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ThinkTank: Introducing a Centralized Resource System to the *FIRST* Community

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by

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Abstract

The *FIRST* Robotics Competition was founded to inspire students and promote the education and involvement of young adults in science and engineering, where students, teachers and professionals could build a new robot to compete in a new game every year. One of the biggest hurdles a *FIRST* student faces when designing is obtaining solid technological information and connecting and working with others. To help overcome these obstacles, the project team designed and tested a social networking website to allow the members to share knowledge and skills, and resources that are beneficial in all aspects of building a robot and running a team. This website, the “ThinkTank”, contains articles and community features, and a framework to accommodate more tools for the ever changing community and its needs. Testing found that, while teams were enthusiastic about the concept, the website itself was not ready and as such the results from the tests proved inconclusive. The website will need the help of the web development team and *FIRST*, in conjunction with the user base, to add features and content, respectively.

Authorship

D Term 2008

Mike-

- Site Brainstorming
 - Background
 - Planning Phases
- Helped with Atlanta Presentation
- Administered Survey at FIRST Championship

Jon-

- Site Brainstorming
 - Background
 - Planning Phases
- Helped with Atlanta Presentation
- Wrote Atlanta Survey
- Created and Managed the Survey Monkey Survey
- Presented at Robotics Conference
- Administered Survey at FIRST Championship
- Created Posters for FIRST Championship

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- Presented at Robotics Conference
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- Organized meetings with web dev team

A Term 2008

Mike-

- Helped test pre-beta website
- Uploaded ~25 articles from RRC
- Team Contact and Followup
- Wrote ThinkTank Vision Statement
- Co-wrote pre-beta survey
- Tracked beta team responses
- Wrote weekly project updates

Jon-

- Helped test pre-beta website
- Moderator of FIRST Forum
 - Setup Forum privileges with FIRST admin
 - Approved users and posts
- Wrote and Uploaded “Solidworks 2007 Basic CAD Class” article
- Uploaded ~15 articles from RRC
- Setup Zoomerang account
- Team Contact and Followup

Evan-

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- Helped test pre-beta website
- Moderator volunteer solicitation and setup
 - Contacted, confirmed and assigned supertags
- Wrote moderator documentation
- Wrote article style guidelines
- Wrote site registration documentation for beta teams
- Co-wrote pre-beta survey
- Wrote registration survey
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- Wrote and uploaded “Basic Shop Safety” article

Dan-

- Team Contact and Followup
- Wrote email blasts
- Tracked beta team responses
- Helped test pre-beta website
- Organized meetings and communicated with web dev team

B Term 2008

Mike-

- Approved uploaded article to ThinkTank
- Co-wrote usability survey
- Wrote “User Profile” guidelines
- Helped distribute Assignments to Teams
- Solicited post-beta testers
- Replied to Beta-Team Emails
- Solicited post-beta testers
- Team Management

Jon-

- Moderator of FIRST Forum
 - Approved users and Posts
- Approved uploaded article to ThinkTank
- Co-wrote usability survey
- Helped distribute Assignments to Teams
- Solicited post-beta testers
- Replied to Beta-Team Emails
- Team Management

Evan-

- Moderator Coordinator during beta
 - Approved on USFIRST forums, sent email blasts, personal dialogues
- Wrote moderator survey
- Compiled and maintained known bug list
- Wrote bug report survey
- Approved uploaded articles to ThinkTank
- Wrote post-beta survey
- Solicited post-beta testers

Dan-

- Team Management
- Co-wrote usability survey
- Wrote and distributed assignments to teams
- Solicited post-beta testers
- Replied to beta team emails
- Organized meetings and communicated with web dev team

Paper Sections

Mike-

- Abstract
- Executive Summary
- “Goals” and “Phases” sections of Introduction
- “Overview” and “Social Networking” sections of Background
- Recommendations

Jon-

- “Survey Techniques” section of Background
- “Atlanta Presentation”, “IRB and Consent Forms”, “Usability Surveys”, and “Full Launch” sections of Methodology
- Appendix H

Evan

- “Focus Groups” section of Background
- “Overview”, “Identify Need”, “Pre-, Mid-, Post- and Moderator Survey”, and “Website Feedback and Modification” sections of Methodology
- Appendices A, B, C, E, F and G

Dan-

- Cover Page
- Table of Contents
- “Beta Site Preparations” section of Methodology
- Results
- Conclusions
- Appendix D
- Paper Assembly

Executive Summary

The *FIRST* Robotics Competition is a high school program started in 1989 to promote science and engineering among students by challenging them to build competitive robots each year. At the most recent count, there are over 42,000 students across 1,680 teams.¹ The competition brings these people together with mentors and professional engineers, and they strive to build functional teams and robots.

Although designs and ideas diffuse through the internet and regional competitions, there is a lack of solid resources and repositories of reliable information. This is likely due to a combination of factors involving money and available personnel. *FIRST*, as an organization, keeps a very small staff and has an incredibly dedicated volunteer base. Because of this, *FIRST* almost certainly does not have the time, manpower or technical facilities to develop and maintain their own resource site. Teams themselves also do not possess the ability to develop and run such a site and, without the backing of *FIRST*, would also not be able to call themselves “official”.

This void is the focus of the project: to bring dependable data to the community, and to encourage the sharing of resources both locally and globally. The ThinkTank is a social networking community that allows users to post relevant and informative articles and rate, utilize and build off of existing content.

There currently exist three primary electronic resources for *FIRST* information: Chief Delphi, the Robotics Resource Center at WPI and usfirst.org. Chief Delphi, a forum-based website run by Team 47, which also includes a place for uploaded technical documents. The Robotics Resource Center, hosted by Worcester Polytechnic Institute, is a repository of presentations and documents, but lacks search and communication features. Usfirst.org is the

¹ US FIRST, 2008 FIRST Robotics At-A-Glance, Brochure, 2008,
<http://usfirst.org/uploadedfiles/who/media_center/frc_assets/2008/08_frc_ataglance.pdf>.

official website of *FIRST* and includes game manuals and rules updates, general registration pages, and some resources for starting and maintaining teams. What is missing from these websites are collaboration and community features that are coupled with a reliable repository of information.

Social networks are already very prevalent on the internet; websites like MySpace and Facebook bring friends and those with similar interests together, encouraging contact via public or private messaging systems. Digg is another style of social network, based on news and articles and the exchange of information, where users submit articles and the community rates and promotes exceptional sources. Digg's type of social network is very similar to the style that was settled upon for this project. Users promote articles they like and the community generates the content and most of the mediation, with some help from approved moderators. Users can bookmark articles and have personalized profiles, displaying only the information they want to share. Articles are sorted by tags and can be useful when searching for an article in a particular category.

The ThinkTank website was initially conceived as a social network, specifically for the *FIRST* community, in order to increase communication and collaboration between competition participants. Before initial development began, a series of focus groups, led by Professor Jim Doyle in January 2008, discussed continued team participation in *FIRST*, as well as the desired type of content and features that should be present on the website. Key problems identified by the focus groups pertaining to team retention and technical resources included a lack of dependable resources and information, problems with schools filtering web content, and limited methods of communication between team members. The rate of new team acquisition is very high, but maintaining teams can be difficult when resources such as money and materials are

sparse. Providing teams with information and resources to help deal with these problems would be a great benefit to teams and the *FIRST* program overall. Some focus group participants expressed concerns with schools filtering web content to protect the students from inappropriate content. These filters unfortunately sometimes blocks helpful and relevant resources, and could cause problems with access to the new website. Specific features desired in a new website in the meetings were organized and searchable pages, reliable ratings, new and refreshing tools, and school accessibility.

After the focus groups, the project team took the results, as well as research on existing social networking websites, and developed a concept website to incorporate many of the features discussed. The project group then prepared to present the concept website to the community at large and conduct surveys to get additional feedback before finalizing the website. Before surveying, each member of the project team had to complete an online course to ensure knowledge of the rights of human subjects. Then, in April, 2008 the group traveled to Atlanta, Georgia for the *FIRST* Robotics Championship to deliver a presentation on the project and survey the community. The goal of the presentation was to show the public the current vision for the project and to gather feedback and suggestions on proposed website feature implementations or new feature ideas. When analyzing results, errors such as coverage, sampling, measurement and nonresponse had to be considered and correctly handled to ensure accurate conclusions.

After the results from the Atlanta surveys had been analyzed, a final list of features was developed. A decision was made to split the website into three distinct sections, addressing technical reference documents, inter- and intra-team communications, and inter-team file management, respectively. The technical reference documents section was to be the first section released, and would be based around “Articles”. Each article would be a document, video,

presentation or other form of media based in one of several general topics related to the *FIRST* Robotics Competition. Articles would have a title, abstract, the main article content and some number of optional resources (such as external links, photos or CAD files). The Article section would also provide the overall structure of the website, as well as the initial user and team registration, overall interface layout, and settings and preferences. Also planned for implementation with the articles section would be an “ask the experts” feature that would allow users to submit questions and receive responses from pre-approved subject-matter experts.

Communication both within and between teams would be addressed in the second phase, known as the “Team Portals”. This phase would be broken up into three specific components: the public team, private team and volunteers. The public team portal would be a series of pages with team-generated information, media, submitted articles and event schedules. These details could be made publicly available only if the team’s main contact chose to make it so. The private team portal would only be available to users registered under the team. Lastly, a special section of the portals would be dedicated to those who volunteer at events but who may not be associated with a team.

The last major section of the website would be the team document manager. This was intended to be a repository feature, based around Microsoft SharePoint, and was subsequently dubbed the “SharePoint” section. This feature would allow a team to upload to a central location and make keeping track of files and revisions as simple as possible. This system was designed with CAD models, award submissions and code in mind, but would not be limited to those.

In April, 2008, the list of desired features were handed to the Worcester Polytechnic Institute web development department to design and build the website. The website’s three main sections were to be released in order, to the *FIRST* competition community, as: ‘Articles, ‘Team

Portals' and 'SharePoint'. The decision to split the release of website features was to allow time to design and test separate components before releasing them for public use. Although the project group and Web Development team conceptualized the aforementioned phases, this project's timeline ended after the launch of the first phase. At the time of writing, only the first phase, "Articles" is implemented.

The first phase was tested under a private beta test to examine the idea and execution of the project. Thirty teams participated, some having been chosen randomly and some selected to cover as wide a demographic range as possible. The beta test lasted for several weeks and uncovered bugs in the system and feedback for streamlining the site layout, such as a more intuitive article submission interface and more visible signup links.

The goals of this project were to bring reliable technical and team information to the *FIRST* community and develop tools to facilitate communication and teamwork between teams. Based on feedback from users in the beta test and Atlanta surveys, the ThinkTank is rapidly progressing towards that goal. The results from the beta test were inconclusive, however, and the project team recommends additional testing before it will be ready for public announcement. In addition, the website will need full time moderators and administrators, to be provided by *FIRST*, the Robotics Resource Center at WPI, and the WPI web development office, in order to remain functional.

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1 Introduction

The *FIRST* Robotics Competition is an annual competition that lets high school students run a team and design and build competition-quality robots alongside mentors such as teachers and professional engineers². The goals of the competition are to inspire students to pursue careers in science and technology, and the community has been growing at a rapidly increasing pace since the first competition in 1992^{3, 4}, with over 40,000 students active on teams spanning the world. The *FIRST* Robotics Competition currently hosts official competitions in four countries: the United States, Canada, Brazil and Israel. Communication and collaboration are a huge part of the *FIRST* Robotics community. Whereas most competitions are generally focused on overcoming opponents and coming out on top, *FIRST* pushes its participants to link together and help each other succeed. The goals of the program are not solely based on winning, but also working with and supporting the rest of the community. Interacting with and learning from others are as important in the *FIRST* Robotics world as they are in the business sector, encouraging new ideas and product evolution.

Unfortunately, every year teams drop out of the competition due to lack of interest, money or mentorship. In 2008, only 91% of teams returned, meaning 117 teams were unable to continue to participate. This project, in conjunction with *FIRST* and the National Science Foundation, aimed to lower the barriers to entry for teams, improve team retention rates and provide quality information for the *FIRST* community by developing a social networking website

² "Who We Are," USFIRST.org, <<http://usfirst.org/who/default.aspx?id=34&LinkIdentifier=id>>.

³ US FIRST. The FIRST Robotics Competition, Brochure, 2007.

<http://usfirst.org/uploadedfiles/community/frc/frc_communications_resource_center/communication_assets/2007_archive_assets/02_frc_competition_lores.pdf>.

⁴ US FIRST, 2008 FIRST Robotics At-A-Glance, Brochure

called the ThinkTank. In addition, the website hopes to improve the traditionally low rates of participation by minorities and women in the engineering disciplines⁵.

The sharing of resources and community networking are the primary focus of the website. The goal of the project is to provide a centralized location for sharing and viewing articles and information relevant to *FIRST* team interests. By offering such services, the project group hopes to supply a system that supports communication and the exchange of ideas, designs and opinions, and will succeed in attaining and retaining more teams.

There are currently three main web-based resources for information and communication that are specifically focused on the *FIRST* competition: usfirst.org⁶, first.wpi.edu⁷ and chiefdelphi.com⁸. The first of those hosts rules updates and other official statements from *FIRST*, in addition to providing some technical documentation and team management resources. The website does not concentrate on providing technical help or communication solutions as much as it focuses on registering for or finding information on regional events, game rules and generalized program information.

The second source, first.wpi.edu, also known as the *FIRST* Robotics Resources Center, is a repository of helpful presentations, basic technical information, and team dynamics help, broken down by category (Technical, Non-Technical, the New Control System and subcategories). The breadth of information is limited on this resource and there is no adequate means by which to search the database. Also, like usfirst.org, there are no collaboration tools, and it exists solely as a warehouse for a few reliable pieces of data.

⁵ More Than Robots: An Evaluation of the FIRST Robotics Competition Participant and Institutional Impacts, Apr. 2005, Brandeis University, http://usfirst.org/uploadedFiles/Who/Impact/Brandeis_Studies/FRC_eval_execsum.pdf, 3.

⁶ USFIRST.org - Welcome to FIRST, <<http://www.usfirst.org>>.

⁷ FIRST Robotics Resource Center, 10 Dec. 2008, Worcester Polytechnic Institute, <<http://first.wpi.edu>>.

⁸ Chief Delphi – Portal, <<http://www.chiefdelphi.com>>.

Chief Delphi (www.chiefdelphi.com) is a forum based website, allowing anyone with a valid email address to sign up and post opinions and information they feel is valid. Other users have the capabilities to discuss and challenge claims and opinions, sometimes leading to an aggressive or vulgar communication thread requiring moderation. Moderators also have the ability to flag inappropriate content at their discretion. The ‘White Papers’ section of the website contains uploaded content, but even though the content is generally reliable, there is no requirement to verify claims. The information on this website is often hard to search due to the forum format, and it can be difficult to differentiate verified facts and figures with personal opinions.

These three resources touch upon the two topics of collaboration and reliable information, but separately none of them manage to mesh both parts. Communicating and working together with others is worthwhile, but can be problematic if the information cannot be fully trusted. In order to develop a website that would fill the perceived void and improve online communications, focus groups and multiple surveys were conducted, focusing on what the community wants from a new online resource, and what kinds of features would meet this need. The project group presented a concept website to the community at the *FIRST* Robotics Championship conference, gathered feedback and then developed a final set of features. The web development office at the Worcester Polytechnic Institute then designed and implemented the features for a private beta test of the ThinkTank website, conducted by the project group. It was hoped that the results from this initial test would provide feedback on the website with regards to meeting the goal of lowering entry and retention barriers by providing a new and reliable source of additional help and information for participating teams. At the conclusion of the beta test, the

project group provided suggestions for future work and set forth a plan for the continued operation and testing of the website.

2 Background

2.1 Overview

The project group researched existing social networking sources and FIRST community websites in preparation for designing both the feature set and user interface for the new website. This investigation would provide the background needed to create a social networking website that caters to interaction and data exchange within the FIRST community environment. In addition, because multiple surveys would be conducted throughout the design and testing of the new website, the project group reviewed proper surveying techniques and survey design principles to ensure that the survey results would be as accurate and useful as possible.

2.2 Social Networking

A social network is defined as a website to connect with people who share personal or professional interests, place of origin, education at a particular school, etc.⁹ Facebook¹⁰, MySpace¹¹, Classmates.com¹², LinkedIn¹³, Digg¹⁴ and Slashdot¹⁵ are a few of the more popular social networking websites. Digg has had 29 million unique active users, while Facebook and MySpace have nearly 60 million each.¹⁶

Recent research into social networks has shown strong correlations between an individual's participation in a network and improved performance in related areas. A study on

⁹ "social network," Webster's New Millennium™ Dictionary of English, Preview Edition (v 0.9.7), Lexico Publishing Group, LLC., <Dictionary.comhttp://dictionary.reference.com/browse/social network>.

¹⁰ Welcome to Facebook!, 4 Feb. 2004, <http://www.facebook.com>.

¹¹ MySpace, 2003, <http://myspace.com>.

¹² Find a Friend - High School Military College Class Reunions, 1995, <http://classmates.com>.

¹³ LinkedIn: Relationships Matter, 2003, <http://linkedin.com>.

¹⁴ Digg - All News, Videos, & Images, 2004, <http://digg.com>.

¹⁵ Slashdot - News for nerds, stuff that matters, 1997, <http://www.slashdot.org>.

¹⁶ "SnapShot of digg.com (rank #21), facebook.com, myspace.com (#10) - Compete." SnapShot of oldnavy.com (rank #344), gap.com (#593), bananarepublic.com (#1,246) – Compete, 2009, <http://siteanalytics.compete.com/digg.com+facebook.com+myspace.com/?metric=uv>.

the effects of social networking on students' academics looked at how three different types of online social interactions on a forum affected students' performance in a course¹⁷. In the study, friendship relations, advising relations and adversarial relations were all tested. For the purposes of the study, friendships were defined as those where the primary goal is to start and maintain a personal relationship with another individual. Advising relations were taken to be those in which the objective was the furthering of knowledge on a specific topic through interactions with peers. Adversarial relations were any interaction that involved negative exchanges and caused increased stress or anger. The results of the study showed that friendship relations had little to no effect on individual performance, while the advising and adversarial relations had positive and negative effects, respectively. While the *FIRST* competition is not strictly an academic endeavor, it has many correlations to academia, most notably to the science and math curriculums and its applications, and it can be extrapolated that an advice-based social network would be beneficial to teams.

Increasingly, people are using social networking websites to maintain relationships with their friends and acquaintances¹⁸. They can communicate and interact in a virtual environment at any time, without the need for physical co-location. The ability to socialize and interact across physical barriers is invaluable, whether the purpose is to teach, collaborate on a project or to simply talk with an old friend. It is these first two abilities, that of improved education and teamwork over large distances, is the most important with regards to the ThinkTank website and the goal of improving resources available for teams participating in the competition.

¹⁷ Yang, Heng-Li, and Jih-Hsin Tang, "Effects of Social Network on Students' Performance: A Web-Based Forum Study in Taiwan," *Journal of Asynchronous Learning Networks* 7 (2003): 93-107, The Sloan Consortium, <http://www.aln.org/publications/jaln/v7n3/pdf/v7n3_yang.pdf>.

¹⁸ Boyd, Danah. *Why Youth (Heart) Social Network Sites: The Role of Networked Publics in Teenage Social Life*, Rep, 2007, University of California – Berkeley, <<http://www.danah.org/papers/WhyYouthHeart.pdf>>.

From a usage standpoint, social networking websites include members from all age demographics, as found in a study by Ofcom¹⁹. In addition, the report found that usage varied very little between socio-economic groups. Recently, such sites as Sagazone²⁰ have launched targeting the over-50 demographic specifically. This non-dependence on age or socio-economic standing provides a strong case for the usage of such a site in a highly technical but very diverse population such as that found in the *FIRST* community.

The online communities come in many varieties to address specific desires or needs of the internet community at large. Facebook, MySpace and Friendster allow users to send private and public messages, post pictures, add friends and details of activities and relationships, all from one website and interface. Users communicate through many different formats, which usually include web-based forums, email or instant messaging. People the world over can meet new people based on current friends and interests and contact them instantly. Classmates.com follows a similar model, acting as a hub for searching for and reconnecting with long lost friends and, like the name implies, classmates.

2.2.1 Digg

Digg is another social network, but one which has a very different business model than those sites in the 'Facebook' category, and is the most relevant to the project. Instead of focusing on meeting and connecting with people, Digg focuses on sharing information and new discoveries with other users²¹. It was started by a TechTV show host, Kevin Rose, with a heavy interest in computers, gadgets and technology. The core of this system revolves around users posting links to news articles and stories about technology and the rest of the community

¹⁹ Social Networking, Rep, 2 Apr. 2008, Ofcom, <http://www.ofcom.org.uk/advice/media_literacy/medlitpub/medlitpubrss/socialnetworking/report.pdf>.

²⁰ Saga Zone | Social Networking | Over 50's, 2008, <<http://www.sagazone.co.uk>>.

²¹ "Digg – Overview," Digg - All News, Videos, & Images, 2004, <<http://www.digg.com/about/>>.

promoting articles they are interested in. The number of users that link a specific article is tracked, and this is called a 'Digg Count'. The articles are rated through this 'Digg count' and if the article accumulates enough it will reach the front page of the website, which typically means a sudden, unexpected influx of hits.

With such an expansive range of information, sources and subjects it would seem that reduced integrity and quality of the articles on Digg would compromise any trust users might have in such a system. While some stories come from CNN, NYTimes, Washington Post, and other relatively 'safe to trust' sources, there will always be lesser known sources. Spam, bias and incorrect information are big problems, but thanks to moderators, comments and an option to bury an article this is rarely a problem for Digg. The bury command works in a similar way to the Digg option, but in reverse. When a story is buried, it is grayed out and set aside from the rest of the articles, influencing the 'Digg count', and whether or not it goes to or stays on the front page. This system of checks and balances helps ensure that articles are of high quality and can be trusted as accurate.

When Digging articles, they are added to the users' profile, similar to bookmarks, and can be seen by friends or the general public depending on user set privacy controls. Each article is associated with categories, or general tags to help group similar articles and make searching for specific ones quick and easy. Such categories include Design, Gadgets, PC games, Politics, Sports, World news and Business. Articles are custom sorted and recommended through an analysis of a user's preferences in articles and groups.

When submitting a story, the user starts by inputting the web address and selects if it is an article, picture or video. The next steps are to create a title, select topics and appropriate tags and finally to write a short summary or abstract. Although the article bookmarking, tags and

organization is all done through Digg's network, it does not actually host the content. This becomes a problem when links change or websites go down over time. Should this happen, users will search for and usually provide an alternative source for the content and post it in the comments. Unfortunately, there is no official Digg mirror for articles and the only real way to view a dead story is to wait until it goes back online or someone posts another link.

While Digg is not a strictly advice-based network, it does bear many similarities, the most important being the sharing of new and interesting information through a community-selection method and "ranking" of article. Of the most popular existing social networking websites, Digg was the closest model to what the ThinkTank hoped to achieve, and was used as the basis for further discussion.

Through analysis of existing websites, the project team compiled a list of features that should be carried over to the ThinkTank site. The group decided to base the main features of the website around the Digg model, proposing that a site which incorporated the ability to share links, upload documents and bookmark favorites would be the best method by which to achieve the project's goals. This alone, however, would not address the entire problem. A lack of professionalism and unverified claims was considered the weakest aspect of both Digg and Chief Delphi, and the project group felt that this would have to be addressed by the new website if it was to be successful. Specifically, the ThinkTank would need an active moderation system to verify the accuracy and professional nature of all published resources on the website. Tagging, a highly successful feature on most of the social networking websites that were analyzed, was the organization method of choice for the new site. Lastly, the project group felt that some sort of profile feature for each user or team, based on the highly successful models employed by Facebook and Digg, would be useful and beneficial in connecting community members.

These critical features would form the basis of the concept website which the project group developed for presentation and public review at the Atlanta conference, and can be summarized as follows:

- Article sharing
- Article rating system
- Article bookmarking
- Moderated content
- Tag-based organization
- User and/or team profiles

2.3 Survey Techniques

The statistics and research acquired from all human participants throughout this IQP has been based mainly around surveys written and distributed by the project team. However, before creating any surveys the project group needed to research the proper way to word questions, inform participants of their “risk” and receive proper consent. This process was achieved by taking an online course, reading books about writing surveys, researching similar surveys online, closely reading the initial grant proposal and carefully understanding the Institutional Review Board (IRB) proposal response. Each of these resources was able to help shape the questions asked in the surveys, without falling outside the range of the IRB requirements or ethical grounds. Without this preparation many problematic survey questions may have made it through to the final drafts.

2.3.1 Online Course

Before the rough draft of the first survey, which was created to gauge response of teams to the ThinkTank in Atlanta, GA, the project team all had to complete the “Protecting Human Research Participants” online course²². This online course created a greater understanding of the care that needed to be taken when writing a survey and of the professional methods that surveys and survey researchers need to follow.

The course changed the overall view of the group concerning what was acceptable and what was not acceptable to ask. The “Syphilis study of Tuskegee” example very clearly explained why there were such strict guidelines in regards to human subjects research. The course brought up the three main ethical principles, respect for persons, beneficence, and justice, which constitute the basis for many regulations regarding surveys. These ethical principles also brought out some important concepts that needed to be paid special attention, such as coercion, research risks and repeated recruitment of research participants for new protocols.

Although the course covered the correct way to ask subjects what was required, it also explained the very careful way that subjects must be selected such as to not put any unnecessary stresses on them or ask too much of them, as well as the need for informed consent from any participant, no matter what was being asked of them. The project group learned that all participants were in no way obligated to complete any survey, even with informed consent. Once the project group was able to find the correct subjects to complete our survey with informed consent, it was then necessary to ensure that all of the data were stored in a secure manner, such that the privacy of individuals would not be compromised. This knowledge of

²² NIH Office of Extramural Research, Partnership for Human Research Protection, <<http://phrp.nihtraining.com/>>.

security was a major factor in deciding to place our survey on a password protected online survey site²³.

The course was a critical part in the initial thought process for creating a survey for general use with human research subjects. It was able to show the correct ways to approach general questions and who could and could not be approached for questioning. It also touched on what was the correct form of action in regards to the IRB.

2.3.2 Development of a Survey

Before an effective survey could be created and distributed, the project group conducted research into proper surveying techniques and examples of good survey writing. Multiple online sources and books outlined the general format to create effective surveys, and focused on a five step process: Survey Design and Preliminary Planning, Pretesting, Final Survey Design and Planning, Data Collection and Data Coding, Data File Construction, and Analysis and Final Report.^{24,25,26}

During the survey design and preliminary planning stage, the goals of the survey must be decided upon, and the method of data collection needs to be approached. Within these decisions there lies the understanding that the sample group needs to be explored, the questionnaire needs to be prepared, and the funding and personnel for the entire process needs to be solidified.²⁷

After the basis for the survey has been compiled and the background has been put in place, the survey is drafted, edited and pretested. The pretest stage entails the initial drafting of

²³ Online Surveys - Zoomerang.com, 1999, <<http://www.zoomerang.com>>.

²⁴ Salant, Priscilla, and Don A. Dillman. How to Conduct Your Own Survey. New York: Wiley, 1994. 53-77.

²⁵ Leung, Wai-Ching, "Conducting A Survey," Student Biomedical Journal 9 (2001): 45-143, <<http://www.allgemeinmedizin.med.uni-goettingen.de/literatur/fragebogen/surveystudbmj.pdf>>.

²⁶ Punch, Keith F, Survey Research : The Basics, Minneapolis: SAGE Publications, Incorporated, 2003. 26-44

²⁷ Czaja, Ronald, and Johnny Blair, Designing Surveys : A Guide to Decisions and Procedures, Minneapolis: SAGE Publications, Incorporated, 1995. 11-31.

the survey from the lists of questions and concepts of the survey design stage. After the survey is drafted it then needs to be edited and made presentable to a pretest group. The pretest group is necessary to uncover any errors in the survey, such as ambiguous wording or extraneous questions. The pretest also allows the survey researchers to ensure that the results will provide sufficient data to meet the survey's goals. The results of the pretest are then used to adjust the survey so that the required data will be collected and the survey researchers can be assured that the results will be accurate enough to use. Pretesting may occur over multiple rounds, for as long as is necessary to ensure that the final survey will provide useful results.

The pretesting is one of the most important forms of preparation for how the final survey will turn out. After the pretest is complete, the finalized survey is designed and the survey administration process can be finalized; this needs to be based on the pretest participants' reactions to the initial survey run through²⁸.

The last stages of administering a survey are the actual data collection and analysis, and may include interviews or simply a paper or online questionnaire. These steps are discussed in more detail below. Finally, once all the data from the surveys have been collected, it is analyzed and a summary report is drafted. In any summary report of a survey, there are three critical points that must be addressed: the goals of the survey must be stated and explained, the major statistics and trends from the survey must be explained, and the conclusions drawn from the survey must be presented, especially with regards to achieving the goals of the survey.

2.3.3 Accuracy of a Survey

When creating a survey, there is a concern that it will not provide the necessary information to be useful. There are many factors that can cause inaccurate survey results, but

²⁸ Czaja, Ronald, and Johnny Blair 45-107.

first there is a need to understand what “accuracy” really refers to. Accuracy, for the purposes of a survey, is the degree to which the results can be trusted to provide an adequate representation of the opinions for the population in question. In certain cases, a survey may have a large variance in the quality of individual responses, but still be accurate enough to show the correct trends. The required accuracy of a survey must be evaluated on a case-by-case basis. There are four major errors that may affect the accuracy of a survey: coverage, sampling, measurement and nonresponse. All of these must be carefully addressed to ensure that a survey is a success.

One very common error that can easily affect many parts of the survey is a coverage error. A coverage error occurs when the population that the survey is meant to sample is not complete. That is, when calculating the population for sampling groups, there is a portion that is ignored or not taken into account. When working with the population for the project group’s survey, there was a need to make sure all of the students, faculty and staff were accounted for. An example of how a coverage error could have easily happened would be if the team submitted a list of all team member names and that list did not have any of the adults that helped out.

Along the same lines as a coverage error, a sampling error can also greatly affect the outcome of the survey. A sampling error occurs when the group administering the survey fails to specify a representative enough sample group, so as to provide an accurate view of the opinions of the population. This could cause a demographic to be over- or underrepresented, or for the population as a whole to be underrepresented. Without a representative sample to account for the entire population and its view, there is no way for the survey to return accurate results.

As a survey is about to be administered, the actual survey needs to have the questions checked for clarity in order to avoid a measurement error. A measurement error occurs when questions are vague and/or biased and a participant may respond with an answer that differs from

his or her true opinion. Depending on the actual way the survey is administered (mail-in, phone or face-to-face) various methods exist to ensure responses are unique and clear. The primary technique to avoid errors is precise wording of questions, such as not including words like “few”, “many”, and “some”. Clarifying answers to the survey questions is always a good idea, not only to avoid a measurement error, but also to make it easier for the participant.

The last error that needs to be avoided is that of nonresponse. This error is very unique and needs to be dealt with immediately or a survey will fail. A nonresponse error occurs when a large number of the participants of a demographic do not respond to the survey. This error does not include participants who complete surveys but decline to answer some or most of the questions. Survey researchers should be especially wary of nonresponse that is correlated with a particular demographic, as this can significantly skew the resulting data. Nonresponse becomes a problem when the number of respondents in a particular demographic drops too low to trust the overall results. If a specific demographic within the population is underrepresented, the survey results are at risk. This error is different from a coverage or sampling error in the fact that the discrepancy lies in the responses received, rather than in the sample being surveyed.

Nonresponse error can be corrected if dealt with in a timely fashion by seeking out additional respondents and implementing measures to increase the response of deficient populations such as reminders. Nonresponse errors can be avoided by maximizing the response rate with preemptive methods and by ensuring both that the number of actual respondents meets the sample size requirements and that the pool of respondents is a representative sample of the population being surveyed.

2.3.4 Sample Groups

In researching sample groups, it was discovered that, when dealing with a large total population, the number of actual survey participants does not necessarily need to be close to that population number. This led to understanding that proper sampling was not directly related to size, but had to do with other factors as well, such as sampling error, the variation of opinion within the population, and demographic representation.

The task, in any sample group selection, is to achieve the necessary accuracy with respect to the goals of the survey. Higher accuracy levels require more intensive surveying and follow up, but can unnecessarily waste time and money if the improved results will not affect any conclusions. It is also necessary to take into account the degree to which opinions vary in the population. A 50/50 division represents a population whose opinions are evenly divided, whereas a population who has a more uniform opinion is considered an 80/20 division. These divisions have implications for the required sample size necessary to obtain accurate results, with an 80/20 population needing a relatively smaller sample size to achieve the same level of accuracy.

An understanding of correct sample group selection and the major survey errors would enable the project group to better determine how many responses would be required for an accurate analysis and, if necessary, employ methods to counter any errors.

2.3.5 Survey Questions

Once the background of the survey process is complete, the actual survey questions must be created. The questions must be based off of a list of goals created during the setup of the survey. They also need to be very carefully structured so as to not put any additional strain on the participants or cause confusion. As each question is written, a survey researcher needs to think about how specific the questions should be, if the questions will produce credible results, if

the participants will be able to answer them, and if the participants will be motivated to answer them.

An important choice to consider when writing survey questions is whether to make them open- versus closed-ended. Open-ended questions do not provide choices that can be selected, while close-ended questions provide the participant with a set number of choices to consider. This decision is very important as each type of question has its own positive and negative qualities.

An open-ended question generally makes it very easy to portray what is wanted of the participant, but it can also be very demanding of the participants, asking them to form an opinion or recall an event that occurred. Open-ended questions may also produce many different responses that cannot easily be compared. This can lead to a measurement error that would be directly related to the fact that the style of response will not be consistent enough across all participants. Even though open-ended questions put a lot of added strain on the participants, there is still some effort required by the researcher. For example, the responses can take a long time to input into a computer for later analysis. However, open-ended questions provide a way for researchers to ask participants about topics on which little information is known prior to the survey.²⁹

Close-ended questions provide for a way to ask participants more specific questions and allow for answers that are typically easier to analyze. There are three types of close-ended questions that can be utilized in a survey: close-ended with ordered responses, close-ended with unordered responses and partially close-ended.

Close-ended with ordered responses is used to gauge how serious participants think each individual problem may be by commonly using a 1-5 scale (or equivalent). It typically asks

²⁹ Salant, Priscilla, and Don A. Dillman 77-101.

participants to evaluate problems independently of each other, but can also be organized so as to allow participants to rate questions relative to one another.

Close-ended with unordered responses is used to have a participant pick out of a predetermined list, usually choosing the “most” or “least” on some variable of interest. Care must be taken, since the responses to these types of questions can be heavily affected by the order in which the answers are listed. The wording needs to be very carefully done in order to ensure that the participant is answering without any bias. Another subdivision of this type of question is partially close-ended responses. These are the same as unordered responses, but allow for the participant to fill in their own answer if they feel the provided answers are not adequate.³⁰

After selecting the format of the questions, it is very important to choose the wording of the questions carefully. The way questions are phrased can change the way a participant answers and, in order to ensure an accurate survey, the question should not be slanted in any way. It is important to be very specific and use simple words to avoid misinterpretation. However, there is also a danger with being very specific. When finalizing questions there needs to be a check to make sure that the researcher is not talking down to the respondents and that the questions are not too specific and do not coerce the participant into any particular answer. As with any part of the survey there needs to be a very clear message that the participant can understand or else the survey will not be effective.

2.3.6 Type of Survey

The three main ways to conduct surveys are by mail, by telephone or through an in-person interview. The method by which the survey is distributed can not only affect the response

³⁰ Czaja, Ronald, and Johnny Blair 51-75.

rate, but may also change the quality of response. Some concepts that need to be considered include how many people can work on the survey, how much time will be available to obtain results, and how much money is available.³¹

One additional method, web-based surveying, is a more recent tool that has become available to survey researchers. An online survey strongly resembles the way a mail survey is administered, but decreases the amount of time that researchers have to sit and input data into the computer. Online surveys typically have a built in analysis feature that compiles all the data and create graphs and lists of responses. This new style of surveys enables anyone to create a survey and issue it to a large group of people with little or no cost and reduced effort³². The major drawbacks of online surveys are that they require the participant population to have access to the Internet, and can fall prey to various computer glitches and user errors that may affect that responses. They are also subject to many of the same limitations of mail surveys.

Based on the research into survey methodology in the context of this project, a variation of the online survey was used, in which participants came to a computer kiosk at a conference to fill out the survey online. In this case, even though the participants were taking an online survey, they still could be treated as if they are involved with a face-to-face survey. The initial face-to-face interaction as well as the ability for the participants to ask for clarification during the survey can be a great advantage in the final accuracy of the survey.³³

It was also decided that as many questions as possible should be multiple choice or yes/no, and that the surveys should be made as short as possible in order to decrease response time. For initial surveying about the site concept in general, the project group assumed an 80/20

³¹ Salant, Priscilla, and Don A. Dillman 33-53.

³² Couper, Mick P., Michael W. Traugott, and Mark J. Lamias, "Web Survey Design and Administration," *Public Opinion Quarterly* 65 (2001): 230-53, Oxford Journals, Oxford University Press, <<http://poq.oxfordjournals.org/cgi/content/abstract/65/2/230>>.

³³ Punch, Keith 40-44

population, based on the report from the focus groups. For future surveys during the beta testing, this division would have to be re-evaluated to reflect the new test population.

2.3.7 Usability Surveys

In addition to general survey techniques, the project group also needed to research usability surveys specifically, to prepare for developing surveys associated with the beta test of the new website. Usability is an extremely important factor in web design, and it would be necessary to get accurate feedback from the beta test teams in order to improve and streamline the user interface.

Before any usability studies can be performed, the interested parties must decide on a “usability goal”, a measurable set of criteria that allow the designers to gauge the product’s usability³⁴. A usability goal needs to address three main points: performance, conditions and criteria. These define the required features of the product, the conditions that these features must be used under, and the minimum degree of functionality that is required. Goals can be either absolute, giving a definitive benchmark to measure against, or relative, using a previous version to compare to.

Once this usability goal has been defined, the problem of creating a survey to measure it becomes greatly simplified. In reviewing examples of other usability surveys^{35,36}, simple questions that require little thought to answer were found to make up the majority of the questions; and most either involved rating specific features or agreeing/disagreeing with statements. In addition, the surveys all were very brief and to the point and used very simple

³⁴ How To Develop Usability Goals, Publication, Xerox Corporation, 1996.

³⁵ "About section page template," Usability and User Experience, Society for Technical Communication, <<http://www.stcsig.org/usability/resources/toolkit/toolkit.html>>.

³⁶ Brooke, John, SUS - A quick and dirty usability scale, Publication, Digital Equipment Co Ltd, <<http://www.usabilitynet.org/trump/documents/Suschapt.doc>>.

wording. Most also had a few open-ended comments boxes, but these were optional and provided space for those who had specific suggestions. These survey decisions help to greatly increase the number of respondents, as it significantly decreases the time required to complete the survey.

A critical component of usability testing is that of an iterative approach. Usability testing should be conducted multiple times to track the progress of the changes being made to improve the usability of the website. Each test should be measured against the benchmarks set forth in the usability goal³⁷. The site should also be tested before and after any changes are made to improve usability, in order to see the effect of each update.

Lastly, it is important to keep in mind that one solution is unlikely to please all users. It is up to the site creators to analyze the usability testing results and select a solution that will improve the site by the largest amount for the most users³⁸. In doing this, it is important to disassociate between the rate of occurrence and the magnitude of the problem. It is sometimes important to prioritize major issues that affect a small number of users over minor problems that affect a larger population.

2.3.8 IRB and Consent Forms

The Institutional Review Board is a committee formed under the United States Department of Health and Human Services to monitor the research of human subjects³⁹. The IRB is in charge of approving any research, including surveys and their associated consent forms, which is to be conducted on human participants. The IRB ensures that a study is not going to

³⁷ Usability Testing, Publication. U.S. Department of Health & Human Services, <<http://www.usability.gov/pdfs/chapter18.pdf>>.

³⁸ "Learn About Usability Testing-Test and Refine," Usability.gov, U.S. Department of Health & Human Services, <<http://www.usability.gov/refine/learnusa.html>>.

³⁹ "HHS - Office for Human Research Protections," United States Department of Health and Human Services, <<http://www.hhs.gov/ohrp>>.

place the participants at risk, and that the consent form makes it very clear to the participant just what they will be encountering. In order to legally administer surveys for purposes of general research, approval must first be obtained from the IRB. The NSF grant that was received to complete this project required that all surveys be completed with proper approval and consent, and required that all surveys first be approved by the appropriate committees.

The IRB proposal must include an overview of the key facts about the survey, such as who will be taking the survey, what they will be subjected to and whether or not they will be compensated. These factors, among other things, help to explain to the IRB that the survey will not be harming any participants.

The consent form for the project surveys was the most important part, as it allowed for the subjects to complete the survey legally. Each human subject had to read and sign a consent form before completing the survey, and was allowed to take a copy of the consent form if they so desired. A sample of the consent form is available in Appendix B.

2.4 Website Usability and Task Division

The task of creating the website was split between the project group and the WPI Web Development office. The project group was in charge of selecting the features to be implemented and describing the overall layout of the website, while the web team would develop the code and actual visual interface. The project group met frequently with the web team to view the latest interface mockups, test site features and provide input on improvements or suggested implementations. Because the project group was to develop the features and basic concept, some research was conducted into principles of web design for usability.

Above all else, the presiding guideline is that of navigation and interface. If the website controls and site organization are not intuitive, the user will get confused and give up, possibly

before finding any of the desired content. Similarly, related links and elements should be grouped together so that the user can easily find them. Simplicity and standardization in the interface is a critical factor in ensuring that the website is intuitive, and this fact later drove decisions to merge features of the website and to keep layouts similar and consistent between features.

Another key aspect is that of user task flow, and matching that to page flow⁴⁰. Put simply, the steps that a user must follow to get to the desired end result should be parallel to the pages that they must go through to get there. Taking a user to a seemingly unrelated page is likely to confuse and discourage them. In addition, the most often used features should be organized to have the shortest path from front page to desired content, such as to reduce the time spent navigating the site. Likewise, it is important to keep all relevant information on the same page, so that users do not have to shuffle between pages while reading or researching, as this will dramatically decrease their productivity.

From a graphical standpoint, it is important to keep flashy or jarring graphics to a minimum, in order to avoid distracting users from the main point of the website or away from the areas where they are looking to go⁴¹.

The project group would keep these principles in mind both when designing the mock-up concept site and when meeting with the web development office to discuss implementations and specific layouts.

⁴⁰ "10 Web Usability Tips - Just Fun," Usability consulting and training with Human Factors International--ensuring user satisfaction through user-centered design, user experience design, human factors, and software ergonomics, <<http://www.humanfactors.com/downloads/10tips.asp>>.

⁴¹ Optimizing the User Experience, Publication, U.S. Department of Health & Human Services, <<http://www.usability.gov/pdfs/chapter2.pdf>>.

2.5 Focus Groups

At the *FIRST* Robotics Competition Kickoff in 2008, hosted in Manchester, NH, Professor Doyle led six group discussions to determine what resources are already used by teams and what teams would like to see provided in a networking and resource website. Each session was 45 minutes long and attempted to discuss a variety of topics ranging from obstacles in continued participation to desired content on an official resource website. A total of 36 subjects participated in the focus groups.

In order to get the opinions of a wider range of teams, both veteran and rookie teams were involved in the focus groups. The average team experience level was around 7 years of participation, with 28% having been involved for two years or less⁴². One of *FIRST*'s biggest concerns is the retention of new and underprivileged teams, so the sessions focused on ways to help teams with limited resources or knowledge succeed and share their experiences. A draft summary of the focus group results can be found in Appendix C.

Many participants stated that, because of the format of existing resource websites, a new website should focus on reliable and official *FIRST* content. A number of comments were also made regarding the need for a better-organized collection of technical help and documentation. One suggested idea was to simply be a portal that would link to other existing resources on the Internet, providing a central location with summaries and ratings for each link.

One of the largest debates was over how website users and content should be controlled. Some participants preferred a fully moderated structure where all users and all posts would have to be approved by a group of selected or hired site administrators. Other suggestions included

⁴² Doyle, Jim, Draft Report on Focus Group Sessions Conducted at FIRST Kickoff Workshops, Social Science & Policy Studies, Worcester Polytechnic Institute, 2008.

user-control and self-moderation via rating and rewards for quality content and thoughtful comments.

Also discussed were barriers to participation on the website. By far the largest concern was the ability and ease of getting the website un-blocked by school filters. Some participants described difficulty in even getting email to team members due to blocked content. It was suggested that using an .edu domain name and requiring a login would help teams get approved access. Also the content type and level of cybersecurity were considered large factors in getting a website approved for viewing at a high school.

Concerns were expressed regarding competition with current resource websites, specifically those created by teams and the unofficial *FIRST* discussion forums known as Chief Delphi. Many of the focus group participants were concerned that teams who create their own resource websites to share with the community would be overshadowed by a new, *FIRST* sponsored website. It was also mentioned many times that the Chief Delphi forums are well established and that the community would not respond well to a new website unless it provided a significantly different format and content. Benefits and downsides to the Chief Delphi forums were discussed at length; the primary downsides were concluded to be a lack of general reliability of information, difficulty in finding desired information and the large amount of “off-topic” and irrelevant activity. The overwhelming conclusion is that while there is an incredible amount of good and useful information available, there are no current websites that do an adequate job of organizing and presenting it.

The project group reviewed the findings of the focus groups and determined the most crucial aspects of a new site were:

- Make content organization intuitive and easily searchable

- Ability to rate, moderate or otherwise ensure reliability of content
- Ensure that site can be accessed from high schools
- Do not attempt to compete with existing resource websites

In addition, the project group determined that additional surveying was necessary before decisions on user organization and management could be made.

3 Methodology

3.1 Overview

The primary goal of the ThinkTank is to provide reliable and official resources for *FIRST* teams. It was developed through analysis of existing resource websites and surveys of the target audience to identify the perceived need of a trusted networking and resource website. The degree to which this need was met was analyzed through a four-week beta test period.

Focus groups were conducted prior to the beta with members of the *FIRST* community and a concept site was developed from the information gathered. The concept site was presented at the *FIRST* Robotics Competition Championship and additional surveying was done to aid in the development of the final site. A beta test of the website was conducted over four weeks and aimed to involve a minimum of 30 teams, selected to cover the largest possible demographic range.

3.2 Identify Need

Though a number of places already offer resources to teams, none of these consistently provide reliable and official documents for all areas relevant to *FIRST* teams. In addition, there currently exist no dedicated websites to aid teams in collaborating on projects and designs. The ThinkTank aims to change that by providing a central, *FIRST*-sanctioned resource sharing website which is professional and reliable, but which still allows the *FIRST* community at large to submit content. The focus groups and surveys conducted at the 2008 *FIRST* Robotics Competition Kickoff and Championship event, respectively, helped the project team cater more specifically to the community needs.

3.3 Design of Proposed Site Layout

After reviewing the results from the focus groups, a rough concept site was developed, with graphical mockups, as the main feature for the presentation in Atlanta. This concept site would incorporate many of the suggestions into a single, integrated resource and community networking website.

The project groups initially considered the suggestion of a site that would simply archive and rate existing online resources. In principle, this would be essentially Digg, but for the *FIRST* robotics community specifically. However, upon further consideration the project group felt that the site would be more successful and beneficial if it provided hosting space for original material in addition to simply providing links to other websites.

It was decided that the most useful and beneficial tools would be a technical and reference document repository, web-based document management and collaboration software for teams that would allow them to keep track of file versions and updates, and team and volunteer portals to facilitate networking and collaboration between teams. Above all, the site was intended to provide resources that are either currently lacking or nonexistent to teams in a manner that was well moderated and trustworthy.

The reference document repository, known as the “Articles” section, aimed to provide easily accessible, quality documents on both the technical and non-technical aspects of the *FIRST* Robotics Competition. Sites like Digg and Amazon.com⁴³ were large influences on the features and layout of the articles section of the ThinkTank website. In order to provide the most versatile content organization system possible:

⁴³ Amazon.com: Online Shopping for Electronics, Apparel, Computers, Books, DVDs & more, 1996, <<http://www.amazon.com>>.

- Articles were designed to incorporate written text, external documents such as CAD files, slideshows, pictures and URLs.
- To ensure that articles stay up to date and relevant, the ability to revise articles was also incorporated; old revisions would be kept in the database should a user ever need to access an old revision.
- Users would be allowed to comment and discuss each article in an associated thread. Like the articles, comments would be moderated so that only relevant and appropriate comments were visible.

Many teams establish an identity with their own websites and the content they create and host there, and the project team felt that requiring teams to partially relinquish this identity would be a barrier to using the website. To accommodate for this, the ability to simply upload links to other online resources was made an option, but the site would encourage original content as its main focus.

Also integrated into the articles section of the website was an “Ask-The-Experts” question and answer feature that would allow users to submit questions to pre-approved subject-matter experts. The experts would then be able to review questions submitted in their area of expertise and reply to them as they saw fit. There would be no requirement for experts to answer every question; the hope was that good questions would get answered and poor questions would be removed, providing positive feedback for appropriate and interesting questions. In order to keep formatting consistent and content easily searchable, the responses to expert questions would be formatted like other uploaded reference articles and incorporated into the article database. Not only would this make the responses able to be revised and commented on just like other articles,

but would also remove the necessity of searching in two separate places when looking for information. This last aspect was considered extremely important, since one of the primary concerns voiced at the focus groups was content organization and ease of searching.

A number of design decisions were dictated by the original grant proposal. Due to the target audience of primarily high school students, cybersecurity and content monitoring were of utmost importance and drove the decision to moderate all public site content, including reference and technical articles, comments, and public documents, via an approval method. Also specified by the grant was the requirement that team leaders have some form of management control for their team's users on the website. The ability to upload user-created content was taken from the proposal as the basis for the article repository of the website. Other proposed website features such as a tag-based organization structure, content rating and user profiles were also incorporated into the final concept site.

Tag-based organization was chosen due to its common use on other websites (flickr, Chief Delphi, etc.) and the advantage of specifying multiple associations for a single article. The exact implementation of the tag system that was proposed incorporated the standard user-submitted tag assignments found on many sites, but also added an additional level of organization by specifying a set number of pre-determined "supertags", which represent the major aspects of *FIRST*. Every new reference article submitted to the site would be required to have at least one supertag, ensuring that, regardless of what other tags were user-assigned, each article would be correctly linked within the overall site. It was hoped that this simple interface change would alleviate the most common problem associated with most tagging systems, inconsistent tagging, while still allowing users to assign new tags that were not thought of by the site designers.

A content rating system was incorporated in order to involve the community in the selection and quality of site content. By providing a rating system similar to sites like Amazon.com and eBay, the website aimed to reward and encourage high quality content. The rating system would also be incorporated into the search function, putting higher rated articles first in the search results. In addition, the concept of a “user” rating, calculated as a function of an individual user’s article ratings, was also proposed as a means to identify users who consistently post quality articles. This would help build a user’s “reputation” based purely on their submitted content, and thus develop a means for the community to immediately judge new and un-rated articles.

One aspect of the site that was left undecided was whether or not professional engineers would receive a special distinction on the website. The advantages of this distinction would be that content from users who are experts in their field would be easily identifiable and subsequently could be considered more trustworthy. Potential downsides included the possibility of content by non-professionals being disregarded or considered lesser, which could be highly detrimental to a website that targets a primarily high school demographic. It was concluded that this choice would be made once other aspects of the website had been decided upon.

A final feature that was included but not fully specified in the concept site was the idea of a “favorite articles” element that would allow users to pick articles that they like or find particularly useful for reference and keep them permanently linked in an easily accessible spot on their user control panel. This feature was inspired by Digg, which adds a link to each user’s profile every time they “digg” an article.

While the technical and reference article section of the website was intended to be the primary feature, the other sections of the website would deal more closely with social

networking. Similar to Facebook and LinkedIn, these sections would provide team profiles and allow teams to get information on other teams. The online document management system would facilitate better inter- and intra-team communication and collaboration, while the team portals would provide a common place for teams to share calendars and advertise events. Features such as team content sharing, team profiles and shareable events calendars were taken directly from the grant proposal.

The document management system would provide a central location for teams to host, view and revise files pertinent to team operations. Teams may use the system to keep track of current versions of CAD files, award reports, electrical schematics and any other files that team members need to share and keep updated. Also proposed for the concept site was the ability to temporarily invite non-team members to view and revise files, allowing outside consultation as well as multi-team collaboration, which is becoming more prevalent. Finally, the concept site included the ability to make documents publicly viewable, allowing teams to share their design process, awards submissions and other helpful content that the team has created throughout the season.

The team and volunteer portals are designed to help teams and volunteers interconnect, as well as providing management resources for teams. Each team registered on the site would have their own team profile: a section with publicly viewable information about their location, years of participation and upcoming events. In addition, a privately viewable section, available only to members of the team, would offer resources like a private team discussion forum and team calendars. The calendar would also include the option to make events public, which would cause them to show up on local teams' public calendars. By providing a geography-based event announcement, teams would be better able to connect and share resources in their immediate

area. The team portals would also allow teams without the resources to build their own website and have a functional online meeting and management space, as well as allow teams with well established domains elsewhere to link to their existing website, but also share events easily with other teams using the portals. Unlike the public content on the website, private team content is not moderated, and it is left to the teams to police their own area of the site.

Many teams have their own currently existing and highly functional websites. Like content that is currently available on team websites, the team website themselves are team identifiers and are points of pride for most teams. The project group felt that if teams were forced to choose between the ThinkTank website and their own domain, they would choose their team-created site. In order to accommodate for this, their team portal section would be able to simply link to their existing website, and they would be able to use as many or as few features on the ThinkTank website as they felt were useful. For teams who do not have their own web domain, however, the team portal would serve as a team website, with all the basic features present on most team-created sites. The project group believed that providing additional means to share their own websites and content by simply linking to them would encourage teams to display their work and would become a point of pride to be recognized on the ThinkTank website. In addition, regardless of the usage as a team website or as a link to an existing domain, the ThinkTank hopes to ensure that anyone looking for team information would be able to find what they need for the majority of teams involved in the competition by providing a portal for every team.

The volunteer portal is similar in concept to the team portals, but is aimed at helping *FIRST* volunteers connect, primarily during competition season. By utilizing a direct link to the Volunteer Information Management System⁴⁴ (VIMS), the volunteer portal would keep a list of

⁴⁴ "FIRST Volunteer Information & Matching System Logon," My FIRST, <<https://my.usfirst.org/vims/logon.lasso?page=logon>>.

the volunteers and their positions at each event during the season. Discussion forums similar to those provided in each team portal would encourage conversation among the volunteers about topics ranging from good food near the venue to tips for new volunteers. In addition, a section of the portal would be dedicated to finding and coordinating lodging at each event.

An integrated private messaging system in the portals to facilitate networking between users was also discussed at length. Since social networking revolves around the ability to contact and discuss with others, it was considered a key aspect of the site. Due to the target audience, however, most forms of direct messaging would present a risk to the users and compromise the moderation practices established on the rest of the site. While a general messaging system was incorporated into the concept site, it was not emphasized or developed and was left open for future revisions of the website to include a safe and secure implementation.

From an interface standpoint, the site was designed to have a similar look and feel throughout the sections to provide a visual parallel to the integrated back end. After developing the features of the concept site, the project team created some simple concept interfaces. Figure 1 shows an example of these graphical mockups of the finalized concept site, which were displayed at the Championship presentation. The rest can be seen in Appendix D.

Denso Motor Specification Graphs

John Smith
Worcester, MA

Rating: 
Views: 683

Torque, Speed, Power information.

Window (Denso)

Speed (rpm)	Torque (N m)	Torque (in lbs)	Current (A)	Power (wt)	Efficiency	Heat (wt)
0	10.600	93.780	18.6	0.0	0%	223
6	9.893	87.528	17.5	5.8	3%	204
11	9.187	81.276	16.3	10.8	5%	185
17	8.480	75.024	15.2	14.9	8%	168
22	7.773	68.772	14.1	18.2	11%	151
28	7.067	62.520	13.0	20.7	13%	135
34	6.360	56.268	11.8	22.4	16%	120
39	5.653	50.016	10.7	23.2	18%	105
45	4.947	43.764	9.6	23.2	20%	92
50	4.240	37.512	8.5	22.4	22%	79
56	3.533	31.260	7.3	20.7	24%	67
62	2.827	25.008	6.2	18.2	24%	56
67	2.120	18.756	5.1	14.9	24%	46
73	1.413	12.504	4.0	10.8	23%	37
78	0.707	6.252	2.8	5.8	17%	28
84	0.000	0.000	1.7	0.0	0%	20

The Denso Window motor is a moderate torque, worm gear assembly, which makes it hard to backdrive and can be used on most areas of the robot, from drivetrain to end effector. This motor is thermal resetting, which means that it shuts down when the temperature gets too high, making it extremely hard to burn out. The window motor is standardly used on car windows...

Figure 1 - Article Page Mockup

Several features discussed in the grant proposal did not make it into the concept website, including User Groups, College and Career, and “Virtual Mentor” sections. These were discussed briefly, but were considered difficult to implement compared to the added benefit. User groups would have introduced common interest groups to link people and provide

discussion areas. While common in other social networking sites like Facebook, it would have been very hard to incorporate into ThinkTank as it was designed. The intent of the user groups would be to develop collaborative content to contribute to the website, but due to the relative independence of the website sections and the lack of any formal common discussion area, this would have been fairly difficult to add. In addition, plenty of good online discussion and collaboration occurs on other well-established *FIRST* related websites. A competition for users was not considered appropriate or beneficial, especially against websites like Chief Delphi, which have extremely large and dedicated user bases.

A college and career section was agreed to be beneficial, but was also struck down due to difficulty of integration and existing resources available from both official and unofficial sources. Based on the results from the focus groups, college and career information was not one of the major areas lacking on existing websites. Taken in total, the decision was made that the website was better served by leaving the section out.

The “Virtual Mentor”, as described in the grant proposal, would act like a “member of the month” recognition section. While never explicitly rejected, the feature was not included in the concept site. Similar user recognition features are included in *FIRST* publications and on the Chief Delphi forums, and though it may have provided some incentive to be active on the website, it was not a key feature in providing teams with new resources and was not considered important enough to merit inclusion on the site.

3.4 Atlanta Presentation

3.4.1 Overview

A large part of the design process for the website was the input received from the community at the *FIRST* World Championship and the Robotics Conference we presented at in

Atlanta, GA. These events provided a great atmosphere to gauge what ThinkTank's targeted audience thought of the initial ideas and plans for ThinkTank.

The presentations that were given at the Robotics Conference allowed for the public to understand what ThinkTank was and how it was to be developed for the future. This opportunity to show audiences what ThinkTank was going to become enabled the project group to create a proper background such that the audience would be able to accurately complete a survey based on the presentation.

The surveys that followed the presentations at the Robotics Conference were intended to not only gauge the response to the presentation to but to allow for the audience to input ideas. With these surveys there was a new understanding that could enable the project group to modify the planned site to reflect this input. This final site layout was a combination of initial brainstorm, requirements of the grant proposal, and the suggestions and ideas of the community.

3.4.2 Audience

The *FIRST* robotics competition holds its annual World championship at the Georgia Dome. This event draws in tens of thousands of students and mentors from across the world⁴⁵, and was the perfect place to present the idea of this site to the public. The ThinkTank needed to be presented to its final audience so the proposed layout could be critiqued. As the site was still in the final design stages there was still the opportunity to improve. This venue made it possible for the project group to expand its sampling size, which would increase accuracy and thus could better represent the desires of the community when referenced for the site design.

⁴⁵ US FIRST, 2008 FIRST Robotics At-A-Glance, Brochure

3.4.3 Presentations

After being invited to present at the Robotics Conference in Atlanta, there were many preparations that needed to be made. The top priority in preparation for the conference was the creation of the PowerPoint presentation, as this served as a backing for the presentation as a whole. The organization of the presentation was critical such that the audience would not lose attention. However, there were three important concepts that needed to be covered. These phases were described in detail from the initial concepts to the final ideas and plans for implementation. A complete copy of the presentation can be seen Appendix D.

The presentation opened with the vision of what the ThinkTank was striving to become. After introducing the idea of the site, the presentation began to deal with the background of the site. Existing sites and how they influenced the vision of the ThinkTank were also mentioned for completeness. This part of the presentation was very carefully explained, as the project group knew it would be met with some objection. Along with reiterating the primary concepts, there were remarks regarding how the site would provide an invaluable source of networking and collaboration.

The presentation then focused on each of the three phases and allowed for the audience to ask questions. The phases were explained in the order in which they were set to be implemented on the site. The Article phase came first and was the most important in this presentation. This explanation touched on why articles were going to be basis of the site, as well as provide a brief template of the layout.

Next came the explanation of the “Ask the Experts” section, which was based around the concept of creating an active environment that would allow for users to ask questions to subject matter “Experts” who would post answers in article format. The concept of an “expert” needed

to be carefully explained, so the audience could understand this user distinction. This part of the presentation was also complemented by a few examples of questions as well as a template that would show the usefulness of a question/answer type article.

The final part of the presentation was based around the concept of portals on the site. This concept could prove to be an invaluable resource to teams, volunteers and *FIRST* leaders. The portal pages were explained to the audience as a way for certain groups in *FIRST* to be linked together and able to use one single site to converse with each other as well as other groups.

As portals were explained there was a shift towards showing what the different teams could do to make their portals unique. The use of the sample templates made it very clear to the audience what functionality these portals could serve to help foster team unity and community involvement.

As the project group presented to the audience at the conference, there was a feeling of awe as well as doubt from the crowd. Many in the crowd enjoyed the presentation and wanted to learn more, as well as provide assistance in the future. However, there was still a small number that was unable to grasp this new idea and clung to the concepts of the past. The questions that followed the presentation reflected these differing views. Questions were asked regarding the differences between the ThinkTank website and Chief Delphi, how the site will be introduced to the teams, how the new control system documentation will be incorporated and how the site would accommodate for teams who already have information on their own sites. It was clear that, while many audience members embraced the idea, some were still skeptical about its effectiveness and benefit over existing sites. With these differing views, however, there was an opportunity to see what the site should become. The response gained from just the presentation

helped the project group better understand the full potential of the site. The presentation was advertised on the *FIRST* website, as well as the conference program. Attendance of the presentation was equal with most of the other presentations at the conference, garnering approximately 30 attendees ranging from student team leaders to prominent mentors in the *FIRST* community.

3.4.4 Survey

The project group's research was a two part process; initially the idea of the ThinkTank was revealed to the audience and then the audience was asked to provide input on these ideas through a survey. Their views were crucial in understanding what was both good and bad about the preliminary design of the site, and provided an aid in shaping the site into what it would become at final launch. Also, the opinions and ideas voiced by the sample group would be used as another "brainstorming group" such that the ThinkTank could have all the necessary functionality. However, this interface with the sample group needed to be carefully controlled. The ability of a survey to cope with these circumstances made it crucial to be used as an information gathering resource.

Once the need for a survey was established, there was the question of what kind of questions would be the most beneficial. Initially there was the idea that a face-to-face interview survey would allow for the best interface between the project group and the audience. However, this was decided against because the number of the sampling group would most likely be limited only to those people that were both willing and had time to talk. A "mail in" type survey was also considered, due to ease of distribution for a large sample size. With the ability to administer large amounts of surveys, however, also came the problem of a non-response error with the survey.

Both of these survey options were considered and the final decision was a compromise between the two. An online survey was selected that was to be completed at a kiosk that was run by the project group. This allowed for anyone to come over and take the survey, but also allowed for the project group to engage in an informal face-to-face interview. This setup also allowed for the survey to ask slightly more in-depth questions, because the participants had the opportunity to ask for clarification on questions. The online surveys all had an incorporated analysis panel, which would create an aesthetically pleasing results page that was easy to read. With the use of an online survey the project group was able to successfully fulfill their goal for a sampling group size and gain the required information for a proper analysis.

As the survey was being outlined, there was a clear division between the sections that were viewed as important. These sections consisted of Moderation, Team Portals, Team SharePoint, Article Management, Ask the Experts and Fundraising Portal. Each of these sections served to help shape a portion of the site. These divisions lead to unique questions that were asked of the participants, but did not always provide a clear explanation of that section. This fact led to the creation of the introduction for each division. These introductions provided a brief overview of that section and explained what was necessary for the participant to accurately answer the questions.

One section of the survey was based on the moderation and management of the site. This focused on the moderation of both the users and the articles on the site. The project group needed to understand how the sample group felt about the differentiation between users and the use of reputation. In addition, there needed to be an understanding about how the registration would be completed and how it would be different for main contacts versus team members. The sample group was also asked to explain to the project group how they felt about the proposed

tagging system. The project group's ability to gain a new perspective about the moderation on the site allowed for the site to be developed for more streamlined use.

The rest of the survey focused on the future phases, including the "ask the experts" pages as well as the portals. This section asked questions referring to how the portals should be privatized and how teams would be able to collaborate. There was also a strong question base aimed at finding out if teams liked the idea of being able to use a Microsoft SharePoint style file sharing service. As the participants began to understand what the portals would become and contain, there were more specific questions referring to what types of portals there should be. The ideas of a team, *FIRST*, volunteer and fundraising portal were all addressed. As the sample group answered these questions, they were able to form a basis not only for the creation of the additional phases but the speed at which they are added to the site.

Once the final survey was drafted there was then a need to run the draft through a pretesting phase. This pretesting phase involved inputting the drafted questions into the online survey and then allowing a small group of administrators to take the survey. After this pretest, the project group could not only gauge the response of the sample group, but also see how the analysis tools incorporated into the online site performed. With these new data, the project group was able to make some small changes in the survey, mostly involving the wording of questions relating to the rating system on the site.

After these critiques were performed, the final survey was complete and ready to be launched. The survey was administered starting directly after the presentation and continued all throughout the 2008 *FIRST* Robotics Championship.

3.4.5 Table

At the event, the project group setup a kiosk area where the audience could come and ask questions following the presentation. The kiosk also served as a way to introduce the concept of the ThinkTank to those who could not attend the presentation at the conference, and was setup at a very prominent setting, located at the top of the escalators that connected the first and second floors. This location allowed for optimal visibility, but there was more that needed to be done. The kiosk also had the purpose of housing the four laptops that were connected to the internet and running the online survey. The project group had to focus on encouraging the audience to stop by the kiosk and take a few minutes to complete the survey. The main methods that were implemented to grab passerby's attention were numerous display posters, as well as the announcements to teams inside the *FIRST* championship pit area. However, these two actions of publicity dwarfed in comparison to the success of just the project group's ability to encourage people to take the survey. The project group, through conversing with the participants, was able to explain what the ThinkTank was and this interaction also caused the total number of subjects in the sample group to increase.

As the number of completed surveys increased so did the response of the audience. The project group correctly anticipated that with a growing number of people at the table there would also be a growing interest. This forethought was confirmed and therefore the main concern of the project group was to keep the amount of people at the table at a constant. The table was consistently busy and the survey responses were large enough to fulfill the required sample size of 100 surveys. This sample size was calculated based on a total population 7000, the approximate number of participants at the *FIRST* Robotics Championship in 2008. This assumed an average of 20 members per team for 340 teams in attendance. Over the course of the event,

128 surveys were completed. Some examples of the final survey as well as the formatting and results can be seen in Appendix D.

3.5 Beta Site Preparations

3.5.1 Web Development Team

In order to keep up with the schedule, the majority of website development took place over the summer break. Therefore, the web development team needed to understand the design that had been developed in the short period of time between the return from Atlanta and the end of the academic term. The project team took this time to review the survey results from Atlanta and adjust some of the website goals and details based on feedback.

With this, a prioritized feature list, available in Appendix E, was developed to better communicate the project team's goals for the website. Over the course of several meetings, this list was again combined with feedback from the Atlanta survey and refined. Based on recommendations from the advisors, the features were grouped into phases, implementing an additional layer of prioritization. This feature list was complemented by the rough design and layout mockups of how the website was envisioned.

The final proposed feature list laid out the groundwork for what would become the beta website. The first phase, which was to be completed over the summer of 2008, would put in place the user management tools, the article upload and revision features, an events calendar, tag-based organization, a distinction for "expert" users, and a rating system for articles and users.

While not much had changed with the overall concepts for the website presented in Atlanta, many more details and styles of implementation were specified in the new proposal. The proposed site now featured individual user profile pages with the ability to upload pictures, and

an “organization” based management system that would allow not only teams, but other groups such as regional planning committees and companies to have their own distinct identity on the website. Articles themselves were better defined, and included the ability to link or embed images and video, as well as auto-generate PDF file formats for download. The tagging system for articles remained essentially the same, incorporating the aforementioned “supertag” model, but also allowing users to submit their own custom tags.

New in the proposed feature list were the specifications for a home page, which was to include a recent articles list, recent news box and other similar features. The proposal also specified that this page be made modular to accommodate for new website features and sections in the later phases.

Based on feedback from the surveys in Atlanta, the proposal also included provisions for an “expert” rating, given to professional engineers and those who proved themselves to be reliable and knowledgeable through article uploads. The site home page would have a separate listing of “expert” articles. Along with the expert designation, an article rating and user reputation system was specified, using a standard five-star rating format for the articles, and deriving a user reputation from the ratings on articles they have posted.

Lastly a public calendar was proposed, with the ability for teams and users to add events. Events on the calendar would be linked to the teams who posted them and could be made public and viewable by all users, or privately viewable only by members of the associated team. Also suggested was an “upcoming events” section, and the ability to link in calendar events with tags.

Phase 2, proposed for late summer or early fall release, would incorporate the “ask an expert” question and answer forum. Users would be able to pose questions, which would be tagged in the same fashion as articles. Only designated “experts” would be able to answer

questions posted, and would have a special section on their home page listing unanswered questions in their field. When answers were submitted, the entire question and answer pair would be formatted as an article and included in the article database. In this way, more than one expert would be able to answer a question (via article revisions), and the final response is easily searchable with the rest of the articles.

Phase 3 was not included in any timeline, as it was considered too large a task to be addressed within the period of this project. A general list of features proposed for the third phase was included, but was not prioritized. Some of the more prominent features in Phase 3 were the introduction of public and private team portals, SharePoint-style private team file repositories, team-specific calendar applications and general site features such as the ability to perform site-wide surveys.

With the preliminary design finalized, the meeting with the development team was held. Colleen Shaver, a representative from *FIRST*, was present via conference call to advise on their behalf. After the design concept was presented, the reality of it was discussed. The web development team discussed feasibility from a design and timeframe standpoint, refining the design further into something that could be ready for launch by fall. Ms. Shaver discussed what could be done from the privacy and legality point of view, especially considering a significant portion of the user base for the website is intended to be minors.

As a result, some of the finer details of the website needed to be changed, but the high level design remained essentially intact. With this feedback, the feature list was revised a final time and sent to the web development team. Over the next month, the web development team turned this list into a document detailing the proposed implementation of the website from a technical standpoint, which is available in Appendix E.

3.5.2 Article Collection

Once the development cycle was in the hands of the web development team, priority shifted to searching for content with which to initially populate the website. Launching the website with no content would provide no motivation for the beta testers to actually use the site at first. Seeding the content proved trivial, however.

One of the first resources utilized was the existing *FIRST* Robotics Resource Center at WPI, already host to a plethora of quality content contributed by various members of the *FIRST* community. Content existed primarily in the form of slideshows and audio recordings of presentations made at various *FIRST* venues, covering a wide range of topics. Using this content offered several distinct advantages; not only was it easy to find and of an inherently high quality, but WPI and *FIRST* already had the rights to host this content, so transferring it to the ThinkTank would be relatively easy. During the summer of 2008, a student cataloged and indexed the content available on the *FIRST* Robotics Resource Center, vastly simplifying the process to transition content between sites.

In addition, content was located across the Internet, though the rights to re-host the content would need to be obtained before any could be used on the website. This, along with original content developed by the project team, served to provide a smaller, yet still valuable source of content, particularly to be an example of what is hoped the users will contribute. Two articles were contributed by the project team, one on basic shop safety, and one an outline of a basic curriculum for teaching Solidworks CAD software.

3.5.3 Pre-launch Preparations

With the end of the initial development cycle nearing, the project team focused on comparing the finalized design to the development progress that had been made over the

summer. Unfortunately, there was no preview of the site available at first, making it difficult to see what progress had been made.

The first non-functional template previews were made available mid-September. The design appeared to be in line with the proposed design, embodying a clean and lightweight, yet powerful interface. Due to the nature of the website design, the functional backend and graphical front-end were developed in parallel, utilizing a template engine.

As the beta launch date approached, more meetings were required with the development team to ensure the website would be ready for the launch. The primary focus of these meetings was to track progress on the website, ensuring the fundamental features necessary for the success of the website were present. These features included user registration and management, article upload and revision, and the basic tagging system, complete with supertags. Based on the progress of the beta website, the project team would be able to shape the beta testing procedure to make it easier for the teams and moderators participating in the test. These initial meetings were followed up with regular requests for status updates.

When the project team was eventually given access to the website, at the end of September, the graphical front-end had not yet been implemented, leaving a text-only backend with no visible layout. The graphical front-end arrived shortly prior to the scheduled launch, which left little time for the project team to learn the final layout of the site and develop adequate documentation for users.

Once the graphical front-end was launched, the process of writing website documentation was able to begin. Article submission and editing was the primary focus, to ensure users would be able to utilize the website immediately.

3.5.4 Volunteer Solicitation

With everything in line on the website end, volunteers needed to be found for the beta test period. Volunteers were broken up into two distinct groups: moderators and teams. Though each group had very different tasks and responsibilities, each required the other to fulfill its responsibilities for the site to work the way it should. Moderators consist of individual users who are responsible for the article approval process, reviewing articles as they are submitted and deciding whether or not they meet the guidelines for approval. Teams, on the other hand, are groups of users from individual FRC teams who are responsible for driving the content of the website, reviewing and submitting articles to populate the site itself.

As moderators should be qualified enough to make informed decisions regarding the approval of articles, the candidates sought after were to be recognized experts in their respective fields by the *FIRST* community at large. This was derived from firsthand knowledge and observations made in communities such as Chief Delphi. Once identified, these moderator candidates were contacted directly to request their help. Of the 15 moderators contacted, 13 responded positive and two did not respond.

Whereas moderators were picked in a subjective manner, due to the nature of the test, the beta testing teams needed to be picked in a more neutral and balanced manner. A balance needed to be found between the reputation of teams and a well-distributed sample set among the *FIRST* community at large. After consultation with the advisors, the selection process was broken up into two equal groups of 30 teams each. The first group would be a simple random selection among the pool of registered FRC teams. The second group, however, was selected based on criteria developed by an advisor as seen in Appendix F. The criteria were designed to ensure a varied sample set, particularly among teams of different ages, sizes, and award receptions. The

one restriction placed on team selections was due to the fact that a new *FIRST* Robotics Competition robot control system was being beta tested at the same time as the ThinkTank, and as such, teams participating in the control system beta test were removed from the pool of eligible teams for the ThinkTank beta test.

To contact the teams, a contact letter was drafted to give just enough information to entice the targeted teams into participating, but kept the details of the ThinkTank vague enough to ensure privacy in the case the team chose not to participate. Due to privacy concerns, *FIRST* wished to send the initial contact email through their own email contact system. Replies were forwarded to the project contact address. A total of 65 teams were contacted, and 24 of the 27 responding teams agreed to participate. Though this was a lower number of participants than the project group had hoped for, it was deemed large enough to suffice for the test. A copy of the initial contact letter can be seen in Appendix F.

3.6 Beta Test Survey Design

3.6.1 Pre-Beta Survey

Before the beta test began, a survey was conducted in order to better characterize the teams that would be participating in the beta test of the ThinkTank and determine if the group was a representative sample. The survey collected information on various team demographics such as sources of income, types of mentorship and available resources. The survey was designed such that follow-up surveys conducted throughout the beta test period could be correlated with the team demographic information to provide a complete view of the site effectiveness and expose any deficiencies in the sample with respect to certain types of teams. Samples of the survey are available in Appendix H.

The surveys were to be completed by the primary contact for each team, provided by *FIRST*. *FIRST* restricts the primary contact to adults associated with the team, and the position is typically held by a lead mentor or school associate. In designing the survey, several key areas were identified as defining team characteristics: Finances, Membership, Mentorship, Preparation and Training, and Resources. An additional section requested personal information about the survey taker to help quantify the type of primary contacts associated with the teams.

The financial section of the survey gathered information on the amount and sources of funding. Funding is one of the most defining characteristics of a team, and is often a relatively good indicator of a team's stability. Due to the \$6000 registration fee required to participate in the *FIRST* Robotics Competition in addition to team operating costs, it was considered reasonable to make the lowest operational budget option \$7000. Registration costs for three regional events and the Championship event amounts to \$19,000, not including other operational costs such as additional robot parts and expenditures, travel expenses and team apparel. Therefore, though no upper limit was set, it was generally accepted that teams using a budget of over \$35,000 could be grouped together as affluent teams.

Membership and mentorship are also some of the most defining aspects of teams and are typically good indicators of consistency in quality robot design and success in competition for both performance and design awards. While some teams operate on very few members, it was decided that fewer than five members on a team was an extremely rare occurrence and would make a safe lower bound. Because teams without mentors are more common, however, the option of zero mentors was made available. Similarly to the financial section, no upper bound was placed on the number of members or mentors, however in both cases, numbers greater than 50 were grouped together as "large" teams. Additional questions involved percentages of

students and mentors in engineering and non-engineering roles as well as information about percentage of returning members and number of new versus returning members. Also requested was the number of years the average team mentor had been involved with *FIRST*. These questions were intended to help gauge the general experience level present on the team.

Team preparation and training, while not necessarily having a direct effect on the success of a team, is definitely a contributing factor. Because this is one of the primary aspects of team operations that the ThinkTank hopes to change, the section was designed to provide insight on what the participant teams currently do to prepare their members, and was intended for comparison to a post-beta survey used to gauge the projected the impact of the website on the overall knowledge and preparation of the beta teams.

Finally, team resources play a major role in a team's success, so it was important to determine what resources the participating teams had available to them and how they were being utilized. The survey tested for usage of other resource websites and connections with local teams, as well as interaction levels with other teams outside of competition events. This was also intended to be re-evaluated with the post-beta survey.

3.6.2 Usability Survey

Throughout the Beta test, the test teams interacted with both the good and bad aspects of the ThinkTank site. This interaction enabled them to see firsthand how smoothly the site architecture was developed and implemented. It was the project team's hope that the feedback gained from the beta test would help to shape the final layout of the site. This goal required a certain amount of proactive interaction with the test teams. One example of this was the usability survey, which was created with the intent to gain a better perspective of how the test teams viewed and interacted with the site.

This targeted interaction with the test teams enabled the project group to ask specialized questions regarding how the site ran. Before the usability survey was developed, the project group decided on the goals of the usability survey, and then compared this list to the questions that other usability surveys had asked^{46,47,48}. By using the example surveys as a template, the project group transformed each of the identified goals into a specific set of questions, organized in a way that would encourage completion.

The initial task of compiling a list of questions pertaining to the site was completed before the beta test was even started by looking through the phases and features that were planned to be implemented for the full launch. As the project group looked through the sections of the site that were to be implemented there were a few distinct groups of questions that stood out: account management, document creation and editing, site navigation, searching, document viewing, moderation and moderators. Each of these groups was selected for its importance in the site's functionality at full launch.

One of the most important aspects that the usability survey focused on was account management. This was chosen because of the necessity of feedback on team's experiences with getting set up on the site. There was also a need to see how they were able to manage their team members that also tried to join the site. Within this group, registration and login were also surveyed in order to test how well the main contacts from a team could set up their own login names and become the leader for their own organizations. Another important section that needed to be asked about was the ability of the main contact to manage the team members that joined a team's organization. This was critical because if a user is not a member of an organization then

⁴⁶Brooke, John

⁴⁷ IBM WebSphere Commerce Suite 5.1 Product Information Feedback, Publication, IBM, <<http://www.stcsig.org/usability/resources/toolkit/wcs51survey.doc>>.

⁴⁸ Naughton, Wendy W, Usability Participant Questionnaire, Publication, Xerox Corporation, <http://www.stcsig.org/usability/resources/toolkit/ut_survy.doc>.

they do not have the privileges to post, revise or rate articles. The final aspect of account management had to do with the editing of the user's details or bio page. All of the questions regarding account management were structured to understand the ability of the team's main contact and their ability to control their own team independent of the site's webmasters.

The document creation section tested on how documents were organized on the site. Articles are the main focus of the ThinkTank site, and it is a necessity to make it as easy as possible for users to create articles. There was a need for questions regarding the initial creation of an article, from getting into the actual creation panel to using the WYSIWYG⁴⁹ editing system that was planned for. Feedback was also requested on the process of uploading additional documents, selecting tags for the article and the degree to which these tags were succeeding as an organization method. Also included in this section were questions pertaining to the editing interface for revising submitted articles.

The next section surveyed the navigation of the site, and was highly influenced by the information that was gathered from the example surveys. The site was constructed to have a very simplistic navigation interface focused around a site toolbar that would always be visible on the top of the browser page. The project group needed to understand how the users were utilizing this bar and if it encompassed enough information to make navigating the site easy. There was also a need to see how effectively the organization of the site was being utilized by the users.

Falling along the same lines of site navigation was the implementation of a search within the site. The users were asked how accurate and relevant they felt the search results were in comparison to what they searched. This information would be used to evaluate the way that the search feature selects articles to match up with a search term.

⁴⁹ "GNRT Appendix: Glossary," The Bulgarian Academic Network, Trans-European Research and Education Networking Association, <<http://www.acad.bg/beginner/gnrt/appendix/glossary.html>>.

The final aspect concerning articles was the process that a user goes through to view the article. The layout of the article was very crucial in the ability of a user to utilize and absorb the information, so the questions focused on the ease of reading and how the layout complemented the articles. Also included in each article layout was a section that listed related articles. This section was determined by the tags of the articles, and there was no real way to gauge effectiveness other than through users' experiences.

The last section that needed to have user feedback was the moderation of the site as well as the moderators' interaction, and it focused on the users' ability to see how the site was being controlled. The project group needed to understand how the moderators were interacting with the site and the article approval process. There also needed to be a way for the project group to quantify if they felt the moderators were implementing some sort of bias towards the articles that were approved compared to those articles that were not approved. Along the same lines of article approval the project group needed to find out from the users how quickly the articles they submitted were getting approved and posted on the site.

After compiling the list of groups that the project group felt would create an accurate view of what the users were experiencing on the site there was a problem that needed to be addressed. As the beta test began, it was very apparent that not all of the site features would be ready for the test teams to experience, such as the "ask the experts" section, rejection of articles with feedback, and the link to the TIMS system that would allow automated team registration. The lack of site completion meant that the questions that were to be asked in the usability survey needed to be restructured.

The project group came to the conclusion that instead of completely restructuring the questions to be asked, there would be a shift in how specific the questions would be. Instead of

asking very specific questions about the site's layout there would be more general questions regarding how the site was intended to be set up. However, even with these more general questions there were still questions that had to be omitted because that feature was not on the site. Some of these omitted questions include those pertaining to the WYSIWYG editor and user profile pictures.

This lack of site features delayed the launch of the usability survey. The project team had initially planned to launch the survey during week three of the beta, but the need to re-write pushed the survey back a week. The delay in the creation of the usability survey had both advantages and disadvantages. As the test teams were involved in the beta for longer, they were able to experience more of the site. However, issuing the usability survey closer to the end of the test meant that there was less time to incorporate any changes, and the beta testers would not have a chance to see and test the changes made based on the usability survey feedback.

From a formatting standpoint, the project group decided to use a general progression of question styles, beginning with general questions that required answers only in the form of yes/no, single word or rating scale, and asking for open answer comments at the end of each section.. The final usability survey can be seen in Appendix H.

3.6.3 Moderator Survey

During the last week of the beta, a short survey was given to the moderators to analyze the effectiveness of the moderator interface. The survey, available in Appendix H, was also designed to help quantify the moderator workload so that the project team could ensure an adequate number of moderators for full launch. The initial proposed survey would cover the intuitiveness of the controls for approval and rejection of articles, the average time spent

reviewing articles and the frequency that the moderators visited the website. Since not all the moderator controls were in place at the time that the survey was conducted, the questions covering the article rejection were omitted.

The first section of the survey, regarding the moderator interface, was intended to gather information on the overall moderator controls, including ease of navigation to find and approve articles. Because approval of articles is the primary responsibility of moderators, these features were considered critical in maintaining interest and activity among the moderators.

The section regarding moderator workload was designed to gauge the time required by moderators on a per-article basis so that the number of active moderators on the live site could be accurately tuned to the volume of article submissions.

3.6.4 Mid-Beta Survey

When first deciding on the surveys and testing techniques, the project group discussed an additional survey that would be administered part way through the beta testing. This survey would test for the same aspects as the post-beta survey, and would have simply been an intermediate check on the progress of the beta teams. Like the post-beta survey, it was intended to be correlated back to the initial pre-beta survey to view the effects of the website with regards to team demographics.

As the beta planning went on, however, it became clear that a mid-beta survey would not provide any useful data. Due to the beta period being only four weeks, a mid-beta survey would likely show little or no change, as the teams would not have had enough experience with the website to accurately describe its effects. Because of this, it was decided that a mid-beta survey would be a large amount of work for very little, if any, benefit.

3.6.5 Post-Beta Survey

The post-beta survey was intended to measure participants on the difference in preparedness in regards to the upcoming *FIRST* competition season after using the ThinkTank website. The responses would be correlated back to the pre-beta survey to see how the site affected teams from different demographic backgrounds. Unfortunately, due to the sharp drop in participation among the beta test teams (see section 4.3 below), the survey had to be modified to gauge how teams felt they would use the site in the future based on the impressions from the beta. In addition, because very few teams had actually experienced the site, the project group felt that correlating the data would not provide any usable statistics, and had high potential to show false trends.

The first section gauged opinions of website quality. Because quality was considered a primary factor in maintaining interest and ensuring the site was well utilized, high overall website quality was identified as a necessity for the continued use of the website. Overall quality is very difficult to measure, so the survey also asked specifically about article type and variety. Since articles were the main feature of the beta website, they were identified as having the largest impact on the perceived quality and utility of the website.

Site organization was another facet of the site that was crucial to keeping interest. As evidenced by the focus groups and by the surveys from Atlanta, organization and straightforwardness of finding resources was a necessity in order to meet the goal of an improved resource website. The survey gathered information on the adequacy of the selected supertags and participants' preferences for browsing via tags or searching for specific topics or articles.

Article ratings, while a fairly small and simple feature, are nonetheless extremely important to site usage and maintaining quality articles. Article rating was also one of the most

used features throughout the beta test. The survey tested opinions on the accuracy of the ratings as well as opinions on whether or not an overall “user rating”, derived from the ratings on a user’s articles, would be helpful. The latter feature was planned but was not able to be implemented in time for the beta test, and so could not actually be tested.

Lastly, projected site usage was, of course, of particular interest to the project team. Since very little content was actually uploaded during the beta period, all questions had to be phrased in a hypothetical format. The survey tested for presumed use for both uploading content and finding information.

3.7 Beta Test Feedback and Modifications

In order to gain the maximum benefit from the beta test, the project group devised a multi-format method of getting feedback, involving forum discussion and assignments in addition to the surveys discussed previously. The forum, set up by *FIRST* on their official forum website⁵⁰, provided a secure community discussion environment where beta participants could converse about their experiences with the website. The assignments, given on a weekly basis over the course of the beta test, served to both familiarize the beta teams with the website and provide feedback to the project group on the types of content that would be submitted, as well as the general site functionality.

The original arrangement for the forums would have involved each participating member of the beta teams registering an account on the *FIRST* forums. Because the beta test was private and by invitation only, the forum was set up such that users had to request to join and the project team would approve the requests on a case-by-case basis. Only approved users of the forum could post or view threads. This would allow each participant to submit bugs, provide feedback

⁵⁰ FIRST Forums - Powered by vBulletin. 12 Jan. 2009 <<http://forums.usfirst.org>>.

on the assignments and discuss problems and solutions with the other beta participants in a fully secure environment. Unfortunately, shortly before the beta test launched, the *FIRST* forums suffered a spam attack and were taken offline. When the forums were re-opened, *FIRST* had made the decision to close new user registration; because of this, the project group was forced to re-evaluate the usage of the forums. The final decision was made to continue to use the forums, but to utilize the pre-assigned team accounts that *FIRST* gives each team. Due to the limited access through the provided account, the forums usage was adapted to be only for assignment comments and general feedback to the project group; bug reports were shifted to an online survey format.

Four assignments were distributed to the beta test teams, one on each Monday throughout the beta test to be completed by the following Friday. These assignments were dual purpose, intended to not only familiarize the beta test teams with the site layout and functionality, but also to uncover any bugs present on the site. A list of the assignments is available in Appendix G. Each assignment asked the beta teams to submit or test a feature on the website and comment on it in the forums. Some assignments also included instructions to complete the various surveys that were being administered throughout the beta test. The features that were tested through the assignments included user bios, article ratings, article submission and article revisions.

Over the course of the beta testing, multiple modifications and features were suggested by the beta test teams. In addition, the beta test was launched with multiple features missing, including article rejection, user profile pictures, user ratings, and the link to the Team Information Management System, *FIRST*'s database of team contact information. After reviewing the feedback, the web development team made the necessary upgrades and updates to the website.

Due to the length of the beta test and the objectives of the beta test, the web development team made the decision to not modify the site during live testing; the updates were implemented on a private development server and prepared for transfer after the end of the beta test. The consequence of this, however, was that certain features meant for the live site would never be tested or experienced by teams or moderators before the website was opened to the *FIRST* community at large. An alternate solution was devised to test the features before the full launch of the website, but could not accommodate the same type of survey and feedback collection as the beta test had.

3.8 Full Launch

As the full launch approached, there was a need to make a plan that could be followed to ensure a smooth roll out of the site. The full launch required that the site be tested and there was a solid site administration in place. These two requirements were decided upon after the project group talked with the web development team as well as doing some research of their own. The beta was critical to receive input both from the test subjects and from the site, while the administrators were needed to automate the user registration process and deal with problems on the site.

The beta test was based on a specified test group of teams that would interact with the ThinkTank for a short period of time. During this test period, the test teams would be asked to complete a series of tasks that would put strains on the site. Being able to see not only how the teams react to the site, but how the site reacts to the teams, would serve as invaluable resource in the final construction of the site.

The beta test group consisted of an initial invitation pool of 50 teams, which resulted in the acceptance of around 25 teams. This group was told that they would be given a test period of

4 weeks. Over this 4 week period they were “assigned” a series of tasks to complete and for each of these tasks the project group needed to figure out how to register the results of them.

As the beta test came to a close, the project group needed to come to a conclusion as to what the next step would be. The results of this beta test were very non-conclusive at best. The teams’ interest dropped off drastically after the first two weeks and there was no real data to base conclusions upon. However, this was not a complete failure as there was still the ability for the remaining teams to test many of the functions of the site. The functions that were on the site were deemed to be working properly and there was a decision to move into another round of testing. This next round of testing was to simply get teams to upload content and utilize the high level site functions.

The extended beta test was to include some of the project group’s old teams as well as some of the teams that were beta testing the new control system. This extended beta was to be incorporated into the website’s release. This new website release was not advertised fully to all *FIRST* Teams, and only meant that the site was on the web.

4 Results

The project group utilized many surveys throughout the research and testing process. These surveys, in addition to the feedback provided during beta through the forums and email contact, provided the basis for the initial website features, immediate goals and necessary changes prior to public release.

4.1 Atlanta Analysis

The first surveys were conducted in Atlanta to provide a better understanding of the needs of the *FIRST* community and their opinions regarding the proposed website. Based on the responses to the survey, the vast majority of the respondents felt that having some sort of user level system would be crucial. The survey responses also showed that the idea of managing team-user registration was important. The idea to link a team contact to TIMS to confirm team membership was thought to be a beneficial feature by almost all respondents. The responses received about reputation were very helpful and showed that people believe reputation rating is a useful reference. They believed reputation should be based on helpfulness of submissions and that as reputation increased, the user's prominence should also increase, possibly providing ability to give more reputation, have special access, or be invited to moderate the site.

In terms of the actual implementation, the two predominant suggestions were either to have an entirely user-driven moderation and rating system (26 explicit suggestions), in league with websites like Digg, or to have moderation and reputation solely in the hands of moderators (4 explicit suggestions). The remainder of responses were either too vague to categorize or incomprehensible. It was also suggested several times that reputation be based on the proportion of average rating to total number of ratings, in league with what was planned.

The concept of team portals was embraced almost universally by respondents. In rating suggested portal features, approval rates never fell below 87%. Respondents felt this would be a great way to enable and facilitate inter-team communications. Many also felt that the team portal concept should be expanded to cover groups beyond teams, such as *FIRST*-related organizations. Portal-centric applications that were proposed were well received: events calendar (94.3% useful or better), communications with members (87.7%), private/public areas (92.7%), team news updates (90.3%). Respondents did express concern, however, that such extensive functionality might detract from individual team websites, especially related to the website awards.

The implementation of a file repository was encouraged by the respondents. 92% of respondents thought the concept of having a central location to upload information would be useful, especially with public and private permissions. Support for multiple file types was appreciated. Many respondents shared their disappointment with PTC's Windchill⁵¹, which was made available to teams for the 2008 season. The most common complaint was that although the program held a lot of potential, many people became frustrated with the user interface.

Approximately 91% of respondents felt that a tagging system would prove useful in the management of articles on the website. They felt that the ability to apply multiple tags to files, in combination with an effective search function, would make finding content much easier. Approximately 75% felt that there should be some sort of "expert" designation to differentiate users that contribute more to the community. This designation could be used as an indicator of trustworthy information, but it was made clear that it should be a subtle designation, not something showy or flashy. The "expert" designation could be derived from peer feedback and article ratings.

⁵¹ Windchill, Computer software, Needham, MA: Parametric Technology Corporation.

The fundraising portal concept was well received, with overwhelmingly positive feedback from respondents. A total of 87.1% of respondents responded with 4 out of 5 or higher when asked if they would find advice and information from major sponsors on obtaining sponsorship helpful. 59% of respondents were also willing to share fundraising and sponsorship materials they had developed with other members of the *FIRST* community. Based on this feedback, a fundraising portal should be placed towards the top of the feature priority list.

Volunteer portals were also well received among respondents. Features such as contact lists, job information, and event schedules were seen as crucial, and proposed features, such as a tool to find other volunteers looking for hotel accommodations, were encouraged. One volunteer in particular was in full support of the idea, but felt that this area should be open to anyone, including people not affiliated with teams, as this volunteer felt volunteers in such a position had very limited options.

Many comments consisted of references to popular social networking websites, such as Facebook and Digg, and *FIRST*-centric websites, such as Chief Delphi and SOAP⁵². Additional suggested features included photo albums similar to what exists on Facebook, a separate forum or blog area, and regional and nationwide networking tools within the website. However, the majority of respondents were explicitly against comments sections of any kind. A simple user interface, powerful searching and organization, and multimedia hosting and viewing capabilities were all seen as key features of the website.

At first, people were not only reluctant to participate in the survey, but they also completely misinterpreted the project's purpose. Passers-by confused the project display for *FIRST*-related technical support, reducing the number of surveys that were completed. This was

⁵² "Statistical Opponent Analysis Program," SOAP Movie HQ. FRC Team 108, <<http://www.soap.circuitrunners.com>>.

partially remedied by setting up additional signage that better explained the purpose of the project. Combined with increased foot traffic on Friday and Saturday and flyers handed out in pits, the rate of responses increased tremendously. In addition, people walking past were much more likely to stop and talk to us if there were a few people sitting at the table filling out surveys. This would often lead to waves of respondents, with periods of being overcrowded followed by periods of having empty seats. People would often lose interest if talked to for too long, so the development of a concise standard statement about the project helped keep people interested. Several *FIRST* officials passed by our booth and wanted to learn more about the project, but none stopped to take the survey, most likely due to their other commitments while in Atlanta.

Overall, the survey was a great success, collecting a large amount of valuable information. It is clear that the *FIRST* community was looking for the kind of website that the project group could provide and was supportive of the effort. Responses very closely paralleled the initial concept of the website.

4.2 Team Characterization

The goal of the team characterization survey was to get a better idea of the demographics of teams participating in the beta test. Teams were asked questions in five categories: funding, membership, mentorship, team training, and resource usage, the first three being the most emphasized. The intent was to compare individual responses to the characterization survey and the post-beta survey to determine the effect, if any, the website had on the testers. A total of 23 responses were collected.

In general, participating teams seem to source the majority of their budgets from corporate sponsors, with 64% of respondents reporting that 45% or more of their funding comes

from corporate sponsors. As a subset of this group, 27% of respondents receive 75%-90% of their funding from corporate sponsors. This is not surprising, as team names, which reference sponsors, school, and other sponsoring organizations, are often extensive, resulting from multiple corporate sponsorships. Paralleling this, when asked what percentage of funding comes from the sponsoring school, 85% of teams responded that 44% or less of the team budget comes from the sponsoring school. The remaining 15%, however, responded that 75% or greater of the team budget came from the sponsoring school. These two seemingly distinct groups could potentially be attributed to a spread between private and public schools, as public school districts might be less inclined or simply unable to fund the relatively high expense of operating a *FIRST* Robotics Competition team, whereas private schools might be better financially able to do so. With regard to fundraising, 91% of participating teams base 44% or less of their budget on fundraising activities. Interestingly, the remaining 9% gathers 60-74% of their budget on fundraising alone.

In terms of team student membership, the participating teams' sizes are fairly distributed, with peaks centered at 15-19 members and 25-34 members, seen in Fig. 2. No teams reported sizes greater than 50 members. Surprisingly, teams were evenly split when asked whether new members are primarily new students, with only 48% reporting as such. Teams also showed relatively high retention rates among members, with 70% of respondents saying that greater than 75% of members returned from the previous year; it is uncertain if this took into consideration graduating students. As would be expected in an organization that emphasizes engineering and technology learning, 91% of teams responded that 39% or less of team members took primarily non-engineering roles on the team.

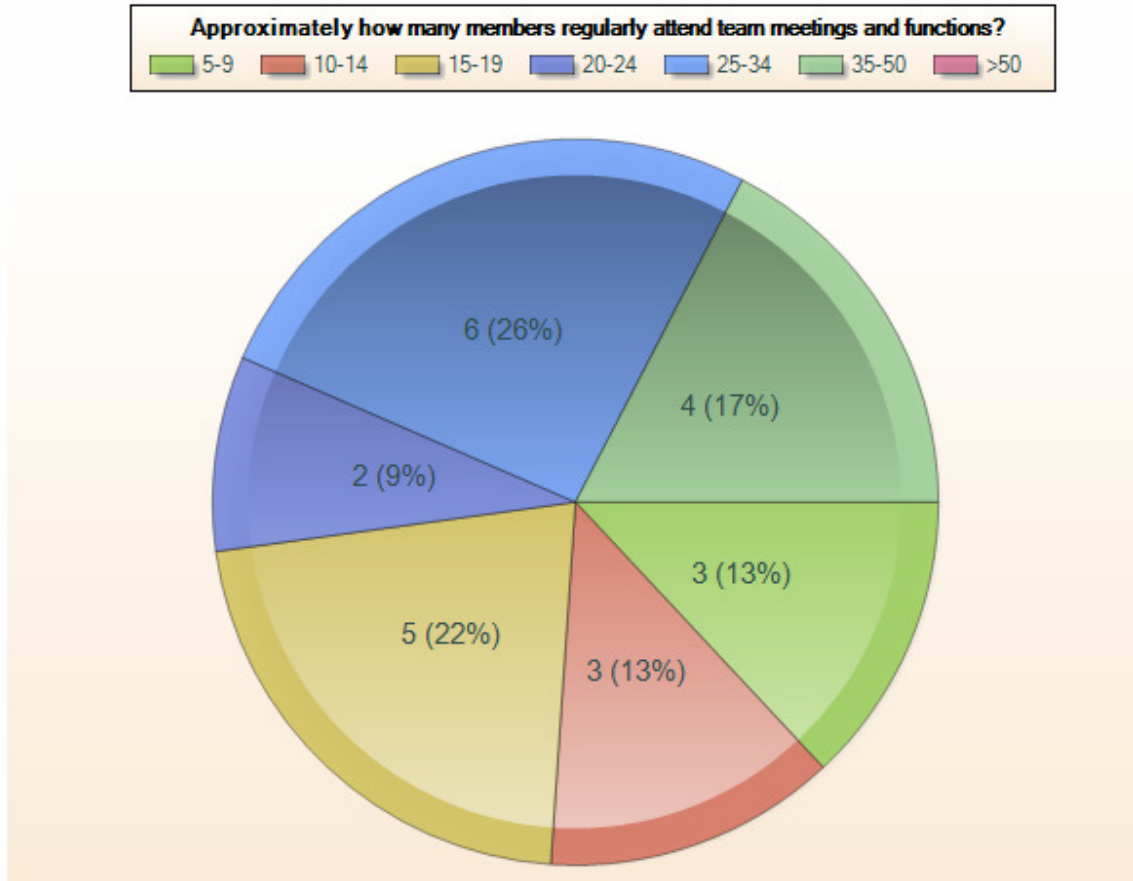


Figure 2 - Average Member Participation Among Beta Teams

Mentorship trends, however, seemed to be more consistent between teams. 83% of teams responded that less than 9 mentors attended meetings regularly. No teams reported any more than 14 mentors attending regularly. In terms of experience, 60% of mentors had been involved in *FIRST* for between 2-6 years as shown in Fig. 3. Interestingly, although 73% of teams reported that less than 19% of mentors took primarily non-engineering roles on the team, 23% reported that greater than 50% of mentors did so.

Among the rest of survey questions, many teams indicated that they participated in activities involving the community at large (see Fig. 4). Sixty-four percent of teams indicated

they gave demonstrations, while 82% held fundraisers. In addition, many teams commented that they also did things such as marching in parades. 65% of teams indicated that they provided mentorship or support to other local teams.

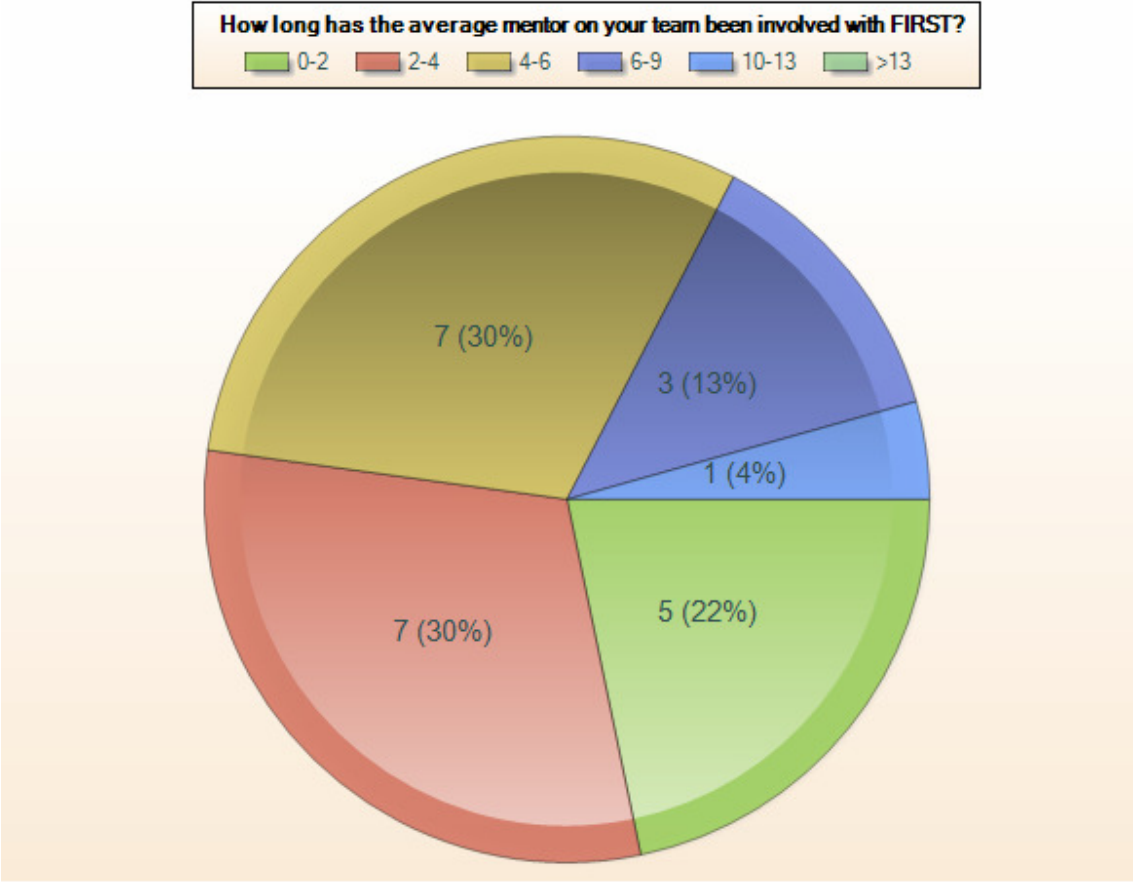


Figure 3 - Average Length of Mentor Participation Among Beta Teams

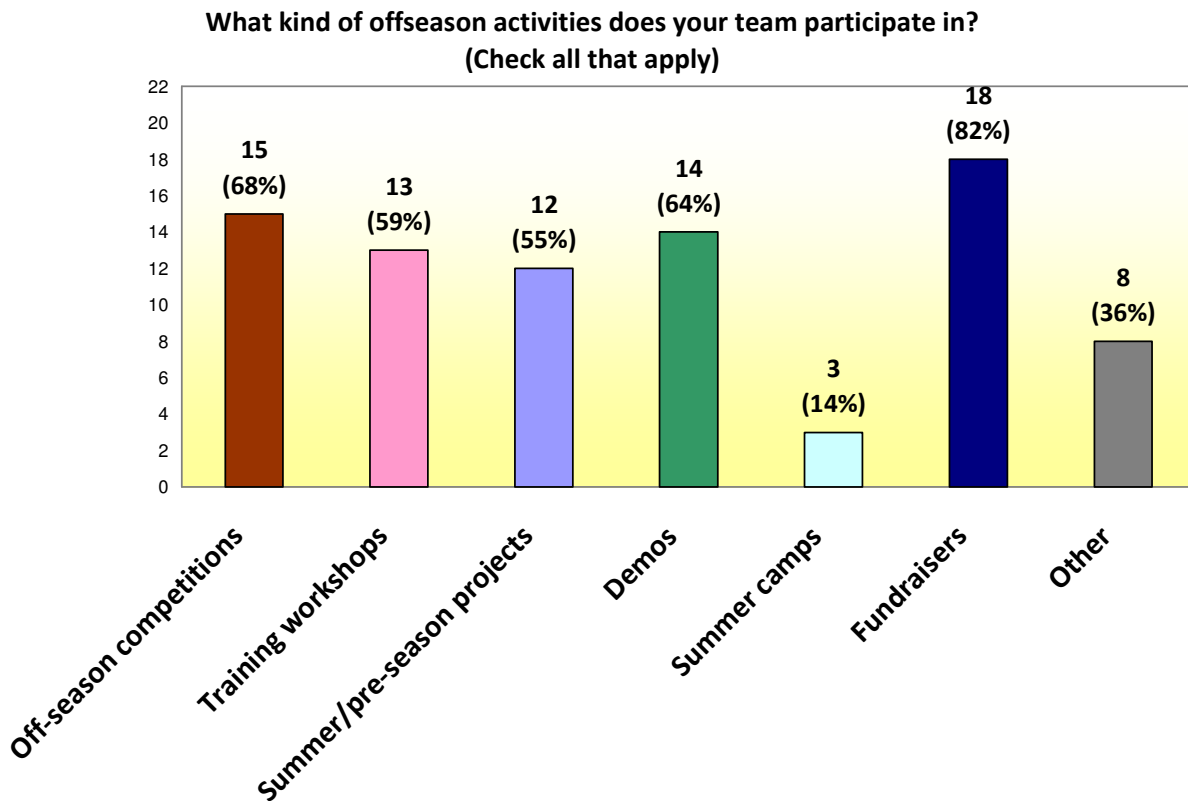


Figure 4 - Offseason Activities Among Beta Teams

Overall, the teams that completed the survey seem to be somewhat representative of all major demographics, though there was a slight trend towards more established teams, the project group felt that the sample was representative enough to provide accurate feedback on the ThinkTank website. Upon completion of the beta testing period, teams were asked how they felt their teams would utilize the ThinkTank website.

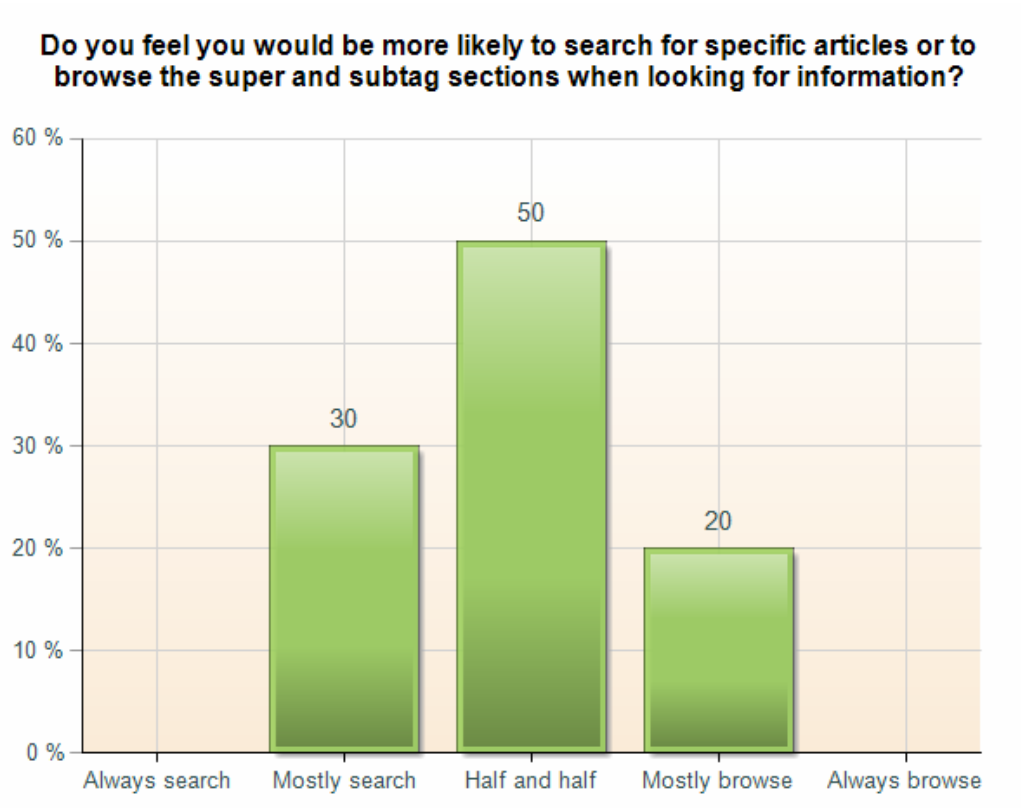
4.3 Other Surveys

On the remaining surveys, we were unable to get a significant number of beta testers to complete the survey. Only three individuals completed the usability survey, and eleven individuals completed the post-beta survey, after several reminders. This is most likely a direct

result of the low number of registered teams that actually participated in the beta, the reasons for which are discussed below.

From the results of the post-beta survey, which had 11 completions, the project group was able to draw conclusions from some very general trends. While the accuracy is likely fairly low due to the small number of responses, the general opinion was that the website was better than average, with 70% of the respondents rating it as “Good” or “Excellent”. Based on free response comments on the website quality, all are positive, with most citing difficulty in registration or lack of content as the primary weaknesses of the site.

Results on preference to browsing tag pages versus searching for content gave an even distribution, with 50% reporting they would use both equally, 30% saying they would mostly search and 20% reporting they would mostly browse.



In addition, 100% of the respondents felt that the rating system accurately represented article quality, and 90% believed that a user rating would be beneficial. While it is hard to predict the actual usage of the site if more users and more content are added, it is safe to say that the potential exists for a well-used, successful resource website.

4.4 Revisiting Site Goals

Due to the low participation during the beta, it is impossible to gauge whether the goals of the beta test were achieved. Only a handful of articles were contributed by beta test participants. Though they are quality content, these contributors are known already for such a level of quality. The goal was to spur *FIRST* participants who did not already contribute to the community to develop their own content to share. In the span of the beta test, this was not achieved.

The usability survey that was administered had three respondents. No useful data can be extracted such a small sample set, especially when considering that the goal for ThinkTank is to have it launched to the tens of thousands of *FIRST* participants. The bug reports that were submitted were almost all known issues before the beta was launched.

If one goal can be evaluated, it would be general interest. As evidenced by the low number participants, teams seemed to lose interest rather quickly in the website. Unfortunately, the exact root cause cannot be easily determined because of the lack of feedback.

Even though the backing survey data is unavailable, the project team was able to draw some conclusions and information from free response survey questions and personal interactions with the teams through the forums and email. As the beta test began, it became clear that teams were having great difficulty in registering for and setting up accounts on the site. Due to the lack of any automated registration, as was initially planned through the TIMS system, the sign up

process for teams and users was overly complicated and required many more steps than was originally intended. Because the graphical interface of the website was also not able to be viewed or tested by the project team until a few days before the beta test began, there was also a lack of adequate documentation on both the site usage and the registration process. Additionally, the actual method of registration that was used was not decided upon until shortly before the test was scheduled to begin. These factors compounded to create an extremely buggy and confusing sign up for users and, taken with the fact that this was the first aspect of the website that the beta participants encountered, was a likely cause of the low participation rate. Through the comments provided by the teams that did successfully register and participate, the project team found that the beta test would have likely retained more interest and participation had this one aspect been more streamlined.

Another major factor that was identified by the project team as possibly affecting the participation rate was the lack of a clear incentive. The beta site, while pre-loaded with a number of presentations and workshops from *FIRST*, did not offer much new content on subjects that would be interesting or beneficial to the beta teams. The site promises information and resources for teams, and so without such resources to attract users, will suffer from low usage rates. The project group had hoped to use the beta test to pre-load the website, but failed to account for a lost of interest in beta due to that same lack of content.

One final reason for a lack of interest in the beta test that was proposed by the project team is the “critical mass” effect. In order for social networking and peer-interaction sites to attract new users, they often require a solid user base. It becomes a problem of circular feedback: people join because it’s well used, and it is well used because lots of people join. The project team believed that, due to factors such as difficulty in registration and the subsequent drop in

participants, the remaining beta testers encountered a website which was mostly dormant and therefore uninteresting and lacking any sort of incentive to use. Other social networking websites, such as the South Korean “Cyworld⁵³” appear to have been affected by this same phenomena. Cyworld saw a small increase in usage in 2004, but remained at the same level of popularity. It is not very well known, and had 15 million users as of 2005⁵⁴, compared to the 100 million users MySpace reached in 2006⁵⁵. The failure to reach critical mass is theorized to be the primary reason for the sharp drop in participation of the teams that did actually successfully register. Regardless, in terms of the original goals, the beta test did not succeed, but not quite for any reasons that were anticipated.

⁵³ Cyworld, <<http://us.cyworld.com>>.

⁵⁴ Malik, Om, "Will Cyworld Stop Myspace Juggernaut," Weblog post, GigaOM, 16 Apr. 2006. <<http://gigaom.com/2006/04/16/will-cyworld-stop-myspace-juggernaut/>>.

⁵⁵ "MySpace music deal poses multiple threats," The Register, 8 Sept. 2006. <http://www.theregister.co.uk/2006/09/08/myspace_threatens_record_labels/>.

5 Conclusions

The primary goal of the ThinkTank project was to develop a new social networking website for the *FIRST* robotics community in an attempt to reduce barriers to entry and increase retention rates. It was important to gather feedback from the eventual user base as to what they felt would best achieve this goal. This was accomplished through surveying of the *FIRST* community to characterize what desired website features and resources were not available to them. This information was used to develop the concept of the website, and then subsequently implement, launch and evaluate the resulting site in a small-scale private beta test.

Before the project began, focus groups were conducted to find out what resources teams already used and what resources were desired. This was accompanied by surveys administered at the 2008 *FIRST* Robotics world championship, where individuals were asked to examine and provide feedback on a website concept and submit desired features. The information gathered from these surveys was used to develop the ThinkTank website.

Feedback from teams suggested teams were looking for a website similar in scope to what was proposed in ThinkTank. Respondents were enthusiastic about many of the proposed features, and said that they would make heavy use of such a website if developed.

The ThinkTank website was subsequently beta tested in the fall of 2008 with selected volunteer teams. Unfortunately, participation during the beta sharply dropped from the start, with very strong interest in the beginning of the test period, but almost zero participation at the end. During the beta testing period, several surveys were administered to characterize the teams participating and track what effect the website was having on the participants.

Why teams chose not to participate after entering the beta cannot be known for sure, but there are several plausible reasons. Perhaps most importantly, teams practically had nothing to

gain from participating in the beta test for the work required of them. This lack of a reward for participation surely discouraged teams from participating. In addition, bugs and problems with the website from the start frustrated and drove away many of the users that did choose to participate. Even with frequent updates, some critical features remained buggy or non-functional, such as new user registration, forgotten password help and article submission. Realistically, the website was not in a ready state when launched for the beta. The combination of these two factors drove users away after the initial excitement, resulting in such low participation.

In the end, the objective of creating a website to address the lack of adequate online resources for teams was achieved, and a website that can benefit the *FIRST* community at large was developed as a result of extensive research and surveying. By providing moderated but still community contributed content, the website has the potential to provide accurate and reliable resources to teams. The groundwork has been laid for future improvements that will make the site an extremely powerful tool for teams.

The final product is currently functional and has a limited user base that is slowly contributing content. The effectiveness of this website, and whether or not it met the ultimate goal of providing more reliable resources to teams, however, was unable to be evaluated. Although the beta test did not fare as well as hoped, it could be repeated with new teams, taking into account lessons learned from the first attempt. In retrospect, the beta should not have been started until the website had full functionality and additional testing. Additionally, the beta test should have had more pre-loaded content and more incentives, possibly monetary or otherwise, to ensure that the participating teams remained active and continued to contribute throughout the beta period. A more complete understanding of the beta test procedures by all parties involved, the project team, the Robotics Resource Center at WPI, the WPI Web Development Office, and

FIRST, would also have led to a more successful initial beta test.

6 Recommendations

The current status of the features that made it through to the web development team proposal is as follows:

Feature	Current Status	Notes
Account creation	Functional	Currently links to TIMS for new teams. Some bugs may still exist.
User information	Modified	User's team is automatically specified by their approved affiliations. Other user information has been combined with user bio, see below.
User permissions	Functional	User permissions are in place for default user, user approver, tag moderators and super administrator. Article approver and tag approver have been combined. "Expert" permissions do not currently exist.
User bio pages	Functional	User bio page displays a name, a bio, list of submitted articles, user rating, and a picture. The abilities to email a user, view their submitted questions or view their favorite articles are not present.
Team pages	Functional	Team pages list the users that belong to the team, along with each user's bio. Lists of articles and questions submitted by team members are not present.
Articles	Functional	Articles are able to be uploaded with abstracts, tags, main text and a number of attached assets. Each aspect of articles is discussed individually below, with subsections in italics.
<i>Saved drafts</i>	Functional	Articles can be saved as drafts before submittal.
<i>Tagging and approval</i>	Functional, Modified	Articles require at least one supertag. Approval has been modified to require each tag to be approved, instead of a certain number of approvers. Provisions exist to keep users from approving their own articles.

<i>Revisions</i>	Functional, Modified	Any user may submit revisions to an article. Instead of going through the author, revisions now go back through the standard article approval process.
<i>Ratings</i>	Functional	Articles can be rated in a 5-star system
Portal page	Functional, Modified	The main page displays the 5 newest articles, 5 highest ranked articles and one random article. Since questions were not implemented, no associated features exist on the main page. Currently logged in users do not appear on the portal page
Category/Tag pages	Functional	Tag pages display all articles, with abstracts, that are assigned the respective tag. Supertags also have a list of subtag categories on their tag pages.
Ask the Experts page	Nonexistent	The Ask the Experts feature does not currently exist on the website.
RSS Feeds	Partially Functional	RSS provisions exist, but the extent to which they are functional is currently unknown.
Control Panels	Functional, Modified	Each proposed control panel is discussed individually below, noted with italics.
<i>Category CP</i>	Unknown	Only accessible by super-administrators and as such was never seen or used by the project team.
<i>Tag CP</i>	Nonexistent	In the current state, no options exist for anyone other than site administrators to create or delete tags
<i>User CP</i>	Nonexistent	Current approval of users transpires by email. No methods exist for user approvers to delete users from their team without contacting site administrators.
<i>Ask the Experts CP</i>	Nonexistent	No control panel exists because the referenced feature is not present.
<i>Article CP</i>	Functional	The article CP is accessible only by tag approvers. The ability to reject articles with comments was moved to the article page itself.

In its current state, the site is fully functional, although some bugs may still exist. Some features that were outlined in the original proposal from the web development team have been modified or removed as was seen fit. The site is far from being fully self-supporting, however, and still requires attention from the WPI Web Development Office, the Robotics Resource Center at WPI and *FIRST* if it is to continue expanding and remain a viable resource for teams.

As the site moves forward, there are many aspects regarding users that need to be addressed. The project team believe that *FIRST* should be responsible for the following aspects:

- Once the full launch has been completed there needs to be a shift from having the webmasters approve all of the users to having a system in place that accounts for main contacts, team members, sponsors and other users that don't fall into any of these groups. The best way to do this would be to distribute this load between an automated system and base of person(s) that would coordinate the approval and distribution of privileges to new users.
- The system for approving the main contacts for each team that is currently in effect is working as anticipated, but this link to the TIMS database will not be without any issues in the future. There should be a set position established that will consist of person(s) that will be in charge of responding to any issues that arise.
- Users that do not belong to a *FIRST* team must be able to be added to the system. This includes sponsors that want to be involved as well as other non-affiliated individuals that would like to contribute useful information. The process for approving a sponsor would be similar to that of approving a main contact for a team, however there is no list of emails that can be referenced (TIMS) for an automated

approval process. There would have to be a dedicated person(s) that would be required to confirm the validity of a sponsor's request to join.

These three sets of users all have aspects that need to be constantly monitored and actions that need to be taken to have the site run smoothly. These requirements can easily be accomplished by employing a person(s) that would be in charge of monitoring and controlling the users on the site. This user would have to create a proper interface by working with the Web Development team. Once this streamlined interface is available, the person(s) would be able to keep track of their site duties and complete all of their required tasks within a few hours each day.

The Web Development Team is crucial to the maintenance and continued operation of ThinkTank. Although the project team did the initial planning run through, it is the Web Team who was the architects of the backend and inner workings of the system. It is recommended that since the Web Team was such an integral part, they decide what is necessary for the continued evolution and operation of the website. Some examples of such work include bug fixes and database and profile maintenance.

The ThinkTank also relies on moderators to approve articles. In order to ensure that the site continues to run smoothly and stay current, it is recommended that the Robotics Resource Center assume responsibility for managing the moderators, which includes:

- Making sure that there are an adequate number of active moderators to meet the demand of the site, and recruiting more if necessary
- Addressing any issues, concerns or questions brought up by moderators
- Being responsible for resolving any issues regarding site content, including duplicated and inappropriate content, due to the proximity to the Web Development team

- Ensuring that there are enough moderator accounts so that any articles posted can be approved in a timely fashion. Due to the fact that moderators cannot approve their own articles, this dictates a minimum of two moderator accounts. More accurately, the accounts owned by the Robotics Resource Center will have to have at least two approvers for any one tag. Currently, there exists one account, registered to firstthinktank@wpi.edu which has approval privileges on every tag. This account is considered the “master” account and should be used only by the Robotics Resource Center to approve articles and to upload articles provided to the Robotics Resource Center by outside parties not registered on the website and with permission from the article’s true author.
- Developing a selection method for new moderators, through peer review, administrator selection, or some combination of the two. In addition, a model needs to be developed relating the number of moderators required to the total number of users, based on feedback from beta test teams and moderators themselves. The end result of this will be to find the proper balance to ensure articles are reviewed promptly while keeping the number of moderators to a minimum.
- Creating proper documentation to support new moderators. Rough documentation has already been developed, but needs to be expanded and updated to reflect recent changes in the website.

It is also recommended that each staff member of the Robotics Resource Center register a separate account and be given moderator privileges to ensure that, even in a case where other moderators are inactive, there is enough support to continue running the site smoothly.

For the immediate future, the top priority should be to develop a solid content base for the website. The project group recommends that the Robotics Resource Center work to improve the selection and volume of content available on the ThinkTank website by a number of methods, the most effective possibly being the recruitment of individuals expressly to write and submit articles to the site prior to any additional testing. Of particular benefit would be members and mentors who participated in the New Control System Beta run by *FIRST*. Those involved could certainly contribute much needed resources on their findings in working with the new control system slated for use in the 2009 *FIRST* Robotics Competition challenge, and it is believed that this would provide a better incentive for teams to utilize the site.

Additionally, a second beta test run with all site features fully functional and a larger test group is needed to determine how the ThinkTank website affects team operation and preparedness. Preliminary research should be conducted into methods to ensure that enough participants remain active throughout the beta, either through extra incentives or by other means. The project group also recommends more involvement from *FIRST* with the second beta in order to help solidify the official nature of the website. Care must be taken in the second beta test to use teams who have not experienced the ThinkTank website before, but it is recommended that a second beta test be run while other teams and users not involved with the beta are using the site. This will increase the effective user population and allow teams who participated in the first beta and have contributed content afterwards to remain active and involved without affecting the new test data.

It is recommended that, ultimately, the Robotics Resource Center make the decision on when and how to inform the *FIRST* community at large about the website. They must take into

account the readiness of the site to handle the traffic and usage of the population, and determine if a gradual release or a public announcement will yield the most desirable results.

Regarding the development of future phases and additional features, this can either be adopted under the guidance of the Robotics Resource Center, or by a future project group. The “Ask the Expert” feature that was specified for release with the rest of the initial website should be the next feature implemented and has already been well enough defined to move forward without very much additional input or oversight. For the future phases involving “Team Portals” and “SharePoint”, the basic structure outlined in the initial proposal to the Web Development Office is a good starting point, but will need to be developed further, with additional input from the *FIRST* community, before implementation is feasible. The decision for future development should be based on the success and usage of the current website, and should be agreed upon by all parties involved before moving forward.

The priority of features to be implemented is recommended as follows:

1. “Ask The Experts”
2. Improved control panels for organization leaders
3. Team private portals, including calendars, messaging systems and forums
4. Volunteer portals, including calendars, messaging systems and forums
5. Team public portals, including calendars, profile information and contact links
6. Team SharePoint, with ability to invite “guest” contributors not affiliated with the team
7. Public SharePoint, with approval system for teams wanting to make their work publicly viewable.

Although no timeline is explicitly specified, it is recommended that any additional data collection and large scale testing of the current website occur after the 2009 *FIRST* Robotics

Competition season, which spans from January through April. Teams and all others involved with the competition are extremely busy during this period, and any attempts to collect information will likely fail due to lack of available participants.

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8 Appendices

Appendix A: NSF Grant Proposal

**02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and
co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS**

Submit only ONE copy of this form for each PI/PD and co-PI/PD identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.B. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. **DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.**

PI/PD Name: Gretar Tryggvason

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more) American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status:
(Select one or more) Hearing Impairment
 Visual Impairment
 Mobility/Orthopedic Impairment
 Other
 None

Citizenship: (Choose one) U.S. Citizen Permanent Resident Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name):

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project

Ethnicity Definition:

Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.

Race Definitions:

American Indian or Alaska Native. A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.

Asian. A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

Black or African American. A person having origins in any of the black racial groups of Africa.

Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

WHY THIS INFORMATION IS BEING REQUESTED:

The Federal Government has a continuing commitment to monitor the operation of its review and award processes to identify and address any inequities based on gender, race, ethnicity, or disability of its proposed PIs/PDs. To gather information needed for this important task, the proposer should submit a single copy of this form for each identified PI/PD with each proposal. Submission of the requested information is voluntary and will not affect the organization's eligibility for an award. However, information not submitted will seriously undermine the statistical validity, and therefore the usefulness, of information received from others. Any individual not wishing to submit some or all the information should check the box provided for this purpose. (The exceptions are the PI/PD name and the information about prior Federal support, the last question above.)

Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational opportunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 268 (January 5, 1998).

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Submit only ONE copy of this form for each PI/PD and co-PI/PD identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.B. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. **DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.**

PI/PD Name: James K Doyle

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more)
 American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status:
(Select one or more)
 Hearing Impairment
 Visual Impairment
 Mobility/Orthopedic Impairment
 Other
 None

Citizenship: (Choose one) U.S. Citizen Permanent Resident Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name):

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project

Ethnicity Definition:

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White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

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PI/PD Name: Michael A Gennert

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more)
 American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status:
(Select one or more)
 Hearing Impairment
 Visual Impairment
 Mobility/Orthopedic Impairment
 Other
 None

Citizenship: (Choose one) U.S. Citizen Permanent Resident Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name):

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project

Ethnicity Definition:

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CERTIFICATION PAGE

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By signing and submitting this proposal, the Authorized Organizational Representative or Individual Applicant is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, and lobbying activities (see below), nondiscrimination, and flood hazard insurance (when applicable) as set forth in the NSF Proposal & Award Policies & Procedures Guide, Part I: the Grant Proposal Guide (GPG) (NSF 07-140). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

Conflict of Interest Certification

In addition, if the applicant institution employs more than fifty persons, by electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.A; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

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Debarment and Suspension Certification (If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency? Yes No

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Exhibit II-4 of the Grant Proposal Guide.

Certification Regarding Lobbying

The following certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Certification Regarding Nondiscrimination

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative is providing the Certification Regarding Nondiscrimination contained in Exhibit II-6 of the Grant Proposal Guide.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:

- (1) community in which that area is located participates in the national flood insurance program; and
- (2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:

- (1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
- (2) for other NSF Grants when more than \$25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE	DATE
NAME			
Fredric J Russo			07/03/07
TELEPHONE NUMBER	ELECTRONIC MAIL ADDRESS	FAX NUMBER	
508-831-5586	trusso@wpi.edu	508-831-5789	
*SUBMISSION OF SOCIAL SECURITY NUMBERS IS VOLUNTARY AND WILL NOT AFFECT THE ORGANIZATION'S ELIGIBILITY FOR AN AWARD. HOWEVER, THEY ARE AN INTEGRAL PART OF THE INFORMATION SYSTEM AND ASSIST IN PROCESSING THE PROPOSAL. SSN SOLICITED UNDER NSF ACT OF 1950, AS AMENDED.			

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PI/PD Name: Cindy A Randall

Gender: Male Female

Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race: American Indian or Alaska Native

(Select one or more)

- Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status: Hearing Impairment

(Select one or more)

- Visual Impairment
 Mobility/Orthopedic Impairment
 Other
 None

Citizenship: (Choose one) U.S. Citizen Permanent Resident Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name):

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project

Ethnicity Definition:

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List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:

Not Listed

REVIEWERS NOT TO INCLUDE:

Not Listed

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE (if not in response to a program announcement/solicitation enter NSF 07-140)					FOR NSF USE ONLY	
NSF 07-140					NSF PROPOSAL NUMBER	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)						
EEC - ENGINEERING RESEARCH CENTERS						
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNSI# (Data Universal Numbering System)	FILE LOCATION	
				041508581		
EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)		SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES, LIST ACRONYM(S)		
042121659						
NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE			ADDRESS OF AWARD ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE			
Worcester Polytechnic Institute			Worcester Polytechnic Institute 100 Institute Road Worcester, MA. 016092247			
AWARDEE ORGANIZATION CODE (IF KNOWN)						
0022335000						
NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE			ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE			
PERFORMING ORGANIZATION CODE (IF KNOWN)						
IS AWARD ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)						
<input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> MINORITY BUSINESS <input type="checkbox"/> IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE <input type="checkbox"/> FOR-PROFIT ORGANIZATION <input type="checkbox"/> WOMAN-OWNED BUSINESS						
TITLE OF PROPOSED PROJECT Social Networking in the FIRST Robotics Competition Community						
REQUESTED AMOUNT	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE			
\$ 199,461	24 months	10/01/07				
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW						
<input type="checkbox"/> BEGINNING INVESTIGATOR (GPG I.G.2) <input checked="" type="checkbox"/> HUMAN SUBJECTS (GPG II.D.6) Human Subjects Assurance Number _____ <input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C) Exemption Subsection <u>3101(b)(1)</u> IRB App. Date _____ <input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION (GPG I.D, II.C.1.d) <input type="checkbox"/> INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.) <input type="checkbox"/> HISTORIC PLACES (GPG II.C.2.j) <input type="checkbox"/> SMALL GRANT FOR EXPLOR. RESEARCH (SGER) (GPG II.D.1) <input type="checkbox"/> VERTEBRATE ANIMALS (GPG II.D.5) IACUC App. Date _____ <input type="checkbox"/> HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.G.1) PHS Animal Welfare Assurance Number _____						
PIPD DEPARTMENT Mechanical Engineering			PIPD POSTAL ADDRESS 100 Institute Road Worcester, MA 01609 United States			
PIPD FAX NUMBER 508-831-5680						
NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address		
PIPD NAME Gretar Tryggvason	PhD	1985	508-831-5759	gretar@wpi.edu		
CO-PI/PIPD James K Doyle	PhD	1991	508-831-5583	doyle@wpi.edu		
CO-PI/PIPD Michael A Gennert	ScD	1987	508-831-5670	michaelg@cs.wpi.edu		
CO-PI/PIPD Cindy A Randall	BA	1986	603-666-3906	crandall@usfirst.org		
CO-PI/PIPD						

CERTIFICATION PAGE

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AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE	DATE
NAME			
Fredric J Russo			07/03/07
TELEPHONE NUMBER	ELECTRONIC MAIL ADDRESS	FAX NUMBER	
508-831-5586	trusso@wpi.edu	508-831-5789	
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Project Summary

Worcester Polytechnic Institute (WPI) and FIRST will partner to develop a social networking community to lower barriers to entry and increase retention of students and mentors in FIRST Robotics Competitions. The social network will serve participants from the FIRST community, consisting of over 130,000 K-16 students, educators, and engineers nationwide.

We propose to use a combination of social networking and wiki development software to allow the FIRST community to share and collaboratively build an online repository of robotic knowledge and practice, promoting widespread access to engineering production and design processes. We will create a framework for a social networking wiki site and populate it with an initial set of materials. Open questions to be addressed include how to organize this social network to encourage all members to contribute, share, and disseminate useful content, and how to use organizational behavior and social science concepts to engineer the network to accomplish these goals. Potential solutions may be found in the establishment of a meritocracy recognizing those within the community who give of their time through reviewing and/or moderating the space, and through non-recognition reward structures where the act of creating becomes adequate incentive, using existing social networks (e.g., MySpace and Facebook) as models. WPI's primary contributions will be in cyberinfrastructure, pedagogy and education (specifically engineering, science, management, and social science faculty), and assessment; FIRST primary contributions will be in community-building, organizing robotics events, and K-16 engagement. WPI and FIRST have an extensive history of collaboration, including event sponsorship, organization, and staffing; robotics software development; and the FIRST Robotics Resource Center hosted at WPI.

Intellectual Merit: We hypothesize that social networking can lower barriers to entry and improve retention of students and mentors in FIRST Robotics Competitions. To test this hypothesis, we propose to (1) Assess how the members of the FIRST Community currently network and use cyberinfrastructure (2) Integrate research on cybertools with development of an engineering education community website. (3) Construct a prototype website based on the outcomes of both the FIRST community evaluation and the social networking analysis.

Broader Impacts: The proposed work will help attract K-16 students to critical SMET disciplines through increased exposure of robotics. Because of the power of robotics-oriented activities to break down traditional cultural barriers that prevent students from realizing their potentials as engineers and/or as business leaders due to gender and racial bias in upbringing, we expect the proliferation of this form of competition to positively impact the diversity of SMET disciplines. The potential of a high-school robotics competition (FIRST) to have these broader impacts is well demonstrated in a recent study that showed women and minority high-school participants subsequently majored in Engineering at high rates: 33% of the female, 27% of the African-American, and 47% of the Hispanic students compared to national averages of 2%, 5% and 6% respectively.

TABLE OF CONTENTS

For font size and page formatting specifications, see GPG section II.C.

	Total No. of Pages	Page No.* (Optional)*
Cover Sheet for Proposal to the National Science Foundation		
Project Summary (not to exceed 1 page)	1	_____
Table of Contents	1	_____
Project Description (Including Results from Prior NSF Support) (not to exceed 15 pages) (Exceed only if allowed by a specific program announcement/solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	15	_____
References Cited	2	_____
Biographical Sketches (Not to exceed 2 pages each)	8	_____
Budget (Plus up to 3 pages of budget justification)	9	_____
Current and Pending Support	5	_____
Facilities, Equipment and Other Resources	1	_____
Special Information/Supplementary Documentation	0	_____
Appendix (List below.) (Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	_____	_____
Appendix Items:		

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

1. Introduction

The issues of educating youth for the 21st century have taken on a new sense of urgency. Several reports and guidelines have been written to begin addressing this pending crisis. The National Academies of Science report "Rising Above the Gathering Storm" (2007) created a call to action stating that the vitality of the United States, which arises in large part from the productivity of well-trained people and a steady stream of scientific and technical innovations they produce, is endangered. This report also states that without high quality knowledge-intensive jobs and the innovative enterprises that lead to discovery and new technology, our economy will suffer and our people will face a lower standard of living. A substantial portion of our workforce finds itself in direct competition for jobs as leading edge scientific and engineering work is being accomplished in many parts of the world.

This report outlined a number of recommendations and priorities to improve the current situation. Under the priority named "10,000 teachers, 10 million minds", Action Item A-2 outlines that *K-12 curriculum materials need to be modeled on a world-class standard* to foster high quality teaching, curricula and assess student learning. Action Item A-3 outlines the need to enlarge the pipeline of students who are prepared to enter college and graduate with a degree in science, engineering or mathematics. The goals described in this report are daunting, with many possible ways to address them. We need to find answers to the following specific questions: How to address the diversity of learning and teaching styles?; How does one increase the awareness that technical and educational content is important and relevant to youth in an engaging and applied manner?; How do we increase the confidence and comfort levels of educators through alternative teaching methods?; and finally, How does one address scale (the large number youth represented in the US) when a "one size fits all" curriculum clearly does not meet the needs of neither educators nor students. In addition to the classroom situation, education and learning also takes place after-school and outside the classroom. How can we encourage learning to continue after-school and be presented in an engaging hands-on manner such that the information is not only learned but integrated into our culture's way of thinking and is acquired through positive experiences that reinforces science, technology, engineering and mathematics as being meaningful and relevant?

The FIRST Robotics Competition is specifically designed to meet the challenges listed above. FIRST has already had major successes but has the potential to achieve even greater visibility and influence in high schools across the US. The main obstacle for increased participation is the relatively high entry barrier for new participants. The main hypothesis of the present proposal is that: **Social Networking, facilitated through online communities, will lower the barriers to entry to FIRST Robotics Competitions.**

This proposal seeks to provide solutions to the questions outlined above through the following activities:

- Develop an understanding of the types of relationships and networks among people and user groups to elevate both the development and learning of STEM content.
- Apply the successful value system and reward structure of FIRST robotics competitions to inform the social networking design.
- Use social networks to distribute science and engineering content to FIRST teams and evaluate its effects.
- Use social networks as a source of engagement for a diverse set of participants along racial, economic, gender, and other lines.

The spectacular emergence of the Internet and associated information technology has enabled unprecedented opportunities for such interactions, via email, instant messaging, news groups, chat rooms, blogs, wikis, podcasts, and the like. Using such technologies, it is now feasible to draw together knowledgeable and interested individuals, databases, analytic tools, and so on, on a scale that was impossible a few short years ago. To date, and within an educational context, such interactions have been incoherent and dispersed, contributions vary widely in quality, and there has been no clear way to converge on well-supported decisions concerning what actions, both grand and ground-level, we should take to solve such a pressing problem as remaining globally competitive and a leader in technological innovations.

Another emerging area of research is called social network analysis. This research on group behavior has been conducted for nearly two centuries now from Ferdinand Tönnies' analysis to the latest by

beliefs or causes can be physical, ideal, theoretical, virtual or philosophical and can find levels of satisfaction and challenge nurturing both the individual and group need; and finally,

7. The **reasons** for participation allows for all members of the community to "rally around the shared belief or cause" for their own personal reasons yet all can contribute and reside peacefully within the larger community. Reasons that motivate an individual to become a part of an "online community" includes: emotional connections, familiarity or sense of place; other "like-minded" individuals; real relationships and shared experiences formed within the community, intellectual stimulation, and/or driven by the interest of the belief or cause.

The "Social Networking in the FIRST Robotics Community" cyberinfrastructure and tools will be carefully crafted so that the users will have the ability to create their own community with its own values over time, defined by what the members link to and what they say about what they link to (Powazek 2001). This factor will be important in the design of the Social Networking website because like a community, real or cyber, an individual has a choice to be a member or not. The NSF Blue Ribbon Advisory Panel on Cyberinfrastructure "*Revolutionizing Science and Engineering through Cyberinfrastructure*" found that cyberinfrastructure can augment and add to the face to face time to enable collaboration between people at different locations, at the same (synchronous) or different (asynchronous) times. NSF describes the "distance dimension" to include not only geographical but also organizational and/or disciplinary distance. "We are at a threshold where a collaborative or grid community can become "the place" where a research community interacts with colleagues, data, literature, and observational systems together with very powerful computational models and services. Although many technical, social, and economic challenges remain, the potential exists for facilitating both deeper and broader scientific and engineering research and education."(NSF 2003). Couple this notion with the wisdom of crowds and membership of community, the Social Networking website should encourage the development of important, useful, engaging K-16 engineering content, idea sharing inspiring all users above and beyond just the FIRST Robotics Competition. The cyberinfrastructure and technologies change quickly over time, and what these tools are trying to establish is the root desire of self-expression, collaboration and the ability to be apart of something larger than yourself within the participation of the FIRST Robotics Competition.

2.3 Program Structure and Justification

The FIRST Robotics Competition (FRC) program will serve as a launching point for students into engineering, science, and technical careers by providing them with role models in these fields to support their efforts virtually. Engineers and educators from all fields of study guide teams of students through the process of creating a robot for each year's challenge. Working side by side with these mentors, students gain exposure to these careers and the mentors enjoy rock star like status in the eyes of today's youth. The creation of a Social Networking website will serve to not only continue fostering the existing mentorship in the FRC community but to expand the access of students to real-world role models and experiences.

The groups that participate in the yearly FIRST Robotics Competition are highly diverse in age, learning styles, technological literacy, expertise using the internet and online collaborative tools, professional backgrounds, and communication styles. In addition to the diversity, is the scale or large numbers of individuals that comprise these robotic teams that are within the FIRST Robotics Competition.

The goal of the Social Networking in the FIRST Robotics Community website project is to harness the multi-generational and diversity of participants that make up the FIRST community by creating the correct balance of cyber-infrastructure, tools, and functionality that will allow the FRC community both individually and as a group to succeed.

2.4 Documenting User Requirements

Obtaining and formally documenting user requirements through workshops, surveys, and other means FIRST will review the existing knowledge sharing venues in our community. Websites, conferences, workshops, and camps hosted by FIRST Headquarters as well as FRC teams, sponsors, and suppliers will be documented to gather important information about what potential participants already make use of in the FRC community. An assessment of existing content will provide a basis for user interactions as part of the Social Networking in the FIRST Robotics Community Project.

3. Project Management Plan

Cindy Randall (FIRST, co-PI) is the Director of Research at FIRST, where she oversees all evaluation efforts for the organization; oversees game design for the FIRST LEGO League; R&D on product integrations and program enhancements for FIRST's various programs; manages the FIRST Place facility which provides school and summer camp programming on engineering, robotics, science and technology; and is responsible for the development and implementation of key strategic organizational goals, including introducing the FIRST Robotics Competition in Israel, created the program called FIRST Tech Challenge, facilitating corporate team building exercises with the use of robotics, to name a few. Cindy has had a longstanding interest in how collaboration occurs, ideas are formed within disparate groups, group dynamics and organizational structures. Also, she is interested in how to broaden engineering education and audience appeal to the general public and to those who do not perceive themselves as having the aptitude. Prior to FIRST, Cindy was an old world prehistoric archaeologist, with an emphasis on reconstructing paleoenvironments in Mesolithic Denmark. She received her degrees and did her studies at University of Arizona, Tucson and University of Wisconsin, Madison.

Colleen Shaver (FIRST) is the Education Resources Coordinator at FIRST and a graduate of Worcester Polytechnic Institute in Worcester, MA. As a high school student, she was heavily involved in the FIRST Robotics Competition as a student leader on her team. Throughout college, she served as a mentor for FIRST Robotics Competition teams as well as teams in the intermediate program. With this being her 12th year involved in the FIRST program at some level, Colleen has significant real-world knowledge of FIRST teams and how their students and mentors interact with and support one another. As the Education Coordinator, her main responsibilities include coordinating all workshops and conferences held for FIRST teams, creating online training strategies for teams and volunteers, teaching students about science and technology through the building and programming of robots, and working with staff from all our programs to seek out or develop materials that will help teams in their program succeed. Colleen also has significant practical experience using a variety of online networking tools.

Professor Greta Tryggvason (WPI, PI) has been the Department Head of Mechanical Engineering for the past seven years. His publications on computational studies of multiphase flows are widely cited and his numerical methods (and codes, in many cases) have been used by a number of research groups around the world. He has served as a Principal Investigator on grants and contract totaling several million dollars, funded by various agencies, including NASA, NSF, ONR, AFOSR, and DARPA. He is a fellow of the American Physical Society and the American Society of Mechanical Engineers, an Associate Editor of the International Journal of Multiphase Flow, and the editor-in-chief of the Journal of Computational Physics. Professor Tryggvason also has a longstanding interest in engineering education (Tryggvason & Apelian 2006, Tryggvason, Vaz, Davis & Mello 2006, Dutta, Geister, & Tryggvason 2004). While at the University of Michigan he chaired a departmental committee that developed plans for extensive curriculum changes (commonly referred to as the four by four by eight model) and as associate department chair he supervised the implementation of the new curriculum (Tryggvason, Thouless, Dutta, Ceccio, & Tilbury 2001). He also served on a College committee that instigated a number of changes, including the introduction of a freshman engineering course. At WPI he has been involved with the introduction of joint degrees with overseas institutions, the introduction of a BA degree in liberal arts and engineering (Quinn, Schachterle, Tryggvason & Vaz 2006), and the establishment of an undergraduate program in robotics engineering. He has helped design and implement departmental assessment programs and overseen three ABET visits (two at the University of Michigan and one at WPI—all leading to six year accreditation).

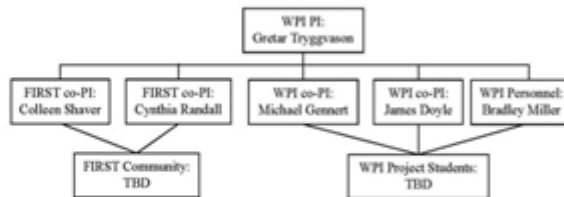
Professor James K. Doyle (WPI, co-PI) is Associate Professor of Psychology and Department Head, Social Science and Policy Studies Department, Worcester Polytechnic Institute, where he conducts research at the interface of psychology and computer modeling of social, economic, and environmental systems. He is interested in the effect of computer simulation models on learning, mental models, and decision making, the relative effectiveness of alternate knowledge elicitation techniques, the effects of group processes on model building, and public understanding and acceptance of simulation modeling. He has a B. A. in Environmental Science from the University of California at Berkeley and a Ph. D. in Social Psychology from the University of Colorado at Boulder.

Professor Michael A. Gennert (WPI, co-PI) is Department Head of the Computer Science Department and Acting Director of the Robotics Engineering Program at Worcester Polytechnic Institute, where he is

Associate Professor of Computer Science and Associate Professor of Electrical and Computer Engineering. He has worked at the University of Massachusetts Medical Center, Worcester, MA the University of California, Riverside, General Electric Ordnance Systems, Pittsfield, MA and PAR Technology Corporation, New Hartford, NY. He received the S.B. in Computer Science, and S.M. in electrical Engineering in 1980 and the Sc.D. in Electrical Engineering in 1987 from the Massachusetts Institute of Technology. Dr. Gennert is interested in Computer Vision, Image Processing, Artificial Intelligence, Scientific Databases, and Programming Languages, with ongoing projects in biomedical image processing, stereo and motion vision, very large spatio-temporal databases, and programming language semantics. Prof. Gennert has been involved in many educational and curricular innovations at WPI, including revising the introductory Computer Science curriculum in 1987 and 1994, and introducing new undergraduate majors in Interactive Media & Game Development (2005) and Robotics Engineering (2007). He is author and co-author of over 80 papers.

Brad Miller (WPI) is the Associate Director of the WPI Robotics Resource Center since October 2007. He is a co-developer of easyC, the visual programming system for FIRST robots (FRC and Vex) and is a co-developer of the full year Robotics Education Curriculum (REC). He has also given numerous talks at FIRST conferences and workshops on robotics programming. He has been an advisor to WPI/Mass Academy FIRST team since 2001.

3.1. Organizational Chart



4. Detailed Task Description

The overarching task in this effort will be the ability to harness the multi-generational and diverse of participants (students, educators, engineers and others) collectively by creating the correct balance of cyberinfrastructure, functionality and tools to allow these communities, through the shared experience of the FRC to create a collaborative community cyberworld that will allow everyone to succeed. Because of the large scale and diversity of groups that make up the FRC community, an immediate next step will be the creation of an advisory group from the FRC community that pilots and supports this initiative. Outlined below, describes our vision for the structure, how we will assess the FRC community user behavior conduct a social networking analysis and create a map of how the FRC community networks currently relate to each other, and the results of the assessment and observations will inform the development of the Social Networking in the FIRST Robotics Community prototype website, the functionality and content that will populate the site.

4.1. Social Networking Analysis of the FRC Community

One of the tasks associated within the Social Networking in the FIRST Robotics Community Project will be a comprehensive review of social networking analysis theory and current applications of these theories to cyberinfrastructure. The body of knowledge that exists looking at the integration and synergies between the internet, online collaborative tools, how and why individuals and groups interface and interact within the cyber world is small and is only now recognized as an important emergent area of research. Based on the literature review, FIRST and WPI will conduct a social networking analysis on the FRC community. Using Wellman and others as examples, this analysis will include the identification of all possible categories (e.g. educators, team leaders, rookie teams), groups (e.g. a FRC team), and networks (e.g. all FRC teams) and how they are connected (nodes), what their relationships, affiliations

and ties are to other groups within the FRC community. For instance, how educators process, use and communicate engineering content to students will be different than how engineers will convey that same information. The result, will be a map that defines the various groups and where each group connects, share what types of information and in what manner. This map will show the functionality and specific cyberfeatures that each group and collectively as a community will be required for the successful implementation of the Social Networking in the FIRST Robotics Community Project.

Like the FIRST Robotics Competition community there is no professed one way or group that dictates or determines directions of engineering robots or competition strategies. Computer scientists and others are now describing social networking as "flock of bird behavior" where each bird [individual] acts on its own however following a set of rules. As long as the community understands these conventions, large numbers of disparate groups can organize themselves with relative ease which provides them with a non-threatening environment in which to be collaborative and take thinking, decisions and innovations to the next level. Solutions therefore are not imposed from above but emerge from the group (Surowiecki, 2005). This practice already takes place within the FRC community but on a limited scale requiring one to have good communication and face to face networking skills to successfully establish smaller collaborative groups.

4.2. Content, Contributors and Moderators

The FRC community will drive the functionality, language, and formatting of engineering content. The same premise of the formatting and determining the functionality of the prototype virtual organization will be taken when developing and determining the original content that will populate the Social Networking in the FIRST Robotics Community web site. FIRST will develop a roster of contributors and moderators for the development of the content required for the FIRST Robotics Community. The initial control will be critical in order to set a high standard and expectation of quality to be present in all contributions made by the FIRST community. FIRST will recognize these key contributors (educators, engineers and students) and work with these groups to develop age and user group appropriate content that will be meaningful to all groups. For instance, a step by step approach presenting specific content as it specifically relates to the FIRST robot and then secondly, in a broader engineering classroom curricular context is one successful format FIRST has employed whereby educators can incorporate content learned in FIRST to their larger classroom.

Because this is a site dedicated to youth, cybersecurity, monitoring, and use of moderators will be critical to a safe engaging learning environment. One way that the Social Networking in the FIRST Robotics Community website will employ cybersecurity will be in the implementation of a FIRST Robotics Content Advisory group to moderate certain components of the webpage, like chat rooms. This Content Advisory group will have basic background checks to further secure the appropriateness of the site. A second means of cybersecurity will also occur at the team leader level. The participating team leaders (adults) will "invite" their community (team) to be a part of their online Social Networking community. The team leader will then have the ability to monitor what their community is doing and which areas within the site they are frequenting. This will also help the team leaders target specific content areas their team might be interested in.

4.3. FRC User Behavior and User Group Assessment

WPI Student Project teams will be responsible for conducting observations of user behaviors in the field and will conduct a series of evaluations on the various user groups represented in the FRC community. An outline of this research is outlined below .

Phase I: Needs Assessment

The needs assessment will begin with a review and summary by FIRST of information on user requirements obtainable through existing records from prior workshops, camps, conferences, and surveys. A review of the content and use of existing "unofficial" websites constructed by FIRST teams will also be conducted. A fairly local sample of 10-20 USFIRST teams will then be recruited to participate in focus group sessions to help identify content and functional needs for the Social Networking in the FIRST Robotics Community website as well as perceived barriers to entry and factors that promote or discourage sustained participation. Efforts will be made to ensure diversity in the focus group teams on

the important dimensions of experience with FIRST, past performance in competitions, and urban versus suburban or rural locations. The sessions will focus on identifying current obstacles to communication and collaboration, establishing priorities for web site content and functionality, and understanding existing team dynamics. The procedures recommended by Stewart et al. (2006) will be followed during the formation, implementation, and analysis of the focus group sessions .

Phase II: Evaluation of Small-Scale Launch

FIRST teams will be recruited to participate in the use and evaluation of the initial small-scale launch of the Social Networking in the FIRST Robotics Community website. A representative sample of experienced and rookie teams will be included. Teams from urban schools and areas that serve high proportions of low income and minority students will be oversampled to aid FIRST in its efforts to increase participation from such communities. Four survey instruments will be designed and administered to participants: a team dynamics questionnaire that gathers information on the roles and contributions of team members; a social networking questionnaire that identifies the nature, quantity, quality, and frequency of both within- and between-team communication; a self-assessment knowledge questionnaire that covers the areas of robotics, engineering, and competition strategy; a standard web usability questionnaire covering frequency and type of use, ease of access and navigation, ratings of site design, content, and functionality, identification of problems and limitations, and suggestions for improvement. Alternate versions of the questionnaires will be prepared for students and advisers, as appropriate. Surveys will be conducted using the mixed-mode (primarily internet) strategy recommended by Dillman (2000) and will be administered both pre and post the period of interaction with the website. A matched sample of FIRST teams that did not participate in the small-scale launch will be recruited to answer all survey instruments except the web usability survey, to serve as a control group.

In addition to the new survey instruments, existing program satisfaction surveys employed by FIRST will be administered to both the experimental and control group samples. As a more objective measure of team learning, judgments and ratings from the results of the FIRST Robotics Competition will be incorporated into the analysis. The assessment will also incorporate data from the ongoing evaluation of website content by users and tracking of user navigation through the site.

Phase III: Summative Project Evaluation

The final summative project evaluation will take place after the full-scale launch of the Social Networking in the FIRST Robotics Community website and will use the same instruments and procedures as for the evaluation of the small-scale launch. There will, however, be no control group as all teams will participate in the social network according to their interest. A representative sample of 10-20 FIRST teams will be recruited to participate in the evaluation. In addition, a larger sample of FIRST advisers will be recruited to participate in a survey documenting their behavioral intentions with respect to future participation in FIRST competitions.

4.4. Social Networking in the FIRST Robotics Community Prototype website

The construction of the Social Networking in the FIRST Robotics Community prototype website will be developed by WPI Student Project teams as part of their Interactive Qualifying Projects (IQP). The IQP is typically undertaken by junior-level students following preparation in the social sciences to study the interaction of science and society. This hands-on real world experience will allow WPI students to work directly with user groups, make observations, and analyze data from both the evaluation and social networking map of FRC. This opportunity will provide the students a real understanding about the algorithms, internet interfaces, user requirements and functionality required by such diverse groups of users.

The FIRST Robotics Competition teams are comprised of many groups diverse in their age, backgrounds, and experiences. These groups at the macro level can be separated into two large groups: students and adults. These groups can be further refined to students who range in interests of science, engineering, math and technology, adult educators, engineers and other professional and volunteer adults. A goal of the Social Networking project is to understand the types of cyberinfrastructure tools and functionality that will increase the synergies of collaboration across teams and compositional ties (e.g. student, educator or engineer grouping and/or categorized as the shared experience called team leaders). The potential features may include:

Tagging - Content will be categorized by a predetermined set of tags, which the creator will be able to label the document with as it uploads. Tags would be based on the FRC program and the typical challenges and activities of the teams. Users and teams will be able to use this same set of tags to identify their areas of interest as well as when searching for documents. Tags would include items like: mechanical, microcontrollers, programming, CAD, animation, fundraising, careers, colleges, rookie, and veterans.

User and Team Profiles - Users and Teams will be allowed to create profiles to provide information to other users, receive personalized information based on the preferences they enter, and to allow easier networking between those with common interests. A user might select that they are interested in robot programming which would move documents concerning that top to move to the top of their resource list. Entering this into their search criteria would allow them to connect and collaborate with other users who also expressed an interest in that topic. For teams, geographic and demographic information will help them connect with others in need of similar resources.

Groups - Users and Teams will be able to create and join groups under predetermined headings based on common interests. Members of the group will be able to share and collaborate on content in a closed setting prior to publishing that information to the entire Social Network. A moderator must approve any new groups before being created in order to minimize the amount of off-topic groups and encourage the joining and expansion of existing groups.

Content Creation and Uploading - While much of the initial content will be generated by FIRST, teams and groups may add documents to the website. After approval by the advisory board, the documents will be available for the Social Network to utilize and give feedback on. Individuals will also be able to add content on an individual level by participating in moderated discussion forums.

Rating Content - Users will be able to rate content based on how well it met their needs and how useful they feel the document would be to other teams. Users would only be able to rate any version of any document one time. Documents with higher ratings would move to the top of any searches.

Virtual Mentor - The Virtual Mentor section of the website is an opportunity to recognize prolific, highly rated contributors to the site. These contributors would be highlighted on a predetermined, rotating schedule. Virtual Mentors may be teams, groups, or individual users. Moderators may also select users, groups, or teams to be recognized as Virtual Mentors and Virtual Mentors given special opportunities to increase their exposure and contributions.

Events Calendar - An event calendar on the site will not only have information about FIRST sanctioned events, it will be an opportunity for users and teams to post events they are hosting in their area including competitions, camps, workshops, seminars, and classes.

Networking - The site will have features that allow users, teams, or groups to connect with other users. By adding users to your community, you can easily connect to them and see the materials they are using or parts of the site they are visiting.

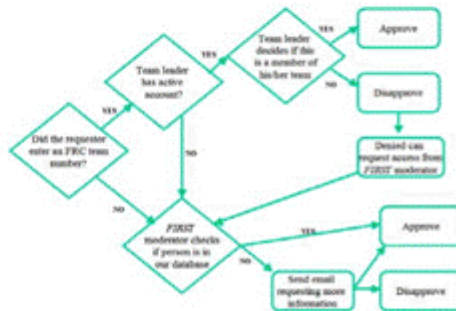


Figure 1: User Request for Site Access Process of Approval

College & Career Opportunities - There will be a section in which users can post information about scholarship, internship, co-op, and career opportunities specific to those people involved in FIRST. This will include information on the hundreds of scholarships already in place for FIRST students as well as internships and jobs available from FIRST sponsors and supporters.

4.5. Participating in the Social Network and Related Information

Members will be allowed to join the site based on their association with any FIRST Robotics Competition team. Team

members will have the ability to request an account from their adult leader and be granted access to the site. They will be automatically placed into a group created for their specific FRC team. From there, the adult leader can assign a "student captain" to the team who can help facilitate their team's activities on the website. If a person is not currently associated with a team, like a volunteer, supplier, or alumni, their request for access will go to a FIRST moderator who will check in our database and approve or disapprove their access. See Figure 1 for a chart showing how the process will be controlled. Access will be given only to those with associations with the FIRST program. This control will add a layer of security to the site against unwanted information or exploitation of technical and user information on the site.

4.6. Recruiting Users

Users for our initial small-scale launch will be recruited through existing channels within the FIRST community. FIRST will seek out active participants from existing and rookie FRC teams to provide a baseline of interaction and feedback on the usability of the site. The launch of the Social Network web site to all FRC teams will occur at the FIRST Championship, which has a large number of teams in attendance and is web cast for any teams not on site. Accounts for existing team leaders will automatically be created. Rookie team leaders will be added as they register for the FRC program.

4.7. Other Cybersecurity and Content Controls

While each individual will have their own account in order to obtain and use information specific to their preferences, emphasis will be placed on teams to cross-collaborate within the various areas of our FRC program. When a document (text, video, audio, etc) is created to be loaded into and shared on the Social Network, it must go through an approval process in which it is vetted by members of the team. Once a predefined number of team members votes that the document is ready for posting and will be helpful to the community, it is sent to an advisory board selected by FIRST. Tagging will facilitate the categorization of content both for reviewing and posting purposes. This board will serve to review submitted documents based on their area of expertise, rate the usability within the community, whether or not similar documents already exist, and approve or disapprove the content based on those factors. The advisory board will provide feedback indicating why the document was not approved to help support the further development of that team's materials.

Once a document is posted, individuals and teams may access documents freely and use them to gain knowledge, improve their teams, and support the growth of new teams. Additions and changes may be recommended by users in order to improve documents based on a broader base of experience. They may rate the document on its utility and top-rated documents will move to the top of the page when searches for like documents occur. Positively rated documents then become easier to find and access, minimizing the need to sift through large quantities of information and taking up valuable time. FIRST or the advisory board may then choose to make certain documents "recommended" for rookie or veteran teams or remove content from the site or suggest improvements based on persistent negative ratings.

Within the Social Network, moderators will be assigned from within the community to monitor the daily activity in all parts of the website. They will have the ability to remove any questionable content and block users from adding content.

4.8. Challenges for Implementation

There are several challenges for successful implementation of the Social Networking in the FIRST Robotics Community Project. These include: 1) diversity of users; 2) the range of technology available to schools and teams participating in FRC; 3) the range of technological literacy, comfort and confidence levels of users; 4) and finally, requirements and functionality of website to be successful within a fast-paced environment like FRC.

FRC high school students – According to the Pew Internet and American Life Project (2007) more than 55% of all American youths, ages 12–17 and who have access to internet, use online social networking sites. The Pew survey also finds that older teens, particularly girls, use these sites as places to reinforce pre-existing relationships, while for boys, the networks provide opportunities for making new friends. Analyzing the online community and social networking sites like MySpace.com, their activity and use of these types of sites are driven by what their other friends, whom they invited to the website, and/or peers

are "doing" on the site, resources they are exploring as well as interactions with other friends they bring to the site. Particularly within this group, certain students act as brokers within their social network by bridging two or more networks that are not directly linked or filling structural holes (Burt 1992). The level of confidence and ease with which this group uses the internet and community sites is higher and often times the amount of time spent on these types of sites are longer within this user group. The hierarchy of decisions by which students use and spend time at these types of websites are driven by priority. Highest priority are given to the student's network(s) of friends and what they are doing at that moment, second level priority are which content their network of friends are using and finally, third level priority is that student is searching for some specific content and/or information.

For the high school students that participate in the FIRST Robotics Competition, there is the addition of the shared external or physical FIRST experience and community of working face to face with a team as well as with a community of teams at competition events. By framing the cyberinfrastructure, online tools and other resources of the "Social Networking" website, students could become more engaged with their own teams through the expanded access of robotics, engineering, competition strategy content and collaboration across teams across the entire FIRST community. The incentives include increasing individual knowledge, team member expertise, and community recognition.

FRC Adult Users – The Pew Internet and American Life Project describe the use of the internet by adults very differently than those of students. While students use the internet to re-connecting with their friends and networks, adults use the internet as a convenient way of getting scientific materials and latest information. Nearly 20% of adults get information regarding science online (to 41% via television). Nearly 87% adults use the internet as a research tool. The National Science Foundation also points out that the internet was the preferred research tool for adults (NSF, Science & Engineering Indicators 2006, Chapter 7 available online at: <http://www.nsf.gov/statistics/scind06/c7/c7h.htm>). Convenience and ease are also cited by the NSF as the two main reasons adults choose the internet to gain access to science information. For the FIRST Robotics Competition, the majority of adult mentors volunteer/work with their teams approximately 30-40 hours in addition to having other full-time employment (based on the results from 2004-2006 FIRST Robotics Competition program satisfaction surveys). Therefore, access to reliable information easily that empowers the team leaders and engages the students positively is a priority. Trust, meaningful relationships, and strong compositional ties (e.g. educators, engineers and so on) are critical to the success of adults using online social networks. Using Wellman's theory of social networking, though the external FIRST community and information regarding the FIRST Robotics Competition is important, the shared experiences of educators to educators learning new information within the shared world view of being an educator and educators to engineers for having the shared experience of being a team leader or mentor will encourage a more dynamic network, connection and content sharing within this population.

What is not well understood is the multi-generational cross-collaborative nature of the FRC user groups. This will be an important research component of the Social Networking in the FIRST Robotics Community Project. Rheingold (2002) describes the 14-25 year old age group as "digital natives", who use the cyber environment frequently, with high comfort and confidence levels in using cyberinfrastructure. A consequence of creating such a multi-generational social networking website will be how the "digital natives", the FIRST Robotics Competition high school students, mentor and influence the adults and how will this change the dynamics of roles, contributions, and collaboration via online and within the real world environment of the team and FIRST community.

Portions of the FRC community are not only technically savvy, they are also used to working in a fast-paced environment where they are always up against a deadline. They can be critical of new efforts to disseminate information, particularly if it is time-consuming to navigate or access important materials. It will be critically important that the design of the Social Network address those concerns, needs, and root behaviors of our community. We will do this by first launching the site to a small group of teams during the time in their season where they are not only at their greatest need for information, but they are all most pressed for time. We will track usage, receive feedback from users, and make corrections to better meet expectations of functionality.

4.9. Dissemination Plan

WPI and FIRST will jointly develop and present the findings of the Social Networking in the FIRST

Robotics Community Project to inform other scientific and engineering communities, engineering education forums and social networking conferences. Some of these organizations and conferences include: 2008 SUNBELT XXVIII International Sunbelt Social Network Conference 22-28 January, 2008; American Society for Engineering Education Annual Conference in June 22-25 2008, the 2008 FIRST Robotics Conference on April 16. Other presentations will be given as identified and appropriate based on the audiences and findings. In addition, we will seek invitation to attend NSF awardees meetings in the close-related Engineering Virtual Organizations (EVO) program. Attendance will facilitate the dissemination of networking concepts both to and from the FIRST Robotics Community.

5. Project Schedule

October - December 2007

FIRST: FRC Pre-season

- Attend NSF conference. Gather existing content including handbooks, white papers, and video and audio recording from past workshops and conferences; Initial development of survey instruments and evaluation strategies.

WPI: Second term

- Attend NSF conference; Identify student project teams.

January – March 2008

FIRST: FRC Season

- Conduct focus session at FRC season kickoff held during the first week of January; Create new material including detailed guidelines and "how-tos" for various subsets of the community;
- Seek the expertise and experience of key volunteers out in the field; Roll in content from kickoff workshops

WPI: Third term

- Contribute to survey development, conduct survey, and analyze survey data.

April – May 2008

FIRST: Post-Championship Event

- Roll in content from Championship Conference; Review of FIRST team web pages to identify & select useful content; Refine new content for prototype; Identify contributors and moderators

WPI: Fourth Term

- Build prototype system.

June - August 2008

FIRST: FRC Post-season

- Alpha version website release and test; Respond to questions and concerns of contributors, users, and moderators.

WPI: Summer term & break

- Continue testing existing features; Continue improving features and implementing new features; Review and assess user behavior; Work with FIRST to verify that usage is congruent with the goals of the Social Networking in the FIRST Robotics Community Project.

September – December 2008

FIRST: FRC Pre-season

- Beta version website release and test; Begin introducing rookie teams to the social network; Develop a "rookie workshop" within the Social Networking in the FIRST Robotics Community Project to help these new teams begin; Continue to promote and encourage the development of new content by teams; Develop game specific content for the 2009 season; Review moderators and advisory board members. Address any issues; Identify a representative number of teams of varying skill level, FRC knowledge and from around the nation to participate in the launch; Attend NSF October conference.

WPI: First and second terms

- Continue development of the Social Networking in the FIRST Robotics Community website by WPI using the predetermined basic structure and features; Integrate existing

applications and code with new materials developed on campus; Continue maintenance of features and implementation of new functionality; Process user feedback and address the validity of new ideas for features; Attend NSF October conference.

January – March 2009

FIRST: FRC Season

- Launch the Social Networking in the FIRST Robotics Community website at FIRST kickoff; Monitor use during the busiest time of the season for our users; Look for gaps in existing content and develop or request development in those areas; Roll in content from kickoff workshops

WPI: Third and Fourth terms

- Continue maintenance of features and implementation of new functionality; Process user feedback and address the validity of new ideas for features; Review and assess user behavior.

April - May 2009

FIRST: Post-Championship Event

- Roll in content from Championship Conference; Review how teams used web pages; Continue to maintain content and upload new material generated through the Championship Event.

WPI: Fourth Term

June – August 2009

FIRST: FRC Post-season

- Assess degree of effort of users, moderators and contributors; Process content and functionality feedback; Prepare follow-on proposal.

WPI: Summer term & break

- Continue improving existing features; Continue development of new functionality and features; Prepare follow-on proposal.

September - December 2009

- Comprehensive evaluation of the Social Networking in the FIRST Robotics Community Project to determine future infrastructure and user needs; Attend NSF October conference; Develop presentation.

References

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- D. Dutta, D. E. Geister, & G. Tryggvason. 2004. "Introducing Hands-On Experience in Design/Manufacturing Education." *International Journal of Engineering Education—Special issue on Manufacturing Engineering Education* 20 (4), 754-763.
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- March, James G. 1991. "*Exploration and Exploitation in Organizational Learning*," *Organization Science* 2 1991:71-87.
- National Science Foundation. 2006. Science and Engineering Indicators. (Ch. 7). Pew Internet & American Life Project Report: *Social Networking Websites and Teens: An Overview*. January 2007.
- Pew Internet and American Life Project Report: *The Internet as a Resource for News and Information about Science*. November 2006.
- P. Quinn, L. Schachterle, G. Tryggvason & R. Vaz. 2006. "The WPI Bachelor of Arts degree in 'Liberal and Engineering Studies.'" In *Proceedings of the ASEE New England Section 2006 Annual Conference*. Worcester, MA, March 17-18.
- Rheingold, Howard. 2002. Smart Mobs. Perseus Books. Boston, MA.
- Stewart, D.W., Shamdasani, P.M., and Rook, D.W. 2006. Focus Groups: Theory and Practice. Thousand Oaks, CA: Sage.
- Surowiecki, James. 2005. The Wisdom of Crowds. First Anchor Books. New York.
- Tönnies, Ferdinand. 1887 [1955]. *Community and Organization*. London: Routledge & Kegan Paul.
- G. Tryggvason & D. Apelian. 2006. "*Re-Engineering Engineering Education for the Challenges of the 21st Century*." Commentary in *Journal of Materials (JOM)*: The Member Journal of TMS, October.

G. Tryggvason, M. Thouless, D. Dutta, S. L. Ceccio, & D. M. Tilbury. 2001. "The New Mechanical Engineering Curriculum at the University of Michigan." *Journal of Engineering Education* 90, 437-444.

G. Tryggvason, R. Vaz, P. Davis & N. A. Mello. 2006. "*Preparing Engineers to Work in a Flat World—The WPI Global Perspective Program.*" 2006 International Mechanical Engineering Education Conference: Mechanical Engineering Education and Global Industry. Beijing, China, March 31 - April 4.

Wellman, Barry. 1999. Networks in the Global Village. Westview Press. Boulder, CO.

Wellman, Barry. 2003, "*Networks for Newbies: A Non-Technical Introduction to Social Network Analysis*". Centre for Urban and Community Studies, University of Toronto.

Grétar Tryggvason

Professional Preparation

University of Iceland	Mechanical Engineering,	B.S.	1980.
Brown University,	Engineering,	Sc.M.	1982.
Brown University,	Engineering,	Ph.D.	1985.
Courant Institute/NYU Appl. Mathematics (postdoc) 9/1/84-8/30/85			

Appointments

2002	Editor in chief: Journal of Computational Physics
2002	Associate Editor, International Journal of Multiphase Flow
2000	Professor and Department Head, Worcester Polytechnic Institute, MA
1999	Visiting Scientist, University of Paris VI, France, 4/19/-5/8
1998	Visiting Professor, IUSTI, University of Provence, France, 4/15/-5/15/
1995	Visiting Research Associate, Caltech, 1/1/-5/31/ (Sabbatical)
1993 - 1997	Associate Chairman, MEAM
1992 - 2002	Associate Editor, Journal of Computational Physics
1992 - 1993	Program Advisor and Director of Undergraduate Studies, MEAM
1997 - 2000	Professor of MEAM
1991 - 1997	Associate Professor of MEAM
1985 - 1991	Assistant Professor of Mechanical Engineering and Applied Mechanics (MEAM), University of Michigan, Ann Arbor.

Awards

2005	Computational Mechanics Award from the Computational Mechanics Division of the Japan Society of Mechanical Engineers (JSME)
2005	Fellow of the American Society of Mechanical Engineers
2005	WPI chapter Sigma Xi senior award for research
2000	Fellow of the American Physical Society (Division of Fluid Dynamics)
1998	College Excellence in Service Award, University of Michigan
1997	Departmental Award for Service, University of Michigan
1996	Best Paper Award, ASEE Annual meeting (with D. Tilbury & S. Ceccio)
1991	Departmental Award for Research, University of Michigan
1987	NSF Engineering Initiation Award
1983	(summer) Predoctoral Geophysical Fluid Dynamics Fellow, Woods Hole Oceanographic Institution
1981	and 1983 Brown University Research Fellowship
1980	Brown University Graduate Fellowship
1980	Fulbright travel grant, 1980.
1980	Thor Thors Special Contribution Award (The American-Scandinavian Foundation).

Membership in Professional Societies

Association of Chartered Engineers in Iceland, 1987-1992; American Physical Society (Division of Fluid Dynamics), 1982-; Society for Industrial and Applied Mathematics; Sigma Xi; American Association for the Advancement of Sciences; American Society of Mechanical Engineers.

Publications—related to this project

- G. Tryggvason & D. Apelian. "Re-Engineering Engineering Education for the Challenges of the 21st Century." Commentary in JOM: The Member Journal of TMS, October 2006.
- P. Quinn, L. Schachterle, G. Tryggvason & R. Vaz. "The WPI Bachelor of Arts degree in 'Liberal and Engineering Studies.'" In *Proceedings of the ASEE New England Section 2006 Annual Conference, Worcester, MA*, March 17-18, 2006
- G. Tryggvason, R. Vaz, P. Davis & N. A. Mello. "Preparing Engineers to Work in a Flat World—The WPI Global Perspective Program." 2006 International Mechanical Engineering Education Conference: Mechanical Engineering Education and Global Industry. Beijing, China, March 31 - April 4, 2006

- D. Dutta, D. E. Geister, & G. Tryggvason. "Introducing Hands-On Experience in Design/Manufacturing Education." *International Journal of Engineering Education—Special issue on Manufacturing Engineering Education* 20 (4), 2004, 754-763.
- G. Tryggvason, M. Thouless, D. Dutta, S. L. Ceccio, & D. M. Tilbury. "The New Mechanical Engineering Curriculum at the University of Michigan." *Journal of Engineering Education* 90 (2001), 437-444.

Publications—other recent

- J. Lu, S. Biswas, & G. Tryggvason. "A DNS study of laminar bubbly flows in a vertical channel." *Int'l J. Multiphase Flow* 32 (2006), 643-660.
- J. Lu & G. Tryggvason. "Numerical study of turbulent bubbly downflows in a vertical channel." *Physics of Fluids* 18, 103302 (2006).
- R. F. Kunz, H. J. Gibeling, M. R. Maxey, G. Tryggvason, A. A. Fontaine, H. L. Petrie, & S. L. Ceccio. Validation of Two-Fluid Eulerian CFD Modeling for Microbubble Drag Reduction Across a Wide Range of Reynolds Numbers. *Journal of Fluids Engineering* 129 (2007), 66-79.
- J. Lu & G. Tryggvason. Effect of Bubble Size in Turbulent Bubbly Downflow in a Vertical Channel. *Chemical Engineering Science*, 62 (2007), 3008-3018.
- S. Radl, G. Tryggvason & J. Khinast. Flow and Mass Transfer of Fully Resolved Bubbles in non-Newtonian Fluids. *AIChE Journal* 53 (2007), 1861-1878.

Collaborators:

- Ph.D. Advisor: Hassan Aref, currently at VPI
 Postdoctoral Advisor: James Glimm, currently at SUNY, Stony Brook
 Recent Collaborators: W.J.A. Dahm, L.P. Bernal, G. Agresar, J.J. Linderman, K. Powell, C.K. Law, M. Gharib, M. Sommerfeld, M. Jager, S. Zaleski, A. Prosperetti, E. Steinthorsson, S.L. Ceccio, R. VanderWal, M. Maxey, G.K. Karniadakis, S. Sundaresan
 Former Graduate Students: (21 total) D. Yu, M. Song, S.O. Unverdi, E. Ervin, M.R. Nobari, C.H.H. Chang, Y.-J. Jan, S. Nas, M. Saeed, A. Esmaceli, F. Tounsi, D. Juric, N.C. Suresh, J. Han, J. Che, B. Bunner, N. Al-Rawahi, W. Tauber, M. Stock, S. Biswas
 Postdoctoral Advisees: M. Zhuang, Y. Yang, S. Homma, A. Fernandez, J. Lu.
 Associate Editors of the Journal of Computational Physics: M. Baines, A. Bayliss, J.P. Boyd, S. Chen, B.I. Cohen, P. Colella, P. Degond, D.A. Knoll, W.R. Martin, P. Moin, S.J. Osher, A. Pouquet, T. Schlick, B. Smit, P. K. Smolarkiewicz, J. Strain, E. Turkel, E.V. Vorozhtsov, P. Wesseling, T. Yabe, G. Karniadakis, T. Tong, H. Choi.
 Editor/Associate editors of the International Journal of Multiphase Flow: G. Hetsroni, M. Shapiro, M.J. McCready, A. Prosperetti, Y. Tsuji, J. Magnaudet.
 Conference Organizers etc. P. Raad, S. Ceccio, A. Prosperetti.

Synergistic Activities:

Educational activities include the restructuring of the ME undergraduate program at the University of Michigan; curriculum development at WPI; and development of course material for a graduate course on computational fluid dynamics (<http://www.wpi.edu/~gretar/me612.html>). I am the co-editor and major contributor to a book (Computations of Multiphase Flows) to be published by Cambridge University Press this year.

Leadership positions in the professional community includes serving as the editor-in-chief of the Journal of Computational Physics and as an associate editor of the International Journal of Multiphase Flow; past chair of the ASME multiphase technical committee; member off the APS-DFD executive committee; and the vice-chair of the governing board of the International Congress of Multiphase Flows.

Scientific contributions: Several years ago my students and I developed a computational method that was well suited for simulations of flows with sharp interfaces. These codes have been shared with a number of investigators; The method has also enabled us to conduct DNS studies of several multiphase systems. Most recently I have also contributed to the development of methods for flows with complex physics, such as phase changes.

James Kevin Doyle

Education

B.A., 1982, University of California at Berkeley: Environmental Science
M.A., 1990, University of Colorado at Boulder: Social Psychology
Ph.D., 1991, University of Colorado at Boulder: Social Psychology; minor in Cognitive Psychology

Professional Experience

Associate Professor of Psychology, Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 1998-
Visiting Scholar, System Dynamics Group, Sloan School of Management, Massachusetts Institute of Technology, Fall 2000
Assistant Professor of Psychology, Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 1992-1998
Research Associate, Center for Research on Judgment and Policy, Institute of Cognitive Science, University of Colorado, 1991 -1992
Research Assistant, Center for Research on Judgment and Policy, Institute of Cognitive Science, University of Colorado, 1987 – 1991

Ten Journal Articles and Book Chapters

- Doyle, J. K., Radzicki, M. J., and Trees, W. S. (2006). Measuring Change in Mental Models of Complex Systems: An Exploratory Study. Complex Decision Making: Theory and Practice (Qudrat-Ullah, H., Specter, J. M., and Davidsen, P. I., eds.). Springer-Verlag, in press.
- Doyle, J. K. (2005). Face-to-face surveys. In The Encyclopedia of Statistics in Behavioral Science. New York: Wiley.
- Doyle, J. K., Ford, D. N., Radzicki, M. J., and Trees, W. S. (2002). Mental models of dynamic systems, in System Dynamics and Integrated Modeling, edited by Y. Barlas, from Encyclopedia of Life Support Systems (EOLSS), developed under the auspices of the UNESCO, EOLSS Publishers, Oxford, UK. (<http://www.eolss.net>)
- Doyle, J. K., and Ford, D. N. (1999). Mental models concepts revisited: Some clarifications and a reply to Lane. System Dynamics Review, 15(4), in press.
- Doyle, J. K., Radzicki, M. J., and Saeed, K. (1998). A Bachelor of Science degree program in system dynamics at WPI. The Creative Learning Exchange, 7(5), 9.

- Doyle, J. K., and Ford, D. N. (1998). Mental models concepts for system dynamics research. System Dynamics Review, 14(1), 3-29.
- Doyle, J. K. (1997). Fire Sprinkler Systems, Backflow Prevention, and Public Health and Safety: Working toward Consensus. In F. L Hart (Ed.), Proceedings of the 1997 Fire & Water Conference (Worcester, MA), pp. 20-29.
- Doyle, J. K., Radzicki, M. J., Rose, A., and Trees, W. S. (1997). Using cognitive styles typology to explain individual differences in dynamic decision making. Center for the Quality of Management Journal, 6(3), 5-15.
- Doyle, J. K. (1997). The cognitive psychology of systems thinking. System Dynamics Review, 13(3), 253-265.
- Doyle, J. K. (1997). Judging cumulative risk. Journal of Applied Social Psychology, 27(6), 500-524.

Other Creative Works

- Doyle, J. K. (1998). Introduction to Interviewing Techniques. Report prepared for the Interdisciplinary and Global Studies Division, Worcester Polytechnic Institute.
- Doyle, J. K. (1997). Introduction to Survey Design and Methodology. Report prepared for the Interdisciplinary and Global Studies Division, Worcester Polytechnic Institute.
- Doyle, J. K. (1996). Educating Techno Sapiens in the 21st Century. Paper prepared for the WPI Plan 25th Anniversary Committee Essay Competition.

Research Interests

Judgment and Decision Making
Mental Models of Complex Systems
Risk Perception and Communication
Public Understanding of Psychological Science

Synergistic Activities:

Associate Editor, System Dynamics Review
Reviewer for: International System Dynamics Conference, System Dynamics Review, Journal of Experimental Social Psychology, Sloan Management Review, U. S. Environmental Protection Agency

BIOGRAPHICAL SKETCH FOR DR. MICHAEL A. GENNERT

Associate Professor and Department Head, Department of Computer Science
 Associate Professor, Department of Electrical and Computer Engineering
 Acting Director, Robotics Engineering Program
 Worcester Polytechnic Institute,
 Worcester, MA 01609
 (508)-831-5679, fax 508-831-5357, michaelg@wpi.edu

(i) Professional Preparation

S.B. Electrical Engineering	1980	Massachusetts Institute of Technology
S.B. Computer Science	1980	Massachusetts Institute of Technology
S.M. EECS	1980	Massachusetts Institute of Technology
Sc.D. EECS	1987	Massachusetts Institute of Technology

(ii) Appointments

Acting Director, Robotics Engineering Program	2006–present	Worcester Polytechnic Institute, Worcester, MA
Department Head, CS	2003–present	Worcester Polytechnic Institute, Worcester, MA
Visiting Associate Professor	2001–present	University of Massachusetts Medical School
Associate Professor, ECE	1999–present	Worcester Polytechnic Institute, Worcester, MA
Associate Professor, CS	1993–present	Worcester Polytechnic Institute, Worcester, MA
Visiting Associate Professor	1994–1995	University of California, Riverside
Assistant Professor, CS	1987–1993	Worcester Polytechnic Institute, Worcester, MA

Research Interests

Computer Vision, Motion Detection, Motion Compensation, Medical Imaging, SPECT
 Reconstruction, Programming Languages, Applications of Category Theory to Computer Science

(iii) 5 most relevant publications

1. M.J. Ciaraldi, D. Cyganski, M.A. Demetriou, M.A. Gennert, B.A. Miller, Y.K. Rong, L.E. Schachterle, K.A. Stafford, G. Tryggvason, "A Robotics Engineering Major", Wkshp. on Research in Robots for Education, Atlanta, GA, June 2007.
2. S. Gu, J. McNamara, M. Ward, M.A. Gennert, M. A. King, "Error Evaluation for Camera Calibration", *IEEE Nuclear Science Symp. and Medical Imaging Conf.*, San Diego, Oct 2006.
3. R.D. Beach, H. Depold, G. Boening, P. Bruyant, B. Feng, H. Gifford, M. Gennert, S. Nadella, M. King, "An Adaptive Neural Network Approach to Decomposing Patient-Motion Tracking Data Acquired During Cardiac SPECT Imaging," accepted to *IEEE Trans. Nuclear Science*, 2006.
4. M.A. Gennert, P.P. Bruyant, M.V. Narayanan, and M.A. King, "Assessing a System to Detect Patient Motion in SPECT Imaging Using Stereo Optical Cameras", Conf. Record IEEE Nuclear Science Symp. and Medical Imaging Conf., Norfolk, VA, Nov. 2002.
5. C.E. Wills, D. Finkel, M.A. Gennert, and M.O. Ward, "Peer Learning in an Introductory Computer Science Course", Proc. SIG Computer Science Education, Phoenix, AZ, Mar. 1994.

5 other relevant publications

1. M.L. Claypool, D. Finkel, M.A. Gennert, R.W. Lindeman, D. O'Donnell, J. Farbrook, J. Forgeng, J. Rosenstock, "A New Undergraduate Major: Interactive Media and Game Development", to appear, Proc. Microsoft Academic Days Conf. Game Development, Feb. 2007.
2. S.G.W. Dunn and M.A. Gennert, "Using logic in a model-based approach to computer vision," Selected SPIE Papers on CD-ROM, Vol. 6: Automatic Target Recognition, F.A. Sadjadi (ed.), SPIE Press, Dec. 1999.

3. D.A. Lisin and M.A. Gennert, "Optimal Function Approximation Using Fuzzy Rules," *Proc. Int. Conf. North American Fuzzy Information Processing Society*, pp. 184–188, NY, NY, June 1999.
4. N. Bourbakis, W. Campbell, B. Cheng, M.A. Gennert, and K. Makki, "The Role of Multimedia and AI in GIS," *Proc. 2nd ACM Wkshp. Advances in Geographic Information Systems*, pp. 84–88, Gaithersburg, MD, Dec. 1994.
5. M.A. Gennert, G.L. Leatherman, and N. Wittels, "Uniform Frontal Illumination of Planar Surfaces: Where to Place the Lamps," *Optical Engineering*, pp. 1261–1271, June 1993.

Related Grants

1. M. A. Gennert, "Patient Motion Detection and Compensation in SPECT," subcontract to University of Massachusetts Medical Center under an NIH grant, June 2003, \$787,104 over 5 years.
2. M. A. Gennert, "Biomedical Imaging Research," U. Massachusetts Medical Center, September 1997, \$19,980.

(iv) Synergistic activities

1. Currently Acting Director, Robotics Engineering Program at WPI. This is the only undergraduate Robotics Engineering B.S. degree in the U.S. Responsible for curriculum development, faculty hiring, laboratories, and interacting with industry.
2. Introduced new courses into the WPI CS curriculum: CS 549 Computer Vision, 1988; CS 1032 Modern Programming Concepts II, 1989; CS 2135 Programming Language Concepts, 1994; CS 525d / EE 539 Special Topics in Computer Science: Data Compression, 1998; CS 1006 Object-Oriented Introduction to Programming, 1998.
3. Introduced new teaching methodologies into existing courses: Introduced groupwork, programming projects, and student presentations into CS / EE 545 Digital Image Processing, 1997; Incorporated collaborative learning activities into all course meetings for CS 2135 Programming Language Concepts; Taught completely on-line version of CS 1006 Object-Oriented Introduction to Programming, 2000; Revised course based on Denotational Semantics, using tools in java and scheme programming languages for CS 536 Programming Language Design, 2001.
4. Proposed and implemented new curricula: Introductory CS curriculum, first year, two courses, (with K.A. Lemone and S.M. Selkow) 1989; Introductory CS curriculum, first two years, four courses, (with D. Finkel, M.O. Ward, C.E. Wills) 1994; New undergraduate major in Interactive Media and Game Development (with F. Bianchi, M.L. Claypool, D. Finkel, D.M. O'Donnell, P. Quinn) 2004.
5. Reviewer: CVGIPIU, IEEE Trans. PAMI, IEEE Trans. ASSP, Int. J. Computer Vision, Machine Vision & Applications

(v) Collaborators and other affiliations (last 48 months)

- a) Collaborators: J.K. Ho, A.C. Quina, J.H. Wang, L. Ma, S. Gu, S. Nadella, J.D. Morgenstern, N. Kumar, D. Finkel, M.L. Claypool, F. Bianchi, D. O'Donnell, P. Quinn (Worcester Polytechnic Institute); M.V. Narayanan, T.H. Farncombe, P.H. Pretorius, R.D. Beach, H.C. Gifford, P.P. Bruyant, B. Feng, M.A. King, G. Boening, R.R. Fulton, J. McNamara (U. Massachusetts Medical School); G.C. Speckert (Consultant); H. Depold (U. Connecticut).
- b) Graduate Advisors: W.Eric L. Grimson (MIT), Berthold K.P. Horn (MIT), Nils Sandell (MIT, AlphaTech).
- c) Thesis Advisor: L. Ma, S. Gu, S. Nadella, J.D. Morgenstern, N. Kumar, J.N. Shutt.

CINDY ABRAMS RANDALL
 Director of Research
 FIRST
 200 Bedford Street
 Manchester, NH 03101
 (603) 666-3906
 crandall@usfirst.org

PROFESSIONAL PREPARATION

University of Arizona, Tucson Anthropology & Prehistoric Archaeology B.A., 1986

APPOINTMENTS

2003 – present	FIRST	Manchester, NH	Director of Research
2000 – 2003	FIRST	Manchester, NH	Manager of FIRST Place
1998 – 2000	FIRST	Manchester, NH	Education Coordinator, FIRST Place
1996 - 1998	Museum of York County	Rock Hill, SC	Program Coordinator
1994 – 1996	SC Institute for Archaeology	Columbia, SC	Contract Archaeologist/Archaeology Field Day Coordinator

PUBLICATIONS

Lathan, C.E, Cindy Abrams, Newman, D.J., Dia Stolnitz, and Diane Soderholm "Promoting Leadership in Girls in an Informal Education Environment: The FAIHM Program," (Selected as Best Paper) Proceedings of the Society of Women Engineers National Conference, Washington, DC, June/July 2000.

Reference to this project in web.mit.edu/annualreports/pres00/11/13/html

SYNERGISTIC ACTIVITIES

Developed the Women In Science and Technology Forum (A Life In A Day), a series of panel sessions of high school, college and professional women in science, technology, engineering and mathematics, for high school girls, that address all of the decisions concerns, and resources young women will need to consider as they prepare college and careers in STEM. The panelists are available year round to mentor all of the participants (1998 – 2006). Over 300 attend each year.

Awarded Verizon Grant to develop and implement Girls FIRST initiative. In collaboration with Girls Inc., and the Girl Scouts, NH State Commission on the Status of Women, University of New Hampshire and Dartmouth College, this initiative was directed at getting more middle-school aged girls involved in computer programming, robotics, and engineering in a series of one-day hands-on workshops (2005), train the trainer program and CDROM toolkit to allow others to start Girls FIRST in their areas. Currently broadening method, materials and locations to both high-school girls and other minority groups (2006) in NY, SC and NV.

Managed several evaluations with Brandeis University, Center for Youth and Communities, Heller Graduate School on FIRST's impact on underserved schools/students participating on FIRST programs FIRST LEGO League and FIRST Robotics Competition (2004-2006).

Awarded a grant from Hewlett-Packard and Institute for Women and Technology for the FAIHM (FIRST Place/Autodesk/Institute for Women and Technology/Hewlett Packard/Massachusetts Institute for Technology) and later became the SharingFIRST program, supported by a grant from the Engineering Information Foundation, for computer equipment and web-based system to empower girls from FIRST teams nationwide to develop applied robotics and engineering curricula to educate other FIRST students (1999 – 2001).

COLLABORATORS & OTHER AFFILIATIONS

Collaborators

Dr. Theresa de Langis, Executive Director of NH State Commission on the Status of Women, Concord, NH
Dr. Donn Griffith (EdD), Engineering Outreach Director, College of Engineering and Information Technology,
University of SC, Columbia, SC

Randall, Page 2

Ruthe Farmer, Project Manager, Fair Play: Design and Discovery, Girls Scouts of the USA, New York City,
NY

Dr. Marcia Kroph, Chief Operating Officer, Girls Incorporated, New York City, NY

Dr. Merle Bruno, Professor of Biology, School of Natural Science, Hampshire College, Amherst, MA

SUMMARY PROPOSAL BUDGET YEAR 1

ORGANIZATION				FOR NSF USE ONLY		
Worcester Polytechnic Institute				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR				AWARD NO.	Proposed	Granted
Gretar Tryggvason						
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-Months		Funds Requested By proposer
	CAL	ACAD	SUMR			Funds granted by NSF (if different)
1. Gretar Tryggvason - PI	0.00	0.00	0.25	\$	4,406	\$
2. James K Doyle - Co-PI	0.00	0.00	0.50		4,333	
3. Michael A Gennert - Co-PI	0.00	0.00	0.25		2,889	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	1.00		11,628	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	1.00		6,066	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					17,694	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					4,636	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					22,330	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT					0	
E. TRAVEL						
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					4,000	
2. FOREIGN					0	
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS	\$				0	
2. TRAVEL					0	
3. SUBSISTENCE					0	
4. OTHER					0	
TOTAL NUMBER OF PARTICIPANTS (0)				TOTAL PARTICIPANT COSTS		0
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES					2,250	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0	
3. CONSULTANT SERVICES					0	
4. COMPUTER SERVICES					0	
5. SUBAWARDS					48,875	
6. OTHER					0	
TOTAL OTHER DIRECT COSTS					51,125	
H. TOTAL DIRECT COSTS (A THROUGH G)					77,455	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
Modified Total Direct Costs (Rate: 52.2000, Base: 53580)						
TOTAL INDIRECT COSTS (F&A)					27,969	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					105,424	
K. RESIDUAL FUNDS					0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	105,424	\$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME				FOR NSF USE ONLY		
Gretar Tryggvason				INDIRECT COST RATE VERIFICATION		
ORG. REP. NAME*				Date Checked	Date Of Rate Sheet	Initials - ORG

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET YEAR **2**

ORGANIZATION Worcester Polytechnic Institute		FOR NSF USE ONLY		
		PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Gretar Tryggvason		AWARD NO.	Proposed	Granted
A. SENIOR PERSONNEL: P/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Funded Person-Months		
		CAL	ACAD	SUMR
1.	Gretar Tryggvason - PI	0.00	0.00	0.25
2.	James K Doyle - Co-PI	0.00	0.00	0.50
3.	Michael A Gennert - Co-PI	0.00	0.00	0.25
4.	Cindy A Randall - none	0.00	0.00	0.00
5.				
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00
7.	(4) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	1.00
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)				
1.	(0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00
2.	(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00
3.	(0) GRADUATE STUDENTS			
4.	(0) UNDERGRADUATE STUDENTS			
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)			
6.	(0) OTHER			
TOTAL SALARIES AND WAGES (A + B)				
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)				
TOTAL EQUIPMENT				
E. TRAVEL				
1.	DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)			
2.	FOREIGN			
F. PARTICIPANT SUPPORT COSTS				
1.	STIPENDS \$ _____			
2.	TRAVEL _____			
3.	SUBSISTENCE _____			
4.	OTHER _____			
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS				
G. OTHER DIRECT COSTS				
1.	MATERIALS AND SUPPLIES			
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			
3.	CONSULTANT SERVICES			
4.	COMPUTER SERVICES			
5.	SUBAWARDS			
6.	OTHER			
TOTAL OTHER DIRECT COSTS				
H. TOTAL DIRECT COSTS (A THROUGH G)				
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Modified Total Direct Costs (Rate: 52.2000, Base: 29673)				
TOTAL INDIRECT COSTS (F&A)				
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				
K. RESIDUAL FUNDS				
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				
M. COST SHARING PROPOSED LEVEL \$ _____				
AGREED LEVEL IF DIFFERENT \$ _____				
P/PI NAME Gretar Tryggvason		FOR NSF USE ONLY		
ORG. REP. NAME*		INDIRECT COST RATE VERIFICATION		
		Date Checked	Date Of Rate Sheet	Initials - ORG

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION				FOR NSF USE ONLY		
Worcester Polytechnic Institute				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR					Proposed	Granted
Gretar Tryggvason				AWARD NO.		
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-Months		
	CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)	
1. Gretar Tryggvason - PI	0.00	0.00	0.50	\$ 8,988	\$	
2. James K Doyle - Co-PI	0.00	0.00	1.00	8,840		
3. Michael A Gennert - Co-PI	0.00	0.00	0.50	5,893		
4. Cindy A Randall - none	0.00	0.00	0.00	0		
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	2.00	23,721		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0		
2. (2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	1.00	12,375		
3. (0) GRADUATE STUDENTS				0		
4. (0) UNDERGRADUATE STUDENTS				0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6. (0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)				36,096		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				9,457		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				45,553		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT				0		
E. TRAVEL						
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				8,200		
2. FOREIGN				0		
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____				0		
2. TRAVEL _____				0		
3. SUBSISTENCE _____				0		
4. OTHER _____				0		
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS				0		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES				4,500		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3. CONSULTANT SERVICES				0		
4. COMPUTER SERVICES				0		
5. SUBAWARDS				97,750		
6. OTHER				0		
TOTAL OTHER DIRECT COSTS				102,250		
H. TOTAL DIRECT COSTS (A THROUGH G)				156,003		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
TOTAL INDIRECT COSTS (F&A)				43,458		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				199,461		
K. RESIDUAL FUNDS				0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$ 199,461	\$	
M. COST SHARING PROPOSED LEVEL \$ _____				0	AGREED LEVEL IF DIFFERENT \$ _____	
PI/PI NAME				FOR NSF USE ONLY		
Gretar Tryggvason				INDIRECT COST RATE VERIFICATION		
ORG. REP. NAME*				Date Checked	Date Of Rate Sheet	Initials - ORG

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Budget Justification – WPI

PI: Tryggvason, Gretar

- A. Faculty - Funds are allocated for one quarter a summer month for the PI (Tryggvason) and one of the co-PIs (Gennert) and one half month for the other co-PI (Doyle) for the two years of the proposed project.
- B. Other Personnel
 - i. Professional Personnel - One month of professional personnel support (Miller) for the two years of the proposed project.

**Salary Increases - A 4% salary increase is applied annually after Year 1 for the faculty and staff.
- C. Fringe benefits - Fringe benefits are calculated at WPI's federally negotiated rate of 26.2% for faculty and staff.
- D. Equipment: N/A
- E. Travel – Funds are requested to support two meetings each year. These include annual NSF meetings in Washington each October and a professional conference at \$1,500 per meeting. In addition, we allocate \$1,000 each year for students to visit FIRST teams to evaluate their current methods of communication.
- F. Participant Support Costs: N/A
- G. Other Direct Costs:
 - i. Materials and supplies: Funds are to be used for materials for the project, including publication page charges, poster preparation, and photocopying.
 - ii. N/A
 - iii. N/A
 - iv. N/A
 - v. Subaward: \$100,000. See separate explanation for FIRST budget justification.
- H. Total Direct Costs: \$153,775
- I. Indirect Costs - Indirect costs are calculated at WPI's federally negotiated rate of 52.2% of Modified Total Direct Costs (MTDC), per agreement with ONR. F & A costs exclude equipment >\$500, tuition, and subawards >\$25,000.

SUMMARY YEAR 1
PROPOSAL BUDGET

ORGANIZATION U S First				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Cindy A Randall				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-Months		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Cindy A Randall - PI	1.80	0.00	0.00	\$	40,000	\$	
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	1.80	0.00	0.00		40,000		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					40,000		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					40,000		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL							
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					1,500		
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____					0		
2. TRAVEL _____					0		
3. SUBSISTENCE _____					0		
4. OTHER _____					0		
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS					0		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					1,000		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					1,000		
H. TOTAL DIRECT COSTS (A THROUGH G)					42,500		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) TDC (Rate: 15.0000, Base: 42500)							
TOTAL INDIRECT COSTS (F&A)					6,375		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					48,875		
K. RESIDUAL FUNDS					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	48,875	\$	
M. COST SHARING PROPOSED LEVEL \$ _____				0			
AGREED LEVEL IF DIFFERENT \$ _____							
PI/PI NAME Cindy A Randall				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY YEAR **2**
PROPOSAL BUDGET

ORGANIZATION U S First	FOR NSF USE ONLY		
	PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Cindy A Randall	AWARD NO.	Proposed	Granted
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-Months		
	CAL	ACAD	SUMR
1. Cindy A Randall - PI	1.80	0.00	0.00
2.			
3.			
4.			
5.			
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	1.80	0.00	0.00
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)	Funds Requested By proposer		
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00
3. (0) GRADUATE STUDENTS			
4. (0) UNDERGRADUATE STUDENTS			
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)			
6. (0) OTHER			
TOTAL SALARIES AND WAGES (A + B)			40,000
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)			0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)			40,000
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)			
TOTAL EQUIPMENT			0
E. TRAVEL	Funds granted by NSF (if different)		
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)			1,500
2. FOREIGN			0
F. PARTICIPANT SUPPORT COSTS			
1. STIPENDS \$ _____			0
2. TRAVEL _____			0
3. SUBSISTENCE _____			0
4. OTHER _____			0
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS			0
G. OTHER DIRECT COSTS			
1. MATERIALS AND SUPPLIES			1,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION			0
3. CONSULTANT SERVICES			0
4. COMPUTER SERVICES			0
5. SUBAWARDS			0
6. OTHER			0
TOTAL OTHER DIRECT COSTS			1,000
H. TOTAL DIRECT COSTS (A THROUGH G)			42,500
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) TDC (Rate: 15.0000, Base: 42500)			
TOTAL INDIRECT COSTS (F&A)			6,375
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			48,875
K. RESIDUAL FUNDS			0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			\$ 48,875
M. COST SHARING PROPOSED LEVEL \$ 0	AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME Cindy A Randall	FOR NSF USE ONLY		
ORG. REP. NAME*	INDIRECT COST RATE VERIFICATION		
	Date Checked	Date Of Rate Sheet	Initials - ORG

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY Cumulative
PROPOSAL BUDGET

ORGANIZATION U S First				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Cindy A Randall				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-Months		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Cindy A Randall - PI	3.60	0.00	0.00	\$	80,000	\$	
2.							
3.							
4.							
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	3.60	0.00	0.00		80,000		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					80,000		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					80,000		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL					3,000		
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					3,000		
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____					0		
2. TRAVEL _____					0		
3. SUBSISTENCE _____					0		
4. OTHER _____					0		
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS					0		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					2,000		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					2,000		
H. TOTAL DIRECT COSTS (A THROUGH G)					85,000		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)					12,750		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					97,750		
K. RESIDUAL FUNDS					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	97,750	\$	
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Cindy A Randall				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

**Social Networking in the FIRST Robotics
Competition Community**

U.S. FIRST - BUDGET JUSTIFICATION

	Year 1	Year 2
Project Management	\$ 10,000	\$ 10,000
Social Networking Analysis	\$ 20,000	\$ 20,000
Content Development and Formatting	\$ 10,000	\$ 10,000
Material Costs	\$ 1,000	\$ 1,000
Travel Costs	\$ 1,500	\$ 1,500
Administrative Overhead (15%)	\$6,375	\$6,375
Total Direct Costs	\$ 42,500	\$ 42,500
Total Indirect Costs	\$ 6,375	\$ 6,375
Costs	\$ 48,875	\$ 48,875

Budget Narrative:

A. Senior Personnel - Cindy Randall. 1.8 mo. effort per year, as follows:

- i. **Project Management** - Management and oversight of all components of the Social Networking in the FIRST Robotics Competition Community Project will be required to insure optimal results, appropriate and constant liaison efforts with WPI, our partner on the project. This position will also write and present findings to interested parties, including the FIRST community.
- ii. **Social Networking Analysis** - An extensive research and review of the literature regarding social networking analysis theory, and a review of current application of social networking to cyberinfrastructure. Finally, a social networking map will be constructed of the FRC community. This map will inform the development of the prototype virtual organization as well as, for the first time have a thorough understanding of the individual, user groups, networks, connections, and patterns that make up the FRC community. This work will be conducted by FIRST in collaboration with WPI and others knowledgeable in social networking and the FIRST community.
- iii. **Content Development and Formatting** - Based on the results of research, field observations and other analyses conducted on the FIRST community, this information will all engineering content to be configured best depending on the user group, the type of cyber-interaction required and goals within the Social Networking in the FIRST Robotics Competition Community webpage. The content development will be conducted by FIRST and its community.

- B. Travel Costs** - The dissemination of the findings will be a critical part of the collaboration process. The Project Management team will be required to attend conferences, workshops and other important meetings to report the Social Networking in the FIRST Robotics Competition Community Project findings
- C. Other Direct Costs -**
 - i. Materials and Supplies-** There will be numerous iterations of curricula and other information piloted and produced. Engineering tools and other resources will be used in the development of the content.
- D. Indirect Costs** - Charged at 15% of Total Direct Costs

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: Gretar Tryggvason	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Direct Numerical Simulations of Nucleate Flow Boiling	
Source of Support: Sandia National Labs Collaborative (Dept fo Energy) Total Award Amount: \$ 320,000 Total Award Period Covered: 10/01/06 - 09/30/09 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.38	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: CPATH CB: Building Community via Robotics Innovations Competition and Conference	
Source of Support: NSF Total Award Amount: \$ 399,734 Total Award Period Covered: 07/01/07 - 06/30/10 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.50	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Robotics Engineering Resource Package Development	
Source of Support: NSF Total Award Amount: \$ 149,983 Total Award Period Covered: 05/15/08 - 08/14/10 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.25	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Investigations of Bubbly Flows Using Direct Numerical Simulations	
Source of Support: Department of Energy Total Award Amount: \$ 380,756 Total Award Period Covered: 09/01/03 - 12/31/07 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.50	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Separation Control by Surface Deformable Actuators	
Source of Support: Office of Naval Research Total Award Amount: \$ 192,000 Total Award Period Covered: 05/01/05 - 02/28/08 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Summ: 0.33	

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: Gretar Tryggvason	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: An Experimental Investigation of a Flexible Flap	
Source of Support: Natick Soldier Center Total Award Amount: \$ 64,940 Total Award Period Covered: 01/16/07 - 02/29/08 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.00	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Social Networking in the FIRST Robotics Competition Community	
Source of Support: NSF Total Award Amount: \$ 199,461 Total Award Period Covered: 10/01/07 - 09/30/09 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.25	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Petascale simulations of the Dynamics of Heterogeneous Continuum Systems	
Source of Support: NSF Total Award Amount: \$ 1,007,489 Total Award Period Covered: 06/01/08 - 05/31/13 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.33	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Summ:	

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.
 Page G-2 USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: James Doyle	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Peak Power Demand Reduction Source of Support: ISO New England Total Award Amount: \$ 63,718 Total Award Period Covered: 09/01/06 - 08/31/07 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.00	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Social Networking in the FIRST Robotics Competition Community Source of Support: NSF Total Award Amount: \$ 199,461 Total Award Period Covered: 10/01/07 - 09/30/09 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.50	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	
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*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.
 Page G-3 USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: Michael Gennert	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: CPATH CB: Building Community via Robotics Innovations Competition and Conference Source of Support: NSF Total Award Amount: \$ 399,734 Total Award Period Covered: 09/01/07 - 08/31/10 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.50	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Robotics Engineering Resource Package Development Source of Support: NSF Total Award Amount: \$ 149,983 Total Award Period Covered: 05/15/08 - 08/15/10 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.25	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Social Networking in the FIRST Robotics Competition Community Source of Support: NSF Total Award Amount: \$ 199,461 Total Award Period Covered: 10/01/07 - 09/30/09 Location of Project: WPI Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 0.25	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Summ:	

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: Cindy Randall	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Social Networking in the FIRST Robotics Competition Community	
Source of Support: WPI (NSF Prime) Total Award Amount: \$ 97,750 Total Award Period Covered: 10/01/07 - 09/30/09 Location of Project: Manchester, NH (FIRST) and WPI Person-Months Per Year Committed to the Project. Cal: 1.80 Acad: 0.00 Sumr: 0.00	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
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Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Summ:	

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.
 Page G-5 USE ADDITIONAL SHEETS AS NECESSARY

Facilities

WPI has the necessary computational resources to host the proposed Social Networking in the FIRST Robotics Community project .

WPI currently hosts a website for FIRST technical team resources at <http://first.wpi.edu/> serving the entire range of FIRST programs. This site is adequate for the demonstration project. Additional computational and storage resources will be necessary for a more extensive Phase II effort.

WPI provides all faculty and staff with access to a wide range of computing equipment, including a mix of PC's, Mac's, workstations and the occasional X-terminal, supporting a variety of computing platforms and various Operating Systems, including Linux, FreeBSD, and Solaris. These computers are tied via the two 1 Gbps connections to WPI's Computing and Communications Center that connects to Internet 2.

Howard Rheingold and Barry Wellman on the applications to the incorporation of technologies and software tools (Rheingold 2002). Even books, like the *Wisdom of Crowds* by James Surowiecki are becoming mainstream and seen as important because it allows us for the first time to view that the actions of people and groups are not random. By understanding the basic premise that a social network or community is more than the sum of its parts, that each constituent part (individual or specific user group) can be identified and mapped to understand the types, strengths, and level of interconnectivity between them will allow for the adoption of information, learning, and collaboration to take place at a larger scale in a specific manner understood by that user. The Social Networking in the FIRST Robotics Community proposal seeks to integrate more succinctly these two emerging research areas and pilot the results, through a prototype virtual organization within the diverse, large scale, and fast-paced environment of the FIRST Robotics Competition.

For over a decade, FIRST, through the innovative development of robotic challenges, has inspired diverse groups of people to design, build, and compete using robots. The diversity of groups include: students (ages 6-18) from all types of backgrounds and economic strata; innovative educators willing to push their limits as well as their students to maximize the fact that what they learn in class has relevance and application in the real world; over 80 colleges and universities who are actively involved and believe in the cultivation of these minds (currently over 8 million dollars in scholarships are awarded to participating students); and finally, government agencies like NASA and NIST and Fortune 500 sponsors, like LEGO, Motorola, Microchip, BAE Systems to name a few, who invest in the workforce of the 21st century. Over 130,000 participants from 46 countries and around the Nation all "rally around the robot". These teams are an educational web where knowledge of math, engineering, physics and technology are applied and where skills like innovation, teamwork, collaboration, problem-solving, oral/written communication, leadership and the pursuit of lifelong learning is established. Also, paramount to the mission of FIRST is the instilling of "FIRST Values". It is simply not enough for the learning of STEM content, building and competing robots. Terms like "gracious professionalism" where one respects and acts professionally through the entire process of building and competing with one's teammates and other competitors are valued. Also valued is the celebration of everyone's accomplishments because every team physically and mentally understands the amazing achievement of building 130 lb. robots, using industrial grade parts that may or may not fit together, in a rapid period of time of 6 weeks. Co-opetition is another value that is promoted. An opponent in one match might be a partner in another match and therefore it does not make strategic sense to destroy your opponent. Instilling the value of mentoring and imparting one's life experience and wisdom is something that everyone strives for on the team. Finally FIRST holds sacred that educators and engineers are freely giving their time and students should not squander such a gift. It is also considered a privilege to be recognized as a mentor.

FIRST is comprised of four (4) K-12 programs: Junior FIRST LEGO League (ages 6-9); FIRST LEGO League (ages 9-14), FIRST Tech Challenge and FIRST Robotics Competition (ages 14-18). All of these programs have the same ingredients: 1) teams of students, educators and professional engineers engaged in hands-on real world robotics engineering challenges; 2) the building of meaningful relationships with technical mentors and caring adults where engineering information is shared in a non-threatening fun environment; 3) a short period of time in which to accomplish the task; and the excitement "rock n' roll" show of competing and celebrating the robots. Within the U.S., FIRST is currently in 5% of all public middle and high schools. The demographics of the teams consist of: 69% men and 31% women; 69% white, 21% African American, 6% Hispanic and 3% Asian. Nineteen percent (19%) of teams are from underserved communities. When compared with a national study of similar students, backgrounds and interests, FIRST students were found to be 3 times as likely to major specifically in engineering (41% versus 13%), approximately 10 times more likely to have an apprenticeship, internship, or co-op job in their freshman year (27% versus 3%), significantly more likely to achieve a post graduate degree (77% versus 63%), more than twice as likely to expect to pursue a career in science and technology (45% versus 20%) and finally, nearly 4 times as likely to expect a career specifically in engineering (31% versus 8%).

An important partner of FIRST in the success of creating college and career-bound scientists and engineers is Worcester Polytechnic Institute (WPI). Since the inception of the FIRST, WPI has been instrumental in providing the necessary connectors for students to become engineers: positive role models and mentors from both college students and faculty; full college scholarships to incentivize and encourage graduating high school seniors to study engineering; college internships and co-op

experiences to assist students with visualizing their futures and provide networking opportunities; a committed connection with their community and public school system (majority underserved) by providing teacher professional development workshops; summer institutes and camps; and finally, host various robotic challenges that brings hundreds of interested students from around the nation to compete and does much to broaden audience appeal of science and engineering.

FIRST and WPI share a common vision of inspiring students towards engineering careers through hands-on experiences, such as robotics competitions. Groups of students working together on a common project and sharing knowledge are the cornerstones of both programs. The combination of a hands-on, engaging robotics challenges, plus a thorough understanding of the motivations and how social networks occur within the FRC community, coupled with the appropriate cyberinfrastructure and tools are the keys to innovation. By expanding the FRC user groups support systems to anywhere the Internet reaches, the access to new knowledge and perspectives, best practices, and network opportunities will become almost limitless, increasing the likelihood of creating more engineers and producing a more technologically literate society.

1.1. Intellectual Merit

The intellectual merit of the proposed work is found in three immediate impacts: (1) lowering barriers-to-entry of students and advisors to robotics competitions, (2) improving retention of students and advisors, and (3) enhancing the sense of community among K-16 STEM-oriented students.

Goals for the Social Networking in the FIRST Robotics Community Project include:

1. Assess how the members, teams and other groups of the FIRST Robotics Competition Community currently network and collaborate with other teams and individuals within the FIRST community for mentoring and advising during the FRC season and throughout the year. Also, assess how these groups and individuals use cyberinfrastructure and other internet tools to further both their team and FIRST community experience. This evaluation will help the project team to inform and refine K-12 engineering content and define appropriate internet tools that will populate the social network website.
2. Integration of research, identification of, and the development of appropriate cyberinfrastructure tools (e.g. wikis, podcasts, forums to name a few) more succinctly with a social networking analysis on the motivations and collaborative connections multi-generational, multi-cultural and compositionally diverse individuals, teams and other groups that participate within the FIRST Robotics Competition. The integration of user behaviors and how they use cyberinfrastructure will allow the development of appropriate cyber tools, formatting, functionality, and navigability of an engineering education community website.
3. A prototype website will be constructed based on the outcomes of both the FIRST community evaluation and the social networking analysis. This information will help frame the website itself determining what the FIRST networks are requiring from a community website: hierarchical versus democratic and static versus interactive or somewhere in between.

1.2. Broader Impacts

The Social Networking in the FIRST Robotics Community project will help attract K-16 students to critical SMET disciplines through increased exposure of robotics. Because of the power of robotics-oriented activities to break down traditional cultural barriers that prevent students from realizing their potentials as engineers and/or as business leaders due to gender and racial bias in upbringing, we expect the proliferation of this form of competition to positively impact the diversity of SMET disciplines. The project will contribute to broader impacts by 1) providing expanded access to mentor support, especially for underserved and underrepresented communities, 2) further advancing current research underway in the areas of cyberinfrastructure, virtual organizations and application of social networking in this cyberworld. We will address issues of scalability, diversity of learning and teaching styles, and increasing the confidence and comfort levels of educators through alternative methods and development of a cyber-network of other educators to support them, and 3) increasing the awareness of science and engineering college and career choices along the lines advocated in the Rising Above the Gathering Storm report, and 4) contributing to realizing FIRST's organizational goal of expanding into 15% of US public high schools within the next 5 years.

1.2.1. Expanded Accessibility of Underserved Populations

FIRST, through working with underserved communities has identified several factors that not only help the team sustain but improves youth outcomes. These factors include: other institutional partnerships between schools, colleges and other community organizations; infrastructure that allows all participants to receive enhanced training, the ability to overcome obstacles and other learning curves; a combination of buy-in and incentives that promote the value of participating in FIRST and the experiences gained; and finally additional technical assistance and mentors. In 2005, FIRST commissioned a study on what the impacts were on program participants and institutions participating in FRC. The report, "More Than Robots: An Evaluation of the FIRST Robotics Competition Participant and Institutional Impacts", prepared by the Center for Youth and Communities Heller School for Social Policy and Management, Brandeis University, concluded that over a period of 4 years, participants of FRC from New York City and Detroit for which 55% were non-white; 41% were female; and 37% came from families where neither parent attended college. The large majority of FIRST alumni graduated from high school and attended college at a higher rate (89%) than high school graduates nationally (65%). Particularly notable was that 77% of female participants were in college; 68% of African-American alumni and 78% Hispanic alumni - all above the national averages of their groups. The Social Networking in the FIRST Robotics Community Project will have the ability to provide enhanced training; virtual mentors; a series of user groups and networks of other teams, educators, engineers and students that can provide guidance throughout the year, in addition to the 6 week season. The FRC community is a microcosm of the larger universe of educators, students and other caring adults interested in expanding education opportunities.

1.2.2. Further Enhancement of Social Networking

The Social Networking in the FIRST Robotics Community Project proposes to integrate more succinctly the body of research surrounding the development of cyberinfrastructure with the latest social networking constructs. The goal is to create a web-based environment which is composed of social networks that provide structure such that individuals within the FRC community can mobilize and organize themselves as required (Wellman 1999). The appropriate cybertools and functionality will allow diverse groups to learn, share and collaborate because the results of the assessment, field observations and social network map will promote better flow, improved communication of content, and an engaging cyber environment.

In *The Wisdom of Crowds*, James Surowiecki states the best collective decisions are the product of disagreement, taking into account the largest cross-section of the community (Surowiecki 2005). Such diverse groups, as found within the FIRST Robotics Competition, will uncover many possible alternatives and secondly, will decide upon them to determine best course of action thereby potentially raising the level and quality of information shared and used by the collective group. The FRC community will elevate the awareness and provide improved technical support and challenge FRC innovations better as a group, than individual teams.

1.2.3. Sustainability and Expansion of Robotics Education

FIRST is already answering the call of the Rising Above The Gathering Storm Report by providing accessible innovative programs to positively transform culture by inspiring young, their schools and communities to appreciate science, engineering and technology. We believe that the Social Networking in the FIRST Robotics Community Project will not only sustain the teams by lowering the constant learning curves and by providing the necessary information in an effective and efficient manner. For the teams that participate in FRC, the first three years are challenging as they face many obstacles like fundraising and learning to become a more innovative and competitive team. Most attrition occurs within this period of time. It is critical to ensure that the appropriate tools and support mechanisms are in place. Social Networking in the FIRST Robotics Community Project will help minimize those frustrations. One of FIRST's strategic goals is to expand to 15% of all public high schools across the US in five years. Enabling the community to easily share knowledge, collaborate on design ideas, and improve their access to the community is a tremendous opportunity.

2. Current Research

2.1. Social Network Analysis Research

The basic premise of social network analysis is the network or community is more than the sum of its constituent parts. Each constituent part (individual or specific group) can be identified as nodes and ties and mapped to understand the types, strength and level of interconnectivity between them. The range of theoretical progress of social networks analysis from Ferdinand Tonnies outlining "*gemeinschaft*" where social groups can exist as personal and direct social ties that either link individuals who share values and beliefs of "*gesellschaft*" or impersonal, formal, and instrumental social links arguing that social phenomena arise when interacting individuals constitute a reality to the incorporation of technologies and software tools that allow for easier coalescence of groups (Rheingold 2002).

Within this dynamic emergence of the internet and technology has come the next level of awareness in social networking analyses and how people communicate to each other, organize themselves to create, problem-solve and collaborate. These online groups are also exhibiting a more intangible socio-psychological phenomenon of creating and requiring a "sense of community" that follow sets of rules, online etiquette, and other social criteria. This sense of community is derived from similar goals and user outcomes highlighted on websites that hold similar belief structures, things in common and are interested specifically in the topics presented. Successful social networking websites (e.g. MySpace.com and others) allow this cyberworld to be driven by its users with minimal moderation. The successes of these sites appear to be directly correlated to the specific type of user and the functionality on these sites.

2.2. The Cyberinfrastructure and Tools

Rheingold and others are now making a convincing argument that the emergence of new of new mobile technologies – from cell phones to mobile computing- are now making it easier for large collections of people to communicate with each other and coordinate their activities in a self-directed manner (Rheingold 2002). The definition of community and the creation of a virtual cyberworld where individuals and groups want to reside, participate, share, contribute, actively believe, and work for the good of the group will be critical in our understanding of both the online tools and behavior if the Social Networking website is to be successful. Communities do not form by accident and consist of several criteria the groups agree and adhere to as they engage each other. These criteria include:

1. **A group** of individuals ever-changing in size, synergistic tendencies and beliefs, and finally, the level and intensity with which relationships and interactions are formed;
2. The environmental context sets the ability by which **relationships** are formed and the breadth and depth of attachments, emotional bonds and connections are made;
3. **Time** is required for groups to coalesce into productive communities. Individuals do not simply join a community. A whole series of decisions, connections, and requirements of acceptance need to be made by both individual and community in order to determine if there is compatibility. Time allows for the attachments, connections, and visualizations of belonging to that community to take place;
4. In any community, individuals **interact** at varying degrees based on number within a community, amount of connection, level of relationships and personality type. With any real world or cyberworld community, individual personalities range on a scale of passive/vicarious participation, full participation/following to full participation/leading. Also, age, life experience, professional background, shared things and beliefs in common, and functionalities of a website are paramount to a successful interaction and continued engagement. Level of exclusivity and notions of **membership** within the cyberworld is now more accessible further emphasizing the importance of an individuals' contribution;
5. A community also is engaged and interacting with each other **frequently**. Interaction, collaboration, sharing of ideas and learning do not reside on a timetable. There have to be persistent reasons for communities to regularly communicate. Part of the frequency includes the fact that the groups and/or individual wants to spend time because of their associations, interaction and relationships within that online community;
6. **Shared beliefs or causes** are fundamental to successful communities because it is there where the individual meets with "like minded people" or the group actively directs itself towards goals. These

Appendix B: IRB Consent Form

Informed Consent Agreement for Participation in a Research Study

Investigator: Gretar Tryggvason, PhD

Contact Information: Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296, doyle@wpi.edu

Title of Research Study: Social Networking in the FIRST Robotics Competition Community

Sponsor: National Science Foundation

You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions.

Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None.

Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams.

Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed.

Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel 508-831-5519, Email mjcurley@wpi.edu

Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

VOLUNTEER'S STATEMENT:

I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study.

I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study.

If I have any questions about my rights as a research subject in this study I may contact:

New England Institutional Review Board

40 Washington Street, Suite 130

Wellesley, MA 02481

Telephone: 1-800-232-9570

By consenting to participate in this study, I have not waived any of my legal rights.

To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records.

By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes No

Appendix C: Focus Group Draft Report

January 21, 2008

Draft Report on Focus Group Sessions Conducted at FIRST Kickoff Workshops,
Friday, January 4, 2008

Jim Doyle

Sample

Number of groups: 6

Number of subjects: 36

Average group size: 6

Average team experience: ~ 7 years

Disclaimers:

1. Focus group research is considered “exploratory.” Hypotheses generated by focus group research should be confirmed with representative samples of sufficient size to determine statistical significance.
2. The unit of analysis in a focus group study is “the group,” not the individual, since data from different members of a group are not independent.
3. I tried to ensure that each group covered the important, basic questions, but discussions were wide-ranging, and to a large extent the direction of the discussion was determined by the participants.
4. The effective length of the sessions was about 45 minutes; not a lot of time to try to cover several topics at some level of detail.
5. Most groups contained multiple members from the same FIRST team, so that the total number of Ss overestimates the total number of teams represented in the sample.
6. Students were not included in these focus groups. These are the opinions of mentors only. The need to run focus groups on FIRST students, and the feasibility of doing so, should be discussed.
7. Obviously, given the venue, most of the participants were from the Northeast region.
8. Given they made the trip, these teams are likely to be better funded than average.
9. It is not clear to me if rookie teams were underrepresented or not. 10 of the 36 Ss (28%) had begun participating in FIRST in 2006 or later.

Note: The following observations are at this point based solely on my personal notes and recollections. 5 of the 6 sessions were transcribed live and those transcriptions are in hand. An audio recording of 4 of the sessions exists, but has not yet been transcribed. For one session my notes are the only record.

Obstacles to sustained participation

Overall, groups expressed more logistical barriers to participation than technical barriers.

The most important barrier to participation, mentioned by almost all of the groups, was difficulty in fundraising. Some of the groups suggested that a section of the proposed website devoted to improving fundraising strategies and skills would be very helpful.

Other barriers mentioned:

Figuring out what you're doing
Adequate location/facilities to do the work
Need for programming help

Current communication practices

With the exception of a few experienced teams who do a lot of outreach to rookie teams, there was surprisingly little mention of communication of any kind between teams, beyond posting on Chief Delphi.

A few teams had made efforts to interact with other teams in their local area.

What communications exist are typically started through personal contacts at meetings and events.

I received so little information here, that I skipped this section for later groups.

Desired content

There was some significant sentiment expressed for the idea that an “anything goes” site already exists in Chief Delphi, and that the new site might better focus on more expert or reliable information.

One suggestion was that the new site could be a “clearinghouse” for existing FIRST-related websites.

A variety of content ideas were expressed (in no particular order):

1. Archives containing previous years' rulebooks
2. Features/profiles/case histories of successful robots, including 3-D views
3. Common pitfalls of rookie teams/advice for rookie teams
4. Ideas/sources for obtaining materials
5. Information from sponsor's perspective/interviews with sponsors
6. Information on how to get sponsors, or contact existing sponsors

7. Awards and how to qualify for them
8. An events calendar
9. Social stories: examples of how the FIRST experience relates to real world issues/problems beyond the competition
10. Fundraising resources/ideas
11. A section that provides “Official Answers” from FIRST.
12. Good, reliable technical data
13. History on teams, awards
14. Information on best practices
15. Libraries of designs
16. Ideas/examples on gracious professionalism
17. A downloadable fundraising video that teams could show potential sponsors
18. An easy way to get to competition documentation
19. Statistics and competition results
20. Curriculum materials, e.g., for use in Project Lead the Way
21. Suggested team building activities for rookies
22. Strategies for getting students access to web sites

One person suggested we “check out what the President’s Circle did this past summer.” I have no idea what that means.

Desired features/capabilities

The most frequently expressed desire was for reliable technical information that is better organized and more easily searchable.

There was some sentiment that there are enough existing forums/discussion boards, and no more are needed.

Opinion on the question of whether the site should be controlled from the top-down versus controlled by the users was mixed. Several people wanted the best of both worlds: the freedom of open authorship but some mechanism to ensure quality (e.g., Ebay-like ratings of the quality of posted information, or awards for teams that have high-quality posts).

Suggested features, in no particular order:

1. Ability to implement surveys so that you could get answers from a lot of different people to the same how did you do that type of question
2. Live chat with an expert
3. Ability to click on team number and learn about the team, or go to their web page
4. An effective search engine
5. Ability to post animations, find them easily
6. Ask an expert
7. Frequently asked questions
8. Downloadable software modules

9. Team website template
10. Skill-building tools for kids to use during down times
11. Code games/logic games to bring students in off-season

Anticipated use

The general consensus was that motivation to participate on the new website would not be a problem. Too much participation would be more likely.

One group suggested that FIRST give an award for participation on the website, or make participation a component of one of the existing awards.

Many teams mentioned that they have significant problems at their schools with firewalls. Certain sites or types of sites (particularly social networking sites) are routinely blocked and access is not obtainable or must be specifically requested.

The nature of these problems varies significantly from state to state.

Specific sites that have been blocked include Youtube, Chief Delphi, Google mail

Some teams mentioned difficulties with getting email messages to students, and with students not being allowed to send emails or access chat rooms from school

For the most part, teams find ways around these problems, e.g., the students figure out how to break through the firewalls, or they access the restricted sites from home (although one team mentioned lack of home computer access as a problem)

A couple of people suggested that an edu domain name would help reduce access problems. It was suggested that a site that required log in with a username and password would be easier to get approved.

Several individuals mentioned that their team websites are well-established and thus they would be unlikely to use any tools for building web pages offered by the new site. Instead, they would just link to their existing team page.

Chief Delphi

Almost every group spontaneously mentioned Chief Delphi during the conversation.

A few groups, one vociferously so, suggested that Chief Delphi is so well-established that if the new website merely tries to duplicate what Chief Delphi does, it would not be successful.

Chief Delphi was generally thought to be strong in the area of social networking, but very weak in its organization and ease of finding the information you are looking for.

Attitudes toward the quality of information available on Chief Delphi varied widely. Some have stopped using it due to its unreliability. Others believe that, through experience, they have learned which posters to trust and which not to, and so the site works for them.

Other strengths of Chief Delphi mentioned included: you get very fast responses to queries, it is incredibly up to date, “there are always at least 50 people on it.”

Other weaknesses mentioned included: lack of moderation, too much irrelevant activity.

A couple of groups mentioned that Chief Delphi is particularly “rough” on novices.

A few people complained that people put misinformation on Chief Delphi. A few others admitted to doing it.

One person mentioned as an obstacle that Chief Delphi does not permit file sharing.

Unsolicited Advice for FIRST

More than one group suggested that FIRST should devote fewer resources to helping rookie teams and more resources to helping 2-3 year-old-teams. The feeling was that is the point where initial funding (e.g., from NASA) runs out and teams need help transitioning to funding themselves.

FIRST needs to market the Robotics competitions to the guidance departments of schools.

A few teams mentioned that more could be done to put experienced and rookie teams together, perhaps making it required rather than optional. The new website might be used to facilitate this process.

More than a few groups mentioned that it is difficult to find what you are looking for on the official FIRST web pages. The site is difficult to search.

FIRST needs better networking among its own people. Referees and game design committees sometimes give inconsistent answers.

“It is very hard to get official answers from FIRST.”

Competitors

One team (Team 25) suggested that they have already developed a website to help rookie teams. See <http://www.raiderrobotix.org/rinos/> They would like their efforts to be considered during the

development of this project, and do not want the new website to discourage individual team efforts.

Another team (Team 125) has an “Ask an Engineer” feature on their site.

Appendix D: Atlanta Championship Results

D.1 Presentation



FIRST Technical Network

A Knowledge Base of Expert Resources

Presented by:

Mike DiBlasi, Worcester Polytechnic Institute
Jon Morgan, Worcester Polytechnic Institute
Evan Morrison, Worcester Polytechnic Institute
Dan Praetorius, Worcester Polytechnic Institute

2008 *FIRST* Robotics Conference



Who We Are

- Worcester Polytechnic Institute Research Project
 - Mike DiBlasi, ME 2010
 - Evan Morrison, ME 2010
 - Jon Morgan, RBE/ME 2011
 - Dan Praetorius, RBE/ME 2011
- National Science Foundation Grant
- Advisors
 - Brad Miller, Associate Director, Robotics Resource Center
 - James Doyle, Department Head, Social Science & Policy Studies



2008 *FIRST* Robotics Conference



The *FIRST* Community

- Amazing ability to share and collaborate
- Wealth of knowledge available online
- Many projects to help other teams



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Some Community Websites

- ChiefDelphi - FRC47
- *FIRST*wiki
- Ask An Engineer - FRC125
- SharingFIRST
- ...and many more!



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The *FIRST* Technical Network

- Provides central location for *FIRST* resources
 - Hosts new content
 - Indexes existing content
- Connects teams, experts, and volunteers
- Host information on new *FIRST* hardware



2008 *FIRST* Robotics Conference



Primary Components

- Articles
 - User-submitted and rated content
- Ask an Expert
 - Personal responses to *FIRST*-related questions
- Portals
 - Teams, Volunteers, *FIRST*, etc.



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Content Organization

- Tags
 - Similar to Flickr, Gmail, del.icio.us
 - Predefined to maintain order
- Supertags
 - **Mechanical:** drivetrain, mechanism, pneumatics
 - **Fundraising:** sponsorship, events, grants
- Flexibility of tags, structure of folders



2008 FIRST Robotics Conference



User Organization

- Registration through team contact
 - Uses code to restrict team registration
 - Similar to TIMS contact
- Affiliations
 - Current and prior teams, volunteer, *FIRST*, etc.
- Subject-matter “Experts”



2008 *FIRST* Robotics Conference



Who is an Expert?

- All of YOU! Anyone can become one
 - Contribute quality content
- Users invited based on community ratings
 - No obligation, solely invitation
- Experts provide additional resource
 - Provide assistance to those in need



2008 FIRST Robotics Conference



Articles



2008 FIRST Robotics Conference



Overview

- Primary channel for user contributions
- Many *FIRST*-related categories
 - Technical
 - Fundraising
 - Team Support/Administration
- Indexes on- and off-site content in one place
- YOU create the content!



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-
- **Linking to off-site content**
 - Allows content from existing websites
 - **Abstract**
 - **Multiple types of media**
 - Text, code, images, CAD models, etc.
 - **Simple, yet powerful layout**
 - Easier to find content



2008 FIRST Robotics Conference



Template

Article Title	Rating: (insert graphic)
Username	Views:
Submitted	
Supertag: subtags	
(Supertag): subtags	

[Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin tristique lorem vitae ante. Etiam eu arcu sit amet massa euismod congue. Morbi fringilla. Nunc accumsan erat vitae pede. Phasellus nec libero. Sed gravida mauris non tellus. Ut euismod pede. Pellentesque accumsan laoreet est. Aliquam nisi nibh, venenatis nec, tincidunt in, consectetur faucibus, nibh. Aenean dolor lacus, cursus sed, bibendum tempus, porttitor ultricies, dolor. Aliquam rhoncus, arcu blandit vulpinate, elementum, velit enim, vehicula du, id vehicula orci nisi sed eros. Praesent iuctus pede sed mauris. Mauris dapibus lorem vitae odio. Nunc vel massa. Ut pede.](#)

[Phasellus feugiat. Duis erat nisl, lacinia quis, porta vitae, mollis tincidunt, quam. Donec dolor vitae erat iaculis viverra. Proin feugiat tortor id dolor. Duis dolor. Sed vitae velit. Donec dignissim velit ut nulla. Integer bibendum. Quisque tortor enim, malesuada nec, semper eget, commodo vel, nisl, Aliquam leo. Quisque consectetur mauris in eros. Suspendisse ligula est, porta nec, consequat eu, rhoncus quis, enim.](#)

Rick Asley would never:

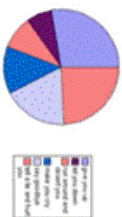




PHOTO UNAVAILABLE

User Name (Expert)
Region

Related Articles
List of articles



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Ask the Experts



2008 FIRST Robotics Conference



Overview

- Users can present questions to “Experts”
- “Experts” answer from hidden queue
 - Prevents spam and unrelated content from appearing
- Response can be spun off into article



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Template

Q: Question would appear here?

Username

Hometown, USA (Some overarching identity)

Rating:
Views:

A:

>Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin tristique lorem vitae ante. Etiam eu arcu sit amet massa euismod congue. Morbi fringilla. Nunc accumsan erat vitae pede.

Phasellus nec libero. Sed gravida mauris non tellus. Ut euismod pede. Pellentesque accumsan laoreet est. Aliquam nisl nibh, venenatis nec, tincidunt in, consectetur faucibus, nibh. Aenean dolor lacus, cursus sed, bibendum tempus, portitor ultricies, dolor. Aliquam rhoncus, arcu blandit vulputate, elementum, velit enim vehicula du, id vehicula orci nisi sed eros. Praesent iustus pede sed mauris. Mauris dapibus lorem vitae odio. Nunc vel massa. Ut pede.

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Resulting/Related
Articles



2008 FIRST Robotics Conference



Portals



2008 FIRST Robotics Conference



Goal of Portals

- Provide teams a place on the Web
 - Intended to bolster collaboration
- Compliments teams' existing sites
- Ease communications and file sharing
 - File repository



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-
- News Updates
 - Team Communications
 - Local and Team Calendar
 - File Repository
 - Public and Private Sites



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File Repository

- Inspired by SourceForge
- Allows teams to share and version files
 - Code, CAD models, etc.
- Can include outside members as collaborators
 - “Experts”, team alumni, other teams



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Private Template

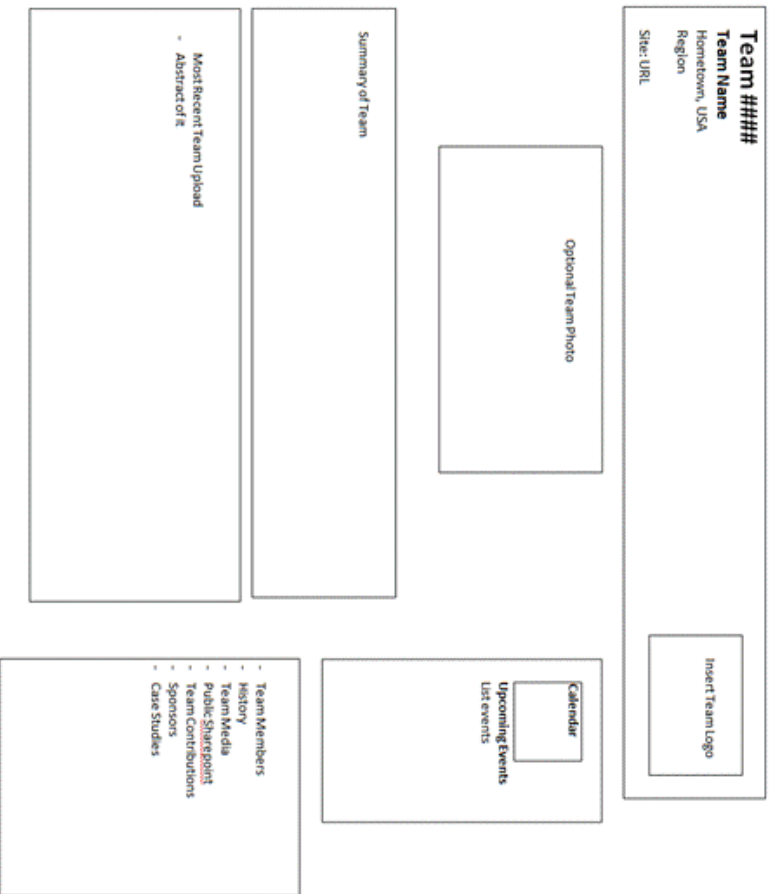
Team ##### Team Name Hometown, USA Region Site: URL	Insert Team Logo
Links: Team Members, Projects, Calendar, Share point(better name and not projects), Team Media,	
News	Calendar Upcoming Events List Events
Current Projects	



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Public Template



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Volunteer Portal

- Connect volunteers for events
 - Link volunteers for lodging
- Show which areas are in need of volunteers
- Connect volunteers to other local events
- Link to VIMS



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Template

Volunteers

Site: [VIMS](#)

Event Name
Location
Event Website
Event Announcements

Calendar
Upcoming Events
List events

Training Schedule for Volunteers

Volunteer of the Week
-user profile article here

List of Volunteers With Friends/Job
- Link to their bio

Hotel Arrangements
Hotel Name
Room
Special Currency/Shipping/Dues
Details
Seminar Arrangements



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Connections and Networking

- Collaboration on Projects
 - Teams needing help can securely receive it
 - Share design process (i.e. FRC121 in 2008)
- Local Team Search
 - Teams can offer/request help to/from nearby teams
- Volunteers



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Hope for the Future

- Support Rookie and Young Teams
- Provide central location for *FIRST* resources
- Encourage collaboration on proper scale



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Timeline for the Future

- Phase I - Fall 2008
 - Articles



2008 *FIRST* Robotics Conference



Contact Information

Mike DiBlasi mdiblas1@wpi.edu

Jon Morgan jmorgan@wpi.edu

Evan Morrison esm@wpi.edu

Dan Praetorius dprae@wpi.edu



2008 FIRST Robotics Conference



D.2 Rough Sketch Layouts

Denso Motor Specification Graphs

John Smith
Worcester, MA

Rating: 
Views: 683

Torque, Speed, Power information.

Window (Denso)

Speed (rpm)	Torque (N m)	Torque (in lbs)	Current (A)	Power (wt)	Efficiency	Heat (wt)
0	10.600	93.780	18.6	0.0	0%	223
6	9.893	87.528	17.5	5.8	3%	204
11	9.187	81.276	16.3	10.8	5%	185
17	8.480	75.024	15.2	14.9	8%	168
22	7.773	68.772	14.1	18.2	11%	151
28	7.067	62.520	13.0	20.7	13%	135
34	6.360	56.268	11.8	22.4	16%	120
39	5.653	50.016	10.7	23.2	18%	105
45	4.947	43.764	9.6	23.2	20%	92
50	4.240	37.512	8.5	22.4	22%	79
56	3.533	31.260	7.3	20.7	24%	67
62	2.827	25.008	6.2	18.2	24%	56
67	2.120	18.756	5.1	14.9	24%	46
73	1.413	12.504	4.0	10.8	23%	37
78	0.707	6.252	2.8	5.8	17%	28
84	0.000	0.000	1.7	0.0	0%	20

The Denso Window motor is a moderate torque, worm gear assembly, which makes it hard to backdrive and can be used on most areas of the robot, from drivetrain to end effector. This motor is thermal resetting, which means that it shuts down when the temperature gets too high, making it extremely hard to burn out. The window motor is standardly used on car windows...

Denso Motor Specification Graphs

John Smith
Worcester, MA

Rating: 
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Torque, Speed, Power information.

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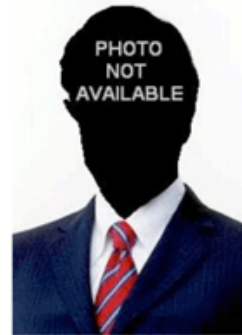
The Denso Window motor is a moderate torque, worm gear assembly, which makes it hard to backdrive and can be used on most areas of the robot, from drivetrain to end effector. This motor is thermal resetting, which means that it shuts down when the temperature gets too high, making it extremely hard to burn out. The window motor is standardly used on car windows...

Q ■ I'm trying to activate multiple cylinders at the same time, there is a delay between them, what is happening and how can I fix it?

John Smith
Worcester, MA

Rating: ★★ ★
Views: 436

A ■ When you are dealing with pneumatics and air, there will always be a delay in the reaction time of the piston, especially if you are running multiple cylinders at the same time. You are pushing that much more air through the tubes, and there is only so much bandwidth. There are a few different techniques you could try to minimize the delay, but you should be aware that it is not possible to completely remove it. With that in mind, lets move to the first option...



John Smith (Expert)
Worcester, MA

***FIRST* Blast**

Latest blurb from FIRST,
Email Blast, etc

Important Documents

[2008 Game Manual](#)

[Rule Updates](#)

FIRST Robotics Competition (FRC) is a unique varsity sport of the mind designed to help high-school-aged young people discover how interesting and rewarding the life of engineers and researchers can be.

The First Robotics Competition challenges teams of young people and their mentors to solve a common problem in a six-week timeframe using a standard "kits of parts" and a common set of rules. Teams build robots from the parts and enter them in competitions designed by Dean Kamen, Dr. Woodie Flowers, and a committee of engineers and other professionals.

FIRST redefines winning for these students because they are rewarded for excellence in design, demonstrated team spirit, gracious professionalism and maturity, and the ability to overcome obstacles. Scoring the most points is a secondary goal. Winning means building partnerships that last.

FIRST Updates

Rules Update



Featured Articles

Rising Stars

Denso Motor Specification Graphs
Torque, Speed information.

Mecanum Drive Code Tutorial
Beginners tutorial to how to program for a mecanum drivetrain.

Grippers and Surface Tests
Data on different styles of gripping mechanisms, materials and surfaces.

[More](#)

Calendar

← April 2008 →

	1	2	3	4	5	
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Team 190

Gompei and the H.E.R.D.

Updates

Upcoming Events

Pasta Dinner
Design Review
Team Meeting

Ask the Experts

I'm trying to activate multiple cylinders at the same time, there is a delay between them, what is happening and how can I fix it?

What is the most efficient organizational structure for a small, rookie team of freshmen?

Championship Meeting

April 8, 5:00 PM - 7:00 PM

Championships

April 17, 8:00 AM - 5:00 PM

Volunteer Debriefing

April 21, 6:00 PM - 7:00 PM

Team 190

Gompei and the H.E.R.D.

Worcester, MA

Northeast

Site: <http://users.wpi.edu/~First/>



[Links](#): [Team Members](#), [Projects](#), [Calendar](#), [Share Site](#), [Team Media](#)

News

This April, after attending the Granite State Regional in Manchester, New Hampshire, and the Silicon Valley Regional, in San Jose, California, Team 190 will be flying to the Championship in Atlanta. A recent hurricane damaged hotels and the Georgia Dome, which will be repaired in time for the event. Unfortunately, the team was forced to switch hotels from the Omni Hotel to the Marriott Marquis, which is a bit farther away from the competition.

Calendar

← April 2008 →

	1	2	3	4	5	
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Pasta Dinner Fundraiser

April 2, 5:00 PM - 7:00 PM

Design Review

April 8, 2:00 PM - 5:00 PM

Team Meeting

April 12, 6:00 PM - 7:00 PM

Current Projects

Mecanum Drive

Middle School Demo

Pasta Dinner Fundraiser

Team 190

Gompei and the H.E.R.D.

Worcester, MA

Northeast

Site: <http://users.wpi.edu/~First/>



Calendar

← April 2008 →

	1	2	3	4	5	
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Summary of Team 190

Founded in 1992, Team 190 embodies the goals of FIRST in every way. Our team is known for some of the most seminal and innovative ideas in the league. The team includes students at Mass Academy, WPI, and other regional high schools making it truly unique.

Team 190 is active all year. Our team promotes the goals of FIRST and spreads the importance of robotics to the general public by offering over 50 demonstrations and hosting 4 tournaments every year.

WPI was the first college to offer scholarships for FIRST participants. Every year one member of the FIRST community is given a full scholarship to WPI.

Pasta Dinner Fundraiser

April 2, 5:00 PM - 7:00 PM

Design Review

April 8, 2:00 PM - 5:00 PM

Team Meeting

April 12, 6:00 PM - 7:00 PM

Most Recent Team Uploads

Denso Motor Specification Graphs

Torque, Speed information.

Mecanum Drive Code Tutorial

Beginners tutorial to how to program for a mecanum drivetrain.

Team Members

History

Team Media

Public Sharesite

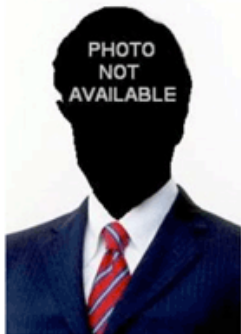
Team Contributions

Sponsors

Case Studies

Grippers and Surface Tests
Data on different styles of gripping
mechanisms, materials and surfaces.





Name: John Smith (Expert)
Location/ Region: Worcester, Massachusetts
Occupation: Mentor
Affiliations: FRC 190, FTC 2035
Site affiliations: Volunteer
Member of FIRST since: 2002
Areas of expertise: Mechanical,
CAD, Pneumatics

Latest Submitted Articles

Denso Motor Specification Graphs
Torque, Speed information.

Mecanum Drive Code Tutorial
Beginners tutorial to how to program
for a mecanum drivetrain.

Grippers and Surface Tests
Data on different styles of gripping
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[More](#)

Ask the Experts

I'm trying to activate multiple cylinders at the same time, there is a delay between them, what is happening and how can I fix it?

What is the most efficient organizational structure for a small, rookie team of freshmen?

Volunteers

Site: VIMS

Championship Meeting

FIRST Headquarters, Manchester, New Hampshire
[Event Website](#)

Event Announcements

Meet at 5:00 PM sharp, topics covered will include responsibilities, parking, rule updates and dress code.

Calendar

← April 2008 →

	1	2	3	4	5	
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Tentative Schedule for Volunteers

7:00: Volunteer entry Open
8:00: Pits Open
9:00: Opening Ceremonies
9:30: Practice Matches
12:00: Complimentary buffet in Smith hall
1:00: Matches resume
5:00: Matches end
8:00: Pits close
8:30: End of day meeting in Smith Hall

Championship Meeting

April 8, 5:00 PM - 7:00 PM

Championships

April 17, 8:00 AM - 5:00 PM

Volunteer Debriefing

April 21, 6:00 PM - 7:00 PM

Volunteer List and Jobs

John Smith: Referee
Jane Jones: Judge
James Jones: Inspector
Michael Smith: Head of Safety

[More](#)

Volunteer of the Week

John Smith



Hotel Arrangements

Marriott Marquis

\$80 per night

Jane Jones, Michael Smith

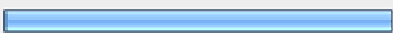

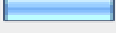
Contact Michael for more information

D.3 Analysis

D.3.1 Condensed Results

FIRST Technical Network

1. How important will it be to have a distinction between different user levels? (i.e. students vs. professionals)							
	Not Important				Extremely Important	Rating Average	Response Count
Choose One	5.6% (7)	12.9% (16)	19.4% (24)	42.7% (53)	19.4% (24)	3.57	124
<i>answered question</i>							124
<i>skipped question</i>							4

2. Should there be a level of distinction "Expert" that can be reached by a user?			
		Response Percent	Response Count
Yes		66.4%	83
No		15.2%	19
Not Sure		18.4%	23
<i>answered question</i>			125
<i>skipped question</i>			3

3. How Beneficial will it be to manage Team-user registration through a team contact and a keyword? (i.e., TIMS contact, password given to team contact)							
	Not Beneficial				Extremely Beneficial	Rating Average	Response Count
Choose one	6.6% (8)	20.5% (25)	48.4% (59)	24.6% (30)	2.91	122	
<i>answered question</i>							122
<i>skipped question</i>							6

4. What role do feel reputation should play on the site?		
		Response Count
		118
<i>answered question</i>		118
<i>skipped question</i>		10

5. How do you think reputation could be successfully implemented?		
		Response Count
		115
<i>answered question</i>		115
<i>skipped question</i>		13

6. How important are restrictions on registering as a team member as to be able to access team sensitive information? (i.e. requiring a keyword)							
	Not Important				Extremely Important	Rating Average	Response Count
Choose One	4.9% (6)	4.9% (6)	20.3% (25)	30.9% (38)	39.0% (48)	3.94	123
<i>answered question</i>							123
<i>skipped question</i>							5

7. What is the likelihood that you or your team would utilize a system designed to link teams needing assistance and teams who can provide needed assistance? (e.g., machine shop, practice field)							
	Not Likely				Extremely Likely	Rating Average	Response Count
Choose One	0.8% (1)	4.0% (5)	19.4% (24)	37.1% (46)	38.7% (48)	4.09	124
<i>answered question</i>							124
<i>skipped question</i>							4

8. How useful would each of the following site features be?							
	Not Useful				Extremely Useful	Rating Average	Response Count
Events calendar (fundraising events, competitions, demos, etc.)	2.4% (3)	3.2% (4)	11.3% (14)	27.4% (34)	55.6% (69)	4.31	124
Communications with Team Members (e.g., email list)	2.4% (3)	9.8% (12)	14.6% (18)	27.6% (34)	45.5% (56)	4.04	123
Private and Public Areas (File Permissions/ Visibility)	2.4% (3)	4.8% (6)	18.9% (21)	41.9% (52)	33.9% (42)	4.00	124
Team News Updates	0.8% (1)	8.9% (11)	16.1% (20)	37.1% (46)	37.1% (46)	4.01	124
	<i>answered question</i>						124
	<i>skipped question</i>						4

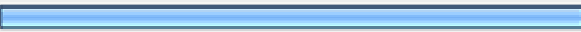
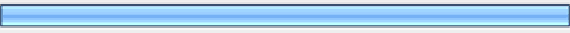
9. Do you have any comments or ideas about how to implement team portals effectively?		Response Count
		77
	<i>answered question</i>	77
	<i>skipped question</i>	51

10. How useful will the ability to have collaborators on projects be?							
	Not Useful				Extremely Useful	Rating Average	Response Count
Choose One	2.4% (3)	5.7% (7)	22.8% (28)	39.0% (48)	30.1% (37)	3.89	123
	<i>answered question</i>						123
	<i>skipped question</i>						5

11. How beneficial would it be to have different file type views/editors (i.e. CVS, sourceforge)							
	Not Beneficial				Extremely Beneficial	Rating Average	Response Count
Choose One	3.3% (4)	7.5% (9)	25.0% (30)	34.2% (41)	30.0% (36)	3.80	120
	<i>answered question</i>						120
	<i>skipped question</i>						8

12. Are there any comments or ideas about the team "File Repository"?		Response Count
		72
	<i>answered question</i>	72
	<i>skipped question</i>	56

13. How useful do you feel a tagging system(based on a required number of tags per article) will be?							
	Not Useful				Extremely Useful	Rating Average	Response Count
Choose One	4.2% (5)	5.0% (6)	25.2% (30)	39.5% (47)	26.1% (31)	3.78	119
	<i>answered question</i>						119
	<i>skipped question</i>						9

14. Please provide two suggestions for "Super Tags" (e.g. mechanical, electrical, team management...)			
		Response Percent	Response Count
Super Tag #1		100.0%	106
Super Tag #2		98.1%	104
	<i>answered question</i>		106
	<i>skipped question</i>		22

15. Please provide two suggestions for "standard tags" that can be used under the "super tags" suggested above. (i.e. mechanical: drive train, end effector, mechanism; team management: fundraising, business plan, community outreach)

		Response Percent	Response Count
Standard Tag A (for #1)		100.0%	102
Standard Tag B (for #1)		95.1%	97
Standard Tag A (for #2)		95.1%	97
Standard Tag B (for #2)		88.2%	90
		<i>answered question</i>	102
		<i>skipped question</i>	26

16. Should there be a distinction between articles submitted by "Experts" and those submitted by standard users?

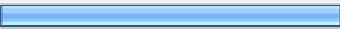

		Response Percent	Response Count
Yes		72.4%	89
No		13.8%	17
Not Sure		13.8%	17
		Why? Why Not?	94
		<i>answered question</i>	123
		<i>skipped question</i>	5

17. Do you have any comments or ideas about article management?

		Response Count
		67
		<i>answered question</i>
		67
		<i>skipped question</i>
		61

18. How helpful would it be to have advice from major sponsors in regard to sponsorship?							
	Not Helpful				Extremely Helpful	Rating Average	Response Count
Choose One	0.8% (1)	5.7% (7)	7.4% (9)	23.0% (28)	63.1% (77)	4.42	122
	<i>answered question</i>						122
	<i>skipped question</i>						6

19. Would distributable materials, to help teams with fundraising, be beneficial? (i.e. brochures, packets)							
	Not Beneficial				Extremely Beneficial	Rating Average	Response Count
Choose One	0.9% (1)	8.6% (10)	15.5% (18)	32.8% (38)	42.2% (49)	4.07	116
	<i>answered question</i>						116
	<i>skipped question</i>						12

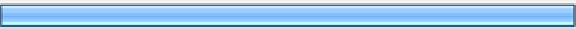

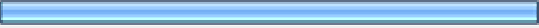
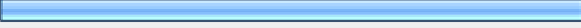
20. Are there any documents that could be beneficial that you (or your team) would be willing to share about fundraising/ sponsorship?			
		Response Percent	Response Count
Yes		58.6%	68
No		41.4%	48
	<i>answered question</i>		116
	<i>skipped question</i>		12

21. What do you feel would be a helpful feature to be implemented in a volunteer portal?		Response Count
		91
	<i>answered question</i>	91
	<i>skipped question</i>	37

22. How beneficial do you feel the ability to institute site-wide surveys will be?							
	Not Beneficial				Extremely Beneficial	Rating Average	Response Count
Choose One	2.5% (3)	10.9% (13)	24.4% (29)	36.1% (43)	26.1% (31)	3.72	119
<i>answered question</i>							119
<i>skipped question</i>							9

23. Are there any features of other websites that you have found useful and would like to see implemented in this new site?		
		Response Count
		76
<i>answered question</i>		76
<i>skipped question</i>		52

24. What features not currently found on other sites would you like to see put into place on this site?		
		Response Count
		66
<i>answered question</i>		66
<i>skipped question</i>		62

25. Please enter the following information if you would like to be contacted as more information about the site is finalized.			
		Response Percent	Response Count
Team Number(s):		98.9%	91
Team position:		91.3%	84
Occupation:		92.4%	85
Years involved in FIRST:		100.0%	92
<i>answered question</i>			92
<i>skipped question</i>			36

26. General Comments/Thoughts:		
		Response Count
		71
	<i>answered question</i>	71
	<i>skipped question</i>	57

D.3.2 Summary

Moderation:

The survey showed that our initial thoughts of the distinct user levels was an important concept, expanding to also include the level of “Expert”. The polls also showed that the idea of managing team-user registration was important. There was a general acceptance of the idea to link a team contact to TIMS such to confirm team membership. The responses we received about reputation were very helpful and showed that people believe reputation is a good thing. They believed reputation should be based on helpfulness of submissions and that as reputation increases the users prominence should also increase (providing ability to give more reputation, special access, moderator,...).

In regards to implementation, there were two distinct applications that people seemed to accept. One was the idea of strict user distributed reputation points and the other idea was that of a moderator distributed reputation. Another interesting concept was given to help keep the reputation points fair, this was based around dividing the points by the number of posts (Discriminate quality vs. quantity of posts by an individual).

Team Portals:

The idea of team portals was embraced by the group of people that took the survey. They agreed with the idea of linking teams together and providing a central location for their information. With the idea of a portal some respondents even suggested that we should not limit the portals to just teams, but expand to encompass other groups. They also liked the applications that we suggested would be implemented (events calendar, communications with members, private/public areas, team news updates). The concept of a private and public team area was widely received and many hoped that they would be able to use it soon to house team documents. However, one concern was that teams didn’t want to detract from the ability of teams to create their own sites and get awards for those sites.

Repository:

The implementation of a file repository was encouraged by the respondents. They liked the ability to upload information to a centralized location and that permissions would be put in place so that collaboration would be encouraged. Also they were glad to see the ability to upload multiple types of files. One suggestion that was widely spoken came in respect to PTC. Teams said that PTC could have been a very helpful resource, but that the interface was difficult to navigate. The general consensus was that a central location will be very helpful, but the ease in the interface is very key.

Article Management:

The majority of survey takers feel that a systematic organization or tagging system is very important, and gave tag ideas such as mechanical and electrical to team organization and fundraising. About 75% feel that there should be an ”expert designation, relating it to having more helpful mentors on a team. Input on the subject mention the importance of getting trustworthy data, and only have a small impact or sign that a person is an expert, and not a big neon sign which hides everyone else. Peer review and feedback is also important, and should play a roll on what or who is considered an expert and trustworthy. Keyword searching and tagging is highly mentioned and claimed important, as well as tags- because you can have overlapping topics or articles. Other notable ideas include a numerical “reputation” value, encouraging posting and possibly an “easy export to pdf” function. Last, but not least, some responses indicate a desire for strict regulation, and a strong aversion to a comments section.

Fundraising Portal:

The concept of a Fundraising portal was widely received and we had many positive comments from people who were taking the survey. 87.1% of users responded with a 4 or 5 to the question of if it would be beneficial to include advice from major sponsors about sponsorships. We also had a very nice reaction to the suggestion of supplying distributable materials, such as brochures and packets to aid in sponsorship acquisitions. 59% of users felt that they had useful sponsorship information and documents that they were willing to share with the community and we were able to construct a list of these teams for help later on. From these responses, a section tailored to the sharing and spreading of FIRST information and sponsorship techniques appears to be the best course of action.

Volunteer Portal:

The features requested for the volunteers section range from calendars, forms and polls to hotel accommodations, transportation and places to eat. Also mentioned were contact lists, job descriptions, user history, email reminders and schedule of events. Important things to include might be Q/A section, rules reminder/explanations, things to bring, and contact lists. We had a conversation with a volunteer about keeping the volunteer area open and available to people not explicitly involved with a team.

General Site Questions:

Most comments centered around websites such as Facebook, Chief Delphi, SOAP and Digg. Requested features include photo albums, such as in Facebook, high customization and personalization options, a detached forum/blog/bulletin board section, and a regional/nationwide section for easy access to networking and friends. Most specifically requested was a simple, clean UI with powerful organization and search functionality, as well as media, CAD and code libraries and information on awards, scouting, competition results, sponsors, suppliers and scholarships. Also suggested was the ability to PM a user via email allowing contact between users without sharing email addresses or releasing private information. A certification system, or banning/blocking system was suggested as well. The File Share function was also a popular request, provided it is easy to use and organize. There was a high request rate for site-wide surveys. (3.72 average believe that this would be a beneficial feature.)

Observations and Conclusion:

At first, people were not only reluctant to participate in our survey, but they also completely misinterpreted our purpose. Passer-bys confused us for FIRST-related technical support for the first day, hurting our numbers. We remedied this by adding additional signage to emphasize the nature of our presence. That, in addition to increased traffic Friday and Saturday greatly increased the number of daily respondents. The increase of traffic past our booth, interest spurred by flyers we handed out, and word of mouth increased respondents tremendously. We also found that when people were sitting at the booth taking our survey, other people passing by were much more likely to stop and ask what we were doing. At times, this would lead to waves of respondents, where we would have quite a few surveys filled out in a row followed by a period of no one filling out surveys. This was much more evident on Saturday, as it never leveled out throughout the day. We found out very quickly that by having a standard response and description of our project that was clear and concise, it was much easier to get people to take the survey. Many times, people walking by would stop and ask about what we were doing.

Though we would have liked to get some FIRST officials to take the survey, the ones that stopped by either were called away by their responsibilities or were not interested in filling it out. This was disappointing, but reasonable.

Overall, we would have to agree that the survey was a great success, as it proved to us that members of the FIRST community were looking for a website like this and supported our effort. The responses gathered almost entirely matched up with the ideas we had come up with, reassuring us before furthering development in this project.

Appendix E: Website Design

E.1 Proposed Feature List

Phase 1 (Summer)

- (1)User management
 - (1) User pages
 - (4) Images
 - (2) Restricted registration for teams (but do not implement, keep open for now)
 - (3) Ensure divisions are separate (ie FRC190, FTC1234, FLL4434, etc.)
 - (3) Provision for other networks (NEMO, Regional FIRST committee, etc.)
- (1)Articles
 - (1) Basic articles with ability to embed images/video, hopefully syntax colored code
 - (1) Articles from user
 - (2) Generate PDF from page for easy download
- (1)Tags
 - (1) Standard tags and super tags
 - (2) Unrestricted tags for time being (make it possible to restrict, or at least guide tagging)
 - (1) Ability to tag articles
- (1)Home page
 - (1) Recent Articles, make it modular so users will be able to add and move components later
 - (2) News module or something similar to post a
- (2)Experts
 - (2)For articles, just identify as experts and have a separate list on front page of expert articles
 - (1) Make it a clear user level/authentication for ask the experts in the future
- (2)Reputation
 - (1) Five star system for articles
 - (1) Combine ratings with views to create aggregate score for article
 - (2) Sum these for a user to get their “reputation”
 - (3) Perhaps have a provision for users with higher “reputation” to have more weight with ratings
 - (4)Also have provision to trigger flag after reputation reaches certain level
 - No need to be visible to regular users, allow admins to see

- (2)Calendar
 - (1)Ability to add events
 - Public and private
 - Colored
 - Linked to teams
 - (1) Upcoming events
 - (2)Link to tags
- (1)Admin Site
 - (1)Can edit stuff

Phase 2 (Late Summer – Early Fall)

- (1)Ask Question
 - (1)Users Can pose question
 - Require abstract just like articles
 - (1)Tag Questions
 - (2)Same Rating system as articles
 - (1)Only experts can answer the questions
- (1)Answer Question
 - (1)Questions loaded to queue (still need to be answered)
 - (2)“Expert” need a section of their homepage to show list of unanswered questions
 - (3)Possible like experts specific expertise to question tags
- (2)Make Answer(s) Article
 - (1)Give ability for answers to be made into articles
 - Provide for more than one answer by different experts
 - (2)Carry over information (user, tags...etc..)

Phase 3

- Ability to create “groups”
 - One user as contact (admin) for group
 - A portal site that is for that group created
- Editing of Portal Site
- Privacy Settings
- File Repository
- Applications
 - Calendar
 - Sourceforge
- General Site Features
 - Site-wide survey (box on pages)
 - Linking of everything through a region

- Users register saying region, groups do same
 - Sort of like the USA map on usfirst.org for teams
- Public Team Portal
 - Header (Team name, region, site link, picture, etc)
 - Team summary/information, history
 - Linked user article submissions between teams/groups
 - Calendar integration from Phase 1
 - Sponsors
 - Case Studies
 - Team Media
- Private Team Portal
 - Calendar
 - Contacts compilation
 - News
 - Privacy settings
 - Integrate team media from public portal
 - Project creation, tagging
 - Share Site
- Volunteer Portal
 - Calendar
 - Updates/news
 - Volunteer lists/job lists
 - Contacts compilation
 - Hotel/Food discussions

E.2 Web Development Proposal

FIRST Robotics Community Site

Overview

The FIRST Community Portal project is designed to allow people in the FIRST community to be able to communicate with each other and share information among each other. The proposal below outlines the three major sections of this project. The first is the users and user management and how that will be handled within the system. The second is the articles the users will be able to create and the third is the ability to ask questions to experts. After these sections have been implemented we will revisit it and discuss adding other features such as team portals and other plug-ins.

The essence of this project is to allow all users in the community to create articles to help out the other teams. These articles can range from simple subjects such as setting up a spaghetti supper to more complex subjects such as designing a driveline. All articles will have a rank assigned to them based off of how useful the users felt it was.

For people who may have questions but can't find the answer they will have the ability to ask a question to the experts. These questions will then be put into a queue to be answered by the experts and will be publicly viewable after an answer has been created.

Technical Overview

The site will be developed from scratch using Perl and MySQL. The editor for the articles will use FCKeditor which is a WYSIWYG web based editor. The html-diff plug-in for Perl will be used to give the system the ability to see the differences between two versions of an article. The server will be a Linux server running Apache.

The output of the Perl program will be XHTML and take advantage of Javascript, CSS, and AJAX for layout and end-user functionality where deemed necessary.

Users and User Management

Account Creation

When someone would like to become part of the community they will need to fill out a form on the site. The form will ask for the following: Name, Email Address, Role (Student, Mentor, Alumni, Team Sponsor), and Primary Affiliation (Drop down list of teams). On the same page it will mention that anyone not on a team should contact FIRST to get access to the site with info on how to contact FIRST.

Upon submission of this form an email will be sent to the “user approvers” for the team they signed up with. These approvers would then have to log-in to the site and approve the user as being part of their team before the new user will have access to anything on the site.

The initial “user approver” will be the main contact in TIMS. This user will be the only user who will have permissions to give someone else on the team rights to approve new users. The “user approvers” will also have permissions to remove someone from their team who may not be affiliated anymore or change their status to alum. The information in TIMS will only work for creating the initial account or overriding the existing account.

User Information

Upon approval the new user will be able to add additional teams that they are affiliated with. Each team they say they are affiliated with will have to be approved in a similar manner as their initial approval. Users will also be able to identify the specific roles they have had on different teams. For example if someone was a student for four years and then became a mentor they would be able to enter the years they were each. These would be specific to team.

Users would also be able to enter a short bio about themselves. These would be limited to about two paragraphs and would allow other users to find out more about the user.

User Permission Groups

There will be several permission groups that users may fall into. Some will be specific to the team they are in and others will be global permissions.

Default Approved User

The default approved user will have the ability to read and search articles. They will also be able to suggest edits to existing articles and create new articles to be approved. These users will also have the ability to ask questions on “Ask the Expert.”

Article Approver

An article approver will have the ability to review and approve/reject articles that have been submitted to publish.

User Approver

The user approver will have access to approve users for the teams they are given access to approve for.

Tag Moderators

Tag moderators will have the ability to add and remove tags.

“Expert”

An “Expert” will be able to answer the questions submitted to “Ask the Expert.” Experts will be assigned a specialty and will only be able to answer questions within that specialty which will be the same as the categories for articles.

Super Administrator

The super administrator is a super approver and will have the ability to approve users for any team. Users with this permission will also be able to approve articles and have them go live before the minimum of 4 approvals. Only a few people should get this level of access.

Pages

User Bio Pages

Each user will have a bio page. This page will comprise of the person's name, a short biography about the person, a list of every article they have written, a list of articles they have found helpful, a link to a form to fill out to email the user, an overall star rating, all questions answered in "Ask the Expert," and any questions asked in "Ask the Expert."

The overall star rating will be an average of all of their ratings for the articles that they wrote and answers given in "Ask the Expert." Anywhere on the site the user is mentioned it will link to their respective page.

Team Pages

Each team will also have their own page. These pages will list the users that belong to that team and their role on the team. It will also list all of the articles and answers given by members of the team. Potentially a star rating can be created for the team based off of the articles and answers given by team members similar to the user ratings. This page will be linked to any where a team is mentioned on the site.

Articles

An article page will look and act very similar to the way Google Knol works with some concepts borrowed from Wikipedia. The article page will contain the article, a picture, list of attached assets, list of related/relevant web sites, list of contributors to the article, current star rating, ability to rate if not already rated, bookmark link, and the name of the original author.

Articles will consist of text with the ability of displaying one image in the top right. The text would be able to reference the attached assets through hyperlinks. The assets can include PDF, PPT(X), DOC(X), XLS(X), JPG, GIF, and a few other formats. Assets will have size limitations but will not have a limitation on how many can be attached to an article.

All approved users will be able to write an article. Articles can be saved in a “draft” mode until the user believes it is ready to be submitted for approval. When the article is ready to be submitted it must have at least one category assigned to it and one tag within that category assigned to it. When the article is being submitted the user has the choice of having it attributed to one of the teams they are affiliated with or having it attributed to them.

The approval process will require a set number of users to approve the article before it can be viewed by the rest of the community. In the beginning the number of people required to approve an article will be set to 4. This number can be changed by the Super Administrator if needed. If an article gets two rejections then it will go back to the original author with the comments of why it was rejected allowing them to fix it and resubmit the article.

Any user may suggest changes to approved articles. These changes will be sent to the original author to approve. Articles submitted on behalf of a team will still go back to the original author for approval. If two weeks have gone by without approval/rejection then the article will show up in the article approvers list to review. Anyone who has contributed to an article will have their name added as a person who has contributed. Similar to Wikipedia people will be able to go back through the changes made to an article to see how things may have changed.

Everyone will be able to rank the article based on a star rating. The average rating will be displayed on the article.

Portal Page

The portal page will be the first page that is seen upon login. The portal page will work similar to how the iGoogle page works. Across the top will be an area where FIRST can place announcements. Below this area there will be several “boxes” which will contain the following:

- 5 newest articles
- 5 newest answered questions
- 5 highest ranked articles
- Bookmarked articles
- Currently logged in users articles
- Currently logged in users Expert Questions

On the left will be a menu containing the main categories for all of the articles along with a link to Ask the Experts.

Category/Tag Pages

A category page will display all articles and answered questions within the category with the ability to sort by title, rank, or recently added. Articles and questions may be in two separate lists or in a single list mixed among each other depending on how easy it is to combine them. On the page will be a list of all the tags within the category. Clicking on one of the tags will use the same layout as a category page but will only display the information related to that tag.

Ask the Experts Page

The Ask the Experts page will allow users to submit a question.

RSS Feeds

RSS feeds will exist for the following items:

- Newly approved articles
- Newly answered questions
- Recently submitted questions (link will only be available for Experts)

While these feeds will not be restricted by a username and password, they will only contain a picture (for articles only), a brief abstract (articles only), the question (questions only), and a link to the full article or question. The answers for questions will not be displayed.

Control Panels

There will be several ways to manage the different aspects of this system each called a control panel. Each panel will only be accessible to the users who have the proper permissions.

Category Control Panel

The category control panel will only be accessible to the Super Administrator. This panel will be the location to create new categories or tags as needed.

Tag Control Panel

The tag control panel will only be accessible to the tag moderators. This is the page they would go to in order to create new tags or possibly delete existing tags.

User Control Panel

Within the User Control panel the User Approver will be able to see all the users who are attached to their team(s) that they have access to administer. From here they will be able to approve new users or change the current role of users (i.e. change current role from student to mentor). This will be the same location the Super Administrator will be able to change the permissions on users.

Ask the Experts Control Panel

The Ask the Experts Control Panel is where the Experts will be able to go to answer questions. The questions will be sorted by the date submitted where the oldest will be displayed at the top and newer questions at the bottom. By clicking on the question the Expert will then be given the ability to answer the question. The experts also need to assign a category and a tag to each question. In order to go live another expert in the same field needs to approve it.

Article Control Panel

The article control panel will contain a list of all articles waiting to be approved with the oldest on top. When approving an article the approvers will have the ability to leave comments on why they think it should or shouldn't be approved. The comments can also be used to say that the article is similar to other articles and suggest merging them.

Addendum

Below are answers to questions that didn't fit within the document but needed clarification.

Q: Will the email sent to “user approvers” have a generated URL?

A: No, the email will include a URL to the User Control Panel. Once the user has logged in they will be able to see all users waiting for approval.

Q: How will the information be coordinated with TIMS?

A: This can be done in multiple ways and we will need to coordinate this with *FIRST*. There are two options we are currently thinking of. One would be *FIRST* gives us the list of teams each year that need accounts and then we have a script on our side that generates the accounts. We would then give *FIRST* a file containing the information on how each team can get access.

Q: What happens with users who are under 13?

A: During the account creation phase the users age will be asked (making sure there is an option for over 21). If the user is under 13 years old then either they will not be allowed to create an account or a special set of instructions will be given. This can be determined at a later time.

Q: What is the picture displayed in the article of?

A: The picture that is part of the article is not a picture of the user but rather a picture related to the article.

Q: What are assets?

A: Assets are any file that can be related to the article. They can be images, PowerPoint, Word, Excel, PDF, or other similar files.

Q: Why is there only one image displayed per article?

A: There is only one image displayed per article due to a few reasons. One reason is to make it easier for the user to create/edit an article. If multiple images were allowed then the user would have to go into a asset manager of sorts to be able to upload the image. Then they would have to go to the article and find the picture within the asset manager and connect to it. With one image all the user would have to do is upload an image and it will automatically connect to the article. Another reason is technical. Trying to let the user choose where images will be displayed can be complicated to set up. Along the same lines keeping it to one image will force all articles to have the same look and feel.

Q: Once an article is written and submitted will there be a revise link for the original author?

A: Yes, this will be the same link that everyone else will see to edit existing articles. The only difference here would be the article would have to go back through the entire approval process if it hasn't already been approved.

Q: Can an article have a new tag/category that must be approved?

A: Kind of, the current idea would be to force the user to choose a tag from an existing set of categories and tags. When the approvers review the article one thing they must do is review the

tags. If they don't believe that an existing tag works for an article then the approvers can suggest new tags. This will help prevent random tags from being created.

Q: How will the feedback get back to the original author?

A: When an article is rejected an email will be sent to the editor telling them that their article was rejected with the reasons included in the email. When the editor logs in to make the edits the reasons will be listed on the page as a reminder.

Q: Is there a search function?

A: There will be a search function. It will use the Natural Language Full-Text Search Functions built into MySQL. More information about this can be found at: <http://dev.mysql.com/doc/refman/5.0/en/fulltext-search.html> . The search will return both articles and questions with answers.

Q: What is a bookmark?

A: A bookmark in the context of this document is referring to the ability of marking an article to be saved to a "bookmark" list on the portal page when a user first logs in. It is meant to allow users to easily find an article if they know they want to come back to it later. Bookmarks can be branded to another name later.

Q: Is it possible to see who has already approved an article?

A: Only the Super Administrator would be able to see who has already approved a page. The reason behind this is to take some of the politics out of the approval process and the belief that if one approver accepts an article that it is therefore a good article and should be approved.

E.3 Beta Website Layout Mock-ups




SEARCH






Menu.Item_1 | Menu.Item_2 | Menu.Item_3 | Menu.Item_4 | Menu.Item_5 | Menu.Item_6 | Menu.Item_7 | Menu.Item_8 | Menu.Item_9

[Log In](#)

FEATURED ARTICLE:

Lorem Ipsum Dolor Sit Amet, Consectetur Adipiscing Elit.

by Grétar Tryggvason

AFFILIATION: WPI, MECHANICAL ENGINEERING DEPARTMENT HEAD

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[Read More](#)

My Library

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5 Newest Articles

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5 Highest Ranked Articles

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view | edit | revisions

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by **Grétar Ivggavason**

AFFILIATION: WPI, MECHANICAL ENGINEERING DEPARTMENT HEAD

Average Rating: ●●●○ 1285 Views | 23 Edits
Your Rating: ○○○○○ 5 Reviews | 30 Comments

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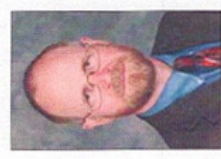
SEARCH TERMS: lorem, ipsum dolor, sit amet, consectetuer

Introduction

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Grétar Ivggavason
MECHANICAL ENGINEERING DEPARTMENT HEAD, WPI
User Rating: ●●●○
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OTHER CONTRIBUTING AUTHORS:

- Lorem Ipsum
- Dolor Sit
- Amet Consectetuer

ATTACHED ASSETS:

- [Lorem Ipsum Dolor \[Powerpoint\]](#)
Posted July 20, 2008
- [Sit Amet Consectetuer \[PDF\]](#)
Posted July 23, 2008
- [Adipiscing Elit Sed Diam \[JPEG\]](#)
Posted July 23, 2008

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- <http://www.sitametconsectetuer.com/>
- <http://www.adipiscindiam.com/>

Edit



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Appendix F: Beta Team Selection

F.1: Selection Criteria

In all cases, a single representative should be chosen as the main point of contact. It is assumed that any of these representatives chosen would bring with them their entire associated FRC team.

It will be required that these representatives chosen are active members of an FRC which is willing and able to participate:

- At least one (1) representative from a 2007 or 2008 Rookie All-Star winning team
- At least one (1) representative from a 2007 or 2008 rookie team who received a significant mentorship from a veteran team
- At least one (1) representative from a 2007 or 2008 rookie team who received little or no mentorship from a veteran team
- At least one (1) representative from a 2007 or 2008 Regional Chairman's Award winning team with less than 6 years experience
- At least four (4) representatives from teams with less than 6 years experience who have not won awards, preferably representatives from engineer- and educator-led teams
- At least one (1) representative who has created content for NEMO
- At least two (2) President's Circle representatives
- At least one (1) local kickoff organizer
- At least two (2) representative from a veteran teams with 10 or more years experience
- At least one (1) college student team leader/mentor
- At least one (1) adult mentor who has posted more than one resource document on Chief Delphi
- At least one (1) student team member who has posted more than one resource document on Chief Delphi
- At least one (1) past Conference Presenter
- At least one (1) past Workshop Presenter
- At least one (1) past presenter from a local kickoff not coordinated by FIRST HQ.

F.2: FIRST Email Invitation Blast

Congratulations! Your team has been selected to participate in the pre-launch beta of the FIRST ThinkTank. The FIRST ThinkTank (FTT) is a new social network and collaboration website being developed by FIRST, Worcester Polytechnic Institute and the National Science Foundation to provide the FIRST community with a central content sharing resource. Users can share and submit informational articles, ask questions to subject matter experts, and connect with one another about all things FIRST. However, we need your help to ensure the FTT is ready to launch for the 2009 FIRST Robotics Competition season.

As a selected FIRST ThinkTank beta team, we ask that you not discuss the site or this invitation on any public forums or with any teams outside your own, except within the confines of the FIRST ThinkTank website. Any feedback about the website should be directed to the site organizers at the appropriate email address. With your help, we hope to bring the FIRST ThinkTank up to full operational capability as fast as possible so that we can open it to all members of the FIRST community.

The deadline to participate is Monday, Oct. 13th. Please contact us before the deadline to let us know whether or not you wish to participate. Please feel free to contact us with any questions you may have.

Regards,

The FIRST ThinkTank team

FIRSTThinkTank@wpi.edu

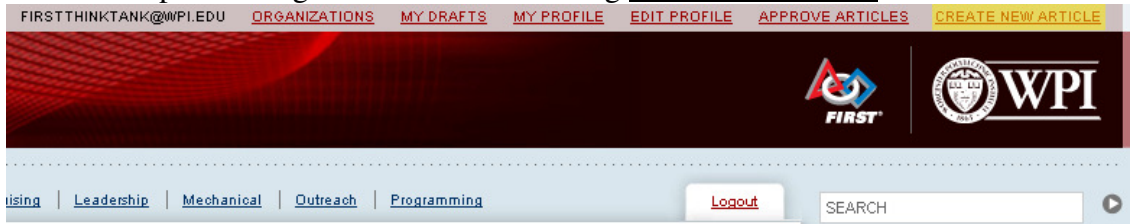
Appendix G: Beta Website Execution

G.1 Website Documentation

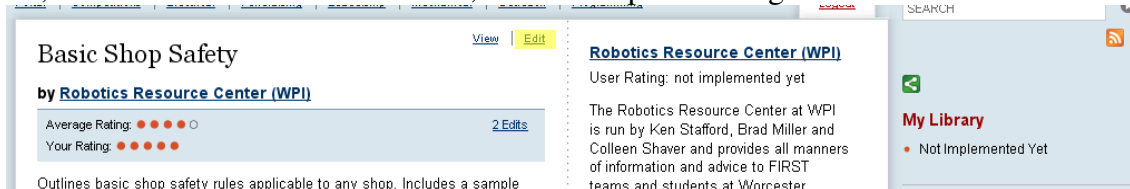
G.1.1 Website Help Documents

Adding/Editing an Article

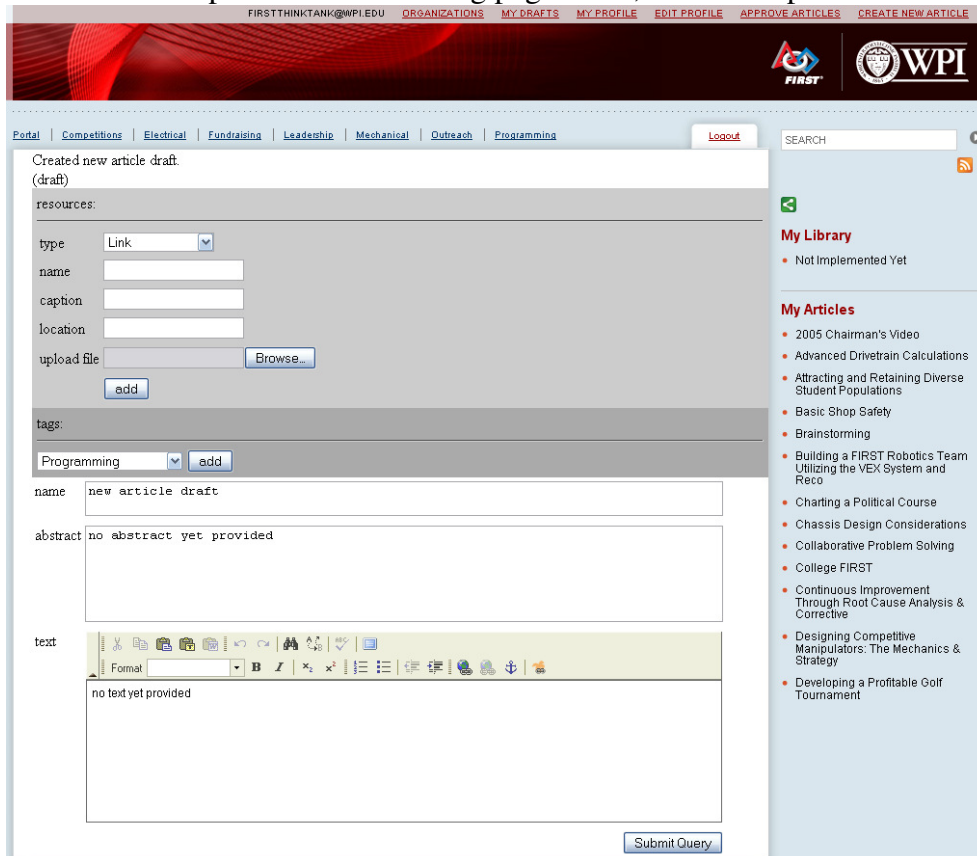
The first step in writing a new article is clicking [Create New Article](#) on the User Toolbar:



Or, if a user wishes to edit an article, the first step is clicking edit on the article view:



This will then open the article editing page. Here, the user is presented with several fields:



Resources: Other documents or web pages that are relevant to the article. Valid resources include images, URLs, CAD files, documents, and YouTube videos. If an image is uploaded, it can be set to be the main article image, appearing prominently with the article.

Tags: Here, the user must choose tags to identify the article. Seven categories, or “supertags”, are available to be chosen (competitions, electrical, fundraising, leadership, mechanical, outreach, programming). Articles must have at least one tag.

Name: The title of the article being written. The title may not exceed 64 characters.

Abstract: A brief summary of the article. This is important, as it allows other users to understand what the article will be covering at a quick glance. This is also what is displayed when users are searching or browsing for articles.

Text: The body of the article. A WYSIWYG (what-you-see-is-what-you-get) editor is provided to allow rich formatting in the article. Please make sure to follow the Article Style Guidelines when formatting your article.

Viewing an Article

The screenshot shows the article page for "Basic Shop Safety" on the WPI website. The page has a dark red header with navigation links: FIRSTTHINKTANK@WPI.EDU, ORGANIZATIONS, MY DRAFTS, MY PROFILE, EDIT PROFILE, APPROVE ARTICLES, and CREATE NEW ARTICLE. Below the header is a navigation bar with links for Portal, Competitions, Electrical, Fundraising, Leadership, Mechanical, Outreach, Programming, and a Logout button. A search bar is located on the right side of the navigation bar. The main content area is divided into three columns. The left column contains the article title "Basic Shop Safety" by Robotics Resource Center (WPI), with average and your ratings, a description, and a "Contents" section. The middle column contains the article text, "Robotics Resource Center (WPI)", and "Attached Assets" including a "Sample Safety Test (DOC)". The right column contains "My Library" and "My Articles" sections. The article text describes the Robotics Resource Center at WPI and provides information and advice to FIRST teams and students at Worcester Polytechnic Institute. The "Attached Assets" section lists a "Sample Safety Test (DOC)" with a description "Sample Safety test". The "Contents" section includes a "Table of Contents" and a "coming soon" status. The "My Library" section shows "Not Implemented Yet". The "My Articles" section lists various articles such as "2005 Chairman's Video", "Advanced Drivetrain Calculations", "Attracting and Retaining Diverse Student Populations", "Basic Shop Safety", "Brainstorming", "Building a FIRST Robotics Team Utilizing the VEX System and Reco", "Charting a Political Course", "Chassis Design Considerations", "Collaborative Problem Solving", "College FIRST", "Continuous Improvement Through Root Cause Analysis & Corrective", "Designing Competitive Manipulators: The Mechanics & Strategy", and "Developing a Profitable Golf Tournament".

Attached Assets: Any documents, images, or other assets the author may have attached to the article. URLs will open a new web page, while files will be prompted for download.

Ratings: “The Average Rating” is the average of all user ratings on the article. “Your Rating” allows the user to assign his or her own rating to the article. This can be changed at a later date; for example, after a revision to the article.

Author Info Box: Displays the name of the author, his or her user bio, and lists any other contributing authors to the article.

Edit: Allows a user to submit his or her own revision to the article.

Organizations

If a user wishes to join an organization, they must first view the organization page. This can be found by going to Organizations in the User Toolbar and locating the desired organization on the page. Once viewing the page, the user can click join to request membership in the group. However, before full membership can be bestowed, the head of the organization must approve the user. When this has been done, the user will be informed via an email, confirming membership in the organization. Users must be a part of at least one organization in order to submit and revise articles.

Editing your Profile

Every user should have a short biography describing the user's education, background, and/or experience. This helps other users identify individuals who have experience in different fields. This can be edited on the Edit Profile page found on the User Toolbar. From here, the user can enter a short biography describing themselves.

Article Drafts

On the My Drafts page, the user can view all drafts of articles the user has written. Articles listed under the headline My Drafts are articles or revisions the user has written, but not submitted for approval. If a user wishes to discard a draft, he or she must view the article in article view, and click Cancel Edit above the article title. Drafts listed under My Drafts Awaiting Approval are drafts which have been submitted, but have not been (fully) approved by moderators. The article will not be publicly viewable until it leaves this queue.

G.1.2 Posting Guidelines

- Search before you upload an article. Articles and links that have already been uploaded previously will not be approved a second time.
- If you get an article from another team's website, notify them that you have used their article. They will be given the opportunity to upload it themselves if they choose to.
- Articles will not be approved if they do not adhere to Article Style Guidelines.
- Articles will not be approved if they contain any of the following:
 - Crude language
 - Vulgar content or mention of any illegal activities
 - Disrespectful remarks
 - Gross spelling or grammatical errors
 - Clearly unverified statements
 - No identifiable relevance to FIRST or FIRST related activities
- Short articles which build off of an already existing article should be suggested as an edit, rather than uploaded as its own article. Longer article should provide a reference to the existing article when uploaded.
- Article authors are expected to update their articles when appropriate edits are suggested.
- Articles which are deemed incorrectly tagged by the moderators may have their tagging changed to better reflect the article's content
- Comments on articles should adhere to the same guidelines as articles
- We reserve the right to remove any articles for any reason, including, but not limited to: copyright infringement, strong objections by the general users, or relevance.
- Repeated submission of content in gross violation of the posting guidelines will be subject to disciplinary action

If you have any questions regarding these guidelines, please contact the site organizers at firstthinktank@wpi.edu

G.1.3 Article Style Guidelines

Articles on the site need to be and easy to read, navigate and must look professional. Please follow these guidelines when submitting new or revised articles.

Article Titles and Headings

- Titles and headlines should be short and concise. Titles are limited to 64 characters.
- The first letter of a title or headline is always capitalized, unless it is part of a proper noun (ie. eBay).
- Titles and headlines should always be mixed case (never all capitals)
- Avoid using the same title that another article on the site is using.
- Avoid using the same headline that is used elsewhere in the article
- Never make a title or headline a link.
- Headlines should go in order, with Headline 1 being the top level. This is necessary in order for the Table of Contents to auto-generate correctly

General Formatting

- Use italicized text, not capital letters, for emphasis.
- Numbered lists should be used only when there is an order to the list. All other lists should use bullet points.
- Follow proper grammar and paragraph formatting.

G.1.4 Moderator Responsibilities

As a moderator with FIRST ThinkTank, you are expected to uphold the responsibilities outlined below and, above all, be professional.

Responsibilities of a Moderator:

- You must be as fair and unbiased as possible in all of your decisions make as moderator of FIRST ThinkTank
- You will be responsible for approving articles and ensuring articles meet submission guidelines
- You will be responsible for enforcing site rules
- When a user requires disciplinary action:
 - 1st offense -warn the user as individual
 - 2nd offense -warn the user again, inform team contact
 - 3rd offense – contact site administrators, inform team contact
- You need to be timely in responses to issues
- You need to contain any arguments that may arise
- You need to assert your power as moderator when the need arises

Should a user commit a serious offense, a moderator may choose to use a more severe punishment than is dictated by the number of offenses, should he or she feel it is necessary.

G.2 Beta Team Weekly Assignments

G.2.1 Week 1 Assignment

Good morning FIRST ThinkTank beta testers!

As the previous email mentioned, part of your responsibility as a beta tester include completing weekly assignments on the site. Before you can fully take advantage of the site and use it to its full potential, you must first get oriented with the basics of operation. After you register, you must fill out a user bio on the [Edit Profile](#) page. This space is to be used as a short biography, to describe your education, employment, expertise, or any other relevant information, not to be used as a signature or for other irrelevant information.

Once you have finished setup of your account, start browsing around the site, by searching, linking from the portal, or browsing the tag pages. We want you to get a feel for how basic navigation on the site works. After you have become acquainted with the website, we ask you begin to rate at least 5 of the existing articles. Please do not rate them blindly, but read the articles first. To keep track of this, please post which articles you have rated in the forum on the USFIRST website. A post template will be provided for you.

To summarize this week's goals:

1. Create a user bio
2. Review the help documents
3. Browse all areas of the website
4. Rate at least five (5) articles and post which you have rated in the forums

We ask that you have this completed by Friday evening (10/24). Please refrain from uploading or editing articles yet, as this will be part of next week's assignment.

Regards,
The FIRST ThinkTank Team
firstthinktank@wpi.edu

G.2.2 Week 2 Assignment

Good Afternoon Teams,

Thank you for your feedback so far in this testing process. We are currently working on your comments and suggestions and you should hopefully see some changes in the future.

Hopefully you have started to learn how the site works over the past week. For this week, we would like you to become acquainted with the article submission process, as this is arguably the most important element of the website. We ask that between all the members of your team, you submit one (1) article for this week's assignment. This can consist of articles you have written just for this and articles you may have already written. When you have done so, please post a response in the forums using the posting template found there.

We ask that you post articles in accordance with the article style guidelines that have been attached to this email. These are the same guidelines presented on the site. The style guidelines are important to establishing a precedent for the authoring of articles to keep them easy to read and informative.

In addition, please continue to use the website as you did last week, rating articles as they are submitted by all of the participants.

Regards,
The FIRST ThinkTank Team
firsththinktank@wpi.edu

G.2.3 Week 3 Assignment

Good Evening Teams,

For this week's assignment, we would like you to either submit a revision to the article you submitted for last week's assignment, or submit an article to the website if you have not yet done so. Once you have done so, please post in the forums what you have submitted or revised. In addition, please rate an article currently in the "5 Newest Articles" section of the front page.

If you have any questions, bug reports, or suggestions, please do not hesitate to contact us at firstthinktank@wpi.edu or post in the forums.

Regards,
The FIRST ThinkTank Team
firstthinktank@wpi.edu

G.2.4 Week 4 Assignment

Good evening teams,

For this week's assignment, we ask that you complete a brief survey about the usability of the FIRST ThinkTank, to help us better design the site to make it easier and more effective to use. Please follow <http://www.zoomerang.com/Survey/?p=WEB228GPX3X3TD> to complete the survey. In addition, please post an article if you have not yet done so.

If you have any questions, bug reports, or suggestions, please do not hesitate to contact us at firstthinktank@wpi.edu or post in the forums.

Regards,
The FIRST ThinkTank Team
firstthinktank@wpi.edu

Appendix H: Beta Test Surveys

H.1 Pre-Beta

H.1.1 Blank

Beta Team Characterization Survey

Informed Consent Agreement for Participation in a Research Study

Investigator: Gretar Tryggvason, PhD

Contact Information: Department of Social Science and Policy Studies,
Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-
831-5296, doyle@wpi.edu

Title of Research Study: Social Networking in the FIRST Robotics Competition
Community

Sponsor: National Science Foundation

You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions.

Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None.

Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the

ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams.

Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed.

Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel 508-831-5519, Email mjcurley@wpi.edu

Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1

VOLUNTEER'S STATEMENT:

I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study.

I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study.

If I have any questions about my rights as a research subject in this study I may contact:

New England Institutional Review Board

40 Washington Street, Suite 130

Wellesley, MA 02481

Telephone: 1-800-232-9570

By consenting to participate in this study, I have not waived any of my legal rights.

To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records.

By clicking “yes” below: I acknowledge that I have read and understand the above information. I agree to participate in this study.



Survey Page 1

Beta Team Characterization Survey

Section 1: Financial

This section helps us better understand your team's sources of funding and sustainability

2

How much funding does your team receive annually?

\$7000-\$9999

\$10000-\$14999

\$15000-\$25000

\$25000-\$35000

>\$35000

3

What percentage of your funding comes from corporate sponsors?

<29%

30%-44%

45%-59%

60%-74%

75%-90%

>90%

4

What percentage of your funding comes from your affiliated high school(s)?

<29%

30%-44%

45%-59%

60%-74%

75%-90%

>90%

5

What percentage of your funding comes from fundraisers, personal donations and local businesses?

<29%

30%-44%

45%-59%

60%-74%

75%-90%

>90%



Survey Page 2

Beta Team Characterization Survey

Section 2: Membership

This section identifies student demographics and participation levels.

6

Approximately how many members regularly attend team meetings and functions?

5-9

10-14

15-19

20-24

25-34

35-50

>50

7

Are the majority of new team members in their first year at your school?

8

What percentage of your members return from the year before?

<29%

30%-44%

45%-59%

60%-74%

75%-90%

>90%

9

Approximately what percentage of your members take primarily non-engineering roles?

<19%

20%-29%

30-39%

40%-50%

>50%



Beta Team Characterization Survey

Section 3: Mentorship

This section identifies mentor demographics and participation levels.

10

Approximately how many mentors regularly attend team meetings and functions?

<9

10-14

15-19

20-24

24-34

35-50

>50

11

How long has the average mentor on your team been involved with FIRST?

0-2

2-4

4-6

6-9

10-13

>13

12

Approximately what percentage of your mentors take primarily non-engineering roles?

<19%

20%-29%

30-39%

40%-50%

>50%

13

If you have corporate sponsors, how many mentors do they contribute to your team annually?

No corporate sponsors

0-2

3-5

6-10

>10



Survey Page 4

Beta Team Characterization Survey

Section 4: Preparation and Training

This section asks about how your team prepares and trains its members.

14

How many months out of the year does your team hold regular meetings?

Don't hold regular meetings

Only during Build Season

2 months

4 months

6 months

School Year

Year round (including summer)

15

What kind of off-season activities does your team participate in? (Check all that apply)

Off-season competition

Training workshops

Summer/pre-season projects

Demos

Summer camps

Fundraisers

Other, please specify

16

Do you hold formal training sessions or seminars for new team members?



Survey Page 5

Beta Team Characterization Survey

Section 5: Resources

This section helps us understand your team's resources and how it utilizes them.

17

What other websites does your team use for reference and technical information?

None

Chief Delphi

www.usfirst.org

first.wpi.edu

FIRSTwiki

The Blue Alliance

Wikipedia

Vendor Websites (McMaster, MSC, Small Parts Inc., etc)

Other Team's Websites

Other, please specify

18

Does your team mentor or provide support for other local teams?

19

Is your team mentored by other local teams?

20

On a scale of 1 to 5, how much does your team share resources (machines, unused parts, fundraisers) with other local teams outside of competition?

Very Frequently Somewhat Frequently Occasionally Rarely Never

21

On a scale of 1 to 5, how often does your team interact with other teams outside of competitions?

Very Frequently Somewhat Frequently Occasionally Rarely Never



Beta Team Characterization Survey

Section 6: Personal

This is simply to give us a little information about yourself, the survey taker.

22

What team are you representing on this survey?

23

How long have you been participating in FRC?

24

How long have you been with your current team?

25

What's your background? (eg. Teaching, Engineering, etc)

26

Do you have any degrees? If so, what are they?

27

What is your main role on the team?

28

Gender

Male

Female

29

Age Bracket

18-25

26-35

36-45

46-55

56-65

Over 65

30

Highest level of education completed

Grade School

High School Diploma or GED

Some College

Bachelor's Degree

Master's Degree

Ph.D.



Survey Page 7

Beta Team Characterization Survey

31

Any additional comments?



Survey Page 8

H.1.2 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams. Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed. Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the

previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel

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508-831-5519 , Email mjcurley@wpi.edu Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1. VOLUNTEER'S STATEMENT: I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study. I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study. If I have any questions about my rights as a research subject in this study I may contact: New England Institutional Review Board 40 Washington Street, Suite 130 Wellesley,

MA 02481 Telephone: 1-800-232-9570 By consenting to participate in this study, I have not waived any of my legal rights. To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records. By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes

Section 1: Financial This section helps us better understand your team's sources of funding and sustainability

2. How much funding does your team receive annually?

\$7000-\$9999

3. What percentage of your funding comes from corporate sponsors?

4. What percentage of your funding comes from your affiliated high school(s)?

>90%

5. What percentage of your funding comes from fundraisers, personal donations and local businesses?

Section 2: Membership This section identifies student demographics and participation levels.

6. Approximately how many members regularly attend team meetings and functions?

15-19

7. Are the majority of new team members in their first year at your school?

Yes

8. What percentage of your members return from the year before?

<29%

9. Approximately what percentage of your members take primarily non-engineering roles?

20%-29%

Section 3: Mentorship This section identifies mentor demographics and participation levels.

10. Approximately how many mentors regularly attend team meetings and functions?

<9

11. How long has the average mentor on your team been involved with FIRST?

0-2

12. Approximately what percentage of your mentors take primarily non-engineering roles?

13. If you have corporate sponsors, how many mentors do they contribute to your team annually?

No corporate sponsors

Section 4: Preparation and Training This section asks about how your team prepares and trains its members.

14. How many months out of the year does your team hold regular meetings?

6 months

15. What kind of off-season activities does your team participate in? (Check all that apply)

**Training workshops
mentoring FLL**

16. Do you hold formal training sessions or seminars for new team members?

Yes

Section 5: Resources This section helps us understand your team's resources and how it utilizes them.

17. What other websites does your team use for reference and technical information?

Chief Delphi

www.usfirst.org

Vendor Websites (McMaster, MSC, Small Parts Inc., etc)

18. Does your team mentor or provide support for other local teams?

No

19. Is your team mentored by other local teams?

No

20. On a scale of 1 to 5, how much does your team share resources (machines, unused parts, fundraisers) with other local teams outside of competition?

Never

21. On a scale of 1 to 5, how often does your team interact with other teams outside of competitions?

Never

Section 6: Personal This is simply to give us a little information about yourself, the survey taker.

22. What team are you representing on this survey?



23. How long have you been participating in FRC?

2nd year

24. How long have you been with your current team?

2

25. What's your background? (eg. Teaching, Engineering, etc)

19 years in Architecture before becoming teacher

26. Do you have any degrees? If so, what are they?

**Bachelor of Technology, Ryerson U
Bachelor of Education, U of Toronto**

27. What is your main role on the team?

Herding

28. Gender

Male

29. Age Bracket

46-55

30. Highest level of education completed

Bachelor's Degree

31. Any additional comments?

FIRST should create an independent referee corp. Volunteers should have no team affiliations.

FIRST FRC should have teams declare the total number of students involved. Declare ratios of student to mentor/teacher and mentor/corporate. My point is students should outnumber mentors.

In my school board we have a competing competition from Skills Canada. Cost of competition is much lower.

Also many Tech teachers in my school board do not participate. There is a divide between those that do.

H.1.3 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams. Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed. Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the

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508-831-5519 , Email mjcurley@wpi.edu Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in

USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1. VOLUNTEER'S STATEMENT: I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study. I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study. If I have any questions about my rights as a research subject in this study I may contact: New England Institutional Review Board 40 Washington Street, Suite 130 Wellesley,

MA 02481 Telephone: 1-800-232-9570 By consenting to participate in this study, I have not waived any of my legal rights. To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records. By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes

Section 1: Financial This section helps us better understand your team's sources of funding and sustainability

2. How much funding does your team receive annually?

\$7000-\$9999

3. What percentage of your funding comes from corporate sponsors?

45%-59%

4. What percentage of your funding comes from your affiliated high school(s)?

<29%

5. What percentage of your funding comes from fundraisers, personal donations and local businesses?

<29%

Section 2: Membership This section identifies student demographics and participation levels.

6. Approximately how many members regularly attend team meetings and functions?

15-19

7. Are the majority of new team members in their first year at your school?

Yes

8. What percentage of your members return from the year before?

>90%

9. Approximately what percentage of your members take primarily non-engineering roles?

<19%

Section 3: Mentorship This section identifies mentor demographics and participation levels.

10. Approximately how many mentors regularly attend team meetings and functions?

<9

11. How long has the average mentor on your team been involved with FIRST?

2-4

12. Approximately what percentage of your mentors take primarily non-engineering roles?

<19%

13. If you have corporate sponsors, how many mentors do they contribute to your team annually?

0-2

Section 4: Preparation and Training This section asks about how your team prepares and trains its members.

14. How many months out of the year does your team hold regular meetings?

School Year

15. What kind of off-season activities does your team participate in? (Check all that apply)

16. Do you hold formal training sessions or seminars for new team members?

Yes

Section 5: Resources This section helps us understand your team's resources and how it utilizes them.

17. What other websites does your team use for reference and technical information?

www.usfirst.org

The Blue Alliance

Vendor Websites (McMaster, MSC, Small Parts Inc., etc)

Other Team's Websites

18. Does your team mentor or provide support for other local teams?

No

19. Is your team mentored by other local teams?

No

20. On a scale of 1 to 5, how much does your team share resources (machines, unused parts, fundraisers) with other local teams outside of competition?

Somewhat Frequently

21. On a scale of 1 to 5, how often does your team interact with other teams outside of competitions?

Somewhat Frequently

Section 6: Personal This is simply to give us a little information about yourself, the survey taker.

22. What team are you representing on this survey?



23. How long have you been participating in FRC?

3 years

24. How long have you been with your current team?

3 years

25. What's your background? (eg. Teaching, Engineering, etc)

Math Teacher

26. Do you have any degrees? If so, what are they?

BS in Mathematics

Masters in Curriculum and Instruction

27. What is your main role on the team?

Organizer

28. Gender

Male

29. Age Bracket

36-45

30. Highest level of education completed

Master's Degree

31. Any additional comments?

H.1.4 Raw Data

FIRST ThinkTank Beta Team Characterization Survey Results Overview



Date: 12/10/2008 6:47 AM PST
Responses: Completes
Filter: No filter applied

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296, doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams. Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed. Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel 508-831-5519, Email mjcurley@wpi.edu Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1. VOLUNTEER'S STATEMENT: I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study. I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study. If I have any questions about my rights as a research subject in this study I may contact: New England Institutional Review Board 40 Washington Street, Suite 130 Wellesley, MA 02481 Telephone: 1-800-232-9570 By consenting to participate in this study, I have not waived any of my legal rights. To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records. By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes		23	100%
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No		0	0%
Total		23	100%

Section 1: Financial This section helps us better understand your team's sources of funding and sustainability

2. How much funding does your team receive annually?

\$7000-\$9999		8	35%
\$10000-\$14999		1	4%
\$15000-\$25000		5	22%
\$25000-\$35000		3	13%
>\$35000		6	26%
Total		23	100%

3. What percentage of your funding comes from corporate sponsors?

<29%		4	18%
30%-44%		4	18%
45%-59%		3	14%
60%-74%		3	14%
75%-90%		6	27%
>90%		2	9%
Total		22	100%

4. What percentage of your funding comes from your affiliated high school(s)?

<29%		13	65%
30%-44%		4	20%
45%-59%		0	0%

60%-74%		0	0%
75%-90%		2	10%
>90%		1	5%
Total		20	100%

5. What percentage of your funding comes from fundraisers, personal donations and local businesses?

<29%		16	73%
30%-44%		4	18%
45%-59%		0	0%
60%-74%		2	9%
75%-90%		0	0%
>90%		0	0%
Total		22	100%

Section 2: Membership This section identifies student demographics and participation levels.







6. Approximately how many members regularly attend team meetings and functions?

5-9		3	13%
10-14		3	13%
15-19		5	22%
20-24		2	9%
25-34		6	26%
35-50		4	17%
>50		0	0%
Total		23	100%





7. Are the majority of new team members in their first year at your school?

Yes		11	48%
No		12	52%
Total		23	100%

8. What percentage of your members return from the year before?

<29%		1	4%
30%-44%		1	4%
45%-59%		4	17%
60%-74%		1	4%
75%-90%		13	57%
>90%		3	13%
Total		23	100%


9. Approximately what percentage of your members take primarily non-engineering roles?

<19%		7	30%
20%-29%		4	17%
30-39%		10	43%
40%-50%		2	9%
>50%		0	0%
Total		23	100%





Section 3: Mentorship This section identifies mentor demographics and participation levels.

10. Approximately how many mentors regularly attend team meetings and functions?

<9		19	83%
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10-14		4	17%
15-19		0	0%
20-24		0	0%
24-34		0	0%
35-50		0	0%
>50		0	0%
Total		23	100%

11. How long has the average mentor on your team been involved with FIRST?

0-2		5	22%
2-4		7	30%
4-6		7	30%
6-9		3	13%
10-13		1	4%
>13		0	0%
Total		23	100%

12. Approximately what percentage of your mentors take primarily non-engineering roles?

<19%		16	73%
20%-29%		0	0%
30-39%		1	5%
40%-50%		0	0%
>50%		5	23%
Total		22	100%

13. If you have corporate sponsors, how many mentors do they contribute to your team annually?

No corporate sponsors		2	9%
0-2		13	57%
3-5		4	17%
6-10		4	17%
>10		0	0%
Total		23	100%

Section 4: Preparation and Training This section asks about how your team prepares and trains its members.

14. How many months out of the year does your team hold regular meetings?

Don't hold regular meetings		0	0%
Only during Build Season		1	4%
2 months		1	4%
4 months		1	4%
6 months		1	4%
School Year		13	57%
Year round (including summer)		6	26%
Total		23	100%

15. What kind of off-season activities does your team participate in? (Check all that apply)

Off-season competition		15	68%
Training workshops		13	59%
Summer/pre-season projects		12	55%
Demos		14	64%
Summer camps		3	14%
Fundraisers		18	82%










Other, please specify		8	36%
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16. Do you hold formal training sessions or seminars for new team members?

Yes		15	65%
No		8	35%
Total		23	100%

Section 5: Resources This section helps us understand your team's resources and how it utilizes them.

17. What other websites does your team use for reference and technical information?

None		0	0%
Chief Delphi		21	91%
www.usfirst.org		22	96%
first.wpi.edu		4	17%
FIRSTwiki		4	17%
The Blue Alliance		13	57%
Wikipedia		3	13%
Vendor Websites (McMaster, MSC, Small Parts Inc., etc)		17	74%
Other Team's Websites		15	65%
Other, please specify		2	9%

18. Does your team mentor or provide support for other local teams?

Yes		15	65%
No		8	35%
Total		23	100%

19. Is your team mentored by other local teams?

Yes		4	17%
No		19	83%
Total		23	100%

20. On a scale of 1 to 5, how much does your team share resources (machines, unused parts, fundraisers) with other local teams outside of competition?

Very Frequently		4	17%
Somewhat Frequently		7	30%
Occasionally		6	26%
Rarely		3	13%
Never		3	13%
Total		23	100%

21. On a scale of 1 to 5, how often does your team interact with other teams outside of competitions?

Very Frequently		4	17%
Somewhat Frequently		8	35%
Occasionally		5	22%
Rarely		2	9%
Never		4	17%
Total		23	100%

Section 6: Personal This is simply to give us a little information about yourself, the survey taker.

28. Gender

Male		17	74%
Female		6	26%

Total	23	100%
-------	----	------

29. Age Bracket

18-25		3	13%
26-35		4	17%
36-45		5	22%
46-55		9	39%
56-65		2	9%
Over 65		0	0%
Total		23	100%

30. Highest level of education completed

Grade School		0	0%
High School Diploma or GED		0	0%
Some College		4	17%
Bachelor's Degree		8	35%
Master's Degree		10	43%
Ph.D.		1	4%
Total		23	100%

FIRST ThinkTank Beta Team Characterization Survey Results Overview



Date: 12/7/2008 11:53 AM PST
Responses: Completes
Filter: No filter applied

#	Response
1	
2	
3	
4	
5	
6	
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23	

FIRST ThinkTank Beta Team Characterization Survey Results Overview



Date: 12/7/2008 11:53 AM PST
Responses: Completes
Filter: No filter applied

#	Response
1	3 years
2	2nd year
3	Starting our 14th year
4	5 years
5	6 years
6	3rd year
7	11 years
8	4 years
9	5yrs
10	Personally 5 years
11	4 years
12	3 years
13	10 years
14	5 years
15	5 Years
16	5
17	2 years
18	4 years
19	1yr
20	8 years
21	4 years
22	this is my first year
23	9 years

FIRST ThinkTank Beta Team Characterization Survey

Results Overview



Date: 12/7/2008 11:54 AM PST
Responses: Completes
Filter: No filter applied

24. How long have you been with your current team?	
#	Response
1	3 years
2	2
3	14 years
4	4 years
5	6 years
6	3 years
7	same
8	1 year
9	5yrs
10	2 years
11	4 yeats
12	3 years
13	10 years
14	5 years
15	5 Years
16	5
17	2 years
18	4 years
19	1/2 yr
20	8 years
21	4 years
22	this is my first year
23	9 Years

FIRST ThinkTank Beta Team Characterization Survey

Results Overview



Date: 12/7/2008 11:54 AM PST
 Responses: Completes
 Filter: No filter applied

#	Response
1	Special Education Teacher
2	19 years in Architecture before becoming teacher
3	Vocational Education Teacher
4	Engineering
5	Electrical Engineering
6	teaching
7	Machinest / Instructor
8	Civil Engineering
9	Engineering
10	Engineering
11	Teaching/Engineering
12	Math Teacher
13	Engineering, Human Resources Professional
14	I am an attorney.
15	US Navy, Teaching
16	Engineering
17	Engineering and Teaching
18	Teaching
19	IT management
20	MFG Company CEO, no formal training
21	Engineer 5 yrs, Teacher in my 3rd year
22	Engineering & Teaching

FIRST ThinkTank Beta Team Characterization Survey

Results Overview



Date: 12/7/2008 11:55 AM PST
 Responses: Completes
 Filter: No filter applied

#	Response
	26. Do you have any degrees? If so, what are they?
1	BS - Special Ed Rehab MEd - Education
2	Bachelor of Technology, Ryerson U Bachelor of Education, U of Toronto
3	Assoc, BA, MA, MA+30
4	BS Electrical Engineering MS Optical Sciences
5	ASEE
6	BA Mathematics MS Computer and Information Sciences
7	none
8	B.S. Engineering Technology
9	Bachelor's Mechanical Engineering
10	Bachelor of Science in Mechanical Engineering
11	BS Industrial Technology, Electronics, Minors: Computer Programming, Radio & TV Broadcasting Master of Business Administration
12	BS in Mathematics Masters in Curriculum and Instruction
13	BS - Engineering Science MS - Engineering Mechanics
14	Yes. Bachelors of Arts and Juris Doctorate.
15	N/A
16	BS, MS
17	Yes. Biomedical Engineer (BS) and pursuing my MBA
18	BS in Mechanical Engineering, MS in Mechanical Engineering, MBA in Management
19	BA
20	bs
21	no

22	Physics
23	MSME,BSME,MS Instruction, Assoc. Design/Drafting

FIRST ThinkTank Beta Team Characterization Survey

Results Overview



Date: 12/7/2008 11:55 AM PST
Responses: Completes
Filter: No filter applied

27. What is your main role on the team?	
#	Response
1	Lead school Advisor
2	Herding
3	Team Leader
4	Lead Mentor
5	Engineering Mentor
6	Lead mentor
7	Gear Head
8	Coach/Mentor/McGyver
9	Team Leader
10	Head Mentor (Coach)
11	Technical Mentor
12	Organizer
13	Team Coordinator
14	Fundraising, awards, team organization.
15	Electrical/Programming Mentor
16	Lead
17	Team Lead
18	Head Coach
19	District Sponsor
20	lead mentor
21	Coach / Primary team contact
22	Sponsor
23	Team Leader

FIRST ThinkTank Beta Team Characterization Survey

Results Overview



Date: 12/7/2008 11:56 AM PST
 Responses: Completes
 Filter: No filter applied

#	Response
1	This year our team is adding members from Marie Katzenbach School for the Deaf
2	FIRST should create an independent referee corp. Volunteers should have no team affiliations. FIRST FRC should have teams declare the total number of students involved. Declare ratios of student to mentor/teacher and mentor/corporate. My point is students should outnumber mentors. In my school board we have a competing competition from Skills Canada. Cost of competition is much lower. Also many Tech teachers in my school board do not participate. There is a divide between those that do.
3	Collecting more details regarding how teams can survive will be important in this economic climate. This year will be interesting as business and schools fail.
4	Our team did not fit into some of the numerical answers. We have 5 students, 4 mentors. No students or mentors take non-engineering roles. Our funding comes 100% from corporate sponsorship or grants. There is no fund-raising by team members. We do not spend any team money on non-technical material (ie. no travel). We have occasionally worked with other teams through our regional mentor.
5	none
6	the first couple pages of questions didn't have <10 as an option, so i left a few blank...
7	30 years machinest / 2 years+ apprentice Instructor
8	Let get started!!!!
9	Love FIRST!
10	Thanks for the opportunity.
11	We are an inner city team with limited resources in terms of mentors and money that in recent years has become better at allocating those resources efficiently.
12	Just that I joined to contribute to the best of my abilities however, my schedule is very full and I am concerned that I may not be able to perform all the required tasks. I will do the best that I can.

H.2 Registration

H.2.1 Blank

FIRST ThinkTank Registration Questionnaire

1

On a scale of 1 to 4, how would you rate the overall registration process?

Very Straightforward Fairly Straightforward Somewhat Confusing Very Confusing

2

Did you encounter any bugs? If so, please state what they were.

3

Was there any part that was confusing or unintuitive? If so, please explain.

4

How would you improve the registration process?



Survey Page 1

H.2.2 Example Response

1. On a scale of 1 to 4, how would you rate the overall registration process?

Very Straightforward

2. Did you encounter any bugs? If so, please state what they were.

No

3. Was there any part that was confusing or unintuitive? If so, please explain.

No

4. How would you improve the registration process?

Doesn't need to be improved.

H.2.3 Example Response

1. On a scale of 1 to 4, how would you rate the overall registration process?

Very Straightforward

2. Did you encounter any bugs? If so, please state what they were.

Yes

When Firefox saved the password, it saved my last name as the username instead of my email address.

3. Was there any part that was confusing or unintuitive? If so, please explain.

No

4. How would you improve the registration process?

I don't think you can beat it--the five-box registration is highly underrated. The only thing I can think of is to add a link to the Organizations page right in the copy for the post-email-confirmation page...but on the other hand, this is a site for FIRSTers that tend to be rather bright.

H.2.4 Raw Data

Zoomerang | FIRST ThinkTank Registration Questionnaire: Results Overview

<http://app.zoomerang.com/Report/PrintResultsPage.aspx>

FIRST ThinkTank Registration Questionnaire Results Overview



Date: 12/7/2008 11:57 AM PST
Responses: Completes
Filter: No filter applied

1. On a scale of 1 to 4, how would you rate the overall registration process?			
Very Straightforward		8	44%
Fairly Straightforward		7	39%
Somewhat Confusing		2	11%
Very Confusing		1	6%
Total		18	100%

2. Did you encounter any bugs? If so, please state what they were.			
Yes		7	39%
No		11	61%
Total		18	100%
7 Responses			

3. Was there any part that was confusing or unintuitive? If so, please explain.			
Yes		5	28%
No		13	72%
Total		18	100%
6 Responses			

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FIRST ThinkTank Registration Questionnaire Results Overview



Date: 12/7/2008 12:03 PM PST
Responses: Completes
Filter: No filter applied

#	Response
	2. Did you encounter any bugs? If so, please state what they were.
1	When Firefox saved the password, it saved my last name as the username instead of my email address.
2	after the confirming email was sent and went to FIRSTThinkTank site to login script put my last name not email address in the email field
3	The forums link doesn't work that was provided in the email. Cannot register/login to forums.
4	Did not read all the email instructions so I sent the email manually as on the one page. My fault...
5	I could not enter my BIO
6	Now that I'm registered, the log-in screen will not accept my ID/Password. And there are no links to re-setting either, administrative support, etc.
7	Main contact registration page did not load after survey.

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FIRST ThinkTank Registration Questionnaire

Results Overview



Date: 12/7/2008 12:03 PM PST
Responses: Completes
Filter: No filter applied

#	Response
	3. Was there any part that was confusing or unintuitive? If so, please explain.
1	After I confirmed my email, it should tell me that I need to log in with my username/password.
2	Not really sure how many team members are allowed to participate. Email says "2 other participating members" so I'm assuming 3 total. Also had another team member that was asked to join our team group before the main contact even registered the team.
3	Give me the URL for main contact so I can try manually instead of re-direct from survey.
4	The sequence of survey, then register, then send and email to Firstthinktank@WPI, then wait for a reply email. I don't know if I'm the main contact - the site says that by default it's the system administrator.
5	N/A
6	After clicking the link I got to the page that said "you are not part of an organization". I had to go back to the instructions and go thru. The process with the PDF instructions I would rate a 1 "very straightforward", but without the instructions, a 2.

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FIRST ThinkTank Registration Questionnaire

Results Overview



Date: 12/7/2008 12:04 PM PST
 Responses: Completes
 Filter: No filter applied

#	Response
	4. How would you improve the registration process?
1	require filling out a user profile after the first login.
2	Doesn't need to be improved.
3	Autolink this survey to the initial login action instead of a separated step
4	I don't think you can beat it--the five-box registration is highly underrated. The only thing I can think of is to add a link to the Organizations page right in the copy for the post-email-confirmation page...but on the other hand, this is a site for FIRSTers that tend to be rather bright.
5	none
6	Provide the primary team contact with a link that can be sent out to the rest of the team to join. This link will not only send them directly to the sign up screen, but it will also cause them to automatically join the team they got the link from. Hopefully, this would prove to be a quicker, easier method to sign up and join a team, requiring fewer steps for most individuals. Additionally, you could include a team drop-down box on the sign up page to include this portion at sign up, instead of after.
7	Fewer steps.
8	Add a process flow across the top of the screen that highlights what part of the process you are currently in and what you still need to do before the process is complete.
9	Put up a functioning help screen and contact address/number
10	I am not sure of the intent or purpose of the ThinkTank. I am not sure who is running this too. Give me names and faces please not just nameless emails.
11	Don't provide the .pdf's until the zoomerang survey is completed. They should be in a confirmation email after the survey and initial registration are done. Don't make people copy firstthinktank@wpi with the confirmation email and the team number in the subject line. It's not clear why that is being done and I'm not sure what to expect after doing it. I still don't know if I have been instated as the main contact.
12	Confirmation needs to be a little more noticeable. Maybe a bigger font or a cool effect?
13	The instructions were very clear on how to sign up. Had no problems at all. It was very helpful to have the signup instructions with screen shots. I think that is what made it so easy.
14	(see answer to #3) Why not just make that pull up the list of organizations?

H.3 Moderator

H.3.1 Blank

Moderator Survey

Informed Consent Agreement for Participation in a Research Study

Investigator: Gretar Tryggvason, PhD

Contact Information: Department of Social Science and Policy Studies,
Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-
831-5296, doyle@wpi.edu

Title of Research Study: Social Networking in the FIRST Robotics Competition Community

Sponsor: National Science Foundation

You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions.

Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None.

Benefits of the Study: Your participation will help USFIRST improve the design

and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams.

Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed.

Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel 508-831-5519, Email mjcurley@wpi.edu

Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1

VOLUNTEER'S STATEMENT:

I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study.

I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study.

If I have any questions about my rights as a research subject in this study I may contact:

New England Institutional Review Board

40 Washington Street, Suite 130

Wellesley, MA 02481

Telephone: 1-800-232-9570

By consenting to participate in this study, I have not waived any of my legal rights.

To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records.

By clicking “yes” below: I acknowledge that I have read and understand the above information. I agree to participate in this study.



Survey Page 1

Moderator Survey

Section 1: Moderation Interface

This section is aimed to give feedback on the intuitiveness and functionality of the moderation controls.

2

How easy was it to find articles that needed approval?

Very Difficult

Somewhat Difficult

Very Easy

3

How intuitive was the article approval interface?

Very Unintuitive

Somewhat Intuitive

Very Intuitive

4

Comments on the moderator interface?



Moderator Survey

Section 2: Moderator Workload

This section asks about the amount of time required of moderators to perform their duties.

5

On average, how long did it take you to fully read and approve an article?

6

How many times per week did you check the approval queue?

Less than once

Once a week

Two or Three times weekly

Four or more times weekly

7

Comments on the moderator workload?



Survey Page 3

H.3.2 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

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Yes

Section 1: Moderation Interface This section is aimed to give feedback on the intuitiveness and functionality of the moderation controls.

2. How easy was it to find articles that needed approval?

3. How intuitive was the article approval interface?

Somewhat Intuitive

4. Comments on the moderator interface?

Section 2: Moderator Workload This section asks about the amount of time required of moderators to perform their duties.

5. On average, how long did it take you to fully read and approve an article?

10 mins

6. How many times per week did you check the approval queue?

Once a week

7. Comments on the moderator workload?

H.3.3 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

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Yes

Section 1: Moderation Interface This section is aimed to give feedback on the intuitiveness and functionality of the moderation controls.

2. How easy was it to find articles that needed approval?

Very Easy

3. How intuitive was the article approval interface?

4. Comments on the moderator inferface?

--

Section 2: Moderator Workload This section asks about the amount of time required of moderators to perform their duties.

5. On average, how long did it take you to fully read and approve an article?

10-15 minutes

6. How many times per week did you check the approval queue?

Once a week

7. Comments on the moderator workload?

H.3.4 Raw Data

FIRST ThinkTank Moderator Survey Results Overview



Date: 12/7/2008 5:57 PM PST
Responses: Completes
Filter: No filter applied

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296, doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

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Yes		2	100%
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No		0	0%
Total		2	100%

Section 1: Moderation Interface This section is aimed to give feedback on the intuitiveness and functionality of the moderation controls.

2. How easy was it to find articles that needed approval?

Very Difficult		0	0%
		0	0%
Somewhat Difficult		0	0%
		1	50%
Very Easy		1	50%
Total		2	100%

3. How intuitive was the article approval interface?

Very Unintuitive		0	0%
		0	0%
Somewhat Intuitive		1	50%
		1	50%
Very Intuitive		0	0%
Total		2	100%

Section 2: Moderator Workload This section asks about the amount of time required of moderators to perform their duties.

6. How many times per week did you check the approval queue?

Less than once		0	0%
Once a week		2	100%

Two or Three times weekly		0	0%
Four or more times weekly		0	0%
	Total	2	100%

FIRST ThinkTank Moderator Survey Results Overview



Date: 12/7/2008 5:58 PM PST
Responses: Completes
Filter: No filter applied

5. On average, how long did it take you to fully read and approve an article?	
#	Response
1	10 mins
2	10-15 minutes

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H.4 Usability

H.4.1 Blank

Usability Survey

Informed Consent Agreement for Participation in a Research Study

Investigator: Gretar Tryggvason, PhD

Contact Information: Department of Social Science and Policy Studies,
Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-
831-5296, doyle@wpi.edu

Title of Research Study: Social Networking in the FIRST Robotics Competition
Community

Sponsor: National Science Foundation

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Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel 508-831-5519, Email mjcurley@wpi.edu

Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1

VOLUNTEER'S STATEMENT:

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I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study.

If I have any questions about my rights as a research subject in this study I may contact:

New England Institutional Review Board

40 Washington Street, Suite 130

Wellesley, MA 02481

Telephone: 1-800-232-9570

By consenting to participate in this study, I have not waived any of my legal rights.

To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records.

By clicking “yes” below: I acknowledge that I have read and understand the above information. I agree to participate in this study.



Survey Page 1

Usability Survey

Section 1: Account Management

This section will be aimed a creating an accurate view of the use of user accounts, maintaining accounts and maintaining organizations.

2

Login:

How inuitive is it to login to the site?

Not Intuitive

Somewhat Intuitive

Very Intuitive

3

Editing User Bio:

How easy was it to edit the details of your bio?

Not Easy

Somewhat Easy

Very Easy

4

Managing sub-users:

How easy was it to approve users to be part of your team's organization?

Not Easy

Somewhat Easy

Very Easy

5

Comments on Account Management:



Survey Page 2

Usability Survey

Section 2: Editing Content

This section will be aimed at creating an accurate view of the process of editing content.

6

How easy was it to start editing your article(s)?

Not Easy

Somewhat Easy

Very Easy

7

How was your experience with the editing process?

Poor

Fair

Excellent

8

Comments on Editing Content:



Survey Page 3

Usability Survey

Section 3: Navigation

This section will be aimed at creating an accurate view of the navigating the site, including site toolbar and sub pages.

9

Standard Site Toolbar:

How easy was it to navigate using the Site Navigation tabs?

Not Easy

Somewhat Easy

Very Easy

10

Tag Pages:

How useful did you find the tag pages (containing the articles found under a tag)?

Not Helpful

Somewhat Helpful

Very Helpful

11

User Pages:

How easy was it to view user pages, both yours and

others?

Not Easy

Somewhat Easy

Very Easy

12

Comments on Navigation:



Survey Page 4

Usability Survey

Section 4: Searching

This section will be aimed at creating an accurate view of the different ways of searching for content on the site.

13

Searching by tag, keyword, title, author, etc:

Do you find it easy to locate a specific article you were looking for?

Not Easy

Somewhat Easy

Very Easy

14

Ranking/ Relevant results:

Are search results relevant to what you searched for?

Irrelevant

Somewhat Relevant

Very Relevant

15

User Pages:

Do search results seem to be ranked in order of quality or popularity?

Quality

Neither

Popularity

16

Comments on Searching:



Survey Page 5

Usability Survey

Section 5: Content Viewing

This section will be aimed at creating an accurate account on viewing content, focusing on the layout.

17

Layout:

Are articles laid out so that they are easy to read?

Not Easy

Somewhat Easy

Very Easy

18

How do you like the layout of the articles?

Not Like

Somewhat Like

Gusta MUCHO

19

How easy is it to navigate inside an article?

Not Easy

Somewhat Easy

Very Easy

20

How easy is it to access attached documents?

Not Easy

Somewhat Easy

Very Easy

21

Comments on Content Viewing:



Survey Page 6

Usability Survey

Section 6: Moderation

This section will be aimed at creating an accurate view of the moderation of the site, including site quality of articles, presence of moderators and content approvals.

22

Quality of articles:

What level of quality do you feel the majority of articles on the site met?

Low

Moderate

High

23

Moderators:

Did the moderators play an active role in the site, besides article approval?

Yes

No

24

Did you or any other participants you have communicated with feel

there was a moderator bias of any sort?

Yes

No

25

Are submitted articles approved or rejected in a timely manner?

Yes

No

26

Comments on Moderation:



H.4.2 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams. Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed. Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the

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MA 02481 Telephone: 1-800-232-9570 By consenting to participate in this study, I have not waived any of my legal rights. To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records. By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes

Section 1: Account Management This section will be aimed a creating an accurate view of the use of user accounts, maintaining accounts and maintaining organizations.

2. Login: How intuitive is it to login to the site?

3. Editing User Bio: How easy was it to edit the details of your bio?

4. Managing sub-users: How easy was it to approve users to be part of your team's organization?

Somewhat Easy

5. Comments on Account Management:

Section 2: Editing Content This section will be aimed at creating an accurate view of the process of editing content.

6. How easy was it to start editing your article(s)?

7. How was your experience with the editing process?

Poor

8. Comments on Editing Content:

It was very difficult to figure out how to work with the website.

Section 3: Navigation This section will be aimed at creating an accurate view of the navigating the site, including site toolbar and sub pages.

9. Standard Site Toolbar: How easy was it to navigate using the Site Navigation tabs?

Somewhat Easy

10. Tag Pages: How useful did you find the tag pages (containing the articles found under a tag)?

11. User Pages: How easy was it to view user pages, both yours and others?

Somewhat Easy

12. Comments on Navigation:

Section 4: Searching This section will be aimed at creating an accurate view of the different ways of searching for content on the site.

13. Searching by tag, keyword, title, author, etc: Do you find it easy to locate a specific article you were looking for?

14. Ranking/ Relevant results: Are search results relevant to what you searched for?

15. User Pages: Do search results seem to be ranked in order of quality or popularity?

16. Comments on Searching:

My search button didn't work half of the time.

Section 5: Content Viewing This section will be aimed at creating an accurate account on viewing content, focusing on the layout.

17. Layout: Are articles laid out so that they are easy to read?

18. How do you like the layout of the articles?

19. How easy is it to navigate inside an article?

20. How easy is it to access attached documents?

21. Comments on Content Viewing:

Section 6: Moderation This section will be aimed at creating an accurate view of the moderation of the site, including site quality of articles, presence of moderators and content approvals.

22. Quality of articles: What level of quality do you feel the majority of articles on the site met?

Moderate

23. Moderators: Did the moderators play an active role in the site, besides article approval?

No

24. Did you or any other participants you have communicated with feel there was a moderator bias of any sort?

No

25. Are submitted articles approved or rejected in a timely manner?

Yes

26. Comments on Moderation:

H.4.3 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams. Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed. Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the

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508-831-5519 , Email mjcurley@wpi.edu Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1. VOLUNTEER'S STATEMENT: I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study. I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study. If I have any questions about my rights as a research subject in this study I may contact: New England Institutional Review Board 40 Washington Street, Suite 130 Wellesley,

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Yes

Section 1: Account Management This section will be aimed a creating an accurate view of the use of user accounts, maintaining accounts and maintaining organizations.

2. Login: How intuitive is it to login to the site?

Very Intuitive

3. Editing User Bio: How easy was it to edit the details of your bio?

Very Easy

4. Managing sub-users: How easy was it to approve users to be part of your team's organization?

5. Comments on Account Management:

account management was excellent

Section 2: Editing Content This section will be aimed at creating an accurate view of the process of editing content.

6. How easy was it to start editing your article(s)?

7. How was your experience with the editing process?

8. Comments on Editing Content:

The issue with clearing text boxes whenever tags or files were added to a new project was annoying, but once that's corrected the content editing was nice to work with.

Section 3: Navigation This section will be aimed at creating an accurate view of the navigating the site, including site toolbar and sub pages.

9. Standard Site Toolbar: How easy was it to navigate using the Site Navigation tabs?

Very Easy

10. Tag Pages: How useful did you find the tag pages (containing the articles found under a tag)?

11. User Pages: How easy was it to view user pages, both yours and others?

Very Easy

12. Comments on Navigation:

some additional tags to refine the contents relativity would be helpful. some articles were tagged and I couldn't understand the link to the tag other than that was the closest tag the author thought was relative

Section 4: Searching This section will be aimed at creating an accurate view of the different ways of searching for content on the site.

13. Searching by tag, keyword, title, author, etc: Do you find it easy to locate a specific article you were looking for?

Very Easy

14. Ranking/ Relevant results: Are search results relevant to what you searched for?

15. User Pages: Do search results seem to be ranked in order of quality or popularity?

Neither

16. Comments on Searching:

There isn't enough content yet to tell if the searches were delivering quality articles

Section 5: Content Viewing This section will be aimed at creating an accurate account on viewing content, focusing on the layout.

17. Layout: Are articles laid out so that they are easy to read?

Very Easy

18. How do you like the layout of the articles?

19. How easy is it to navigate inside an article?

Very Easy

20. How easy is it to access attached documents?

Very Easy

21. Comments on Content Viewing:

It would be nice to encourage more authors to add content into the actual article. most content was little more than the abstract with an attached powerpoint file

Section 6: Moderation This section will be aimed at creating an accurate view of the moderation of the site, including site quality of articles, presence of moderators and content approvals.

22. Quality of articles: What level of quality do you feel the majority of articles on the site met?

23. Moderators: Did the moderators play an active role in the site, besides article approval?

No

24. Did you or any other participants you have communicated with feel there was a moderator bias of any sort?

No

25. Are submitted articles approved or rejected in a timely manner?

Yes

26. Comments on Moderation:

it was a little hard to tell what impact moderators had on any particular article, other than approving the article. maybe there should be a moderator's comments field on each article so the mods can post more actively without disrupting the articles flow

H.4.4 Raw Data

FIRST ThinkTank Usability Survey New Results Overview



Date: 12/7/2008 6:01 PM PST
Responses: Completes
Filter: No filter applied

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296, doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

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Yes		3	100%
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FIRST ThinkTank Usability Survey New Results Overview



Date: 12/7/2008 6:01 PM PST
 Responses: Completes
 Filter: No filter applied

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296, doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

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Yes		3	100%
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No		0	0%
Total		3	100%

Section 1: Account Management This section will be aimed a creating an accurate view of the use of user accounts, maintaining accounts and maintaining organizations.

2. Login: How intuitive is it to login to the site?

Not Intuitive		0	0%
		0	0%
Somewhat Intuitive		0	0%
		1	50%
Very Intuitive		1	50%
Total		2	100%

3. Editing User Bio: How easy was it to edit the details of your bio?

Not Easy		1	33%
		0	0%
Somewhat Easy		0	0%
		1	33%
Very Easy		1	33%
Total		3	100%

4. Managing sub-users: How easy was it to approve users to be part of your team's organization?

Not Easy		0	0%
		1	33%
Somewhat Easy		1	33%
		1	33%

Very Easy		0	0%
Total		3	100%

Section 2: Editing Content This section will be aimed at creating an accurate view of the process of editing content.

6. How easy was it to start editing your article(s)?

Not Easy		1	33%
		1	33%
Somewhat Easy		0	0%
		1	33%
Very Easy		0	0%
Total		3	100%

7. How was your experience with the editing process?

Poor		2	67%
		0	0%
Fair		0	0%
		1	33%
Excellent		0	0%
Total		3	100%

Section 3: Navigation This section will be aimed at creating an accurate view of the navigating the site, including site toolbar and sub pages.

9. Standard Site Toolbar: How easy was it to navigate using the Site Navigation tabs?




Not Easy		0	0%
		1	33%

Somewhat Easy		1	33%
		0	0%
Very Easy		1	33%
Total		3	100%

10. Tag Pages: How useful did you find the tag pages (containing the articles found under a tag)?

Not Helpful		1	33%
		0	0%
Somewhat Helpful		0	0%
		2	67%
Very Helpful		0	0%
Total		3	100%

11. User Pages: How easy was it to view user pages, both yours and others?

Not Easy		0	0%
		1	33%
Somewhat Easy		1	33%
		0	0%
Very Easy		1	33%
Total		3	100%

Section 4: Searching This section will be aimed at creating an accurate view of the different ways of searching for content on the site.

13. Searching by tag, keyword, title, author, etc: Do you find it easy to locate a specific article you were looking for?




Not Easy		0	0%
		1	33%

Somewhat Easy		1	33%
		0	0%
Very Easy		1	33%
Total		3	100%

14. Ranking/ Relevant results: Are search results relevant to what you searched for?

Irrelevant		0	0%
		1	33%
Somewhat Relevant		1	33%
		1	33%
Very Relevant		0	0%
Total		3	100%

15. User Pages: Do search results seem to be ranked in order of quality or popularity?

Quality		1	33%
		1	33%
Neither		1	33%
		0	0%
Popularity		0	0%
Total		3	100%

Section 5: Content Viewing This section will be aimed at creating an accurate account on viewing content, focusing on the layout.

17. Layout: Are articles laid out so that they are easy to read?

Not Easy		0	0%
		0	0%

Somewhat Easy		1	33%
		1	33%
Very Easy		1	33%
Total		3	100%

18. How do you like the layout of the articles?

Not Like		0	0%
		0	0%
Somewhat Like		1	33%
		2	67%
Gusta MUCHO		0	0%
Total		3	100%

19. How easy is it to navigate inside an article?

Not Easy		0	0%
		0	0%
Somewhat Easy		0	0%
		2	67%
Very Easy		1	33%
Total		3	100%



20. How easy is it to access attached documents?

Not Easy		0	0%
		0	0%
Somewhat Easy		0	0%
		2	67%

Very Easy		1	33%
Total		3	100%

Section 6: Moderation This section will be aimed at creating an accurate view of the moderation of the site, including site quality of articles, presence of moderators and content approvals.

22. Quality of articles: What level of quality do you feel the majority of articles on the site met?

Low		0	0%
Moderate		2	67%
High		1	33%
Total		3	100%

23. Moderators: Did the moderators play an active role in the site, besides article approval?

Yes		0	0%
No		3	100%
Total		3	100%

24. Did you or any other participants you have communicated with feel there was a moderator bias of any sort?

Yes		0	0%
No		3	100%
Total		3	100%

25. Are submitted articles approved or rejected in a timely manner?

Yes		2	100%
-----	--	---	------

No		0	0%
	Total	2	100%

H.5 Post-Beta

H.5.1 Blank

FIRST ThinkTank Post-Beta Survey

Informed Consent Agreement for Participation in a Research Study

Investigator: Gretar Tryggvason, PhD

Contact Information: Department of Social Science and Policy Studies,
Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-
831-5296, doyle@wpi.edu

Title of Research Study: Social Networking in the FIRST Robotics Competition Community

Sponsor: National Science Foundation

You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions.

Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None.

Benefits of the Study: Your participation will help USFIRST improve the design

and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams.

Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed.

Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel 508-831-5519, Email mjcurley@wpi.edu

Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1

VOLUNTEER'S STATEMENT:

I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study.

I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study.

If I have any questions about my rights as a research subject in this study I may contact:

New England Institutional Review Board

40 Washington Street, Suite 130

Wellesley, MA 02481

Telephone: 1-800-232-9570

By consenting to participate in this study, I have not waived any of my legal rights.

To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records.

By clicking “yes” below: I acknowledge that I have read and understand the above information. I agree to participate in this study.



Survey Page 1

FIRST ThinkTank Post-Beta Survey

Section 1: Website Quality

2

How would you rate the overall quality of the FIRST ThinkTank website?

Poor

Fair

Moderate

Good

Excellent

3

How adequate do you find the types and selection of articles?

Poor

Fair

Neutral

Good

Excellent

4

Comments on the website quality?



Survey Page 2

FIRST ThinkTank Post-Beta Survey

Section 2: Site Organization

5

Do you feel that the selection of Supertags is sufficient?

If no, why not?

6

Do you feel you would be more likely to search for specific articles or to browse the super and subtag sections when looking for information?

Always search Mostly search Half and half Mostly browse Always browse

7

Comments on the site organization?



FIRST ThinkTank Post-Beta Survey

Section 3: Ratings

8

Do you feel that the ratings you saw on articles were an accurate representation of the articles' quality?

9

Do you feel that a user rating (generated as a function of the ratings on their articles) would help you identify quality articles?

10

Comments on the rating system?



FIRST ThinkTank Post-Beta Survey

Section 4: Site Usage

11

How much do you feel your team would utilize this site to share content?

Not at all Rarely Sometimes Frequently Always

12

How much do you feel your team would utilize this site to find information?

Not at all Rarely Sometimes Frequently Always

13

Would you recommend this site to other teams looking for information?

If no, why not?

▲
■
▼

14

Please comments on your usage of the site. If you did not participate much during the beta test, please comment on why you were unable to participate.



Survey Page 5

H.5.2 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams. Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law.

However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed. Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the

previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel

508-831-5519 , Email mjcurley@wpi.edu Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1. VOLUNTEER'S STATEMENT: I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study. I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study. If I have any questions about my rights as a research subject in this study I may contact: New England Institutional Review Board 40 Washington Street, Suite 130 Wellesley,

MA 02481 Telephone: 1-800-232-9570 By consenting to participate in this study, I have not waived any of my legal rights. To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records. By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes

Section 1: Website Quality

2. How would you rate the overall quality of the FIRST ThinkTank website?

Moderate

3. How adequate do you find the types and selection of articles?

Good

4. Comments on the website quality?

Based on other sites which may contain similar information, this one is okay. I would be better able to comment once full site is up and running.

Section 2: Site Organization

5. Do you feel that the selection of Supertags is sufficient?

Yes

Will need to see site in full operation to determine how well they work.

6. Do you feel you would be more likely to search for specific articles or to browse the super and subtag sections when looking for information?

Half and half

7. Comments on the site organization?

Not bad. As long as the categories are clear and the articles are easy to search for.

Section 3: Ratings

8. Do you feel that the ratings you saw on articles were an accurate representation of the articles' quality?

Yes

9. Do you feel that a user rating (generated as a function of the ratings on their articles) would help you identify quality articles?

Yes

10. Comments on the rating system?

Everyone has their own rating scale and will rate an article based on it's importance to them personally. As more users are involved, we will get a better idea which articles rise to the top.

Section 4: Site Usage

11. How much do you feel your team would utilize this site to share content?

Frequently

12. How much do you feel your team would utilize this site to find information?

Sometimes

13. Would you recommend this site to other teams looking for information?

Yes

Probably. Again, it will have to be able to provide content that teams cannot get more efficiently elsewhere. Right now, there are a few sites (Chief Delphi, other sites) that I would direct teams to before this one.

14. Please comments on your usage of the site. If you did not participate much during the beta test, please comment on why you were unable to participate.

I feel that the site usage was okay. I never uploaded an article after trying 2-3 times. I provided feedback that I could not get it to work. Now, I was trying to do this while on a break from my "real job" and did not have the time to work out all the details. However, this might be similar to many FIRST mentors, who would be interested in uploading articles.

H.5.3 Example Response

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies,

Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296 , doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. Benefits of the Study: Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and

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previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel

508-831-5519 , Email mjcurley@wpi.edu Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1. VOLUNTEER'S STATEMENT: I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study. I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study. If I have any questions about my rights as a research subject in this study I may contact: New England Institutional Review Board 40 Washington Street, Suite 130 Wellesley,

MA 02481 Telephone: 1-800-232-9570 By consenting to participate in this study, I have not waived any of my legal rights. To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records. By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes

Section 1: Website Quality

2. How would you rate the overall quality of the FIRST ThinkTank website?

Good

3. How adequate do you find the types and selection of articles?

Good

4. Comments on the website quality?

Section 2: Site Organization

5. Do you feel that the selection of Supertags is sufficient?

Yes

6. Do you feel you would be more likely to search for specific articles or to browse the super and subtag sections when looking for information?

Half and half

7. Comments on the site organization?

Section 3: Ratings

8. Do you feel that the ratings you saw on articles were an accurate representation of the articles' quality?

Yes

9. Do you feel that a user rating (generated as a function of the ratings on their articles) would help you identify quality articles?

Yes

10. Comments on the rating system?

Section 4: Site Usage

11. How much do you feel your team would utilize this site to share content?

Rarely

12. How much do you feel your team would utilize this site to find information?

Sometimes

13. Would you recommend this site to other teams looking for information?

Yes

14. Please comments on your usage of the site. If you did not participate much during the beta test, please comment on why you were unable to participate.

I did not participate much. My available time is limited. There are already well established sites for FIRST information so why look elsewhere. The little time I did spend with the site I though was good. That is I thought the site was good but in is not far superior to say Chiefdelphi so why change when I already have a site that I am comfortable with. I am not trying to be critical, just honest.

H.5.4 Raw Data

FIRST ThinkTank Post-Beta Survey Results Overview



Date: 12/7/2008 6:37 PM PST
 Responses: Completes
 Filter: No filter applied

Informed Consent Agreement for Participation in a Research Study Investigator: Gretar Tryggvason, PhD Contact Information: Department of Social Science and Policy Studies, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609, 508-831-5296, doyle@wpi.edu Title of Research Study: Social Networking in the FIRST Robotics Competition Community Sponsor: National Science Foundation You are part of a selected sample of USFIRST Robotics Competition participants being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits or risks that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation. Purpose of the study: Along with faculty at Worcester Polytechnic Institute, USFIRST is creating and testing a website where USFIRST teams can share information about robotics, engineering, and competition strategy. The purpose of this first phase of the study is to find out what content and features users would like to see on the website. We are also interested in finding out why USFIRST teams do or do not continue to participate in robotics competitions. After the website has been launched another study will document how people use the web site and how that usage affects the team. The overall study results will help USFIRST improve the website for future competitions. Procedures of the study: This is a survey study being conducted on the web. Your participation is limited to filling out survey forms on the web and submitting them electronically.

Risks to study participants: None. **Benefits of the Study:** Your participation will help USFIRST improve the design and functionality of the website. It is hoped that the website will improve the ability of USFIRST teams to share information that improves team knowledge and performance. It is also expected that the website will help reduce the barriers to entry and sustained participation faced by new USFIRST teams. Recording keeping in confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the New England Institutional Review Board (NE IRB), will be authorized to inspect the data and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. Your identifying information will be kept in a secure location and will be stored separately from your survey answers. Once the data collection period is ended, all identifying information will be destroyed. Payment: You will not be compensated for your participation in this study. For more information about this research or about the rights of research participants, please contact: Professor James K. Doyle as listed at the top of the previous page. In addition you may also contact NE IRB Chair Dr. Alan Sugar at 1-800-232-9570 or the WPI University Compliance Officer, Michael J. Curley, Tel 508-831-5519, Email mjcurley@wpi.edu Your participation in this study is voluntary: Your refusal to participate will not result in any penalty or loss of benefits to which you may otherwise be entitled and will have no effect on your participation or placement in USFIRST Robotics Competitions. You may withdraw your participation in the study at any time. You may also refuse to answer any particular question posed by the study questionnaires.

1. VOLUNTEER'S STATEMENT: I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. I may contact Dr. Tryggvason if I have any more questions about taking part in this study. Dr. Tryggvason and the company he is employed by are being paid by the sponsor for my participation in this study. I understand that my participation in this research project is voluntary. I know that I may quit the study at any time without losing any benefits to which I might be entitled. I also understand that the investigator in charge of this study may decide at any time that I should no longer participate in this study. If I have any questions about my rights as a research subject in this study I may contact: New England Institutional Review Board 40 Washington Street, Suite 130 Wellesley, MA 02481 Telephone: 1-800-232-9570 By consenting to participate in this study, I have not waived any of my legal rights. To obtain a printed copy: I may contact the investigators at any time if I wish to receive a printable copy of this consent agreement for my own records. By clicking "yes" below: I acknowledge that I have read and understand the above information. I agree to participate in this study.

Yes		10	100%
-----	--	----	------

No		0	0%
Total		10	100%

Section 1: Website Quality

2. How would you rate the overall quality of the FIRST ThinkTank website?

Poor		0	0%
Fair		0	0%
Moderate		3	33%
Good		5	56%
Excellent		1	11%
Total		9	100%

3. How adequate do you find the types and selection of articles?

Poor		0	0%
Fair		0	0%
Neutral		3	33%
Good		6	67%
Excellent		0	0%
Total		9	100%






Section 2: Site Organization

5. Do you feel that the selection of Supertags is sufficient?

Yes		8	89%
No		1	11%



		Total	9	100%
2 Responses				

6. Do you feel you would be more likely to search for specific articles or to browse the super and subtag sections when looking for information?


Always search		0	0%
Mostly search		2	22%
Half and half		5	56%
Mostly browse		2	22%
Always browse		0	0%
Total		9	100%

Section 3: Ratings

8. Do you feel that the ratings you saw on articles were an accurate representation of the articles' quality?

Yes		9	100%
No		0	0%
Total		9	100%

9. Do you feel that a user rating (generated as a function of the ratings on their articles) would help you identify quality articles?



Yes		8	89%
No		1	11%
Total		9	100%

Section 4: Site Usage

11. How much do you feel your team would utilize this site to share content?

Not at all		0	0%
Rarely		3	33%
Sometimes		3	33%
Frequently		3	33%
Always		0	0%
Total		9	100%

12. How much do you feel your team would utilize this site to find information?

Not at all		0	0%
Rarely		1	11%
Sometimes		4	44%
Frequently		4	44%
Always		0	0%
Total		9	100%

13. Would you recommend this site to other teams looking for information?

Yes		8	89%
No		1	11%
Total		9	100%
2 Responses			

FIRST ThinkTank Post-Beta Survey Results Overview



Date: 12/7/2008 6:38 PM PST
Responses: Completes
Filter: No filter applied

4. Comments on the website quality?	
#	Response
1	Based on other sites which may contain similar information, this one is okay. I would be better able to comment once full site is up and running.
2	The website is in good condition and is well organized. keep up the good work.
3	Just needs more content
4	The ultimate quality will be determined not by its design or implementation, but by its contributors and users.

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FIRST ThinkTank Post-Beta Survey Results Overview



Date: 12/7/2008 6:38 PM PST
Responses: Completes
Filter: No filter applied

5. Do you feel that the selection of Supertags is sufficient?	
#	Response
1	Will need to see site in full operation to determine how well they work.
2	I don't think a predefined set of tags is *ever* going to be enough. Future needs aren't always foreseen.

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FIRST ThinkTank Post-Beta Survey Results Overview



Date: 12/7/2008 6:39 PM PST
Responses: Completes
Filter: No filter applied

7. Comments on the site organization?	
#	Response
1	Not bad. As long as the categories are clear and the articles are easy to search for.
2	The site is well organized.
3	organization is good
4	It's okay, but it took a while to get comfortable with it. I suppose I'm spoiled by the customizable "portal" of many other sites I frequent.

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FIRST ThinkTank Post-Beta Survey Results Overview



Date: 12/7/2008 6:40 PM PST
Responses: Completes
Filter: No filter applied

10. Comments on the rating system?	
#	Response
1	Everyone has their own rating scale and will rate an article based on it's importance to them personally. As more users are involved, we will get a better idea which articles rise to the top.
2	The rating system works well.
3	none
4	Any "peer" rating system is subject to manipulation.

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FIRST ThinkTank Post-Beta Survey Results Overview



Date: 12/7/2008 6:42 PM PST
Responses: Completes
Filter: No filter applied

13. Would you recommend this site to other teams looking for information?	
#	Response
1	Probably. Again, it will have to be able to provide content that teams cannot get more efficiently elsewhere. Right now, there are a few sites (Chief Delphi, other sites) that I would direct teams to before this one.
2	There are already too many other sites to keep track of.

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FIRST ThinkTank Post-Beta Survey Results Overview



Date: 12/7/2008 6:43 PM PST
Responses: Completes
Filter: No filter applied

14. Please comments on your usage of the site. If you did not participate much during the beta test, please comment on why you were unable to participate.

#	Response
1	I feel that the site usage was okay. I never uploaded an article after trying 2-3 times. I provided feedback that I could not get it to work. Now, I was trying to do this while on a break from my "real job" and did not have the time to work out all the details. However, this might be similar to many FIRST mentors, who would be interested in uploading articles.
2	I did not participate much. My available time is limited. There are already well established sites for FIRST information so why look elsewhere. The little time I did spend with the site I though was good. That is I thought the site was good but in is not far superior to say Chiefdelphi so why change when I already have a site that I am comfortable with. I am not trying to be critical, just honest.
3	We were extremely busy mentoring 3 FLL teams and getting ready to host a FLL Regional Qualifier.
4	So far most of the articles didn't have much information on them. To be useful, more information needs to be given. A good place to start would be with the new control system.
5	using the site was simple and easy to navigate it should be a great resource for FIRST teams
6	Time was a large factor.
7	It was a nice place to get info, but we're a smaller team that hasn't hosted workshops for other teams, which means we didn't have an article ready for posting. I think especially for newer teams, this site is great because of all of the resources available.
8	I was unimpressed by the site's apparent purpose, and I had other FRC-related sites I needed to monitor and use.

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