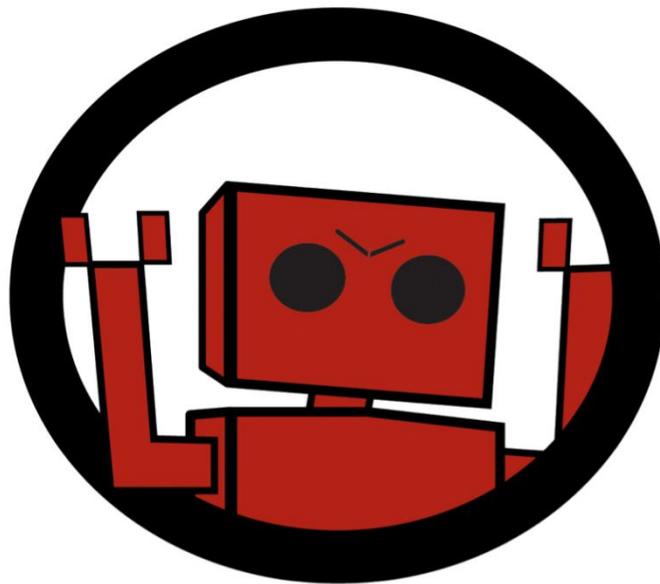


Mountaineer Area Robotics

MARS 2614



FY 2016 - 2017 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 appreciation 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 professional and life skills, self-confidence and 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 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 those throughout the state. Since inception, MARS members have received many accolades, winning a variety of awards and earning berths to the FIRST World Championship eight out of nine years. Using robotics as a foundation, MARS encourages West Virginian students to pursue post-secondary education. Attaining this mission is important because currently only 19.8% of West Virginia high school students will earn an associate or baccalaureate college degree. This is considerably less than the U.S. national average of 26.5%. The team is extremely proud that 98% 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 fiscal year period of July 1, 2016 through June 30, 2017.

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 – Dr. Ralph Utzman

Board Member – Herb Baker

Board Member – Mark Lusk

Board Member – Mark Tennant

2. Strategic Focus

2.1 Vision

MARS strives to provide a purpose-driven, creative outlet to 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.
- superior dedication and commitment to team and community.
- highly developed organizational skills.

2.3 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, technical expertise, etc.
- ***Excellence*** - Team members are expected to complete tasks on time with a superior level of quality and workmanship. Everything the team produces is of a high quality and contributes to the team's ability to represent the FIRST community.
- ***Initiative*** - Team members can be counted on to stay on task when supervision is absent. They can be relied upon to recognize work that needs to be done and complete it of their own accord.

- **Drive** – Team members are often compelled by an inner force to succeed and become the absolute best that they can possibly be.
- **Bold** – This is where self-confidence meets enthusiasm. MARS students gain courage 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 in both easy and hard times.
- **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.

2.4 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 that awareness is increased among community businesses and institutions, to build appreciation for FIRST and make it easier for MARS to garner 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 keeps a steady alumni force who are able to mentor

younger students and keep them educated on the team's governing values. This 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 \$90,000 per fiscal year. The team provides year-round teaching for their team members, mentors robotics programs, and attends many community outreach activities (20 in 2016). Given these significant costs, adequate funding through sponsors, grants, and fundraising activities are equally as important to 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 leaving high school.
- ***Being Successful in FRC Competitions*** – MARS gains respect and recognition through its strong competition presence. MARS hopes to uphold this in order to maintain its credibility as mentors 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.

2.5 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 sets its goals and makes adjustments each year. This year, following the new team structure plan (see Section 3.4.6), MARS has created individual outreach task force goals. During the 2016 season, MARS decided to change our

previous five-year goal plan to a three-year goal plan, to fit our quick student turnaround and the team's frequent formation of new and unexpected partnerships and initiatives. Below is the list of MARS' overall team objectives, as well as task force objectives for the next three years.

2.5.1 Overall Team Goals

Year One Goals (FY Ending in 2017)

- Establish at least one new high school robotics team in WV
- 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 2018)

- Establish at least one new high school robotics team in WV
- 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 2019)

- Maintain a 95% post-secondary education attendance rate
- 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

FRC:

Year 1 goals include:

- Create a better organizational structure for Tucker Teams at MARS-attended FRC regionals, for maximum efficiency. Specifically, target communication techniques and pre-competition tool/material preparation.
- Encourage teams that have assisted with Tucker Teams in the past to run their own help-desks at regionals that MARS is not attending.
- Apply for a conference position at the 2017 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.
- 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:

- Holding the Tucker Team conference, formalize informational supplies and post resources to website. Reach out to teams across the country through social media & direct contact, and invite them to hold their own Tucker Team help-desks during the 2018 season.
- Identify opportunities for new FRC teams around West Virginia. Target large cities and FTC/VEX teams that may be interested in transitioning to FRC.

- 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 Team network and update materials as necessary.
- Continue to seek and develop opportunities for new FRC teams around West Virginia. Target large cities and FTC/VEX teams that may be interested in transitioning to FRC.
- 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.

FLL Jr.:

Year 1 goals include:

- Increase the emphasis on and presence of FLL Jr. at MARS-hosted events.
- Add incentives such as small trophies in addition to awards certificates to MARS FLL Jr. Expos.
- Introduce the idea of having a mid-season get-together with FLL Jr. coaches to increase interactions between teams.
- Send out a survey to coaches and team members post-season to allow for modifications to current systems of operations.

Year 2 goals include:

- Improve competitions based off needs and responses from teams and coaches.
- 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.
- Connect local FLL teams with FLL Jr. teams for mentoring and team support.
- Host mid-season get-together with FLL Jr. coaches to discuss the year's game and increase interactions between teams.

- Send out a survey to coaches and team members post-season to allow for modifications to current systems of operations.
- Identify and reach out to opportunities for expanding the FLL Jr. network within WV elementary school curriculum.

Year 3 goals include:

- Continue to improve competitions based off needs and responses from teams and coaches.
- Expand and continue the system of connection between FLL and FLL Jr. teams.
- Send out a survey to coaches and team members post-season to allow for changes/modifications to current systems of operations.
- Further partnerships with the identified opportunities for expanding the FLL Jr. network within WV elementary school curriculum.

FLL:

Year 1 goals include:

- Continue support of state FLL network through means such as funding and mentoring teams. Volunteer as referees and judges at qualifiers and the state tournament.
- Continue holding high-quality competitions.
- Continue to support expansion of state FLL with NASA's IV&V Facility.
- Assist in holding the summer 2017 Mountain State FLL Invitational

Year 2 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.
- 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.
- Create and elaborate on outreach plans to assist the growth of the program.
- Help to manage new events for rookie teams within schools.

- Create a state FIRST team networking website (working title: Mountaineer Robotics Initiative) to connect state FLL and FLL Jr. teams for assistance during build seasons, and offer team and coach resources.
- 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.

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 a national political figure to MARS FLL events and the state tournament.
- Continue maintaining state FIRST team networking website (working title: Mountaineer Robotics Initiative) to connect state FLL and FLL Jr. teams for assistance during build seasons, and offer team and coach resources.
- Advertise the introduction of FLL-based curriculum into middle schools in partnership with NASA's IV&V Facility.
- Continue state growth through the NASA partnership
- Assist in holding the summer 2019 Mountain State FLL Invitational.

Political Action:

Year 1 goals include:

- Maintain communication between MARS and local elected officials.
- Invite local elected officials and school board members to MARS events, specifically the MARS FLL qualifier, FLL state tournament, and the MARS Open House.
- Contact newly elected state and local officials to establish a foundation for future support and partnership.
- Be active members of NASA's political initiatives within WV.
- Begin advocating for FLL and FLL Jr. curriculum to be implemented into local schools.

Year 2 goals include:

- Continue advocating for FLL and FLL Jr. curriculum to be implemented into West Virginia schools.
- Invite local elected officials and school board members to MARS events, specifically the MARS FLL qualifier, FLL state tournament, and the MARS Open House.
- Advocate to WVDE for teachers to be paid, as a sports coach would be, for their time spent leading a school-based robotics team.
- Raise knowledge and awareness of MARS in local high schools by inviting school administrators to the MARS Open House using hand-delivered letters.
- Hold biannual robot showcases to students during lunches.

Year 3 goals include:

- Contact newly-elected state and local officials to establish a foundation for future support and partnership.
- Invite local elected officials and school board members to MARS events, specifically the MARS FLL qualifier, FLL state tournament, and the MARS Open House.
- Continue advertising for FIRST curriculum to be implemented in schools.
- Advocate to WVDE for teachers to be paid, as a sports coach would be, for their time spent leading a school-based robotics team.

Community Events:

Year 1 goals include:

- Make it mandatory for all MARS team members to attend community outreach events during the fall season.
- Attend one additional type of event during outreach season.
- Continue and increase outreach events to surrounding counties.

Year 2 goals include:

- Make it mandatory for all MARS team members to attend community outreach events during the fall season.
- Make more of an impression at outreach events by interacting with community leaders to encourage a sustainable impact of FIRST (i.e. new teams and curriculum expansion).
- Attend one additional type of event during off-season.
- Identify a new activity for community events (such as brush bots) and begin a new biannual cycle of new activity.

Year 3 goals include:

- Make it mandatory for all MARS team members to attend community outreach events during the fall season.
- Make more of an impression at outreach events by interacting with community leaders to encourage a sustainable impact of FIRST (i.e. new teams and curriculum expansion).
- Attend one additional type of event during outreach season.

VEX:

Year 1 goals include:

- Send emails to local VEX teams offering in-person and online help during their season.
- Contact NASA about opportunities for volunteering at state events.

Year 2 goals include:

- Work with NASA in order to run VEX competitions and build a communication network between state VEX teams.
- Have a MARS-owned VEX field in the MARS building that VEX teams will use and for which they can receive mentoring.
- Have a mechanical help desk at every VEX competition in the state for teams that need assistance.

Year 3 goals include:

- Hold a VEX kickoff with NASA for all VEX teams around the state.
- Connect neighboring VEX teams to ensure sustainability and Gracious Professionalism™.
- Work with NASA in order to run VEX competitions and build a communication network between state VEX teams.
- Have a MARS-owned VEX field in the MARS building that VEX teams will use and for which they can receive mentoring.

FTC:

Year 1 goals include:

- Help NASA's IV&V Facility to run, judge, and referee the FTC State Tournament at Fairmont State University.
- Expand FTC initiatives within MARS to build a stronger FTC task force.
- Introduce the idea of progressing to FTC to FLL teams at the state tournament.
- Make FTC resources readily available on the MARS website.

Year 2 goals include:

- Hold an FTC kickoff and invite FLL veterans to attend, to improve FTC visibility.
- Hold a summer camp for FTC teams with NASA's IV&V Facility (FTC boot camp).
- Partner with NASA's IV&V Facility to lead FTC mentoring sessions.
- Continue to help run the FTC State tournament.
- Hold open shop days to allow FTC teams access to MARS' machining resources.
- Make FTC resources readily available on the MARS website.

Year 3 goals include:

- Advertise and spread FTC mentoring sessions.
- Hold a kickoff as well as a scrimmage for FTC teams.
- Make FTC resources readily available on the MARS website.

- Continue to help run the FTC State tournament.
- Hold a summer camp for FTC teams with NASA's IV&V Facility (FTC boot camp).

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 had 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 totality of strategies that MARS implements when building new teams and taking part in general STEM outreach.

1. Engage: Community Presence and Visibility

The first step in this plan is to engage individuals, groups and even communities within our state through visibility. Sometimes our strategy is simply to appear at public events such as baseball games and parades, to increase our visibility in and familiarity with 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 as part of more organized STEM initiatives. STEM nights at schools, summer camps, Museum Science Days, and festivals comprise the majority of our outreach events. In these settings it's easier to talk face-to-face with both youth and adults and help them discover that with a little help, everyone can follow their passions. For example, we partnered with the Children's Museum of West Virginia in the fall of 2015 which took us to approximately five new STEM nights around the area.

At every event, MARS provides general FIRST information (flyers, brochures, etc.) for the public, as well as stickers, buttons, and patches to increase visibility even more. To keep

consistency and a uniform image at these events, MARS students always wear MARS gear and act in an organized and professional manner.

At all outreach events, MARS students demonstrate and explain 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 make efforts to explain design decision and systems. We often add an interactive activity when there is a more hands-on component required for the event. For the past two seasons, our activity combined both a craft and the construction of a small robot which drew with markers. These "Doodle Bots" were very popular with our audience. We are developing a "Brush Bot" activity for the upcoming outreach season.

During the year, our team attends approximately 20 outreach events around the state. In addition to our FLL Jr., FLL, and FTC outreach efforts.

2. Inspire: Starting FIRST/STEM Teams

If parties show interest in starting a robotics program, MARS stays in contact with them through a delegated student or mentor. One of the first steps in forming a new team is to provide both local and national resources. We provide informational documents as well as contact information to interested individuals. We also provide instruction for coaches along with our partners at NASA's IV&V Facility.

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

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 and help them get started. This includes MARS providing direct funding as well as locating other potential sources of funding to sponsor these teams.

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

One of our most important initiatives 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 e-mail 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. They can use practice tables and get help with programming 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. MARS students then become the 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 just have questions that they need answered before the next large group practice. Sometimes our students communicate only through e-mail, 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.

We provide travel funds for FLL/FTC students so that the expense of travel to the FIRST championship is not overbearing. This encourage 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 (13 programs to date). 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 education on a personal, immediate level for our team members as well other FIRST teams is the key to our students' success.

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 now 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.

Finally, MARS provides information and advocacy for college attendance. We share information (both to our students and other teams) about scholarship opportunities and partnered with WVU and Fairmont State University help students obtain scholarships at these regional institutions.

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. 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, 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 Children's Museum of West Virginia and attended five STEM nights at local elementary schools, plus four more events through local after-school programs.

In MARS' ninth season, 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 Children's Discovery Museum of WV, MARS attending 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 Phillipines. 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.

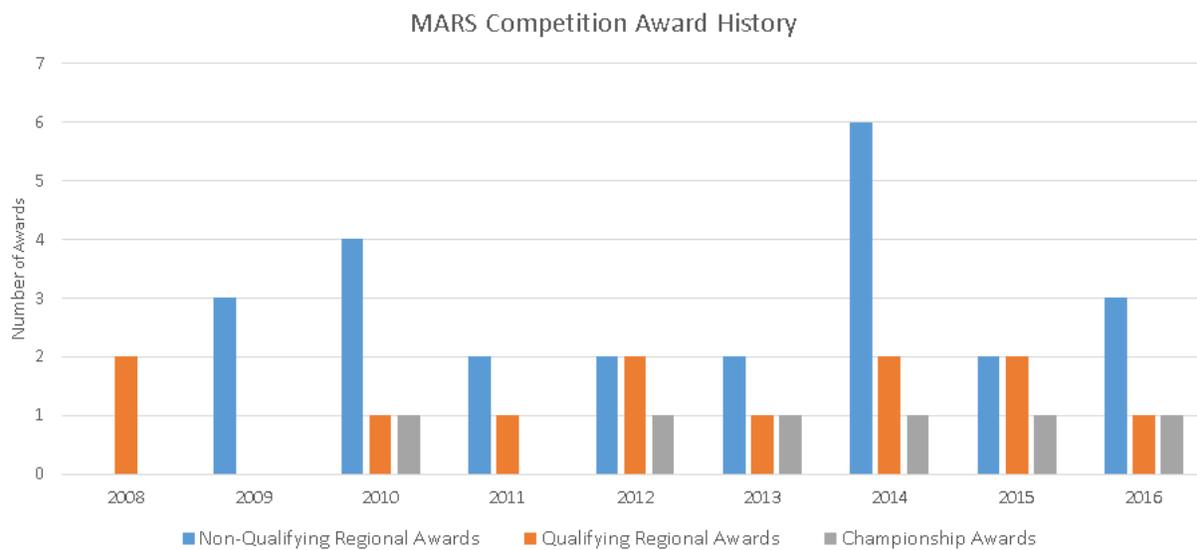
To date, the team is 44 members and 29 core mentors strong, with the program rapidly expanding. With nearly a 3:2 student-to-mentor ratio, MARS offers a personalized learning experience for their students. Almost all the graduates have advanced into post-secondary education with either a full or partial scholarship, and many of them are 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

In addition to attending many competition events, MARS has seen incredible success on and off the field. While the primary focus of the organization is to build youth into productive members of society, the team also actively works to be the best they possibly can be. 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
Regional Chairman's	2012, 2014, 2015, 2016
Regional Finalist	2012, 2014, 2016, 2016
Regional Winner	2008, 2012, 2014, 2015
Rockwell Automation Innovation in Control	2009, 2009, 2010, 2010, 2012
Rookie All-Star	2008
Website Excellence	2009
Woodie Flowers Finalist	2011, 2015
World Championship Subdivision Finalist	2015
World Dean's List	2010

World Entrepreneurship	2013
World Innovation in Control	2014
World Gracious Professionalism	2016
World Woodie Flowers	2012
Xerox Creativity	2014



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 29 core mentors, including 12 college mentors. Below is our complete mentor roster divided by the functions they perform for the team.

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

<u>Sub-Teams</u>		<u>Mentors</u>
Mechanical	Design	Dr. Earl Scime
	Fabrication and Shop	Dr. Todd Hamrick Herb Baker Diane Raque Dr. Earl Scime
	Building Management	Mark Tennant Aaron Kitzmiller
Programming	Software	Steve Raque
	Beta Testing	Steve Raque
Outreach and Public Relations	Photography	Trish Vos Kari DeMicco
	Video	Trish Vos Alex Stout
	Business Plan	Kari DeMicco Beth Thompson
	Animation	Everett Daly
	Chairman's Award Submission	Trish Vos Kari DeMicco Alex Stout Alex Bonnstetter Beth Thompson
	Fundraising	Dr. Earl Scime Debbie Baretto Herb Baker Kari DeMicco
Outreach	FIRST/VEX	Dr. Earl Scime Ryan Utzman
	Website	Dr. Earl Scime
	Community	Sharda Mohammed Trish Vos

	Workshop Organization	Alex Bonnstetter
	WVRoX (24 Hour Event)	Mark Tennant Trish Vos
	T-Shirts, Paraphernalia	Kari DeMicco
	MMS/GPM	Dr. Earl Scime
Competition	Driver Training	Dr. Earl Scime Ryan Utzman
	Scouting	Steve Raque
	Pit Area Structure	Herb Baker Mark Lusk Dr. Earl Scime
	Hotels and Travel	Maggie Sorensen Trish Vos Diane Raque

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 holds the Outreach/Public Relations team and the Outreach Task Forces (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.

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 the code for the autonomous and tele-operated functions of the robot. The team learns the LabVIEW and C++ programming languages during the off-season and works on programming the robot during the season. This team is also involved in the development and workings of various sensors and electronics.

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.

3.4.4 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 video that complements the Chairman's award submission, as well as others for promotional purposes. 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. The team works 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 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 interact with the Scouting team and the Pit Crew.

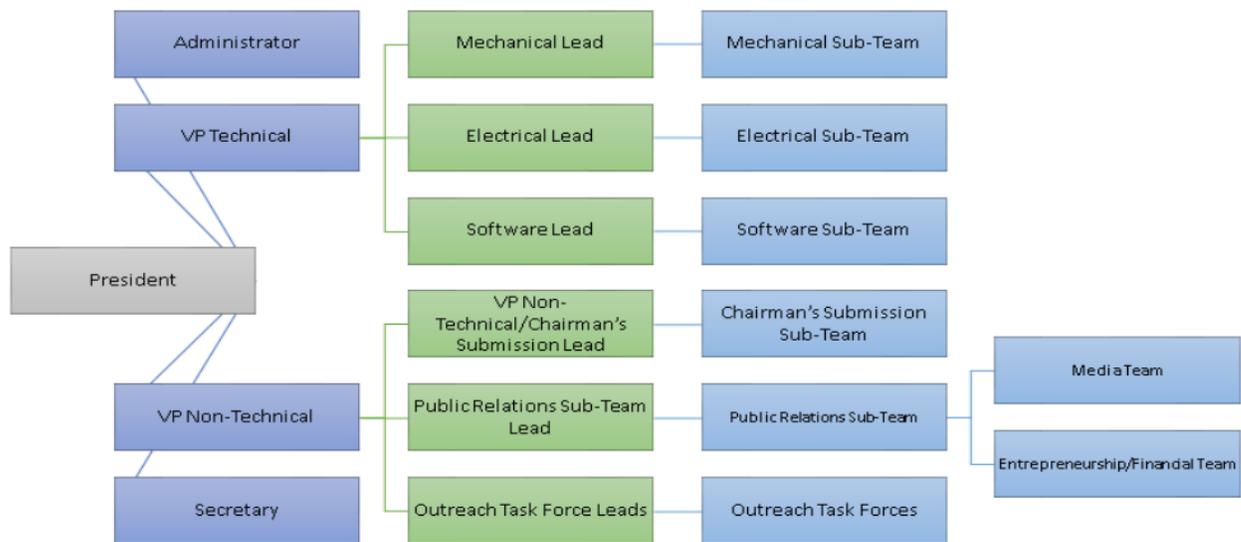
Scouting Team: Students on this team develop materials and methods to assess teams at competition, providing the Drive team with as much advantage as possible when choosing alliance members. At the competition, this team makes presentations to the drive team on Thursday and Friday evenings.

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 at their best. 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. MARS also hoped to create a more official system for delegating non-technical tasks to make outreach and public relations a more vital part of the experience for all student 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 general team meetings
 - *Administrator:*
 - Keeps the council on track and in line with MARS' policies 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
 - Schedules council meetings
 - Organizes and documents lower level meetings as needed
 - *Vice President (Technical):*
 - Speaks for all technical sub-teams
 - Hosts meetings to ensure communication among technical sub-team leads
 - *Vice President (Non-Technical):*
 - Speaks for all non-technical aspects, personnel, and task forces
 - Host meetings to ensure communication among all sub-team and task force leaders
 - Floats among task forces
 - Acts as head of the Chairman's Submission Task Force

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
- Chairman's/Awards Submission 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 Task Force
- FIRST Robotics Competition Task Force
- VEX Robotics Task Force
- Community Events Task Force
- Political Action 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. FIRST Green e-watt saver LED light bulbs and custom LEGO® models of NASA's Magnetospheric Multiscale Satellite spacecraft and NASA's Global Precipitation Measurement space probe are just some of the ways MARS funds their team.

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:

- Over 100 FLL teams in 27 counties of West Virginia started 18 FLL Jr. teams
- "Technology for All" program in India
- FLL program in the Philippines
- Organizes and Staffs FLL Qualifiers and State FLL/FTC Tournaments
- Robotic Demonstrations at:
 - Trans Tech Energy Conference
 - Rocket Boys Festival, *Dominion Post* Fall Festival
 - Elementary/Middle School STEM Nights
 - Board of Education, Rotary Club, United Way
 - MARS Open House

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 100 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 started 18 FLL Jr. teams. 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. For more information on the team website, please visit the website at 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 with both students and mentors at every FRC regional competition. This can assist rookie teams with problems they may be experiencing in any aspect of the competition (Tucker Teams). In partnership with West Virginia University, the team also hosted the world's first 24-hour FRC event in August of 2014. With the event's success, the team made this a biannual event, so the second 24-hour FRC event was held in Morgantown in 2016. Additionally, MARS and NASA's IV&V Facility are running the Mountain State International FLL Invitational starting summer 2017 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 is currently mentoring a team 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	<ul style="list-style-type: none"> ● Funding ● Mentors ● Alumni ● Facilities ● Team Character ● Team Structure ● Team Image 	<ul style="list-style-type: none"> ● Disconnect from History ● Internal Communication Breakdown
	Opportunities	Threats
External Environment	<ul style="list-style-type: none"> ● STEM Programs in Schools ● Rural Communities inside West Virginia ● Nationally & Internationally Underserved Areas 	<ul style="list-style-type: none"> ● 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 29 core 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 seven 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, as students turn over from year to year, 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, communications can weaken between the sub-teams. MARS is combating this by holding weekly team meetings, daily 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.

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 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 Phillipines 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.

7.1.4 Threats

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.

Macroeconomic Fluctuations - In addition to the facility, technical and educational need 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 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, PhD. and Mr. Phil Tucker. In 2015, MARS lost Mr. Tucker. While Mr. Tucker's loss was a major hit 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. Should MARS also face the loss of Dr. Scime, it is likely that the team would struggle to survive.

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

Active logo link 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

Active logo link 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 2016-2017 Sponsor List

Below is a list of sponsors for the 2016 - 2017 season.

- WVU Department of Physics and Astronomy
- WVU Benjamin M. Statler College of Engineering and Mineral Resources
- WVU Department of Mathematics
- NASA IV&V Robotics Alliance Project
- Monongalia County Board of Education

- WV Space Grant Consortium
- United Way
- Best Buy
- Mylan Pharmaceuticals
- Aurora Flight Sciences
- Dynergy
- Cheat Lake Rotary
- Pratt and Whitney Canada
- Halliburton Energy Services
- STEM Enterprises
- EQT
- Wilson Works
- National Instruments
- AECOM
- Sextant Technical Services
- Compton Metals
- Mountaineer Boys and Girls Club
- Phillip M. Tucker Memorial Fund
- Tanner's Alley
- Sheehan and Nugent, PLLC
- KeyLogic
- MedExpress
- Commercial Land Trust
- M&S Consulting
- TransTech Energy Conference
- Animal Medical Center
- Dassault Systèmes
- Daniel Hill

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 \$20,000.00 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 \$70,000.00.

8.2.3 Fundraising

MARS fundraising activities comprise local and internet sales of LED light bulbs, LEGO MMS models and the new LEGO GPM models. The projected funding through these avenues is expected to be \$1,000.00.

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 ~\$20,000.00.

9. Financial Plan

MARS needs 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 2015 and FY 2016. The team's fiscal year runs from July 1st to June 30th.

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 they have 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 fiscal year. In FY 2015, MARS had a slight deficit, but had enough funding from FY 2014 carryover to cover program expenses. Since these statements were created with data up to January 1st, 2017, FY 2017 does not include outflows for additional promotional materials, travel expenses and robot construction, and any potential inflows for the Jan 1st-June 30th time frame.

Surplus and Deficit			
As of January 1st, 2017			
	FY 2015	FY 2016	FY 2017
	7/1-6/30	7/1-6/30	7/1-12/31
Funding	\$85,538.06	\$110,394.04	\$81,140.78
Expenses			
Payroll	\$0.00	\$0.00	\$0.00
Promotion	\$3,106.59	\$6,663.31	\$96.00
Depreciation	\$0.00	\$0.00	\$0.00
Operations	\$1,364.53	\$1,498.26	\$1,974.35
Equipment	\$5,384.03	\$441.12	\$2,693.13
Event Registration	\$14,777.54	\$18,875.00	\$9,000.00
STEM Support	\$16,041.15	\$19,437.03	\$10,063.87
Robot Construction	\$19,332.34	\$7,966.90	\$1,084.10
Travel	\$29,263.57	\$23,701.62	\$12,280.56
Total Operating Expenses	\$89,269.75	\$78,583.24	\$37,192.01
Surplus Before Interest and Taxes			
EBITDA	\$89,269.75	\$78,583.24	\$37,192.01
Interest Expense	\$0.00	\$0.00	\$0.00
Taxes Incurred	\$0.00	\$0.00	\$0.00
Net Surplus/Deficit	-\$3,731.69	\$31,810.80	\$43,948.77
Net Surplus/Deficit ÷ Funding %	-4%	29%	54%

Note: Our fiscal year runs from July 1 to June 30th. Since these statements were created with data up to January 1st, 2017, FY 2017 does not include outflows for additional promotional materials, travel expenses and robot construction, and any potential inflows for the Jan 1-June 30th time frame.

9.2 Statement of Financial Position

The Statement of Financial Position provides a snapshot of the assets, liabilities, and owner's equity of MARS as of January 1st, 2017. Currently, MARS holds no liabilities or investments, so only the team's assets are included on the statement below.

Statement of Financial Position	
As of January 1, 2017	
	FY 2017
<i>Assets</i>	
Cash	\$85,968.82
Total Assets	
<i>Liabilities and Capital</i>	
Liabilities	\$0.00
Total Liabilities	
<i>Net Worth</i>	\$85,968.82

9.3 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	
	FY 2017
	7/1-12/31
Cash Received	
Operations	
Cash Funding	\$81,140.78
Subtotal Cash From Operations	\$81,140.78
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	\$81,140.78
Expenditures	
Expenditures from Operations	
Cash Spending	\$37,192.01
Subtotal Spent on Operations	\$37,192.01
Additional Cash Spent	\$0.00
Sales Tax, VAT, HST/GST Paid Out	\$0.00
Principal Repayment of Current Borrowing	\$0.00
Other Liabilities Principal Repayment	\$0.00
Long Term Liabilities Principal Repayment	\$0.00
Purchase Other Current Assets	\$0.00
Purchase Long-term Assets	\$0.00
Dividends	\$0.00
Subtotal Cash Spent	\$37,192.01
Net Cash Flow	\$43,948.77
Cash Balance	\$85,968.82