MCMASTER UNIVERSITY

CAS 4ZP6 CAPSTONE PROJECT 2013/2014

PORTER SIMULATION

Requirements Documentation Revision 0

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1 Purpose of the Project

1.1 Background

1.2 Goals

2 The Stakeholders

Hamilton Health Sciences (HHS) operational management team is the main stakeholder for this project. Names and position are: Patients and Hospital Staff are the secondary stakeholders for this project. Any benefits that arise from the successful completion of this project will affect these stakeholders.

2.1 The Client

Hamilton Health Sciences (HHS) operational management team is the client for this project. Names and positions are:

2.2 The Customer

Hamilton Health Sciences (HHS) operational management team is also the customer for this project. Names and positions are:

2.3 Other Stakeholders

Not Applicable

2.4 Hands on Users

Operational Management Staff will be the primary hands on users of the finished product. Names and positions are:

3 Mandated Constraints

3.1 Solution Constraints

(a)

3.2 Schedule Constraints

(a) Simulation Software must be complete and requirements met by March 2014 (Current Academic Year)

4 Naming Conventions and Technology

4.1 Definitions of All Terms, Including Acronyms, Used by Stakeholders involved in the Project

(a) **HHS:** Hamilton Health Sciences

(b) **IVR:** Interactive Voice Request - phone system for requesting portering services

(c) **Porter:** Staff member responsible for movement of equipment such as beds, wheelchairs, other medical instruments and patient transfers from one location to another

  (i) **Off-System Porter:** Porters that follow a strict scheduled and a predetermined set of activities

  (ii) **On-System Porter:** Porters that respond to ad-hoc and pre-booked requests

(d) **Dispatching System:** An automated software system responsible for receiving and assigning requests to Porters

  (i) **RDE** Remote Dispatching E... - portal used to view the current state of all the porter jobs currently in the Dispatching System

(e) **Zoom Stretcher:** A powered stretched used for patient transportation

(f) **Pneumatic Tube:** A transportation system for lab samples and specimens

(g) **Priority of Requests:** Requests placed by Hospital Staff can be prioritized on a scale from 0 - 9 with 0 being the most urgent. Porters can place an Assist Call that has a higher priority than 0.

(h) **Event State:** A state of the porter service event as dictated by the Dispatching System

  (i) **Pending:** Job has been placed in the system queue

  (ii) **Dispatched:** Job has been matched to an available porter

  (iii) **In-Progress:** Job is being executed by the porter

  (iv) **Complete:** Job has been completed

  (v) **Dispatch Delay:** Porter states that he/she is delayed during a Dispatched event

  (vi) **In-Progress Delay:** Porter states that he/she is delayed during a In-Progress event

(i) **Transaction Time:** the time from Event State: Pending to Event State: Complete

(j) **Proactive Page:** A porter pages the request location to inform the requester of his/her impending arrival

(k) **Age of Request:** How long a job has been pending in the dispatch system

(l) **Break3:** A state a porter can enter where they are still logged into the system but do not receive any calls from the dispatch system

(m) **Zoned:** A term for a porter that only receives certain types of requests as specified by the dispatching system

(n) **System Item Request:** requests that deal with specimens/blood/bed movement/etc ...

5 Relevant Facts and Assumptions

5.1 Relevant Facts

(a) HHS will provide the project team with available non critical data

(b) HHS currently uses a Dispatching System to rout its porters to desired locations

(c) On certain route segments, 2 porters are required to transport the patient

(d) Lab/Specimen delivery use Off-System Porters on weekdays from 8:00 to 16:00

5.2 Business Rules

(a) Under their collective agreement a porter cannot be scheduled for less than an X amount of hours per week and X amount of hours per shift

(b) Each request has 6 event states (Pending, Dispatch, In-Progress, Complete, Dispatch Delay, In-Progress Delay)

(c) Requests are prioritized on a 0 - 9 scale

(d) There are 3 types of transportation equipment (Stretcher, Zoom Stretcher, Wheelchair)

(e) There are two types of porters (On-System, Off-System)

(f) Every completed event has an associated transaction time

(g) Only Off-System porters can be scheduled for pre-booked requests

(h) Juravinski uses the Pneumatic Tube for 40% of the lab deliveries and porters for 60 %

(i) Dispatch System determines the assignment of requests by using these parameters (Priority, Proximity, Pre-Scheduled Appointment Use, Age of Request)

(j) Industry standard for patient transport transaction time is 30 minutes

(k) Porter service requests can be made using any hospital computer or phone (IVR)

(l) Porters can enter into an unscheduled break mode (Break3) where they do not receive any requests from the dispatch system

(m) Porters can be "zoned" into system item requests by the dispatching system

5.3 Assumptions

(a) Every porter is equally capable of performing every task as every other porter

(b) All transporting equipment is in equal physical condition as other equipment of the same type

(c) Wheel Chair transport of patients is 4-5min less in transaction time

(d) Some porters use proactive paging

(e) The majority of service requests are made through hospital computers

(f) Porters do not abuse the "Break3" mode

6 Scope of the Work

6.1 Current Situation

Hamilton Health Sciences are experiencing inefficiencies when synchronizing their porter services throughout each of their locations and are lacking the tools to solve this problem. The biggest problem comes from the lack of compliance and coordination of the many separate entities of the hospital body.

6.2 Context of the Work

The context of the work is to provide HHS with a simulation that models their porter services. The simulation is not to provide a solution but act as a tool to test new operational ideas.

6.3 Business Use Case

The simulation tool will be used by members of the operational management staff to model their process as per their variables and the simulation constraints.

7 SCOPE OF THE PRODUCT

7.1 PRODUCT BOUNDARY

(a) The simulation tool will not model the 100% full hospital environment

(b) The simulation will focus on the On-System Porters

(c) Not all porter activities will be simulated. Simulation will concentrate on the 4 event states tracked by the dispatching system (Pending, Dispatch, In-Progress, Complete)

(d) The simulation tool will only model the Juravinski Hospital location

7.2 PRODUCT USE CASES

(a) Operational Manager has a new initiative they want to implement into everyday operation. He/She uses the simulation by changing the adjustable variables with his/her own values and executing it. He/She analyses the output of the simulation and determines if the new initiative should be implemented.

(b) Operational Manager has to determine how to modify the schedule for the porter service staff. He/She uses the simulation by changing the adjustable variables with his/her own values and executing it. He/She uses the output to design/refine the new schedule.

(c) Operational Manager wants to increase operational compliance of some particular policy. He/She uses the simulation by changing the adjustable variables related to a certain level of compliance with his/her own values and executing it. Once positive results have been verified he/she shows the results to all the parties involved in the compliance policy to effectively increase compliance.

(d) Operational Manager wants to experiment with theoretical scenarios. He/She uses the simulation by changing the adjustable variables with his/her own values and executing it. He/She analyses the output data and either creates a new initiative based on result or archives the data.

8 FUNCTIONAL REQUIREMENTS

8.1 FUNCTIONAL REQUIREMENTS

(a) **Description:** Simulation must use a CSV file type as input
Rationale: Operational Management staff has indicated that using the CSV file type as the input is the preferred option
Originator: Operational Management staff
Fit Criterion: Simulation must accept the CSV File type without error 100% of the time assuming the CSV file is without error

(b) **Description:** A series of simulation variables that affect the simulation output must be editable by the user
Rationale: Operational Management staff must be able to modify the simulation
Fit Criterion: Simulation must include at least 85% of the following variables

(i) Number of Porters

(ii) Frequency of Events

(iii) Number of Locations

(c) **Description:** Simulation Tool must be able to run a pre-designed model incorporating the given input variables and exit
Rationale: Operational Staff must be able to run the simulation
Fit Criterion: Simulation must be accurate within X range of accuracy

(d) **Description** The output of the simulation must be a CSV file type
Rationale: It is best design to use the same file type for output as input
Fit Criterion: The output file must be have 0% errors according to the CSV file type standards