Final Report

St. Jude's Anglican Home

viper consulting

November 24, 2016

Revision History

Name	Date	Reason for Changes	Version
Whole team	Nov. 21	Initial document creation.	1.0
Zane, Bernice, Wayne	Nov. 22	Project Charter, Requirements document, Appendices	2.0
Bernice, Jeff, Todd, Maston, Wayne	Nov. 23	Solution, Conclusion, Recommendations, Glossary	3.0
Devon, Jeff	Nov. 24	Final edits and formatting for consistency	4.0

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1. Introduction

1.1: Project Overview

1.1.1 Executive Summary

St. Jude's Anglican Home is a non-profit, society governed complex care home providing residential care for the elderly. Care and services are provided in a home-like environment; the mission of the facility is to care for and support elderly citizens in a safe and nurturing environment. Other than two private beds, the rest of the beds are funded by Vancouver Coastal Health and donations. St. Jude's has limited financial and human resources, but it still provides valuable care to its patients.

St. Jude's Anglican Home has requested a comprehensive solution to address some issues with their food service system and processes. The current system in place has some potential for errors occurring. Although there are not a lot of problems with the system, any dietary errors at St.Jude's can be dangerous to resident's health due to food restrictions, allergies and various medical conditions. Implementing a new system or updating the current system will increase accountability and safety. Thus, the St. Jude's Anglican Home Problem Analysis project aims to increase staff accountability, overall meal accuracy, and communication efficiency, therefore improving the quality and safety of service received by the patients.

1.1.2 Project Context

Our client, St. Jude's Anglican Home, is an extended care nursing home for the elderly located in the South Cambie district of Vancouver. Featuring 55 beds across two floors, St. Jude's is a non-profit nursing home mainly funded by Vancouver Coastal Health, with additional income from user fees and donations. Since 1948, St. Jude's has offered extensive quality care that includes 24 hour nursing provided by registered nurses, recreation and social programs, house physicians and other medical professionals, pastoral care for all faiths, palliative care, and five meals per day, tailored to special diets by an on-site dietician.

The issues St. Jude's would like us to resolve primarily revolve around the meals and snacks that are provided to their residents. Currently, the residence contains two separate cafeterias, with two distinct food delivery systems. On the first floor, meal preferences and dietary needs are relayed from the residents to the cook by the lunch support staff and dietary aide. After being prepared by the cook, the food is then delivered by the support staff and dietary aides to the residents. On the second floor, food is stored in a food cart and distributed solely by the dietary aide, with assembly based on a handout given by the cook. As St. Jude's caters to a vulnerable population, it is crucial that each meal accounts for the resident's allergies, personal preferences, and ability to chew and swallow. Errors have occurred in the past, most recently when a non-regular staff member gave an unsuitable meal to a resident with dementia.

1.1.3 Needs

St. Jude's requires an improved food delivery system to ensure patients are always fed according to their personal and medical needs. Additionally, it is required to prevent dietary errors from occurring, thereby improving

the quality and safety of each resident's care. The current system has only experienced a single error, but any error can have serious consequences. Thus, improving the system to help prevent errors from occurring is essential to ensuring patient safety.

In the current food delivery system, there lacks any staff accountability. In the event of an error occurring in food preparation or delivery, the facility managers need to be able to identify the details that caused the error. Thus, St. Jude's requires a staff accountability system. In the past, when a dietary aide gave an inappropriate meal to a patient, the facility could not find out exactly who made the mistake. By increasing staff accountability, it will ensure that any staff member responsible for an error or accident is held responsible. Furthermore, since dietary aides serve food based on a chart provided from the kitchen, the added accountability will ensure cooks will make the proper meals according to the allergy guidelines.

1.1.4 Scope

The focus of the project is to address the needs of the facility pertaining to the accountability of staff as well as implementing preventative measures in food delivery. The project will explore ways to improve the process of food preparation at St. Jude's so that both the upstairs and downstairs kitchen can prepare and deliver food in similar ways while simultaneously emphasizing residents' safety.

The project will look at the flow chart of the current food preparation and delivery processes at St. Jude's, and the entire preparation procedure will be analyzed and mapped. The process of communicating residents' meal changes will also be assessed. The training of non-regular staff will not be assessed, nor will the computer and medical system used to record changes to residents' meals. This is because the facility does not need to completely change the already-established system, but instead needs improvements in specific stages of the workflow.

1.1.5 Stakeholders

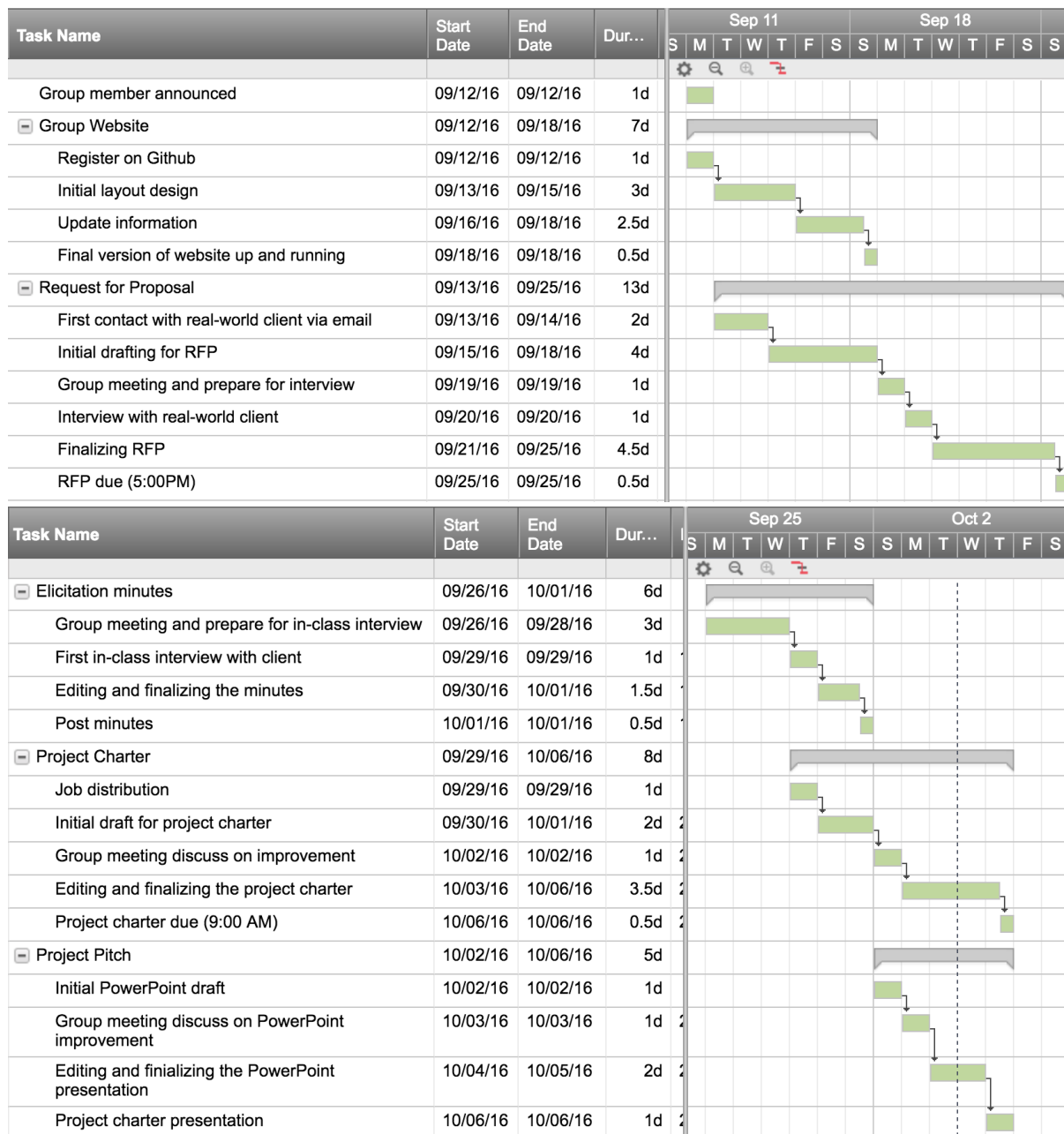| Role	People	Relationship to the Project
Facility management	St. Jude's Anglican Home managers and overseers	They are responsible for the outcomes of this facility and will also be concerned with the methods used in this implementation.
Regional government	Vancouver Coastal Health (VCH)	VCH might be involved in sponsoring or approving the project if it requires significant changes to the workflow of the facility.
System users	Kitchen Staff, Nursing Staff, Resident Physicians, Dietitian, non-regular aides	These people will interact with the system daily and are a very important group to consider.
Patients	Patients and their families	The outcomes of the project will affect patient's safety.

1.1.6 Objectives

The goals of this project are to implement preventative measures in the meal distribution process and to increase staff accountability. Although there has only been one reported case where a St Jude's staff gave out an incorrect meal, changes should be made to address the possibility of this happening in the future. This is the primary objective of the project as it is potentially a safety issue as well as a liability concern for the patients. Increased accountability among staff members is also crucial to the facility. This project aims to create a measurable, concrete way of keeping staff accountable for any errors. Since the staff member that gave out the wrong food in the reported incident was never determined, and this information would be useful to all stakeholders, increased accountability is a primary objective of this project.
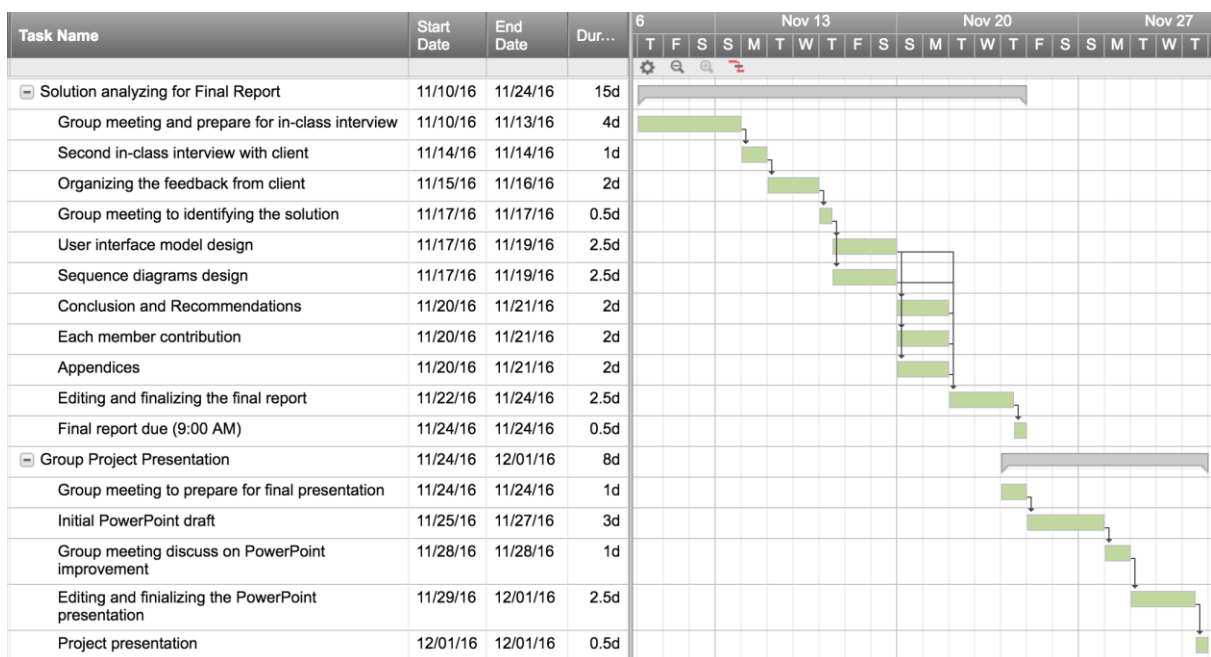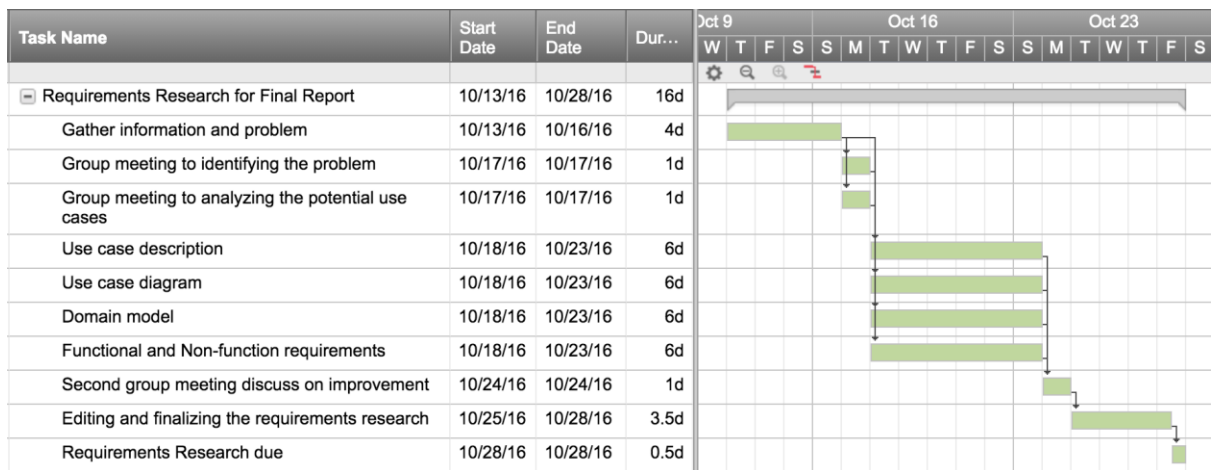
1.2 Project Organization

1.2.1 Team Organization and Roles

Member	Roles	Skills
Bernice Brown	External Relations	Experience in healthcare technologies, project coordination, and planning
Graeme Clarke	Secretary	Meeting notetaking, distribution of tasks, general document review/creation
Devon Fang	Web Developer, Analyst, Editor	Experienced in website development with HTML and CSS, Problem solving and general editing
Maston Ho	Analyst, Editor	Experience in programming and analyzing the problem
Zane Li	Project Leader	Project lead, project organization, analysis
Todd Xu	Web Developer, Analyst	Problem analysis, familiar with multiple programming languages
Jeffrey Zhang	Analyst, Editor	Training, data management, data analysis, basic computer skills
YuWei (Wayne) Zhang	Web Developer, Analyst	Critical thinking and analysis , and experienced web-based programming skills

1.2.2 Work Breakdown and Schedule

Task Name	Start Date	End Date	Dur…
Group member announced	09/12/16	09/12/16	1d
Group Website	09/12/16	09/18/16	7d
Register on Github	09/12/16	09/12/16	1d
Initial layout design	09/13/16	09/15/16	3d
Update information	09/16/16	09/18/16	2.5d
Final version of website up and running	09/18/16	09/18/16	0.5d
Request for Proposal	09/13/16	09/25/16	13d
First contact with real-world client via email	09/13/16	09/14/16	2d
Initial drafting for RFP	09/15/16	09/18/16	4d
Group meeting and prepare for interview	09/19/16	09/19/16	1d
Interview with real-world client	09/20/16	09/20/16	1d
Finalizing RFP	09/21/16	09/25/16	4.5d
RFP due (5:00PM)	09/25/16	09/25/16	0.5d

Task Name	Start Date	End Date	Dur…
Elicitation minutes	09/26/16	10/01/16	6d
Group meeting and prepare for in-class interview	09/26/16	09/28/16	3d
First in-class interview with client	09/29/16	09/29/16	1d
Editing and finalizing the minutes	09/30/16	10/01/16	1.5d
Post minutes	10/01/16	10/01/16	0.5d
Project Charter	09/29/16	10/06/16	8d
Job distribution	09/29/16	09/29/16	1d
Initial draft for project charter	09/30/16	10/01/16	2d
Group meeting discuss on improvement	10/02/16	10/02/16	1d
Editing and finalizing the project charter	10/03/16	10/06/16	3.5d
Project charter due (9:00 AM)	10/06/16	10/06/16	0.5d
Project Pitch	10/02/16	10/06/16	5d
Initial PowerPoint draft	10/02/16	10/02/16	1d
Group meeting discuss on PowerPoint improvement	10/03/16	10/03/16	1d
Editing and finializing the PowerPoint presentation	10/04/16	10/05/16	2d
Project charter presentation	10/06/16	10/06/16	1d

Task Name	Start Date	End Date	Dur...	Gantt Chart
⊟ Requirements Research for Final Report	10/13/16	10/28/16	16d	
Gather information and problem	10/13/16	10/16/16	4d	
Group meeting to identifying the problem	10/17/16	10/17/16	1d	
Group meeting to analyzing the potential use cases	10/17/16	10/17/16	1d	
Use case description	10/18/16	10/23/16	6d	
Use case diagram	10/18/16	10/23/16	6d	
Domain model	10/18/16	10/23/16	6d	
Functional and Non-function requirements	10/18/16	10/23/16	6d	
Second group meeting discuss on improvement	10/24/16	10/24/16	1d	
Editing and finalizing the requirements research	10/25/16	10/28/16	3.5d	
Requirements Research due	10/28/16	10/28/16	0.5d	

Task Name	Start Date	End Date	Dur...	Gantt Chart
⊟ Solution analyzing for Final Report	11/10/16	11/24/16	15d	
Group meeting and prepare for in-class interview	11/10/16	11/13/16	4d	
Second in-class interview with client	11/14/16	11/14/16	1d	
Organizing the feedback from client	11/15/16	11/16/16	2d	
Group meeting to identifying the solution	11/17/16	11/17/16	0.5d	
User interface model design	11/17/16	11/19/16	2.5d	
Sequence diagrams design	11/17/16	11/19/16	2.5d	
Conclusion and Recommendations	11/20/16	11/21/16	2d	
Each member contribution	11/20/16	11/21/16	2d	
Appendices	11/20/16	11/21/16	2d	
Editing and finalizing the final report	11/22/16	11/24/16	2.5d	
Final report due (9:00 AM)	11/24/16	11/24/16	0.5d	
⊟ Group Project Presentation	11/24/16	12/01/16	8d	
Group meeting to prepare for final presentation	11/24/16	11/24/16	1d	
Initial PowerPoint draft	11/25/16	11/27/16	3d	
Group meeting discuss on PowerPoint improvement	11/28/16	11/28/16	1d	
Editing and finializing the PowerPoint presentation	11/29/16	12/01/16	2.5d	
Project presentation	12/01/16	12/01/16	0.5d	

1.2.3 Milestones

This is a high-level overview of the project schedule which lays out the most significant events throughout the course of the project.

Project Milestone	Description	Date
Team Formation	Meeting the team members and doing an activity together	September 12, 2016
Request for Proposal by Client	Identifying and defining the need for improvement	September 25, 2016
First Client Meeting with Analysts	Gathering information about the nature of the problem	September 29, 2016
Project Charter by Analyst Team	Detailed description of the team's approach to the project	October 6, 2016
Project Pitch	Presenting the project charter	October 6, 2016
Requirements Research	Gathering information on the requirements of the problem	October 28, 2016
Second Client Meeting	Acquiring further details to guide the creation of a solution	November, 14, 2016
Project Report	Aggregating details of the project approach, research, and solution	November 24, 2016
Project Presentation	Team presentation of the project	December 1, 2016

1.2.4 Deliverables

The deliverables that lead to the completion of the Project Milestones are the following.

Project Deliverables	Description
Client Pitch	A presentation to describe the need of improvement from a real-world business
Due date:	September 19, 2016
RFP	Request for proposal as a client group
Due date:	September 25, 2016
Analyst Website	A functional website to show project work
Due date:	September 29, 2016
Elicitation Minutes	Notes from the meeting with client
Due date:	October 3, 2016
Project Charter	A comprehensive overview of the project setting out the details regarding goals, roles, and responsibility, etc.
Due date:	October 6, 2016
Project Pitch	A presentation to demonstrate the details of the project through the project charter
Due date:	October 6, 2016
Requirements Section	The requirements section in the final report
Due date:	October 27, 2016
Final Report	The report to illustrate possible solution for client's need
Due date:	November 24, 2016
Project Presentation	Group project presentation to highlight the final report
Due date:	December 1, 2016

1.2.5 Risks

This is our assessment of the risks that may be associated with certain aspects of the project, and how the team will work to mitigate them.

Risk Description	Probability	Effect	Planned Mitigation
Complexities and associated details of the facility's workflow defined poorly	Low	Low	Details of the workflow can be clarified by looking over interview notes, or by speaking to the client representatives.
Requirements gathering may take longer to accomplish than expected	Medium	Low	The team will adjust priorities to accommodate a delay. This includes setting aside additional time to meet with the client.
System implementation may exceed the technical abilities of staff	Low	Medium	Training modules will be developed and an education plan will be put in place for staff. A back-up plan for system adaptation will be developed.
Client representatives may not be available to meet if we have further questions	Low	Low	We will contact the client representatives by e-mail or phone consultations only to reduce the risk of scheduling conflicts.

2.Requirements

2.1 Introduction

2.1.1 Purpose

The document describes the requirements needed in the St. Jude's Anglican Home problem analysis process. The purpose of this project is to address the need of implementing preventative measures and increasing accountability of staff in the food delivery process. Although there has only been one reported food delivery mistake, any error would be a concern for the patient's health and safety.

2.1.2 Project Scope

The project has two main focuses, both associated with the food delivery process: improving accountability of staff, and implementing preventative measures. The project will explore ways to improve the process of food preparation at St. Jude's so that both the upstairs and downstairs kitchens can prepare and deliver food in identical ways while simultaneously emphasizing patients' safety. The primary objective is to implement preventative measures in the meal distribution process, as it is a potential safety issue for patients.

The project will look at the flow chart of the current food preparation and delivery processes at St. Jude's, and the entire preparation procedure will be analyzed and mapped. This project does not need to completely change the already-established system, but instead produce a solution that implements improvements in specific stages of the workflow.

2.1.3 References

[1] St. Jude's Anglican Home. *Care and Services* [Online]
Available: http://stjudes.bc.ca/care-and-services/

[2] St. Jude's Anglican Home. *Care Home Guidelines* [Online]
Available: http://stjudes.bc.ca/data/uploads/2015/family-booklet-sept-2015.pdf

[3] BC Residential Care Facilities. *Residential Care Regulation* [Online]
Available: http://www.bclaws.ca/Recon/document/ID/freeside/96_2009

[4] University of Victoria. *Requirements Document Template* [Online]
Available: https://connex.csc.uvic.ca

2.1.4 Overview

This section of the document contains seven sub-sections and an appendix. The following section contains a high-level description of the current system. Main product features and stakeholders are described along with assumptions about St. Jude's food delivery system. The third section describes the required system features that must still exist in our proposed solution. The fourth section describes external interactions with the system. The fifth section lists the constraints and nonfunctional requirements, including security and safety requirements. The sixth section contains additional requirements, such as legal ones that are not covered in prior sections. The

seventh section outlines the entity relationship diagram, use case model, and data flow diagram that represents the current system. The appendix lists any issues that have not been addressed.

2.2 Overall Description

2.2.1 Product Perspective

The system currently being developed by Viper Consulting is a replacement for the existing food delivery system in the St. Jude's Anglican Home cafeterias. This system will increase staff accountability throughout the food delivery process, and reduce errors such as delivering the wrong food to patients. It will store all patient dietary information and meal preferences, which can be altered by nurses, used by dietitians to design meals for each patient, and referred to by cooks when preparing each meal. Users will not be able to access the system outside the workplace, primarily for patient privacy purposes.

2.2.2 Product Features

Having each staff member log in before altering patient information and meal preferences allows for tracking of each worker's activity in the system; not only will this reduce errors as workers will be more mindful when using the system, but if an error were to occur, it would be easier to find the source and take appropriate action to ensure the error does not reoccur.

The system improvements will not require new hardware or substantial software changes, which reduces costs considerably while fostering an easier transition for users of the current system.

2.2.3 User Classes and Characteristics

The four main users of the St. Jude's food delivery system are the nursing staff, the cook, the dietary aides, and the dietitian.

The nursing staff determines which patients' information needs to be updated, and modifies said information in the system as needed. This includes allergies, current state of medical conditions, and chewing ability, among others.

The cook looks up food information from the system, which he then uses as a guideline to create new menus. He/she also cooks the food.

The dietitian collects menu choices from the patients, and refers to patients' food charts in the system to design appropriate individual food plans for each senior. The dietitian is also responsible for updating each patient's meal preferences in the system.

The dietary aides have three main responsibilities: gathering meal preferences from each patient, keeping the nurses up-to-date on said preferences, and delivering food from the cook to the patients.

2.2.4 Operating Environment

The system will operate to support the food service processes of St. Jude's Anglican Home. It operates from 5:00 AM in the morning to prepare breakfast, and runs until 8:00 PM after dinner service is completed. In order to reduce mistakes while increasing efficiency, an updated software and new database will be implemented to the current computer system. Employees will be able to access a unique database containing all meal restrictions for

every patient. The system will receive light maintenance daily after 8:00 PM and will be shut down afterward until the next morning.

2.2.5 Design and Implementation Constraints

Budget: Since St. Jude's is a non-profit organization, funding is limited. Thus, this project will only use the resources that St. Jude's currently has, such as the current computer system and printer.

Software capability: Computers at St. Jude's Anglican Home must be capable of running the new software and database efficiently. Therefore, this project will keep the system as simple as possible to reduce the workload of the computer.

Maintenance: St. Jude's Anglican Home cannot afford to hire a new employee for system maintenance purposes, so the maintenance process must be kept as simple as possible.

2.2.6 Assumptions and dependencies

Computer connection: This project assumes that the computers on the first and second floor are connected, because the new system requires frequent data interchange between them.

Computer skill: This project assumes that the employees have the basic knowledge and skills required to use a computer and that they are capable of learning how to operate the new system.

Employees adaption: This project assumes that the employees will be capable of following the new food delivery rules, such as signing their name on a list after delivering food.

Time: This project assumes that every employee can be trained without simultaneously hindering the quality of service at St. Jude's Anglican Home.

2.3 System Features

This section details the system features that will be implemented and maintained within any new or proposed systems.

2.3.1 Track Patient Information

2.3.1.1 Description and Priority

Tracking patient information is the basis of the entire food delivery system. It is of the highest importance, as the safety and comfort of patients requires a consistent, detailed means to track patient information accurately.
Priority: High

2.3.1.2 Functional Requirements

REQ-ER-1: The system must allow for dietitians to meet with patients

- *Backwards Traceability:* Dietitian-patient meetings are necessary in order to create a dialogue between the dietitian and the patient. Direct meetings are necessary to determine and communicate what the dietitian feels the patient should be eating over time.
- *Forwards Traceability:* This requirement can be verified by checking that meetings are happening.

REQ-ER-2: The dietitian must be able to update patients' electronic records

- *Backwards Traceability:* Dietitians play one of the most important roles in determining the short and long term dietary plans. The most effective way to make this information known within the entire system is for the dietitian to be able to update patients' electronic records. Furthermore, dietitians must have access to information that may have been added by staff members that affect patient meal plans.
- *Forwards Traceability:* This requirement can be verified by ensuring the records are being updated (and by whom) via the "Last Updated" text.

REQ-ER-3: Care aids must be able to discuss patients' dietary issues with nurses

- *Backwards Traceability:* Care aides may be the first to notice changes in patients that may directly affect their meal plan. If this is the case, the system must allow for care aides to effectively communicate this with the nursing staff.
- *Forwards Traceability:* This requirement can be verified by ensuring care aide - nurse meetings are occurring.

REQ-ER-4: The Nurse must be able to update patients' electronic records

- *Backwards Traceability:* The nurse may be one of the only staff members to be able to medically observe and document dietary-related updates/issues within patients. Therefore, they must be able to both read and write information to the patient record.
- *Forwards Traceability:* This requirement can be verified by ensuring the records are being updated (and by whom) via the "Last Updated" text.

2.3.1.3 Use Case(s) associated with the Feature or Functional Requirements
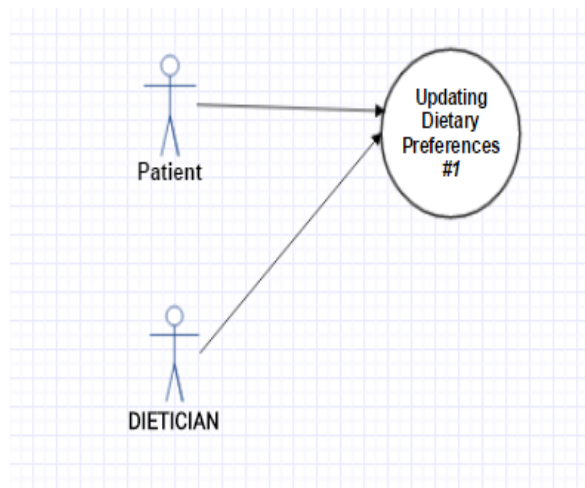
Precondition: The electronic medical record and all patient records exist and have been created.

Use Case: *Updating dietary preferences*

1. dietitian reviews patient plan
2. dietitian schedules meeting with patient
3. dietitian asks patients about their current meal plan
4. dietitian records patients preferences
5. dietitian records and updates information in electronic record

Postcondition: The patient records in the EMR are updated with their preferences.

Alternate Flows: If the patient has no changing preferences, the EMR is updated but the information stays the same.
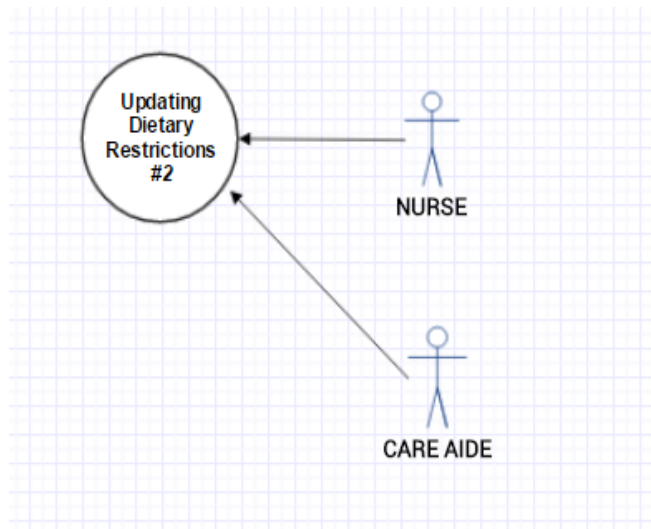
Precondition: The electronic medical record and all patient records exist and have been created.

Use Case: *Updating Dietary Restrictions*

1. Care aides make observations about patient symptoms relating to health and food choices
2. Aides tell this information to the nurse
3. The nurse updates the patient's electronic chart

Postcondition: The patient records in the EMR are updated with their dietary restrictions.

Alternate Flows: If the patient has no changing preferences, the EMR is updated but the information stays the same.

2.3.2 Meal Plan Creation

2.3.2.1 Description and Priority

The planning of meals over time that meet the recommendations of the dietitian is an essential part the system.

Priority: Medium

2.3.2.2 Functional Requirements

REQ-MPL-1: The dietitian must be able to view patients' electronic records

- *Backwards Traceability:* The dietitian must be able to view patients records in order to determine long term and short term dietary plans.
- *Forwards Traceability:* This requirement can be verified by checking dietician EMR access.

REQ-MPL-2: The dietitian must be able to update the electronic record

- *Backwards Traceability:* Changes noticed or made by the dietitian may be crucial dietary information to be referenced by staff members. Therefore, the dietitian needs to be able to add essential dietary plan-related updates.
- *Forwards Traceability:* This requirement can be verified by ensuring the records are updated (and by whom) via the "Last Updated" text.
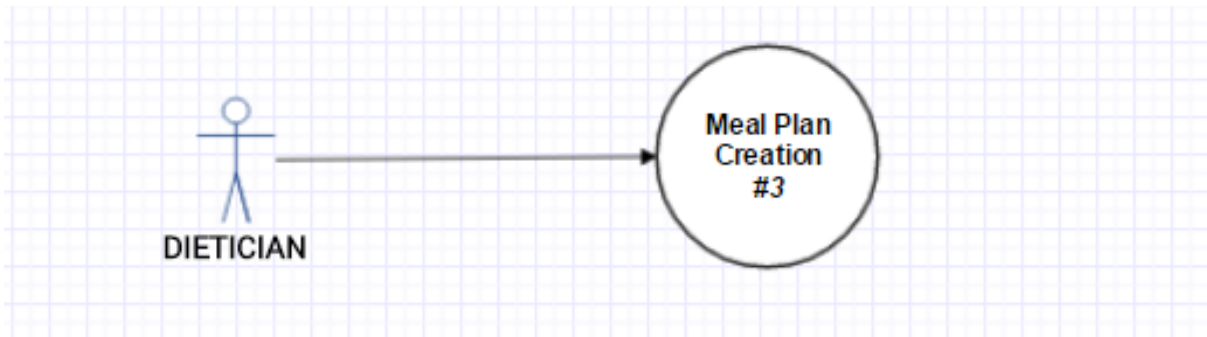
2.3.2.3 Use Case(s) associated with the Feature or Functional Requirements

Precondition: Patient preferences and dietary restrictions exist in the electronic record, and the dietician has access to the electronic record.

Use Case: *Meal Plan Creation*

1. Dietitian reviews records from patient's current chart from the electronic record
2. Dietitian checks for any additional changes to dietary restrictions and preferences
3. Dietitian uses this information to create a new meal plan for the patient (if changes were made)
4. Dietitian records the new meal plan in the electronic record.
5. Process is repeated weekly to keep records up to date.

Postcondition: Patients' updated meal plans are stored in the electronic record.

Alternate Flow: If patients have nothing to change in their meal plan, it is updated without changing any information.

2.3.3 Menu Creation and Cooking

2.3.3.1 Description and Priority

The meal preparation process is a fundamental aspect of the system. The system must allow for the preparation of food that meets the dietary needs of patients, while still appealing to their specific preferences.

Priority: High

2.3.3.2 Functional Requirements

REQ-MPR-1: The system must allow the cook to access the patient chart

- *Backwards Traceability:* In order to create meals for patients, the cook must be able to access the general dietary restrictions of the entire patient populus.
- *Forwards Traceability:* This requirement can be verified by ensuring the records are updated (and by whom) via the "Last Updated" text.

REQ-MPR-2: The system must allow the cook to create a menu

- *Backwards Traceability:* The cook must have a degree of versatility in the choosing of meal types, so that patients will be able to have both their preferences and dietary requirements met.
- *Forwards Traceability:* This requirement can be verified by checking that the weekly menu is updated.

REQ-MPR-3: The system must allow the cook to order ingredients

- *Backwards Traceability:* The cook must be allowed to order ingredients themselves, so they can order based on the menu they intend to create.
- *Forwards Traceability:* This requirement can be verified by ensuring that fresh ingredients are being ordered.

2.3.3.3 Use Case(s) associated with the Feature or Functional Requirements
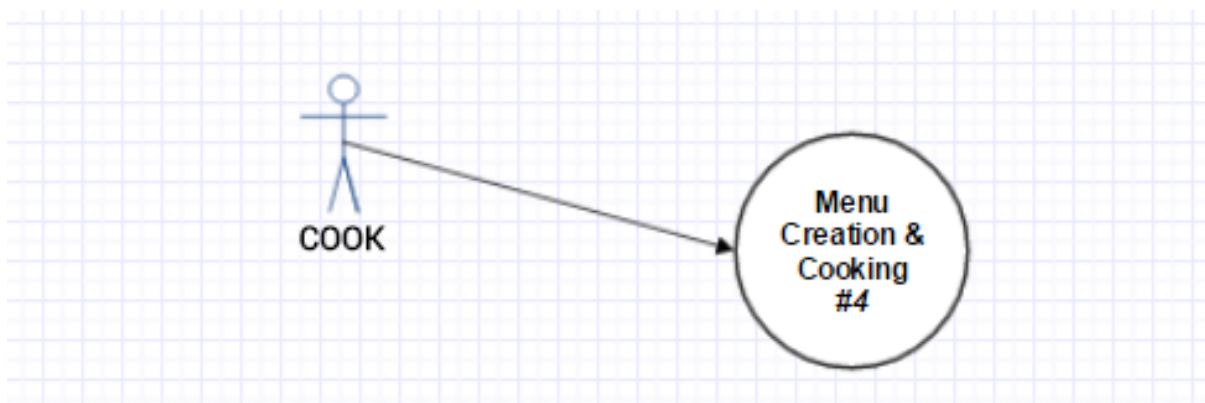
Precondition: The patient chart of dietary restrictions and preferences exists and is accessible by the cook.

Use Case: Menu Creation & Cooking

1. The cook accesses the chart for the creation of the weekly menu - the chart will now contain each patient's preferences and restrictions
2. The cook orders appropriate ingredients from external source
3. The cook writes the weekly menu and stores it in the electronic system
4. The cook makes dishes from the weekly menu, which the patients will be able to choose from during meal time.

Postcondition: The weekly menu is created based off of patient preferences and restrictions.

Alternate Flow: Ingredients do not require to be ordered every meal. The cook may order ingredients a few times a week to stock up for his weekly servings of food.

2.3.4 Meal Distribution

2.3.4.1 Description and Priority

The system must allow for the physical distribution of meals to each patient, while meeting all of their dietary needs. All of the appropriate staff should have access to the relevant information in order to safely distribute meals effectively.

Priority: High

2.3.4.2 Functional Requirements

REQ-MD-1: The cook must have access to basic information relevant to meal assembly

- *Backwards Traceability:* In order to create meals for patients, the cook must be able to access the general dietary restrictions of the entire patient populus.
- *Forwards Traceability:* This requirement can be verified by ensuring the cook has patient chart access.

REQ-MD-2: The system must allow the cook to create meals

- *Backwards Traceability:* In order to feed patients, the cook must be able to create meals for each patient - while still meeting any restrictions/preferences.
- *Forwards Traceability:* This requirement can be verified by checking that meals are being created.

REQ-MD-3: The system must allow for the dietary aid to deliver meals to patients

- *Backwards Traceability:* The dietary aid must be able to deliver food to patients, as they are the final step in the expediting of patient meals. The dietary aid must be able to delivery patients, regardless of whether they eat in their rooms or a dining area.
- *Forwards Traceability:* This requirement can be verified by ensuring that patients are receiving their meals.

2.3.4.3 Use Case(s) associated with the Feature or Functional Requirements
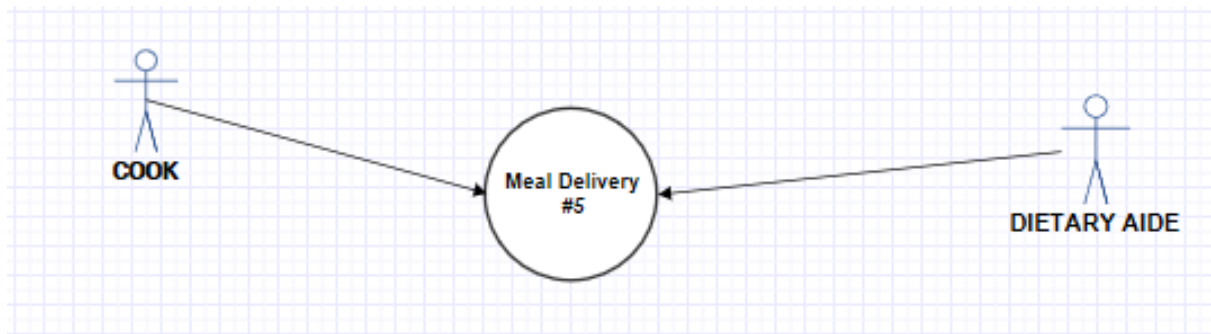
Precondition: The patient dietary chart exists and the cook is able to access it.

Use Case: *Meal Delivery*

1. The Cook prints out a copy of patient dietary restriction chart
2. The Cook assembles cooked food and awaits dietary aide requests
3. The Dietary aide asks each patient for their meal choice, tells cook
4. The Cook assembles plates according to the dietary aide's information as well as the chart information
5. The Dietary Aide delivers the dish to the residents table, assists patient with eating if needed
6. The Dietary Aide signs off that they have delivered the meal.

Postcondition: Patients will be in possession of the meal that they ordered.

Alternate Flow: For patients with dementia (2nd floor), orders are not taken. Instead, the Dietary Aide will simply provide them with a meal that fits their restrictions according to the patient chart. They will then sign off on the chart.

2.4 External Interface Requirements

2.4.1 Physician

Physicians are an external interface as they input information into the food delivery system. The system at St. Jude's cannot influence physician, but the actions of physician will directly influence the system. As the professionals who evaluate patients' health and allergies, physicians interact with the system by making decisions about the patients in the facility. For example, a physician might decide that a patient cannot have solid foods for a week, which will affect the subsequent actions taken in the system. A dietician may have to modify food

restrictions for that patient while considering their food preferences. The cook also has to consider this change while making the food, and the dietary aide has to consider the change when using the patient chart.

2.4.2 Food Supplier

Food suppliers are another external interface as they supply food into the system. When food in St. Jude's is insufficient, the cook has to contact a food supplier with a list of ingredients that are needed. The food supplier will check their storage and supply the requested food in a reasonable time. However, certain types of food from the food supplier may meet shortage. In this case, the food supplier will affect some of the actors in the system. The cook may have to consult a dietician about the substitution for the unavailable food. The dietician will make changes on the existing meal plan considering available food, and the cook will prepare food according to the modified meal plan.

2.5 Other Nonfunctional Requirements

2.5.1 Performance Requirements

REQ-NF-01: dietitians must adhere to BC Residential Care Home's nutrition policies [3]

- Backward Traceability: In order to avoid health and food risk, St. Jude's must adhere to BC's Residential Care Regulation.

- Forward Traceability: This requirement can be verified by BC health officers who conduct inspections every month.

Since St. Jude's has more than twenty four patients living in the care home, dietitians must design the meal for the patients. dietitians will design patients meal based on each patient's file stored on the computer located on each floor because the dietitians will not make suitable meal combinations if they do not look at the patient's file and see potential new changes to a patient's health. dietitians must design appropriate meals based on a patient's need and the Canada's Food Guide to ensure healthy diets. Furthermore, the dietary plan must be reviewed on a regular basis with the dietitian.

REQ-NF-02: Cooks must adhere to St. Jude's mealtimes [2]

- Backward Traceability: In order to reduce health risk for patients and liability risk for St. Jude's, cooks must prepare food on time as specified in St. Jude's Home Guidelines.

- Forward Traceability: This requirement can be verified by dietary aides and patients during meal times.

Nutrition is an important aspect to healthy living and meals must be ready on time for patients to eat. Since St. Jude's has already signed off on exact meal times, cooks need to have the meals prepared on time. For example, although breakfast's start time varies depending on the patient, each patient breakfast time is dependent on an individual patient's needs.

REQ-NF-03: System features must have accountability

- Backward Traceability: In order to reduce the potential for error and pinpoint cause of error if it arises, accountability will be added to each system feature.

- Forward Traceability: This requirement can be verified by assuring that proper documentation is added to each system feature.

Accountability is crucial to the system because it increases the security and health of patients. This requirement will ensure that nurses, dietitians, cooks, and aides will follow proper procedure will doing their jobs which will reduce potential for errors. If an error does occur, accountability will identify where in the system was the cause of error and the staff responsible for the incident. For example, if an incident occurs in the food preparation process and a cook was the person who made the inadequate meal, investigating the documentation will release the details on who made the error.

2.6 Other Requirements

There are currently no other requirements.

2.7 Analysis Models (Use Case Model, Data Flow Diagrams, Entity relationship diagrams)

2.7.1 Use Case Model

This diagram shows the combination of all the use cases in the St. Jude's food delivery system. The six actors in the system - the patients, dietician, cook, nurse, care aide, and the dietary aide, are shown with their relationship to the use cases. Since the information about food preferences comes from the patient's choices, they are contributors to the first use case. Both the nurse and the care aide are involved in updating dietary restrictions. This is because care aides take care of the patient's personal needs and are usually the first person to notice any new changes in the patient's eating abilities. The requirements for each use case and the detailed steps in each use case are outlined in section 3 of this document.
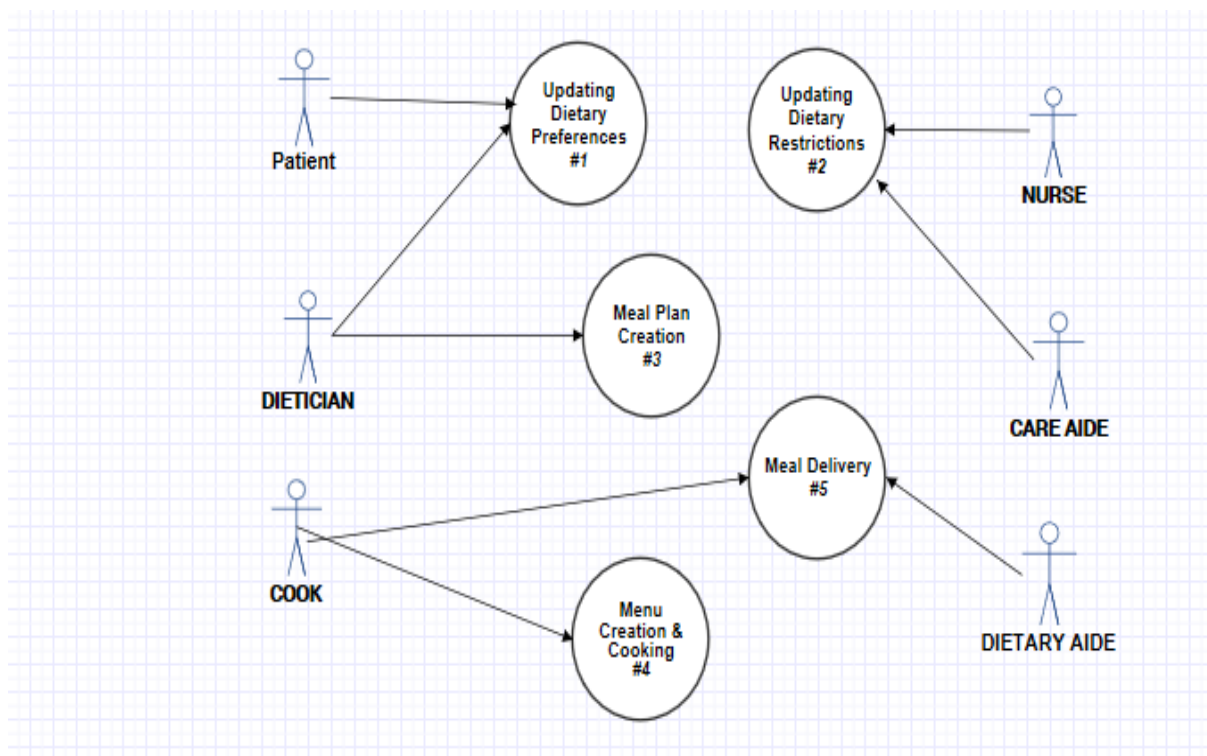
2.7.2 Context Diagram (Data Flow Diagram - 0)

This diagram shows a high level representation of the food delivery system at St. Jude's Anglican Home. The system and its processes are abstracted into the Deliver Food entity, and all the actors are represented with their respective data input and output information. The physician is an external actor that provides information that might influence some internal actions of the system.
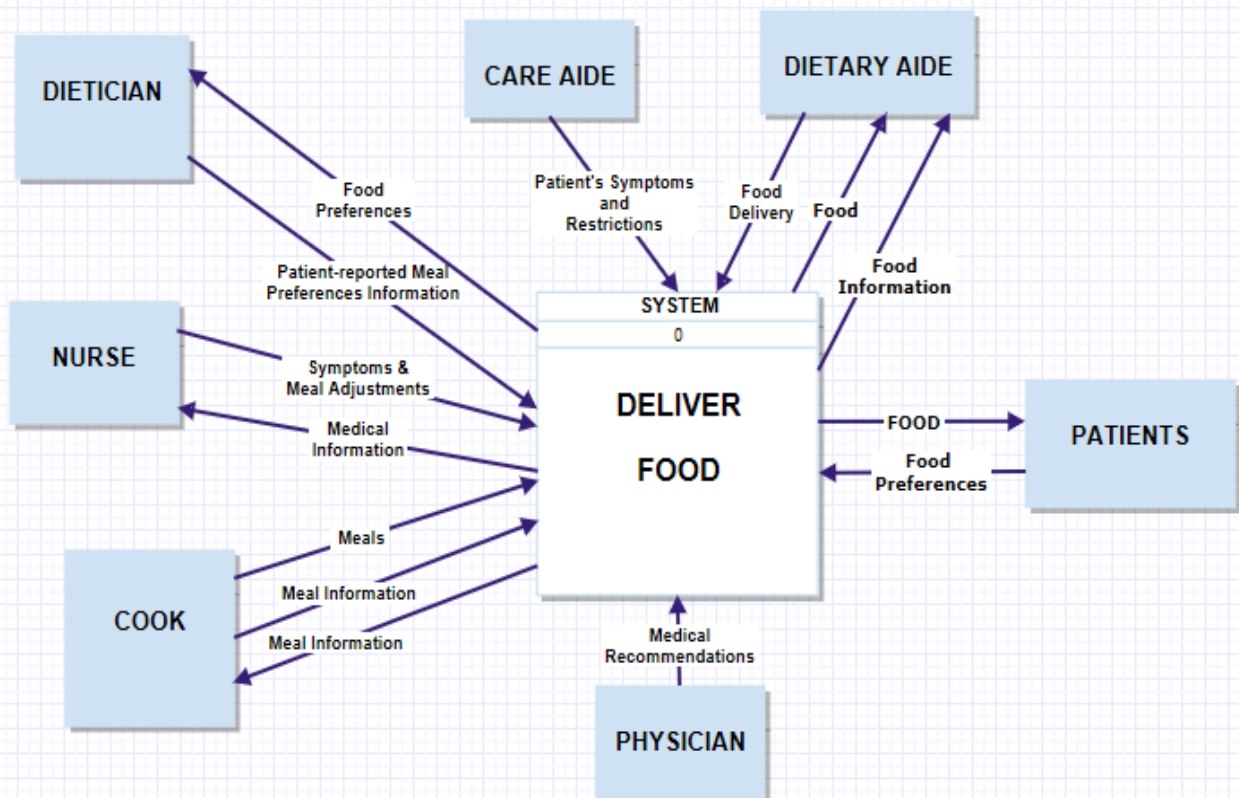
2.7.3 Data Flow Diagram - 1

This diagram shows the processes that make up the food delivery system in more detail. There are five major processes in this model that make up the entire system. It is evident from the diagram that the data store (also known as the patient chart) is a central host for the information needed in the system processes. The processes are actions taken by the actors in the system, and the information input and output are shown on the arrows.
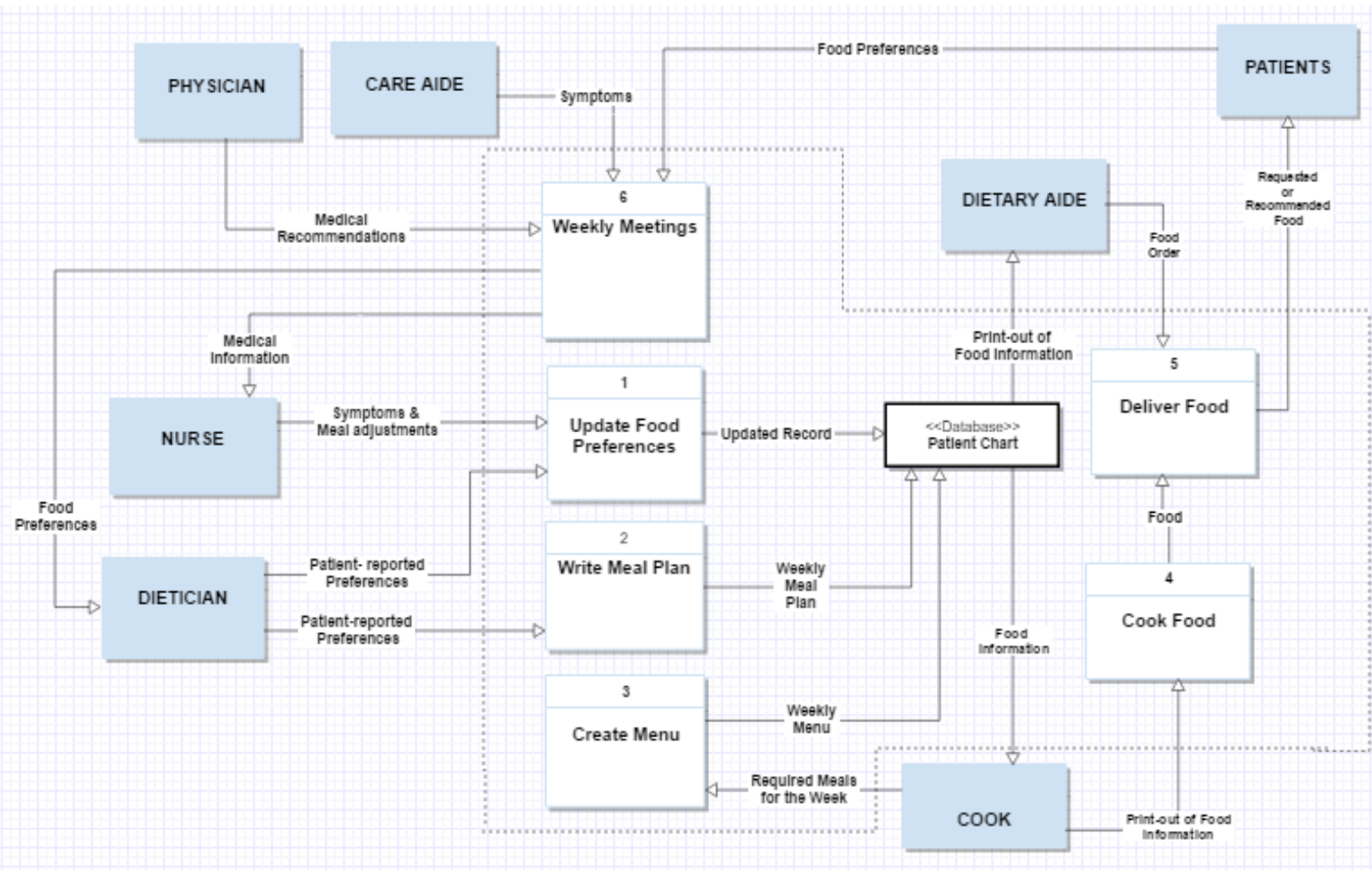
2.7.3 Data Flow Diagram - 2

This diagram shows a more detailed layout of the system, particularly the parts of the system where Viper Consulting plans to implement accountability measures (process 5). This diagram shows the flow of information and how an additional step in the food delivery process may be used to encourage accountability among staff.

2.7.4 Entity Relationship Diagram

This entity relationship diagram contains ten entities: Nurse, Dietician, Patient Chart, Cook, Meal Plan, Care Aide, Patient, Menu, Food, and Dietary Aide. Physicians are not included in the ERD because they are the external entity. Care Aides observe patient's symptoms relating to health and eating abilities and communicates this information to nurses during the weekly meeting. Nurses then update the patient chart, which will be used by dieticians to design meal plans for each patient. Dieticians may also meet with the patients in order to collect food preferences. The cook looks up the meal plans and creates the Menu, which contains food information. Dietary Aides then deliver the food that is cooked by the cooks to each patient.

3. Solution

3.1 Design - The Two-step Confirmation Process

Our Two-step Confirmation Process implements the changes needed in the food delivery system at St. Jude's Anglican Home. The first step involves confirming the identification of the patient, using the unique four-digit PIN on each patient's wristband. The second step requires that the staff member provides proof that they have checked the patient's dietary chart and confirmed that the correct patient gets the correct food. They do this by signing with their initials or unique signature.

As shown in Figure 3.1a below, the current method of food delivery (process 5) in place does not enforce a confirmation step when a dietary aide delivers food. However, with the proposed Two-step, process 5 can

be separated into three different steps (Figure 3.1b) to encourage staff to make sure they are serving the correct patient the correct food. The new design of the wristband is shown in Figure 3.1c.
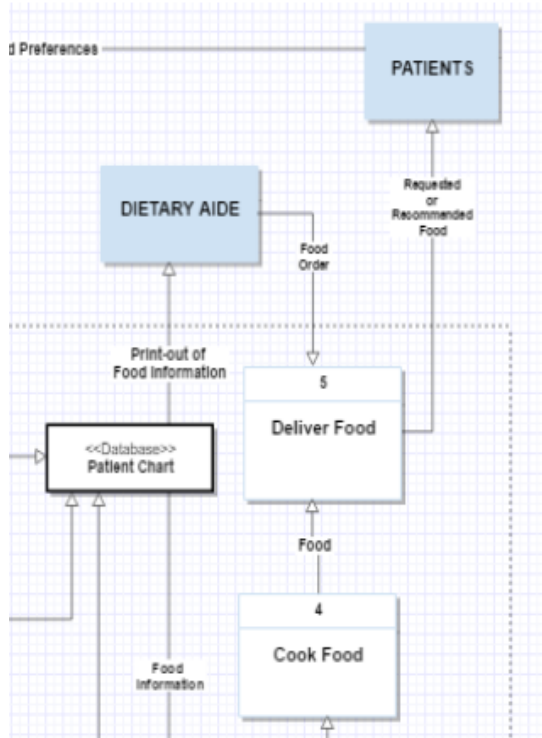
Figure 3.1a. The current food delivery process at St. Jude's.
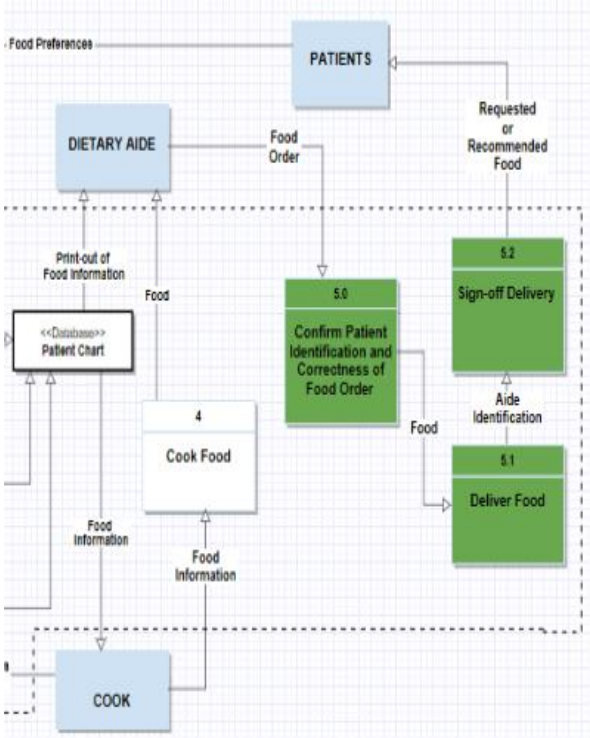
Figure 3.1b. The proposed system design that implements the Two-Step Confirmation Process.
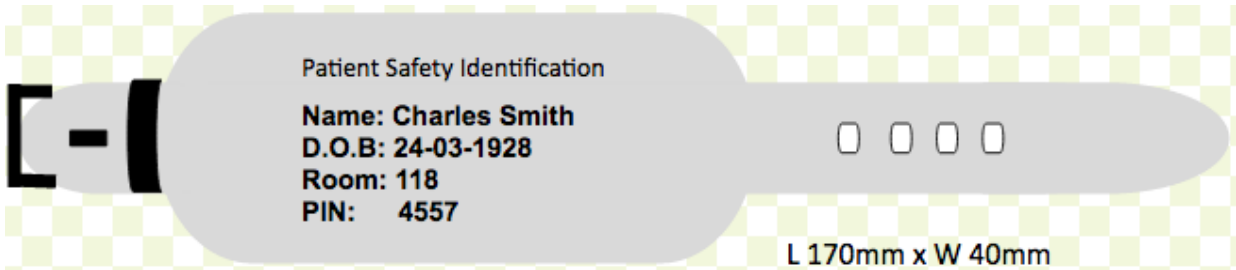
Figure 3.1c. Our new design for patient wristbands.

3.2 User interface (UI) models

3.2.1 First Floor Patients

The Daily Dietary Chart shown here is an updated charting method that uses the current chart being used but with added information and data fields. There are two different versions of the chart for the two different floors.

The updated chart contains fields to help in the proposed system. Each patient's daily meals and dietary restrictions are contained in this one-page chart. This chart can be used by the dietician, nurse, cook, and dietary aide. Information on the chart can be updated by the related actors in the respective use cases outlined in the requirements section.

The physical process of implementing the Two-step Confirmation Process differs on each floor. On the first floor, the dietary aide, who is responsible for delivering food to patients at the cafeteria or in their rooms on the first floor will confirm the patient's name and date of birth from the wristband, and then write down the patient's four-digit PIN which is written on the wristband. After this is done, the dietary aide can now hand out the food, and sign on the Daily Dietary Chart next to the meal being served. These steps are repeated for each meal, on a single

CHARLES SMITH

FIRST FLOOR
Room 118

DOB: 24-03-1928 (88)   Meal plan for June 09, 2016

DIETARY NOTES

- Allergic to SHELLFISH and NUTS
- Must take all medication BEFORE each meal (Benazepril tab x2)

BREAKFAST   Eggs Benedict, fruit salad, black coffee

Eggs, whole wheat English muffin, ham,   Delivered by   Patient PIN
Hollandaise sauce; apples, honeydew,
pineapple, grapes; coffee

LUNCH   BLT sandwich, Greek salad, orange juice

Bacon, lettuce, tomato, mayonnaise,   Delivered by   Patient PIN
white bread; cucumber, tomato, onion,
olives, bell pepper, feta cheese;
oranges

DINNER   Spaghetti + meatballs, steamed vegetables

Spaghetti, ground beef, tomato sauce;   Delivered by   Patient PIN
carrots, broccoli, cauliflower, zucchini

chart printed out at the beginning of each day.

3.2.2 Second Floor Patients

The solution for the second floor is similar but slightly more rigid to encourage accountability since the second floor houses patients with dementia. Patients on this floor require help while eating, which is provided by a specified eating aide.

The steps taken on the first floor are repeated with an additional confirmation needed from the care aide or eating aide. The care aide will sign that they have witnessed the dietary aide perform the required confirmation steps.

At the end of each day, the charts are to be collected from each floor and scanned into the computer, where they will be stored in electronic files for each patient for safe-keeping and for future reference.

ANGUS ADAMS

DOB: 13 - 12 - 1934 (81)

SECOND FLOOR
Room 258

Meal plan for **August 23, 2016**

DIETARY NOTES

- Allergic to DAIRY, ORANGES, AVOCADOS
- CELIAC (NO GLUTEN)

CAUTIONS

- DEMENTIA (Stage FIVE [5])
- SEVERE CHEWING DIFFICULTIES

BREAKFAST Breakfast smoothie (no dairy), black coffee

Mixed berries, banana, soy milk, flax seeds, ice; coffee

Delivered by   Eating Aide   Patient PIN

LUNCH Chicken noodle soup, porridge, apple juice

Chicken, carrot, celery, onion, chicken stock, noodles; oats, water, cinnamon, sugar; apples

Delivered by   Eating Aide   Patient PIN

DINNER Polenta + meat sauce, kale smoothie

Polenta, water, salt, margarine, ground beef, tomato sauce; kale, spinach, banana, pineapple

Delivered by   Eating Aide   Patient PIN

4. Conclusion and Recommendations

4.1 Reflections On Experience

This course allowed us to use real business processes in a simulation of the real world, by taking on the task of solving a real client's system problem. Throughout the course, we learned and applied how to define and understand the client's problem, how to evaluate possible solutions, and how to design the final solution and models. Arguably the most difficult task was to define the problem based on the RFP and the interview with the client, since both client and analyst groups lacked in-depth knowledge about the work environment and the specifics of the actual work flow. Because of this, it was more difficult to distinguish between real needs and perceived needs.

As we developed our understanding of the problem, we also realized that limitations from reality were significant to how we made assumptions, which sometimes led to a completely different solution. For example, since there are only two computers in the client's facility, we assumed most of the staff have limited knowledge of or access to computers; as a result of this, an improved paper-based system seemed ideal even though a digitized system could have offered more versatile capabilities. In other words, each potential solution is heavily reliant on the assumptions we make, which increases the difficulty of making said decisions. As such, we attempted to minimize assumptions by improving the existing system instead of designing a new one.

Identifying and playing to each team member's strengths was a major key that transformed our group into a team. This process required the trust and patience of each member, but gradually improved overall time management, work distribution, and cooperation, among others.

4.2 Recommendations For Future Students

Staying organized and well prepared are general keys to success for this project. Being consistently productive is also important. To improve team productivity, we suggest that the team elects a leader in the early stages who is willing to take responsibility, has good communication skills, and maintains a positive attitude. The team leader should distribute tasks based on each teammate's strengths and abilities. The team leader should supervise work progress, ensuring that team members can finish their parts by each deadline.

Furthermore, we recommend that weekly meetings be scheduled, accompanied by lists of objectives to be tackled during each meeting. Having objectives improves the efficiency of each meeting, as the team can focus their time on solving problems instead of identifying them. Taking minutes is necessary during each meeting, since team members can refer to the document in case they miss or forget the specific details of a meeting.

Google Docs is super useful as well, as it facilitates efficient, easy collaboration no matter where each team member is located. Teammates can also edit and leave comments on which sections they think can be improved. On the topic of teamwork, the first two week of class were rather confusing because team members were not confirmed. Thus, it is important to be patient and adjust accordingly as teams are finalized and roles are assigned.

5. Each member's Contribution

Group Member	Contribution
Bernice Brown	Bernice was primarily involved in developing the use cases and associated steps for the requirements section, as well as drawing the use case model diagram, context diagram, and data flow diagrams for the domain modelling section. She has also been involved in report writing, editing, and project coordination for the group. Bernice helped develop questions for the first client meeting, organized notes, and contributed to identifying the needs, objectives, and stakeholders for the project. She has also helped in creating the solution and developing the UI models in the final report.

Devon Fang	As an analyst and editor of the group, Devon worked on refining the problem to determine what the use cases and objectives for the solution would be. Often working together with other group members to complete a variety of tasks, Devon dabbled in a bit of everything. Working with Wayne, the project website was created, designed, and successfully hosted on github. When it came to writing documents, he would often help edit the phrasing of other users to help maintain a consistent flow. Having worked with Graeme to create the features of the system, and with Jeffrey to help manage final edits and formatting of documents prior to handing them in, Devon has spread his abilities across a variety of topics to help the team grow and progress.
Graeme Clarke	Graeme was primarily responsible for taking meeting minutes at team meetings, and consulting/notetaking at client interviews. He also contributed to general document editing and formatting. His most significant contributions were his roles in the client interviews and both project presentations. In the creation of the RFP, Graeme was responsible for writing the constraints section as well as general editing. He also contributed to the system features and functional requirement section of the Requirements document.
Jeffrey Zhang	Jeffrey was responsible for much of the editing of each document, ensuring consistency between the writing styles of each author. He also wrote a section or two of each document himself, and worked with Bernice in developing the UI models for the final report. Jeffrey tried his hand at presenting for the project pitch, though this was clearly not his forté. He also helped analyze the needs and constraints of the client organization.
Maston Ho	Maston worked as an analyst who helped identify as well as evaluate possible solutions to problems in the current system. He helped in editing and formatting in every deliverable documents. In the project charter, Maston was responsible in creating the work breakdown table that showed the different objectives of the project, and the precedence each step had. In the requirement document, he described the operating environment with the design constraints and the assumptions that the team made in the solution. In the final report, Maston completed the conclusion and recommendation sections and helped explain the difficulty the team faced in the project. Finally, Maston gave his knowledge that he gained through this course to future students, to help them improve their productivity in future courses.
Todd Xu	Todd was one of the analysts in the group. He worked on the RFP editing, the deliverable section and some others in project charter, the external interface section of the requirement documents, and the conclusion section of the final report as he observed the difficulties that the team have met. Besides some general documents editing, he also helped to develop questions for the first client meeting, to define problem, and to identify the details of actual workflow in client's work environment.

Wayne Zhang	Wayne works as the website developer and one of the analysts in our group. One of his responsibilities is to build the group website in terms of developing the basic framework as well as uploading contents to the team website. In addition, Wayne made his contributions to project documents through writing and editing. His works include: team section in RFP, Stakeholders and Team Organization and Roles sections in project Charter, part of domain model as well as appendices sections in final report. Wayne also helped with asking question during the client interview.
Zane Li	Zane was primarily involved in coordinating the tasks of group members and making sure everyone stays on task. Some of the work he did for the final report include Report writing, group presentation, document editing. For the interviews, Zane consulted with the client group to ask for clarification along with presenting our ideas. In the Project Charter, Zane wrote the needs and scope section. For the requirements document, Zane wrote the non functional requirements and the introduction section. He also helped in designing the solution, the domain models, and UI models.

6. Appendices

a. Glossary of terms from domain model

- **Patient**: Residents of St. Jude's Anglican Home.
- **Nurses**: Include Registered Nurse and Licensed Practical Nurse. Nurses update patient's electronic records.
- **Physician**: Physicians make observations of patients' symptoms and consult patient chart to propose remedies for patient
- **Dietitian**: Dietitians design meals for each patient.
- **Care Aide**: Care aides make observations about patient symptoms relating to health and food choices.
- **Dietary Aide**: Dietary Aide gather meal preferences from each patient, keeping the nurses up-to-date on said preferences, and delivering food from the cook to the patients.
- **Patient Chart**: Patient Chart contains dietary restrictions and preferences exists.
- **Meal Plan**: Meal Plans contain meal information for each patient. Meal Plans are stored in the electronic record.
- **Cook**: Cook orders ingredients, makes weekly menu, and assembles plates.
- **Menu**: Menu contains meal information. Menu is stored in electronic system.
- **RN**: Registered Nurse
- **LPN**: Licensed Practical Nurse
- **Residential Care**: A round-the-clock care facility with physicians and nurses where new patients are referred by hospitals.
- **Vancouver Coastal Health**: Regional Health Authority that provides a wide range of health services to over one million BC patients living in Vancouver and surrounding areas.
- **Viper Consulting**: A team of dedicated systems analysts and developers in the Health Information Science and Computer Science programs at the University of Victoria.

b. Interview Notes

1.First meeting with the representatives of St. Jude's Anglican Home on September 29th, 2016.

Objectives:
- Are you looking for a technical solution or a non-technical solution?
  - *Constraints need to be met. We have only one computer which may limit technical solutions particularly to this specific user-group.*
- Can you elaborate on the measurability of the objectives?
  - *Measurability can be found in the reduction of risks*
  - *The parameters are not necessarily measurable in this particular implementation*

Patient Environment:
- Do all patients eat at the same time? Do they eat in the same location? *(Do some patients eat in their rooms? Is there an eating area?)*
  - *Patients all eat at the same time in the cafeteria on the second floor*

- ○ *Patients who aren't mobile are helped by care aides into the cafeteria*
  - ○ *Wristbands per patient, ID.. the wristbands contain only the names of the residents and the residents wear it all the time.*
  - ○ *The ratio of nurses to patients is 1 nurse for every 2 patients*
  - ○ *SECOND Floor IS PRIORITY, if the system accommodates the first, that's also good*
  - ○ *It's important to know that the hospital is currently full - all 55 BEDS are filled, and the second floor is for patients with dementia.*
- ● Could a patient get the wrong wristband?
  - ○ *We don't have details about the wristbands, unfortunately. .*
  - ○ *However, we are very sure that the wristbands would not come off the patient's wrist.*
  - ○ *The bracelet only contains the patients' names and nothing else*
- ● Is there a particular staff "type" (nurses, kitchen staff, <u>non-regular</u>, etc) that would be implementing the proposed system? What should we keep in mind regarding this?
  - ○ *Most systems would likely involve the cook, the physician,*
    - \- *Would mostly fall on nurse distributing the food*
    - \- *Previous incident was a result of NON-REGULAR STAFF (In rfp)*
- ● What are the specific limitations on cost?
  - ○ *Solution costs should not exceed the requested donation amounts on St Jude's Website: ($360/week), "even close to that would be excessive"*
  - ○ *St Jude's Relies heavily on donations*
  - ○ *Payment comes 80% from users*

Current System:
- ● Can you describe in detail about the current system (in relation to the problem of food preparation)
  - ○ *"How often do they print the allergy/restrictions chart"*
    - ■ *Every meal*
    - ■ *Given to cook*
  - ○ *Change is implemented by the Physician and then told to the Dietitian ->*
  - ○ *Example:*
    - ■ *Care worker notices patient can't swallow*
    - ■ *Care worker notifies Nurse*
    - ■ *Nurse confirms issue, updates chart in computer system*
    - ■ *Prior to meals, the most recent version of the chart is printed for dietary*
    - ■ *Dietary aide pushes cart, distributes food based on chart*
    - ■ *Physician/Dietitian consult chart to propose remedies for patient*

- ● Can you elaborate on the computer system the patient files are stored in? Is it the same as system that records meals?
  - ○ *The computer at the nurses station has all patients on file in one system, it is unknown to what the specifics of the system are.*
  - ○ *The client-group suspects that the computer system likely an excel sheet or a static document, as supposed a specifically medical-focused patient system*
  - ○ *Multiple staff types manipulate the patient files including Physicians, Dietitians, Nurses*

Meal Information:

- How often do specific patients' meals have to be modified?
  - *Almost Never - food is made in bulk to meet the dietary needs of everyone - not individually*
- What mistakes did the non-regular staff member make during the incident that an unsuitable meal being given?
  - *Non-regular staff in incident didn't look at chart*
    - *Likely because they thought they knew*
- What does the one-day orientation include for casual staff?
  - *Overlying review what the regular staff do "for one day' through SHADOWING*

General Notes/Information:

- Wristbands contain names, not information beyond chart correspondence.
- Rooms have patient's name, in addition to wristband.
- Any solutions should be "realistic relative to a low budget".
- Site is asking for donations for maintenance, food carts…
  - Implies a lack of disposable income for the organization
- In the incident the non-regular staff didn't look at the chart at all - she thought that she knew the dietary restrictions of the patient
- EVERY staff member can be non-regular or can be temporarily replaced by a non-regular
- A new system should be just easy to understand as current system for non-regular staff
- The dietary aide has per patient information for food exclusively
- Prior to preparing bulk meals, the cook looks at "what ingredients are not okay"
  - Scans allergy list and required textures (Some patients struggle with chewing, etc)
  - Dietitian may or may not talk about specific meals/meal-types, may recommend if nutrients is needed for something else

2. Second meeting with the representatives of St. Jude's Anglican Home on November 17th, 2016.

Clients' Concerns:
- How do we enforce that signatures are being kept?
- Make a mock document..
- How do we ensure safety isn't lost at all
- Safety measures.
- Tracking of incidents..
- Two issues:
  - Implement post-delivery storage of chart documents
  - How do we ensure safety before delivery