Implementation of Best Practices in the Operation of the WPI Assistive Technology Resource Center

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Abstract

The purpose of this project is to investigate and review the operations of the Assistive Technology Resource Center (ATRC) of WPI and provide a strategic future plan. To ensure the efficiency and efficacy of operations, it becomes necessary for organizations to execute a periodical review of the operations and overall status of the organization through a performance review. The ATRC was founded in 1999. Using the original Mission Statement of the ATRC as the focus of the review, an understanding of the best practices for the ATRC was developed through the use of surveys sent to clinical, educational, governmental and social service organizations. Additional comparisons to similar university-based Assistive Technology centers provided best known methods of operation. It is recommended that the ATRC focus on the areas of facilities, operations, management, marketing, and cost awareness. It is recommended that standardized organizational practices and a centralized database be developed. Recommendations for increased improvements in operations and marketing include greater levels of networking with stakeholders, the use of buddy marketing, the continued development and updating of publications, and a renovation of the website. In the areas of management and cost awareness, it is recommended that discrete roles are defined, the number of personnel be expanded, a cash flow projection be completed with subsequent application for funding, along with periodic comparison to similar university-based Assistive Technology centers. A five year plan for the development and future success of the ATRC is included.
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Chapter 1: Introduction

The objective of Assistive Technology (AT) is to provide the appropriate assistive, adaptive and rehabilitative devices or services to permit persons with disabilities to accomplish desired tasks. A formal definition of the term appears in the Assistive Technology Act of 1998: “The term `Assistive Technology' means technology designed to be utilized in...any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities or...any service that directly assists an individual with a disability in the selection, acquisition, or use of an Assistive Technology device” (Assistive Technology Act of 1998, 1998). To successfully strategize, design, realize and implement such technology requires the combined effort of individuals within various disciplines. This group or team is often made up of the individual with the disability, a family member or caregiver, a person trained specifically in the area of concern (whether it be a physical or occupational therapist, speech and linguistics pathologist, physician, etc.), as well as a rehabilitation engineer.

With the exception of a handful of large rehabilitation centers found in major population centers, such services and skills are often provided by organizations or centers that do not directly specialize in AT. For example: within Central Massachusetts there exist a number of organizations that provide rehabilitation services, yet only a handful of these specialize in, or contain departments specializing in, AT. Under these circumstances, all necessary resources may not be present for successful realization and fulfillment of the
principles of AT. Historically, the most predominant difficulty encountered by organizations involved with AT stems from both a deficient link to technical data pertaining to specific available devices as well as the lack of an engineering perspective when developing custom solutions.

The Assistive Technology Resource Center (ATRC) of WPI was founded in 1999, in part, to alleviate the need for these technical resources within AT-related organizations of the Central Massachusetts region. As a provider of technical resources, the ATRC developed a collection of web links pertaining to AT. These provide reference to a range of informational sources including national manufacturers offering assistive devices, local organizations offering a variety of services, educational resources, and national and state law and legislation regarding those with disabilities. With the large number of undergraduate students studying to become engineers at WPI, the ATRC sought to provide an educational opportunity for students to design assistive devices while simultaneously providing the engineering perspective to organizations in need of custom AT.
Chapter 2: Description of the ATRC

2.1 History and Overview of the ATRC

Worcester County and the surrounding area are home to a large number of organizations focused on providing support for persons with disabilities. APPENDIX C: List of Contacts, contains the names of several of these organizations. Programs include those at rehabilitation centers and hospitals, extended care facilities, disability services organizations, physical therapy centers, special education departments of primary and secondary schools, as well as other AT and rehabilitation specific organizations. Many of these organizations lack the engineering capabilities necessary to provide for the technical aspect of rehabilitation and AT device development. WPI Professors Allen Hoffman and Holly Ault sought to provide the necessary technical resources to organizations in need, leading to the founding of the ATRC in 1999 through a grant provided by the Fairlawn Foundation with the objective of providing a centralized source of technical information regarding current assistive technologies as well as the technical expertise of engineering students (Hoffman, Ault, & Catricala, 2001).

The ATRC facility includes a 1000 square foot laboratory used by student teams for the design and development of AT devices and resources for Interdisciplinary (IQP) and Major Qualifying Projects (MQP). Typical projects include an award winning glide control mechanism for wheelchairs (James F. Lincoln Foundation, 2002), a power wheelchair bumper system, a powered arm orthosis (for which a patent application has been filed), and a multipurpose worktable. The lab also serves to support graduate research projects.
as well as undergraduate courses, such as Rehabilitation Engineering (ME 3506), Introduction to Engineering Design (ME 2300), and an Introduction to Engineering course (ES 1020). Examples of projects designed in groups of three to five students within these classes include an armrest for a Mountain Man Bi-Ski, adaptive remote controls, and a self-leveling wheelchair cup holder. Many of these project ideas are developed through the associations with organizations, allowing students to create solutions to real-world problems.

One of several changes that have occurred since the Center’s conception is that the ATRC has evolved to become a regionally recognized center, expanding its outreach to a broader area in the Northeast. Today the ATRC continues to provide the community, health care organizations, and persons with disabilities a general AT resource and to continually expand the breadth of the mechanical engineering department by incorporating AT-based design projects within the WPI curriculum.

2.2 Mission of the ATRC

The mission statement of the WPI Assistive Technology Resource Center (ATRC) as it appears on the WPI ATRC website is:

"The mission of the ATRC is to foster the use of Assistive Technology through collaboration with professionals associated with local and regional clinical, educational, governmental and social service organizations that serve persons with disabilities. The ATRC disseminates technical information regarding the availability and use of assistive devices. When an appropriate commercial device is not available, the ATRC will collaborate with cooperating organizations in developing
modifications to existing devices or the design of a custom device. The ATRC focuses on mechanical and electro-mechanical devices.”


The ATRC focuses on promoting the use of assistive devices by both providing information about previously developed assistive technologies and creating customized devices of a mechanical or electro-mechanical nature. This basic pairing of an overall goal and methods of reaching said goal provides a succinct basis for evaluation and critique of the ATRC. The overall intent and wording of the Mission Statement shall remain as a foundation for the continued development of the Center.

2.3 The ATRC’s Outreach

Outreach is defined as an organization’s involvement with or activity in the community, especially in the context of social welfare (McKean, 2005). As with any non-profit organization, community involvement is integral to the program’s success; much of the ATRC’s success has been derived from active community involvement and awareness. Outreach programs have shown to be effective through the history of the ATRC (Hoffman & Ault, Interview with ATRC directors, 2007). Since its inception in 1999, the ATRC has actively sought to provide various outreach efforts, as shown through involvement in annual programs such as Camp REACH (a summer program for girls entering 7th grade), projects, and seminars. Through a continued focus on community involvement and awareness, the ATRC will be a center effective in achieving its mission.
2.4 Affiliations

Direct participation with other organizations related to the AT field is an essential element for the expansion and continued development of the Center. With the combined resources and funding provided by these affiliations, centers such as the ATRC can actively embrace projects once considered beyond the scope of the Center’s resources - for example an adaptive saddle for hippotherapy done in conjunction with Massachusetts Hospital School’s equine program (Landi & Manrique, 2003). Assistive technology centers, agencies, and other programs provide networking to a diverse array of resources and skills essential for the fulfillment of the Center’s mission. While the ATRC serves to assist and aid in the development of assistive devices, a combined effort is necessary for successful implementation. Close affiliations with other organizations may also provide opportunities for expanded outreach through the expanded contact base. Through active affiliations the ATRC can work to better provide and disseminate information from a centralized resource for rehabilitation professionals, while also providing a technically-based resource for the development and modification of assistive devices.

2.5 Projects at the ATRC

The growth and expansion of ATRC transpired through the development of affiliations. Numerous project and research opportunities are possible through the ATRC’s proactive involvement with students. As organizations and agencies became aware of the resources provided by the ATRC they began to seek the Center’s assistance, resulting in additional project ideas. Presently, the ATRC is incorporating many AT design projects into engineering courses, while also providing long-term projects such as Interactive Qualifying
Projects and Major Qualifying Projects. These projects range from several weeks to years, as in the case of graduate thesis work.

Since the conception of the ATRC, projects have focused on AT. While the education of students through AT projects remains the primary objective of the Center, aiding those with disabilities through development of assistive solutions follows as the secondary objective. Students work with both sponsors and faculty to design, prototype, and implement AT devices for clients. Project groups typically include two to five students working to develop devices that fulfill the needs of the client, company or organization. Through the successful completion of projects that satisfy the needs of the client, the Center acquires an effective means of developing affiliations, funding, and resources for the future.
Chapter 3: Background

3.1 General Information

The ATRC of WPI was established based on guidelines described in various proposals. With the intent of defining effective operations for the Center, a focus group was established, comprised of individuals from various organizations, with the goal of providing essential insight toward what would be the Center’s mission (Hoffman & Ault, Proposal to Establish An Assistive Technology Resource Center at WPI, 1998). By establishing working relationships and affiliations with several organizations through an active community outreach program, operations defined through the original focus group, the Center has been effective in its original mission.

3.2 Review of Funded ATRC Proposals

The establishment of the ATRC was a direct result of several documents, outlining the foundations for the Center. This section helps to define the original foundation of the ATRC through the review of these initial proposals.

3.2.1 Original Proposal of Establishment

The “Proposal to establish an Assistive Technology Resource Center at WPI”, written in August 1998, provides descriptions of the goal, background and objectives essential for the foundation of the ATRC (Hoffman & Ault, 1998). This proposal provided a directive for the ATRC’s conception. The goal of this proposal was “to develop an Assistive Technology Resource Center as part of the WPI Rehabilitation Engineering Laboratory” (Hoffman &
Ault, 1998). Shortly after, through a grant provided by the Fairlawn Foundation, the ATRC received the necessary funding to establish the Center and begin projects focused on AT.

The Center’s original focus was to serve the Worcester area in two forms: to provide the dissemination of AT information to the general public, and to design and develop custom AT solutions if an appropriate device is not available. With active involvement in the community and with rehabilitation agencies, funding was provided by the sponsoring agency (Fairlawn) for the development of assistive devices and organization of the resource center. Through resources such as the World Wide Web, internet databases, technical publications and manufacturers’ catalogs, the Center proposed to disseminate information on AT to both the community and rehabilitation professionals. Training sessions were provided to rehabilitation professionals on the use of the aforementioned resources. By the proposed affiliations, projects, and dissemination of AT information, the Center would function as a resource for not only other agencies but also as a center reaching to the region.

3.2.2 ATRC’s Purpose

The IQP “Assistive Technology Resource Center at WPI” (Martin & Thamilavel, Assistive Technology Resource Center at WPI, 1999) provides that the basis on which the ATRC was founded, with the report serving “to create a model for an Assistive Technology resource center at WPI, means of coordinating and supporting project activity in the disability fields between the project centers throughout the world and WPI campus” (Martin & Thamilavel, 1999). The breadth of this report, advised by Professors Hoffman and Ault, is rather expansive with a focus on various topics, including both IQPs and MQPs,
global work, design projects and several others. Much of the report focuses on previous project work, both nationally and abroad, showing that while many IQPs related to AT make use of global project centers, MQPs have been primarily limited to domestic sponsors. One problem outlined in the IQP is that many of the previous IQPs completed abroad have developed valuable information regarding the social and economic status of other countries. However, a separation existed between the completed IQP and MQP reports. The technical knowledge obtained though global project center-based IQPs had not been utilized in the completed MQPs. Martin and Thamilavel also draw focus to problems with the coordination in AT between students, advisors, and the global project center directors. Martin and Thamilavel arrive at these conclusions from the review of all AT based projects from 1986 to 1998, many of which dealt with customizations to wheelchairs; this realization was used in part to assert the need for an AT center at WPI.

This IQP effectively identified five functions that the AT center would provide to the WPI academic environment and in particular, the undergraduate Qualifying Projects. These five “tasks” were derived through critiques of the global project centers, recognition of the potential value of establishing connections between rehabilitation programs and the ATRC, analysis and definition of the need of AT in public school systems, and analysis of specific web resources. As a result, the IQP suggested five functions for use in the development and performance of the center.

These recommendations all serve a direct purpose in establishing a strong operating procedure for the ATRC. The first task focuses on involving the student body and attempting to gain student awareness, a process that would permit the ATRC to host
projects for students with a genuine interest in AT. The second task fulfills the Mission Statement in the goal of disseminating technical information available regarding AT devices, not only for practitioners in the health care or social service fields, but also for students in global project centers. The third topic indicates Martin and Thamilavel’s recognition of the potential value of working with the global project centers by means of funding. The fourth recommendation is based on interviews with advisors and students who completed projects relating to AT with other project centers. Martin and Thamilavel recognized considerable value in providing clear channels to the resources of the ATRC for students at other project centers. The fifth recommendation acknowledges that the ATRC would be capable of coordinating efforts with the global project centers through IQPs to discover areas of AT need, and in turn provide MQPs or possibly additional IQPs to fulfill the needs identified. The recommendations made within this report may be found in APPENDIX G: Martin and Thamilavel, Recommendations.

3.2.3 Expansion and continued development of the ATRC

“The Development Of a Regional Assistive Technology Resource Center,” submitted to the 2001 RESNA Annual Conference, provides the description of the ATRC as a “university-based center that serves as a technical resource to regional service providers” (Hoffman, Ault, & Catricala, 2001). Many regions lack a rehabilitation center, served instead by many smaller organizations offering forms of expertise and service. Working affiliations with both service organizations and agencies aid in melding the intrinsic forms of expertise and service provided by each, effectively implementing an interdisciplinary team approach through the consolidation of skills and services known to each organization.
The ATRC works to provide rehabilitation organizations and agencies with the technical skills provided by an engineering perspective.

The ATRC works to achieve two objectives related to Assistive Technology.

1. To provide a centralized information resource for rehabilitation professionals within the region.

2. To provide a technically based resource for either the modification, or the design and development of customized assistive devices.

(Hoffman, Ault, & Catricala, 2001)

The development of the ATRC was guided by an initial focus group, comprised of several representatives from local agencies, with funding provided by a local charitable foundation and assistance provided by other provider agencies. Through the attainment of such funding the ATRC began to provide three types of assistance; technical advice, development of design specifications and development/modification of customized hardware (Hoffman, Ault, & Catricala, 2001). Through quarterly meetings, participation at seminars, and active engagement in other outreach activities the ATRC effectively provides technical advice and hardware to other agencies.

3.3 Standards of Practice for Assistive Technology

“Assistive Technology can be defined as any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities" (United States Congress, 2006). In an effort to promote a code of conduct with regard to AT standards of practice, RESNA has defined a set of “Standards of Practice,” as may be found
in APPENDIX H: RESNA Standards of Practice. These RESNA standards serve as the general reference in terms of Rehabilitation Engineering and Assistive Technology (RESNA Professional Standards Board, 2004).

### 3.3.1 RESNA

RESNA, formally the Rehabilitation Engineering Society of North America, provides basic standards of operations for AT practitioners. The RESNA guidelines serve as standardizing mechanism within the AT community. RESNA has set forth twenty-one guidelines essential in promoting the highest ethical standards. These guidelines, presented in APPENDIX H: RESNA Standards of Practice, indicate how professionals are to serve clients. Example guidelines include: individuals shall engage in only services within their scope of competence, individuals shall truthfully and accurately represent their credentials, individuals shall cooperate with members of other professions. These examples show that the guidelines set forth are for the promotion of ethical standards to benefit clients. As such, the understanding and practice of RESNA guidelines serve as tool from which operational practices may be standardized to the best known practices of the AT industry.

### 3.4 Five Forms of Service

The Assistive Technology Resource Center at WPI works to provide the community, organizations and student body with five forms of service.

1. Identification and direction towards available services;
2. Immediate solutions and information to minor AT problems;
3. Long-term (greater than seven weeks) investigational and design projects provided for students in fulfillment of WPI’s required Interdisciplinary Qualifying Project (IQP) and Major Qualifying Project (MQP).

4. Short-term (less than seven weeks) projects for classes such as Rehabilitation Engineering (ME-3506), Intro to Engineering Design (ME-2300), and Introduction to Engineering (ES-1020).

5. Long-term graduate research projects.

From community involvement, participation at seminars, and programs such as Camp REACH, the ATRC works to provide information regarding available services offered by AT. The Center also provides large scale investigational and design projects for undergraduate students in fulfillment of WPI’s required Interactive Qualifying Project (IQP) and Major Qualifying Project (MQP). While fulfilling academic requirements, projects provide valuable experience. These projects help to further students’ knowledge within engineering practice and Assistive Technology, by providing small scale, multi-faceted projects for classes including Rehabilitation Engineering, Introduction to Engineering Design and Introduction to Engineering. Through the completion of such projects, the ATRC works in providing direct solutions to both minor and major AT problems.
Chapter 4: Problem Statement

After providing services and information in such a diverse and frequently transforming field for nine years, the ATRC Directors, Professors Hoffman and Ault, realized the need to assess the Center’s operations. The objective of this project was to provide an assessment of the Assistive Technology Resource Center and discover the best practices of similar successful organizations. Final objectives included providing recommendations and a five-year plan to enable continued development of the objectives set forth in the original proposal for the Center and as stated in the Mission Statement. A review of the best practices is necessary as the methods by which the services of the ATRC have been provided, along with the services themselves, may no longer be the best suited in the continuous goal of satisfying the objective of the Mission Statement. With the implementation of the best methods and recommendations presented, the ATRC will become more efficient in achieving its mission. An updated informational pamphlet will be developed along with a five year plan of goals is included.
Chapter 5: Methodology

A complete performance review necessitates a thorough understanding of operations, past and present. Much of this information has no written or concrete form, but is rather dynamic in nature and attainable only through a combined analysis of the Center’s operations and answers provided by questioning those who have been and are currently involved with the ATRC. Likewise, a firm grasp on the future of the organization is essential for the creation of a comprehensive business plan – an abstract area, most easily identified through interviewing current as well as prospective stakeholders. Thus, the purpose of this chapter is to establish methods for compiling a list of individuals and agencies to contact, for establishing survey and interview questions, for analyzing the current operations of the ATRC, and for comparison with other organizations of similar nature and purpose.

5.1 Contacts

To complete a thorough performance review required input from individuals previously and currently involved with the ATRC. Additionally, connecting with potential clients – those who do not currently have a vested interest in the Center, but may benefit from an affiliation – provided the information and contacts needed for future planning. Predicting the type of information these contacts would be able to provide proved necessary for successful interviews and surveys. For simplicity, the categories of these contacts consisted of past, current, and future; within these may be found the subcategories of: rehabilitation centers and hospitals, extended care facilities, services for the disabled,
physical therapy centers and practitioners, school based special education departments, AT services, University AT centers, and previous clients.

5.1.1 Previous Stakeholders of the ATRC

Past contacts include those clients whom the ATRC has served, undergraduate students that have completed either their required IQP or MQP through the Center, participated in related courses, and former graduate research students. By interviewing previous contacts, the practiced scope of the program, as compared to the suggested scope found in the proposals, was identified and served for support of analysis of the operations and of any continued change to the program direction. All past contacts provided by Professors Ault and Hoffman, and previous students as found through completed IQP and MQP summaries, were contacted. Information obtained from these individuals provided insight toward the success of the center in terms of fulfilling the needs of the clients, meeting the expectations of the contributors, and providing a rewarding educational, social, leadership experience to students.

5.1.2 Current Stakeholders of the ATRC

Current contacts included those students currently working with the center, the staff and clients. This entire category, except for students, includes several continuing contacts, and presents an area of overlapping knowledge. These contacts provided the most valuable information regarding all aspects of current operations, as they are an integral part in the ongoing operations of the center. Gathering and contacting the list of current contacts presented little difficulty, as all members remained active within the Center’s program and the list was easily acquired through the staff. The number of
contacts made with active or current stakeholders was sizable – approximately 25 contacts, spread between WPI Faculty, project sponsors and current students to provide a sufficient sample group to gain an understanding of the ATRC’s current operations.

5.1.3 Future Potential Stakeholders

In the discovery of potential stakeholders, primarily two subcategories were found to exist for the purposes of this report: prospective clients and funding agencies. Persons contacted within these categories included social workers, occupational and physical therapists, and special education teachers. Agencies contacted included rehabilitation clinics and hospitals, AT suppliers, local and national foundations. The benefit in contacting future stakeholders was twofold. First, the outreach provided information essential to the development of a recommendation set for the future operations of the Center. In addition, contacting these agencies provided a mechanism to exchange information regarding opportunities and services provided by the ATRC. In order to develop a list of possible stakeholders, a wide variety of means utilized included the local phone book, links featured on the ATRC website, websites of regional AT and Rehabilitation Engineering organizations and companies, and national groups such as RESNA.

5.2 Surveys and Interviews

Creating an effective set of surveys and interviews is an essential form of gathering useful information from a range of individuals. For the purposes of this project, two varieties of survey were used: quantitative and qualitative. Quantitative surveys consist of a questionnaire seeking short response answers, allowing an easy and quick reference to results. Qualitative surveys include a list of open-ended questions, similar to an interview.
Each type of survey will prove more apt for a specific group of contacts depending on several factors, with the level of involvement between the contact and the ATRC acting as a primary measure in the decision process. As nearly every contact presents a separate case necessitating a customized question set, topics are divided into past, current, and future categories, and likewise sub categories (rehabilitation centers and hospitals, extended care facilities, disabled services, physical therapy centers and practitioners, special education departments, AT services and university AT centers).

5.2.1 Survey Research: The Basics

In "Survey Research: The Basics," (Punch, 2003) focuses on small-scale, quantitative surveys, although much of what is stated applies to both types of survey. The presented set of guidelines for establishing a survey focuses on Independent Variables (IVs) and Dependent Variables (DVs). IVs are any subcategory that falls under the main subject and descriptor of the area pertinent to research, recognized as the DV. For example, "What is the relationship between intelligence, social status and motivation (IVs) and achievement in secondary school (DV)?" (Punch, p. 6). This overall defining question, broken down into singular IV-DV relationships (e.g., social status – achievement) provides qualitative, open-ended questions. The further breakdown and refinement of this relationship creates a concise list of quantitative questions. This method facilitates the formulation of questions that are direct and purposeful from a varied range of aspects. As these surveys will cover several different topics pertaining to a common goal, the IV-DV method will provide a clear method to creating the questionnaires, both quantitative and qualitative.
5.2.2 The Quantitative Survey

The concise and definitive nature of a quantitative survey best suits the needs of questioning when: the length of survey may be a limiting factor of response, there exists minimal current or past emotional investment or personal involvement between the surveyed and the DV, a quantitative set of data would provide the most effective response criteria, a clear set of IVs based on a DV exists, and a sizable number of persons with similar interests must be contacted.

5.2.3 The Qualitative Survey

Both qualitative forms of survey, interviews and open-ended surveys allow for a personalized response from the individual. The lack of a defined answer set and general question form proves valuable when there is a wide array of IVs, or likewise, a multitude of DVs. The lengthier nature demands more time for completion than the quantitative form, yet allows for detailing beyond the scope of the question (if the surveyed individual feels inclined to respond) – this is a valuable trait of this style, as those with strong opinions will usually put in the extra effort to extend their opinion. Smaller group sizes benefit from this form as tailoring questions to individuals themselves becomes possible.

Due to the personalized nature of this style, it is preferred that individuals complete these in a relaxed or familiar atmosphere allowing deeper, unrestrained thought (Creswell, 2003). For this reason, written surveys will take precedence over verbal interviews when possible. As this form of survey often provides responses of greater length, the free-response nature removes much of the ambiguity of quantitative surveys through the greater detail attainable (Creswell, 2003).
5.2.4 Survey Development

The individual IVs and DVs pertaining to each category of contacts determined, in part, the style of survey used with each category. Other factors include the number of persons to contact, the time that is expected for a subject to complete the survey, and the overall quantity of data desired from the category.

- **Previous Stakeholders – Qualitative surveys**
  - For most surveys, there exist discrepancies between each contact in a sub-group – minor personalization is therefore necessary.
  - There are numerous sets of individuals that must be surveyed, eliminating the personal interview capability.
  - These individuals have a vested interest in the function of the ATRC due to the previous relationship, and thus are likely to participate in a reasonably lengthy survey
  - **DV:** The successful operation of the ATRC according to its mission statement
  - **IVs:** (examples) The experience the respondent had while involved with the ATRC. The quality of work completed. The level of resources outside of the ATRC required.

- **Current Stakeholders – Qualitative Surveys & Interviews**
  - The rather limited set of individuals actively involved directly with the Center allows for highly personalized question sets.
  - If completed in interview form, it is possible to elaborate on certain questions and likewise recognizing new question opportunities. In cases where considerable information is sought but there is no logical way to proceed through questioning, an interview was utilized.
As stakeholders of the ATRC, the depth and breadth of the survey may be maximized.

**DV:** The successful operation of the ATRC according to its mission statement.

**IVs:** (examples) Participation in Assistive Technology associations. Outreach programs such as Camp REACH, EPICs. Ongoing affiliations. The experience of working with the ATRC.

- Prospective Future Stakeholders – *Quantitative*

  These potential stakeholders will have a number of questions pertaining to the ATRC. As such, a thorough description of the Center was provided to educate the surveyed, and clear, concise, and descriptive quantitative survey questions were utilized to receive maximum responses.

  **DV:** Would they see an affiliation with the ATRC as being beneficial? Worthwhile?

  **IV:** Their specific need for Assistive Technology resources

### 5.3 Critical Analysis of Current Operations of the Center

The method used for reviewing the operations of the ATRC follows four simple steps meant to provide a uniform critique of all parts. The initial step is *identification* and *definition* of the distinct components, during which first impressions about these components of the Center were also identified. Next, the *evaluation* of these components – give the specific method as to the current process, the form, and presentation. Following this, an *interpretation* of the effectiveness of each element provides a brief explanation of strengths and weaknesses, followed by a summary of findings. The final step is to provide
recommendations believed to better the current operations. This entire process focuses on referencing every operation through the Mission Statement.

5.4 Assessment of Similar Assistive Technology Centers

Several colleges and universities feature programs dealing with AT. A listing of these, as of 2004, is a feature under the Related Resources link on the ATRC website; additional university AT programs were discovered through extensive Internet research. Only a select few of these programs have goals similar those of the ATRC. University of Massachusetts Lowell features an Assistive Technology Program, a subset of their Electrical and Computer Engineering department, developing predominantly electrical engineering based AT devices. Many programs are resource centers for providing various services to students with disabilities, such as Stanford University’s Disability Resource Center. A third type is exemplified by the Adaptive Technology Resource Centre of the University of Toronto, where designs that do not meet the needs of individuals with disabilities undergo evaluation and redesign, resulting in useful Adaptive Technology.

While the purpose of these programs may not be the same, their service as university-based, “custom solutions” engineering programs provides a similar basis for operations. The best practices of these programs, found after consideration of each program’s method of operations, in comparison to those of the ATRC, provide a clear set of guidelines for possible improvements.
5.5 Developing A Five-Year Plan

The Five-Year Business Plan will serve as a proposal recommending the best-known methods of operations within the ATRC. The format shall follow that of a traditional Five-Year Business Plan, wherein (in order) appear:

- **An Executive Summary** explaining the objectives of the ATRC, with a clear and concise statement of the expected direction of the program.

- **A Description of the ATRC**, providing, in revised form, the Mission Statement, goals and objectives and background of the ATRC.

- **Services and Products Offered** by the ATRC, including a revised set of the Five Forms of Service mentioned in the Background

- **Marketing Plan** of the ATRC, consisting of all elements usable for public relations. This will facilitate the distribution of the ATRC’s services along with the future expansion of both markets and prospective clients. Also included will be a redesigned informational pamphlet featuring recent activities and including updated information.

- **Operational Plan** consists of the best practices discovered through research, including the daily operations of the organization. Guides to physical facility, archival system and website operations will be included to ensure consistent practice of operations in these areas.

- **Management and Organization**, including a description of the employees and their positions, along with an available backup plan for duty redistribution in the circumstance of loss of an individual.

- **Financial Plan** will include recommendations for acquiring sponsors, grants, or funding.
5.6 Final Methods

Information was obtained through the use of surveys and both phone and in-person interviews. Ten surveys were constructed (see APPENDIX E: Surveys), each tailored to a specific organizational group. Surveys were developed through initial research and the establishment of areas of concern, providing information for topics and questions. Contact information for the target population was obtained through various resources such as phonebooks and online mapping programs, effectively targeting our sample population.

In the interest of obtaining a higher response rate, each contact was pre-notified by phone, explaining the purpose of the survey and the overall goal of our project. Following the notification, e-mails were sent providing further information such as a pamphlet, the history and mission of the ATRC, and contact information. Additional surveys were distributed in several forms. The majority of potential clients were also sent a hard-copy survey, including a return envelope and pamphlet. Online surveys were also made available, providing efficient and quick results, while also being easy to access from any computer, at any time - the hardcopy and e-mailed survey both provided a link to the online survey. Results provided an overview of a series of topics, each providing distinct information relevant to the understanding and development of BKMs for use in the five-year timeline presented in APPENDIX A: Five-Year Plan.
Chapter 6: Findings and Discussion

6.1 Background

Being a university-based center whose primary focus is to provide a variety of low-cost and free information and design services relating to AT through student projects, the ATRC most similarly compares to a non-profit organization. As with any organization or business, continuous improvement founded on the best-known methods (BKMs) for the organization must be an unending goal. As the project focused on the development of these BKMs, surveys were developed to accrue information pertinent to the operations of the Center from various sources including representatives of rehabilitation departments, hospitals and extended care facilities, school districts, other university-based AT centers, previous clients, and alumni. In total, surveys were sent to 127 individuals and organizations (excluding the larger number of additional alumni who inadvertently received the survey), receiving 49 responses providing information pertinent to the development and understanding of the current best known methods.

Table 1: Summary of Contacts

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Contacted</th>
<th>Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehabilitation Centers/Hospitals</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Extended Care Facilities</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Disabled Services</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>PT Centers/Individuals</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Schools</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>University AT Centers</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>AT Relevant Organizations</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Previous Students</td>
<td>71</td>
<td>28</td>
</tr>
<tr>
<td>Previous Clients</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>49</td>
</tr>
</tbody>
</table>
6.2 Potential Client Surveys/Interviews

As with any organization, success is often directly impacted by the role of other organizations as clients, who play a distinct and dynamic role in the mission of the ATRC. Initial research provided information to develop our understanding of such organizations, resulting in a detailed target population. Surveys were sent to 45 organizations that could yield potential clients, and would thus be fundamental to the Center’s success. Thirteen responses were received, including two interviews and three phone conversations. Questions outlined several key topics including disabilities encountered, period of involvement, suggested areas for improvement, and solutions. These surveys and interviews provided information regarding the impact of AT throughout a variety of organizations including rehabilitation and extended care centers as well as special education departments within school districts. The results of the surveys and phone interviews aided in setting a basis for operational standards within the ATRC.

6.3 Hospital Rehabilitation Departments

Surveys were sent to 13 rehabilitation hospital department administrators, with replies from Burbank and St. Vincent’s Hospital. Each survey consisted of 10 questions outlining several key categories including disabilities encountered, period of involvement with the patients, recommendations for involvement with the ATRC, and disability solutions as shown in APPENDIX E: Surveys.
Results show that rehabilitation hospitals focus on short-term care, providing physical, occupational, and speech therapy with services provided within a 7-9 week time period. Services requiring extended care, such as those involving stroke, spinal cord injury, burns, trauma and orthopedic conditions are initially treated; if found to require further care, the department will make referrals to centers specializing in long term rehabilitation. Furthermore, patients requiring further assistance, whether neurological, or rapidly progressing illnesses’ such as Lou Gehrig's, MyeloDysplastic Syndrome, and cancer are referred to hospice care programs.

Devices sought for rehabilitation, especially those used in physical care therapy, are readily available, mass produced, and inexpensive. The department often provides device adaptations for cases requiring specific care, or requiring an adapted device. Furthermore, rehabilitation centers often see similar injuries, where current devices may be adapted to provide more sufficient care. Product adaptations result from an understanding of need, once perceptible, therapists work in modifying the device by simple adaptations such as to reduce pronation, improve support or improve other mobility issues. Noting the ATRC's devotion towards product adaptation and development, interest was expressed in the possibility of forming an affiliation to provide the opportunity to improve care.

### 6.4 Extended Care Facilities

Surveys for extended care addressed several topics, including commonly seen disabilities, what factors lead to a recommendation for extended care, services provided, and device use. Surveys were sent to eight extended care center administrators, receiving two replies APPENDIX E: Surveys.
Extended Care centers, or long-term rehabilitative centers provide services for increased periods of time; depending on each situation, therapy may be provided anywhere from several weeks to several years. In cases necessitating extended care, recommendations towards extended patient care are a direct result from prior experience with rehab therapists, social workers, nurses, family members, and residents. Extended care facilities focus on progressive illnesses, such as those affecting communication, mobility, and Activities of Daily Living (ADLs). Once recommended, patients will receive therapy, including OT, PT and speech, often through the use of ambulation, ADL and communication devices. While frequently making use of various assistive devices, centers show a need for custom solutions, due to the diversity of cases. Adaptations to devices are often required; however, as centers do not have the required internal resources or the funding to seek external resources, such solutions may not be feasible. Moreover, as centers do not have the appropriate resources, whether technical or monetary, both expressed an interest towards the ATRC, predominantly to discuss possible solutions to patient care through the use of assistive devices.

6.5 Primary and Secondary Education

Special education departments at primary and secondary public schools, as well as schools specifically for the disabled, ensure that the educational experience of an individual with special needs is the same as that of their peers. As started with the 1972 Massachusetts Chapter 766 education law (Chapter 71B), and progressing to the Individualized Education Plan (IEP) of the national Individuals with Disabilities Education Act (IDEA) (TITLE I -- Amendments To The Individuals With Disabilities Education Act,
2004), the education of youth with disabilities became directly tied to assistive devices through the need for environmental access and educational aids. “504 Plans,” as named for the Section 504 Rehabilitation Act of 1973 (Section 504 of the Rehabilitation Act) and the Americans with Disabilities Act (Americans with Disabilities Act, Title II, Subtitle A, 1991), ensure that those individuals not needing specialized instruction will still receive all necessary accommodations, often through assistive technologies, to provide a standard level of education.

In the interest of understanding the specific role AT plays in the educational environment, individuals at five special education departments and two schools focused solely on providing education to the students with disabilities, or special education schools (SESs), were interviewed or sent surveys. Three responses were received from special education administrators and therapists, while one response was received from a the administrator of a school for students with disabilities. The responses ranged in terms of departmental positions, one derived from the PT/OT of the school, two from special education program directors, and one from an AT director.

Typical periods of involvement vary, contingent on the level of adaptation needed and dependence of the student. Within the public school system, assistance is provided to students ranging from 2 to 22 years of age (this is extended into adulthood at SESs). Direct service is initially provided for “minor” cases one to two times per week in the form of a consultation lasting 30 to 45 minutes. As the student becomes more independent, involvement decreases to one or two times a week, further decreasing to a monthly basis or
a final discharge from the program. These students typically require only slight modification or assistance to the environment, grade level or curriculum.

Students with equipment or special AT needs are eligible for consultative services until graduation. If requiring further assistance, eligibility and IEP teams determine the student’s suitability to the program; if deemed suitable for an IEP or “504 plan,” extended services are provided in the areas needed, whether through physical therapy, a specialized education program, or specific learning aids. Depending on the school district, all cases are re-evaluated on a one to three year basis to determine if the program remains suitable for the student; review is continuous, and plans may be adjusted at any time. IEPs are also formulated for those with severe cognitive disabilities; it was indicated that in the past these students often left the education system before secondary education levels, but now it is common to see them graduate through secondary school; individuals are often recommended to providers of employment, habilitation and clinical services such as CLASS, Inc. and Community Work Services\(^1\).

Products and devices used to assist students with disabilities are dependent on the level of therapy needed. Students provide their own wheelchairs, often customized or developed with therapists’ input. Other products, such as standers and walkers, are ordered from a variety of manufacturers. Additionally, departments within the school system, such as the maintenance and AT department, order or customize devices such as desks, chairs and standers to fit the need of a specific student/patient. However, two

\(^1\) CLASS and Community Work Services are non-profit organizations devoted enhancing the lives of those with disabilities by offering job opportunities, assistive technology, family resources, habilitative services, and other services to assist those with disabilities.
individuals within special education departments indicated that they encounter many situations where custom devices prove useful. The respondents provided several examples of situations requiring the use of custom assistive devices. “A young boy with Duchene’s MD is unable to feed himself anymore and needs a self-feeder that is light weight and easily transported.” Also “A student with severe cerebral palsy is unable to access his communication device well with his hand/fist. A visual scanning system and head pointer have also not been successful with him.” In addition, one respondent identified a young girl with underdeveloped motor skills; the center would like to use a motorized tricycle. As the girl gains motor control, the input power would decrease, until the girl may independently ride the tricycle.

Although more exuberant than some, when asked if she believed an affiliation with a university-based project center would be beneficial, one respondent stated, “Yes, yes, yes! Any and all help is greatly appreciated!” Three categories where help could be utilized were indicated: services, professional development workshops or training, and equipment. Services included consultations in preschool classrooms, life skills classrooms and resource rooms to suitably determine how to better accommodate students on IEP or on 504 plans; general assistance with IEP planning; assessments of augmentative, communicative, written, expressive, computer, vision, and literacy skills. Professional development includes integrating augmentative and alternative communication (AAC) into the classroom, such as training with Boardmaker (picture communication software), Co:Writer and Write:OutLoud (literacy and communication software), and Universal Design for Learning (UDL), a concept developed by the Center for Applied Special Technology (What is Universal Design for Learning, 2007). Equipment includes not only such devices as
mentioned previously, but also educational software, communication devices and displays, touch-based devices, alternative keyboards and mice, along with the training on the use of these specific devices for all individuals involved.

6.6 Previous Clients

Three previous clients were interviewed, following four contact attempts. The topics covered in conversation included the type of projects completed with the client, perceived value and success of the projects, communication with the project groups, areas for improvement and overall impressions. Areas of discussion are broken four key categories, relevant to the understanding of BKMs: communications, overall impression, purpose, value.

Results show three predominant forms of communications were used throughout the period of involvement. Following initial contact, communication is provided through on-site visits, E-mail, and phone, all of which are believed to be effective in providing adequate information to successfully complete each project. Upon the project completion, clients typically receive one follow up e-mail, inquiring as to the implementation and use of the device. Additionally, clients appear to have a continued interest with the center, wishing to receive additional updates to the Center’s developments; it was indicated that clients appreciate the newsletters.

In relation to the Center's success, results show the ATRC consistently produces useful and creative devices, with one client stating, “The projects were stimulating and enjoyed.” Furthermore, another client stated that although “not all the projects fulfill the
required objective, but those that do cannot be beat.” Clients stated that they appreciated
the student involvement, which allows for fresh thinking and a new outlook on ideas, all
while showing that they care for the position of others. The ATRC, more specifically, the
Introduction to Engineering Design course (ME-2300) provides for two specific niches:
developing supplementary products, and helping to fill research fields. Results consistently
prove the ongoing operations of the ATRC to be successful, delivering devices to fulfill the
required need.

These results provide valuable insight into future affiliations for the ATRC, offering
both guidance and understanding of the need for AT. As shown throughout the history of
the ATRC, projects consistently emerge as a direct result of client input. Additionally,
conversations with previous clients repeatedly show an interest in continued collaboration
the center; consistently commending the ATRC as providing an excellent resource for both
students and clients alike. However, as clients noted, the ATRC does not provide continued
outreach, subsequent to that of a follow up. With clients as the primary source for such
projects, importance lies upon the continued involvement of each client.

Results also demonstrate the specific niche of the ATRC, shown to be within the
class projects of the Introduction to Engineering Design class (ME-2300) and IQP/MQPs,
each fulfilling a distinct need. As noted by one client, the ATRC satisfies the need for quick
and innovative solutions, providing helpful solutions to a select group of people, the result
of many class projects. Furthermore, the ATRC provides solutions assisting those with
chronic and progressive illnesses’ so often seen within extended care centers. School
districts also show widespread acceptance of a center such as the ATRC. As these are
centers are devoted to providing long-term care, opportunities are missed due to the lack of resources: many simply do not have the technical capability to design assistive devices. As a center devoted to the development and creation of devices used to assist in daily activities, the ATRC fits the need of both extended care centers and school districts, providing the necessary engineering background for successful device creation.

6.7 Alumni

After an inadvertent event substantially expanded the alumni contact list, over 30 responses from those completing projects concerning disabilities and AT were received. It is to be noted that several more responses arrived from students regarding the previous forms of the ATRC or of its developmental period; only topics deemed current are included herein. The following focuses on areas recognized as adequate and those deemed deficient (see APPENDIX E: Surveys).

In identification of the Center’s academic success, the most predominant concept indicated by those who have worked with the ATRC is that they continue to hold a lasting interest in AT and aiding those with disabilities – to quote a former student, "[The ATRC] furthered my knowledge in disabilities and what can, and needs, to be done to improve the lives of people with disabilities. I was amazed at the limits of what is commercially available." Another former student, now a web developer, insures all websites produced meet ADA guidelines for accessible Internet. Coupled with the majority of responses indicating that their interactions were successful in not only bettering their academic and "business-orientated [sic] acumen," responses further identify that there was a great personal value, such as this former student’s response: "I loved my project and still feel like
we did something to improve the lives of others." These findings all indicate the overall success of the ATRC in providing students with valuable projects, MQP, IQP or other, through which they may develop their individual abilities.

Regarding communication between students and project clients, one-on-one interviews are described to be the most valuable, with phone interactions the second most valuable. It was noted e-mail and other computer-based interactions may work sufficiently in some cases and be impossible in others – further, the e-mail process tends to require more time to receive the equivalent information. In situations where no specific client is specified, the advisor input and knowledge “proved more than adequate” to develop project specifications, and when required, design iterations.

One alumnus noted that the Center contained few examples of devices available on the market; these devices, even if not directly applicable to a project, would provide a better understanding of the functionality and general concept of device design. Further, it was noted these would likely be easy to attain through corporate donations and partnerships. Without in-house devices such as powered prosthetics, orthotics, or similar biomechanical equipment, the alumnus noted that several visits were required to the sponsor’s site to develop a hands-on understanding for the desired device.

Several alumni who responded actually completed projects external to the Center, while still relative to AT. Many noted that work could be done toward better name recognition within the student body, as they believed the use of the Center’s resources would have effectively enhanced their project. This would provide students with the
knowledge of the resources available both in preparation for a project (PQP, when applicable) and during the project.

Responses from individuals eager to learn more about the Center were also received. These requests include those of personal interest, with respect to family and personal disabilities, as well as corporate or client interest. One individual also indicated an interest in financial support of student projects. This desire to connect with the current happenings of WPI serves as a clear indicator to the value in continued outreach to alumni – not only may the Center provide greater awareness to the community, there are several opportunities for the continued development of the ATRC available through the alumni body.

6.8 University Based Assistive Technology

6.8.1 Background

There exist numerous universities with programs devoted to providing assistance to those with disabilities throughout the United States of America and Canada. The majority of these centers and programs focus on providing assistive technologies and environmental access reviews for their respective student populations; few of these programs focus on outreach to provide AT to the external community. In a search initially based on a 300 mile radius from WPI, three centers were found to closely relate to the ATRC, an additional three were part of an integrated or multi-faceted university program (these are not focused centers, but rather one area covered by a larger program), and one other program featured a coordinated relationship with a healthcare provider.
From these seven centers and programs (as found in APPENDIX C: List of Contacts), phone interviews were conducted and questionnaires sent seeking a general breakdown of the operations. Topics covered included public and internal relations, funding and sponsorship, scope of management, and project coordination (APPENDIX E: Surveys). Of these seven centers and programs selected to receive questionnaires, four responses were received – the UMass Lowell Assistive Technology Program (ATP), an ATRC-like program with a focus toward electrical and computer engineering; the Adaptive Technology Resource Center (ATRC) of the University of Toronto, similar to WPI’s ATRC in mission, except limited to the student body only; the Hampshire College Applied Design and Assistive Technology Program (Lemelson Center), an integrated-design program; the Center for Assistive Technology (CAT) of Buffalo University, a multi-faceted research unit.

6.8.2 Specific-focus programs

As variations in the types of university-based centers create differing levels of management and operational needs, the WPI ATRC is most closely related to programs that may be defined as "specific-focus programs" - those who function only to provide AT projects to students and engineering services to clients. For this comparison, the UMass Lowell ATP is used due to the similar nature of the programs.

All other contacted university-based centers feature a larger faculty and staff size – for example, the UMass Lowell ATP had eight faculty or staff affiliated with the center, described as "sufficient" for the support of center operations. The CAT of Buffalo features 15 individuals on staff, with eight additional affiliate members. Professors Ault and Hoffman provide all of the faculty support for the ATRC. At various times during the history
of the Center, additional support for administrative tasks has been provided by graduate students and, occasionally, work-study students. The positions found at other centers include: program director, capstone project instructors and advisors (equatable to WPI faculty project advisors), technical coordinator, AT support, program consultant, and fabrication specialist.

The average number of projects completed per year at the UMass Lowell ATP is 20.5 projects (years 2000-2007). The WPI ATRC completes an average of 3.7 MQPs and IQPs per year. In comparison to this most recent year, 2007, the Lowell ATP completed 27 projects with the eight staff members; the ATRC completed six ATRC MQP and IQPs with the two staff members. This gives ratios of 3.4 and 3 projects per staff member - it was indicated that at the CAT of Buffalo, advisors conduct an average of four projects per year. The WPI ATRC advisors also conducted four classes involved with the ATRC. These classes were represented as three projects per class (it was indicated this may be up to five) or twelve additional projects per year, yielding an adjusted ratio of over 9 projects per faculty in 2007.

Figure 1: Projects Advised at the WPI ATRC (MQP and IQP) and Figure 2: Projects Advised at the UMass Lowell ATP, show the variation in number of projects conducted over the past several years at the ATRC and UMass Lowell, respectively. The data for these graphs was established through the searchable MQP & IQP collection found at the WPI George C. Gordon Library (MQP and IQP Searchable Collection, 2007) and UMass Lowell ATP website (Assistive Technology Program, 2007), respectively.
There are several key notations must be made about these values. It is clear that the analysis of a single year may not sufficiently represent a basis for comparison, as the number of projects completed varies greatly at each center each year. The nature and complexity of the projects completed at the centers may not be equivalent; faculty and staff may have commitments other than toward the AT program; faculty and staff size may not
remain constant. Nonetheless, it appears that faculty involvement is around 3-5 projects per year at these centers.

6.8.3 Multi-focus programs

Of the integrated programs, the Lemelson Center was found to be a single project center for general design with a focus on AT. The Center houses a metal and plastics fabrication shop as well as a computer-aided design lab within the School for Interdisciplinary Arts. The CAT of Buffalo University is a rather dynamic organization concentrating on research through multiple programs. Both centers indicated that the multitude of disciplines available through a varying range of faculty and staff, as well as the direct access to design and fabrication facilities results in an invaluable, synergetic environment.

CAT of Buffalo has developed several areas of focus, each formed into what are essentially separate programs. One example includes a client-service program that assesses an individual’s current needs and ability to use the appropriate AT, and then is provided the recommended equipment through third party sources. The individuals are trained to competency with the device and receive any necessary continued support to adapt to daily activities. Another example is trainings, or workshops provided on AT access, use and interoperability. This is done in affiliation with the Western New York Independent Living Project, Inc (an organization similar to CLASS, Inc of Massachusetts), who provide general information and referral as well as a demonstration and loan center. Both of these aforementioned programs rely heavily on affiliations with third-party organizations.
Described as being valuable to community outreach, the CAT of Buffalo, or more particularly the faculty and staff, commit to activities beyond design projects focused on device development. Classes or mini-courses are taught in regional schools, promoting disability awareness throughout the primary and secondary school levels; this activity is very similar to the disability awareness workshop offered by the ATRC as part of Camp REACH. On a fee-basis, continuing education on AT is provided to teachers, therapists and counselors, providing up-to-date information regarding the capability of current devices and the availability of these devices. On-campus environmental and educational accessibility reviews are conducted as needed, fully documenting the nature of the problem and indicating the best available solutions. Workstations are found or developed for students who would benefit from such devices. All of these activities insure that those who may both actively and passively work with AT are up to date and informed about the technology, all while promoting the center as available for research and development tasks. The ATRC does not provide this form of service.

6.8.4 Funding

Minimal response was received with regards to funding, other than to note that primary funding for general research and development derived most often from federal grants, with private foundations often providing monetary help for specific projects based on disability. The National Institute on Disability and Rehabilitation Research (NIDRR) was twice noted as the primary sponsor. The NIDRR is a component of the U.S. Department of Education, Office of Special Education and Rehabilitative Services, focused on providing “comprehensive and coordinated programs of research and related activities to maximize the full inclusion, social integration, employment and independent living of individuals of
all ages with disabilities” (NIDRR, 2007). With regards to all university-programs contacted, no definite information on operating or per-project costs was received as many are “funded as necessary” with advisor approval.

6.8.5 Geographical coverage

Both the UMass Lowell ATP and the CAT of Buffalo indicated the importance of recognizing the services from programs related to individuals with disabilities that serve the same geographical region is of utmost concern to the operations. With a firm understanding of what is already available within the given region, the resources of the center may then be applied to areas where it is most needed. With regards to this, the Lemelson Center and the UMass Lowell ATP are found to be 60 and 43 miles, respectively, away from WPI by major highway. As both provide AT services, it is important to realize the scope of operations of these programs both in terms of geographical area and project type. The Lemelson Center provides a multi-discipline approach to the creation and adaptation of assistive devices with a focus within Franklin, Hampshire and Hampden counties; the UMass Lowell ATP provides a predominantly electrical and computer engineering project base to the greater Nashua, Middlesex and Essex areas; the WPI ATRC provides services to the Worcester County region with a focus on mechanical and electromechanical devices.

The identification of similar services extends beyond university programs, as it is even more pertinent to be aware of services and programs with similar or parallel missions within the vicinity of the organization. Database search engines such as Hoovers (Hoover's Company Search, 2008) and Associations on the Net (Associations on the Net, 2008),
collections such as the Gale Encyclopedia of Business and Professional Associations (Gale Research Inc., 1995-) or even basic internet searches present viable routes for the discovery of relevant organizations. Acknowledging these not only ensures that there is minimal service overlap, but also creates a collection of programs and organizations that may be viewed as potential clients or affiliates for the continued operations of the Center.
Chapter 7: The Developmental Process of a Business Plan

7.1 Business Planning

A range of topics covering the management of a non-profit business, as well as the proper form for a business plan, were discussed extensively in one-on-one meetings with individuals from WPI’s Collaborative for Entrepreneurship & Innovation and the Department of Management. Through the resources of these individuals in the management field, along with the resources presented through WPI’s George C. Gordon Library (Business Plan Resources, 2007), valuable information was obtained to relate common small business practices to the operations of a not-for-profit university-based project center.

The primary concept leading to the successful function of a business is that of goaling. Whereas the ATRC’s Mission Statement clearly identifies the continuing purpose of the Center, there remains a requirement of short-term goals for the organization and the individuals within it. These relate directly to a master plan made up of long-term goals and the mission of the organization.

Most formats for a business plan, essentially a guide to achieving the master plan of an organization, follow a very similar design: executive summary, business description, market description, operations, public relations/marketing, management, financial statement. Also suggested for inclusion is a five-year plan, providing the goals described through the business plan in a linear, time-based format. While the business plan itself
provides the strategy, the five-year plan indicates achievable targets for specific time periods.

In regards to the specific management of an organization, it is stressed that task delegation must be clearly defined, that each member must be focused on continuous improvement and that periodic reviews should be used to ensure the development of the organization. It is necessary to identify the best practices or best-known methods for accomplishing activities in order to strive toward the ultimate mission of the organization. Reinforcing the concept of a master plan, it is difficult to define tasks, seek continued improvement or even sufficiently review actions without first having a firm understanding of where the organization is headed as indicated through a business plan.

Business planning is a fundamental step within any organization, identifying areas of focus required for continued development. Researching various fields such as marketing, public relations and operations, provides the basis for defining the best-known practices and focus for a program. Business plans often identify the strengths of marketing, PR and operations. By analyzing the current Center, recommendations may be made accordingly, providing focus towards needed improvement. While business plans identify the strengths and needs of the market by providing information regarding improvements, other tools such as a marketing plan indicate the best-known methods for disseminating information about the current success of the ATRC.
7.2 Marketing Plan

Strategic market planning is an instrumental tool used by management to focus operations, fulfilling previously defined goals. Non-profit organizations are capable of attaining a stable revenue source through grants and foundations when the necessary criteria for receiving such funding are met. Furthermore, organizations such as the ATRC are also capable of keeping a continuous flow of projects through the center by effectively marketing the organization. In order to successfully and continually operate in this stable manner, a strategic plan is required. The Center must have adequate resources to provide for the development of such a plan. Discussion with various personnel within WPI’s marketing department resulted in several options to market the overall goals of the ATRC, as provided within the WPI ATRC Mission Statement. It is important to recognize the significance of marketing, as such a plan is used to market the resources available to potential stakeholders, providing for the ongoing development of the Center.

A multitude of resources exist, both on campus and locally, to successfully market the services and success of the ATRC. Such techniques are commonly used in businesses for the establishment and widespread growth of their market and potential clients. While unable to determine the value in terms of success for the ATRC, such marketing strategies can effectively disseminate information, services and success to widespread markets. Within WPI, the school newspaper and the publication Transformations, received by current students, employees and alumni of university, present clear opportunities for the internal marketing of the Center. In the past, articles such as “Two Degrees of Separation,” (Bowles, Winter 2005) clearly indicated the potential and value of the Center to the WPI
community. The *Telegram & Gazette* publicizes articles of general interest and has a
circulation throughout central Massachusetts.

There exist external publications specific to assistive technology and related health
care fields where attempts at marketing may hold great value. Publications directly tied to
assistive technology, like disability and rehabilitation: Assistive Technology (Taylor &
Francis) and Assistive Technology Outcomes and Benefits (Assistive Technology Industry
Association) describe present research and development within the Assistive Technology
field. These publications call for papers describing the outcomes and development of
assistive technology, for which submittals may be made online. There exist organizations
and publications directed toward related healthcare fields such as extended care providers,
physical and occupational therapists, rehabilitation centers, among others, to which the
submittal of appropriate documents may prove worthwhile. Wherever there is a potential
use for the services of the Center, there remains an open opportunity to spread the ATRC
name.

An important note is that each publication may only be effectively utilized on a
certain time frame and towards specific information. While publishing information
regarding activities in the Center may work on a frequent, possibly term-by-term basis in
the school newspaper, other marketing through publications such as the *Telegram &
Gazette* or a specific journal may be best suited for long term “updates” or unique,
exemplary events. The Division of Marketing & Communications at WPI is more than open
to aiding any university centers.
Chapter 8: Recommendations: Continued Success of the ATRC

All ideas for the enhancement of the Center are presented through four categories: facilities, marketing, operational/management, and cost awareness. Recommendations are a direct result of the best-known methods as obtained through research, interviews, surveys and meetings. Such best-known methods, or best practices, will be applied to the operations of the ATRC; the results of which will be described in detail. It is important to note that while each recommendation is discrete, the individual headings present a series of interrelated recommendations to be concurrently implemented.

8.1 Facilities

The ATRC facility provides necessary resources to fulfill the Center’s mission, effectively providing the foundation for operations. Used as a location for the majority of project meetings and prototype development and having at least one room with clear visibility to any who pass by, the ATRC Directors must recognize the need for continual updates, advertisement, and organization of the facility.

8.1.1 Storage

The ATRC is housed within a 1000 square foot laboratory, utilizing the space for project development, meetings, exposition of previous projects and storage. From an “initial view” perspective the area appears cluttered, disorganized and unkempt. While providing a useful resource for involved students, outsiders may view the Center as disordered. The team recommends that in effort to eliminate this viewpoint the ATRC organize and publicize the lab. Organization within the Center may be maintained through
the arrangement of tools during periodical cleaning sessions; it is recommended that a minimal once-per-week walk through for organization be completed. The Center should also keep counters and tables free of excess clutter; this provides the sense of cleanliness and professionalism to outsiders. This is not to say that tables should be wholly cleared, as works in progress kept out display the active use of the facility.

The Center stores a multitude of prototyped assistive devices within the lab, appearing to be what was labeled by a Senior Mechanical Engineering student of WPI as a "wheelchair graveyard." Presently, the ATRC does not practice a standard organizational method for previously completed devices. It is thus recommended that the Center identify a specific locations and areas where devices can be discretely cataloged; discrete cataloging involves the use of unique storage locations, individually set to each project. It is recommended that designed "parking" areas are labeled for commonly used devices, indicated on the floor and device by tape of a discernable color/pattern. Devices and items less commonly used should be stored in low shelving or cabinets, with contents marked on the outside; the item should also be marked with regards to which storage space it belongs in. Devices viewed as valuable for display purposes should be given prime locations near or visible through the windowed-door at the South entrance of the lab. Organization through this method clears space within the ATRC and organizes past devices for timely retrieval. This system of cataloging should be integrated into a database to ease the future retrieval of projects, with a list of items and location displayed in the storage area. Photos taken of each room or area while in the desired state of organization, and then posted within that area, serve as a visual best-known-method.
Currently, many students know the ATRC as the “Wheelchair Lab”, due in part to the large number of wheelchairs present in the lab. The Center should identify the lab as a part of the ATRC, asserting its presence as an organization and facility, rather than another lab. The promotion of the ATRC is achieved through the presentation of the ATRC logo within and around the lab itself. Additionally, the ATRC should increase the use of interior wall space for publication purposes, displaying project posters along the upper wall. Through simple improvements the lab becomes the ATRC, known to students, students; families and anyone else who may walk through the building.

8.1.2 Centralized Database

Currently, the ATRC does not have a centralized database for the organization of reports, affiliate and potential clientele information, or grant opportunities and requests. It is recommended for the ATRC to develop electronic databases for the organization and easy retrieval of such information. Centralized databases will allow students to search the database for information pertaining to a certain project or affiliate. Similarly, staff may search for previous clients, grant opportunities, potential clientele, and other resources. Such a system would provide excellent organization of information within the Center, being easily accessible by students and staff. This centralized database would allow the Center to coordinate maintenance and activity efforts between personnel while determining the Center’s current status.

To implement such a system the Center Directors may look to develop a future IQP involving students outlining the development of centralized databases for the center. This IQP should also accompany the further development of the website, as both are ultimately
related. Such databases should be easy to access and user friendly for all, while easily updateable for staff. When developing a database detailing previous devices, it is recommended that the Center provide a visual database. One specific idea involves the use of the human body divided into multiple sections, with each project listed under the section which the device focuses to assist (arm, leg, hand, etc.). This type of a database is easily searchable by students, affiliates, and potential clientele, while also being user friendly and interactive, ultimately effective in providing information regarding the completion of projects within the ATRC. Furthermore, databases used for affiliates, potential clientele or grants may be simple excel spreadsheets listing contact information, previously completed projects, dates of notification and contact with the organization, information sent, and any response from the organization or foundation.

### 8.2 Marketing

Marketing is the second most valuable tool for the ATRC, the first being projects themselves. Being such a valuable asset, the ATRC must look to take further initiative in improving its presence throughout the community. Since marketing and public relations provide the primary support and development of the Center, future success will directly relate to the continued involvement and development of this area.

#### 8.2.1 Networking

As project ideas are often the direct result of client suggestions, networking is essential for the continued success of the ATRC. As such, networking will be an important aspect for the future expansion in the ATRC; in regards to project development, outside funding, and potential clientele. By becoming proactive in regards to the development of
clientele, the ATRC may effectively disseminate the Center’s name and Mission to potential clients. To effectively network, the ATRC may see a need to create a database listing potential clients to contact, as further explained in the aforementioned section on databases. The Center will need to determine their effective range. Once determined, an individual, perhaps a work-study position, should develop a list of potential clients within the specified range. Results from surveys provide information regarding the potential clients of the ATRC - special education departments, extended care facilities, hospice care and pediatric programs.

Additionally, the Center may see the need to develop a series of tasks to be completed that may help spread the ATRC’s name to both organizations and the community. Such tasks include the distribution of pamphlets, courting of local media, continued involvement in conferences and the development of articles for publication in trade journals. Furthermore, it is important to note that while networking provides the introductory development, marketing and publication strategies provide the means of use.

8.2.2 Buddy Marketing

Buddy marketing is a strategy employed to increase the overall networking initiative through free and efficient marketing. Used as a promotional tool, buddy marketing makes use of present affiliations for increased publication. The team recommends that the ATRC seek to develop such a marketing strategy, as a result from conversation with a potential client, recommending the use of buddy marking to promote market development. As such, the team recommends that the ATRC seek to develop such a strategy.
Buddy marketing works through the joint distribution of information when seeking potential clients, or distribution of annual newsletters/pamphlets. As an example of buddy marketing, when the Center provides information to affiliates, potential clients or other contacts relevant information regarding a specific affiliate would also be included describing their operations, mission and services. In return the affiliate provides the same service, including information regarding the mission of the ATRC with publications, or newsletters. The Center may speak with previous clients to evaluate their interest of participation in a buddy marketing program, providing an overview of such a strategy to these clients. If willing to participate, the Center must develop an effective strategy for implementation. One strategy the team recommends would be to develop and distribute a pamphlet or newsletter providing a section devoted to the affiliate, providing an overview of recent events, updates and services. Buddy marketing essentially expands the market of organizations through widespread distribution, resulting in a larger potential client market. Such a strategy will help in promoting the continual networking and dissemination of the ATRC’s mission.

8.2.3 Publications

Publications are an effective, cheap, and simple marketing tool used to continually update previous clients, or entice potential clients. It is recommended that the Center regularly update both the pamphlet and newsletters. Provided with this project is a modernized template for the pamphlet (APPENDIX B: Example Updated Pamphlet); such a design could be annually updated with recent projects. The Center uses publications for continual contact with previous affiliates; while effective for the continued involvement with past affiliates, such a strategy does not effectively disseminate information to
potential clients. Furthermore, after discussion with previous clients the team recommends that publications should be sent bi-annually to both potential and previous clients wishing to receive updates. Potential clients note that the most effective form of contact would be through E-mail. It is recommended that the Center seek to E-mail pamphlets to potential clients. When unable to obtain E-mail addresses, pamphlets should be individually mailed to potential clients.

When sending information to potential clients, it is recommended that the Center look towards school district PT/special education programs, extended care facilities, long term care centers, and programs such as hospice care, as these are organizations that are directly involved with providing services to the disabled. As this process is time consuming, the team recommends that the ATRC hires a work-study student to prepare mailings for potential clients using an aforementioned database.

8.2.4 Website Modification

Websites often provide the initial means of communication between organizations and future clients. Being a primary source of initial contact, the ATRC should focus on providing continuous up-to-date information regarding the operations, resources and involvement of the ATRC. Currently, the ATRC’s website is out of date and does not meet W3C guidelines as shown through the application of W3C guidelines using Webdeveloper\(^2\) in Firefox (APPENDIX D: W3C Guidelines Test). Most predominantly, this test shows that as the pictures on the website are not displayed, the primary link to the ATRC’s home page

\(^2\) Webdeveloper is an add in for Firefox providing the tools to assess and develop web sites to meet regulatory guidelines.
is effectively eliminated. Furthermore, the test also shows the cell divisions overlapping, complicating navigation and accessibility. Various resources exist to assist web developers in insuring an ADA Approved site (Center for Applied Special Technology, Inc., 2007), many of which can be accessed online; the W3C guidelines are presented in the W3C guidelines (Chisholm, Vanderheiden, & Jacobs, 1999). "Bobby/W3C Approved" sites allow equal accessibility for those with disabilities. As an Assistive Technology Center, those with vision impairment and other such disabilities that may limit interoperability with a standard display may view the site.

The website should also be updated to include recent announcements, activities, projects and any recent publications pertinent to the ATRC. This information should be displayed on the main page of the ATRC, providing the reader with an overview of the recent postings, activities and operations of the ATRC with links to any additional information. At the end of each year, the ATRC should provide a separate page with an overview of the highlights of each year; the WPI Camp Reach website may be referred to as an example (Camp Reach, 2008).

It is recommended that the website include sections describing the affiliates and local organizations that have been involved with the operations of the ATRC, including information regarding projects completed with each affiliate. By providing information describing the affiliations and organizations, potential clients develop an understanding of the services provided with regard to assistive devices. Also, the dissemination of information regarding the Center’s operations, projects, academic value and resources allows potential clients to determine the value of the Center as applied to their operations.
As such, it is important to provide a page devoted to contacting the ATRC. As websites require ample time to consistently update; Center personnel should develop a regular update schedule to continually present the ongoing work of the Center. Such modification may be the result of an IQP done with perhaps a MG or MIS student, or through hiring an individual (student or other).

8.2.5 Documentation

At the present time, the Center does not effectively document current projects, recent involvement with WPI, clients and community, or ongoing operations within the ATRC. Survey results with potential clients and past students illustrate that the ATRC name is unfamiliar throughout both the school and community. As such, it is important for the ATRC to publish and document all ongoing operations, internally, online, and through media. To facilitate documentation, the Center should develop a centralized location, server or database, as described in the section “Centralized Database”. This documentation facilitates internal organization while also offering information towards the continued developments of the center. Documentation provides the opportunity to distribute the name and operations of the ATRC without additional cost to the Center. Furthermore, the documentation of current operations, projects and other news present the ATRC as an active center, consistently involved in Assistive Technology.

8.2.6 Continual Project Updating

Projects consistently show the success and academic value of the Center, all of which should be documented. As documentation requires substantial completion time, it is recommended that the Center look to hire a federal work-study student to document
previous and current projects. Projects should be updated online and included within a centralized database for future reference. Additionally, Directors within the Center should continually archive each team’s progress throughout the course of a project, facilitating future documentation. Project updates may include a step-by-step description of the design/engineering process, as depicted by written explanation and visual involvement. This documentation should provide the abstract, as written by the students, overviewsing the goals and intended progress. Also included should be information describing the continued development and course of the project until the final completion. Such documentation provides potential stakeholders with detailed information to permitting an assessment of the academic value and success of the Center before becoming involved. Furthermore, such documentation presents the notion of group involvement, with active advisor participation, presenting the academic success of the center.

8.2.7 Media

Today, 54 percent of Americans read the daily newspaper, according to an annual report on journalism (Project for Excellence in Journalism, 2004). As Massachusetts is home to over six million people this equates to roughly 3.5 million daily readers, a substantial resource for any business or organization. Given the large number of readers, such a resource provides an excellent source to publicize the mission and operation of both WPI and the ATRC. Additionally, the ATRC should look to publish or disseminate information regarding the ATRC and its operations in trade journals, publications or other literary resources. Such marketing will present the operations and success of the ATRC to a wide range of potential clients. Media provides an effective and easy way to further the range of the ATRC, increasing the awareness of both WPI and the ATRC and their role and
efforts in the community. The WPI Division of Marketing and Communications provide openly offer their services in publicizing and spreading awareness of all campus happenings through various media outlets. Directors may look to compose an article detailing a recent project, overviewing the fulfillment of need as described by the client and the communal and academic value presented by the project. This article would be submitted to the public relations department for final review and publishing. Ultimately, the decision regarding final publication and source distribution of articles falls with WPI Marketing at the time of circulation. Additional information may be obtained by contacting the PR department at this time. Such publications provide valuable insight into the development and understanding of Assistive Technology and the distinct impact on individuals.

8.2.8 Visual Identity

Visual identification is critical for identifying the Center’s operational prominence within WPI. Presently, a deficiency exists in the visual establishment of the ATRC as a functioning Center. Results from alumni surveys consistently show the ATRC is unknown to most students and alumni, with several stating that they were not sure if their project was completed for the ATRC. Students within the Introduction to Engineering Design course (ME2300) were also unaware of the ATRC’s involvement in course projects, as faculty made no mention of the Center’s association throughout the class. Furthermore, upon the inspection of recent projects, the ATRC logo and name is absent from reports, while other projects clearly indicate the department and/or corporate sponsor. If sponsoring projects required for degree completion, the ATRC should request the visual presence on poster presentations. Additionally, instructors within the ME2300 course
should address the affiliation, mission, and role of the ATRC to students completing AT projects. Visual identification defines the Center within WPI, addressing the mission, role and technological impact within the AT field to students, potential clients, professors and parents.

8.3 Operations/Management

The management of the ATRC is the keystone of the Center’s operations, providing the necessary resources fundamental for continued operation. With only two teaching professors overseeing operations, constraints are placed on the time allotted to certain tasks. As such, the division of roles and appointment of additional positions is necessary for the Center’s future operations.

8.3.1 Defined Roles

Defining discrete roles within any organization allows for continual organization and review of operations. The assignment of such roles between individual employees reduces the overall work, enabling each employee to better focus their efforts. Currently, the Center does not define specific roles for each position, with the director’s completing tasks as they see necessary. It is recommended that the ATRC define discrete roles for each position, appropriately dividing work between employees. Directors should provide for the continued operation of the center, focusing on budgeting, projects and any other tasks required for the successful operation of the Center. Additional work-study positions should be appointed defining the completion of tasks: documentation, updating, and mailings. Although necessary for the future success of the Center, these tasks require
additional time to complete. Furthermore, this work provides valuable experience to students, developing skills valuable outside the regular curriculum.

### 8.3.2 Personnel

The ATRC operates under the management of two professors, both fulfilling the management, operational, academic, networking, and public relation positions of the Center. While managing a successful center, the professors do not have the time required to efficiently complete such tasks as networking and public relations; it is recommended that the Center look to appoint a position for graduate students, or work-study students. Such a position permits the delegation of such time-consuming tasks as networking and publicizing. Students within these positions may develop newsletters and articles for distribution among affiliates and potential clients, create advertisements, contact potential clients directly, and organize the Center’s resources. Furthermore, students may develop databases to effectively organize both projects and potential clients for further contact. The Center may also look to develop an IQP for students to redesign and update the current website. Such an IQP would offer a valuable experience to students while providing a free resource to update and better publicize the Center.

### 8.4 Cost Awareness

As with any organization providing not for profit services, cost awareness and planning is important for continued success. Listed below are several recommendations for the accrual of funds and allocation of budgets within the Center.
8.4.1 Grants

As the ATRC continues its mission, funding will be a predominant factor in the continuation and further development of the Center. After speaking with other university centers, as well as individuals from WPI’s marketing department, it is recommended that the ATRC look towards the attainment of external funding. Additionally, the WPI marketing department recommended that the ATRC develop a grant database, listing numerous organizations that offer funding for non-profit and disability services. Many sources exist providing information regarding grant agencies and programs offering funding. Within WPI there exists a grant database where information pertaining to specific grant types may be obtained, local libraries offer a multitude of information pertaining to grants and the ATRC may look to readily available online grant searches. The information obtained from the aforementioned resources allows for the development of a detailed grant database and subsequent preparation of grant applications.

8.4.2 Cash Flow Projection

A cash flow projection is a tool used to analyze the transfer and use of money within organizations. Since the ATRC runs multiple projects with limited funding, importance should be placed upon the understanding of monetary flow throughout the Center. Such projections allow the Center to forecast weekly, monthly, or annually expenses, effectively predicting the required monetary assets for a specific time period. Additionally, such projections provide information concerning the distribution of money throughout the organization, useful if the Center is budgeting for an expended period of time. The process for a cash flow projection is simple. In application the Center would begin by identifying the anticipated income and expenditures for each week, month or year, this being cash
flow. Once charted, the Center can accurately approach budgeting for the following week, month or year, while also allocating money where needed.

8.4.3 Comparison to similar centers

There are several local centers focusing in the development or adaptation of assistive devices to aid the disabled. Following conversations with the WPI management department, it is recommended that the ATRC compare the Center’s program and operations to other centers such as Lemelson and UMass Lowell, both expressing interest in the operations and developments of other centers. By comparing the ATRC to other, similar centers the ATRC will determine valuable information pertaining to operations, management, and monetary investments, essentially understanding the effectiveness of the operations.
Chapter 9: Conclusions

The Assistive Technology Resource Center of WPI (ATRC) was founded in 1999, its mission to foster the use and understanding of assistive technology, while also assisting in the development or modification of assistive technology devices. As nine years have passed since the development of the ATRC, the Center’s involvement within the continually developing assistive technology field caused the managing professors to seek a study of the current best practices for the Center. This report provides information and recommendations to assist the ATRC in the implementation of the best practices for its continued operation.

The evaluation and presentation of recommendations were a direct result of literature research, observations and interviews with potential and previous clients, alumni and the AT center directors. Interviews overviewed a broad range of topics focused to provide specific information regarding the need and use of assistive technology, the responses of which led to the development of recommendations for the continued success and development of the Center. Additionally, information obtained regarding AT centers, and other organizations involved with the use and implementation of AT devices led to the development of a five-year plan. This plan serves in assisting the Center by setting a series of time-based goals for continued success.

This report serves to identify the potential clients, market and understanding of need for assistive technology, as well as present recommendations for best practices in the operation of the ATRC. A five-year plan was created to assist in the future planning and development of the ATRC. The guidance offered through this plan will help ensure the
continued development and accrual of potential clients, affiliates, while also setting forth a plan for increased internal analysis through adjustment of operations. As these suggestions offer the direction dictated by the current best practices, the implementation of these recommendations is an essential component for the continued development and success of the ATRC regarding the future development of Assistive Technology at WPI.
References


http://atp.caeds.eng.uml.edu/


http://www.w3.org/TR/WAI-WEBCONTENT/


Gale Research Inc. (1995-). *Gale Encyclopedia of Business and Professional Associations*.


APPENDIX A: Five-Year Plan

Objectives of the WPI Assistive Technology Resource Center
As established through the ATRC Mission Statement and Directors

- To provide students with projects valuable to their academic experience.
- To disseminate technical information regarding Assistive Technology.
- To provide technical engineering knowledge and services to the Assistive Technology community.

Goals of the WPI ATRC
As realized to ensure the successful attainment of stated objectives

- Improve management of facilities in terms of storage and organization as well as centralized databasing of all items handled by the ATRC.
- Improve the Visual Identity of the ATRC through action toward increased and improved outreach and marketing.
- Improve operations and workload levels of ATRC staff through defined roles and consideration of increased personnel.
- Ensure sufficient funding for all projects and Center operations.
- Ensure both continual and periodic reviews of practices occur to assess the ongoing operations of the ATRC.

Priorities for the next five years
Targets to be completed by end of year; based on a typical A,B,C,D,E term year.

Year 1: The 2008 to 2009 Academic Year

- Development of basic operations and physical plant. These tasks are selected in priority to provide a firm basis for the continued development of the ATRC over the next five years.
  - Updated website meeting W3C guidelines for internet content. Design should also be simple enough to permit any ATRC staff member to update. Create sufficient documentation on how to update the various pages of the website. - Task sufficient for IQP or ISP work.
• Formulation of databases for maintaining universal contact lists, previous student list, newsletter recipient list, press-release contacts. Also, database of existing projects in both physical and hardcopy should be created. - Task sufficient for IQP or staff.

• Updated formatting of newsletter to include not only recent projects but information regarding the recent sponsors/clients. When the sponsor/client permits, distribute with information regarding their operations. - Task sufficient for any staff member of Center.

• Updated pamphlet, with design capable of being updated on an annual basis so as to provide recent project examples to the recipients. An example design is included within this report. - Task is sufficient for any staff member of the Center.

• Organization of the physical plant should be completed, with specific marked locations for high-use items, low-use items stored away in non-intrusive locations, and items of general interest given locations viewable through the South, glass-door entrance of the lab. This applies to not only devices, but also books, documents, posters, tools and supplies. Visual representations and lists matching items to location are key to the success of organization on this scale. - Task is sufficient for staff or as part of IQP.

• Contact previous year’s clients to survey satisfaction of completed projects. - Task suited for any staff member.

Year 2: The 2009 to 2010 Academic Year

• Definition of Roles and Decision on Expansion of Center. With the previous year’s tasks completed, the focus of this year is to develop an understanding of the direction the ATRC is to go.

  o Perform a review of the roles of every individual working for the ATRC. Focus on division of work, investigating areas of overlap in search of

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3 Example simple database for Previous Students may be found on submitted Compact Disc.

4 Staff includes work-study positions for qualified students, graduate student, or general hired staff member.

5 The example pamphlet may also be found in template form on the submitted CD.
simplification. Determine work load to determine the need for additional staff. - Task is ideally suited to a hired staff member.

- At this point, a decision should be made on whether or not it is desirable to expand the Center. Expansion would presumably consist of bringing on additional advisors, as well as at least one staff member, an operations manager, to handle day to day operations of the Center; additional funding through a sponsorship, or shared resources through a direct affiliation should be considered. - Task should be discussed between directors and then department and other interested faculty.

- Develop a current contact list consisting of clinical, educational, governmental and social service organizations that the Center may contact to offer services. - Task is suited to any staff or as part of IQP.

- Review and critique website, database, newsletter and organizational methods, making any necessary adjustments. It is predicted that the organizational methods will undergo several changes before a suitably static solution is realized. As part of the review, ensure that regular updates of website and databases have occurred. - Task is suited to staff.

- Perform the annual update on pamphlet and website project pages, archiving the previous year's projects. - Task suited for any staff member of the ATRC.

- Contact previous year's clients to survey satisfaction of completed projects. - Task suited for any staff member.

**Year 3: The 2010 to 2011 Academic Year**

- Outreach to Potential Clients and Publicizing of ATRC. After reviewing the basic operations of the ATRC, determining the desired direction of future operations, and developing a list of potential new clients, it is the time to

- Based on desired future size of the Center, a varying number of organizations should be contacted to develop additional relationships. The potential of clinical, educational, governmental and social service organizations in terms of project ideas is large. It may be necessary to prioritize additional project ideas, in which case a database should be created identifying the client, idea, and perceived priority. - Task is best suited to hired staff due to the time consuming nature.
- Publicizing the Center’s recent projects through various local and regional media outlets, as well as device-relevant journal publications. The process should be recorded and contacts made with the media elements so as to permit regular publicity exposures. Internal marketing, as through the WPI student newspaper and internal newsletter *Transformations*, should also be performed. - Task is best suited to combined effort of directors with the WPI Marketing and Communications Division.

- Review basic operations, ensuring website, database, newsletter and organizational methods remain effective in achieving goals. It is likely that any necessary changes to these elements will be small in nature. Ensure posted "relevant links" on webpage are working and update with any new organizations. - Task is suited to any staff member of the ATRC.

- Perform the annual update on pamphlet and website project pages, archiving the previous year’s projects. - Task suited for any staff member of the ATRC.

- Contact previous year’s clients to survey the level of satisfaction of completed projects. - Task suited for any staff member.

**Year 4: The 2011 to 2012 Academic Year**

- Grant Development and Funding. At this time, it would be advisable for the ATRC to seek external funding for large scale projects and general operational funding. With the previous year developing project ideas and contacts, the necessary platform for establishing financial need will be available.

  - Attempts should be made to discuss the operations of other similar university based centers, in particular Hampshire College’s Lemelson Program and UMass Lowell’s Assistive Technology Program. Discussion of operational procedures, monetary investments and management resources will provide a deeper understanding of the current - Task is suited to an operations manager or directors.

  - The Center should identify the anticipated income and expenditures on a weekly, monthly and yearly basis, indicating the cash flow. From here, a budget forecast may be made to determine the need for funding. - Task is best suited for center directors.

  - A list of possible grants should be developed, and decision made on which may be applicable to the current activities of the ATRC. The development
of a top-quality grant proposal is highly pertinent to the application process. - This task is well suited for cooperation between a reference librarian, the WPI office of Research Administration and ATRC staff.

○ Continue to provide focus on contacting organizations related to the Assistive Technology field. - Task is suited for any ATRC staff.

○ Continue to provide focus on publicizing the Center. - Task is suited to an operations manager or directors.

○ Review basic operations, ensuring website, database, newsletter and organizational methods remain effective in achieving goals. It is likely that any necessary changes to these elements will be small in nature. Ensure posted "relevant links" on webpage are working and update with any new organizations. - Task is suited to any staff member of the ATRC.

○ Perform the annual update on pamphlet and website project pages, archiving the previous year's projects. - Task suited for any staff member of the ATRC.

○ Contact previous year's clients to survey the level of satisfaction of completed projects. - Task suited for any staff member.

Year 5: The 2012 to 2013 Academic Year

• Review and Continued Development. With the previous tasks having been completed, the ATRC should be in a position to again decide on the intended direction of the Center.

○ It is suggested that at this time an IQP or MQP for a Management major be planned for the review of the developed operations of the ATRC. All areas should again fall under scrutiny, with an increased focus on the financial side of the operations - the basic groundwork laid out through the previous four years should provide a sufficient platform for the development of a financial assessment along with a long-term Business Plan for the ATRC.

○ An area of focus should continue to be the contacting organizations related to the Assistive Technology field. - Task is suited for any ATRC staff.

○ An area of focus should continue to be publicizing the Center. - Task is suited to an operations manager or directors.
o Review basic operations, ensuring website, database, newsletter and organizational methods remain effective in achieving goals. It is likely that any necessary changes to these elements will be small in nature. Ensure posted "relevant links" on webpage are working and update with any new organizations. - Task is suited to any staff member of the ATRC.

o Perform the annual update on pamphlet and website project pages, archiving the previous year's projects. - Task suited for any staff member of the ATRC.

o Contact previous year's clients to survey the level of satisfaction of completed projects. - Task suited for any staff member.
APPENDIX B: Example Updated Pamphlet

See electronic copy, filename “Example Pamphlet.pdf”

Figure 3: Pamphlet Side 1
Figure 4: Pamphlet Side 2

Graduate students worked to develop a powered wheelchair bumper system. The device employs multiple motors supporting 2-axis movement. This movement provides powered shoulder flexion/extension, abduction/adduction, but extension to assist in daily activities.

A senior student design team designed and evaluated a bumper system for a power wheelchair that eliminates bumper damage to chairs, parking meters, and other large objects in sports.

Students involved with an Engineering Design course contributed to our prototypes to assist in daily activities.

Students worked to develop a keyboard for a Braille display for a blind client with cerebral palsy.

Three student teams developed a linked dolly system to assist in disabled transportation. This design allows for easy storage of the dolly, while being secure and extremely stable.

A project group developed a device that would effectively reduce the wheelchair glide. The glide was controlled through the use of a friction belt. When the wheelchair was moving backwards the belt would engage, providing additional weight and braking the glider.

Improved Multi-Passenger Van Accessibility

Keyguard for a Braille Display

Glide Control Device
# APPENDIX C: List of Contacts

## Schools
- Marlborough Public Schools
- Shrewsbury Public School
- Wachusett Regional School District
- Worcester Public Schools

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## University AT Centers
- Adaptive Technology Resource Center Toronto - U.Toronto
- CAT of University of Buffalo
- Center for Assistive Tech and Environmental Access - Gatech
- Lemelson Assistive Technology Dev. Center - Hampshire
- UMASS Amherst Assistive Technology Lab
- UMASS Lowell ATP
- UPMC - Center for Assistive Technology - U.Pitt

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## AT Relevant Organizations
- Assistive Technology Solutions (ATS) at CLASS, Inc.
- Assistive Technology, Inc.
- Center for Living and Working
- DBTAC New England Ada Center
- Easter Seals
- Federation for Children with Special Needs
- MASSTART Central Region (UMass Med Center)
- MASSTART Coordinator
- United Cerebral Palsy

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## Previous Students and Clients
- Alumni
- Galvin Regional Center, Mass DMR
- Gary Rabideau
- Lorraine Norwich
- Seven Hills - Groton

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APPENDIX D: W3C Guideline Test

Shown below is the result from the W3C guidelines test as performed on the WPI ATRC homepage. Several guidelines were affixed to the site using Firefox WebDeveloper - displaying of Alt text for both pictures and links, removal of flash objects and viewing of link perimeters. These guidelines allow the developer to quickly identify the web page's fulfillment of W3C guidelines.
APPENDIX E: Surveys

Surveys and survey questions were developed to allo analysis into current and future involvement and best practices in the Assistive Technology field. The survey’s were issued via mailings to all individuals, while also being available online. Additionally, several survey resposense were the result of interviews. The surveys available online were created with FormSite\textsuperscript{6} and implemented on a WPI ATRC Survey site, developed by the team.

APPENDIX E-1: Potential Client Surveys

Surveys developed for potential clients and affiliates. Potential Client surveys were sent to 52 individuals, receiving 19 results. The result of online and interview surveys allowed the team to gauge future involvement and best practices within the medical industry. These surveys outlined several key topics including disabilities encountered, period of involvement, suggested areas for improvement, and solutions.

\textsuperscript{6} FormSite is a program used for the development and creation of online surveys for implementation in specific websites.
What is the typical length of involvement with clients?

What is the methodology for seeking clients and specific organizations (disability services, extended care centers, etc.)?

How many projects occur simultaneously, and what is the productivity in a given year?

What is the primary method of funding for the center?

Do you feel a strong community outreach, as well as maintaining contact with previous clients beneficial to the center?

Remember: All results are completely anonymous.
What are the centers community outreach efforts? do you provide newsletters, pamphlets, etc.

What do you feel are the key elements to a successful program, such as outreach, projects, organizational structuring?

Additional Comments:
What is the typical length of involvement with clients?

How does the staff interact or instruct project members through a typical project?

What is the methodology for seeking clients and specific organizations (disability services, extended care centers etc.)?

What is the methodology for obtaining project ideas, do you look to any specific organizations?

How many projects occur simultaneously, and what is the productivity in a given year?

Remember: All results are completely anonymous.
What is the primary method of funding for the Center? Could you provide a ballpark figure for the overall operating budget?

What is the relationship between the schools curriculum and the center's projects?

How do students become involved with projects?

What are the center's community outreach efforts, do you provide newsletters, pamphlets etc?

Additional Comments:
Remember: All results are completely anonymous.

What forms of disabilities do you provide services to?

What is the typical period and type of involvement with patients?

Do you provide follow up care services to discharged patients?

What types of disabilities do you see to be benefited by custom Assistive Technology devices.

How do you handle a situation if a device does not suite the needs of the client?
Do you see cases where custom Assistive Technology devices would be beneficial, if so could you explain one such case?

Would it be beneficial to have contact with a university based Assistive Technology center to discuss possible solutions?

Would you be interested in receiving more information about the WPI Assistive Technology Resource center?

Do you have any affiliations to other organizations that provide services to those with disabilities?

Additional Comments:
Assistive Technology Resource Center

Extended Care Centers

*Remember: All results are completely anonymous.*

What forms of disabilities do you see likely to be benefited by Assistive Technology?

Who makes recommendations towards cases necessitating long term or extended care?

What rehabilitation services do you provide to residents?

What services are provided for chronic disabilities?

Do you use any devices to assist residents with daily activities?
Have there been situations where a custom solutions device may have proved useful?

Would it be beneficial to have contact with a university based Assistive Technology center to discuss possible solutions?

Additional Comments:
Physical Therapy

Remember: All results are completely anonymous.

What is the typical period and type of involvement with patients?

Who makes recommendations towards cases necessitating long-term rehabilitation?

In dealing with products used to assist patients, do you seek readily manufactured devices, or do you look for custom designed solutions?

Have you encountered situations where a custom designed device would be useful?

When discharging patients with a chronic disability, do you offer referrals to sources providing assistance with daily activities? Would it be beneficial to have contact with a university based Assistive Technology center to discuss possible solutions.
Remember: All results are completely anonymous.

What forms of disabilities do you see likely to be benefited by Assistive Technology?

Who makes recommendations towards cases necessitating long term or extended care?

In a typical outpatient case, what is the average length of time that services are provided for?

What is a normal process for an outpatient case?

In dealing with devices required for rehabilitation, do you solely seek manufactured devices or do you also look to custom solutions?
Have there been situations where a custom solutions device may have proved useful?

Would it be beneficial to have contact with a university based Assistive Technology center to discuss possible solutions?

What is the basic layout of the organizations structure, and what are the groups involved within a typical patients case.

What are some forms of community outreach used by the center?

What is your centers strategy for contacting discharged patients, do you find this useful?

When discharging patients with a chronic disability, do you offer referrals to sources providing assistance with daily activities?

Additional Comments:
School Rehabilitation

*Remember: All results are completely anonymous.*

What types of disabilities do you see to be benefited by custom Assistive Technology devices?

When encountering a situation where a patient has a chronic disability, what is the typical course of action?

What is the typical length of involvement with clients?

In dealing with chronic disabilities, would you refer patients to services providing daily care, and if so what type of services?

How do you handle a situation if a device does not suite the needs of the client?
Have you seen cases where custom Assistive Technology devices would be beneficial, if so could you explain one such case?

Would it be beneficial to have contact with a university based Assistive Technology center to discuss possible solutions?

Would you be interested in receiving more information about the WPI Assistive Technology Resource center?

Do you have any affiliations to other organizations that provide services for disabilities necessitating long-term care?

Additional Comments:
Special Needs

*Remember: All results are completely anonymous.*

What is the typical number of individuals under the care of your department in any given time period?

Could you provide an estimate of the number requiring assistive devices?

Do you see a value in customized assistive devices, whether it be for educational, mobility, environmental, or other purpose, in the Individualized Education Program or in the formulation of a 504 plan?

Are there regularly cases where customized or specialized devices would be useful, if not necessary?

Could you describe the level and type of involvement your department aims to provide when it comes to environmental access and barrier-free education?
Could you please briefly describe the overall process of recognizing the needs of an individual and then seeing that the necessary action is taken?

Being a university-based center, projects completed by the WPI ATRC typically involve between seven and twenty-four week periods. While a majority of projects have focused on creating a customized device, several instructional and informational projects providing educational benefits have been conducted, an example being a “do-it-yourself” wheelchair maintenance guide and video. With this having been said, would you see a benefit in having a relationship with a university-based project center?

Additional Comments:
APPENDIX E-2: Previous Clients

Shown below is the survey generated for Previous Clients. Previous Client surveys were discussed with four previous clients; this survey was also available to previous clients on the WPI ATRC Survey website. The results of this survey indicated the Center’s previous involvement, success, and recommendations for improvement.

Remember: All results are completely anonymous.

What types of projects were completed during your involvement with the ATRC, were the outcomes of these projects successful?

How many times were you involved with the ATRC, how many devices were produced during this involvement?

Did the finalized product/prototype meet the desired goals?

Have you maintained contact with the ATRC following the completion of a project?

During the project, what were the forms of communication used, do you feel these to have been adequate?

Do you view your interaction with the ATRC as being useful?
Having previous experience with the ATRC, do you see any areas where the center could be enhanced?

Additional Comments:
APPENDIX E-3: Alumni

The survey created for the WPI Alumnus involved with the ATRC is presented below. This survey was distributed via the WPI Alumni E-mail to 71 Alumni previously involved with the ATRC, generating 28 responses. The survey provided information regarding the involvement, success and identification of the ATRC with regard to student involvement.

**Assistive Technology Resource Center**

**Previous Students**

*Remember: All results are completely anonymous.*

What type of project did you complete during your involvement with the ATRC and do you feel the project was successful?

Have you maintained an active interest in assistive technology and helping those with disabilities?

If you worked with a specific client, what were the forms of communication used, and do you feel these to have been adequate?

Do you view your project with the ATRC as having furthered your academic experience? In what regards?

Having previous experience with the ATRC, do you see any areas where the center could be enhanced?

Additional Comments:
APPENDIX F: Questions and Responses

Each individual was contacted by phone to yield a higher response rate. If unavailable contacts received a preliminary E-mail overviewing our project, the Center and the Center’s mission, also attached was a document form of the survey and link to the WPI ATRC Survey website. Individuals requesting additional information were further contacted by phone. The team received 49 responses. These responses were then used to formulate the recommendations and five-year plan for the report, assisting in the implementation of best practices for the continued operation of the ATRC.

*PLEASE NOTE, THESE RESPONSES REPRESENT ONLY THOSE RESPONSES RECEIVED ELECTRONICALLY*

Rehabilitation Survey

*What forms of disabilities do you see likely to be benefited by Assistive Technology?*
   CVA, TBI, MS, Cancer, orthopedic/amputee, OA, RA, geriatric - all dx that could potentially benefit from AT

*Who makes recommendations towards cases necessitating long term or extended care?*
   Patient, family, MD, NP, NSQ, CM, SW, OT, PT

*In dealing with devices required for rehabilitation, do you solely seek manufactured devices or do you also look to custom devices?*
   Funding generally prohibits custom solutions unless therapist or family can fabricate the device

*Have there been situations where a custom solutions device may have proved beneficial?*
   Yes.
* Would it be beneficial to have contact with a university based Assistive Technology center to discuss possible solutions?
  Yes - AT center would need to be able to travel to facility to provide consultation. Would also need to go through some sort of credentialing + background check process to enter facility + interact with patients.

* What is the basic layout of the organizations structure, and what are the groups involved within a typical patient’s case?
  Organiz structure: Corp President - Facil Administration - Dept Heads - Staff
  Groups involved in pt care: PT/Family, MD, NP, NSQ, OT, PT, SLP, CM, SW, CNA's, housekeeping, maintenance.

* What are some forms of community outreach used by the center?
  Participate in community events: lecture series, senior events  Mtgs: local safety officials

* What is your center's strategy for contacting discharged patients, do you find this useful?
  Follow-up satisfaction survey mailed to d/c pts. When they return the survey (if they return it) - feedback is very beneficial.

* When discharging patients with chronic disability, do you offer referrals to sources providing assistance with activities?
  Yes

Extended Care Survey

* What forms of disabilities do you see likely to be benefited by Assistive Technology?
  Communication issues, Mobility issues, ADL issues

  Communication and Mobility

* Who makes recommendations towards cases necessitating long term or extended care?
  Rehab therapists Social workers Nurses Family members Residents

  Social workers, family members, rehabilitation specialists

* What rehabilitation services do you provide to residents?
  PT

  Physical therapy services
* What services are provided for chronic disabilities?
   OT PT & SPEECH services are available for any person with disabilities in long term care setting especially if a change or decline has occurred and are not functioning at their prior level of care or at their maximum functional level

Physical, occupational, and speech therapy services

* Do you use any devices to assist residents with daily activities?
   Ambulation devices ADL devices Communication devices

   Adaptive equipment, ambulation aides, wheelchairs (including power chairs), mechanical lifts

* Have there been situations where a custom solutions device may have proved useful?
   Yes, but funding is an issue-some people do not have the resources to purchase devices

   Yes, primarily for communication issues but this is not usually covered by health insurance in the long term care setting

* Would it be beneficial to have contact with a university based Assistive Technology center to discuss possible solutions?
   YES, especially if it the cost would be covered

   Yes, if it is funded--not all residents can afford these devices

* What are some forms of community outreach used by the center?
   I'm not sure--the Social Service department would know!

   Not my area, sorry.

Primary/Secondary Special Education Department Survey

What is the typical number of individuals under the care of your department in any given time period?
   30

   Our department addresses the needs of over 350 students, ages 3-22. We are responsible for assistive technology and assistive and augmentative communication.
Could you provide an estimate of the number requiring assistive devices?

All

30+

Do you see a value in customized assistive devices, whether it be for educational, mobility, environmental, or other purpose, in the Individualized Education Program or in the formulation of a 504 plan?

yes

Yes, custom software, and custom devices to assist students in interacting with the curriculum, and demonstrating knowledge are needed.

Are there regularly cases where customized or specialized devices would be useful, if not necessary?

yes

Yes, often the devices do not meet the specific needs of students.

Could you describe the level and type of involvement your department aims to provide when it comes to environmental access and barrier-free education?

100%

We are dedicated to idea that every student has a right to a barrier-free education.

Could you please briefly describe the overall process of recognizing the needs of an individual and then seeing that the necessary action is taken?

It is our mission

Members of the educational team refer a student for an Assistive Technology Assessment. We have a team of 3 AT Specialist. The specialist assigned to the student’s school will do an assistive technology evaluation, and make recommendations for accommodations to assist the student in overcoming the curriculum barriers.

Being a university-based center, projects completed by the WPI ATRC typically involve between seven and twenty-four week periods. While a majority of projects have focused on creating a customized device, several instructional and informational projects providing educational benefits have been conducted, an example being a “do-it-yourself” wheelchair maintenance guide and video. With this having been said, would you see a benefit in having a relationship with a university-based project center?

perhaps
Yes, yes, yes!...Any and all help is greatly appreciated! Please contact [Catherine Salerno], Assistive Technology Center, Worcester Public Schools

Classroom Consultations: Preschool classrooms, Life Skills classrooms, Resource rooms, Students on IEP, Students on 504

Student Assessments, Augmentative Communication, Written Expression, Computer Access, Low-Vision resources, Reading Software

IEP Planning

Purchasing/Installations

Trainings: Students, Teachers, Therapists, Parents, Community Links, Easter Seals, Center for Living & Working, Inc.

Professional Development Workshops/Trainings: Introduction to Boardmaker, Advanced Boardmaker, Co:Writer & Write:OutLoud, Introduction to IntelliTools, Writing With Symbols, Universal Design for Learning, Integrating AAC into the Classroom, Trainings on use of student specific devices, Others as necessary

APPENDIX G: Martin and Thamilavel, Recommendations

1. The Assistive Technology resource center will advertise opportunities in the field of Assistive Technology. It will inform students about available Assistive Technology projects, update available Assistive Technology projects, and make students aware of the needs for assistive technologies in developing nations. This should generate more support and interest in Assistive Technology projects.

2. The Assistive Technology resource center will provide information resources such as previously completed projects, currently available projects, and publications available in the field of assistive technologies.

3. The AT resource center will work in conjunction with the global project centers to procure funding from WPI, sponsors, and other outside sources.

4. The AT resource center will provide a means of communication between students, advisors, project center directors, and sponsors. Greater levels of communication will raise the quality of Assistive Technology project work and ensure that the expected outcomes are achieved.

5. The AT project center will review IQPs conducted in developing countries to determine the state of AT technologies in these countries, and the center will propose MQPs based on the results of these IQPs

APPENDIX H: RESNA Standards of Practice

1. Individuals shall keep paramount the welfare of those served professionally.

2. Individuals shall engage in only those services that are within the scope of their competence, considering the level of education, experience and training, and shall recognize the limitations imposed by the extent of their personal skills and knowledge in any professional area.

3. In making determinations as to what areas of practice are within their competency, Assistive Technology practitioners and suppliers shall observe all applicable licensure laws, consider the qualifications for certification or other credentials offered by recognized authorities in the primary professions which comprise the field of Assistive Technology, and abide by all relevant standards of practice and ethical principals, including RESNA’s Code of Ethics.

4. Individuals shall truthfully, fully and accurately represent their credentials, competency, education, training and experience in both the field of Assistive Technology and the primary profession in which they are members. To the extent practical, individuals shall disclose their primary profession in all forms of communication, including advertising, that refers to their credential in Assistive Technology.

5. Individuals shall, at a minimum, inform consumers or their advocates of any employment affiliations, financial or professional interests that may be perceived to bias recommendations, and in some cases, decline to provide services or supplies where the conflict of interest is such that it may fairly be concluded that such affiliation or interest is likely to impair professional judgments.

6. Individuals shall use every resource reasonably available to ensure that the identified needs of consumers are met, including referral to other practitioners or sources which may provide the needed service or supply within the scope of their competence.

7. Individuals shall cooperate with members of other professions, where appropriate, in delivering services to consumers, and shall actively participate in the team process when the consumer’s needs require such an approach.

8. Individuals shall offer an appropriate range of Assistive Technology services which include assessment, evaluation, recommendations, training, adjustments at delivery, and follow-up and modifications after delivery.
9. Individuals shall verify consumer’s needs by using direct assessment or evaluation procedures with the consumer.

10. Individuals shall assure that the consumer fully participates, and is fully informed about all reasonable options available, regardless of finances, in the development of recommendations for intervention strategies.

11. Individuals shall consider future and emerging needs when developing intervention strategies and fully inform the consumer of those needs.

12. Individuals shall avoid providing and implementing technology which expose the consumer to unreasonable risk, and shall advise the consumer as fully as possible of all known risks. Where adjustments, instruction for use, or necessary modifications are likely to be required to avoid or minimize such risks, individuals shall make sure that such information or service is provided.

13. Individuals shall fully inform consumers or their advocates about all relevant aspects, including the financial implications, of all final recommendations for the provision of technology, and shall not guarantee the results of any service or technology. Individuals may, however, make reasonable statements about prognosis.

14. Individuals shall maintain adequate records of the technology evaluation, assessment, recommendations, services, or products provided and preserve confidentiality of those records, unless required by law, or unless the protection of the welfare of the person or the community requires otherwise.

15. Individuals shall endeavor, through ongoing professional development, including continuing education, to remain current on all aspects of Assistive Technology relevant to their practice including accessibility, funding, legal or public issues, recommended practices and emerging technologies.

16. Individuals shall endeavor to institute procedures, on an on-going basis, to evaluate, promote and enhance the quality of service delivered to all consumers.

17. Individuals shall be truthful and accurate in all public statements concerning Assistive Technology, Assistive Technology practitioners and suppliers, services, and products dispensed.

18. Individuals shall not invidiously discriminate in the provision of services or supplies on the basis of disability, race, national origin, religion, creed, gender, age, or sexual orientation.

19. Individuals shall not charge for services not rendered, nor misrepresent in any fashion services delivered or products dispensed for reimbursement or any other purpose.
20. Individuals shall not engage in fraud, dishonesty or misrepresentation of any kind, or any form of conduct that adversely reflects on the field of Assistive Technology, or the individual's fitness to serve consumers professionally.

21. Individuals whose professional services are adversely affected by substance abuse or other health-related conditions shall seek professional advice, and where appropriate, withdraw from the affected area of practice.

(RESNA Professional Standards Board, 2004)
APPENDIX I: Pert Chart: Project Concept to Finish