Appendix D

Sample Requirements Documents

This appendix illustrates some of the requirements documents and diagrams described in this book, using a small, hypothetical project called the Cafeteria Ordering System (COS). The artifacts included here are the following:

- A vision and scope document
- A list of use cases and several use-case descriptions
- A portion of a software requirements specification
- Some analysis models
- A partial data dictionary
- Several business rules

Because this is just an example, these requirements elements aren't intended to be complete. My objective here is to provide an idea of how the various types of requirements information relate to each other and to illustrate how you might write the contents of each document section. On a small project, it often makes sense to combine different requirements information into a single document, so you might not have a separate vision and scope document, use-case document, and SRS. The information in these documents could be organized in many other reasonable ways. Clarity, completeness, and usability of the requirements documents are the essential objectives.

The documents generally conform to the templates described in previous chapters, but because this is a small project, the templates have been simplified somewhat. In some cases, several sections have been combined to avoid duplicating information. Every project should consider how to adapt the organization's standard templates to best suit the size and nature of the project.

Vision and Scope Document

1. Business Requirements

1.1 Background, Business Opportunity, and Customer Needs

A majority of Process Impact employees presently spend an average of 60 minutes per day going to the cafeteria to select, purchase, and eat lunch. About 20 minutes of this time is spent walking to and from the cafeteria, selecting their meals, and paying for their meals by cash or credit card. When employees go out for lunch, they spend an average of 90 minutes off-site. Some employees phone the cafeteria in advance to order a meal to be ready for them to pick up. Employees don't always get the selections they want because the cafeteria runs out of certain items. The cafeteria wastes a significant quantity of food that is not purchased and must be thrown away. These same issues apply to breakfast and supper, although far fewer employees use the cafeteria for those meals than for lunch.

Many employees have requested a system that would permit a cafeteria user to order meals on-line, to be delivered to a designated company location at a specified time and date. Such a system would save those employees who use the service considerable time and it would increase the chance of them getting the food items they prefer. This would improve both their quality of work life and their productivity. Knowing what food items customers want in advance would reduce wastage in the cafeteria and would improve the efficiency of cafeteria staff. The future ability for employees to order meals for delivery from local restaurants would make a wider range of choices available to employees and provide the possibility of cost savings through volume purchase agreements with the restaurants. It might also permit Process Impact to have the cafeteria handle only individual lunches, relying on restaurants to fill orders for breakfasts, dinners, special events, and weekend meals.

1.2 Business Objectives and Success Criteria

BO-1: Reduce cafeteria food wastage by 50% within 6 months following initial release.[1]
Scale: Value of food thrown away each week by cafeteria staff
Meter: Examination of Cafeteria Inventory System logs
Past [2002, initial study]: 30%
Plan: Less than 15%
Must: Less than 20%

BO-2: Reduce cafeteria operating costs by 15% within 12 months following initial release.

1. This example shows the use of Planguage as a way to precisely state a business objective or other requirement.

BO-3: Increase average effective work time by 20 minutes per employee per day within 3 months following initial release.
SC-1: Have 75% of those employees who presently use the cafeteria use the Cafeteria Ordering System within 6 months following initial release.
SC-2: Achieve an increase in the average rating on the quarterly cafeteria satisfaction survey of 0.5 within 3 months following initial release and 1.0 within 12 months following initial release.

1.3 Business Risks

RI-1: The Cafeteria Employees Union might require that their contract be renegotiated to reflect the new employee roles and cafeteria hours of operation. (Probability = 0.6; Impact = 3)
RI-2: Too few employees might use the system, reducing the return on investment from the system development and the changes in cafeteria operating procedures. (Probability = 0.3; Impact = 9)
RI-3: Local restaurants might not agree to offer price reductions to justify employees using the system, which would reduce employee satisfaction with the system and possibly their usage of it. (Probability = 0.4; Impact = 3)

2. Vision of the Solution

2.1 Vision Statement

For employees who wish to order meals from the company cafeteria or from local restaurants on-line, the Cafeteria Ordering System is an Internet-based application that will accept individual or group meal orders, process payments, and trigger delivery of the prepared meals to a designated location on the Process Impact campus. Unlike the current telephone and manual ordering processes, employees who use the Cafeteria Ordering System will not have to go to the cafeteria to get their meals, which will save them time and will increase the food choices available to them.

2.2 Major Features

FE-1: Order meals from the cafeteria menu to be picked up or delivered
FE-2: Order meals from local restaurants to be delivered
FE-3: Create, view, modify, and delete meal service subscriptions
FE-4: Register for meal payment options
FE-5: Request meal delivery
FE-6: Create, view, modify, and delete cafeteria menus
FE-7: Order custom meals that aren't on the cafeteria menu
FE-8: Produce recipes and ingredient lists for custom meals from cafeteria

FE-9: Provide system access through corporate intranet or through outside Internet access by authorized employees

2.3 Assumptions and Dependencies

AS-1: Intranet-enabled computers and printers will be available in the cafeteria to permit cafeteria employees to process the expected volume of orders without missing any delivery time windows.

AS-2: Cafeteria staff and vehicles will be available to deliver all orders within 15 minutes of the requested delivery time.

DE-1: If a restaurant has its own on-line ordering system, the Cafeteria Ordering System must be able to communicate with it bidirectionally.

3. Scope and Limitations

3.1 Scope of Initial and Subsequent Releases

Feature	Release 1	Release 2	Release 3
FE-1	Standard meals from lunch menu only; delivery orders can be paid for only by payroll deduction	Accept orders for breakfasts and dinners, in addition to lunches; accept credit and debit card payments	
FE-2	Not implemented	Not implemented	Fully implemented
FE-3	Implemented if time permits (medium priority)	Fully implemented	
FE-4	Register for payroll deduction payments only	Register for credit card and debit card payments	
FE-5	Meals will be delivered only to company campus sites	Add delivery from cafeteria to selected off-site locations	
FE-6	Fully implemented		
FE-7	Not implemented	Not implemented	Fully implemented
FE-8	Not implemented	Fully implemented	
FE-9	Fully implemented		

3.2 Limitations and Exclusions

LI-1: Some food items that are available from the cafeteria will not be suitable for delivery, so the menus available to patrons of the Cafeteria Ordering System will be a subset of the full cafeteria menus.

LI-2: The Cafeteria Ordering System shall be used only for the cafeteria at the main Process Impact campus in Clackamas, Oregon.

4. Business Context

4.1 Stakeholder Profiles

Stakeholder	Major Value	Attitudes	Major Interests	Constraints
Corporate Management	improved employee productivity; cost savings for cafeteria	strong commitment through release 2; support for release 3 contingent on earlier results	cost savings must exceed development and usage costs	none identified
Cafeteria Staff	more efficient use of staff time throughout the day; higher customer satisfaction	concern about union relationships and possible downsizing; otherwise receptive	job preservation	training for staff in Internet usage needed; delivery staff and vehicles needed
Patrons	better food selection; time savings; convenience	strong enthusiasm, but might not use it as much as expected because of social value of eating lunches in cafeteria and restaurants	simplicity of use; reliability of delivery; availability of food choices	access to corporate intranet is needed
Payroll Department	no benefit; needs to set up payroll deduction registration scheme	not happy about the software work needed, but recognizes the value to the company and employees	minimal changes in current payroll applications	no resources yet committed to make software changes
Restaurant Managers	increased sales; marketing exposure to generate new customers	receptive but cautious	minimal new technology needed; concern about resources and costs of delivering meals	might not have staff and capacity to handle order levels; might need to get Internet access

4.2 Project Priorities

Dimension	Driver	Constraint	Degree of Freedom
Schedule			release 1 planned to be available by 3/1/03, release 2 by 5/1/03; overrun of up to 3 weeks acceptable without sponsor review
Features		All features scheduled for release 1.0 must be fully operational	
Quality		95% of user acceptance tests must pass; all security tests must pass; compliance with corporate security standards must be demonstrated for all secure transactions	
Staff	projected team size is half-time project manager, 2 developers, and half-time tester; additional half-time developer and half-time tester will be available if necessary		
Cost			budget overrun up to 15% acceptable without sponsor review

Use Cases

The various user classes identified the following use cases and primary actors for the Cafeteria Ordering System:

Primary Actor	Use Cases
Patron	**1.** Order Meal
	2. Change Meal Order
	3. Cancel Meal Order
	4. View Menu
	5. Register for Payroll Deduction
	6. Unregister for Payroll Deduction
	7. Subscribe to Standard Meal
	8. Modify Meal Subscription
	9. Override Meal Subscription
Menu Manager	**10.** Create Menu
	11. Modify Menu
	12. Define Meal Special
Cafeteria Staff	**13.** Prepare Meal
	14. Generate Payment Request
	15. Request Delivery
	16. Generate System Usage Reports
Meal Deliverer	**17.** Deliver Meal
	18. Record Meal Delivery
	19. Print Delivery Instructions

Use Case ID:	**UC-1**		
Use Case Name:	Order Meal		
Created By:	Karl Wiegers	Last Updated By:	Jack McGillicutty
Date Created:	October 21, 2002	Date Last Updated:	November 7, 2002
Actors:	Patron		

Description: A Patron accesses the Cafeteria Ordering System from the corporate intranet or from home, optionally views the menu for a specific date, selects food items, and places an order for a meal to be delivered to a specified location within a specified 15-minute time window.

Preconditions:

1. Patron is logged into COS.
2. Patron is registered for meal payments by payroll deduction.

Postconditions:

1. Meal order is stored in COS with a status of "Accepted".
2. Inventory of available food items is updated to reflect items in this order.
3. Remaining delivery capacity for the requested time window is updated to reflect this delivery request.

Normal Course:

1.0 Order a Single Meal

1. Patron asks to view menu for a specified date.
2. System displays menu of available food items and the daily special.
3. Patron selects one or more food items from menu.
4. Patron indicates that meal order is complete.
5. System displays ordered menu items, individual prices, and total price, including any taxes and delivery charge.
6. Patron confirms meal order or requests to modify meal order (back to step 3).
7. System displays available delivery times for the delivery date.
8. Patron selects a delivery time and specifies the delivery location.
9. Patron specifies payment method.
10. System confirms acceptance of the order.
11. System sends Patron an e-mail confirming order details, price, and delivery instructions.
12. System stores order in database, sends e-mail to notify Cafeteria Staff, sends food item information to Cafeteria Inventory System, and updates available delivery times.

Alternative Courses:

1.1 Order multiple meals (branch after step 4)

1. Patron asks to order another meal.
2. Return to step 2.

1.2 Order multiple identical meals (after step 3)

1. Patron requests a specified number of identical meals.
2. Return to step 4.

1.3. Order the daily special (after step 2)

1. Patron orders the daily special from the menu.
2. Return to step 5.

Exceptions:

1.0.E.1 Current time is after order cutoff time (at step 1)

1. System informs Patron that it's too late to place an order for today.
2a. Patron cancels the meal order.
2b. System terminates use case.
3a. Patron requests to select another date.
3b. System restarts use case.

1.0.E.2 No delivery times left (at step 1)

1. System informs Patron that no delivery times are available for the meal date.
2a. Patron cancels the meal order.
2b. System terminates use case.
3. Patron requests to pick the order up at the cafeteria (skip steps 7–8).

1.2.E.1 Can't fulfill specified number of identical meals (at step 1)

1. System informs Patron of the maximum number of identical meals it can supply.
2. Patron changes number of identical meals ordered or cancels meal order.

Includes: None

Priority: High

Frequency of Use: Approximately 400 users, average of one usage per day

Business Rules: BR-1, BR-2, BR-3, BR-4, BR-8, BR-11, BR-12, BR-33

Special Requirements:

1. Patron shall be able to cancel the meal order at any time prior to confirming the order.
2. Patron shall be able to view all meals he ordered within the previous six months and repeat one of those meals as the new order, provided that all food items are available on the menu for the requested delivery date.
(Priority = medium)

Assumptions:	1. Assume that 30 percent of Patrons will order the daily special (source: previous six months of cafeteria data).
Notes and Issues:	1. The default date is the current date if the Patron is using the system before today's order cutoff time. Otherwise, the default date is the next day that the cafeteria is open. 2. If Patron doesn't want to have the meal delivered, the precondition requiring registration for payroll deduction is not applicable. 3. Peak usage load for this use case is between 8:00 A.M. and 10:00 A.M. local time.

Use Case ID:	**UC-5**		
Use Case Name:	Register for Payroll Deduction		
Created By:	Karl Wiegers	Last Updated By:	Chris Zambito
Date Created:	October 21, 2002	Date Last Updated:	October 31, 2002
Actors:	Patron, Payroll System		
Description:	Cafeteria patrons who use the Cafeteria Ordering System and have meals delivered must be registered for payroll deduction. For noncash purchases made through the COS, the cafeteria will issue a payment request to the Payroll System, which will deduct the meal costs from the next scheduled employee paycheck or payday direct deposit.		
Preconditions:	1. Patron is logged into COS.		
Postconditions:	1. Patron is registered for payroll deduction.		
Normal Course:	5.0 Register for Payroll Deduction 1. Patron requests to register for payroll deduction. 2. System invokes Authenticate User's Identity use case. 3. System asks Payroll System if Patron is eligible to register for payroll deduction. 4. Payroll System confirms that Patron is eligible. 5. System informs Patron that he is eligible for payroll deduction. 6. System asks Patron to confirm his desire to register for payroll deduction. 7. Patron confirms desire to register for payroll deduction. 8. System asks Payroll System to establish payroll deduction for Patron. 9. Payroll System confirms that payroll deduction is established. 10. System informs Patron that payroll deduction is established and provides confirmation number of the registration transaction.		
Alternative Courses:	None		

Exceptions:	5.0.E.1 Patron identity authentication fails (at step 2) 1. System gives user two more opportunities for correct identity authentication. 2a. If authentication is successful, Patron proceeds with use case. 2b. If authentication fails after three tries, System notifies Patron, logs invalid authentication attempt, and terminates use case. 5.0.E.2 Patron is not eligible for payroll deduction (at step 4) 1. System informs Patron that he is not eligible for payroll deduction and gives the reason why. 2. System terminates use case. 5.0.E.3 Patron is already enrolled for payroll deduction (at step 4) 1. System informs Patron that he is already registered for payroll deduction. 2. System terminates use case.
Includes:	Authenticate User's Identity
Priority:	High
Frequency of Use:	Once per employee on average
Business Rules:	BR-86 and BR-88 govern an employee's eligibility to enroll for payroll deduction.
Special Requirements:	1. User authentication is performed per corporate standards for medium-security applications.
Assumptions:	None
Notes and Issues:	1. Expect high frequency of executing this use case within first 2 weeks after system is released.

Use Case ID:	**UC-11**		
Use Case Name:	Modify Menu		
Created By:	Karl Wiegers	Last Updated By:	
Date Created:	October 21, 2002	Date Last Updated:	
Actors:	Menu Manager		
Description:	The cafeteria Menu Manager may modify the menu of available food items and prices for a specified date to reflect changes in availability or prices or to define daily meal specials.		
Preconditions:	1. Menus already exist in the system.		
Postconditions:	1. Modified menu has been saved.		

Normal Course:	11.0 Edit Existing Menu 1. Menu Manager requests to view the menu for a specific date. 2. System displays the menu. 3. Menu Manager modifies the menu to add new food items, remove or change food items, create or change a meal special, or change prices. 4. Menu Manager requests to save the modified menu. 5. System saves modified menu.
Alternative Courses:	None
Exceptions:	11.0.E.1 No menu exists for specified date (at step 1) 1. System informs Menu Manager that no menu exists for the specified date. 2. System asks Menu Manager if he would like to create a menu for the specified date. 3a. Menu Manager says yes. 3b. System invokes Create Menu use case. 4a. Menu Manager says no. 4b. System terminates use case. 11.0.E.2 Date specified is in the past (at step 1) 1. System informs Menu Manager that the menu for the requested date cannot be modified. 2. System terminates use case.
Includes:	Create Menu
Priority:	High
Frequency of Use:	Approximately 20 times per week by one user
Business Rules:	BR-24
Special Requirements:	1. The Menu Manager may cancel out of the menu modification function at any time. If the menu has been changed, the system shall request confirmation of the cancellation.
Assumptions:	1. A menu will be created for every official Process Impact business day, including weekends and holidays in which employees are scheduled to be on site.
Notes and Issues:	1. Certain food items will not be deliverable, so the menu presented to the Patrons of the Cafeteria Ordering System for delivery will not always exactly match the menu available for pickup in the cafeteria. The menu shall indicate which items may not be delivered. The system shall not permit a Patron to order those items for delivery.

Software Requirements Specification

1. Introduction

1.1 Purpose

This SRS describes the software functional and nonfunctional requirements for release 1.0 of the Cafeteria Ordering System (COS). This document is intended to be used by the members of the project team that will implement and verify the correct functioning of the system. Unless otherwise noted, all requirements specified here are high priority and committed for release 1.0.

1.2 Project Scope and Product Features

The Cafeteria Ordering System will permit Process Impact employees to order meals from the company cafeteria on-line to be delivered to specified campus locations. A detailed project description is available in the *Cafeteria Ordering System Vision and Scope Document* [1]. The section in that document titled "Scope of Initial and Subsequent Releases" lists the features that are scheduled for full or partial implementation in this release.

1.3 References

1. Wiegers, Karl. *Cafeteria Ordering System Vision and Scope Document, www.processimpact.com/projects/COS/COS_vision_and_scope.doc*
2. Wiegers, Karl. *Process Impact Intranet Development Standard, Version 1.3, www.processimpact.com/corporate/standards/PI_intranet_dev_std.doc*
3. Zambito, Christine. *Process Impact Business Rules Catalog, www.processimpact.com/corporate/policies/PI_business_rules.doc*
4. Zambito, Christine. *Process Impact Internet Application User Interface Standard, Version 2.0, www.processimpact.com/corporate/standards/PI_internet_ui_std.doc*

2. Overall Description

2.1 Product Perspective

The Cafeteria Ordering System is a new system that replaces the current manual and telephone processes for ordering and picking up lunches in the Process Impact cafeteria. The context diagram in Figure D-1 illustrates the external entities and system interfaces for release 1.0. The system is expected to evolve over several releases, ultimately connecting to the Internet ordering services for several local restaurants and to credit and debit card authorization services.

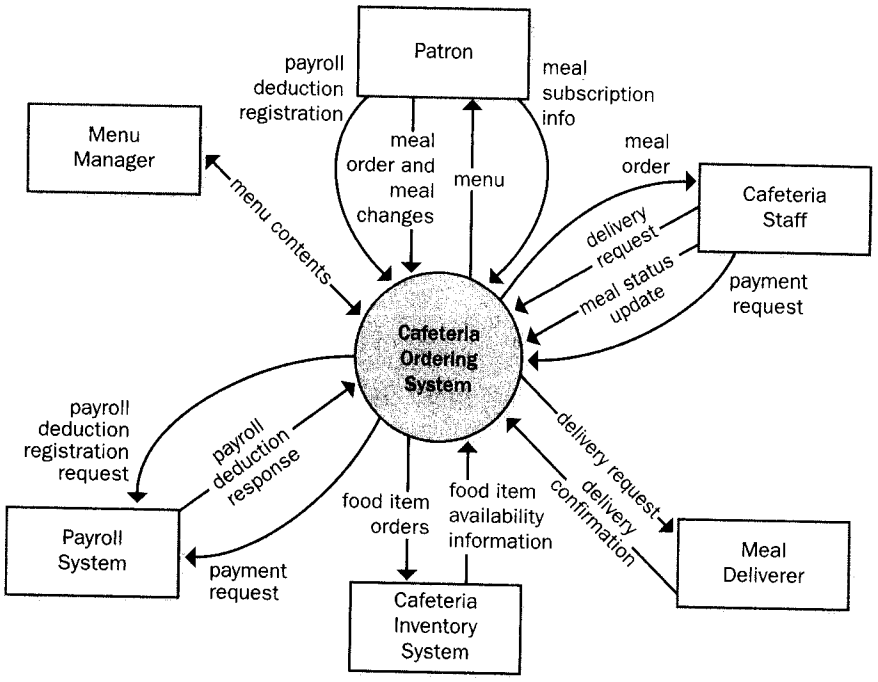

Figure D-1 Context diagram for release 1.0 of the Cafeteria Ordering System.

2.2 User Classes and Characteristics

User Class	Description
Patron (favored)	A Patron is a Process Impact employee at the corporate campus in Clackamas, Oregon, who wishes to order meals to be delivered from the company cafeteria. There are about 600 potential Patrons, of which an estimated 400 are expected to use the Cafeteria Ordering System an average of 4 times per week each (source: current cafeteria usage data). Patrons will sometimes order multiple meals for group events or guests. An estimated 90 percent of orders will be placed using the corporate Intranet, with 10 percent of orders being placed from home. All Patrons have Intranet access from their offices. Some Patrons will wish to set up meal subscriptions, either to have the same meal to be delivered every day or to have the day's meal special delivered automatically. A Patron must be able to override a subscription for a specific day.
Cafeteria Staff	The Process Impact cafeteria currently employs about 20 Cafeteria Staff, who will receive orders from the Cafeteria Ordering System, prepare meals, package them for delivery, print delivery instructions, and request delivery. Most of the Cafeteria Staff will need to be trained in the use of the computer, the Web browser, and the Cafeteria Ordering System.

User Class	Description
Menu Manager	The Menu Manager is a cafeteria employee, perhaps the cafeteria manager, who is responsible for establishing and maintaining daily menus of the food items available from the cafeteria and the times of day that each item is available. Some menu items may not be available for delivery. The Menu Manager will also define the cafeteria's daily specials. The Menu Manager will need to edit the menus periodically to reflect planned food items that are not available or price changes.
Meal Deliverer	As the Cafeteria Staff prepare orders for delivery, they will print delivery instructions and issue delivery requests to the Meal Deliverer, who is either another cafeteria employee or a contractor. The Meal Deliverer will pick up the food and delivery instructions for each meal and deliver it to the Patron. The Meal Deliverers' primary interactions with the system will be to reprint the delivery instructions on occasion and to confirm that a meal was (or was not) delivered.

2.3 Operating Environment

OE-1: The Cafeteria Ordering System shall operate with the following Web browsers: Microsoft Internet Explorer versions 5.0 and 6.0, Netscape Communicator version 4.7, and Netscape versions 6 and 7.

OE-2: The Cafeteria Ordering System shall operate on a server running the current corporate-approved versions of Red Hat Linux and Apache HTTP Server.

OE-3: The Cafeteria Ordering System shall permit user access from the corporate Intranet and, if a user is authorized for outside access through the corporate firewall, from an Internet connection at the user's home.

2.4 Design and Implementation Constraints

CO-1: The system's design, code, and maintenance documentation shall conform to the *Process Impact Intranet Development Standard, Version 1.3* [2].

CO-2: The system shall use the current corporate standard Oracle database engine.

CO-3: All HTML code shall conform to the HTML 4.0 standard.

CO-4: All scripts shall be written in Perl.

2.5 User Documentation

UD-1: The system shall provide an online hierarchical and cross-linked help system in HTML that describes and illustrates all system functions.

UD-2: The first time a new user accesses the system and on user demand thereafter, the system shall provide an online tutorial to allow users to practice ordering meals using a static tutorial menu. The system shall not store meals ordered using this template in the database or place orders for such meals with the cafeteria.

2.6 Assumptions and Dependencies

AS-1: The cafeteria is open for breakfast, lunch, and dinner every company business day in which employees are expected to be on site.

DE-1: The operation of the COS depends on changes being made in the Payroll System to accept payment requests for meals ordered with the COS.

DE-2: The operation of the COS depends on changes being made in the Cafeteria Inventory System to update the availability of food items as COS orders are accepted.

3. System Features

3.1 Order Meals

3.1.1 Description and Priority A cafeteria Patron whose identity has been verified may order meals either to be delivered to a specified company location or to be picked up in the cafeteria. A Patron may cancel or change a meal order if it has not yet been prepared. Priority = High.

3.1.2 Stimulus/Response Sequences

Stimulus: Patron requests to place an order for one or more meals.

Response: System queries Patron for details of meal(s), payment, and delivery instructions.

Stimulus: Patron requests to change a meal order.

Response: If status is "Accepted," system allows user to edit a previous meal order.

Stimulus: Patron requests to cancel a meal order.

Response: If status is "Accepted," system cancels a meal order.

3.1.3 Functional Requirements

Order.Place:	The system shall let a Patron who is logged in to the Cafeteria Ordering System place an order for one or more meals.
Order.Place.Register:	The system shall confirm that the Patron is registered for payroll deduction to place an order.
Order.Place.Register.No:	If the Patron is not registered for payroll deduction, the system shall give the Patron options to register now and continue placing an order, to place an order for pickup in the cafeteria (not for delivery), or to exit from the COS.
Order.Place.Date:	The system shall prompt the Patron for the meal date (see BR-8).
Order.Place.Date.Cutoff:	If the meal date is the current date and the current time is after the order cutoff time, the system shall inform the patron that it's too late to place an order for today. The Patron may either change the meal date or cancel the order.

Order.Deliver.Select:	The Patron shall specify whether the order is to be picked up or delivered.
Order.Deliver.Location:	If the order is to be delivered and there are still available delivery times for the meal date, the Patron shall provide a valid delivery location.
Order.Deliver.Notimes:	The system shall notify the Patron if there are no available delivery times for the meal date. The Patron shall either cancel the order or indicate that the Patron will pick up the order in the cafeteria.
Order.Deliver.Times:	The system shall display the remaining available delivery times for the meal date. The system shall allow the Patron to request one of the delivery times shown, to change the order to be picked up in the cafeteria, or to cancel the order.
Order.Menu.Date:	The system shall display a menu for the specified date.
Order.Menu.Available:	The menu for the current date shall display only those food items for which at least one unit is available in the cafeteria's inventory.
Order.Units.Food:	The system shall allow the Patron to indicate the number of units of each menu item that he wishes to order.
Order.Units.Multiple:	The system shall permit the user to order multiple identical meals, up to the fewest available units of any menu item in the order.
Order.Units.TooMany:	If the Patron orders more units of a menu item than are presently in the cafeteria's inventory, the system shall inform the Patron of the maximum number of units of that food item that he can order.
Order.Units.Change:	If the available inventory cannot fulfill the number of units ordered, the Patron may change the number of units ordered, change the number of identical meals being ordered, or cancel the meal order.
Order.Confirm.Display:	When the Patron indicates that he does not wish to order any more food items, the system shall display the food items ordered, the individual food item prices, and the payment amount, calculated per BR-12.
Order.Confirm.Prompt:	The system shall prompt the Patron to confirm the meal order.
Order.Confirm.Not:	If the Patron does not confirm the meal order, the Patron may either edit or cancel the order.
Order.Confirm.More:	The system shall let the Patron order additional meals for the same or for different date. BR-3 and BR-4 pertain to multiple meals in a single order.

Order.Pay.Method:	When the Patron indicates that he is done placing orders, the system shall ask the user to select a payment method.
Order.Pay.Deliver:	See BR-11.
Order.Pay.Pickup:	If the meal is to be picked up in the cafeteria, the system shall let the Patron choose to pay by payroll deduction or by paying cash at the time of pickup.
Order.Pay.Details:	The system shall display the food items ordered, payment amount, payment method, and delivery instructions.
Order.Pay.Confirm:	The Patron shall either confirm the order, request to edit the order, or request to cancel the order.
Order.Pay.Confirm.Deduct:	If the Patron confirmed the order and selected payment by payroll deduction, the system shall issue a payment request to the Payroll System.
Order.Pay.Confirm.OK:	If the payment request is accepted, the system shall display a message confirming acceptance of the order with the payroll deduction transaction number.
Order.Pay.Confirm.NG:	If the payment request is rejected, the system shall display a message with the reason for the rejection. The Patron shall either cancel the order, or change the payment method to cash and request to pick up the order at the cafeteria.
Order.Done:	When the Patron has confirmed the order, the system shall do the following as a single transaction:
Order.Done.Store:	Assign the next available meal order number to the meal and store the meal order with an initial status of "Accepted."
Order.Done.Inventory:	Send a message to the Cafeteria Inventory System with the number of units of each food item in the order.
Order.Done.Menu:	Update the menu for the current order's order date to reflect any items that are now out of stock in the cafeteria inventory.
Order.Done.Times:	Update the remaining available delivery times for the date of this order.
Order.Done.Patron:	Send an e-mail message to the Patron with the meal order and meal payment information.
Order.Done.Cafeteria:	Send an e-mail message to the Cafeteria Staff with the meal order information.
Order.Done.Failure:	If any step of Order.Done fails, the system shall roll back the transaction and notify the user that the order was unsuccessful, along with the reason for failure.

Order.Previous.Period:	The system shall permit the Patron to view any meals he has ordered within the previous six months. [Priority = Medium]
Order.Previous.Reorder:	The Patron may reorder any meal he had ordered within the previous six months, provided that all food items in that order are available on the menu for the meal date. [Priority = Medium]

[functional requirements for changing and canceling meal orders are not provided in this example]

3.2 Create, View, Modify, and Delete Meal Subscriptions

[details not provided in this example]

3.3 Register for Meal Payment Options

[details not provided in this example]

3.4 Request Meal Delivery

[details not provided in this example]

3.5 Create, View, Modify, and Delete Cafeteria Menus

[details not provided in this example]

4. External Interface Requirements

4.1 User Interfaces

UI-1: The Cafeteria Ordering System screen displays shall conform to the *Process Impact Internet Application User Interface Standard, Version 2.0* [4].

UI-2: The system shall provide a help link from each displayed HTML page to explain how to use that page.

UI-3: The Web pages shall permit complete navigation and food item selection using the keyboard alone, in addition to using mouse and keyboard combinations.

4.2 Hardware Interfaces

No hardware interfaces have been identified.

4.3 Software Interfaces

SI-1: Cafeteria Inventory System

SI-1.1: The COS shall transmit the quantities of food items ordered to the Cafeteria Inventory System through a programmatic interface.

SI-1.2: The COS shall poll the Cafeteria Inventory System to determine whether a requested food item is available.

SI-1.3: When the Cafeteria Inventory System notifies the COS that a specific food item is no longer available, the COS shall remove that food item from the menu for the current date.

SI-2: Payroll System

The COS shall communicate with the Payroll System through a programmatic interface for the following operations:

SI-2.1: To allow a Patron to register for payroll deduction.

SI-2.2: To allow a Patron to unregister for payroll deduction.

SI-2.3: To check whether a patron is registered for payroll deduction.

SI-2.4: To submit a payment request for a purchased meal.

SI-2.5: To reverse all or part of a previous charge because a patron rejected a meal or wasn't satisfied with it, or because the meal was not delivered per the confirmed delivery instructions.

4.4 Communications Interfaces

CI-1: The Cafeteria Ordering System shall send an e-mail message to the Patron to confirm acceptance of an order, price, and delivery instructions.

CI-2: The Cafeteria Ordering System shall send an e-mail message to the Patron to report any problems with the meal order or delivery after the order is accepted.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

PE-1: The system shall accommodate 400 users during the peak usage time window of 8:00 A.M. to 10:00 A.M. local time, with an estimated average session duration of 8 minutes.

PE-2: All Web pages generated by the system shall be fully downloadable in no more than 10 seconds over a 40 KBps modem connection.

PE-3: Responses to queries shall take no longer than 7 seconds to load onto the screen after the user submits the query.

PE-4: The system shall display confirmation messages to users within 4 seconds after the user submits information to the system.

5.2 Safety Requirements

No safety requirements have been identified.

5.3 Security Requirements

SE-1: All network transactions that involve financial information or personally identifiable information shall be encrypted per BR-33.

SE-2: Users shall be required to log in to the Cafeteria Ordering System for all operations except viewing a menu.

SE-3: Patrons shall log in according to the restricted computer system access policy per BR-35.

SE-4: The system shall permit only cafeteria staff members who are on the list of authorized Menu Managers to create or edit menus, per BR-24.

SE-5: Only users who have been authorized for home access to the corporate Intranet may use the COS from non-company locations.

SE-6: The system shall permit Patrons to view only their own previously placed orders, not orders placed by other patrons.

5.4 Software Quality Attributes

Availability-1: The Cafeteria Ordering System shall be available to users on the corporate Intranet and to dial-in users 99.9% of the time between 5:00 A.M. and midnight local time and 95% of the time between midnight and 5:00 A.M. local time.

Robustness-1: If the connection between the user and the system is broken prior to an order being either confirmed or canceled, the Cafeteria Ordering System shall enable the user to recover an incomplete order.

Appendix A: Data Dictionary and Data Model

delivery instruction	=	patron name
	+	patron phone number
	+	meal date
	+	delivery location
	+	delivery time window
delivery location	=	* building and room to which an ordered meal is to be delivered *
delivery time window	=	* 15-minute range during which an ordered meal is to be delivered; must begin and end on quarter-hour intervals *
employee ID	=	* company ID number of the employee who placed a meal order; 6-character numeric string *
food item description	=	* text description of a food item on a menu; maximum 100 characters *

food item price = * pre-tax cost of a single unit of a menu food item, in dollars and cents *

meal date = * the date the meal is to be delivered or picked up; format MM/DD/YYYY; default = current date if the current time is before the order cutoff time, else the next day; may not be prior to the current date *

meal order = meal order number
+ order date
+ meal date
+ 1:m{ordered food item}
+ delivery instruction
+ meal order status

meal order number = * a unique, sequential integer that the system assigns to each accepted meal order; initial value is 1 *

meal order status = [incomplete | accepted | prepared | pending delivery | delivered | canceled] * see state-transition diagram in Figure D-3 *

meal payment = payment amount
+ payment method
+ (payroll deduction transaction number)

menu = menu date
+ 1:m{menu food item}
+ 0:1{special}

menu date = * the date for which a specific menu of food items is available; format MM/DD/YYYY *

menu food item = food item description
+ food item price

order cutoff time = * the time of day before which all orders for that date must be placed *

order date = * the date on which a patron placed a meal order; format MM/DD/YYYY *

ordered food item = menu food item
+ quantity ordered

patron = patron name
+ employee ID
+ patron phone number
+ patron location
+ patron e-mail

patron e-mail = * e-mail address of the employee who placed a meal order; 50-character alphanumeric *

patron location = * building and room numbers of the employee who placed a meal order; 50-character alphanumeric *

patron name = * name of the employee who placed a meal order; 30-character alphanumeric *

patron phone number = * telephone number of the employee who placed a meal order; format AAA-EEE-NNNN xXXXX for area code, exchange, number, and extension *

payment amount = * total price of an order in dollars and cents, calculated per BR-12 *

payment method = [payroll deduction | cash] * others to be added beginning with release 2 *

payroll deduction transaction number = * 8-digit sequential integer number that the Payroll System assigns to each payroll deduction transaction that it accepts *

quantity ordered = * the number of units of each food item that the Patron is ordering; default = 1; maximum = quantity presently in inventory *

special = special description
+ special price
* the Menu Manager may define one or more special meals for each menu, with a particular combination of food items at a reduced price *

special description = * text description of a daily special meal; maximum 100 characters *

special price = * cost of a single unit of a daily special meal, in dollars and cents *

Figure D-2 is a partial data model for release 1.0 of the Cafeteria Ordering System, showing the entities described in the data dictionary and the relationships between them.

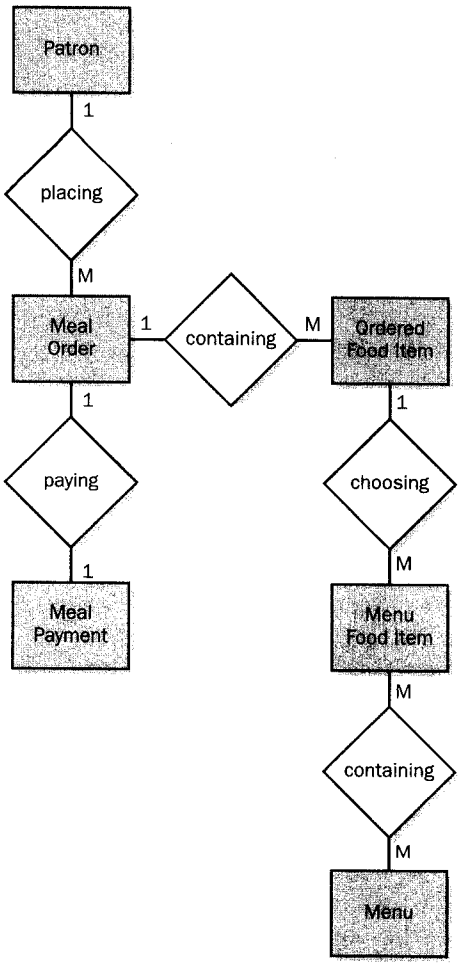

Figure D-2 Partial data model for release 1.0 of the Cafeteria Ordering System.

Appendix B: Analysis Models

Figure D-3 is a state-transition diagram that shows the possible meal order status and the allowed changes in status.

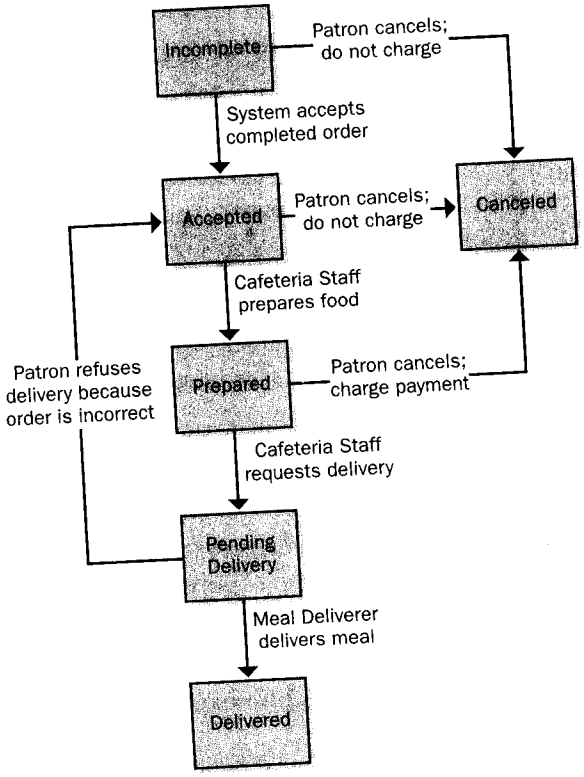

Figure D-3 State-transition diagram for meal order status.

Business Rules

[the following is a sample of a separate business rules catalog]

ID	Rule Definition	Type of Rule	Static or Dynamic	Source
BR-1	Delivery time windows are 15 minutes, beginning on each quarter hour.	Fact	Static	Cafeteria Manager
BR-2	Deliveries must be completed between 10:00 A.M. and 2:00 P.M. local time.	Constraint	Dynamic	Cafeteria Manager
BR-3	All meals in a single order must be delivered to the same location.	Constraint	Static	Cafeteria Manager
BR-4	All meals in a single order must be paid for using the same payment method.	Constraint	Static	Cafeteria Manager
BR-8	Meals must be ordered within 14 calendar days of the meal date.	Constraint	Dynamic	Cafeteria Manager
BR-11	If an order is to be delivered, the patron must pay by payroll deduction.	Constraint	Dynamic	Cafeteria Manager
BR-12	Order price is calculated as the sum of each food item price times the quantity of that food item ordered, plus applicable sales tax, plus a delivery charge if a meal is delivered outside the free delivery zone.	Computation	Dynamic	cafeteria policy; state tax code
BR-24	Only cafeteria employees who are designated as Menu Managers by the Cafeteria Manager may create, modify, or delete cafeteria menus.	Constraint	Static	cafeteria policy
BR-33	Network transmissions that involve financial information or personally identifiable information require 128-bit encryption.	Constraint	Static	corporate security policy
BR-35	*[details about restricted computer system access policy would go here]*	Constraint	Static	corporate security policy
BR-86	Only permanent employees may register for payroll deduction for any company purchase.	Constraint	Static	Corporate Accounting Manager
BR-88	An employee may register for payroll deduction payment of cafeteria meals if no more than 40 percent of his gross pay is currently being deducted for other reasons.	Constraint	Dynamic	Corporate Accounting Manager