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Increasing the Success of Technology Transfer: A Guide to Implementing a Capacity Planning Tool in the Veteran's Affairs Community-Based Outpatient Clinics

An Interdisciplinary Qualifying Project Report: Submitted to the Faculty Advisors:

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Abstract

More patients are seeing medical compensation for their service as veterans and, thus, the Veterans Affairs Healhcare System is overwhelmed trying to incorporate them into the healthcare providers' schedule. At the Worcester Community-Based Outpatient Clinic (CBOC), more than 100 new patients are being registered monthly along with its established patients. This Interactive Qualifying Project attempts to transfer and to spread a solution for scheduling. Instead of tailoring a solution for only one facility, we attempt to integrate concerns experienced within different VA CBOCs. The report outlines a methodology to transfer a schedule-planning tool, called ProSkedge, among VA CBOCs through product needs assessment, development of a user manual and its impact evaluation. The methodology of implementing ProSkedge is carried out through interviews with CBOCs representatives and surveys with the WPI community and CBOC.

Table of Contents

1. Executive Summary

Many Community-Based Outpatient Clinics (CBOCs) in the New England Veterans Health Care System are operating at capacity. One of the consequences being over capacitated is scheduling difficulties. Worcester CBOC has encountered scheduling issues as it is mandated to take in 100-200 new patients every month while other regional CBOCs experience a similar condition. With their current scheduling method, or lack of an efficient plan, they have found it stressful and time consuming to balance the providers' schedule with both new and established patients. Thus, a more advanced and accessible scheduling tool to enhance their existing method is desired.

Innovations into new products are important to drive an organization forward; however, a technology will have a wider impact if its use can be adapted within more organizations. A technology's efficiency is determined by how well it satisfies the needs of the user and how well it spreads within an organization of potential end-users over time. In this project, a successful technology transfer and spread of a better planning tool results in greater patient-access to health care within the veteran's health system. To maximize the spread of the planning tool, we will focus on finding issues and methods of technology transfer that researchers had done through a series of literature reviews. We have also developed a methodology for transferring a schedule-planning tool, created by Worcester Polytechnic Institute (WPI) Major Quality Project (MQP) team, to CBOCs within the New England area. The findings from a review of previous case studies, unique features of the capacity-planning tool, and specific scheduling issue experienced by each CBOC add into the development of the final product, called ProSkedge.

The stages of data collection and analysis are done as inspirations of what it takes to successfully implement the use of ProSkedge, resulting in not only a proposed methodology of its spread but also an user manual to ProSkedge.

2. Introduction

This section discusses the background of the VA health system, the motivation behind the project, the problem definition, the project's objectives, and the organization of the report.

2.1. Background

The Veterans Affairs (VA) Healthcare System is facing challenges in serving an ever-increasing demand from returning veterans. Facilities ran by the VA are operating over capacity at most of their 733 community-based outpatient clinics (CBOCs) for primary care services. For example, 100 new patients have been assigned to Worcester CBOC every month in addition to their registered veterans in care (Susan Krantz, primary care physician in Worcester CBOC, *interview*, Sep. 27, 2010). In Lowell CBOC, the waiting time for the next available neurologist appointment takes five months (Andrea Bleak, primary care unit leader in Lowell CBOC, *interview*, Oct. 21, 2010). Currently, Worcester CBOC is confronting an unprecedented challenge in how to accommodate the new patients in addition to the current patients without compromising their quality of care. The VA patient-aligned care team is devised in response to such challenges, centering on a personal physician and a team-based unit for more effective care delivery (Susan Krantz, primary care physician in Worcester CBOC, *interview*, Sep. 27, 2010). Simultaneous to our project, a WPI MQP team attempts to address the capacity issues at Worcester CBOC by developing a technological tool for better planning in care providers' scheduling. The planning tool will be further discussed later in this report as we make an effort to spread its use via technology transfer.

2.2. Motivation

Technology transfer is the exchange of knowledge/technology between two entities (ex. university-hospital), which disperses both research and innovation globally. Successful technology transfer and spread will bring innovation to public use as rapidly as possible (Professor Fraser at Florida State University). The technology being transferred in this project is a schedule-planning tool – named ProSkedge –, which will coordinate the primary care providers' schedule in consideration of the specialists' schedule and room demands. As many CBOCs are experiencing similar patient-provider capacity issues, ProSkedge has the potential of contributing decision-making factors to the providers' schedule at various CBOCs. Success of ProSkedge's distribution and use will improve patient access across the VA health system as the planning tool optimizes the CBOC's limited resource into its planning - namely physicians, examination rooms, nurses and time. However, the necessity of using ProSkedge for planning may be different among CBOCs; it is possible that a more efficient or similar product is already available. Nevertheless, even if this planning tool works well for the Worcester CBOC, it may

not work as effectively for other CBOCs without any modifications. Thus, this project is motivated by how to ensure that ProSkedge or any technologies can be successfully transferred and implemented from the development site into other industrial locations.

2.3. Problem Definition

The necessity for ProSkedge remains undetermined for other CBOCs to implement other than Worcester CBOC. Individual CBOCs may be facing unique scheduling issues ranging from the availability of resources to the preference of the product's features. Furthermore, a planning tool can be much less effective than expected if it is not used appropriately. Hence, the product's transferability, along with its usability, becomes a crucial factor in determining its accessibility and overall value.

2.4. Goals and Objectives

The overall goal of our project is to transfer and spread the use of ProSkedge among VA CBOCs in New England. This goal is accomplished through user interviews, training materials and feedbacks from users. Specifically, the following items define our sub-objectives: 1. Conduct a schedule-planning tool needs-assessment in each CBOC we visited; 2. Acquire information pertaining to provider scheduling, for example: numbers of primary care providers and specialists, level of comfort with current scheduling method; 3. Obtain suggestions from care providers and managers on the schedule planning tool to incorporate their needs; 4. Develop a user manual for the schedule-planning tool; 5. Develop an impact evaluation for the planning tool.

2.5. Report Organization

Section 3 of this report will review the literatures regarding to technology transfer and spread. Following, section 4 will discuss the methodology used while section 5 summarizes findings obtained through interviews and surveys with different CBOCs. Lastly, a conclusion and future work of the project is given in section 6.

3. Literature Review

This literature review consists of three sections: outpatient issues, technology issues, methods of technology transfer and constructions of an user manual.

3.1. Scheduling Issues Related to Patients

Many factors affect patient scheduling and cause capacity issues. In this context, we will discuss the most common scheduling issues related to patients.

3.1.1. Late Cancelations and No-shows

Late cancelations and no-shows are very common problems in outpatient clinics. Cancelations increases during periods of both inclement and fair weather. For example, on nice summer days, patients prefer to go out to enjoy the day rather than visiting a doctor.

Many studies have been conducted to ease the impact of no-shows like the use of overbooking (Kim and Giachetti, 2006 and LaGanga and Lawrence, 2007), the easy access program (Tuso *et al*., 1999*)*, and the open access system (Ulmer and Troxler, 2002). Recommendations have been developed in an effort to reduce no-shows, for example, by sending postcard remainders to patients (Gupta *et al*., 2008); however, these no-show problems cannot be completely eliminated due to lack of transportation, day care and the inability to get time off from work etc. (Gupta *et al*., 2008). According to Andrea surname in Lowell CBOC and Susan Krantz of Worcester CBOC, the late cancellations and no-shows continue to be serious issues in outpatient scheduling.

3.1.2. Patient Preferences

Corresponding to no-shows, patients' preference on the date and time of the appointments adds into the scheduling complexity. Incorporating patient preferences with doctors' availability results in a more complicated scheduling model and becomes a challenge for schedulers with unpredictable patterns of appointment among patients. Together, the schedule coordinator may find it difficult to design scheduling model that works for all providers (Gupta *et al*., 2008).

3.1.3. Increasing Demand for Care

Other than the inconsistency of patient visits, the Veteran Health Administration is overwhelmed by the volume of needed health care from returned veterans and is unable to handle the current claims process according to a study conducted at Harvard University (Bilmes, 2007). The rapid growth in demand leads to challenging appointment scheduling problems such as putting patients on waiting lists and prolonging return visits, and puts pressure on many CBOCs to schedule a high volume of patients every day. A neurologist in Lowell CBOC has to find time in her regular

office hours to see four additional patients a day as demanded (Andrea Bleak, primary care unit leader in Lowell CBOC, *interview*, Oct. 21, 2010). The number of patients in Brockton CBOC has exceeded 28% of the calculated maximum, which was predetermined by the number of staff and rooms in service, during the induction of 100 to 200 incoming patients each month in the next half to one year (Rosemary Conlon, head of registered nurses in the primary care unit in Brockton CBOC, *interview*, Oct. 18, 2010). Yet many veterans are still placed on the waiting lists for appointment to see a medical care provider (Enrollment Restrictions-Fact Sheet 16-3, 2009). The problem of tight scheduling is compounded by tardiness of care providers and staff absences (Gupta *et al*., 2008).

3.2. Technology Issues with its Users

Issues in technology transfer vary according to the economy, the geography, the policy and the familiarization level of users on the technology being transferred. In this section, we will use the failure of technology transfer in hospitals as examples to illustrate some issues regarding technology transfer in healthcare.

3.2.1. Why a Technology Is Not Used

The success of a technology does not merely resolve its designated problems but also convinces the users its potential for promising results through attaining their acceptance. Fred D. Davis attempts to correlate the crucial factors affecting the users' decision with his technology acceptance model (TAM), focusing on the product's "perceived usefulness" and accessibility. Hypothesizing that these two will have a significant positive regression on the product's market, psychological measurements of the users' opinion toward its use are integrated into the mathematical function of TAM. Through experiments and observations of two similar products – an electronic mail system and a text editor – with 112 participants, a poll is conducted to analyze the rating given by them. The most essential variable affecting its acceptance turns out to be it perceived usefulness, directly affecting the users' impression and indirectly boosting its chance of actual success in the market. Although the accessibility also experiences a positive correspondence, its effect on acceptance is significantly lower compared to that of the product's usefulness. Assuming that the ease of use is not overly challenging that requires post-graduated level of education, having a proficient usefulness is enough to be given a chance of acceptance with its end-users (Davis, 1991).

Yet, for a product to remain in the market requires it to move with the population and to adapt to new changes. Introduction of new competitors with similar function and/or better feature may endanger its standing. In 2009, the year of the new Window 7 OS, many personal computers are upgraded (Ralden, 2009); some anti-virus scanning programs, however, are not initially compatible with the new updates and lose the favor of its users until its company decides to release a new patch to run on the new OS. Thus, being up-to-date, along with handiness, helps to retain its user; when more options are available with the same degree of usefulness, its accessibility and ease of use will determine its competitiveness in the industry. With both desirable usefulness and accessibility, along with its reception, a technology is considered efficient.

3.2.2. Lack of Knowledge, Skill and Infrastructural Support to Use New Technology

Reinforcing nursing professionals' knowledge and skills to use new technology is as important as implementing the new technology. In the 1990s, many major hospitals have found the integrated delivery networks (IDN) attractive and plan to adapt the new information systems. This IDN is a network of facilities and providers working together to offer a continuum of care to a specific market or geographic area (McDaniel, President and Chief Executive Officer). However, this implementation is short-lived because the hospital managers and nursing staffs are unable to use the IDN and/or not willing to change the existing procedures for its adaption (Li and Benton, 2006).

An incident in 2003 at Cedars-Sinai Medical Center, Los Angeles demonstrates the importance of staff training when implementing new technologies. A physician-order-information system has to be offset because medical staffs are complaining about the difficulties of using the information system, fearing the accidental leak of patients' information if operated incorrectly (Carpenter, 2004). "In the healthcare industry, when a health service provider has an inadequate level of understanding of information technology and a low level of staff training required to adjust to a more dynamic environment, the advantages of technology will not be fully achieved" (Li and Benton, 2006, Finlay and Marples, 1998).

3.2.3. Lack of Communication

Communication can also have a large effect on the success of implementing new technologies. Among sixteen investigated hospitals that attempted to adapt the innovative technology for cardiac surgery, seven have experienced unsuccessful implementation (Edmondson *et al*., 2001). A common factor shared within these seven hospitals is the lack of communications among nurses, surgeons, specialists and patients. Some doctors choose not to speak up when they saw a possible mistake during its implementation because they are uncertain. On contrary, some doctors may see it as something obvious that requires no needs to address. Certain hospitals do not have any form of new technology evaluation before its implementation, lacking (Edmondson *et al*., 2001).

3.2.4. Effect of End Users

End-users also affect the success in the process of diffusion within healthcare facilities. Their skills and willingness to adapt the new technology greatly determine the success or failure of a technology implementation. It is worth noting that those in the older generation prefer to go along a familiar pathway. In Dozet's (2002) study, he has discovered that the older generations are more conservative and less friendly to changes, lacking the motivation to learn new tricks.

3.3. Methods of Technology Spread

Technology spread is a process of transferring a technology from its developing site to the recipients who find this technology useful. These recipients can be working in institutes, hospitals, private homes, etc. The process includes some or all of the following steps: define, measure, analysis, implement, control, etc. In this section, we have summarized the methods and models of technology transfer used both at a macro and micro scale. The macro view involves a more generalized method in technology transfer, for example, how to bring innovation to users. The micro view involves a more specific method that can be used to implement a specific technology in a specific entity. Methods of communicating and educating users are also included in this section.

3.3.1. The Macro View: Bringing University Research/Innovations to Hospitals

Many universities use technology transfer offices to connect university innovations with hospitals or health related centers. For example, there is an Academic Technology Center in

WPI, which provides a wide variety of technology-based services in support of the teaching, learning, and communication. Technology transfer professionals play a great role in this connection. The procedures of bringing university innovations to hospitals can be summarized in four steps: 1. Judge the value of potential health innovations; 2. Orientation to users; 3. Adding value to early-stage inventions; 4. From immediate user to end- users (Miller *et al*. 2009).

3.3.2. The Micro View: Developing New Routines for a Specific Technology Transfer-An Example

A process model is established to create new routines in 16 hospitals for implementing an innovative technology for cardiac surgery (Edmondson *et al*., 2001). This process model involves four steps: enrollment, preparation, trials, and reflection, as shown in the diagram below. The third and fourth steps are iterative. Though, this is a process designed for a technology for cardiac surgery, it is generally applicable for many other technology adaptations including the schedule-planning tool. The trials and reflections steps are very important to edit, improve and realize the value of the technology.

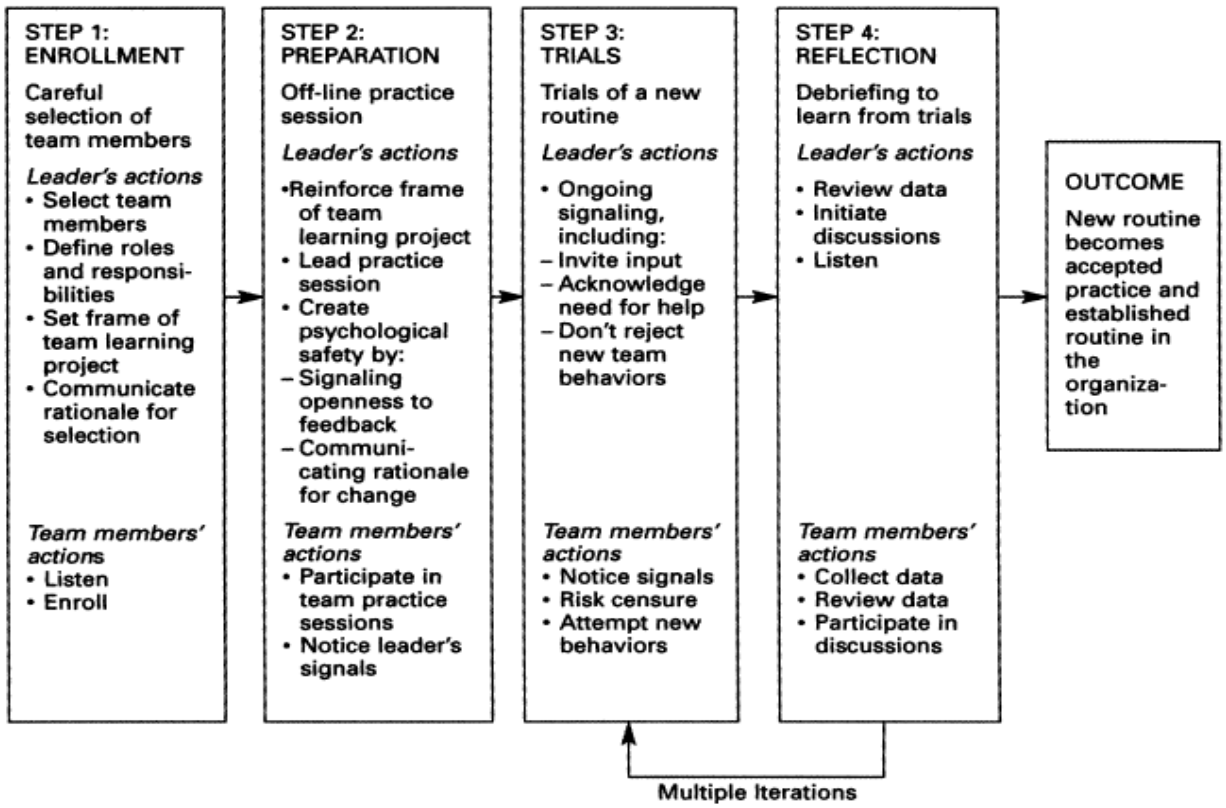

Figure 1. A process model for establishing new technological routines. Adapted from Amy C. Edmondson *et al*., "Disrupted Routines: Team Learning and New Technology Implementation in Hospitals", page 697. *Administrative Science Quarterl* (2001) 46, 685-716.

Enrollment involves selecting interested participants for the implementation. Preparation involves a series of activities such as formal trainings and practices before actually using the new technology. Trials involve initial but actual uses of the technology while reflections draw upon the discussions of trials among the participants, gaining feedbacks for changes and improvements.

It has shown that more trials followed by reflection give rise to successive iterations, forming a learning cycle for a successful implantation (Schbn, 1983; Kolb, 1984).

3.3.3. Methods of Educating/Training New Technology Users

A very important part in a successful technology transfer is ensuring that users have obtained enough information and knowledge to be able to master the new technology. A few options of educating users are outlined below:

Distance learning has the advantage of reducing travel cost and has the potential to reach unlimited learners. However, the efficiency of distance learning is an issue, lacking the immediate feedback or interaction between trainers and learners. Trainers must envision what the trainees will be able to do at the end of the training so that trainers know what they should concentrate on, not on what they would like to cover in the instruction (Price, 1996). Distance learning can be held in various forms like post instructions, manuals or videos on the internet, open televised distance education courses, and other telecommunication means (Price, 1996).

Other options include 1. Weekly seminars on currently used technologies and tools within an organization (May, 2008); 2. Send an individual from a facility to receive the trainings in hopes that she/he will be able to train his colleagues upon returning (Mercurio, 1999); 3. Provide independent study with a trainer or tutor to assist the learners when problems are encountered (McKenzie, 1993); 4. Form a formal, classroom-based training session with plenty of guided practice and support (McKenzie, 1993).

3.4. User Manual

Aside from the trainings, independent supportive aid to familiarize users with the product is very important in technology spread as it enables technology recipients to operate the product on his/her own with fewer obstacles. A product support system can be set up in various forms like an user manual, video tutorial, and searchable sites online. In this section, we are going to focus on the importance and the method of developing a software user manual.

3.4.1. The Importance of a User Manual

In small firms, it occurs frequently that their products come to market places without a user manual, especially during their early startup stages when the product is undergoing refinement and/or where there is a lack of manpower. Some companies consider making a user manual as a non-profitable process, a complete waste of time and resource (Velasco, electrical and software engineer for cellular technology Ltd.). However, the lack of a user manual or an indecent guide increases the burdens experienced by the recipient, who spends extra time in trying to familiarize him/herself with the product. As a result, software companies eventually lose their customers. High quality user manual that answers most of the user's questions can reduce after-implementation support calls as well as the expense needed to maintain such supportive services in a software company. To many end users, the usability and accessibility of a product is just as important as its functionality. They are more interested in whether the product will enable them to have their work done quickly with minimum error (Melonfire, software technical writer for Melonfire).

3.4.2. How to Write a User Manual

Before starting to write a user manual, the technical writer must understand: 1. who are the audience; 2. what is the scope of the document; 3. is it going to be in print mode or electronic mode? (Melonfire, software technical writer for Melonfire)

An organized process of documentation will usually have the following phases: planning, style sheet creation, development, review, version management and delivery (Melonfire, software technical writer for Melonfire).

A generic user manual structure includes: 1. Introduction, 2. Installing the software, 3. Using the software, 4. Administration, 5. Troubleshooting, 6. Appendix (Melonfire, software technical writer for Melonfire).

4. Methodology

In general, the process of implementing and spreading an anticipated technology to Worcester CBOC and other sites can be broken into four stages as illustrated in Figure 2. The essential objectives are to successfully perform a technology spread from a developing center into the Worcester CBOC and to further spread the technology from the Worcester CBOC into other New England CBOCs within the VA Healthcare system.

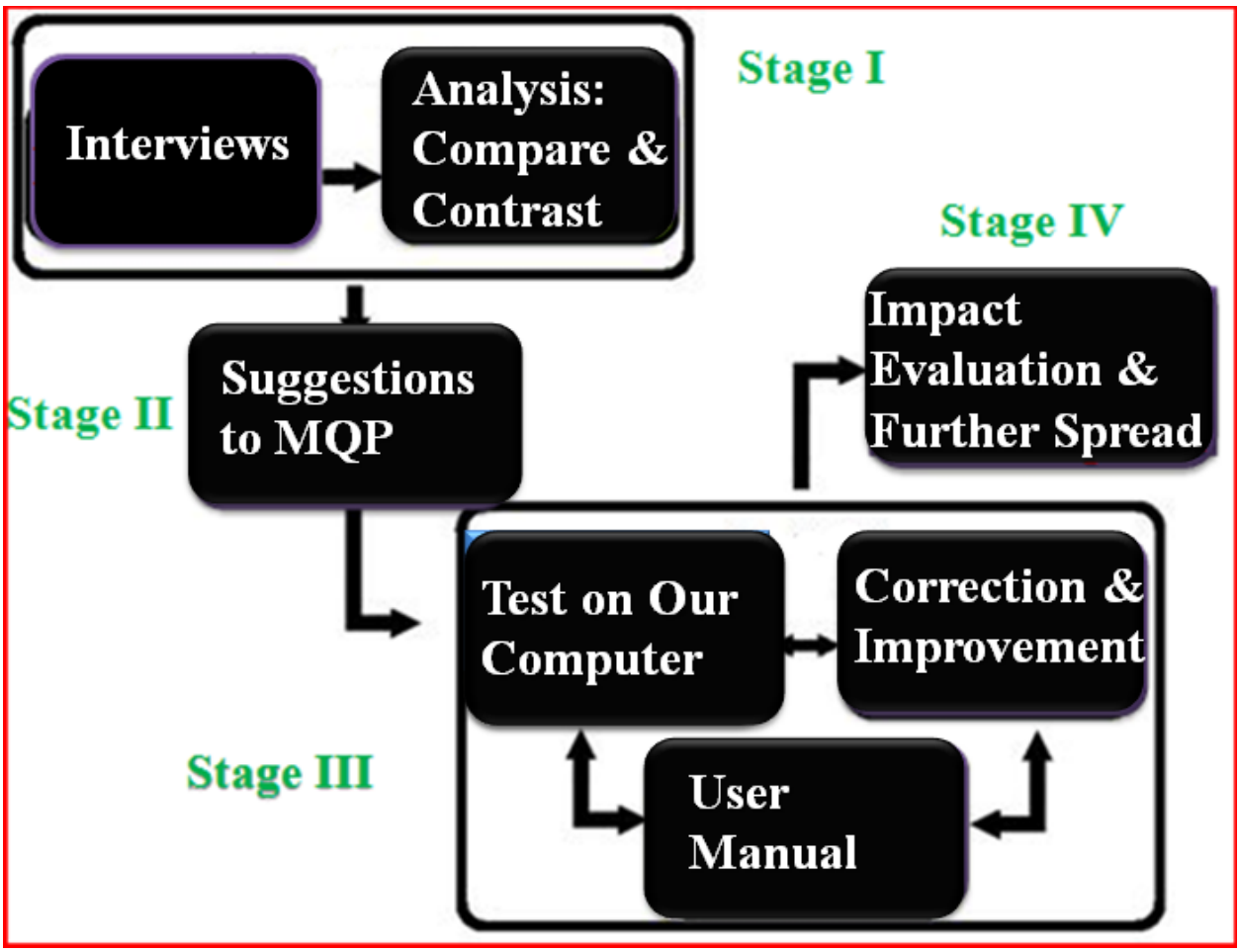

Figure 2: Methodology Flow Diagram

Stage I: Prospecting

The first stage is prospecting, which identifies the scheduling issues, the causes of capacity issues in individuals CBOCs, and their interest in an optimizing planning tool. We plan to interview physicians, nurses, and/or other staff members from various CBOCs located in Worcester, Boston, Brockton, Quincy and Lowell. This process generated first hand thoughts with the capacity problem and their stand regarding to a possible solution. Available resources including on duty care providers and computers, along with their peak hours of patient flow, are emphasized throughout the interviews in order to conduct an analysis of the overall demand for a technological solution regarding schedule planning. We also have an interview with implementation researcher, Lisa Zubkoff, for advices in how to spread and implement a new technology.

Stage II: Suggestions to MQP Team

Information collected in each CBOC from stage one can be compared and contrasted in relevant to the Worcester CBOC and be brought into stage two, which involved providing suggestions to enhance, and tailor the planning tool developed by the WPI MQP team. Thus, needs of various CBOCs are incorporated into the planning tool, which was initially aimed to offer a premium plan for care provider scheduling in the Worcester CBOC. After the planning tool is finished, it can be tested on WPI computers to ensure its applicability.

Stage III: User Manual

A very important part in a successful technology spread is the usability of the technology. There are many examples with user people abandoning the use of a technology because it is too difficult to operate. Consequentially, we will have to develop a user manual for this schedule-planning tool to make it easier for users to use and to troubleshoot. A survey regarding to the content and format of an ideal user manual for a software is conducted with the participation of the WPI community and visited CBOCs. Results generated from the survey will provide valuable information for us to create a physical user manual for the planning tool. Electronic version in PDF and video tutorial are also put into consideration depending on survey results. (A copy of the survey questions and a copy of the user manual can be found in Appendix II and Appendix IV, respectively.)

Stage IV: Impact Evaluation, Follow-up Interviews, and Modification

By the time we submit this report, we might not have the chance to carry out this late step completely, which involves the actual implementation and spread of the product and follow-up interviews (or questionnaires) with the end user to gather their thoughts after using the planning tool. Thus, this is a proposed step for possible future work in modifying the planning tool and/or the user manual for better performances. Further information on this step can be found in the "Future Work" section later in this report.

5. Findings

This chapter describes the pertaining information collected and observed in various CBOCs throughout the spread of the project. The following subsections are addressed in accordance to the outline of the methodology, emphasizing the goal and the meaning behind the findings during the spread of ProSkedge, the planning tool product. A succeeding 'survey analysis' subsection reflects the general population's (CBOCs and WPI-community) best approach on spreading the use of the planning tool along with an user manual.

5.1. Advice on Technology Spread and Implementation

After a phone interview with Lisa Zubkoff (VA healthcare researcher in technology implementation) on Nov. 18, 2010, we gained valuable information in spreading the planning tool. She advised us to look forward to speak with the head or director in charge of the VA facility of interest (e.g. CBOC) and show him/her the product by sending the software along with its user manual while explaining why this technology is beneficial. Once convinced, the director can issue an order to the employees under him/her, increasing the chance of the product being used. If the general response to the product is positive, further spreading can be issued; however, she warned us on not going too far in trying to transfer the product to all the CBOC to minimize the consequence if anything in the product is to go wrong. Other factors to consider include its simplicity to operate, to maintain, and to remain in market before a better version is available.

Due to the restricted access on computer downloads and installation, all VA intranet applications must be approved by the VA Office of Information and Technology (OINT) for security reason regarding to patient privacy. If the product exists as a small add-on file to pre-existing application like MS Excel, we can attempt to upload it online to VA's SharePoint with WPI

Professor Bar-On's or Cliona's (a liaison between Worcester CBOC and our project) VA account and have Lisa Zubkoff try to install it to her VA computer. However, if this is not possible, further discussion with VA OINT's Chief of Application, Robert Bonner, is needed for approval.

5.2. Scheduling and Capacity Issues among CBOCs

In the following subsections, we have summarized our findings regarding to scheduling and capacity issues in each CBOC. We visited CBOCs of varying sizes and locations to obtain information regarding to operating systems and capacity issues seen in outpatient scheduling. Information from different types of CBOCs is needed to ensure that the tool being created is appropriate for transferring while meeting everyone's expectations. We obtained information by interviewing primary care unit leaders or doctors in the CBOCs. A copy of the interview questions is provided in Appendix I. Through interviews, we are able to obtain the most up-to-date scheduling situations in CBCOs as well as feedbacks and suggestions for the development of the schedule-planning tool.

5.2.1. Lowell CBOC

Lowell CBOC has four primary care providers, four nurses, two health technicians and two visiting specialists. The CBOC is not concerned with its room constrains or with its offered care for female patients. However, the CBOC is concerned with (1) an increase of thirty new and transferred patients every month for an expected 1.5 years; (2) a two-month wait for primary care appointment; (3) shortage of doctors and nurses with retirements making the situation worse; (4) a five-month wait for a neurologist; (5) not enough computers for care providers to use. Patient scheduling becomes more challenging due to outpatient issues, which include (1) some patient walk ins without having an appointment; (2) a lot of appointment cancellations especially during bad weathers. Currently, their computers operate on Windows Vista with Microsoft Office 2007.

5.2.2. Quincy CBOC

Quincy CBOC consists of only three rooms shared among two care providers, two nurses, and a health technician. In contrast to other CBOCs, the number of patients the Quincy CBOC sees is decreasing due to deaths and transferals. The idea of having a new CBOC in Plymouth further lessens their burden.

5.2.3. Brockton CBOC

Brockton CBOC has 14 care providers, 22 nurses, and 3 specialists and 22 rooms. The CBOC is concerning with (1)100 to 200 new incoming patients every month, which has exceeded 28% of their calculated maximum; (2) extending working hours does not help because patients generally don't come after 3PM. They currently have Windows XP with Microsoft Office 2007 on their computer, with new portable equipment order for the patient-aligned care team model. Comments and suggestions from Brockton CBOC are outlined in the next session.

5.2.4. Boston CBOC and Worcester CBOC

Boston CBOC and Worcester CBOC have very similar capacity and scheduling issues as Brockton CBOC. Nurse Ghose of Boston CBOC also states that they currently use VistA to schedule while manually planning the schedules of providers by on paper. Comments and suggestions from Boston CBOC are outlined in the next session.

5.2.5. Conclusion: Decisions on Needs Assessment

The needs assessment of different CBOCs was conducted based on the following reasons:

(1) The main feature of the planning tool is to provide care providers with appropriate schedules based on variable inputs, for example, number of doctors and number of patients to be seen. (2) If the clinic is satisfied and finds their scheduling planner efficient, there is no reason for it to change.

CBOCs	Change in Number of Patients	Change in Number of Physicians	Satisfied with Current Scheduling Tool?	Need the Planning Tool?
Worcester	Increase Greatly	Same	No	Yes
Worcester (mental health)	Increase	Same	Yes	No
Boston	Increase Greatly	Same	No	Yes
Brockton	Increase Greatly	Same	No	Yes
Lowell	Increase	Same	No	Yes
Quincy	Decrease	Same	Yes	No

Table 1: Necessity of ProSkedge

5.3. Reflections from Physicians about the Scheduling Tool

Both Laura Ghose, a registered nurse in Boston VA CBOC primary care, and Rosemary Conlon, head of registered nurses in the primary care unit in Brockton CBOC, are really looking forward to this planning tool, hoping to releases their overloading patient capacity. They also expressed their concerns as well as suggestions as summarized below: (1) Will this new scheduling method increase the number of patients being seen each month? (2) It will be a problem if no patients were scheduled when providers are assigned clinical hours following the ProSkedge generated schedule. (3) Paperwork can take any time from 10 minutes to 30 minutes for each patient. If the next patient comes but the provider has not finished the paperwork, should he/she continue the paperwork or stop to see the new patient? (4) Sometimes sticking to the schedule generated by the planning tool may not be a wise choice. During critical time, providers can be excuse from meeting and other duties in order to take care of more patients. (5) What if all providers choose to work in the morning? (6) Some patients may prefer to come during certain time and such model could generate an issue when the time is not included in the provider's preference. (7)

Suggestion on making the output time span adjustable just in case changes were to be made to the recall system. For example, besides one-month assignment plan, two or three-month assignment plans may be useful, too.

5.4. Survey Analysis

In preparation for spreading the planning tool to different CBOCs within Massachusetts and possibly to CBOCs in other states, functionality and usability are crucial in determining its distribution. The end users – most likely the CBOC manager and/or schedule planner – must be able to fully understand the tool's features and functions for it to be beneficial. In our research, we have decided that a user manual would be the most appropriate form of a product supporting system, utilizing the least amount of manpower to deliver the message. Thus, an accompanying user manual must outline the correct use of the tool, along with explanations to maintain the tool from possible errors. To gain a better insight on what the CBOC employees would expect to be on a software/tool manual of operation, an online survey is sent to the CBOCs, emphasizing their attitude and reliance on software manual in the past, along with the content and layout style that should be readily available. Such survey allows quick tallying of accumulated response. Yet, due to the low number of CBOC participants (7), an overall deduction of manual preference may be inaccurate. Thus, the same survey is also conducted on the WPI community (both undergraduate students and faculty), which generated 481 responses. We assume that the general response from our body of students and professional staffs complemented that of the CBOC employees, which can be found through Figure 3 to Figure 7 in Appendix II.

In Figure 3, the majority of both groups used software manual "occasionally" while the "never" and "often" choices dominated the leftover response; yet, a small difference was observed in the WPI Community that was not present in the CBOC chart: a small percentage (4%) chose the option "always" to use a software manual. But due to the similarities on both charts, we could deduce that if the population of CBOC participants increased, we would see a similar trend in that a few people would choose the "always" choice. The similarities of response from both groups were seen again in the "reasons of using a software manual", with both groups stating for mainly familiarization with the product, troubleshooting, educational purpose, and lastly entertainment in descending order. In other words, their main objective of reading a software manual was to know how to use and maintain the product. Regarding the "importance of a

software manual", as demonstrated in figure 5, about 86% and 71% of the CBOC group and WPI groups, respectively, found the presence of the manual to be "very important" or "somewhat important" in additional to the software. This slight difference might be due to the fact that these students and professor were from a technical school and most had somewhat strong computer background. Surprisingly, a list of content to be include in a software manual in figure 6 for both groups were not as nearly identical as the previous data. Although their top four choices ("guide on operation", "troubleshooting", "table of content", and "picture") were the same, their orders of importance were different. The CBOC group thought that the "guide on operation" was the most important, following with "table of content" and picture in descending order. But the WPI group found that the "troubleshooting", "table of content", and "pictures" were more important than "guide on operation". This difference could be an indication that some tech savvy students do not find the need of following a written guide. For the manual's layout, responses from both WPI community and CBOC group found that booklet and electronic file were easier to read than the other forms, as demonstrated in Figure 7.

5.5. Content of User Manual

Since the CBOC employees are the end users of the software and manual, their responses were given more weight over the WPI community. The final manual would be an electronic booklet so that it is easy to distribute among CBOCs once uploaded onto their intranet. We decided that the manual should include an operational guide on how to use, troubleshooting for maintenance, table of contents, and corresponding pictures as a visual aid in additional to the text. The glossary, index, and cover page were not the best interest of the end users from the responses of the survey; nevertheless, the use manual will include the following to reinforce the organization and the familiarization of certain terms. Contract information and the acknowledgement for recognizing the original creators were also provided as background. Pictures, from screenshot of ProSkedge, were included for visual aid along with the text as desired by our users. (Manual can be found in Appendix IV.)

During the trial runs, we were able to load ProSkedge on Microsoft Exel 2010, despite the creators failed to do so. There were some glitches in the early progress, including but not limited to MS Excel not responding upon trying to generate output and failure to output any schedule. Apparently, input must be rational for ProSkedge to run smoothly; for example, there were only

four rooms but all the providers needed five rooms, making it impossible to optimize. Program may output falsely, crash out (program shut down) or stop responding during the generating process. The concerns were brought to the creators and the troubleshooting section of our manual included the current solution if similar experience occur.

6. Future Work

Currently, ProSkedge has been manually installed into the computer of Steven Cohen, Manager of Worcester CBOC; however, approval for ProSkedge, along with the manual, to be uploaded on the VA's intranet for VA download is still being negotiated with Chief of Application Robert Bonner and Nancy Coote, the IT supportive of Boston CBOC, as of March 3, 2011. Upon its approval in the future, follow-up visits with the previously visited CBOCs must be made to reintroduce the finalized ProSkedge and its user manual. Attached with the ProSkedge Manual is a follow-up survey that is meant to be completed and mailed to Prof. Konrad regarding to the use and the efficiency of the tool itself, along with the clarity of the manual, after three months of use. Improvable changes can be made for better adaptation for other CBOCs. To evaluate the impact of the schedule planning tool, it is important to focus on the following aspects: 1) how well and accurate was ProSkedge; 2) whether ProSkedge was inflicted with errors; 3) is it worth using ProSkedge over the past method; and 4) comments for improvements on both ProSkedge and the manual. These aspects were incorporated into the follow-up survey.

Positive reviews from the Worcester CBOC can also generate a positive effect on speeding up the negotiation. As a side note, we were also told by Nancy Coote that the Boston Healthcare's Worcester division will be moved to Northampton VA by October. "It would be prudent to involve them in anything new if VA approves."

7. Summary

The goal of this project is to propose a mechanism on transferring and on spreading a technological product like ProSkedge into the VA CBOCs as an attempt to solve their capacity issues due to schedule planning. Each CBOC's state of being over-capacity is highlighted during our interview with their representatives to determine their need of a better planning product against the growing population of patients, which majority of them needed. Prerequisites steps

are taken through surveys to draw the potential user's attention to a possible product and to acquire their expectation on familiarizing the new product through an user manual and possible tutorial videos. Though, our project ended before having to see the VA's intranet approval of downloadable ProSkedge installation, we have outlined an initiated process for future spread.

This project has laid the foundation for a continued work on improving technology transfer, along with ProSkedge's evaluation. More reflections are expected from Worcester CBOC and/or other CBOCs once the planning tool enters the trial-run. The proposed step as described in Stage IV of the methodology and future work section can be carried out either later during the year by us or another motivated group in the future, who strives to make a difference on improving the technology standard on health-related facilities.

Before concluding the report, we would love to express our thoughts pertaining to the concerns of our potential end users during our interviews on the ProSkedge's prototype. With demand for caring a more than a hundred new patients monthly, the new patients are bound to be able to quickly fill up the emptied timeslots. However, if one is fortunate enough on seeing empty timeslots, does it indicate that the capacity burdens have been mitigated? As for the physicians' preferences on clinical duty leading another schedule conflict, ProSkedge has a built-in optimizer that stations a minimum number of physicians during the days as inputted by the user, erasing the concerns of having no physicians to work during non-preferential day or hours. Toward the interest of outputting schedule for more than a month ahead of time, multiple simulations can be run to determine the outputted schedule several months ahead. When no changes are made to the inputted constrains, the schedule will be more or less the same, which may prove that extending output ranges may be unnecessary for time being. Yet, we are anticipated to hear from the CBOCs after their experience with ProSkedge for future advancements.

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Appendix I: A List of Interview Questions Given to CBOCs

Interview questions given to CBOCs

1) How would you describe the CBOC's situation pertaining to capacity?

2) What might be causing such problems?

3) Have anyone approached the capacity problem? If yeas, what method was utilize? How successful was it?

3) Do the physicians and nurses work here primarily as a fulltime employee? If not, how can you determine their availability before hand for scheduling appointments?

4) How long does it take for the general flow of patient visiting their doctors?

5) Are there specific days and hours that are more/less busy?

6) How often do specialists visit and how do you do the scheduling for the specialist?

7) How do you think about the current scheduling method? Are you comfortable with it?

8) What computer operating system do you use? What is your Microsoft office version?

9) What do you think about the provider schedule planning tool?

Appendix II: User Manual Survey Questions

User Manual Survey Questions

✱ 1. How often do you use a user's manual for a software?

- Always
- Often
- Occasionally
- Never

✱ 2. Why would you use a user's manual for a software? (check all that applies)

- Familiarization with the product
- Educational purpose
- Entertainment
- Troubleshooting

Other (please specify)

✱ 3. Initially, you look into the user's manual for a software when...

- Before using the product
- After an issue occur during the use of product
- Never

✱ 4. How important is a user's manual for a software?

- Very important
- Somewhat important
- Neutral
- Somewhat not important
- Not important at all

✱ 5. How useful are pictures corresponding with the text of a software's user manual?

- Very useful
- Somewhat useful
- Neutral
- Somewhat not useful
- Not useful at all

✱ 6. What should be included in a user's manual for a software? (check all that applies)

- Cover page
- Copyright page
- Table of Content
- Guide on operation
- Troubleshooting/Frequently Ask Question
- Contact information for further assistance
- Glossary
- Index
- Multi-language translation
- Pictures

Other (please specify)

7. Please rate the layout/format of a software user manual in its ease of use.

	Hard	Somewhat Hard	Neutral	Somewhat Easy	Easy
Electronic file					
Booklet					
Pamphlet					
Plain text on document paper					

Other (please specify)

8. Please enter your email for a chance of winning a $20 gift card from Donkin Donuts

Appendix III: Results from Survey on User Manual

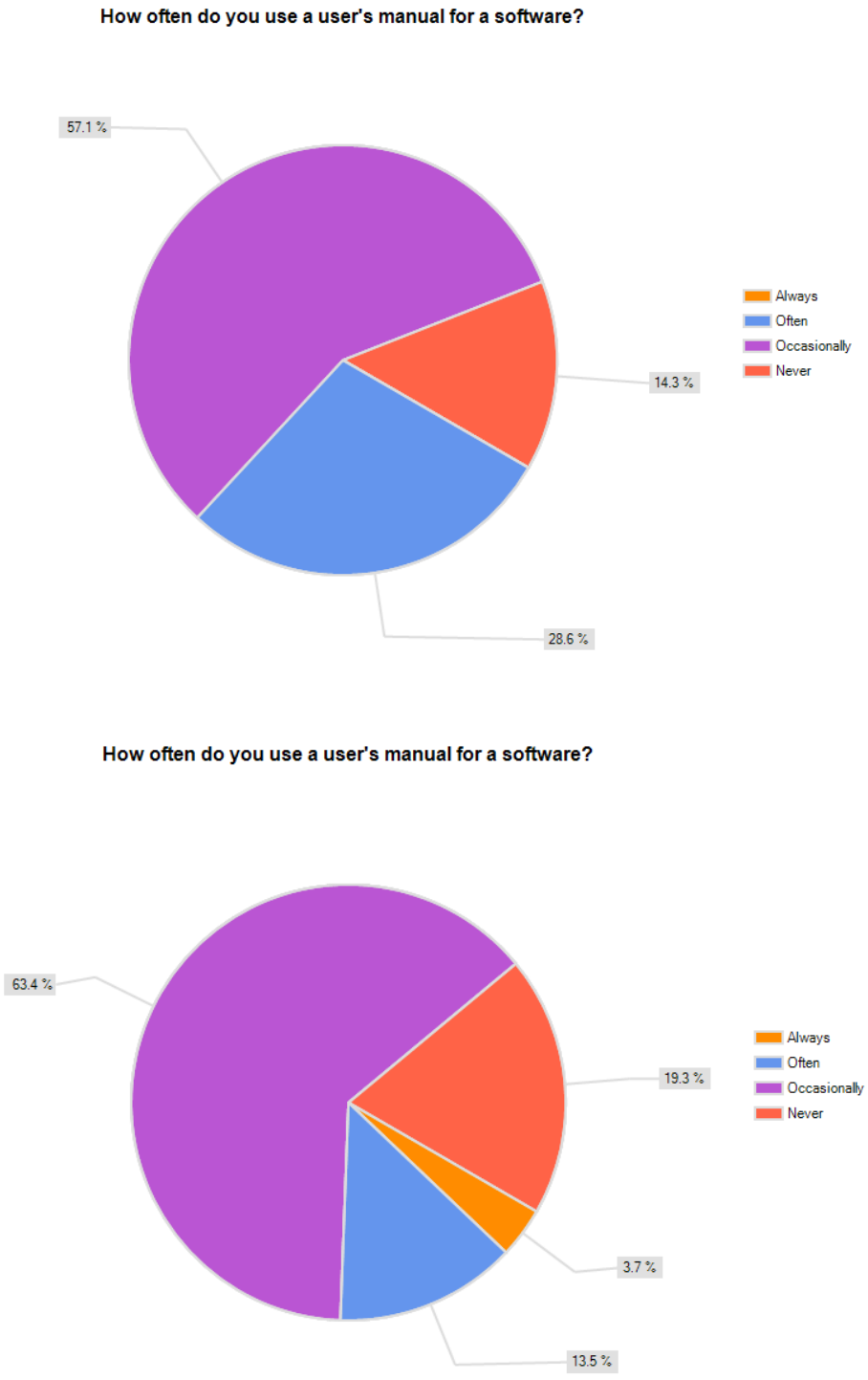


Figure 3: How often do participants use a software manual? Responses from CBOCs (*top*) and WPI Community (*bottom*)

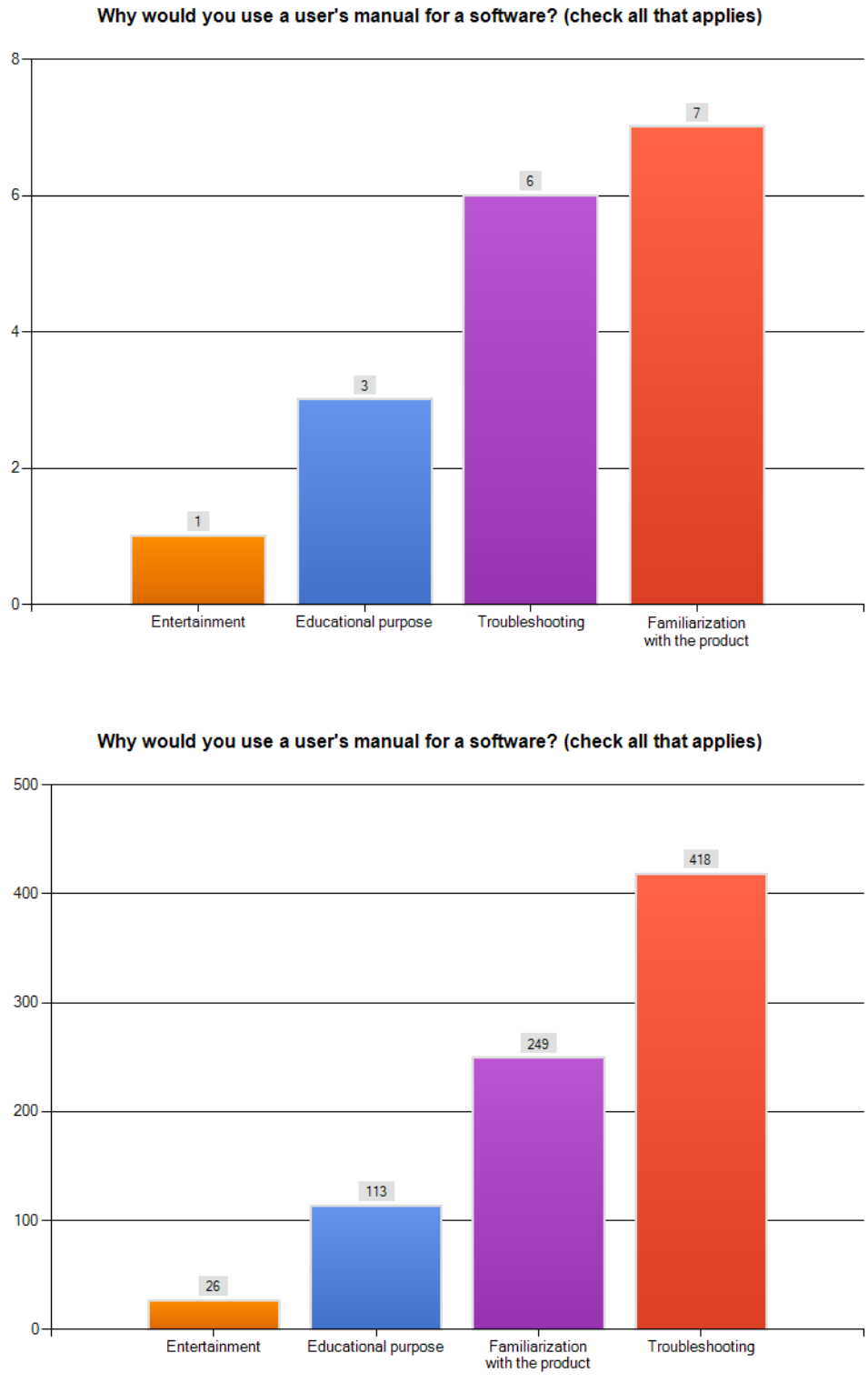
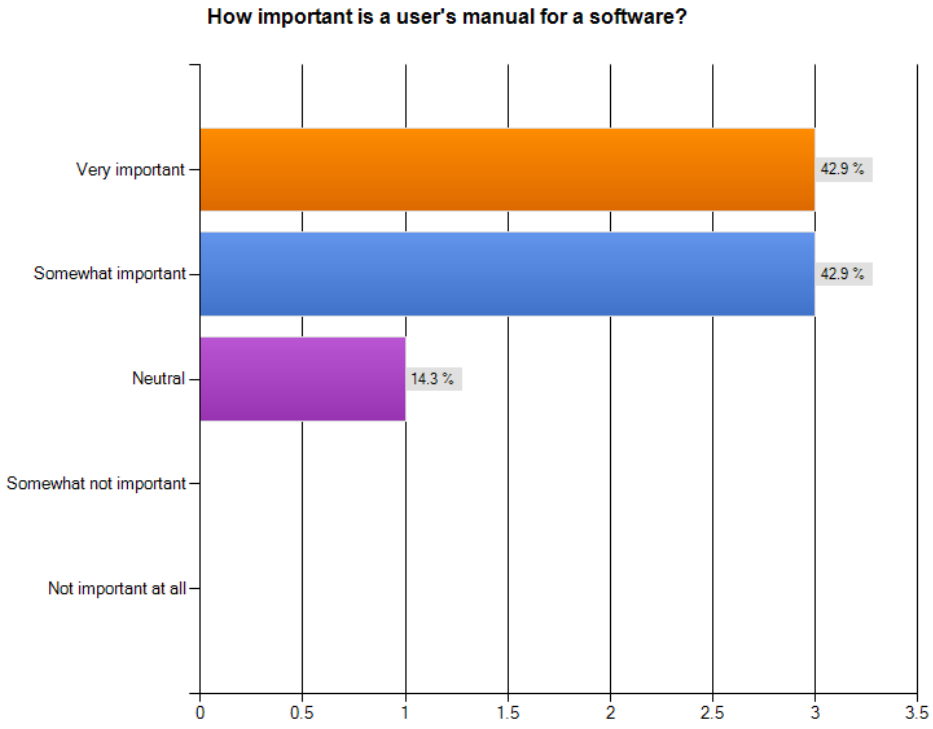


Figure 4: Reasons on using software manual with responses from the CBOC (*top*) and WPI Community (*bottom*)



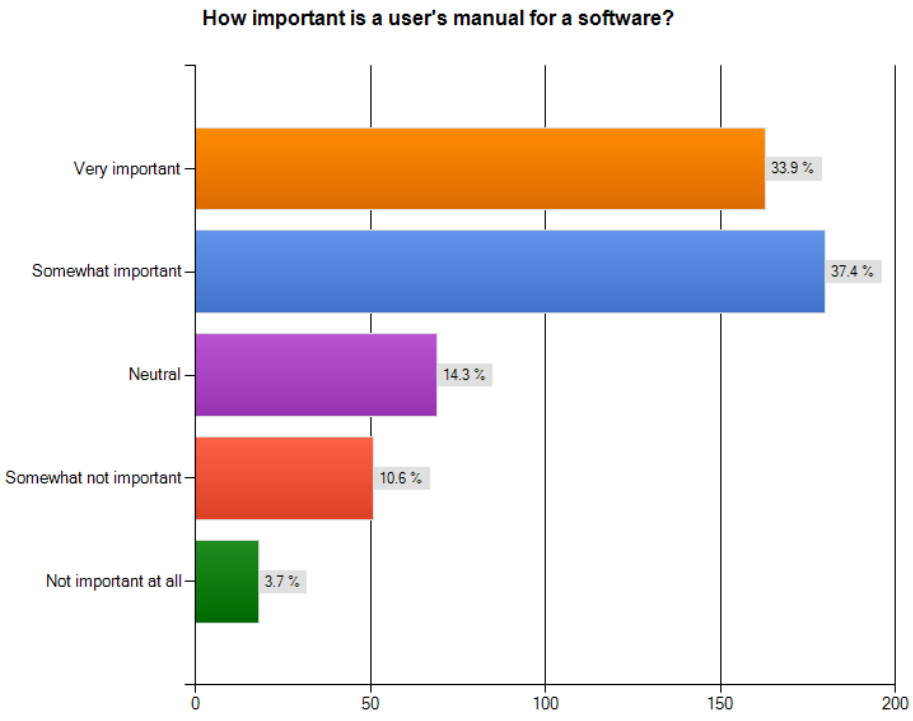


Figure 5: Importance of software manual responses from the CBOC (*top*) and WPI Community (*bottom*)

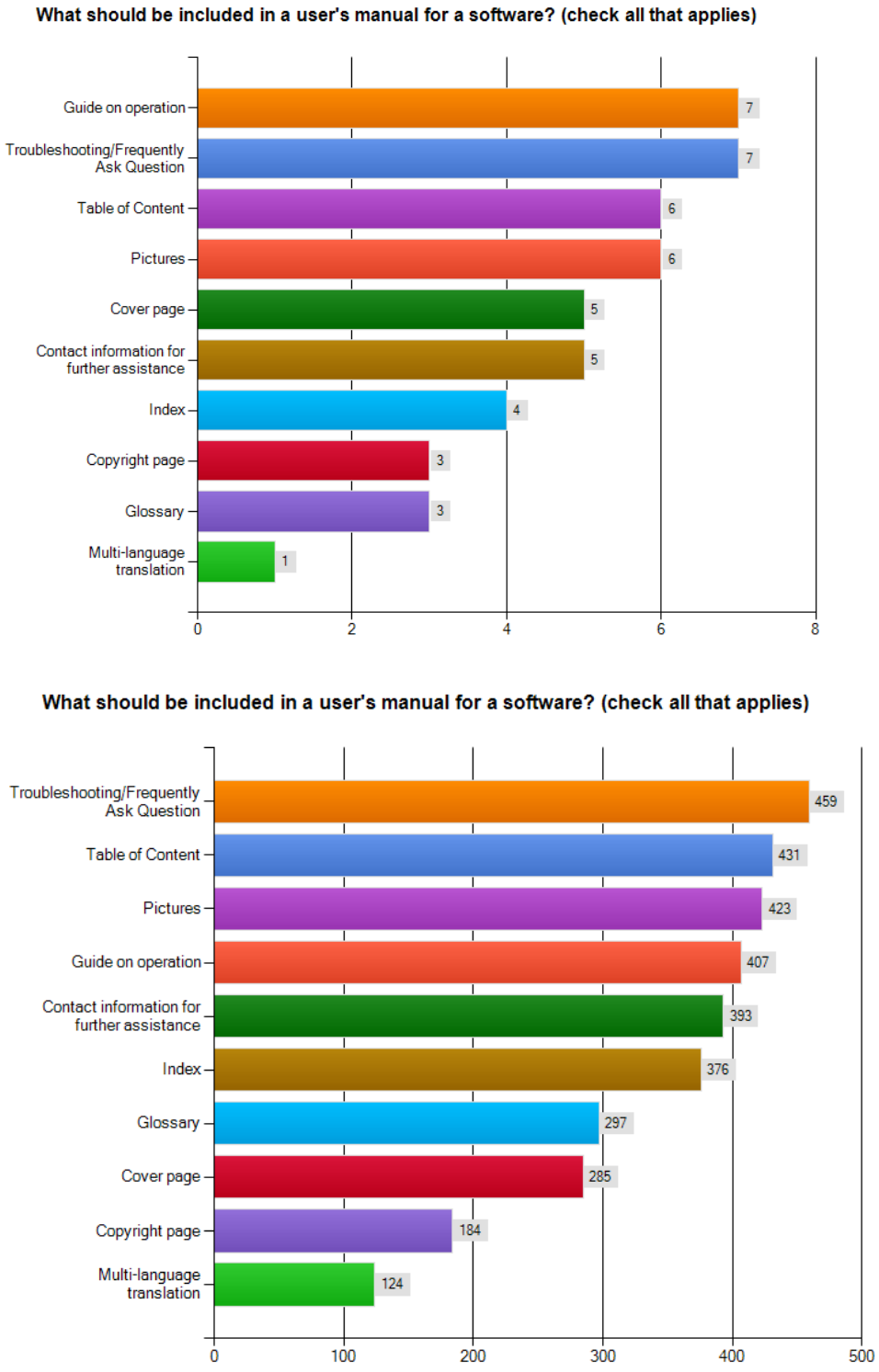


Figure 6: Content within software manual responses from the CBOC (*top*) and WPI Community (*bottom*)

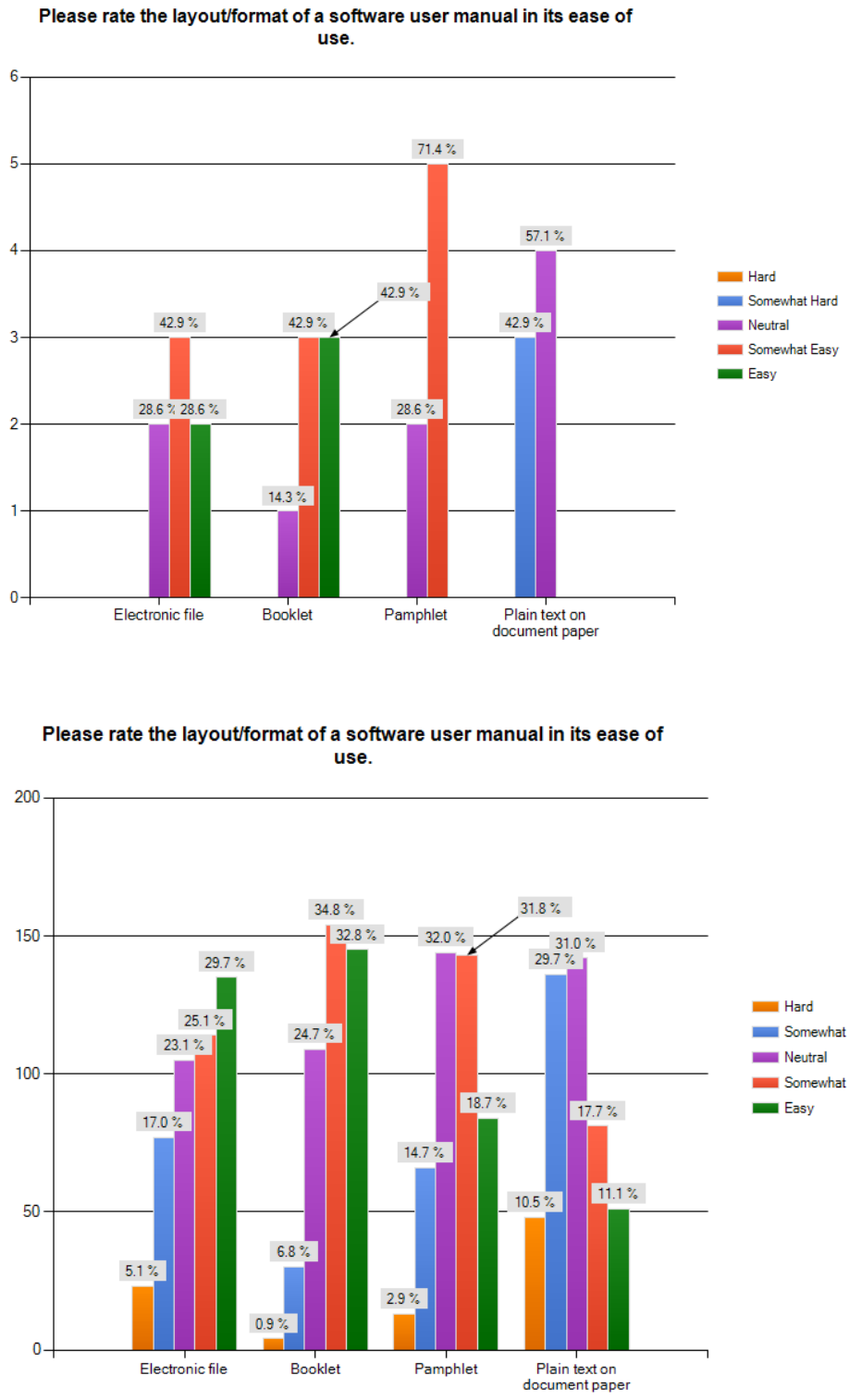


Figure 7: Accessibility preferences on manual layout for software response from the CBOC (*top*) and WPI Community (*bottom*)

Appendix V: User Manual for the Schedule Planning Tool "ProSkedge"

ProSkedge

User's Manual

By Steven Quan and Xiu-ping Chen

Acknowledgement

Although we are the authors of this manual, the hard work and expertise of many individuals contributed to this manual. ProSkedge, itself, was created by a WPI MQP team composed of Sarah Albrecht, Catherine Danko, and Rachel Wallace while trying to solve the capacity issue experienced at the Worcester CBOC. I would also like to thank Professor Konrad and Professor Bar-On on leading both teams into developing the planning tool, along with its spread.

ProSkedge: User's Manual

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Table of Contents

Introduction

ProSkedge is a capacity-planning tool to help coordinate the schedules of primary care providers. It uses a mathematical approach called linear programming to generate a schedule given certain constraints such as rooms available and appointment length. ProSkedge also incorporates the administrative and triage duties of each physician. After a user enters a CBOC's constraints, ProSkedge produces a 4-week schedule for each provider.

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System Requirements

Component	Requirement
Operating System	Windows XP(Service Pack 3), Vista(Service Pack 1), or 7
CPU	500 MHz or faster processor
Memory	512 MB RAM or more
Hard Drive	At least 1 MB free space
Version of Microsoft Office on Computer	Microsoft Office 2007 (or later)

Setup:

A. Installation?

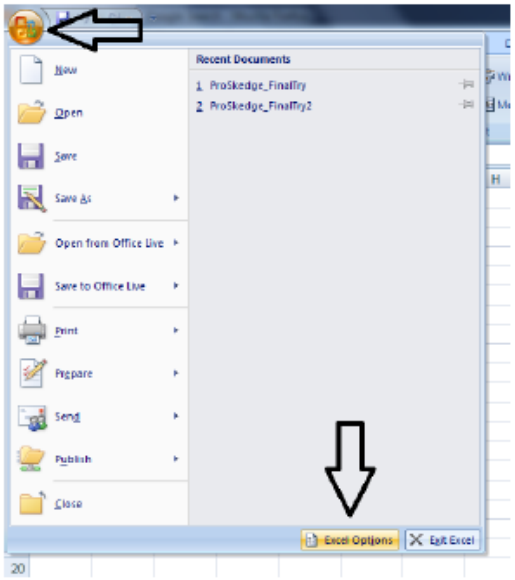
(As of March 2, we are still waiting for the response of Mr. Bonner, VA's Chief of Application.)

B. Prerequisites to MS Excel

In order to run ProSkedge on MS Excel, the Solver add-in must be installed.

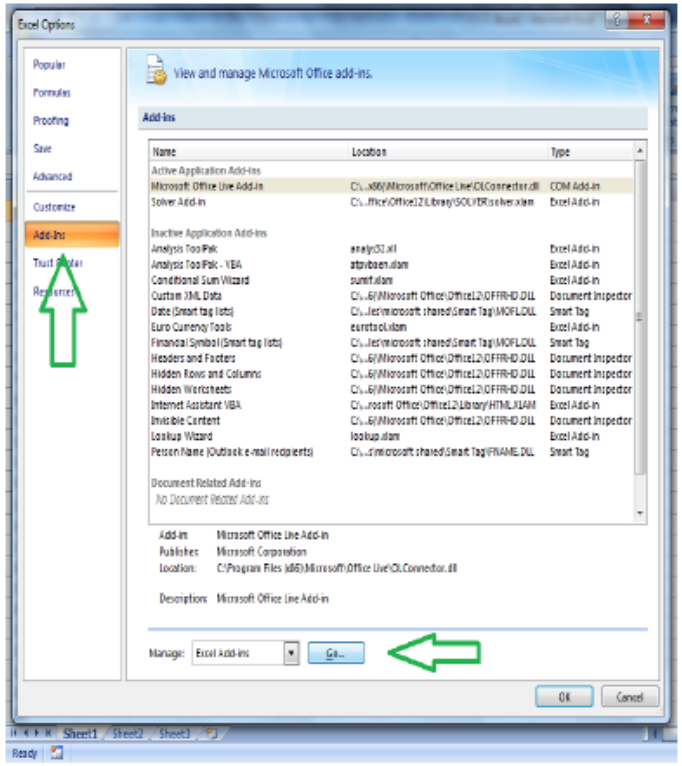
To load/install Solver Add-in:

1) Open a new MS Excel spreadsheet.
2) Click the **Microsoft Office Button** (for 2007) or **File** tab (for 2010) and then click **Options**.



3) Click the **Add-Ins** category.

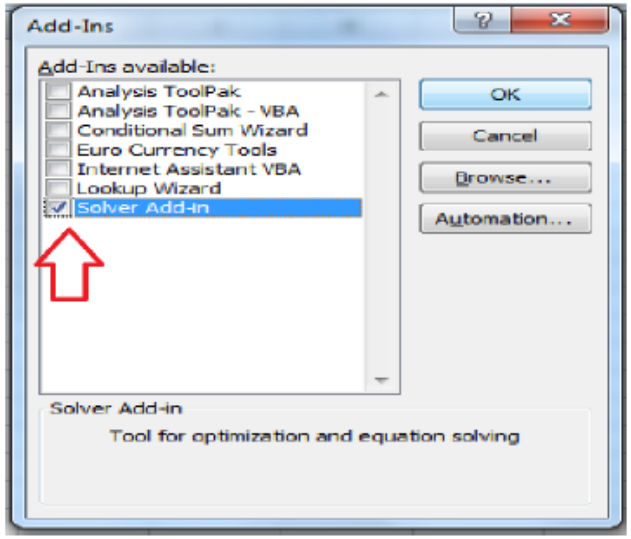
4) In the **Manage** box, select **Excel Add-ins**, and then click **Go**.



5) To load an Excel add-in, do the following:

   a. In the **Add-Ins available** box, select the check box next to the **Solver add-in** and then click **OK**.

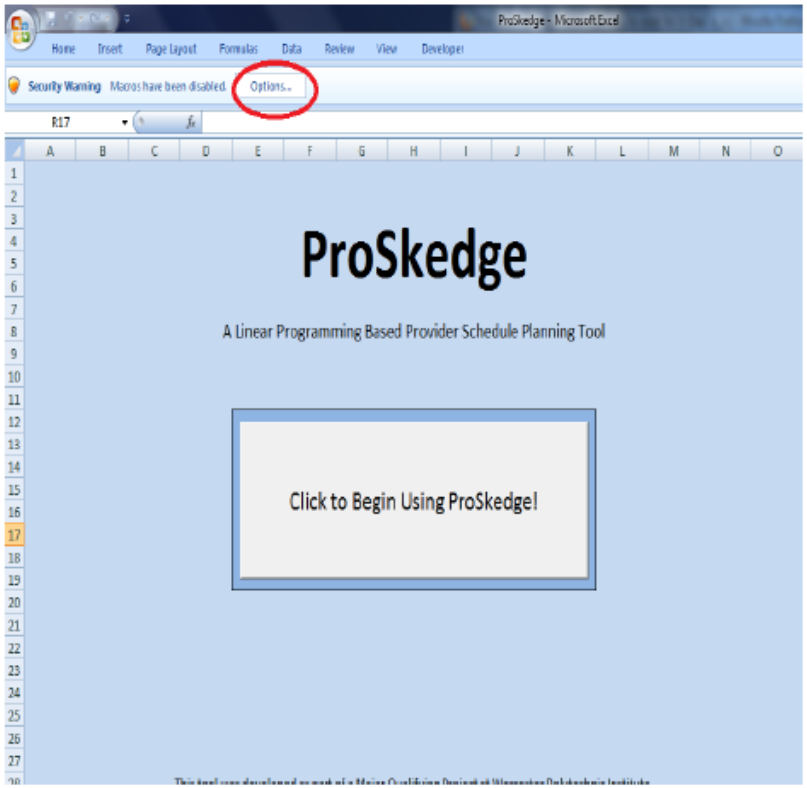
   Tip If the add-in that you want to use is not listed in the **Add-Ins available** box, click **Browse**, and then locate the add-in. Add-ins that are not available on your computer can be downloaded from Downloads on Office Online.



   b. If the add-in is not currently installed on your computer, click **Yes** to install it.

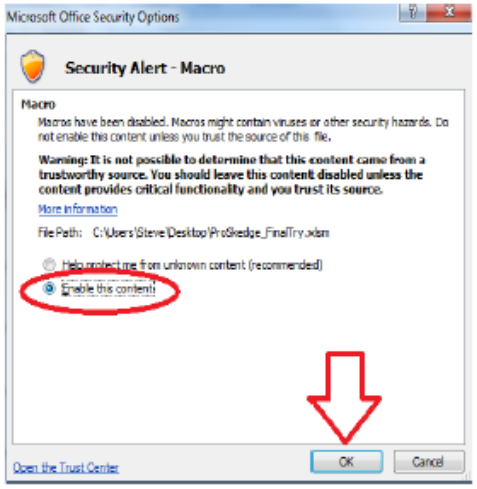
Operational Guide

Upon loading **ProSkedge** on MS Excel, the **Welcome Screen** should appear as follow:



A. Enable Marco

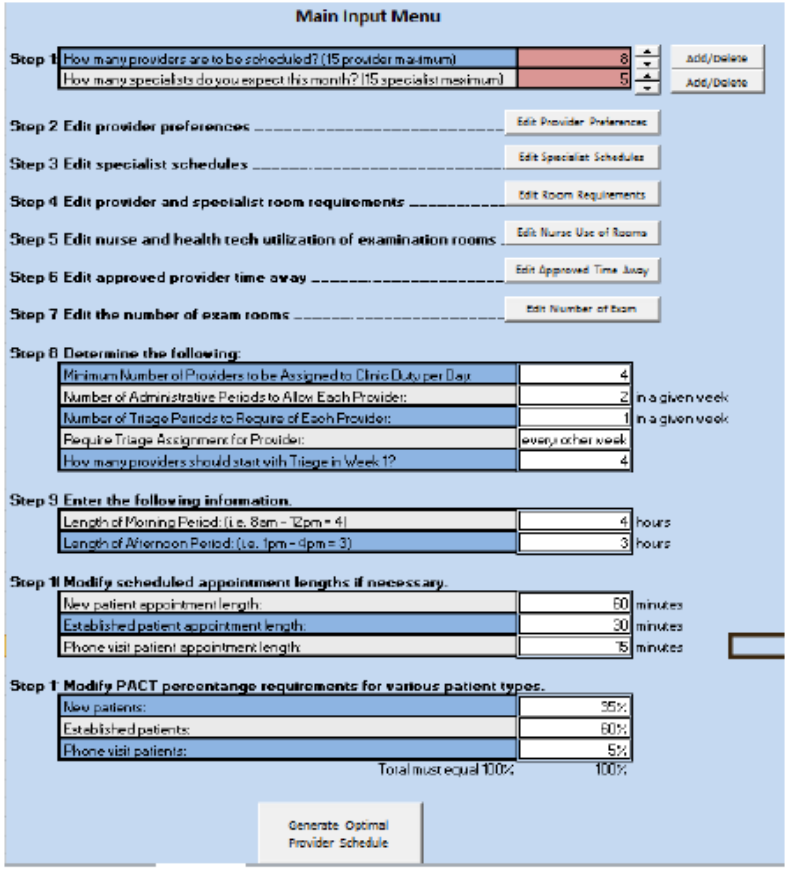
Note: In order to run ProSkedge, please enable **macro** by clicking the **Option** from the **Security Warning** that is circled, which will prompt user to the following pop up:



Select **Enable the content** and click **OK** to enable macro.

B. Main Input Menu

Upon clicking the "Click to Begin Using ProSkedge" button, the following input screen will appear:



Instructional Steps for Input:

1) **Number of Providers and Specialists** expected to work during the following month can be change by pressing the arrows next to the box. Please remember to click **Add/Delete** box every time a change is made.
2) **Edit Provider Preferences** will prompt user to another screen to address each provider's desired hours to perform clinical duties. (see page 8)
3) **Edit Specialist Schedule** will prompt user to another screen to address the specialists' schedule and availability. (see page 9)
4) **Edit Room Requirements** will prompt user to another screen to enter the number of rooms required by each provider and specialist. (see page 9)
5) **Edit Nurse Use of Room** will prompt user to another screen to enter the number of rooms utilized by nurses. (see page 9)
6) **Edit Time Away** will prompt user to another screen to address each provider's availability. (see page 10)
7) **Edit Number of Rooms** will prompt user to another screen to enter the number of exam rooms available. (see page 10)
8) In step 8, enter the minimum number of providers needed for clinical duties each day and their administrative time allowance in a week. Triage setting can also be adjusted to your facility's requirement. Press **Enter** to finalize.
9) In step 9, enter the length of the morning and afternoon period and press **Enter** to finalize.
10) In step 10, enter the lengths of each type of appointments and press **Enter** to finalize.
11) Step 11 allows user to modify the desired percentages of the different visits in a given month; press **Enter** to finalize all settings.

Click **Generate** to output an optimal schedule.

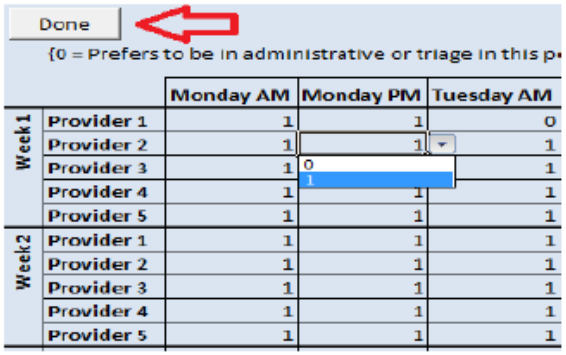
Note: Generating output can take a ***few*** minutes.

B1. Provider Preferences Menu

In this screen, please indicate the provider's preferential time for clinical duties in the box corresponding to its week, day, and hour.

Code	Meaning
0	Prefers not to be schedule for clinical duty, instead, prefers to work in triage or administrative duty
1	No preference
2	Strongly prefers to be working on clinical duty
*The default value is **1** with each provider having no specific preferences.*	

To edit the preference code, highlight the box of interest and a drag down arrow will appear at the right side of the box. Click on the arrow to select the number code.



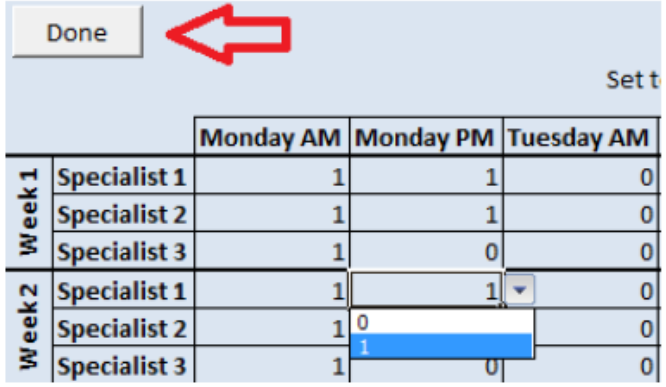
If satisfy, click **Done** to return to **Main Input Menu**.

B2. Specialist Schedule

In this screen, please indicate the availability of the specialists to accept patient visits in the box corresponding to its week, day, and hour.

Code	Meaning
0	Not available (not present in facility)
1	Available (present in facility)
*The default value is **0** with each specialist not present in the facility.*	

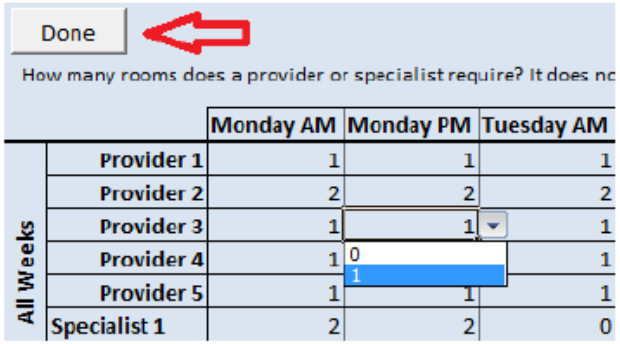
To edit the specialists' availability code, highlight the box of interest and a drag down arrow will appear at the right side of the box. Click on the arrow to select the number code.



If satisfy, click **Done** to return to **Main Input Menu**.

B3. Room Requirements

In this screen, please indicate the number of rooms requested by the providers and specialist by highlighting the box corresponding to the week, day, and time of interest. A drag down arrow will appear with a selection of required room ranging from 0 to 6 rooms.



		Monday AM	Monday PM	Tuesday AM
All Weeks	Provider 1	1	1	1
	Provider 2	2	2	2
	Provider 3	1	1	1
	Provider 4	1	0 / 1	1
	Provider 5	1	1	1
	Specialist 1	2	2	0

If satisfy, click **Done** to return to **Main Input Menu**.

B4. Utilization of Rooms by Nurse/HealthTech

In this screen, please indicate the number of rooms used by the nurses and health techs by highlighting the box corresponding to the week, day, and hour of interest. Upon being highlighted, key in a number and press **ENTER** on keyboard to finalize edit.

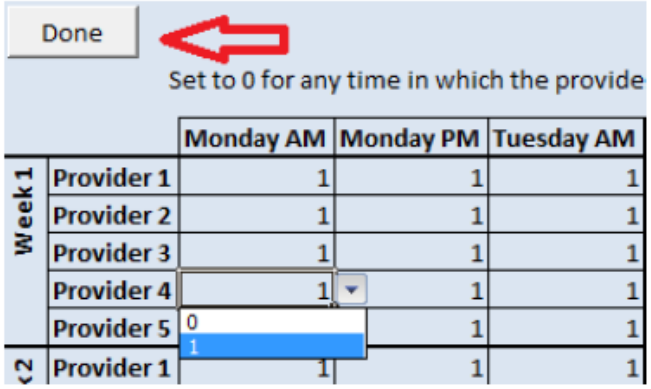
If satisfy, click **Done** to return to **Main Input Menu**.

B5. Time Away

In this screen, please indicate the availability of the providers. Providers may be unavailable if needed to attend meetings, vacations, etc.

Code	Meaning
0	Not available (not present in facility)
1	Available (present in facility)
The default value is 1 with each provider present in the facility.	

To edit the providers' availability code, highlight the box of interest and a drag down arrow will appear at the right side of the box. Click on the arrow to select the number code.



		Monday AM	Monday PM	Tuesday AM
Week 1	Provider 1	1	1	1
	Provider 2	1	1	1
	Provider 3	1	1	1
	Provider 4	1	1	1
	Provider 5	0 / 1	1	1
2	Provider 1	1	1	1

If satisfy, click **Done** to return to **Main Input Menu**.

B6. Number of Rooms

In this screen, please indicate the number of rooms available to be distributed among providers, specialists, and nurses/healthtechs by highlighting the box corresponding to the week, day, and hour of interest. Upon being highlighted, key in a number and press **ENTER** on keyboard to finalize edit. Number must be greater than or equal to zero.

If satisfy, click **Done** to return to **Main Input Menu**.

Output Schedule

Upon completion of personal inputs and of generating an output, a screen similar to the screenshot below will appear.

Done

Optimal Provider Schedule

		Monday AM	Monday PM	Tuesday AM	Tuesday PM	Wednesday AM	Wednesday PM
Week 1	Provider 1	1	1	0	0	1	1
	Provider 2	0	1	0	1	1	1
	Provider 3	0	1	1	1	1	1
	Provider 4	1	0	1	1	1	1
	Provider 5	1	0	1	1	1	1
Week 2	Provider 1	1	1	1	1	1	1
	Provider 2	1	1	1	1	1	1
	Provider 3	1	1	1	1	1	1
	Provider 4	1	1	1	1	1	1
	Provider 5	1	1	1	1	1	1

The green boxes corresponding to the week, day, and hour of interest indicate that the providers are available for clinical duty like seeing patients in scheduled appointment. The red boxes, on the other hand, indicated that the provider is not available for clinical duty. This can be a result of being away during a specific time block or of being on administrative paperwork duty. Depending on whether the user allowed triage in facility, a red box can also indicate the provider's time slot spend in triage instead of on clinical duty. Users can plan accordingly to set provider's availability to accept appointments and rooms requirements based on this output.

User can return to **Main Input Menu** by clicking on the **Done** button at the top left corner or view the optimal number of each visit types as planned in the schedule by clicking the **Throughput Result** button on the top right corner.

In the **Throughput** screen, the number of patients and types of visits are listed based on the input in **step 8.** User can return to the previous **Output Schedule** by clicking the **Schedule Results** button at the top right corner or return to the **Main Input Menu** by clicking the **Done** button at the top left corner.

FAQ

Q1 What year of MS Excel is needed to run ProSkedge?

A1 Currently, MS Excel 2007 and 2010 are capable of running ProSkedge.

Q2 How long does it take to generate output schedule?

A2 It varies depending on the input constrains. As more providers are available with differences in preferences and the facility settings (room. triage frequency, etc), the longer it would take to optimize. Generally, it should take between one to seven minutes. If after 10 minutes, and nothing resulted, it is recommended to close programs and adjust your values again.

Q3 Is the previously inputted value auto-saved?

A3 Yes, all input data is auto-saved over the default values; thus, no need to save after exiting MS Excel. However, once the number of provider/specialist is changed, the provider/specialist of the highest value will be affected. Addition of new provider will take on default values initially.

Troubleshooting

1) If buttons does not work,

   Check to see if macro is enabled. Refer to page 7

   If the **Security Warning** is not present, access excel option as shown on page 5; however, instead of clicking the Add-in tab, select **Trust Center** tab and then **Trust Center Setting**. A new pop-up with new tabs will appear. Click on the **Marco Setting** tab and select "**Disable all macros with notification**" to enable Security Warning or "**Enable all macro**", which is not recommended.

2) If cannot run ProSkedge after inputs,

   Check to see if **Solver Add-in** was installed and/or loaded. Refer to page 5.

   If problem persists, restart program and/or computer. It is possible for Proskedge to crash or output falsely if the inputs were irrational (ex. There are only four rooms but all the providers need five rooms, making it impossible to optimize)

3) Cannot exit Proskedge.

   After pressing **Ctrl, Alt, Del** simultaneously on keyboard, select start task manager and highlight **EXCEL.EXE** from the list of images in the **Processes** tab before hitting end process.

ProSkedge Evaluation

We would love to thank everyone who has used ProSkedge and to hear from its users on the product's evaluation (after three month of use), which may be served as references for future advancements. Please complete survey and mail it to Prof Konrad (see contacts). We value your inputs on trying to make ProSkedge better.

Proskedge Follow-up Survey — Exit this survey

1.

1. Have you ever used or heard of the Proskedge planning tool for scheduling?

- ○ Yes, I have heard of Proskedge but never used it
- ○ Yes, I have heard of Proskedge and used before
- ○ No, I have never used or heard of Proskedge

Other (please specify)

2. What is your purpose of using Proskedge? (check all that applies)

- ☐ Optimization of scheduling
- ☐ Organization of healthcare providers/nurses
- ☐ Determining factor for exam room distribution among providers, specialist, and nurses in order to optimize resource
- ☐ Self-evaluation: jobs completed vs jobs predicted to be completed
- ☐ N/A

Other (please specify)

3. When using this new scheduling method, are there more (or fewer or about the same) patients being seen each month comparing to the number of patients being seen when using the previous scheduling method?

- ○ More
- ○ The same
- ○ Fewer
- ○ Not sure

Other (please specify)

4. Do the care providers prefer this new scheduling method over the previous scheduling method?

- ○ Yes
- ○ Neutral
- ○ No
- ○ Not sure

Other (please specify)

5. Do you find it easier to use Proskedge than manually planning on paper? Please be specific if you have used other alternatives on schedule planning.

- ○ Yes, A lot easier
- ○ Yes, Slightly easier
- ○ The same
- ○ No, it is more difficult use Proskedge compared to planning manually
- ○ N/A

Other Alternatives (please specify)

6. How well does Proskedge fulfills its objectives?

	Does not work	Sometimes with gliches	Most of the times	Always	N/A
Optimization of scheduling	○	○	○	○	○
Organization of healthcare providers/nurses	○	○	○	○	○
Determining factor for exam room distribution among providers, specialist, and nurses in order to optimize resource	○	○	○	○	○
Self-evaluation: jobs completed vs jobs predicted to be completed	○	○	○	○	○
In changing condtions, eg, increasing number of patients	○	○	○	○	○

Other (please specify)

7. How often do you encounter the following problems while running Proskedge?

	Always	Often (Five out of ten times)	Once in a while (One out of ten times)	Never	N/A
Program fails to output schedule	○	○	○	○	○
Program stops to response	○	○	○	○	○
Program self exit	○	○	○	○	○
Computer freezes and/or restarts	○	○	○	○	○

Other (please specify)

8. Please rate the overall usefulness of the tool's feature.

	Not Useful	Need Improvements	Good	Excellent	N/A
Optimization of scheduling	○	○	○	○	○
Organization of healthcare providers/nurses	○	○	○	○	○
Determining factor for exam room distribution among providers, specialist, and nurses in order to optimize resource	○	○	○	○	○
Self-evaluation: jobs completed vs jobs predicted to be completed	○	○	○	○	○
Text Front	○	○	○	○	○
Color and Layout	○	○	○	○	○

9. Was the software manual clear and helpful?

- ○ Yes, very direct and concise
- ○ Somewhat helpful
- ○ Neutral
- ○ Slightly confusing
- ○ Not useful at all

Other (please specify)

10. Would you be interested in using Proskedge in the future?

- ○ Already Using ProSkedge
- ○ Interested in Using ProSkedge
- ○ Quit Using ProSkedge
- ○ Not interested in giving ProSkedge try

Other (please specify)

11. Any Comments in regarding to the survey or suggestions for improvement to enhance the features of Proskedge

Glossary

Add-in is a software program that extends the capability of larger programs.

Administrative Duty is the time spent on paperwork following patient visits and etc.

Afternoon Period is the length of time from post-lunch-break to the end of the working hours.

Appointment Length is the length of time used for appointments.

Capacity Issue: with the returning veterans, the VHA is experiencing greater demands to take care of more veterans for both new and established patients

Clinical Duty is the time spent with patients during schedule appointment visits.

Community-Based Outpatient Clinic (CBOC) is a medical facility providing limited service to given locals.

Established Patient Appointments is a type of patient visits in which returning-patients are coming back for more health-related services.

Macro (MS Excel) is a set of functions that can be triggered by keyboard shortcut, toolbar button, or an icon in a spreadsheet.

Morning Period is the length of time from the start of work till lunch-break.

New Patient Appointments is a type of patient visits in registering new veterans under care and will generally take longer than other visits for a throughout examination.

Number of Providers and Specialists: The number of primary care doctors and specialists in facility.

Number of Room is the total number of rooms available to be used for doctor-patient or nurse-patient interactions.

Optimal Schedule: Under room constrains used by specialists and nurses, the optimal schedule aims to distribute providers among clinical, administrative, and triage duty to minimize the utilization of limited resource while attempting to maximize the population of patients in regards to the capacity issue in the VHA.

Patient Aligned Care Team (PACT): The concept and practice of establishing ongoing relationships with personal physicians with patient, physician directing medical team to provide whole patients orientation services in coordinated care system, and VHA providing the quality and safety to access care

Phone Visits is a type of patient visits in which registered patient call health facility for short questions and consultation regarding to medical conditions.

Primary Care Unit is a health service that acts as a first point of consultation for all patients.

ProSkedge is a schedule planning tool developed my WPI's MQP team in order to output an optimal schedule timeslots one month ahead of time

Provider Preference: A favorable time declared by individual providers on when she/he prefers to have clinical, administrative, and/or triage duties

Providers are general health practitioners (primary-care doctors).

Room Requirements are the number of rooms requested by individual providers and specialists for health practices.

Rooms Utilized by nurses or healthtech are the number of rooms need by the nurses/healthtech in performing vitals, shots, and other health-assisting duties.

Special Schedule is the availability of specialists in a facility.

Specialists are providers disciplined in a specific field like cardiology, neurology, etc.

Time Away summarizes the availability of the providers to determine whether they are present in the facility for work. Absences could be due to meeting, vacation, etc.

Triage Duty is the time spent with non-scheduled patient visits such as emergency and etc.

United States Department of Veterans Affairs is a government-run military veteran benefits system.

Veterans Health Administration (VHA) is the component of the US Department of Veterans Affairs that implements the medical assistance program of the VA through the administration and operation of health facilities

Index