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| CarePartner | Team members: Isabelle Bichindaritz |

ContactManagement Database Project

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Conceptual Data Model

# Introduction

The ContactManagement project is part of the CarePartner project effort and aims at creating an electronic contact form and management system to replace the current phone answering service of the Long-Term Follow-Up (LTFU) unit at Fred Hutchinson Cancer Research Center (FHCRC). An electronic contact management system over the Internet would offer many benefits both for home care providers and LTFU staff.

## Project Overview

The Long-Term Follow-Up unit currently handles by phone and mail all inquiries from home care providers in need of diagnosis and treatment advice for patients transplanted at Fred Hutchinson Cancer Research Center. Inquiries are received by LTFU nurses, who discuss with a LTFU expert clinician during regular clinical meetings. The nurses call back the physicians to provide them with the expert advice of LTFU clinicians. This process generally takes several days. Moreover, contact information is recorded on paper forms, and a very time consuming process of abstracting the information manually from hand-written contact forms takes place. Research nurses select pertinent clinical events and enter them in the clinical research database for research purposes.

By contrast, the ContactManagement project will have the benefit of having all contact information entered in electronic format in a database. More data will be available for research investigations, such as medications and their dosage, not currently abstracted in the clinical research database. The ContactManagement system will also provide real-time access over the Internet by home care providers to a knowledge-based decision-support system, part of the CarePartner project effort. Home care providers will receive instant answers for their inquiries in more than 95% of the cases. Thus, the ContactManagement system will benefit the efficiency and quality of both care and research , for home care providers and FHCRC alike.

## Project Scope

The scope of the project is to allow all contact information to be entered electronically, both by home care providers and LTFU clinicians. Home care providers will use the system to place a contact, view the answer to the contacts they have placed, and browse the history of contacts. LTFU staff will use the system to view contacts placed by home care providers, provide solutions to the contact inquiries, and generate statistics from the data gathered during contact management.

In a first stage, the system will not link automatically to the decision-support system, but only LTFU staff will provide solutions to the clinical problems. Neither will it be linked with the electronic patient record.

In a second stage, which will be presented in another report, the ContactManagement system will be integrated with the decision-support system (see DecisionSupportSystem project report) and the ElectronicPatientRecord (see ElectronicPatientRecord project report). Only then will the CarePartner system be complete.

## Document Overview

This document part presents an overview of the project, then a use-case diagram to visualize the functional requirements, a class diagram to sketch the main data, and a data dictionary that provides a description for each data element.

#  Project Overview

## Client

The client for this project is LTFU, and particularly Dr. Keith M. Sullivan, LTFU head. The system will be used by:

1. LTFU staff handling phone and mail inquiries with home care providers, currently 5 nurses and clinicians.
2. LTFU data coordinators, currently 3 research nurses who may generate statistics from the system.
3. Most users will be home care providers, up to 1,500 actively caring for a patient transplanted at FHCRC in Seattle.

Users may have any level of computer proficiency, and the user interface, as most Web-based interfaces should not require training.

## Main Functionality

Primary care provider users will access the ContactManagement system to:

1. Place contact: a user places a contact through an electronic contact form with a reason for contact, a list of current problems, a list of signs and symptoms, a list of medications, a list of procedure results, and a list of allergies.
2. View contact: a user visualizes a complete contact, including a list of diagnosis assessment tests, and a list of treatment actions.
3. Browse contacts: a user browses the list of contacts, for a specific patient.

LTFU users will access the ContactManagement system to:

1. Browse contacts: a user browses the list of contacts, and can rank them according to several criteria. The user can also select a subset of contacts, such as for a specific patient, or a specific primary care provider, for instance.
2. Provide solution: a user types in a proposed solution to a contact inquiry, as a list of diagnosis assessment steps, and a list of treatment action steps.
3. Generate statistics: a user generates statistics such as graph the number of contacts per day, or cluster the contacts per reason for contact for instance.

Among the non-functional requirements, the system is a Web-application running on the Internet so that any home care provider in the nation, and over the world, can contact LTFU 24 hours a day and 7 days a week over the Internet. Some of the non-functional requirements for this system are:

* High security and confidentiality of any patient-identifiable information, including strong authentication, encryption, audit trails, role-based access to data, and organizational security plan (see CarePartner Security report).
* System reliability and fault-tolerance.
* Web-application developed with Java Server Pages (JSP).
* 2,000 patients to follow-up, and 1,500 active home care providers who may place concurrently an average of 100 contacts a day. They may also consult contact follow-up information concurrently.

# Use-Case Diagram

The use-case diagram represents in use cases the main functionality of the system. Two actors are represented for future connection, the DecisionSupportSystem, and the ElectronicMedicalRecord. The KnowledgeBase is a database system which will provide information to the ContactManagementSystem, such as the list of problems, or the list of diagnoses.



1. Figure 1 Use case diagram.

# Class Diagram



1. Figure 2 Class diagram.

# Data Dictionary

A description of the data required by the system is presented here as a first data dictionary for the database system.

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| --- | --- | --- | --- |
| ***Class*** | ***Attribute*** | ***Data type*** | ***Description*** |
| AttributeValue | attribute | String | Any attribute name. |
|  | value | String | Any value of the corresponding attribute. |
| Contact | contactDate | Date | Date and timestamp when contact was placed. |
|  | contactType | String | Type of contact, such as real contact, or follow-up. |
|  | contactMean | String | Whether the contact was placed by phone, mail, … |
|  | contactDirection | Boolean | Whether the contact was Taken by, or Placed by, LTFU. |
|  | contactTakenBy | String | Name of person having taken the contact. |
|  | source | String | Name of person having placed the contact. |
|  | title | String | Title of the person having placed the contact. |
|  | phone | String | Phone number of the person having placed the contact. |
|  | fax | String | Fax number of the person having placed the contact. |
|  | reasonForContact | String | Brief description of the reason motivating the contact. |
|  | KPS | Integer | KPS is a score of general wellness of the patient. |
|  | weight | Integer | Current weight of the patient. |
|  | weightUnit | Boolean | Whether the weight is in kg or pounds. |
|  | height | Integer | Current height of the patient. |
|  | heightUnit | Boolean | Whether the height is in cms or in inches. |
| Diagnosis | diagnosisCode | String | SNOMED diagnosis code. |
|  | rank | Integer | Relative number of this diagnosis in the list. |
|  | dateObserved | Date | Date when diagnosis was observed. |
|  | dateStarted | Date | Date when this disease was first diagnosed. |
|  | dateEnded | Date | Date when this disease ended. |
|  | abstraction | String | Whether this diagnosis has been abstracted in the clinical database. |
|  | siteCode | String | SNOMED site code. |
|  | organismCode | String | SNOMED organism code. |
|  | outcome | String | What was the outcome of this disease. |
|  | comment | String | A general comment added to this diagnosis. |
|  | text | String | All the information above as text in case some codes did not exist. |
| Laboratory | labCode | String | SNOMED laboratory code. |
|  | rank | Integer | Relative number of this diagnosis in the list. |
|  | dateResult | Date | Date when the lab result was made. |
|  | value | String | Value of the lab result. |
|  | unit | String | Unit in which the lab result was measured. |
|  | method | String | Method used to perform the lab measurement. |
|  | interval | String | Time interval when repeated measures. |
|  | dose | String | Dose of medication taken before lab. |
|  | delay | Integer | Number of minutes between the time the medication was taken, and the lab was measured. |
|  | source | String | Name of the laboratory having performed the measurement. |
|  | rangeInferior | String | Value of the inferior value of the normal range. |
|  | rangeSuperioir | String | Value of the superior value of the normal range. |
|  | interpretation | String | Whether the lab value is normal, or elevated, or low. |
|  | evolution | String | Whether the lab value has decreased, increased, or remained stable since the last measure. |
|  | comment | String | A general comment added to this lab. |
|  | text | String | All the information above as text in case some codes did not exist. |
| LTFUSpecialist |  |  |  |
| Medication | medicationCode | String | SNOMED medication code. |
|  | rank | Integer | Relative number of this medication in the list. |
|  | dose | Double | Dose of medication given. |
|  | unit | String | Unit of medication dose given. |
|  | exponent | Integer | Exponent value of dilution for dose. |
|  | calculatedValue | Double | Value of medication dose as calculated from dilution. |
|  | dateStart | Date | Date when this medication was started. |
|  | dateEnd | Date | Date when this medication was ended. |
|  | frequency | String | Frequency at which this medication should be taken. |
|  | route | String | Route of medication, such as per os, or through blood. |
|  | comment | String | A general comment added to this medication. |
|  | text | String | All the information above as text in case some codes did not exist. |
| Patient | patientUpn | String | Patient unique patient number, or identifier. |
|  | firstName | String | First name of the patient. |
|  | lastName | String | Last name of the patient. |
|  | middleName | String | Middle name, or initial, of the patient. |
| PrimaryCareProvider | lastContactDate | Date | Last date when a contact was placed with this provider. |
|  | lastDateEstimated | Boolean | Whether the lastContactDate was estimated or not. |
| Problem | problemCode | String | Unique problem code. |
|  | rank | Integer | Relative number of this problem in the list. |
|  | dateObserved | Date | Date when problem was observed. |
|  | comment | String | A general comment added to this problem. |
|  | text | String | All the information above as text in case some codes did not exist. |
| Procedure | procedureCode | String | SNOMED procedure code. |
|  | rank | Integer | Relative number of this procedure in the list. |
|  | dateResult | Date | Date when procedure result was determined. |
|  | siteCode | String | SNOMED site code. |
|  | organismCode | String | SNOMED organism code. |
|  | comment | String | A general comment added to this procedure. |
|  | text | String | All the information above as text in case some codes did not exist. |
| Symptom | symptomCode | String | SNOMED symptom code. |
|  | rank | Integer | Relative number of this symptom in the list. |
|  | dateObserved | Date | Date when symptom was observed. |
|  | siteCode | String | SNOMED site code. |
|  | organismCode | String | SNOMED organism code. |
|  | importance | String | Whether the importance of this level was low, high, or moderate. |
|  | level | String | Whether the level or intensity was high, average, or low. |
|  | comment | String | A general comment added to this symptom. |
|  | text | String | All the information above as text in case some codes did not exist. |
| Treatment | treatmentCode | String | Unique treatment code. |
|  | rank | Integer | Relative number of this treatment in the list. |
|  | comment | String | A general comment added to this treatment. |
|  | text | String | All the information above as text in case some codes did not exist. |
| User | userName | String | Unique user name. |
|  | password | String | Password for user to access the system. |
|  | firstName | String | First name of the user. |
|  | lastName | String | Last name of the user. |
|  | middleName | String | Middle name, or initial, of the user. |
|  | institution | String | Institution where the user works. |
|  | email | String | User email address. |
|  | phoneNumber | String | User phone number. |
|  | streetNumber | String | User street number. |
|  | streetName | String | User street name. |
|  | addressComplement | String | User complement of address. |
|  | zipcode | String | User zip code. |
|  | state | String | User state. |
|  | position | String | User position at his/her institution. |