PATTERSON SUPERSTORE: Health Clinic Online

Section 1: Historical Background

This section will introduce many concepts regarding object-oriented analysis and design. To make these concepts more relevant and understandable, we will apply the concepts introduced .in each chapter to a fictitious company called Patterson Superstore

Patterson is a retail chain established in Pittsburgh, PA, in 1985. The chain has expanded from four stores in the Pittsburgh area to a well-known national presence.

Initially Patterson sold diversifi d merchandise, including a variety of clothing, toys, housewares, sporting goods, and electronics. However, during the 2000s, it expanded its offerings into groceries and pharmacies and began branding itself as a superstore.

In 2008, Patterson's extended its pharmacy services by offering free blood pressure and cholesterol screening and affordable flu shots. From the immediate success of these services, the VP of the pharmacy division, Max Ross, recognized a growth opportunity and expanded the pharmacy offerings to include in-store health clinics. Services offered include diagnosis and treatment of minor illnesses (colds, strep, flu), skin conditions (impetigo, chicken-pox, shingles), injuries (burns, cuts), and vaccinations (tetanus, HPV). Additionally, wellness services such as school and sport physicals are available. The in-store medical clinics are staffed by nurses and physician assistants or nurse practitioners and operate on an appointment or walk-in basis.

Superstores, such as Patterson, enjoy several advantages over medical centers in offering these services.

1. Since superstores have multiple types of income streams, delays in Medicaid and other types of insurance reimbursement are signifi antly less problematic than for medical centers that lack several revenue streams.
2. Superstores also enjoy reduced overhead cost while still generating the same copay revenue collected by medical centers. A copay is still a copay.
3. Patients like the convenience of one-stop shop with a seamless care, diagnosis, prescription fulfillment process.
4. Personnel costs tend to be lower than medical centers because the clinics are overseen by a nurse practitioner or physician assistant with nurses providing much of the care.

Max Ross has identified an additional opportunity related to the health clinic segment. Currently, Patterson uses a mobile application to facilitate prescription order and refill, notification, and auto-refill services. This service is widely used by Patterson's client base, and Patterson has leveraged this mobile app to gain an advantage over less technically advanced .competitors

Clients now want to use this technology to access health clinic services. Max Ross wants to use this opportunity to position Patterson as a leader in the use of technology use for clinic access. The system that he envisions would enable real-time communication with medical

personnel (audio, video, and text), mobile appointment scheduling, tele-health assessment, and diagnosis of minor problems through video house calls. In addition, Patterson desires data .analytic and tracking capabilities

Th s project would build on existing expertise within the IT department. The IT department staff designed, developed, and maintains the sophisticated prescription fulfillment system already in place at Patterson and can leverage that experience in creating the proposed system.

The IT department has enthusiastically moved toward RAD and Object-Oriented Methodologies and views familiarity with these methodologies as a strategic advantage. Th s project would lend itself to such development and thus increase expertise in this area.

Based on the reading above and the criteria for selecting a methodology that you learned in Chapter 1, what methodology would you recommend?

Information Systems projects are approved at Patterson by a steering committee that consists of high-level division representatives (such as Max) and IT division leaders. There are always many projects to consider and to prioritize. Max Ross plans to present a systems request that outlines his idea more fully at the next steering committee meeting. In this document, he will explain the business need, opportunity, and business value of the proposed system.
One problem that Max envisions is pushback from other segments of the organization who feel that the medical clinic concept is not part of the Patterson mission. However, the pharmacy and health clinic area has been the most profitable division for the last two years, and Max plans to explain how this project would further increase Patterson's profitability by outlining the expected financial benefits of the new systems

How might you address the pushback?

In preparation for this meeting, Max is working with his team to develop high-level requirements for the proposed system and is also identifying issues and constraints related to his proposed system.

:Requirements

- Defi ed level of service offerings
- Data analytics and tracking
- Viewable wait time in real time
- Walk-in clinic and automated response system for scheduling appointments
- Referral information for conditions beyond the scope of the clinics service
- Intuitive Auto response with periodic human monitoring to avoid unhandled clients
- Video conferencing capability
- Limited diagnostic capabilities for call-ins

Add to the list of requirements based on what you have read and your experience with medical care.

Problems currently experienced within the clinic that the system should address include:

- Patients want to be able to schedule treatment but are often required to be evaluated prior to a treatment appointment being scheduled

- How to deal with referring items cannot be treated at the clinic
- Staff cutbacks have caused delays in responsiveness

Constraints:

- Must be HIPPA compliant
- Security is vital
- Staffing regulations
- Highly regulated fi ld

Are there other constraints that Max and his group have not identified? Do you have any concerns about this project?

Section 2: System Request

In this segment of the Patterson Superstore case, we look more closely at the integrated health clinic delivery system that Max Ross envisions, which will enable real-time communication and scheduling for Patterson's health clinics. In addition, we will examine the completed system request that Max Ross and his team developed. Finally, we will review the feasibility analysis that accompanies the request and see how the project is staffed and managed

Project Identification and Systems Request

At Patterson, potential projects are reviewed during quarterly steering committee meetings where participants from IT and the major business departments decide which projects to approve. Approval is based on business need and on how well the project advances the strategic objectives of the organization. Using the systems request template (Figure 2-1), Max Ross prepared a system request for the Integrated Health Clinic Delivery System (Figure 2-A).

The business need is to accommodate clients' desire to electronically access health clinic services. Doing so will heighten Patterson's competitive advantage, improve customer service, and increase the effectiveness of clinic offerings. Business need does not focus on the tech-nology itself but instead on business elements, such as customer service, competitiveness, and efficacy. At this juncture, business requirements are described at a high level of detail. Max's vision for the requirements includes

- Mobile appointment scheduling
- Real-time communication with medical personnel (audio, video, and text)
- Tele-health assessment and diagnosis of minor problems through video house calls
- Data analytic and tracking capabilities

Business value describes how the requirements will affect the business. Intangible business value will come from the increased satisfaction of current clinic customers and the enhanced recognition of value-added aspects of Patterson's clinical services. The proliferation of mobile applications and the growing interest of consumers in having larger and more convenient roles in their own healthcare further enhance the business value of this project. Max expects that the system will increase the number of clinic clients by offering convenient scheduling and service. Th s increase is projected to subsequently raise prescription and non-prescription sales due to the upsurge of foot traffi in the clinics and stores. Market research indicates that customers are seeking convenience in scheduling health appointments and that there is growing frustration with the requirement of face-to-face visits for routine diagnosis. Based on current clinic usage and the type of services currently requested, many customers do not utilize available clinic services due to wait times and scheduling confli ts. Max estimates that approximately 5 percent of potential service income is currently lost. A more convenient system could increase existing customer base service income as well as generating new clinic customers.

Feasibility Analysis

After reviewing the submitted systems request, the steering committee ranked the project as a high priority. Kelly Herman, a senior systems analyst, was assigned to work with Max to study the feasibility of the Integrated Health Clinic Delivery System. Kelly had been the team lead for the prescription order notifi ation and auto refill mobile app project and was eager to develop further mobile services. Kelly and Max worked closely to develop the feasibility analysis below based on the technical, economic, and organization perspectives of the project.

System Request—Integrated Health Clinic Delivery System

Project sponsor: Max Ross, Vice President of Pharmacy Services

Business Need: This project has been initiated to integrate health clinic services by providing real-time electronic communication and scheduling for Patterson Superstore health clinics.

Business Requirements:

- Mobile appointment scheduling
- Real-time communication with medical personnel (audio, video, and text)
- Tele-health assessment and diagnosis of minor problems through video house calls
- Data analytic and tracking capabilities

Business Value:

We expect this integrated health clinic delivery system to lead to improved customer satisfaction and increased brand recognition due to its first mover advantage and increased convenience for clinic clients. Implementation of this system is also expected to boost in-pharmacy sales due to increased foot traffic in stores.

Conservative estimates of tangible value to the company per clinic include:

- $375,000 (75 percent of $500,000) in clinic services from new customers
- $750,000 (75 percent of $1,000,000) in clinic services from existing customers
- $50,000 in pharmacy sales from increase foot traffic in stores

Special Issues or Constraints:

- The Pharmacy Department views this as a strategic system that will add value to the current business model and will also provide customers with increased convenience and satisfaction.
- In order to gain first mover advantage, the system should be implemented in phases with the appointment scheduling piece in place within six months from the approval date.
- Increased staffing will be needed to operate the new system from both the technical and business operations aspect.

FIGURE 2-A Systems Request

Technical Feasibility

Technically, this project carries a low level of risk due to the expertise developed in the previous mobile application project. The IT department staff designed, developed, and maintains the sophisticated prescription fulfillment system already in place at Patterson and can leverage that experience in creating the proposed system. The IT department has enthusiastically moved toward Rapid Application Development and considers familiarity with these methodologies as a strategic advantage. Th s project would lend itself to RAD development and thus is expected to further increase proficie cy in this area. The project size is considered medium risk because the project team will include fewer than ten people. User involvement will be required for proof of concept, testing, and requirements determination.

Economic Feasibility

Economic feasibility, based on the cost benefit analysis income shown in Figure 2-B, shows that this project would signifi antly add to Patterson's bottom line. While the development costs would be a one-time expenditure (with subsequent maintenance), the operating costs would be incurred at each clinic. However, as Figure 2-B indicates, even allocating total costs including development to an individual clinic, the clinic would return a profit in the fi st year (using a conservative estimate of income in the fi st year). Estimating a modest increase of 5 percent per year yields substantial increases in each following year. Intangible costs and benefits include increased satisfaction of current clinic customers and enhanced recognition of the ease of using Patterson's clinical services.

Income per clinic	2015	2016	2017
Clinic services from new customers	$375,000	$393,750.00	$413,437.50
Clinic services from existing customers	$750,000	$787,500.00	$826,875.00
Increased pharmacy sales	$50,000	$52,500.00	$55,125.00
TOTAL BENEFITS:	**$1,125.000**	**$1,181,250**	**$1,240,313**
Cost			
Labor: Analysis and design	$60,000	**0**	**0**
Labor: Implementation	$120,000	**0**	**0**
Staff training	$7,000	**0**	**0**
Office space and equipment	$2,000	**0**	**0**
Software	$10,000	**0**	**0**
Hardware	$35,000	**0**	**0**
TOTAL DEVELOPMENT COSTS:	**$234,000**	**0**	**0**
Labor: Computer operations	$50,000	$52,000	$54,000
Labor: Customer support	$45,000	$47,000	$49,000
Labor: Management oversight	$65,000	$67,000	$69,000
Labor: 3 staff	$90,000	$96,000	$102,000
Software upgrade/licensing	0	$4,000	$4,000
Hardware upgrades	0	$3,000	$3,000
User training	$2,000	$1,000	$1,000
Connectivity/Communication charges	$30,000	$30,000	$30,000
Promotional expenses	$50,000	$30,000	$30,000
TOTAL OPERATIONAL COSTS	**$332,000**	**$330,000**	**$342,000**
TOTAL COSTS	**$566,000**	**$330,000**	**$342,000**
TOTAL PROJECT BENEFITS/COST	**$559,000**	**$851,250**	**$898,313**

FIGURE 2-B Cost Benefit Analysis

Organizational Feasibility

From an organizational perspective, this project has low risk. The goals of the system to enhance competitive advantage, improve customer service, and increase the effectiveness of clinic offerings are aligned with the senior management's goal of increasing sales for Patterson Superstore. The project has a project champion, Max Ross, VP of Pharmacy Services, who is well-positioned to sponsor this project and to educate the rest of the senior management team to the benefits of the project. To date, much of senior management is aware of and support the initiative. Since health clinic clients have led to this proposal through requests for a more integrated and convenient health clinic system, user acceptance is expected to be high. Given the increased sales potential, store managers should be willing to accept the system.

Project Selection

Based on the strong profit potential of this project, the steering committee selected the Integrated Health Clinic Delivery System for funding and development. Because the fi st phase of the project was scheduled for implementation six months after approval, Max and Kelly were apprehensive about the short time frame. They quickly set to work fi ding a project manager to form a team and develop a project schedule. Ruby Neiley was chosen to manage the project due to her management of the prescription fulfillment project that was completed on time and within budget. In addition, Ruby has experience in leading phased development projects.

The system was approved based on implementation in phases. The phased development-based methodology apportions an overall system into a series of versions that are developed

sequentially. Phased development-based methodologies quickly put a useful system into the hands of the users. Because users begin to work with the system sooner, they are more likely to identify important additional requirements sooner than with structured design. The time boxing technique was chosen in conjunction with phased development to control scope and scheduling.

Time boxing steps include:

1. Set the date for system delivery.
2. Prioritize the functionality that needs to be included in the system.
3. Build the core of the system (the functionality ranked as most important).
4. Postpone functionality that cannot be provided within the time frame.
5. Deliver the system with core functionality.
6. Repeat steps 3 through 5 to add refi ements and enhancements.

Since the appointment scheduling portion of the system needs to be in place within six months from the approval date, the version 1 system delivery time is set. While the appointment scheduling portion of the project is only one of the requirements, it is the most requested from customers. Delivery of this phase to the clinic clients should increase satisfaction and convenience for customers and prepare them for subsequent versions of the envisioned system.

In the upcoming analysis phase, the overall system concept will be further defi ed and the team will categorize the requirements into a series of versions.

Project Effort Estimation

One of Ruby's project management duties was to estimate the project's effort and schedule. Using the Use Case Point Worksheet (see Figure 2-15), Ruby estimated the effort to create the new system using the following steps.

1. Ruby and Max identifi d the business processes that the system would support and the users who would interact with the system. Then they sorted different user types into actors and arranged the business processes into use cases. The next step was to classify each actor and use case as being simple, average, or complex. In the case of the actors, the existing Pharmacy System had a well-defi ed API. As such it was classifi d as a simple actor. Th ee average actors include interaction with the web, mobile, and patient database. The Customer, Medical Staff, and Clinic Staff actors were classifi d as being complex. Th s gave an Unadjusted Actor Weight Total Value of 14.
2. Alec and Margaret classifi d each use case based on the number of transactions the use case had to handle. For the Mobile Appointment Scheduling (Version 1), there was one simple use case (Confi m Appointment), one average use case (Determine Suitability), and one complex use case (Make Appointment). Based on these, a value of 30 to the Unadjusted Use Case Weight Total was computed.
3. Ruby computed a value of 44 for the Unadjusted Use Case Points.
4. She rated each of the technical complexity factors, rated each of the environmental factors, and computed the values for TCF and EF.
5. Using the Unadjusted Use Case Points and the TCF and EF values, Ruby calculated a value of 52.73 for Adjusted Use Case Points.
6. Based on the decision rule for determining whether to use 20 or 28 as the value of the person hours multiplier, Ruby used 20. Using these figu es, Ruby estimated the effort for the project to be 1,054.6 person hours. Th s equates to about 6.59 person months (1,318.2/160). In other words, it would take a single person working full time about 6½ months to complete the project.

Unadjusted Actor Weighting Table:

Actor Type	Description	Weighting Factor	Number	Result
Simple	External System with well-defined API	1	1	1
Average	External System using a protocol-based interface, (e.g., HTTP, TCT/IP, or a database)	2	2	4
Complex	Human	3	3	9
			Unadjusted Actor Weight Total (UAW)	**14**

Unadjusted Use Case Weighting Table:

Use Case Type	Description	Weighting Factor	Number	Result
Simple	1–3 transactions	5	1	5
Average	4–7 transactions	10	1	10
Complex	>7 transactions	15	1	15
			Unadjusted Use Case Weight Total (UUCW)	**30**

Unadjusted use case points (UUCP) = UAW + UUCW 44 = 14 + 30

Technical Complexity Factors:

Factor Number	Description	Weight	Assigned Value (0–5)	Weighted Value	Notes
T1	Distributed system	1.0	5	5.0	
T2	Response time or throughput performance objectives	1.0	5	5.0	
T3	End-user online efficiency	1.0	5	5.0	
T4	Complex internal processing	1.0	3	3.0	
T5	Reusability of code	1.0	3	3.0	
T6	Easy to install	0.5	3	1.5	
T7	Ease of use	0.5	5	2.5	
T8	Portability	2.0	4	8.0	
T9	Ease of change	1.0	3	3.0	
T10	Concurrency	1.0	3	3.0	
T11	Special security objectives included	1.0	5	5.0	
T12	Direct access for third parties	1.0	5	5.0	
T13	Special User training required	1.0	3	3.0	
			Technical Factor Value (TFactor)	**52.0**	

Technical complexity factor (TCF) = 0.6 + (0.01 * TFactor) 1.12 = 0.6 + (0.01 * 52)

Environmental Factors:

Factor Number	Description	Weight	Assigned Value (0–5)	Weighted Value	Notes
E1	Familiarity with system development process being used	1.5	2	3.0	
E2	Application experience	0.5	2	1.0	
E3	Object-oriented experience	1.0	2	2.0	
E4	Lead analyst capability	0.5	2	1.5	
E5	Motivation	1.0	3	3.0	
E6	Requirements stability	2.0	2	4.0	
E7	Part time staff	–1.0	0	0.0	
E8	Difficulty of programming language	–1.0	2	–3.0	
			Environmental Factor Value (EFactor)	**11.0**	

Environmental factor (EF) = 1.4 + (–0.03 * EFactor) 1.07 = 1.4 + (–.03 * 11)
Adjusted use case points (UCP) = UUCP *TCF *ECF 52.73 = 44 * 1.12 * 1.07
Person hours multiplier (PHM) PHM = 20
Person hours = UPC * PHM 1,054.6 = 52.73 * 20

FIGURE 2-C Project Effort Estimation Version 1 of the Integrated Health Clinic Delivery System

Staffing the Project

Ruby created a list of roles that needed to be filled. These included an infrastructure analyst to ensure both that the new system adheres to Patterson's infrastructure standards and that this infrastructure can support the new system. Integration with existing systems will be an important part of this project. Ruby also wanted both a systems analyst and a business analyst on the team to advocate for the technical and business perspectives of the analysis and design of the project. Because data tracking and analysis is a central requirement of the system, Ruby decided that a data analytics specialist was a necessary member of the team. Lastly, she needed a programmer with expertise in mobile application development and experience with video capture. Ruby chose the members of the team from the previous prescription fulfillment project team due to the expertise that they had developed. Most importantly, the group chosen formed an already jelled team with a high level of trust, project ownership, and synergy among members. The team roles and individuals assigned are listed staffing plan shown in Figure 2-D:

Role	Description	Assigned To
Project Manager	Oversees the project to ensure that it meets its objectives in time and within budget.	Ruby Neiley
Infrastructure Analyst	Ensures the system conforms to infrastructure standards at Patterson and that the Patterson infrastructure can support the new system	Sam Wilson
Systems Analyst	Designs the information system using a technology focus	Kelly Herman
Business Analyst	Designs the information system using a business focus	Sarah Kirschner
Data Analytics Specialist	Develops plan and structure for data tracking and analytics	Ben Joseph
Programmer	Codes system	Alice Smith
Reporting Structure: All project team members will report to Ruby		

FIGURE 2-D Staffing Plan

Creating and Managing the Workplan for Version 1 of the Integrated Health Clinic Delivery System

After completing staffing plan and project effort estimation, Ruby created an evolutionary work breakdown structure for Version 1. She started by reviewing the Enhanced Unifi d Process phases and workfl ws (Figure 1-16) and the evolutionary work breakdown structure template (Figure 2-17). At this juncture, Ruby does not have enough information to create a complete workplan and so has included as much detail as she knows to be correct (Figure 2-E). For example, Ruby is confide t about the estimation of time to create the requirements defin tion and to elicit the requirements. However, she will not know whether how long it will take to develop the functional, structural, or behavioral analysis models until the actual requirements are defi ed. Until this determination can be made, any estimation as to the time required would be simply a guess. As time passes, Ruby expects to know much more about the development process and will add much more detail to the workplan. (Remember that the development process and the project management processes are iterative and incremental in nature).

	Duration	Dependency
I. Business Modeling		
a. Inception		
1. Understand current business situation		
2. Uncover business process problems		
3. Identify potential projects		
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
II. Requirements		
a. Inception		
1. Identify appropriate requirements analysis technique		
2. Identify appropriate requirements gathering techniques		
3. Identify functional and nonfunctional requirements		II.a.1, II.a.2
4. Analyze current systems		II.a.1, II.a.2
5. Create requirements definition		II.a.3, II.a.4
A. Determine requirements to track		
B. Compile requirements as they are elicited		II.a.5.A
C. Review requirements with sponsor		II.a.5.B
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
III. Analysis		
a. Inception		
1. Identify business processes		
2. Identify use cases		III.a.I
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
IV. Design		
a. Inception		
1. Identify potential classes		III.a
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
V. Implementation		
a. Inception		
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
VI. Test		
a. Inception		
b. Elaboration		

(Continued)

FIGURE 2-E Workplan for Version 1 of the Integrated Health Clinic Delivery System

	Duration	Dependency
c. Construction		
d. Transition		
e. Production		
VII. Deployment		
a. Inception		
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
VIII. Configuration and change management		
a. Inception		
1. Identify necessary access controls for developed artifacts		
2. Identify version control mechanisms for developed artifacts		
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
IX. Project management		
a. Inception		
1. Create workplan for the inception phase		
2. Create system request		
3. Perform feasibility analysis		IX.a.2
A. Perform technical feasibility analysis **B.** Perform economic feasibility analysis **C.** Perform organizational feasibility analysis		
4. Identify project size		IX.a.3
5. Identify staffing requirements		IX.a.4
6. Compute cost estimate		IX.a.5
7. Create workplan for first iteration of the elaboration phase		IX.a.1
8. Assess inception phase		I.a, II.a, III.a IV.a, V.a, VI.a VII.a, VIII.a, IX.a, X.a, XI.a XII.a
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
X. Environment		
a. Inception		
1. Acquire and install CASE tool		
2. Acquire and install programming environment		
3. Acquire and install configuration and change management tools		
4. Acquire and install project management tools		
b. Elaboration		

(Continued)

FIGURE 2
(*Contined*)

	Duration	Dependency
c. Construction		
d. Transition		
e. Production		
XI. Operations and Support		
a. Inception		
b. Elaboration		
c. Construction		
d. Transition		
e. Production		
XII. Infrastructure Management		
a. Inception		
1. Identify appropriate standards and enterprise models		
2. Identify reuse opportunities, such as patterns, frameworks, and libraries		
3. Identify similar past projects		
b. Elaboration		
c. Construction		
d. Transition		
e. Production		

Section 3: Requirements Determination

The Integrated Health Clinic Delivery System will enable mobile appointment scheduling, real-time communication with medical personnel (audio, video, and text), and facilitate clients' desire to electronically access health clinic services. The system will be developed using the phase development methodology and will begin with the mobile appointment portion of the project.

Determining the system's requirements is the most important activity in the systems development process. A requirement is WHAT the system must do or WHAT characteristics it must have. If the requirements are not fully or correctly defi ed, the system developed is unlikely to meet the needs of the user. In other words, if the requirements are wrong, the system will be wrong. Max defi ed the requirements in the systems request, at a very high level of detail:

- Mobile appointment scheduling
- Real-time communication with medical personnel (audio, video, and text)
- Tele-health assessment and diagnosis of minor problems through video house calls
- Data analytic and tracking capabilities

As the team moves into requirements determination, the high-level requirements will be expanded and refi ed. Requirements are either functional (WHAT the system must do) or nonfunctional (HOW the system will behave). Functional requirements answer the question of WHAT processing the system must perform or WHAT information the system must contain. Nonfunctional requirements refer to the behavioral properties of a system and will be explored in depth during the design phase (when the focus is on HOW the system will operate) but must be considered from a high-level viewpoint during analysis. Creating a requirements defin tion is an ongoing process of collecting information from users, analyzing the information collected, identifying the appropriate business requirements, and adding them to the requirements defin - tion report. While requirements defin tion is an iterative process, it must be carefully managed to ensure that the evolving requirements fit the defi ed scope of the project. Scope creep has caused many projects to fail because the requirements grow to the point that the project is never fin shed. Ruby and Max are well aware that the scope of this project must be controlled. Their plan is to retain requirements beyond the scope of the project in a requirements list that can be addressed in the future versions.

Requirements Analysis Techniques

The envisioned system will improve the existing health clinic model by utilizing technology to improve the effici cy and effectiveness of clinic operations. Moderate change will be made to the way the clinic operates but the processes in place in the physical setting will see little disruption. For this reason, the team needs to understand the current system but will mainly focus on how to improve business processes. Some techniques that the team chose to use are technology analysis, informal benchmarking, and duration analysis. Max suggested that they plan joint application development (JAD) sessions with clinic managers, front-line employees of the clinics (who take calls, receive complaints, and handle delays), and with IT members who were involved with the prescription fulfillment rollout. Together this group could explore current processes and problems, and brainstorm technical solutions. To encourage all participants to freely share ideas, Ruby decided to run the session as an e-JAD session utilizing the existing laptops and installed software in the Training/ JAD room. Sarah suggested that the team also schedule JAD sessions with technically savvy clients currently using the clinic to gain an understanding of the userexperience and how it might be improved.

Ruby and Max conducted the internal e-JAD sessions over a three-day period. Ruby used technology analysis to uncover available mobile and video technologies for the group to consider. The fi st day's session yielded a brainstormed list of how the health clinics might use these technologies. Based on the potential for adding business and fit with the objectives of the proposed system, Ruby categorized the ideas into three groupings: defin te, possible, and unlikely. On the second day, Max projected websites and promotional materials that tele-healthcare providers and competing businesses currently use. While the sites were not very specific with what they showed, the JAD participants were able to use the information to begin a list of suggested business requirements for the project team. The third day's session did not go as well as the other two sessions. Ruby used duration analysis and attempted to introduce the activity elimination technique. Because employees became defensive and territorial regarding the speed and importance of their work, she quickly took a different tack and instead used the remaining time to continue brainstorming on the use of technology and to further develop business and high-level technical requirements.

Ruby and Sarah, the business analyst, conducted a one-day JAD session with existing clients from the busiest clinic. To encourage participation, they provided breakfast, lunch, and a superstore gift card to participants. Ruby started the session by stating that Patterson Superstore had listened to customers and was developing an Integrated Health Clinic Delivery System. When Ruby outlined the proposed features, the group became every excited. She explained that systems development was a lengthy process and that this project would be completed in phases with the mobile appointment scheduling coming first. Sarah then explained the importance of the user in developing the requirements for the system. Brainstorming occupied most of the morning session with ideas again sorted into definite, possible, and unlikely. One problem voiced about the current clinic that the system would address is that patients want to be able to schedule treatment but are often required to be evaluated prior to a treatment appointment being scheduled. During lunch, Ruby noticed that the participants had begun complaining about wait times and other problems with the current operation of the clinic. As soon as lunch was over, Ruby introduced the concepts of duration analysis and fairly successfully turned the complaints into an analysis of how long current processes took (from the customer's perspective). She decided not to use activity elimination because the clients lacked knowledge of the clinics' internal processes. Instead she used the results of the duration analysis to solicit suggestions for reducing activities that the clients experienced themselves (again being cognizant of internal processes). This would be useful information to share with development team as well as with the clinic managers.

Requirements Gathering Techniques

In addition to providing information and ideas, the JAD sessions established trust and rapport with the stakeholders. Realizing that they needed a deeper understanding of the existing processes, the team used document analysis, interview, and observation techniques to gather further information. First, Kelly, the systems analyst, collected existing reports (e.g., appointment schedules, input forms, diagnosis reference materials) and system documentation (functional, structural, and behavioral models) that shed light on the as-is system. In this way, Kelly was able to better understand the clinic processes and systems. When questions arose, Kelly conducted short interviews with the individual who provided clarifi ation. Next, Kelly interviewed the senior analysts for the prescription fulfillment system to better understand the lessons learned from that project. Kelly asked if there were integration issues that she would need to address and also asked for input for the new system. Ruby interviewed the vendor of the Cloud platform that Patterson was using and spoke at length with the Patterson IT individual currently supporting the fulfillment system. Both provided information about the existing

communications infrastructure and its capabilities. Finally, Sarah spent a half-day visiting two of the health clinics and observing exactly how scheduling, clinic visits, documentation, and follow-up processes worked in the facilities.

Requirements Defintion

Th ough the information collected, Kelly and Sarah tried to identify the business requirements for the system. As the project progressed, requirements were added to the requirements defin tion and grouped by requirement type. When questions arose, they worked with Max and Ruby to confi m that requirements were in scope. Requirements that fell outside of the scope of the current system were captured in a separate document to be saved for future use. After gathering and documenting the requirements, a draft requirements defin tion was distributed to Max and several health clinic managers. Th s group, along with the project team then met for a two-day JAD session to clarify, fi alize, and prioritize business requirements. The project team created functional, structural, and behavioral models (Chapters 4, 5, and 6) that depicted the objects in the future system. Members of the IT department and pharmacy division reviewed the documents during interviews with the project team. Figures 3-A and 3-B show the functional and functional requirements.

System Proposal

Ruby reviewed the requirements defin tion and the other deliverables that the project team created. Given the six-month time frame for delivery of the fi st phase of the project, Ruby decided to time box the project into three versions. The fi st version would implement the mobile scheduling portion for delivery in six months. The second version, planned for late spring or early summer, would implement the real-time communication with medical personnel (audio, video, and text). The third version would initiate tele-health assessment and diagnosis of minor problems through video house calls. Data analytic and tracking capabilities would be built into all three versions. Figure 3-C shows a portion of the Systems Proposal.

Nonfunctional Requirements

1. Operational requirements
   - 1.1 The system will operate on any web browser including mobile
   - 1.2 The system will integrate with the current clinic systems
   - 1.3 The system will automatically back up each day at midnight
2. Performance requirements
   - 2.1 The system must be available 24 hours daily (365 days per year)
   - 2.2 Response time for interactions between the system and the user will be less than three seconds
   - 2.3 The system will store and retrieve appointment and other transactional information every two seconds
3. Security requirements
   - 3.1 Access to patient medical information is limited to medical staff only
   - 3.2 Scheduling and administrative personnel can access patient contact and billing information but not medical information
4. Cultural and political requirements
   - 4.1 The system will comply with all regulatory requirements. The health clinics operate in a highly regulated field. Compliance with all regulation is imperative
   - 4.2 Strict compliance with all aspects of HIPAA will be maintained at all times

FIGURE 3-A Nonfunctional Requirements

Functional Requirements

1. Schedule appointment
   - 1.1 Client requests to be seen by the clinic
   - 1.2 The system displays the defined service offerings list
   - 1.3 Client either chooses a defined service offering from the list or requests that a service need survey be completed so that the system can determine whether the service needed falls within the scope of the clinic's capabilities
   - 1.4 Referral information will be listed for conditions beyond the scope of the clinic's service
     - 1.4.1 Compare and evaluate referral need against referral list
     - 1.4.2 Display appropriate referrals
   - 1.5 Appointment information will be listed for conditions that fall within the scope of the clinic's services
     - 1.5.1 Current real-time availability will be displayed with wait time listed
     - 1.5.2 Clients can choose appointment time for the current day or make an appointment in advance
     - 1.5.3 The calendar will be updated to reflect scheduled appointment
     - 1.5.4 Confirmation will be sent to client
2. Communicate real time
   - 2.1 Client can request real-time meeting with caregiver
   - 2.2 Client indicates available time and technology preference
   - 2.3 Caregiver responds with duration and availability
   - 2.4 Session scheduled with clients, caregivers
3. Assess via tele-health
   - 3.1 Client answers question matrix to determine suitability for tele-health assessment
   - 3.2 Limited diagnosis developed based on matrix answers from client
   - 3.3 Diagnosis info reviewed by caregiver
   - 3.4 Diagnosis info given to client if the problem is minor and diagnosis info is conclusive
   - 3.5 Or Video-conference scheduled
   - 3.6 Video conference held with diagnosis, follow-up, or referral

FIGURE 3-B Functional Requirements

Outline of the Systems Proposal for the Integrated Health Clinic Delivery System

1. Table of Contents
2. Executive Summary (To be completed once everything else is done)
3. System Request (Figure 2-A)
4. Economic Feasibility (Figure 2-B)
5. Evolutionary Work Breakdown Structure (Figure 2-E)
6. Requirements Definition (Figures 3-A and 3-B)
7. Functional Model: To be completed in the future (see Chapter 4).
8. Structural Models: To be completed in the future (see Chapter 5).
9. Behavioral Model: To be completed in the future (see Chapter 6).
10. Appendices
    - A. Staffing Plan (2-D)

FIGURE 3-C Systems Proposal Outline