ABSTRACT

LEARNING BY DOING AT MEDPLUS

by Toby Green

This report describes my internship at MedPlus, Inc., a subsidiary of Quest Diagnostics Incorporated, between August 1 and October 14, 2008. MedPlus is a leading provider of information technology solutions to hospitals and other medical sites. I interned with the documentation group for MedPlus’ flagship product, ChartMaxx, editing, authoring, and designing instructional materials for ChartMaxx users.

This report reflects the phases of my internship: my introduction to the company, training within the technical communications department, and work on ChartMaxx documentation. I have also made conclusions describing differences between academic communication and the practical workforce, strengths and limitations of a technical communications department, and the lessons I learned while moving from academic to professional communication. These conclusions are juxtaposed to relative theories of knowledge management.
LEARNING BY DOING AT MEDPLUS

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Master of Technical and Scientific Communication
Department of English
by
Toby Peter Green
Miami University
Oxford, Ohio
2009

Advisor________________________________________

Dr. Jean Lutz

Reader________________________________________

Dr. Katherine Durack

Reader________________________________________

Dr. Alton Sanders
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Chapter 1: Introduction

I have successfully concluded a three-month technical communication internship with MedPlus, a subsidiary of the laboratory services company, Quest Diagnostics. MedPlus produces healthcare information technology software. Between August 1 and October 14 of 2008, I worked in MedPlus’ technical communication department performing a broad range of tasks. Most of my time was spent documenting MedPlus’ flagship product, ChartMaxx. Through the tasks I performed at MedPlus, I learned about both communication and corporate practices.

About MedPlus

MedPlus is a leading provider of healthcare information technology software. MedPlus products target three groups: patients, doctors, and hospital administrators. The current president of MedPlus, Richard Mahoney, founded the company in 1991 (“About Us,” 2007). MedPlus has steadily expanded in size and scope since that time, through both its acquisition by Quest Diagnostics and its own purchase of smaller companies. However, the company has managed to retain a great deal of autonomy and a close, “small business” culture.

I interned at the main MedPlus office in Mason Ohio, which houses just over 350 employees. The small size of the workplace made it easy to learn the layout of the building and to build connections with many coworkers. Several hundred additional MedPlus employees work remotely from offices and homes around the country. However, interaction between office staff and remote employees maintains the same amiable character as intra-office communication. MedPlus' relaxed, friendly, atmosphere encourages collaboration and is a point of pride for the company's management. Because of this cooperative culture, MedPlus is able to develop software successfully in spite of its small size.

MedPlus software is built and supported almost entirely in-house. This software addresses health care in three distinct spheres:

- The needs and concerns of the patient.
- The work and responsibilities of the physician.
The information needs of hospital administrators.

Each sphere is addressed by at least one MedPlus product. However, MedPlus products can also be interconnected to provide a more comprehensive set of benefits to the healthcare industry. MedPlus products can be used together as a single system in order to manage patient information, physician tasks, and hospital operations as one process.

Providing full information technology solutions for healthcare requires the work of many teams and departments. Communicators at MedPlus play three significant roles:

- **Editors.** Editors improve and enrich company documents.
- **Documenters.** Through print and electronic documentation, communicators provide instructions for MedPlus software.
- **Team members.** Communicators, and all other MedPlus employees, consistently advise one another and help with tasks on an “as-needed” basis.

During my internship, I occupied all of these roles. It was difficult to manage many different responsibilities, but it was also very rewarding.

**My Role at MedPlus**

I joined the MedPlus Technical Communication department as an intern. Including me, this department has ten employees, two of whom work remotely. My mentor, Lori O’Malley, initially planned that my internship would be spent converting MedPlus documents to IBM’s DITA XML (Darwin Information Typing Architecture Extensible Markup Language). This architecture uses predefined XML classes to single-source technical documents to print, the Web, or other formats (OASIS, 2008).

However, by the time my internship was finalized, DITA adoption had been moved to a later date. There were several reasons for this: the complexity of adapting existing documents to DITA was greater than anticipated, and the other communicators working on DITA adoption had other, more pressing responsibilities that prevented them from addressing their DITA work. Lori identified a more immediate project I could work on—documentation for the ChartMaxx product line.
At the time my internship started, ChartMaxx 5.0 was near release and development of ChartMaxx 6.0 was also about to begin, creating a significant need for ChartMaxx documentation work. In addition to writing and editing documentation for ChartMaxx 5.0 and 6.0, I was given a number of general editing tasks early in my internship. Completing this work helped prepare me for more complicated communications work at MedPlus. Although professional communicators must cope with many different responsibilities at once, I was assigned one new task at a time. This slow introduction to a full communication workload helped me adjust to working at MedPlus. There was also some overlap between old and new tasks in my schedule, which forced me to budget my time and be aware of deadlines.

![Figure 1](image)

*Figure 1.* The distribution of my work during my internship.

**General Editing**

The technical communications department at MedPlus has two responsibilities: product documentation and general editing for material written in other departments. By applying our knowledge of sound communication, we can help our coworkers create clearer, more effective documents. Although most of our work consists of documentation, this general editing is always a small part of our jobs. Offering assistance like this is an important way that a technical communication department can add value to an organization.
ChartMaxx 5.0 Duties

One of my first tasks at MedPlus was to join the documentation team for ChartMaxx 5.0 as an editor. ChartMaxx documentation spans thousands of pages and is edited prior to every release. This editing has two purposes: to reflect the changes made to ChartMaxx in the current release and to improve existing documentation. ChartMaxx 5.0 documentation work occupied most of my time for the middle of my internship. I learned a great deal about MedPlus during this time, and my work on ChartMaxx 5.0 helped prepare me for work on ChartMaxx 6.0 documentation.

ChartMaxx 6.0 Duties

My work creating documentation for ChartMaxx 6.0 was far more complex and challenging than editing the ChartMaxx 5.0 documentation had been. Even during the development of ChartMaxx 5.0, planning was under way for the 6.0 release. MedPlus assembled CFTs (Cross-Functional Teams) made up of developers, project planners, marketing and sales staff, technical communicators, business analysts, and managers. Each team was tasked with a significant enhancement project for the 6.0 release of ChartMaxx. I was assigned to two of these cross-functional teams. My involvement in these projects began as work on the 5.0 release of ChartMaxx concluded. As the activities of the cross-functional teams intensified, more and more work was assigned to me, and I gradually assumed the workload of a professional technical communicator. My work on ChartMaxx 6.0 was the heart of my internship.

My efforts documenting ChartMaxx 6.0 focused on two projects dubbed C345 and C394. C345 was an expansion of existing customization features in ChartMaxx. Users have the ability to rename some data fields in ChartMaxx, and C345 increased the number of fields that could be renamed. All 18 applications in the ChartMaxx suite were affected in some way by this project. However, because the actual usability of ChartMaxx was unaffected, only slight changes were needed to most documentation. Only one element of the ChartMaxx suite required substantial new documentation as a result of C345.

Project C394 was a complete rebuild of the ChartMaxx Web client and theoretically involved a complete rewrite of the existing ChartMaxx Web client documentation. The total amount of documentation created for this project would have exceeded the amount created for C345,
requiring the complete rewriting of the documentation for one ChartMaxx component, ChartMaxx for the Web. The C394 team also adopted unconventional planning practices for their work. These new practices made it challenging to write documentation, but they were essential in order to address the daunting scope of the project. Although Project C345 was completed successfully, Project C394 was suspended due to slow progress and time constraints, and I only completed draft documentation for its features.

The differences between documenting C345 and C394, and my other experiences at MedPlus, have given me insight into the real world of technical communication. This report will highlight my experiences, describe relevant facts about MedPlus, and articulate lessons I have learned in my time there. I will explore how a communicator can adapt to the dynamic and unpredictable “real world,” and how academia differs from professional communication. I will also discuss my own adjustment to the workplace.
Chapter 2: ChartMaxx, the Flagship MedPlus Product

The product for which MedPlus is best known is ChartMaxx. ChartMaxx is a comprehensive workflow and data management tool. It is one of several distinct products sold by MedPlus. MedPlus products each target a different audience. As a result, they are built differently based on the needs of those audiences. At the same time, every MedPlus product is developed by the same company and many features of one MedPlus product overlap with other MedPlus products. Although the differences and similarities among MedPlus products create some complicated redundancy, they allow different products to meet the needs of different clients effectively.

As clients' needs have become greater and better defined over time, MedPlus developers have continued to fine-tune their software. The result has been an increasingly robust set of products. In some cases these products can interact to provide more robust functionality to users. This evolution can be likened to the growth of software suites such as Microsoft Office, Adobe Creative Suite, or the Apple iLife suite (“iLife,” 2008). Like these products, MedPlus software suites are improved strategically, and future improvements often begin during the development of an earlier release. This was the case with ChartMaxx, the sixth version of which was already in planning when development of version 5.0 was concluding.

ChartMaxx is actually a suite of several programs. These programs are used by different hospital departments, and they interact to support the hospital holistically. ChartMaxx's structure is similar to that of the hospital itself. Each department is represented by several applications within the suite. The names for a hospital's departments will vary by site, but ChartMaxx functionality is divided across the following five groups:

- **Clinicians and Nurses.** Clinicians are physicians who treat patients. They collaborate with nurses to provide patient care.

- **Laboratory Physicians and Specialists.** Laboratories staffed by physicians and other professionals analyze samples and analytes (such as urine, cheek swabs, or radiology exam results). Laboratory findings are an important factor in caring for a patient.
• **Administration.** Hospital administrators are in charge of the logistical and financial operation of the hospital. They must also ensure that patients receive adequate care.

• **Document Management.** Hospitals keep thorough records, which can easily include millions of documents. Sound document management is essential to hospital operation.

• **Information Technology.** Hospitals depend on electronic tools like ChartMaxx and require information technology departments to oversee those tools.

As a patient's care progresses, that care is supported by every department in the hospital. These departments must work in concert to succeed, and the complex relationships between hospital departments dictate the design of ChartMaxx. Each department has access to the portions of the ChartMaxx suite that facilitate their role in the treatment process.

*Figure 2. The process of patient treatment across hospital departments.*
The ChartMaxx suite contains the following eighteen applications:

1. *Main Menu*, the control panel from which other elements of ChartMaxx are launched. All ChartMaxx users have access to this application.


3. *Completion*, an alternate interface for Navigator that allows physicians to manage their hospital responsibilities such as checking on a patient, performing a test, or writing a report.

4. *Workflow Manager*, a tool used to build scripts that explain how hospital staff should work with documents. Workflow Manager supports a branching course of action, and allows managers to plan for multiple outcomes when working with documents. Hospital Administrators have access to Workflow Manager.

5. *Scan Operator*, an imaging tool that directly controls scanning equipment at a hospital and collects the scanned documents on the ChartMaxx network. ChartMaxx’s ability to manage scanned documents and imaging has repeatedly earned accolades among other imaging software from the review group, Klas Enterprises (Imaging Update, 2006). Document management specialists are the only users of Scan Operator.

6. *Quality Review*, a tool that facilitates reviewing and editing scanned documents. A small part of a document management department is usually responsible for Quality Review operation.

7. *Deficiency Analysis*, an alternate user interface and tool set for Chart Navigator that allows physicians to browse charts for administrative action items that they must address.

8. *Release of Information*, a distribution utility that can draw data from other ChartMaxx applications and automate the print and sale of this information. Administrators and document management staff use Release of Information to provide information to insurers, other hospitals, and other third parties.
9. **Chart Editor**, an alternate user interface for Navigator containing specialized tools used by clinicians to edit charts. In some hospitals, only supervising clinicians may edit charts directly.

10. **Security Manager**, a tool that information technology security specialists use to control application privileges for ChartMaxx users.

11. **ChartMaxx Reports**, an analytic tool used to audit patient charts, other records, and ChartMaxx itself. ChartMaxx Reports produces reports based on these audits which help administrators clearly understand the work being done in their hospitals.

12. **Table Manager**, a preference manager utility that stores settings for every other ChartMaxx application. Only supervisors in a hospital's information technology department have access to Table Manager.

13. **System Manager**, a command-line interface used by a hospital's information technology department to make complex, global changes within a ChartMaxx system.

14. **Workflow Operator**, an editing tool that is used to directly view and interact with the workflow scripts generated by Workflow Manager. Both physicians and administrators have access to Workflow Operator.

15. **Encoder**, a database tool that allows the information technology department to associate ChartMaxx values with the alphanumeric record codes used by hospitals.

16. **Registration Assistant**, a clinician application used to register patients at a hospital. This registration is the basis for a patient’s electronic chart.

17. **Distribution Manager**, a powerful content control tool capable of automating the distribution of documents and e-mail. Administrators in charge of hospital communications work with Distribution Manager.

18. **ChartMaxx for the Web**, a dynamic HTML interface which emulates the functionality of the ChartMaxx suite. ChartMaxx for the Web cannot do everything ChartMaxx can, but it reproduces many key features. Physicians who do not have direct access to ChartMaxx can still complete many important tasks remotely using ChartMaxx for the Web.
By building a product out of multiple modular sections, MedPlus developers are able to easily update and maintain ChartMaxx on a by-component basis. For customers, restriction of access on a by-component basis makes ChartMaxx systems more secure. Because hospital staff in each department only use a few ChartMaxx applications, it is simple to train ChartMaxx users, since they only need to master a small part of the suite.

Although it is not marketed as such, ChartMaxx is a knowledge management tool. ChartMaxx collects and stores information about patients, tracks the responsibilities of physicians in hospital workflow, and manages documents and records. The primary unit of data created and manipulated in ChartMaxx is the chart, an electronic equivalent to the traditional paper hospital chart. These electronic charts can contain almost any type of data or document and may be updated electronically from any hospital department as more patient information is collected.
Chapter 3: MedPlus Corporate Culture

Corporate culture is a defining force at MedPlus, and indeed, at any company. If companies were defined only by the products that they produce, Sun Microsystems and Microsoft would be identical, as would Sony and Phillips, or Ford and Chevrolet. Companies are also defined by policies and practices that make up a corporate methodology, determining a company’s success and corporate culture. Three aspects of MedPlus corporate culture affected my internship: the company's relationship to Quest Diagnostics, its project management policies, and employee relations fallout resulting from the Microsoft vs Vizcaino lawsuit.

MedPlus as an Independent Company Within Quest Diagnostics

MedPlus began as an independent company but was purchased in 2001 by Quest Diagnostics, a laboratory testing company that supports hospitals. While Quest was well established in medical laboratory services, the company possessed no information technology capabilities. Acquiring MedPlus allowed Quest to expand the services they offered hospitals to include information technology (IT) services such as workflow and record management, and document imaging. The importance of MedPlus to Quest has led to a unique relationship between the newly joined companies.

Because IT was new to Quest, MedPlus was allowed to retain a great deal of autonomy. This independence was essential; Quest had no knowledge or infrastructure for supervising a software company. The CEO and most employees of MedPlus remained through and beyond the buyout. MedPlus is largely in control of its own policies and also receives new responsibilities from Quest. For instance, MedPlus recently purchased the health care software developer FirstGateways and continues to develop its products for Quest (Bizjournals, 2007).

In spite of the autonomy MedPlus enjoys, it is still a subsidiary of Quest Diagnostics. MedPlus employees participate in ethics and compliance training chosen by Quest. Quest policies determine when MedPlus can purchase goods and hire staff, and when spending must be frozen. Most recently, Quest issued a new set of document styles to MedPlus.
**Project Management**

Strong project management is critical to any successful company. MedPlus project management strongly emphasizes the human resource requirements of projects. Employees may work on a variety of different projects within their department. As a result, MedPlus requires extremely detailed employee time entry, which must indicate what projects each hour of the day is spent on. Every MedPlus project is mapped by managers in terms of employee commitment. Precise planning is needed at MedPlus because the company is comparatively small; with only a few hundred employees, no employee time can be wasted. This way of working is fast-paced and demands strong organizational skills. However, employees are treated with respect and dignity and are encouraged to innovate beyond their basic roles in each project.

This focus on planning and precise human resource allocation often requires that employees think on their feet, seeking every free opportunity to contribute to projects. This way of working is very productive, but it is intimidating to individuals who prefer consistent, predictable working environments. While keeping staff continually active across a variety of projects generates an efficient, rapid workflow, it can also force overworked teams to choose between completing one task or another that seems equally important. Projects that exceed the time they are allotted can undermine carefully scheduled timetables and drag down other projects.

Individual MedPlus departments have experimented with many project workflow doctrines during my time with the company. MedPlus managers continually search for the best way to do their work, but this search is seldom coordinated among all departments. Global change occurs slowly and the exploration of new management techniques is not strongly emphasized within the company. The search for an ideal way of working can also be complicated by trends and events within corporate America, such as the broad and enduring fallout of the Vizcaino Vs. Microsoft class-action lawsuit.
Vizcaino Vs. Microsoft Fallout in the IT Industry

In 1996, temporary and contract workers at Microsoft joined contractor Donna Vizcaino in a class-action lawsuit which would have strong implications for many companies' relationships with their temporary employees. The plaintiffs claimed that Microsoft hired them as temporary workers without full-time benefits. After the hiring, however, Microsoft extended these employees’ contracts. Demanding full-time workloads of their temporary workers, Microsoft did not make the benefits of full-time employment available (US Court of Appeals for the Ninth Circuit, 1999). The employees eventually won their suit.

Vizcaino vs. Microsoft sent waves of concern through the IT industry. If a company as powerful as Microsoft was vulnerable to such a lawsuit, analysts worried, who wasn’t? Popular IT journals began to advocate means by which employers could create clear distinctions between full-time and temporary employees. Many companies eagerly adopted these plans, which were often discriminatory to temporary workers and prescribed rather extreme measures, including:

- The restriction of temporary employee movement within buildings.
- The reduction or stoppage of temporary employee training.
- The denial of resources such as offices and computers to temporary employees.

These policies made temporary employees inferior to full time employees. Further, these plans restricted what temporary workers could do for their employers. This treatment also raised issues of trust. If a company does not trust its temporary employees, should it have hired them? If employers cannot trust themselves to treat workers fairly, can they do businesses ethically?

During my internship, MedPlus instituted restrictive policies for its temporary workers, including me. Our door passes were revoked, and we were forbidden to move to and from our desks without escort. These measures proved to be very inconvenient. Without a pass, we could not enter the building before the receptionist arrived to open the doors. While I had been arriving to work at 7:30, I instead had to wait until 8:00. Similarly, when any temporary workers arrived at MedPlus, their supervisor was required to escort them to their department. This requirement wasted both the employee and the supervisor’s time.
My privileges were restored before my internship ended. This decision was made for two reasons: it had been decided that I would probably become a full time employee after my internship, and as an intern I was already subject to substantial oversight. However, other temporary employees continued to be restricted in this fashion. The result was an atmosphere of stratification, and a decrease in efficiency. It is worth noting that many of these measures were also instituted by Microsoft as stress mounted over their policies regarding temporary employees. Ultimately the measures taken by Microsoft, and being taken now by other companies, failed to prevent the Vizcaino vs. Microsoft lawsuit (Brophy, 2006). To divide and limit employees in this way may be a dangerous standard for MedPlus in light of the flexibility and workload expected of their employees.

MedPlus' corporate culture is shaped by its relationship with Quest and by its internal practices. This culture faces pressure from outside influences, and has changed in some ways that complicate work rather than facilitate it. Ultimately, all businesses have a unique corporate culture of supportive and limiting forces. Within these cultures, employees and interns must find ways to address their responsibilities to their employers. MedPlus corporate culture was a strong force in how I worked from the moment the first responsibilities of my internship began.
Chapter 4: Initial Responsibilities

My primary task at MedPlus was to document features of ChartMaxx 6.0. However, earlier in my internship I had several other responsibilities. These responsibilities varied in complexity and purpose, and included editing documents written by other MedPlus staff, editing ChartMaxx 5.0 documentation, and attending several recurring meetings. In a sense, these initial responsibilities were my training. Starting work immediately made me feel trusted and drove me to excel. As I completed each new project, I also gained valuable experience and insight about communicating and working at MedPlus.

**General Editing**

Sometimes professionals who do not typically write for an audience outside their company must do so. At such times, technical communicators can work with these individuals as editors to produce a higher quality communication. This collaboration benefits the writer, relieving them of the stress and time requirements of editing. Editing the communications of others also allows the communicator to learn more about their company's business and to enrich the company in areas other than documentation. Editing documents from other departments was educational for me, provided variety in my workload, and let me show others the value I could bring to MedPlus.

**ChartMaxx 5.0 Release Letter**

The first document I edited was a release letter for ChartMaxx 5.0. This document was produced by MedPlus' marketing department. Its intended audience was current ChartMaxx users who were curious about the new features in the latest release. Although this letter was only 33 pages long (much shorter than the product documentation that MedPlus technical communicators usually work with), editing it required almost a full workday, longer than is typical for editing a document of this length. The letter was an excellent illustration of the need for communicators within a corporation. The marketing executive who wrote it was more knowledgeable about the needs of ChartMaxx users and the full details of her product than any communicator would be, but her writing contained many errors. Combining her knowledge with my skills as a technical communicator yielded a more valuable document than either of us could have written alone.
The errors in the letter were typical of most unedited texts and included the misuse of punctuation (especially the apostrophe), confusion of tenses and pluralization, and a lack of consistent wording for describing product features. However, the writer was extremely knowledgeable about ChartMaxx, and knew what would interest and appeal to customers. In editing the letter, I took care not to undermine or misrepresent the author’s information, or to change her writing style. The tone of a document can be as important to a reader as the information it contains, and should always be respected unless it is inappropriate for its audience.

*ChartMaxx 5.0 MIE Monitor Manual*

Another task I undertook was to edit the ChartMaxx MIE Monitor manual. Most ChartMaxx users will never interact with the MIE Monitor, because this program's sole purpose is to monitor the link between ChartMaxx and outside interfaces. These interfaces are other programs, specifically configured to send information to ChartMaxx, and might include another hospital’s database software or a third-party registration tool. The MIE monitor determines whether these programs are communicating with ChartMaxx normally, malfunctioning, or doing nothing at all. The MIE Monitor can also be used to analyze and control these interfaces.

The documentation for the MIE Monitor is intended for system administrators at care sites. In the past, it has been written by the monitor's developers and distributed directly to administrators. The monitor itself is far simpler than ChartMaxx. This simplicity, coupled with its limited usership, meant that sophisticated documentation had never been required. For this release, however, the developers decided to submit their documentation to the technical communication department so that it could be made clearer and more accessible. I was charged with editing the manual and making any improvements I saw fit.

MedPlus' developers are not trained as writers. However, they are well-educated professionals with an excellent grasp of software. The manual was grammatically and technically sound, but it was written in a way that resembled development notes more than documentation. Menu items, for instance, were described as “allowing” users to perform certain actions, rather than causing those actions to happen. I revised the manual to reflect a more traditional, user-centric viewpoint. For example, I described actions that a user would take more clearly as instructions, and described the user as a more active and significant part of MIE Monitor activity.
I also placed the manual in a generic template used for ChartMaxx-related documents. This template gave the manual consistency with other ChartMaxx documents the end users would possess. A major part of this standardization was the appearance of figures in the text. I resized and repositioned almost every table and graphic to conform to the template. The result was a document that more strongly addressed usability and corporate identity.

**Benefit to Later Work**

My early tasks at MedPlus had a positive impact on everything I would go on to do. Editing other documents prepared me for documenting ChartMaxx release 6.0. Although I was trained to be a competent communicator, I was not yet a good MedPlus communicator. I didn’t know what information was most important in my documents, what kinds of errors to look for while editing, or what ideas were key to MedPlus documentation. However, after working on a variety of projects at MedPlus, I was able to approach ChartMaxx documentation like an experienced MedPlus communicator.

Another benefit of this editing was that it familiarized me with the products and documents that support a ChartMaxx release. Understanding the culture of a ChartMaxx release gave me a fuller appreciation for the role of documentation in all levels of software development and release. The documents I edited also furthered my understanding of the end users of ChartMaxx.

**ChartMaxx 5.0**

When I began my internship, I was assigned to the technical communications team responsible for documenting ChartMaxx. This group's work was divided between documenting the current release (5.0) of ChartMaxx and preparing to document the next release (6.0). ChartMaxx 5.0 was nearly finished, so completing updates to the existing ChartMaxx documentation was a high priority. I participated heavily in editing and testing this documentation.
Pre-Production Editing

I was responsible for pre-production edits of many of the ChartMaxx 5.0 administrator manuals, which are intended for ChartMaxx system administrators. Together, all of the ChartMaxx manuals are several thousand pages. My task was to search these manuals, finding and correcting obvious errors such as the following:

- Deviations from normal MedPlus documentation style.
- Typographic errors.
- Missing content, such as omitted words or missing punctuation.

Generally, each ChartMaxx administrator manual took most of my work day to edit, although I became slightly quicker over time. Each ChartMaxx administrator manual contained numerous errors. This is not a mark of deficiency on the part of any writers. These errors may have escaped notice for many revisions, or they could have been completely new. ChartMaxx manuals are the products of years of work, but mistakes are inevitable. Multiple edits by different team members, throughout the update process, help to correct new, or previously undiscovered, errors. No one person is to blame, nor are such errors abnormal. Any document the length of the cumulative ChartMaxx documentation is likely to include many errors, most so small as to pass beneath the notice of writers and users.

Proofing

When preproduction editing was complete, the files for each manual were sent to a printer. When proofs came back from the printer, our team began a second review. We believed that very little additional work would be needed at this stage, but we were incorrect. Initially, the process seemed simple. Although we found a few errors in the proofs that were too severe to release (required correction and reprinting the manuals involved), it appeared that most of the documents could be released in their current state.

At this time, hospitals that were beta-testing release 5.0 of ChartMaxx began to report serious issues. SCRs (software change requests) poured in. The developers slowed their work on release 6.0 to address these requests. Correcting the problems in ChartMaxx 5.0 caused many changes to
the software, which invalidated much of the ChartMaxx 5.0 documentation. We once believed that few manuals would need to be changed, but it became apparent that all of them would.

This stage of editing was more fast-paced and difficult than pre-production editing. When the other members of the team edited the manuals, I would review the new material. I was not looking for individual errors, but for serious formatting mistakes (missing footers, errors in the index and glossary, etc). This phase was extremely frustrating, as every time it appeared that we had finished a manual, new SCRs forced us to make more changes. ChartMaxx 5.0 and its documentation were completed more than a month behind schedule.

**Benefit to Later Work**

There were distinct benefits to documenting an older version of a program before documenting the new release. By working on the documentation for ChartMaxx 5.0, I came to understand the software and documentation I would be working with for release 6.0. It is noteworthy that most ChartMaxx functions remain largely the same between releases. Release 6.0 merely expands on 5.0 with improvements and new functionality. Therefore, understanding ChartMaxx before these additions made it easier to know how to document them. I also learned what flaws were present in existing documentation, which helped me to avoid them in my own.

**Meetings**

I regularly attended both technical communication and ChartMaxx documentation team meetings. For technical communication meetings, every member of the department gathered in person or by telephone for one hour every Monday to discuss the state of the department. Issues discussed in these meetings included:

- Purchasing needs.
- The status of current projects.
- Present or upcoming workflow issues (medical absences, vacations, or unexpected complications).

The ChartMaxx documentation team met every Thursday in order to discuss our documentation progress and issues relating to ChartMaxx itself. These informal meetings lasted for only 30
minutes. Their goal was to specifically address what issues the ChartMaxx documentation team would deal with each week.

**Benefit to Later Work**

The relevance of departmental meetings to my work varied. While I could not always help resolve the issues of other department members, knowing about how they were resolved helped me to deal with those problems when I faced them. My fellow communicators also possessed unique insights that made my work easier. ChartMaxx team meetings were more clearly beneficial. Whenever I lost my way, the other ChartMaxx communicators were able to guide me to an appropriate course of action. As a new writer I asked many questions at these meetings. Invariably I received honest, useful answers that prepared me for future work.
Chapter 5: ChartMaxx 6.0 Technical Documentation

As my work editing documentation for ChartMaxx 5.0 came to an end, I began documenting release 6.0. This documentation was the largest, most important part of my internship. It was also the most demanding, and the most educational. In documenting ChartMaxx 6.0, I put the knowledge I gained from my earlier tasks to practical use. Documenting ChartMaxx 6.0 required all of my writing, editing, and teamwork skills and was my greatest challenge.

Documenting a release of ChartMaxx required an understanding of how new content is added to the ChartMaxx suite using the RUP (Rational Unified Process) model (IBM Rational Unified Process, 2008):

- The first stage of the RUP model is inception. In this phase, MedPlus business analysts create hypothetical use cases. These cases reflect tasks that customers want to perform with future versions of ChartMaxx. The analysts may perform feasibility studies for new features at this time.

- Inception is followed by the elaboration phase. Business requirements that indicate specific tasks are established based on the use cases. One use case might involve several business requirements, and the same business requirement may appear in several use cases. For instance, the use case “a doctor looks up tasks for the morning” might have the business requirements “allow daily logins to the system” and “allow physicians to browse workflows.” Communicators plan their documentation at this time.

- Developers decide how to meet the business requirements. Their decisions are embodied in short solutions called software requirements. The impact of these decisions on product usability is defined by functional requirements.

- Communicators refine the document plan based on the functional requirements. At this stage, individual user tasks can be documented.

- The RUP construction phase begins. ChartMaxx is modified to reflect the functional requirements. Screenshots can be taken for documentation at this stage, and instructions can be finalized.
A single ChartMaxx release is made up of numerous projects. Each project is entrusted to different CFTs (cross-functional teams). I was assigned to document two projects for ChartMaxx 6.0, C394 and C345. The different approaches taken by the teams responsible for these projects led to a vastly different experience for me in each project. At the same time, delays to all of ChartMaxx 6.0 reduced the amount of time available to complete both projects.

**Delays to ChartMaxx Release 6.0**

Work on ChartMaxx 6.0 was considerably delayed. ChartMaxx 6.0 had a volume of changes that was unprecedented among previous ChartMaxx releases. I was initially assigned to document seven different ChartMaxx 6.0 projects. However, of my assigned projects, only two began during my internship. Even these projects began far later than anyone anticipated. Several factors caused these delays:

- ChartMaxx 5.0 was released to test hospitals in an early alpha state. As a result, many improvements were found by test users at those hospitals. Improvement of the 5.0 release to correct these issues took up developers' time, preventing them from working on ChartMaxx 6.0.

- Many ChartMaxx 6.0 improvements depended on one another. For example, project C345 allowed users to rename virtually any field in ChartMaxx to reflect their locale (Canadian users could replace the American social security number field with the Canadian equivalent, for instance). However, this project could not be completed until other projects which introduced more fields (and upon which it was dependent) were finished.

- Many developers relaxed their use of the RUP model and wrote code without developing requirements. This omission made it difficult for communicators to anticipate how ChartMaxx would change. We were only able to document fully coded features because we had no requirements to base our writing on.

To counter these delays, I planned my workflow to adapt to the changing face of ChartMaxx development. I met often with project planners and requested permission from other team members to attend extra project planning and customer review meetings. By meeting with the
project planners on my teams and developing my documentation as they built their upgrades, I hoped to keep pace with their workflow. The eventual completion and release of ChartMaxx 5.0 also gave me more time to focus on ChartMaxx 6.0 documentation.

**Project C394**

Project C394 was a total redesign of ChartMaxx for the Web. ChartMaxx functionality is spread across a suite of proprietary Windows applications. These applications connect to a hospital’s servers to enable hospital information management. ChartMaxx for the Web allows physicians to access this system over the Internet, but it lacks many features of the Windows suite.

Project C394 was meant to create a newer, more robust Web client with greater functionality. This new Web client would replace the existing ChartMaxx for the Web. More significantly, it would be the basis of an entirely Web-driven ChartMaxx. At some future release, this advanced Web client would supersede the Windows client. Unfortunately, the expansive nature of this project made it difficult to manage, and pitfalls emerged because of the sheer number of improvements being made. The C394 team abandoned much of the traditional RUP model development cycle in order to cope, hoping that by adopting a less structured methodology, we could more effectively attack the complexities of the project. The many issues that the 394 cross-functional team faced slowed progress, but those difficulties paled compared to the potential benefits of success: a completely new version of an existing product that could serve as the basis for a wholly Web-based version of ChartMaxx.

**Premise**

ChartMaxx for the Web delivers many features of the ChartMaxx Windows client over the Internet as a Web site. This addresses a limitation of ChartMaxx: it is intranet-based. While ChartMaxx offers valuable functionality to hospital employees who can access it directly, doctors are not always at the hospital. By making the physician-facing functions of ChartMaxx available online, ChartMaxx for the Web allows doctors to work at any time, from any location.

Doctors can log into ChartMaxx for the Web remotely to manage their ChartMaxx workflow. Most significantly, doctors can use ChartMaxx for the Web to exchange messages and links to chart information with other ChartMaxx users and to search for and view chart documents and
laboratory results. Doctors can even use the Web client to review their deficiencies (documents requiring some action by a physician to be complete) and resolve them. ChartMaxx for the Web employs a unique user interface that makes basic ChartMaxx functionality available in a simple, accessible fashion. This interface consists of a large document viewing pane on the right side of the page and flexible navigation on the left.

Project C394’s changes were intended to make the Web client more accessible to users, and more compliant with modern Web standards. For example, the new Web client was designed to use Java, which is highly accessible across platforms. Stylistically, ChartMaxx for the Web in ChartMaxx 6.0 would have closely resembled other MedPlus Web applications.

The new architecture of ChartMaxx for the Web would also have been designed to accommodate expansion in the future. While the 6.0 release of the Web client would not have been capable of every function of the Windows client, future releases would have been expanded further. Although Project C394 was eventually suspended, the progress made in working on it has strong implications for future development.
**Change Issues**

ChartMaxx for the Web was to be redesigned and recoded. The planners and designers of this project arranged a number of design mockups and user reviews to determine what design changes might be beneficial. Unfortunately, the project was very loosely coordinated. Coding and user interface design took place simultaneously, without any specific correlation. The preliminary design documents that typically precede actual work were not completed. No business requirements for how ChartMaxx for the Web was to be used or software requirements defining specific changes to the program were created until coding was well under way.

These problems were a result of the team's attempts to cope with the staggering complexity of the project. While other projects only required changes to existing software, C394 called for the reconstruction of an entire program. The atypical development cycle we employed in the C394 team represented an attempt to cope with this extreme workload. The traditional management structure of a RUP cross-functional team simply was not adequate to address a project as complicated as C394.

Without requirements, project tasks can become ill-defined and lack direction. The first phase of C394 implemented a new means of delivering documents to users. This methodology was not specifically identified as a need in the project and did not meet the privacy expectations of some reviewers. As a result, the new feature was deemed inadequately secure for the standards held by MedPlus and was rejected.

Because of work lost in this setback, the second phase (or "iteration") of the project was greatly reduced in scope. A month was devoted to simplifying and redesigning the Web client’s search tool. Coding this feature began rapidly, as did a redesign of the user interface for the search tools. The result of this parallel work was that the mockups of the search feature and the working design of the search feature had very little in common. With the proposed user interface not applied to the new code, and no solid planning documents supporting either effort, documenting the feature was difficult.
My Reaction

Because the developmental process for C394 was different from typical MedPlus methodology, I adopted unorthodox measures. I began working more closely than normal with the user interface designer. By doing this, I could understand how he was designing the new user interface and write documentation appropriately. This approach was not without limitations. In a normal cycle of requirement discovery, requirements emerge first in anticipation of, and then in description of, project work. Oversight is exercised at each step to make sure that all requirements are practical and productive. Documentation based on these requirements is guaranteed to be mostly correct, barring later edits. In the C394 development cycle, the requirements for fully accurate writing did not exist. It would have been wasteful to document features based purely on speculation. Therefore, I hoped that working more closely with designers would put me at the forefront of available project knowledge. However, without some written requirements to justify writing, I could not commit to final documentation. Instead, I maintained a draft document, which changed as the product developed. I believed this agility was necessary to document the project successfully. Although it was difficult to work with so little certainty, it was also exciting to constantly communicate with other team members and reshape the documentation to meet a growing and changing vision.

Outcome

Although C394 was an ambitious project with great potential, several circumstances eventually forced its suspension. As work on C394 became more and more erratic, documentation grew more difficult. The project itself began to fall behind. It became clear that C394 was too much work for a single project, and that the alternative management strategies employed by our team were not succeeding. It looked for some time as though C394 would not succeed. A major concern was that C394 might delay the release of ChartMaxx 6.0, since it was a far larger project than any other part of the update.

Ultimately, it was decided that C394 was too large to be a part of a general release. However, because so much effort had been put into C394, it was suspended for future development. The dedication of the C394 cross-functional team, coupled with a large project development cycle should ensure the project’s eventual success. Although finding the right way to cope with the
difficulties of C394 will take some time, this solution will allow work to continue in the future without delaying current efforts. Even the new approaches to development taken by the C394 team may have a positive impact.

The UI designer for C394 sought frequent user reviews of his work and requested that as many team members as possible also participate so that he could benefit from their input. Being involved in this process allowed me to interact directly with the end users of my documentation. Although the C394 UI designer was receptive to involving me in user reviews, cross-functional teams in the past have not extended this access to technical communicators. Project planners at the start of a project communicate with users to develop their plans, and the business requirements that form the basis of project planning are based on user input. Users at test sites adopt pre-release versions of ChartMaxx for testing and review purposes. At the end of a developmental cycle, the quality assurance department also has access to users for test purposes. Yet, while technical documentation also benefits from usability testing, MedPlus technical communicators have typically had little or no access to end users. I do not know the exact reasons for this practice; however it is my hope that my interaction with users created a positive precedent for the future, and that cross-functional teams will continue to encourage contact between end users and communicators.

**Project C345**

Project C345 expanded users' abilities to customize their ChartMaxx experience. ChartMaxx 5.0 users are able to rename a number of fields in ChartMaxx, and they may customize these fields for localization (for instance, changing dollars to pounds, or the word *state* to *province*). Users can also apply masks to data entry fields in ChartMaxx, which control what characters and formatting can be used in those fields. These features work in conjunction. For instance, hospital staff could rename patient account numbers from “acct#” to “acct no,” and specify that they be five digits long and contain no letters.

Project C345 greatly expanded the number of fields users could rename or mask. It also added the option of custom formatting for social security numbers. Social security number formatting allows users to save an entire social security number in ChartMaxx but display only portions of it
in the interface. These modifications allowed users more freedom to customize ChartMaxx to their locale and security needs.

**Premise**

Project C345's core premise was that ChartMaxx needed to be easier to localize outside the United States. Most hospitals that use ChartMaxx are domestic. In America, the information types used by hospitals are standardized by government regulations and software conventions. Medical record numbers and patient account numbers are typically consistent across hospitals. The core of most American identification is the social security number, a government identifier given to every American citizen at birth or naturalization which is heavily used in health care. However, many sites in Canada use ChartMaxx as well. Canadian hospitals use different identification numbers, many of which vary among provinces. In ChartMaxx 5.0, hospitals could configure some values, but had to rely on default names and lengths for others.

With C345's expanded customization options, ChartMaxx users could more effectively configure their software for their own needs. These improvements would make ChartMaxx more useful to existing users and prepare ChartMaxx for future markets with unknown needs. The ability to shield social security information would likewise make ChartMaxx a more secure information technology tool for the management of patient data.

**Proposed Changes**

Project C345 introduced many changes to increase customer control over their ChartMaxx interface. Several fields which could not previously be formatted in the ChartMaxx user interface became configurable, and complex masking was implemented, allowing hospitals to conceal patients' social security numbers from ChartMaxx users. To accommodate these changes, the existing user interface for labeling and masking was expanded. It was divided into one menu for choosing new labels and another for assigning masks and social security number formatting.
It was decided that these menus would appear as dialog boxes, in which Table Manager administrators could define how the social security number would appear to end users in other ChartMaxx applications.

![Modify GUI Custom Label Map: MASK_SSN](image)

**Figure 4.** The GUI Custom Label Map dialog box.

Project 345 also included several minor updates to ChartMaxx that did not change the user interface. ChartMaxx was refined to more effectively acquire and use the locale settings on a user's computer such as the locale's date and time format, as well as the format and name of the locale's currency.

The total effect of project 345 was to allow ChartMaxx to conform to the regional needs of care sites. This set of changes, when released, will make ChartMaxx more usable for international care sites and more adaptable to future markets. These changes may be especially important in the United Kingdom. Several UK hospitals have used ChartMaxx in the past, but have stopped upgrading their ChartMaxx installations or paying for support. A greater capacity for international localization might help MedPlus reclaim the UK market.

**Workflow**

Work on project C345 began with the development of use cases and business requirements for the project. As I mentioned before, use cases are possible scenarios in which ChartMaxx users perform some new activity in ChartMaxx. In tandem with use cases, the project planners develop business requirements. These requirements represent specific needs experienced by ChartMaxx users. A use case may include several business requirements; a single requirement may appear as part of many use cases. In the case of C345, the ability to change each re-nameable field was a business requirement. C345 had many well-developed requirements which gave us a clear image of what features would be added in the update. Being aware of these features early in the project was very useful to me as I planned my documentation.
Planning my documentation was more complicated than I expected. C345 affected all ChartMaxx applications, but left their basic functions unchanged. While users could rename several fields, those fields would function in the same way they always had. I decided that a distinction needed to be drawn between all-new functionality and new potential customization.

The primary application that was changed was Table Manager. Table Manager defines how other applications perform. It is used to customize many features including labels and masks. Table Manager administrators required a list of new changes they could make to ChartMaxx data fields. The existing instructions for changing labels and masks also needed to be expanded to address social security number formatting. In particular, documentation for the Table Manager user interface would undergo many changes to accommodate the new formatting menu options introduced by C345. Every image of this interface that appeared in the ChartMaxx documentation was updated to include new options added by project C345. For most other applications the existing instructions were still valid. I created the documentation for the project in two parts: general information about the new features, and specific instructions for the most heavily impacted applications.

*Figure 5.* The Table Manager user interface.
This approach to documentation was well received by the other members of the C345 cross-functional team. The sales department, however, expressed concern that Table Manager users were not adequately made aware of their impact on other applications. A Table Manager administrator might change the label, masking, or format of a field without considering how that change would affect some other user. This concern was legitimate. Most other ChartMaxx users never use Table Manager and vice versa, and communication among different user groups varies widely.

Resolution

The issue of safe Table Manager administration was the most significant issue I had to cope with. Most of the features of C345 already existed to some extent; C345 simply added more options. However, the impact a Table Manager administrator could have on other users by changing custom label mapping had never been fully documented.

In order to document this risk, I researched all existing ChartMaxx documentation. Any application that included a modifiable field needed to be recorded. I also had to know which fields occurred in which applications. If the Table Manager administrator were to change a field that affected only two ChartMaxx applications, there would be no point in alerting users of the other applications. I searched every ChartMaxx manual, looking for any mention of modifiable fields related to user tasks. I eventually assembled a list of what applications would be affected by each field, should that field be changed. I arranged the fields as one axis of a table and the applications as another. I also included a column which described whether each field could be masked in addition to being re-labeled. The ability to format the social security number was unique to one field, so I did not include it.

Because C345 initially seemed like a simple project, I was skeptical about the amount of time that was required for it. However, in the process of completing the project, our team had discovered the need for unforeseen additions to the ChartMaxx documentation. By quickly addressing the needs of other team members, I was able to increase the value of ChartMaxx documentation. It was important to address this issue proactively because:
The number of customizations Table Manager administrators can perform to other applications increases with every release. Failure to make Table Manager administrators aware of the potential impact of their actions could have led to future problems for customers.

Waiting until users had a problem to correct documentation could have led to those customers having a less positive opinion of the product. Customers with an unfavorable opinion of a product often do not buy upgrades or support for that product.

By providing a great deal of information in a single-page figure, communicators can easily increase the usability of a document.

For all these reasons, it made sense to pursue the issue of Table Manager impacts. In the end, the creation of the table represented only about ten hours of research and design on my part. This time is a good investment if it prevents even a few support calls, or even one serious problem at a ChartMaxx hospital.

Eventually, the developer assigned to C345 finished coding the project and released their work on an internal test client. Access to the code-complete project allowed me to see the features I had been writing about first-hand. Although I knew how the new features worked, I had not seen the final code in action. Fortunately, C345 worked exactly as described in the planning documents. Unfortunately, this occurrence is not typical of most projects. Since my documentation accurately covered the final features of the project, I could proceed to review and refine my work.

**Demonstration**

Changes to the ChartMaxx software typically go through a demonstration before they are finalized. This demonstration shows members of other teams what the project does and how it impacts their own work. Demonstrations are some individuals' first encounters with project work, and the last time a serious change can be levied against a project team’s workload.

Because full documentation was available in time for the demonstration, our team demonstrated the documentation as well. Much of the documentation I had prepared was deemed unnecessarily detailed by reviewers, who asked that all but the most relevant portions be omitted from the
manuals. The proposed omissions constituted over half of the documentation I had written. This decision was disheartening from an authorial standpoint. However, it made it easier to add my changes to the existing documentation, since fewer of those changes would be used. While it would have been ideal to know exactly how much documentation was required before writing it, knowing that much of what I had written would be discarded greatly reduced the number of books I had to revise and the amount of peer editing I asked my teammates to perform. The fact that the entire C345 team was present at the review, and able to discuss all the requested documentation changes also made the removal of material more palatable and easier to understand. Reviewers from other branches of the company also contributed their points of view about document development and communication with customers. This input helped me standardize my documentation with that of other MedPlus departments.

Project C345 itself functioned well in the demonstration. The consensus of all reviewers was that C345 satisfied the requirements under which it was developed. The acceptance of the project in its current state left me free to focus on improving the accuracy and information value of my documentation.

**Document Review**

After the demonstration, I trimmed my documentation of extraneous material. I originally planned to include a two page preface in each ChartMaxx manual explaining the changes made in C345. The near-unanimous conclusion at the demonstration was that the new features only needed to be documented where they specifically changed the use of a ChartMaxx component. I also made extensive mechanical and stylistic edits to my work. When it was of the highest quality I could achieve, I distributed it to the other ChartMaxx documentation team members for review.

Team-level document reviews produce two types of edits: those directly pertaining to the new documentation, and those related to flaws discovered in existing documentation during the review of new material. Both kinds of edit are equally valuable. In the case of my C345 documentation, there were changes I had omitted. New text in one menu option was not reflected in one document. In another I had listed menu choices in a different order than they appeared in the final application. However, because I had been able to document the project throughout its
development, my documentation was still very accurate, and coping with edits to new material required less than a day of work. Terminology was a major issue in these edits. For instance, my documentation used the term “physician” extensively, but “physician” is not always specific enough. Some instructions apply only to clinicians, who work with patients (as opposed to laboratory physicians, who do not).

Edits to existing content were more complex. Correcting “legacy” errors in ChartMaxx documentation is important. These errors can create considerable difficulty for users. They can be time consuming and difficult to fix. Frequently, time is not available to search existing documents for mistakes. Locating these errors while reviewing new content is often the only way in which they are found or resolved.

**Finalization**

As of the conclusion of document review, C345 documentation has not progressed further. The final steps of producing documentation will begin when ChartMaxx 6.0 is closer to completion. When a change project is concluded in advance of the release of a new version of the product, there is typically a brief hiatus during which the communicator assumes other tasks.

The steps to finalize documentation mirrored my duties at the start of the internship. Communicators review one another’s work, and the edits that were made by each project team undergo scrutiny as part of a larger text. If the documentation is found to be incomplete or inconsistent, it is revised. These revisions are made by the reviewer if they are simple, or by the original author if they are extensive.

When the print documentation of a new release is finalized, help files must be built. ChartMaxx uses contextual help, meaning that different ChartMaxx windows are each associated with unique help files. Help content is generated from the print manuals themselves. The core files of the documentation are entered into an application called ePublisher. This program chunks the files into pieces that correspond to user tasks in ChartMaxx. These pieces are converted into the HTML files that ChartMaxx uses for help. Generating help is a complex process requiring extreme diligence to complete. However, the timely and successful resolution of project C345 means that time is available to complete the corresponding print documents and help systems.
Conclusion

As an intern at MedPlus, I was expected to work as productively and thoroughly as a salaried employee. Accordingly, I have not shied from difficult tasks. I have taken every opportunity to participate in office business and socialize with coworkers, and I feel that I have had a richer experience as a result. At the conclusion of my internship, I was asked to remain with MedPlus. I believe that my internship has been excellent preparation, both for a career as a technical communicator and for my other future endeavors. My experiences have also helped me draw a number of conclusions about the outcome of the projects I worked on, the transition from academia to the working world, and the strengths and limitations of a corporate technical communication department.

While building a strong product and earning income are both positive, the knowledge I have gained at MedPlus can serve me in many careers and situations. Understanding the outcome of my ChartMaxx 6.0 documentation work gave me valuable insight into communication. Perhaps the greatest lessons I learned, however, were the differences between academic and professional technical communication. While schooling is excellent preparation for some aspects of professional work, it is completely ineffective for others. I have also learned a great deal about the strengths and limitations of a technical communication department.

In analyzing the many experiences one has in a workplace, it can be useful to compare them to a single concept. Both my work with MedPlus and my development as part of the MedPlus technical communication department can be understood through principles of knowledge management, because training new employees and informing the users of a product are both applications of knowledge. Throughout my conclusion, I will explain how communicators are agents of knowledge management and how knowledge management concepts related to my work experiences.

The last topic I will discuss in this report are the general lessons I learned at MedPlus. Some of these lessons relate to technical communication, some to working in general, and some to life. My internship unquestionably prepared me for the post-collegiate world, making me a richer person, with new abilities and more to offer employers and customers.
The Outcome of ChartMaxx 6.0 Projects C345 and C394

It would be easy to say that C345 was more successful than C394. The objectives of the project were more successfully completed, and in less time. C345 achieved this superior performance with a smaller team and the same resources as C394. It is also tempting to view the smooth progress of C345 as a standard against which to criticize C394. However, having participated in both projects, I believe the truth is more complicated. There is no magical source of blame for C394’s poor success, and it would be incorrect to label C345 as merely average. A comparison of the projects reveals a complex situation.

Comparison of C345 and C394

If one compares C345 and C394, it becomes apparent that in spite of their differences, both projects were managed in a similar fashion. Project management was driven by need in both cases. In C345, where project needs emerged in an orderly fashion, management and planning were logical and progressive. In project C394, where project needs were sprawling and partially defined, the team adopted less orthodox techniques that we believed would be effective. For project C345, most project criteria were completely defined before work began. Development was segmented in an orderly fashion. In project C394, the scope was so broad and the features so new that the team could not manage the project in units of time smaller than a full iteration.

The fact that the decisions made by the C394 team were unproductive does not speak ill of the effort made by the team. It speaks only to the difficulty of managing an extremely large project using strategies designed to manage small projects. Could the C394 team have performed better with different practices? Obviously we could have, but no best practice guidelines existed to show us how to do so. The reality is that those of us on the C394 team did our best, but the project needed more planning and structure to succeed.

Lessons Learned

Methodology is a critical part of project management, although this is not always obvious during the project's life cycle. Related projects often follow similar management strategies. The similarity between two cross-functional teams, for instance, allows members of each to compare performance and plan collaboration. Over time, accepted workflow and management strategies
become the norm for working on a product. This methodology becomes a part of the product, although customers cannot see it. When clients buy ChartMaxx, they are buying, in a sense, everything that went into making that product: the programming, the documentation, and the methodology that guided development.

However, while a methodology is a part of corporate culture, there are times that it can become useless. A methodology for making small changes to an application will not always work for managing huge sweeping changes. At such times, it is natural to do what the C394 team did and seek out a new process. However, this solution is imperfect. Because a methodology is such an innate, tacit part of project work, we forget the time that it takes to build a truly effective methodology. Snowden (2002) states two basic rules of tacit knowledge: “we always know more than we can tell, and we will always tell more than we can write down” and “we only know what we know when we need to know it.” In other words, while individual members of the C394 team possessed knowledge of new processes that might have improved their workflow, without a concerted effort to share this knowledge and consciously create a new approach to development, their ideas were never unified into a strong new methodology. Each team member was aware of the need to change, but could not understand how this change should occur beyond their own spheres of work. The C394 team learned the hard way that it is impossible to cultivate a new way of doing things without significant effort.

This lesson is important to me as a member of other teams at MedPlus, but it is also a lesson for MedPlus. Had extra time been spent on improving the practices within ChartMaxx CFTs, the company as a whole might have experienced less difficulty. Now that project C394 has demonstrated the kind of flexibility that future work will require, I can plan ahead for the kind of adaptations I will need to make, and MedPlus can give teams the kind of practice support that is required to really work in new ways. Measures to provide this support have been taken by several departments, and it is obvious that everyone has become more sensitive to the important role of methodology in software development. Not only has a new group within the development department been formed to encourage best management practices, but many product lines have migrated to Scrum, an agile development doctrine better suited to elaborate software projects (The Scrum Alliance, 2009).
Academics Vs. the Working World

Work and school are very different. While this is something that my instructors in the Masters of Technical and Scientific Communication program at Miami had told me frequently, it was never made truly real to me. All of my previous jobs have been academic. Even my job as Marketing Assistant in Miami University’s office of Lifelong Learning was guided by academic needs and principles. However, the corporate and academic worlds are substantially different, and technical communication differs between academics and business in many ways, such as time and space constraints, and a knowledge of communication tools.

Time and Space

The limits of time and space placed on a communicator differ greatly between school and work. In academic technical communication, the communicator must meet due dates, but retains an extremely flexible schedule. Student’s working days are shorter than those of professionals, and they have the bulk of their free time in which to complete projects. They are also fairly unconstrained by spatial restrictions. Computer labs and portable computing mean that the academic communicator can do his or her work almost anywhere.

A corporate technical communicator is bound by many more constraints. Due dates for projects are more rigid, and the penalties of turning in an incomplete project are more severe than merely being docked points or made to redo work. Allowing flawed materials to leave one’s company speaks poorly of both the company and its communicators. Further, time limits are not controlled by the communicators themselves, but by their managers. These limits are subject to changes that do not always reflect the desires and needs of communicators. Typically, these limitations are also non-negotiable.

Similarly, while a student can just as easily take his or her work home as do it in school, for the corporate technical communicator there are fewer freedoms. MedPlus does allow many employees to work from home on borrowed laptops, but this solution is incomplete. Many important network resources at MedPlus are unavailable from home, and the tremendous size of some MedPlus documents makes bandwidth a barrier to communication off the jobsite. It is also far easier to participate in meetings, deliver presentations, and have incidental discussions with
team members at work. Because of distance and conflicting personal schedules, networking with coworkers outside the workplace is also more difficult than communicating with fellow students outside of class. Salaried technical communicators must often make the onerous choice of what work to complete in the office and what to take home, committing themselves to a workweek longer than their contract specifies in order to meet their deadlines within their spatial constraints.

From a knowledge management standpoint, students entering the workforce are limited in their ability to create knowledge. Although they may be adept communicators, some entry-level communicators (such as myself) are not initially prepared for the pace of work required to contribute to a company's knowledge. Soo, Devinney, and Midgley (1999) write that “As goods and services become more sophisticated in content and production, the foundation of competition becomes intensively knowledge based, with the focus on developing valuable and hard-to-imitate knowledge...” To create knowledge that is valuable to employers, new employees and interns must adapt to a strict and fast-paced workflow. This adaptation may be quite difficult and time-consuming. The result is that a student who showed a strong ability to create and crystallize knowledge in school may not initially match that past performance in the workforce. This difficulty is important to recognize and adapt to for any new professional communicator.

**Tools and Currency**

Although a communicator will often be academically trained with many tools, this experience may not prepare them fully for professional communication. Most students can count on gaining valuable experience with many cutting edge tools. High-quality printers, up-to-date software, high network speeds, and current computers all help students do their work quickly and effectively. Most schools also train students in using these tools in addition to the basics of technical communication.

However, a company may not have the resources for tools that a school does. For many companies, other financial issues come before upgrading the communication department’s production tools. A standpoint of “if it works, don’t fix it” is adopted, wherein technology is only replaced when it reaches complete obsolescence. This situation can be exacerbated when
Managers are not fully aware of communicators’ needs. Often, corporate communicators find themselves meeting contemporary workflow demands with outdated resources.

The computers most members of the communication department at MedPlus work with are several years old, and far slower than those used in the technical communication program at Miami University. These computers regularly experience hardware failures; my computer often cannot make contact with my home wireless network. Similarly, the software used at MedPlus is several releases old, and many tools that would ease production are unavailable. For example, while the popular desktop publishing tool, Adobe InDesign, would be an ideal tool to design the covers for MedPlus documentation, it is unavailable, and Adobe Illustrator must be used instead. The virtual private networking client used by MedPlus for working from one’s home is far slower than most Internet connections, and many of the file sharing clients used at MedPlus are obtuse and overcomplicated.

Although MedPlus and other companies would benefit from providing their communicators with the most current technology available, this issue has stronger implications for schools. It is all well and good to train students in the latest tools, but this practice can leave them unprepared for the limited conditions of real-world work. Technical communication students could benefit from training, not only with today’s newest tools, but also with older software which is still used in the workplace. In this way, students entering careers can function with limited tools, but also promote new options as change agents.

Knowledge management, however, suggests an opposing viewpoint to the issue of tool currency in communication. If we consider disseminating knowledge the primary goal of communication, then it might not be appropriate to seek new tools when proven technologies are already available. A case study from my experience at MedPlus illustrates this idea. The technical communication department recently upgraded the software we use to build our help systems. Because we had numerous complaints about our previous help software, we tested a number of alternative products. Although every product we tested offered some positive reason to switch, none could provide the functionality we required from our help systems. Rather than lose valuable time adopting a new product and redesigning our help systems within its limitations, we purchased the latest version of our current software. Although some of our grievances with the
product were not resolved, we were able to provide customers with feature-rich help systems with minimal delay. We decided not to upgrade to another, better product in order to continue providing knowledge to our customers at the velocity they had come to expect.

**Strengths and Limitations of a Corporate Technical Communication Department**

Operating a technical communication department within a larger company offers distinct benefits, but it also creates potential problems. Communicators may be assigned to other departments, they may (as I experienced in a previous job) be made a part of the company’s marketing department, or they may operate individually without a department of any kind. Creating a specific department for technical communication requires a strong dedication to your organization’s communication needs, as well as acknowledgement of what such a department can and cannot do for your company.

**Strengths**

A technical communication department has many strengths. Perhaps the most obvious strength is that a technical communication department belongs to everyone. Communicators who work for one program’s developers might never work on projects beyond that program. However, a technical communication department is a free-standing resource that the whole company can approach through the department’s manager. For instance, while my main tasks were to document the ChartMaxx 5.0 and 6.0 releases, I was also made available for editorial work. A different member of the technical communication department routinely creates multimedia projects for other departments. This is possible because our manager can budget our time, allocating it wherever it is needed.

Another strength of a technical communication department is that the department owns its work. At MedPlus, the communication department is responsible for researching, writing, editing, and publishing their documents. Developers are available to answer questions, but they do not dictate the nature of the documentation as they might if the communicators were part of their department. When development of C394 became uneven and traditional process models faltered, this was very important to me. I was able to communicate with the ChartMaxx documentation
team and determine the best course of action. In the face of a difficult project, I was still able to work effectively because of my independence.

A technical communication department is also strong because of its ability to change quickly. As products come and go, and business needs shift, communicators must change as well. A communication department has the management structure to reschedule work, reallocate employees, and interact with many other departments. Communicators attached to an existing department are, by contrast, overworked when that department encounters a heavy work period, and under-used when the department is idle. Coping with varied projects before beginning ChartMaxx 6.0 documentation helped me prepare for the differences between CFTs within the project. I was able to effectively document two very different sets of features, because I was not entrenched in one particular way of doing things.

Independence allows the technical communication department at MedPlus to follow the model of a knowledge management department and provide many of the same functions. Understanding this relationship requires that we consider the “organization” in a new light. If we consider customers to be part of the organization along with developers, then there is a considerable need for the collection and distribution of knowledge. Communicators connect the customer to the knowledge of developers through documentation, just as a traditional knowledge management team connects organization members to organizational knowledge. The World Health Organization (2009) describes the role of their stand-alone knowledge management department as “...bridge the know-do gap: the gap between what is known and what is done...” This quote describes the role of a technical communicator: bridging the gap between what developers know, and what customers must do. The ability to operate independently allows the communicator to distribute knowledge in an unbiased, consistent fashion, without boundaries dictated by the originators or consumers of the knowledge.

Limitations

Perhaps unsurprisingly, the strengths of a technical communication department are also its greatest limitations. Limitations within any department are unavoidable. Although every strength of a technical communication department has a negative aspect, it would be a mistake to construe these limitations as arguments against maintaining a technical communication department.
Rather, limitations are a fact of life. They must be overcome and worked around in any business. By acknowledging and coping with these limitations, a business will inevitably grow stronger.

A technical communication department is limited by belonging to everyone. Other departments will clamor for the communicators’ services, without regard for one another’s needs. Several times, while documenting ChartMaxx 6.0, I had to suspend my speculative work on C394 in favor of completing concrete tasks for C345. The C394 team was often intolerant of these suspensions, unwilling to place the needs of a more complete project over their own. To overcome this difficulty, the ChartMaxx team is closely involved in all active development projects. Members must budget their time strictly, and ensure that all the work they must do is eventually done. At the same time, communicators must meet the needs of other departments and cope with issues within the technical communication department itself.

A technical communication department is limited by owning its work. It is responsible for this work, and may have difficulty completing it. When communicators do not work directly for developers, disconnects can grow between a product and the documentation for that product. The communicators become burdened by keeping pace with developers and verifying the quality of their work. Similarly, the communication department assumes full responsibility for all documentation. Other departments are less inclined to provide finished text than they would if they were helping to build an internal document. The individuals for whom I edited documents had left serious omissions in their work, assuming I would completely correct all of their errors.

A technical communication department is limited by its tendency to change quickly. Staff can enter and leave projects rapidly as they are needed elsewhere. Because of this, documents produced over time in a communication department will inevitably have many contributors. In ChartMaxx’s 13-year existence, almost every member of the MedPlus communication department (including many who have since left) has worked on its documentation. Each writer has introduced different styles to the documentation. This inconsistency must be corrected through careful editing and strict adherence to publishing standards. The rapid pace of a communication department can also produce stress for some communicators. Succeeding in a communications department requires teamwork skills and adaptability.
From a knowledge management perspective, independence can limit the flow of knowledge through a technical communication department. Because communicators are not attached directly to other departments, they must actively seek knowledge from those departments. Tacit departmental knowledge, which is passed on within the department through the course of time, may not be apparent to the communicator. Communicators at MedPlus typically engage in discovery work in which they identify missing product knowledge and seek it from developers. Often this knowledge is available, but because of the disconnect between technical communication and other departments, it is not shared.

**What I learned at MedPlus**

I will take some editorial license in describing the specific lessons of my internship. MedPlus has been a difficult but rewarding workplace. Although college coursework is difficult, it is a kind of difficulty born of time requirements and sheer workload. It is surmountable with patience and effort, and its challenge comes from the student's willingness to work. It is a game, winnable by any who persevere. Individual strategy and adaptability are useful, but any student who can complete their work can succeed.

At MedPlus, the challenge has been greater and more varied. Challenges at MedPlus often cannot be met on one's own, and sometimes not at all. Work that is seemingly complete can be torn away for reconstruction, and entire projects on which a writer has labored can vanish like smoke in the wind. I am coming to understand that this is commonplace in technical communication, and I am adjusting to it slowly. That MedPlus is a challenging workplace does not make it a bad one. It is deeply rewarding, highly enjoyable, and very educational, and it has taught me three important lessons.

**Work is Hard**

As a technical communicator, I was not fed all the information I needed on a silver platter. People certainly tried to help me, but I learned that when you work with developers and planners to document a feature, they will often give you only what information they feel is appropriate. However, they may not know exactly what you need. Research is a must. In school I was conditioned to be self-reliant and to not lean on other students (save in collaborative projects),
because of the possibility of academic dishonesty. I have found this to be reversed in the working world. I have become willing to ask anybody anything at any time. It is useful to share knowledge with your teammates explicitly in this way, but some knowledge will remain tacit and can only be shared through frequent communication. It is vital for communicators to share this knowledge whenever it is of use. The conversation a communicator has with a coworker through the wall of a cubicle about the project they share could save that project when it must be documented.

Another significant lesson I learned was that taking my work personally is wrong. My work belongs to my employers the moment it leaves my fingertips. I will never get it back, and if someone above me doesn't like it, they will tell me to change it. My worth as a communicator is not individual works, but my ability to adapt, communicate, and meet the needs of stakeholders. Part of adapting to this outlook has been giving up some creative license, assimilating and passing on what is needed by customers, not deciding for myself what is needed in a vacuum.

**Sometimes I Fail**

Everyone makes mistakes. Coworkers are sometimes displeased with my work and are quick to correct me if it does not meet their needs. This does not mean they respect me less or dislike me personally. It means that they want me to perform well, to meet the high expectations that they have of all their peers. Our workflow always provides time to correct mistakes, and there is no shame in using it. The measure of a communicator's success is in part the communicator's ability to cope with failure and turn it into triumph.

Sometimes projects fail in spite of everyone's best efforts. Most likely no one individual is to blame, so there is no reason to feel upset. I have learned to look for the problems that I can correct (or better yet, prevent) and do so. Failure is a valuable source of knowledge, both of what to do in the future, and what to stop doing:

> An organization has to understand that every failure opens up ways for improvements and triggers learning and unlearning process. Organizations pass through a failures and learning process to develop a successful product or services (All KM, 2009).
At the same time, I do need help. A communicator should not be afraid to ask for help: it may not be provided, but there is no harm in trying. Others also need my help. I always try to help where I can without promising help I can't deliver. I can always help after at first saying no, but if I am committed to a task, it is impossible to withdraw gracefully. A communicator must be responsible to the communication department first. I trust my team to steer me in the right direction. If they cannot, I rely on the most concrete, absolute needs of my company, and work outward from there.

Some of the most frustrating moments in professional communication come when our employers' regulations and policies limit our ability to meet their needs. The restrictions imposed on temporary employees in reaction to Microsoft Vs. Vizcaino only impacted me briefly, but during this time I was tardy to some meetings because of schedule restrictions. Similarly, my supervisors had to use valuable time escorting me through the building. The time spent on these tasks was drawn from projects, slowing their progress. At the same time, as a restricted employee I could not freely travel through my workplace. I could not engage in the same research and knowledge-sharing as an unrestricted employee, and my development and ability to work were equally impaired. This remains the case for many temporary employees, not only at MedPlus but throughout America.

Work Goes On

Difficulties are frustrating, but a communicator cannot give up. A difficult project can be made up of a daunting number of tasks, but they are individually doable. Sacrifices may be required. Sometimes I must go without a lunch break one day, or stay half an hour late the next. My group supervisor once locked himself and his team in a meeting room for a week to work, leaving only to sleep and eat.

It was intimidating to realize that the workload I committed to when I began working will be with me for the rest of my career. However, that work matters. I worked hard in academics, but my primary goal with that work was self-improvement. Although I was afforded opportunities to work on projects for clients, much of my work only existed for my own growth. When I started my internship, I found the number of people who would interact with, and benefit from, my work to be very empowering. My internship and employment have allowed my communication to
reach beyond the limits of a class or a building. I am now helping my coworkers to succeed in their jobs. I am helping my company to succeed in the market. More importantly I am helping hospitals manage their data. I am helping doctors save lives and the sick become well. I am a small part of this but I matter, and mattering in life is an important goal throughout education and beyond.
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