funds for FLL/FTC students so that the expense of travel to the FIRST championship is not overbearing. This encourages students to return.

4. Progression of Programs: Encouraging Teams to Stay Involved in Robotics Programs

Along with our partners, MARS works hard to identify and support as many types of youth robotics programs as possible, to engage West Virginia students in STEM education. We actively help groups evaluate their resources to identify programs which can succeed in their unique situation, but we also encourage students to progress to higher programs.

To do this, we encourage higher level teams such as our fellow FRC competitors to have active and supportive relationships with younger teams. Additionally, we communicate with groups' local government officials to find financial support. MARS also offers funding and information about grants to help these teams move from one level of FIRST to another.

We also commit a large part of our time and personnel to organizing, hosting, running, and assisting as many local, regional, and state events and competitions as possible for FLL Jr., FLL, FTC, VEX, and FRC. The MARS-run FLL and FTC state championships occur back-to-back at Fairmont State University to make higher level robotics teams visible to FLL participants and encourage this transition.

5. Creating Leaders and Innovators: Inspiring Students and Alumni

The final goal of our plan is to help students gain valuable life skills which will aid them as they head toward high school graduation and beyond. To support this continuation to higher education, our events are held at universities around the state such as West Virginia University, Fairmont State University, and Shepherd University. This helps create a sense of familiarity with post-secondary educational institutions. Having information about the

importance and access to higher education on a personal, immediate level for our team members as well other FIRST teams is the key to our students' success.

Finally, MARS provides information and advocacy for college attendance. We share information (both to our students and other teams) about scholarship opportunities and have partnered with WVU and Fairmont State University to help students obtain scholarships at these regional institutions, including the three scholarships WVU offers to students who are chosen during our biannual event, WVRoX.

Through outreach initiatives, our own team members become role models for younger students. The power of youth leading STEM events, helping others, enjoying the work of creating something with a team, and volunteering their time for others is incredible.

This year, through a long standing partnership with our county Board of Education, FLL teams are being incorporated into three middle schools in a pilot program for retention. This is a milestone towards helping youth gain access to FIRST programs in our communities, gaining valuable skills through participation in STEM organizations. In fall 2017, MARS ran competitions during the school day for these middle school teams, from which the winning teams advanced to the State Tournament.

3. Organization and Management Summary

3.1 Outreach History

During the team's first two years, MARS began its outreach efforts by participating in many community events, developing an inclusive marketing plan, and beginning a successful FLL program by starting eight and sponsoring ten teams. To help other FRC teams, MARS developed an informational manual for rookie teams, *SEarching for Rookie Team Inspiration (SERTI)*, which they translated into three languages; it is unfortunately out of date, but still available. MARS also participated as a LabView beta test team.

In MARS' third season (2010), the team grew while also creating the curricula for a variety of summer camps and sponsoring 11 and mentoring 14 FLL teams in three counties. MARS-sponsored FLL teams swept the WV FLL state tournament, including first place overall,

first in technical, and first on the field. This was also the year that MARS created their WV Plan (now referred to as the MARS Plan), details of which can be found in Section 2.6.

In MARS' fourth season (2011), the team implemented the WV Plan, and the FLL program expanded dramatically to include teams in more than 15 counties. MARS also started a rookie FRC team at Winfield High School in Putnam County, WV, FIRST Team 3492 - PARTS. MARS-sponsored FLL teams once again swept the WV FLL state tournament. This was also the year that MARS began working with WV 4-H to run youth science summer camps.

In MARS' fifth season (2012), the FLL program spread to over 20 West Virginia counties and one Southwestern Pennsylvania county, widening the impact of their FIRST program with the WV Plan. The team also appeared for the first time at the October Sky festival in southern West Virginia, while continuing their work with summer science camps.

In MARS' sixth season (2013), they continued their outreach throughout the summer and fall, expanding their FLL Program to 63 teams in 22 West Virginia counties and one Southwestern Pennsylvania county. In addition, MARS continued to host its annual FLL scrimmage with 24 FLL teams and over 230 students in attendance. The team worked with NASA's IV&V Facility and other FRC teams to produce the West Virginia State FLL Tournament. During this year, the team again conducted workshops at 4-H camps and with the Boy Scouts of America®. Projects such as these have helped MARS to reinforce the value of STEM education throughout the state.

During MARS' seventh season (2014), the team hosted and volunteered at numerous STEM summer camps for students, such as TekKids and StemPloy. They also continued their work with FLL, hosting their own pre-competition scrimmage and regional qualifier before helping NASA's IV&V Facility coordinate the FLL State Tournament. The team also added its first international outreach initiatives, officially renaming the WV Plan the "MARS Plan" accordingly. Two different projects were started in India, one by a team member in Jackal, India under the name Technology For All, and one by a team alumnus in Varanasi, India, where he was awarded a gap year by Princeton University. These two projects began working together to institute FLL teams in rural areas of the country and started gaining funding and sponsoring support both in the United States and in India. In the summer of 2014, MARS

hosted the first off-season, FRC robotics, 24-hour endurance event in FIRST history, West Virginia Robotics eXtreme (WVRoX). It was the first FRC event held in West Virginia and attracted teams from 13 states and 2 countries. WVU, our gracious host and partner, offered scholarships to the winning alliance team members.

In MARS' eighth season (2015), the team continued to support FLL, by running a scrimmage and qualifier, and assisting in running the state tournament. Overall, MARS assisted over 100 FLL teams and 20 FLL Jr. teams in the state. While continuing efforts in India, the team also built connections in Harare, Zimbabwe in order to work through a pre-existing FLL team and start more FLL teams in rural parts of that country. The team also began a relationship with the Spark! Imagination and Science Center and attended five STEM nights at local elementary schools, plus four more events through local after-school programs.

In MARS' ninth season (2016), the team assisted in the growth of the WV FLL program by running mentoring sessions, a scrimmage, and qualifier while volunteering at three other qualifiers and the state tournament. Through a partnership with the Spark! Imagination and Science Center, MARS attended several additional STEM nights at elementary schools around Monongalia and Preston counties, bringing their fall outreach total to 20 events. MARS continued their international outreach initiatives, specifically with Pragya S. who spent a gap year in India starting FLL teams and Daphne B., who inspired the creation of FLL teams in the Philippines. In the summer of 2016, MARS ran WVRoX for a second time, bringing 28 teams from the US, Canada, and China to the WVU Rec Center for over 26 hours of intense robot competition.

In MARS' tenth season (2017), the team continued to support the state FIRST network in partnership with NASA and ran the inaugural Mountain State FLL Invitational at Fairmont State University, attracting FLL teams from several countries. Continuing our community outreach, the team implemented a new "Brush Bot" activity in place of "Doodle Bots," and increased their community presence by about 10 events, to 30 total. One of these new events was the Pittsburgh Maker Faire, which MARS attended with friends from the Steel City Robotics Alliance. During the fall off-season, MARS reorganized both the MARS Plan and their Student Leadership Structure, to better organize all team efforts. With this reorganization, Outreach Taskforces were created for each facet of MARS outreach. One Taskforce with

immediate effect was the FRC Taskforce, which began to expand regional FRC Tucker Team Help Desks with help from other FRC teams.

In MARS' eleventh season (2018), the team built upon the growth of the WV FLL Programs by continuing to run bi-weekly mentoring seasons, a scrimmage, and a qualifier; additionally we volunteer at other qualifiers in our area and the state tournament. We also assisted at the World Robotics Olympiad (WRO), logging approximately 200 man hours. In our community outreach, we recently established a new activity, the "Play-doh Circuitry" initiative; which is designed to incorporate both art and STEM into a form that is easy for children to comprehend. This year marked our third successful 26 hour endurance event: West Virginia RObotics eXtreme (WVROX). We had 24 teams from 13 states, as well as one team from China attend this event. MARS logged a total of 605 man hours, with an average of 23 Martians working at any given hour. Due to 100% of MARS students participating in outreach, we found it counterproductive to have a taskforce dedicated to that branch; therefore we redefined it as the communications taskforce. This better prepares students dedicated to this taskforce for speaking with sponsors, judges, and the community. Additionally, during the offseason students took inspiration from a 2012 Oregon based project called "Go Baby Go" and mechanically altered a toy car's seating and steering wheel to gift to a young child with disabilities.

To date, the team is 38 members and 46 mentors strong, with the program rapidly expanding. MARS offers a personalized learning experience for their students. All graduates have advanced into post-secondary education, many with either a full or partial scholarship, with 82% of them majoring in STEM fields. Local businesses and corporations have offered internship opportunities for many MARS youth, either during or following their high school careers.

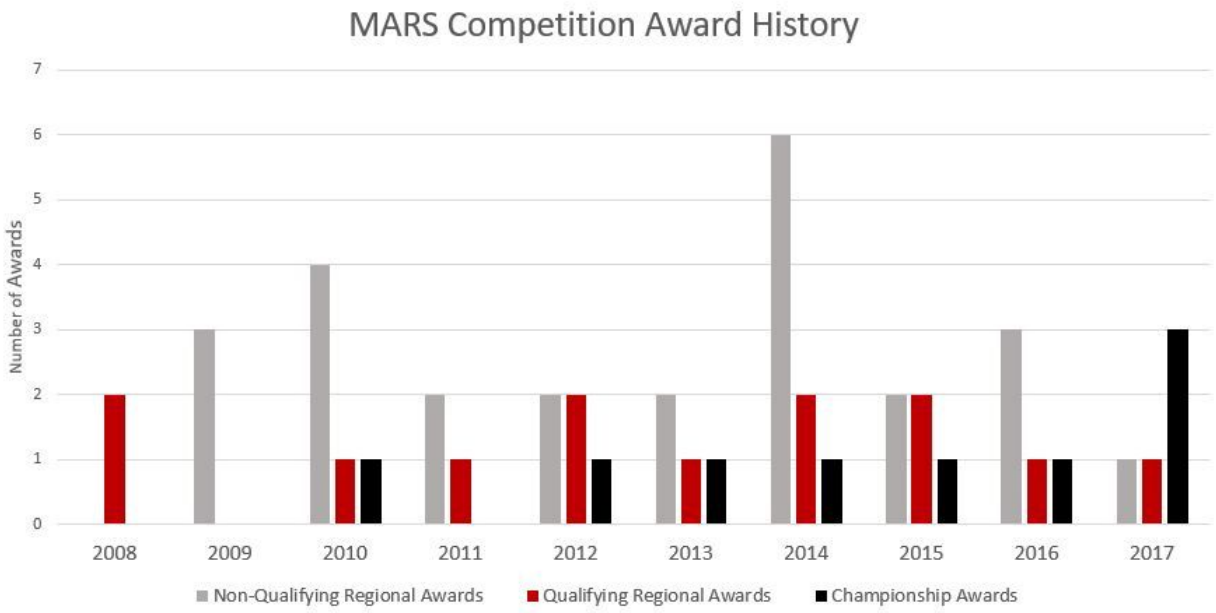
3.2 Competitive Award History

MARS has seen incredible success on and off the field. While the primary focus of the organization is to build youth into being productive members of society, the team also

continually strives to be the best they can be at their competition events. The following awards are representations of the hard work and dedication its members have contributed to the program.

Award	Years Won
Coopertition ®	2010
Dean's List Finalist	2010, 2013, 2014
Engineering Inspiration	2010, 2011, 2013
Entrepreneurship	2011, 2013, 2013, 2014
Gracious Professionalism ®	2014, 2014, 2015, 2016, 2016
Industrial Design	2016, 2018
Regional Chairman's	2012, 2014, 2015, 2016, 2017
Regional Finalist	2012, 2014, 2016, 2016, 2018
Regional Winner	2008, 2012, 2014, 2015, 2018
Rockwell Automation Innovation in Control	2009, 2009, 2010, 2010, 2012
Rookie All-Star	2008
Website Excellence	2009
Woodie Flowers Finalist	2011, 2015, 2017
World Chairman's Award	2017
World Chairman's Finalist	2017
World Championship Subdivision Finalist	2015, 2017, 2018
World Dean's List	2010

World Entrepreneurship	2013
World Innovation in Control	2014
World Gracious Professionalism	2016
World Woodie Flowers	2012
Xerox Creativity	2014
Quality Award by Motorola Solutions Foundation	2018



3.3 Management Summary

The management functions associated with MARS are carried out by a talented group of mentors who assist, guide and teach the students in each of the team's activities. Their patience and support is instrumental to the prosperity of the team. Currently MARS has 38 mentors, including 12 college mentors. Below is our mentor roster divided by the functions they perform for the team, note that these are not all of our mentors, but just those with specific roles.

The two mentors that lead MARS are Dr. Earl Scime and Steve Raque.

Sub-Teams		Mentors
Mechanical	Design	Dr. Earl Scime
	Fabrication and Shop	Dr. Todd Hamrick Herb Baker Wayne Gillo Julia Krueger Brianna Cain Dr. Earl Scime
	Building Management	Mark Tennant Billy King Marty Dombrowski
Safety	Safety	Marty Dombrowski
Electrical	Electrical	Herb Baker Henry Vos Matt Scott
Programming	Software	Andrew Ballard Nick Ohi
	Beta Testing	Andrew Ballard Nick Ohi
Outreach and Public Relations	Media	Marty Dombrowski Alex Stout
	Business Plan	Trish Vos

		Melissa Giggenbach
	Award Submissions	Sharda Mohammed Trish Vos Alex Stout
	Fundraising	Dr. Earl Scime Sharda Mohammed Herb Baker Melissa Giggenbach
Outreach	FIRST/VEX	Dr. Earl Scime Ryan Utzman
	Website	Dr. Earl Scime
	Community	Sharda Mohammed Trish Vos
	Outreach Organization	Sharda Mohammed
	WVRoX (24 Hour Event)	Mark Tennant Melissa Giggenbach
	T-Shirts, Paraphernalia	Melissa Giggenbach
	MMS/GPM	Dr. Earl Scime
Competition	Driver Training	Dr. Earl Scime Ryan Utzman
	Scouting	Andrew Ballard
	Pit Area Structure	Mark Lusk Dr. Earl Scime

	Hotels and Travel	Maggie Sorensen Michele Ballard

3.4 Team Structure

The Mountaineer Area RoboticS team (MARS) is divided into two major subsets; one which focuses on technical and one on non-technical efforts. The technical half of the team is comprised of the Mechanical, Electrical, and Programming sub-teams. The non-technical half of the team consists of the Outreach/Public Relations team and the Outreach Taskforces (discussed in Updated Team Structure, Section 3.4.6). Each sub-team is led by adult and college mentors who help guide students to achieve mutual goals. Each sub-team also has a student leader who helps keep the team on track during the season. Furthermore, students from all of these sub-teams join together to form "competition teams" at regional events.

Below is a brief description of each of the sub-teams and their functions:

3.4.1 Mechanical Team

Build Crew: This team is in charge of assembling the mechanical aspects of the robot during the build phase. Student jobs vary depending on the direction of the build mentors and the abilities of the students. All members go through shop training to ensure the safety of all members and mentors.

Computer Aided Design Team: The CAD Team uses Autodesk products and Solidworks to create the CAD drawings used to construct the robot. Team members are expected to attend additional meetings and go through software training. These students often work at home on projects.

3.4.2 Electrical Team

Electrical Team: The Electrical team is in charge of designing power applications and wiring of the robot. They connect all the components to make the robot operate. This team develops the robot's sensors to interface mechanical and programming. They must have a good understanding of basic circuitry and robot components.

3.4.3 Programming Team

Robot Programming: This team is in charge of developing code for all autonomous and teleop states functions of the robot. Students focus on learning the LabVIEW programming language and advancing software capabilities during the off-season. They work on programming the robot during the season, often involving electronics, sensors, and control systems of the robot. Some members might also work with other programming languages to create, enhance, and debug additional software pertaining to MARS.

3.4.4 Outreach and Public Relations (OPR) Team

Communications/Public Relations Team: The communications team often speaks directly to groups, judges and the media. At competitions, they are stationed outside the pit area to greet other team members and present our image to the public. This team submits press releases and articles to the local news on a regular basis.

Media Team: The Media team takes and archives photos and videos of competitions as well as year-round outreach events. They produce the reveal video as well as promotional team videos. They also run the team's social media accounts, including Twitter, Instagram, and Facebook.

Website Team: The Website team creates and maintains the MARS website. They work year-round to update and improve existing content, both at team meetings and at home.

3.4.5 Competition Teams

Drive Team: The Drive Team consists of a driver, a co-pilot, a human player, a technician, a back coach, a backup co-pilot, and a backup driver. The Drive Team is required to stay with the robot a majority of the time at the competitions. This group must collaborate with the Scouting Team and the Pit Crew.

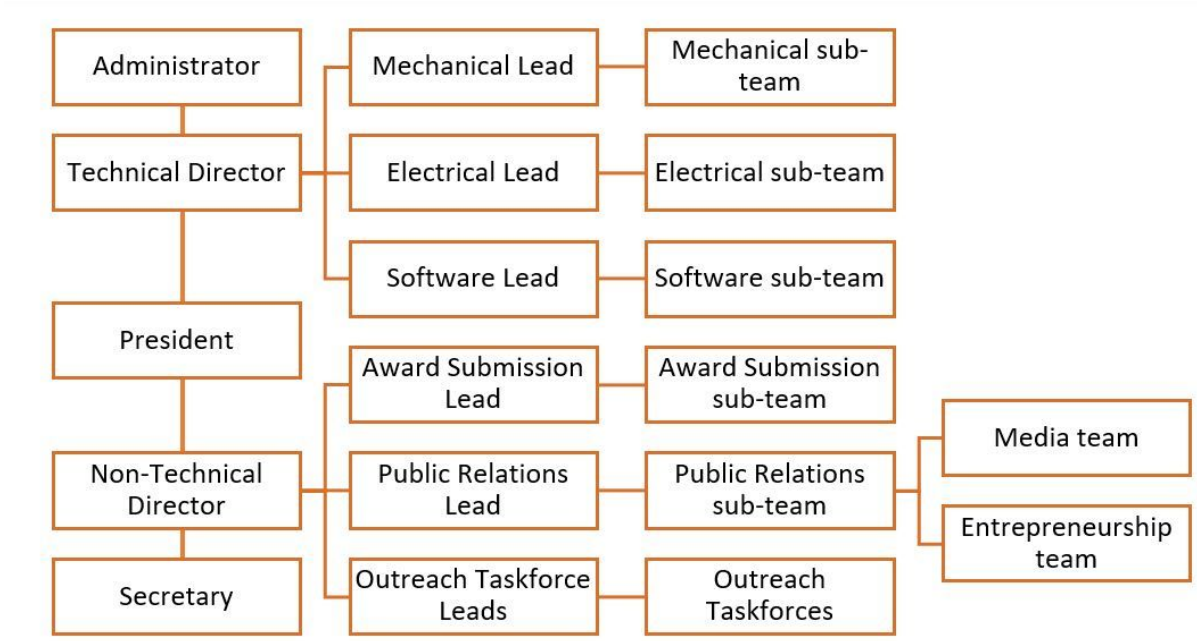
Scouting Team: Students on this team develop materials and methods to assess teams at competition, providing the Drive Team with as much advantage as possible when choosing alliance members. At the competition, this team makes presentations to the Drive Team on Thursday and Friday evenings.

Tucker Teams: The Tucker Teams are comprised of students from different parts of our organization. These students actively work during FRC competitions to provide other teams with help and instruction. They ensure that all teams are playing to the best of their abilities. They serve as the main outreach team during competitions. This sub-team honors the ideals of our late mentor, Mr. Phil Tucker.

Pit Crew: The Pit Crew is a small group of students involved in the maintenance and creation of the robots, playing field, tools, and other accessories. During the off-season, students are expected to maintain current robots and tools. Once the competition season starts, the Pit Crew is responsible for the creation of a playing field to specific directions. At competitions, their major responsibility is the maintenance of the robot and tools.

3.4.6 Updated Team Structure

The leadership structure of MARS was re-created for the 2016-2017 season to ensure productivity of each project as well as facilitate effective communication between members of the team. This new structure also provided a more official system for delegating non-technical tasks to make outreach and public relations a more vital part of the experience for all students who joins MARS. A five-person Leadership Council oversees technical and non-technical sub-team leads as well as outreach task force leads. All leads are elected for one full year by their teammates.



Student Leadership Council:

- Guides conversation of large or overarching team decisions
    - *President:*
        - Largely honorary title
        - Sets agenda and facilitates discussion in student leadership council meetings
        - Runs council team meetings
    - *Director of Technical Affairs:*
        - Speaks for all technical sub-teams
        - Hosts meetings to ensure communication among technical sub-team leads
    - *Director of Non-Technical Affairs:*
        - Speaks for all non-technical aspects, personnel, and Taskforces
        - Host meetings to ensure communication among all sub-team and Outreach Taskforce leaders
        - Floats among Outreach Taskforces

    - Acts as head of the Award Submissions team
- *Administrator:*
    - Keeps the council on track and in line with MARS' vision and mission
    - Upholds use of efficient processes with special attention to core values and goals
    - Acts in part as a historian
- *Secretary:*
    - Organizes relevant notes and documentation for council
    - Liaison between student and mentor leadership
    - Organizes and documents lower level meetings as needed

Technical Team:

A student leader for each sub-team is elected by MARS and is tasked with acting as a facilitator for productive work and communicating progress to the rest of the team.

- Mechanical Team
- Electrical Team
- Software Team

Non-Technical Team:

A student leader for each sub-team is elected by MARS and is tasked with acting as a facilitator for productive work and communicating progress to the rest of the team.

- Public Relations Team
    - Media Team
    - Entrepreneurship Team
- Awards Submissions Team

Each member of MARS is placed onto at least one outreach task force of their choosing. These groups meet monthly to discuss and organize projects. The facilitators of these meetings, task force leaders, are students designated by the student leadership council based on merit and experience in each particular area.

- FIRST LEGO League Task Force
- FIRST LEGO League Junior Task Force
- FIRST Tech Challenge/VEX Robotics Task Force

- FIRST Robotics Competition Task Force
- Communications Task Force

4. Products and Services

All of MARS' products and services strive to increase youth involvement in STEM programs, not only in their home state of West Virginia, but also around the globe.

4.1 Products

MARS has multiple programs in use to help fund their endeavors. The sale of LEGO® models of NASA's Magnetospheric Multiscale Satellite spacecraft and NASA's Global Precipitation Measurement space probe are two long term projects which provide funding for MARS. Since 2016, along with West Virginia University, MARS hosts and runs a biannual FRC event which also helps to fund MARS' initiatives through registration fees and t-shirt sales.

4.2 Services

MARS provides outreach programs that aim to develop youth interest in the STEM fields. These outreach programs include FLL Jr. and FLL programs for the elementary and middle school levels. At the high school level, MARS introduces groups to the FRC, FTC and VEX programs. Their services include the following:

- Volunteering at the WV School for the Deaf and Blind Qualifier.
- Over 100 FLL teams in 27 counties of West Virginia, and over 70 FLL Jr. teams.
- "Technology for All" program in India.
- Suncrest Robotics after-school club.
- FLL program in the Philippines.
- Organizing and Staffing FLL Qualifiers and State FLL/FTC Tournaments.
- Robotic Demonstrations at:
    - Trans Tech Energy Conference.
    - Rocket Boys Festival, Pittsburgh Maker Faire.
    - Elementary/Middle School STEM Nights.
    - Board of Education, Rotary Club, United Way.

- MARS Open House.
- Numerous outreach events in our community.

5. Market Analysis Summary

To stay true to the MARS mission of getting youth in West Virginia as well as youth across the globe involved in STEM, MARS has identified the following target markets:

- High School Students
- Middle School Students
- Elementary School Students
- Pre-K Students

5.1 Market Segmentation

High School Students: To extend robotics programs to high school students, MARS, along with local partners, has started teams in multiple areas of WV and supports multiple robotics programs, ensuring teams' sustainability through both number of and variety of robotics programs. MARS also utilizes a feeder system for high school robotics programs by strongly supporting FLL programs throughout the state. High school programs then provide an outlet for veteran FLL students, allowing them to stay involved but also gain valuable membership.

Middle School Students: To expand the interest in STEM among those students at the middle school level, MARS assists and/or mentors over 90 FLL teams across West Virginia. In addition to those in WV, MARS has also started FLL teams in India, Zimbabwe and the Philippines. MARS members also assist with a variety of youth summer camps, specifically targeted at this age group. This year MARS students will be involved in a supportive role with the Monongalia County School Districts pilot program which introduces FLL into middle school curriculum.

Elementary School Students: To recruit students at the elementary school level, MARS has worked with over 70 FLL Jr. teams, including 10 through the Suncrest Robotics after-school

club initiated by MARS student Shannon W. in 2017. The group also does a variety of outreach events to engage these students in STEM at an early age.

Pre-K Students: MARS aims to spark an interest in STEM in the minds of WV youth by hosting frequent outreach events. MARS members actively facilitate read-alouds, robot demonstrations, and fun activities for youth in this age spectrum.

6. Website Marketing Strategy

The MARS website, www.marsfirst.org, is designed and updated by a few select members of the MARS team. The website is used to supply information to those interested in the MARS program as well as in FIRST. The team also uses the website as a way for new students to apply to the team and also provides a calendar to show all upcoming events. The website was redesigned in the summer of 2017 to include more information and resources for other FRC teams after MARS's Hall of Fame induction. For more information on the team website, please visit www.marsfirst.org.

7 Strategy and Implementation Summary

MARS' goal is to develop and promote increased student participation in post-secondary education among West Virginian high school students. MARS' strategy to attain this goal is to start and mentor FLL Jr. and FLL teams. Cultivating and sustaining an interest in science and technology at a very early age will give students the best chance of maintaining that interest through high school and into college. As such, they concentrate the majority of their outreach efforts in the primary through middle school grades.

MARS will continue to develop and promote the above strategy, previously known as the WV Plan, until all counties in the state of West Virginia contain a viable robotics program. MARS now assists in the development of FIRST activities in other states as well, such as Pennsylvania and Maryland.

In addition, MARS has a dedicated technical team of students and mentors at their FRC regional competitions whose primary goal is to assist less advanced teams with any problems they may be experiencing through “Tucker Team” Help Desks in the competition pits. MARS is currently working with other FRC teams to expand the reach of Tucker Teams, and hopes to present the initiative to the FIRST community through a Championship Conference.

In partnership with West Virginia University, the team also hosted the world's first ever 24-hour FRC event in August of 2014, called West Virginia Robotics eXtreme (WVRoX). With the event’s success, the team made this a biannual event, so the second FRC event was held in Morgantown in 2016 and turned into a 26-hour 14-minute event in representation of MARS’ team number 2614. The third successful installment was held in 2018, and featured tours to the public and media to maximize the STEM exposure. Additionally, MARS and NASA’s IV&V Facility introduced the Mountain State International FLL Invitational in summer 2017 at Fairmont State University, to be run as a parallel biannual event. With this, MARS is bringing a major FIRST event to West Virginia every summer.

The team also realizes that West Virginia is not the only area with underserved rural communities. As such, MARS has begun expanding its outreach beyond the borders of West Virginia to an international scale. Thus, the team adapted the WV Plan model to be applicable around the world, renaming it “The MARS Plan.” The team identifies areas that would benefit from implemented STEM programs and develops techniques to help sponsor and mentor FIRST programs in these areas. To date, two alumni of our organization each spent a year in India, one helped promote STEM education in Zimbabwe and a current member has initiated FLL in the Philippines.

7.1 SWOT Analysis

MARS performs an annual SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to aid in team advancement. The MARS SWOT analysis divides traits into two categories: internal and external environment. The first category, internal environment, defines the team’s Strengths and Weaknesses. The external environment is comprised of Opportunities and Threats that can affect MARS's viability.

The MARS Focus Group identified the following:

	Strengths	Weaknesses
Internal Environment	● Funding ● Mentors ● Alumni ● Facilities ● Team Structure ● Team Image	● Disconnect from History ● Internal Communication Breakdown ● New Mentor Recruitment ● Lack of Enthusiasm
	Opportunities	Threats
External Environment	● STEM Programs in Schools ● Rural Communities inside West Virginia ● National & International Underserved Areas ● FIRST Hall of Fame Status	● Macroeconomic Fluctuations ● Loss of Core Partners and/or Sponsors ● Loss of Key Personnel

These individual issues will be discussed in detail in the following sections.

7.1.1 Strengths

Funding - Funding was identified as one of the team's keys to success (see Section 2.4). MARS is blessed with funding from a variety of sources, as the team is both a good investment for foundations providing grants and for corporations seeking to reinvest in their community through tax deductible donations. Over the years, MARS has developed a close working relationship with many of our sponsoring partners, which has allowed MARS a level of consistency in its funding from year to year.

Mentors - MARS is led by 40 mentors. These mentors are all highly experienced in their fields, including education, business, health care, and engineering. The level of instruction from these mentors allows students to perform well at competitions and in their academic careers.

Team Alumni - Each year, an average of five to ten students graduate from the program. Many of these students continue volunteering as mentors, returning over college holidays and weekend breaks to assist the team in many aspects. These alumni return whenever possible to set examples for younger members, providing our team with a tremendous range of experience to utilize.

Facilities - MARS has access to extensive facilities to aid them with their mission. West Virginia University graciously provides access to rooms, labs, computers, and workshops. The Monongalia County Board of Education provides an entire building for use as a full-sized practice field and mentoring facility. This practice facility benefits not only MARS but many other FRC and FLL teams from the surrounding area. MARS opens the building to nearby teams during their competition seasons.

Team Character - The organizational culture of MARS lends itself to a very close-knit, family-like atmosphere. Since the team is comprised of rival schools as well as many home school students, the team cannot commit to the organizational culture of any one of its components. As such, MARS has developed its own unique culture. Teammates not only interact at MARS functions, but in non-FIRST related activities. Due to this bond, when competition time rolls around, MARS naturally transforms into an extremely focused, unified group that is a force to be reckoned with at any competition.

Team Structure - In 2016, MARS revamped their team and leadership structure (see section 3.4.6). The team is led by a five-student council, who facilitate communication between the different general areas of the team and make broad team decisions. Under the technical and non-technical vice presidents, each subteam has a student lead, who organizes tasks for that team. Each outreach taskforce also has a similar lead. This system has proven very beneficial for more organized and efficient task management.

Team Image - MARS maintains a cohesive image throughout the community and within FIRST competitions. At all outreach and competitive events, students wear the standard team t-shirt, which has become widely recognized in both West Virginia and at FIRST events. On one day at regional competitions, MARS wears standard black dress shirts with black bottoms and

a red “MARS bow-tie.” These uniforms are fitted with MARS patches bearing the team logo, to maintain uniformity throughout competition.

7.1.2 Weaknesses

Disconnect from History - The original members of MARS formed a set of core values that focused their efforts toward success. However, with student turnover, this culture can fade if not shared with the new generations. MARS has been taking steps in the past two years to re-establish the core values that were inherent in the original team.

Internal Communication Breakdown - As MARS has grown, sub-teams have become more separate and distinct from each other. This increase in members allows for specialization. As this occurs, communication can weaken between the sub-teams. MARS is combating this by holding weekly team meetings, tri-weekly during build season, where students discuss important progress and announcements of each sub-team and plan for the week ahead. Additionally, the new Student Leadership structure provides a channel for communication between the technical and non-technical sides of the team.

New Mentor Recruitment - Most MARS mentors join the team through child involvement. In recent years, we’ve seen a slight decrease in the number of new parents lending their time or expertise to the team. With the inevitable loss of current members, willingness of parents or newer mentors to step into leadership roles is critical to our continued success. For this reason, MARS intensified mentor recruitment in both technical and non-technical areas starting in 2016.

Lack of Enthusiasm - During competitions MARS has a tendency to be viewed as showing disinterest or apathy towards the game or our fellow teams. While this is just due to the busy nature of our students and lack of time to cheer on our drive team or others, it is a common perception that damages our strong team image.

At this point in time, none of these weaknesses have developed into significant issues. Both the students and mentors of the team have recognized these potential weaknesses and take steps to mitigate them before they have a dilatory effect on the team's competitiveness.

7.1.3 Opportunities

Rural Communities Inside West Virginia - MARS began with a mission to promote STEM education and increase participation in post-secondary schooling among West Virginia high school graduates. As the team became more ambitious, they developed the West Virginia Plan, now The MARS Plan, which has led to the rapid expansion of FIRST programs throughout the state. Graduates of these FIRST programs continue on to post-secondary educational venues.

National & International Underserved Areas - MARS knows that rural communities across the United States and around the world face similar problems as those in West Virginia. Given this, MARS, as of the 2013-2014 season, began identifying potential nations which would benefit from having FIRST programs. MARS was able to identify and successfully connect with India, Zimbabwe and the Philippines to develop FLL programs.

STEM Programs in Schools – MARS has always sought to increase the interest for STEM in youth. By starting STEM programs in schools, students have the opportunity to expand their knowledge of STEM fields at an early age so that they are more likely to consider a career in STEM. Through our long term advocacy, this year FLL teams will become a standard educational tool in select middle schools in our area as part of a retention pilot program. By utilizing already formed institutions, MARS can expand the opportunities available to students.

FIRST Hall of Fame Status - Through the 2017 World Chairman’s Award, MARS entered the FIRST Hall of Fame. Through the transition to this position, the team is gaining a stronger connection to several other well-known FRC teams, and the organizational leadership at FIRST. This offers great opportunity for future partnerships or influence within FIRST. With

this, MARS also gained the responsibility to assist other FRC teams, specifically with outreach and STEM expansion efforts.

7.1.4 Threats

Macroeconomic Fluctuations - In addition to the facility, technical and educational needs described above, MARS would be unable to function without the generous funding provided by our corporate sponsors and foundation grants. Unfortunately, fluctuations in the nation's overall economy can negatively affect the availability of funds for the team.

Loss of Core Partners and/or Sponsors - MARS has four core partners that sponsor a majority of their activities: WVU, NASA's IV&V Facility, the Monongalia County Board of Education and the United Way of Monongalia and Preston Counties. These partners provide a majority of the team's facilities, technical, financial, and educational support. While all our sponsors are important to the team, loss of support by any one of these four would severely hamper the team's ability to operate at its current levels. However, since MARS has a variety of sponsors, one loss, while detrimental, would not end the program. For example, if WVU were to decide to stop supporting the team, while we would lose our main workspace we would still be able to operate through the building Monongalia County Board of Educations rents out to us.

Loss of Key Personnel - The team's adult mentors provide the ongoing organizational and logistical support that makes the very existence of MARS possible. While all our mentors are valuable to the team, MARS identified two key personnel vital to the team and its ongoing operation, Dr. Earl Scime. and Mr. Phil Tucker. In 2015, Mr. Tucker passed away. While Mr. Tucker's loss was devastating for the team, due to the leadership of Dr. Scime and the willingness of other mentors to step in and shoulder new responsibilities, the team was able to carry on and move forward honoring Mr. Tucker's memory. Currently, Dr. Scime's expertise, experience, and contacts in the FIRST and business communities are irreplaceable to the team. In the event that MARS also faces the loss of Dr. Scime, MARS is training Ryan Utzman to step into the Head Coach position

While the above threats are indeed real and must be considered, they are survivable. In the end, there is little MARS can do to mitigate the risks other than to maintain good stewardship of its resources, be watchful, and plan accordingly.

8. Fundraising Strategy

MARS offers fundraising opportunities at a variety of levels to sponsors and grant providers on an annual basis. Sponsoring MARS is a wonderful way to support STEM education throughout West Virginia, while also offering a variety of avenues for promotion for local businesses. One-hundred percent of all donations go towards registration fees, robot parts, outreach materials, and student lodging during travel to competitions. All donors are recognized in a variety of ways. Below is a list of the sponsorship levels and their associated benefits:

Olympus Mons Donor - $5,000 and up
Listing in all team literature
Logo on the MARS website
Listing on the team T-shirt
Sponsor name on robot
Identification as a primary sponsor in formal team name

Valles Marineris Donor - $1,000 - $4,999
Listing in all literature
Logo on the MARS website
Listing on the team T-shirt
Sponsor name on robot

Hellas Basin Donor - $250 - $999
Listing in all literature
Logo on the MARS website
Listing on t-shirt

Utopia Planitia Donor - $50 - $249

Listing in all literature

Logo on the MARS website

8.1 2018-2019 Sponsor List

Below is a list of sponsors for the 2018 - 2019 season.

- Advanced Research Corporation
- AECOM c/o National Energy Technology Laboratory
- Animal Medical Center
- Allegheny Science and Technology
- Brewer & Giggenbach, PLLC
- Compton Metals
- CSC-Home and Hardware
- Daniel Hill
- Dassault Systèmes
- EQT
- Halliburton Energy Services
- Leidos
- M & S Consulting
- Med Express Urgent Care
- Monongalia County Board of Education
- Monongalia County Commission
- Mountaineer Boys and Girls Club
- MPL
- NASA IV&V Robotics Alliance Project
- National Instruments
- Phillip M. Tucker Memorial Fund
- Rotary Club of Cheat Lake
- Sheehan & Nugent, PLLC

- Tanner’s Alley Leather Design Studio
- United Way of Monongalia and Preston Counties
- Wilson Works
- WV Governor’s Office STEM Initiative
- WV Space Grant Consortium
- WVU Benjamin M. Statler College of Engineering and Mineral Resources
- WVU College of Mathematics
- WVU College of Physics and Astronomy

For more information on the team's sponsors, visit the website at www.marsfirst.org.

8.2 Funding Forecast

To achieve MARS’ fundraising goals, MARS receives its funding through four primary avenues:

1. Contributions
2. Grants
3. Fundraising
4. Carryover

8.2.1 Contributions

Sponsorships and donations are the primary funding avenue for MARS. Without the generous support of corporate sponsors and private donors, achieving the MARS mission would be nearly impossible. MARS projects $62,000.00 through this avenue.

8.2.2 Grants

Grants are a vital funding source for MARS. Grants come from programs and organizational foundations. The projected funding through this avenue amounts to $11,0000.00.

8.2.3 Fundraising

MARS fundraising activities include the sale of LEGO MMS models, LEGO GPM models, and sales of t-shirts along with registrations for our FRC Event WVRoX. The projected funding through these avenues is expected to be $4,000.00.

8.2.4 Carryover

MARS consistently maintains a positive cash flow. Financing a significant carryover is vital to ensuring a team rainy day fund, since MARS is primarily funded through grants and local donors. In the case of an economic downturn, MARS can still sustain themselves until new funding sources can be procured. We anticipate a carryover amount of ~$48,000.00.

9. Financial Plan

MARS expects a funding growth of 5% per annum to achieve its goals and objectives. This growth is expected to be obtained through the retention and renewal of current grants, the continued support of their current sponsors and donors, as well as, the acquisition of new grants, sponsorships, and increased fundraising. At the current time, MARS intends to continue to operate on a cash basis and has no intention to use debt as an instrument to fund its activities.
MARS believes that by pursuing this strategy it can continue to grow its operations while still maintaining a surplus without the acquisition of any long-term liabilities. Below are the financial statements for FY 2016 , 2017 and 2018. The team's fiscal year runs from January 1st to December 31st.

9.1 Surplus or Deficit Statement

MARS operates on a cash basis by paying its bills at the time the expense is incurred. As can be seen on the statement below, MARS has no payroll expenses, as there are no paid personnel. All mentors and other support personnel are unpaid volunteers graciously donating their time free of charge. To date, MARS owns no major long-term assets. As such, there are no depreciation expenses recorded. Funding trickles in throughout the duration of the year.

METRIC NAME	2015	2016	2017	2018
PROMOTIONS	+$747.21	$1,378.03	+$192.28	+$1,848.51
OPERATIONS	$2,039.88	$1,286.44	$4,573.44	$2,082.60
EQUIPMENT	$1,370.30	$1,029.47	$1,783.12	$2,136.88
EVENT REGISTRATION	$14,000.00	$14,875.00	$15,150.00	$14,050.00
STEM SUPPORT	$14,528.88	$16,672.77	$20,154.41	$12,079.62
ROBOT CONSTRUCTION	$12,348.85	$8,578.81	$12,125.39	$15,967.00
TRAVEL	$13,555.33	$15,402.81	$28,093.38	$27,935.29
OPERATING EXPENSES	$57,096.03	$59,402.81	$81,687.46	$72,402.88
SURPLUS/DEFICIT	$6,415.82	$32,170.21	-$11,630.17	-$9,810.49
SURPLUS/DEFICIT %	10%	35%	-17%	-16%

9.2 Statement of Cash Flows

Since MARS is a 501 (c)(3) non-profit corporation, the team's Statement of Cash Flows is incredibly similar to the team's Surplus and Deficit Statement and the Statement of Financial Position. MARS continuously operates on a cash basis and has no financing or investing initiatives.

Statement of Cash Flows	
Operations	$72,402.88
Cash Funding	$62,592.39
Subtotal Cash From Operations	$62,592.39

Additional Cash Received Sales Tax, VAT, HST/GST Received	$0.00
New Current Borrowing	$0.00
New Other Liabilities (interest-free)	$0.00
New Long-term Liabilities	$0.00
Sales of Other Current Assets	$0.00
Sales of Long-term Assets	$0.00
New Investment Received	$0.00
Subtotal Cash Received	$62,592.39
Expenditures	
Expenditures from Operations	
Cash Spending	-$72,402.88
Subtotal Spent on Operations	-$72,402.88
Additional Cash Spent	$0.00
Sales Tax, VAT, HST/GST Paid Out	$0.00
Principle Repayment of Current Borrowing	$0.00
Other Liabilities Principle Repayment	$0.00
Long Term Liabilities Principle Repayment	$0.00
Purchase Other Current Assets	$0.00
Purchase Long-term Assets	$0.00
Dividends	$0.00
Subtotal Cash Spent	-$72,402.88
Net Cash Flow	$134,995.27
Cash Balance	$31,041.22