MIS 6308.0W1 – Fall 2023
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Proposed Design for Enhancements for Alpha Beta Gamma Healthcare's Digital Identity and Patient Tracking features.

1. Executive Summary

Alpha Beta Gamma Healthcare (ABGH) is a (fictional) successful provider in the healthcare space. They support multiple facilities (17) in different cities across multiple states. Within individual healthcare facilities, patients may need to check-in and potentially wait in lines for every step of their care. Transition between locations or even within different wings/buildings in the same facility has led to a reduction in customer satisfaction in subsequent years. We would like to propose two separate features that we feel will work to improve are customer intimacy, physician/nurse-to-patient awareness, and near instant identity of people while they are within our facilities. We feel that these implementations will strengthen the existing systems at ABGH and work seamlessly with our existing IT list of tools.

Mobile Identity - Allowing for additional features based on location data tied to a patient's smartphone/device. The idea is to enhance the existing patient portal app data elements support and to include GPS location from the patient's device to enhance the experience. This opens the possibility many new features but will start with inputting of existing and new client data elements (Name, Address, Insurance information, current medicines), and the app can tie into map programs based on location data, to provide maps of current facilities so patients will never get lost or be without identification.

IoT Tracking During Visits - The existence of "wrong-site, wrong-procedure, wrong-patient errors" in hospitals (*Wrong-site, wrong-procedure, and wrong-patient surgery*) is avoidable with

proper IoT tagging with smart bracelets of patients as they enter and are tracked throughout the facility by positioning with the existing wireless networks through Wi-Fi triangulation (Simonite, 2020). Basic data already known or collected can be enhanced to include the persons location. This would be on top of the existing data elements such as attending physician, patient status, and details on scheduled procedures. The amount of data available to the user is keyed upon their need to know to consider existing compliance requirements such as Health Insurance Portability and Accountability Act (HIPAA). This information can be tracked in a central repository to enable patients to visit any of the buildings that make up ABGH's campuses and be used a unique identifier to avoid such risks. Nurses and doctors can then use this information to correctly identify people easily and can use the existing system to pull up and update charts on the patient.

2. **A problem statement (Systems Proposal): It should follow the format discussed in class Analysis**

Project Name: Enhancements for Alpha Beta Gamma Healthcare's (ABGH) Digital Identity and Patient Tracking features: Mobile Identity and Enhanced Patient Tracking

Project Sponsor: Director Johnathan Doe (Director of Healthcare Client Services)

Business Need: The Healthcare Client Services division have identified two separate elements that they would like to address with these improvements to existing systems.

Mobile Identity: As ABGH has grown in size as a company with an increase in the number of locations, there has been a reduction in customer satisfaction in key areas. One in particular is a growing concern for the inability to promptly and accurately identify patents (customers) within ABGH Client Services system often requiring patients to demonstrate their identity, insurance information, and existing medications possibly multiple times during a single visit. ABGH wants to improve customer satisfaction and customer intimacy by improving the existing digital identity used for app users to allow for clients to leverage their devices as their identification throughout ABGH facilities and to allow ease of use for updating existing records.

Enhanced Patient Tracking: Patient Tracking systems are not new to ABGH, but the constant threat of Wrong-site, wrong-procedure, and wrong-patient surgery is still a challenge that happens within the medical world. In addition to providing an additional level of customer service/intimacy, Client Services would also like to enable smart bracelets that constantly connect to the existing Wi-Fi infrastructure at ABGH facilities.

This will allow people (administrators, doctors, nurses) to be able to identify patients quickly and easily, or to be able to find patients if they are out of their room but still within an ABGH location.

Functionality: Mobile Identity will create a modified layout to our existing client portal/app that is enjoyed by many of our customers. The existing client facing part of the app is only used for read-access to backend records, the enhancement will increase key data elements requested and also allow for clients to modify key data elements such as known medicines and insurance data, it will also be allowed to be used to staff to update other information as needed directly from the app. An authorized user (administrator, doctor, nurse) can use their private QR code identification to allow the application to temporarily update backend data stores. This still can only impact certain fields such as address, insurance details, appointments, and medications in use. Patients can then use the existing app to pull up ABGH locations, pass that information over to their favorite mapping/travel software, and be able to see where they are based on GPS data and tying into publicly available mapping/location data such as Google Maps.

The enhanced Patient Tracking system will still allow for the existing QR/barcode methods of identifying patients and will enhance the abilities of the system to include a near-real-time way to track and identify patients. Upon arrival to a ABGH location, patients will be signed in and issued a unique ID and bracelet for that stay. The bracelets will then connect to and monitor a patient's location by communication with the existing Wi-Fi network. In the first phase of the roll out, the bracelets will send their location data to their existing patient identity in the system. This information can be leveraged by hospital staff when needed, either to identify a specific person in a specific room, or to look for/query a specific person in a given facility.

Expected Value: Mobile Identity: As all locations managed by ABGH have 100-250 beds, studies show that the average net patient revenue varies based on the region but the average net revenue in 2021 was $207.6M per hospital (Tieche, 2023). If Mobile Identity is able to positively impact customer satisfaction to increase acquiring/retaining patients by 1% then the system would yield approximately $1MM in additional revenue at least annually per location. Enhanced Patient Tracking: Studies show that the average out of court settlement wrong-site surgery and liability was over $130,000 not to mention the damage to an organization's brand and drop in customer confidence. If ABGH were able to leverage the Enhanced Patient Tracking system to avoid a single incident per site, the annual the savings would be $130,000 per location across the ABGH network. Additionally, a general sense of increased customer satisfaction/intimacy would have similar financial increases similar to the Mobile Identity features. Combined this could yield up to $19MM in value annually.

Special Issues or Constraints:

The Mobile Identity/Enhanced Patient Tracking features could be taken on as a special project with the existing software development staff within the ABGH organization. It would need anywhere from 3-6 personnel (developers, testers, administrators) to implement over a period of six months to one year. This would allow us to perform a series of unit tests to a small audience roll out across our three smallest campuses. This would take approximately six months for initial development and a small scope rollout (three sites), and then ABGH can expand and replicate the success to the remaining locations over the course of an additional six months (one year total). Additionally, ABGH could contract out the work to persons outside of the ABGH organization as needed through staff augmentation. The development team would then report to the

implementation team which of course would need to have access to ABGH locations for the implementation/mapping/roll out.

The enhancements to the application would require the developers to have access to the existing databases that power the mobile application and the check-in and monitoring processes that currently exist using QR/barcodes.

The enhancements to the application would require the developers to have access to the repository for the mobile application source code to update/implement features as needed.

The enhancements are expected to leverage existing and available software apps for triangulation/positioning such as the WifiRttLocator App developed with Google or other publicly available software repos such as https://github.com/initbrain/Python-Wi-Fi-Positioning-System. Although there are GPS tracking tools that are accurate within a few meters, GPS can be blocked by the structures where patients will reside while using the devices. The dev team will identify which base is the best for providing location and then mapping that back to a model of the facilities.

The enhancements will require personnel to map and build out known dimensions/floorplans of buildings as they are migrated into the system.

The enhancements will require the acquisition of smartwatches that can run the software for uniquely identifying persons through Wi-Fi triangulation.

The estimated cost of the development of the enhancements including the full roll is expected to be $500,000 plus the cost of the bracelets. The cost of the bracelets will be negotiated but should not exceed $100 per unit with an average of 250 beds per location, and 17 locations or $425,000.

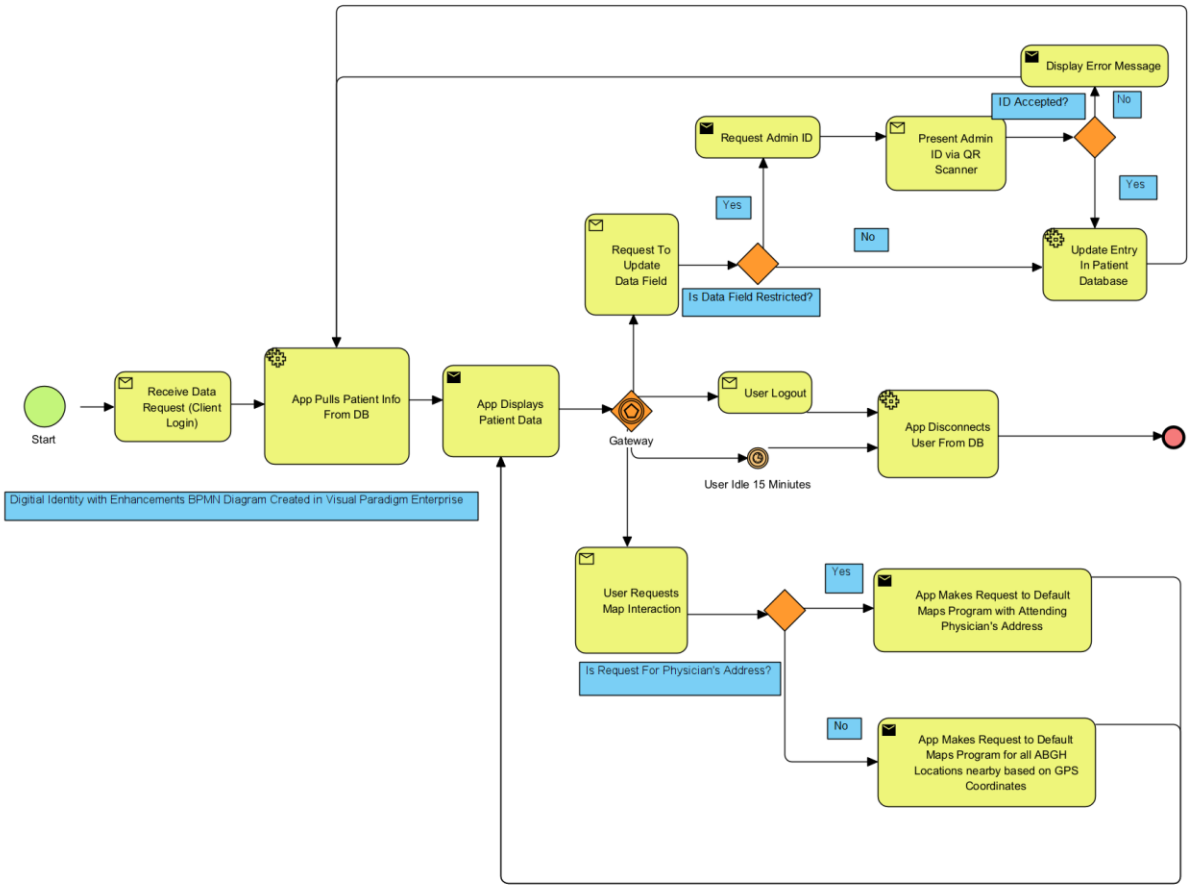
With the ongoing cost to maintain the system and expected replacements of bracelets, the total cost of the project would be expected not to exceed $1,250,000 over the first three years.

3. A business process model using BPMN for the key business processes your system is intended to support.

The following process flows have been identified:

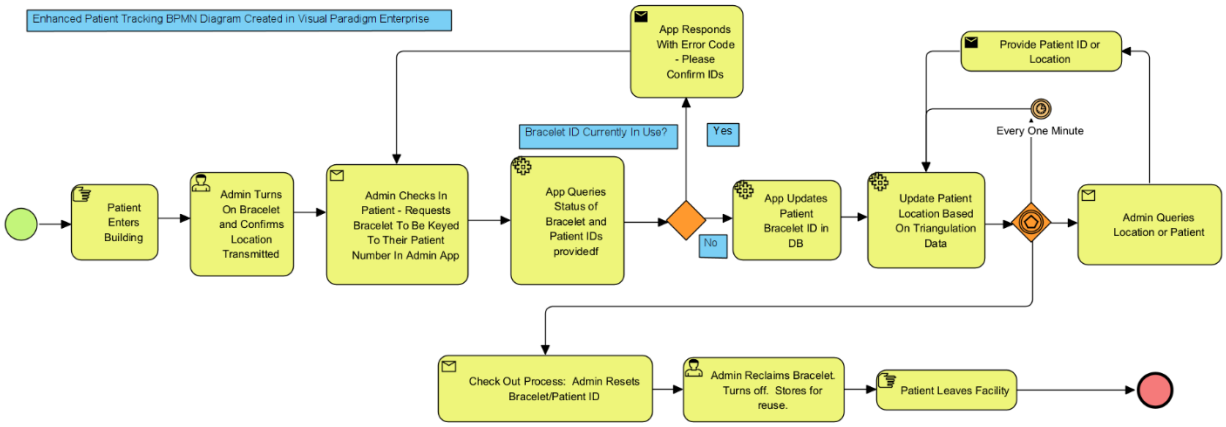
Digital Identity Flows:

- Enrollment by Administration (populates all existing data) – Happens outside of the Digital Identity flow but included here for completeness.
- Pull data down from DB to Mobile Device (Login and screen refresh)
- Push data to DB by user (Select Fields)
- Push data to DB by administrator (All Updatable Fields)
- Locate ABGH Physician Location (Sends request to default Map Program)
- Locate nearest ABGH Location (Sends request to default Map Program)
- End Session (Timeout/Log Out)

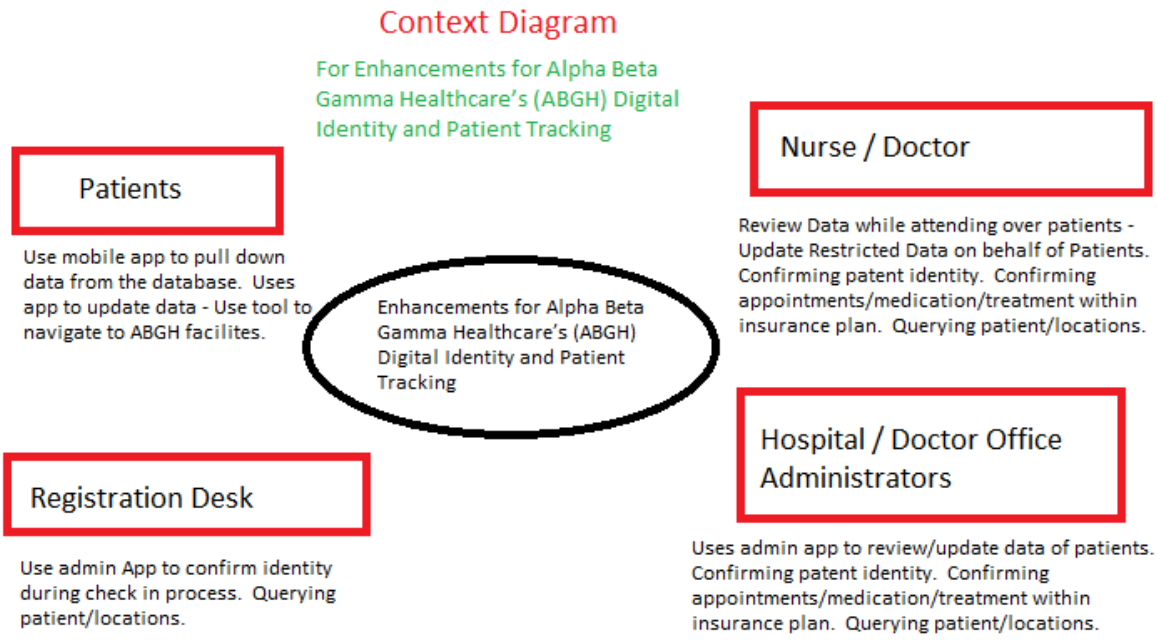


Enhanced Patient Tracking Flows

- Check in -> Enroll Patient at Location (Ties unique bracelet ID to their patient ID)
- Broadcasting Location to DB
- Admin Query Location (Query persons in a location such as room or query location of a person)
- Check Out -> Relinquish Bracelet (Set bracelet ID to default for storeroom)



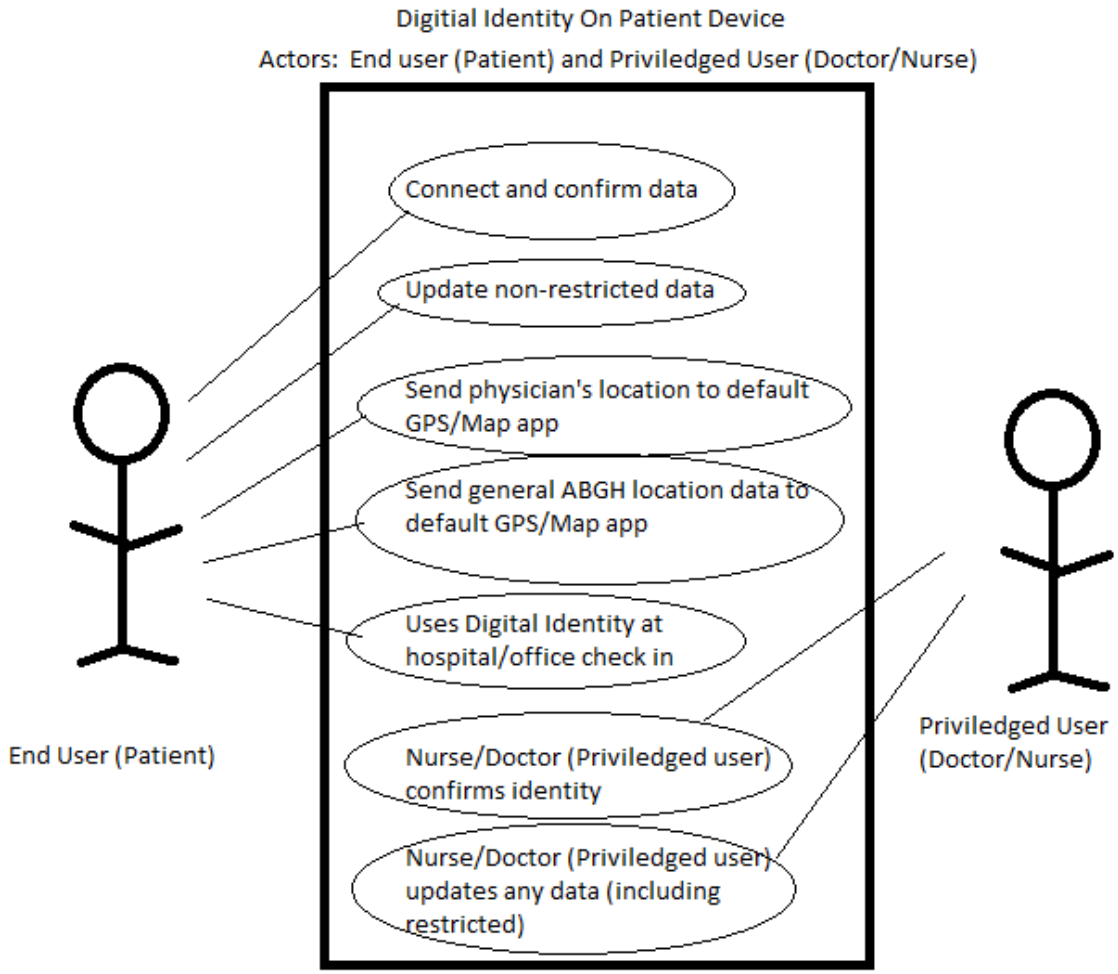
4. A Context Diagram for the proposed system



5. Process Model: Use-Case Diagram and use case descriptions for critical business processes in the proposed system

Listed are the following Use-Cases and accompanying diagrams.

For using the Digital ID app on an end user's device:



User-Case Name: User Connects and Displays Data
ID: 1
Importance Level: High
Primary Actor: User (Patient)
Stakeholders and Interests: User (Patient)
Brief Description: The user logs in and connects to the database through the app on their mobile device. Device displays current data in the GUI. User may use this data to identify themselves at ABGH locations.
Trigger: User logs into the app on their mobile device.

Type: External
Relationships:
Association: User (Patient)
Include:
Extend: User Updates Data, User Identifies themselves with Digital ID
Generalization:
Normal Flow of Events:
1) User Logs into application
2) Application makes system call to database and pulls updated data to the application
3) Applications displays updated information
Subflows: None
Alternative/Exception Flows:
1) User not in system (fail to identify)
2) Application unable to connect to DB (Error Message)

User-Case Name: User Updates Data
ID: 2
Importance Level: High
Primary Actor: User (Patient)
Stakeholders and Interests: User (Patient)
Brief Description: After the user logs in and connects to the database through the app on their mobile device. Device displays current data in the GUI. User then updates fields accessible to them to add/modify/delete fields based on their permissions. As an example, a user cannot update their DoB.
Trigger: User selects fields in the GUI and submits updates.
Type: External
Relationships:
Association: User (Patient)
Include: User Connects and Displays Data
Extend:
Generalization:
Normal Flow of Events:
1) User selects column to edit and hits the edit key for fields they have permission to update
2) User updates the field with new data which may include 'null'
3) User commits new data
4) Application pushes new data to overwrite existing data in the backend database
5) Application queries database to refresh given view to confirm that data has been changed.
Subflows:
Alternative/Exception Flows:
1) System sends error message if user attempts to delete elements that require data in the field.

2) System fails to connect to the DB (sends error message)

User-Case Name: Physician Office Map Request
ID: 3
Importance Level: Medium
Primary Actor: User (Patient)
Stakeholders and Interests: User (Patient)
Brief Description: While logged into the application on their mobile device, the user navigates to their physician's contact information. The user clicks the button that forwards the location information to their default GPS/Maps application for directions.
Trigger: User clicks button to send information to default GPS/Maps application.
Type: External
Relationships:
Association: User (Patient)
Include: User Connects and Displays Data
Extend:
Generalization:
Normal Flow of Events:
1) User clicks button to send information to default GPS/Maps application.
2) Application invokes the default GPS/Maps application and sends information for directions
3) Default GPS/Maps application users the user's location (GPS) and navigates to physician's location.
Subflows:
Alternative/Exception Flows:
1) Default GPS/Maps application not identified/installed
2) GPS disabled on device

User-Case Name: ABGH Closest Location Map Request
ID: 4
Importance Level: Medium
Primary Actor: User (Patient)
Stakeholders and Interests: User (Patient)
Brief Description: While logged into the application on their mobile device, the user navigates to their physician's contact information. The user clicks the button that forwards general ABGH (Not the physician's office) location information to their default GPS/Maps application for directions.
Trigger: User clicks button to send information to default GPS/Maps application.
Type: External
Relationships:
Association: User (Patient)
Include: User Connects and Displays Data
Extend:
Generalization:

Normal Flow of Events:

1) User clicks button to send the closest ABGH office information to default GPS/Maps application.

2) Application invokes the default GPS/Maps application and sends information for directions

3) Default GPS/Maps application users the user's location (GPS) and navigates to physician's location.

Subflows:

Alternative/Exception Flows:

1) Default GPS/Maps application not identified/installed
2) GPS disabled on device

User-Case Name: User Identifies themselves with Digital ID
ID: 5
Importance Level: High
Primary Actor: User (Patient)
Stakeholders and Interests: User (Patient), Personnel (Doctors/Nurses), Registration Desk
Brief Description: After the user logs in and connects to the database through the app on their mobile device. Device displays current data in the GUI. User then uses this information to identify themselves at ABGH locations (Doctor's offices, hospitals, surgery centers, etctera). Information is received by Personnel/Registration Desk and acted upon as needed to confirm the identity of the user.
Trigger: User demonstrates their Digital ID to ABGH personnel
Type: External
Relationships:

Association: User (Patient)
Include: User Connects and Displays Data
Extend: Registration Desk (Check-In), Registration Desk (Check-Out)
Generalization:

Normal Flow of Events:

1) User displays data and shares their personal device with personnel who use the application to identify the user

2) Personnel confirm identity of patient

Subflows:

Alternative/Exception Flows:

1) System fails to connect to the DB (sends error message)

User-Case Name: Privileged User Updates Data
ID: 6
Importance Level: High
Primary Actor: Privileged User (Doctor/Nurse)
Stakeholders and Interests: User (Patient), Privileged User (Doctor/Nurse)
Brief Description: After the user logs in and connects to the database through the app on their mobile device. Device displays current data in the GUI. User hands their device over to a

privileged user (Doctor/Nurse) to update any data (including restricted data). Privileged User then updates fields accessible to them to add/modify/delete fields based on their permissions. As an example, even a privileged user cannot update the patient ID.
Trigger: Privilege User identifies self and selects fields in the GUI and submits updates.
Type: External
Relationships:

Association: User (Patient), Privileged User (Doctor/Nurse)
Include: User Connects and Displays Data
Extend:
Generalization:

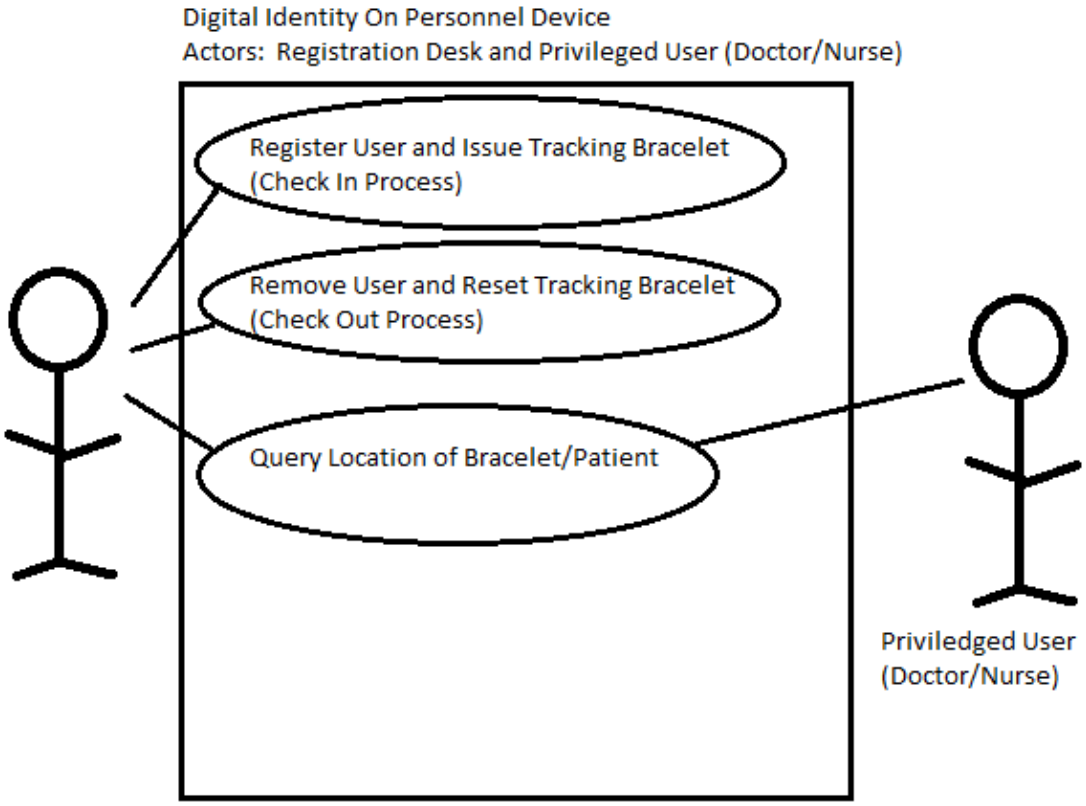
Normal Flow of Events:

1) Privileged User (Doctor/Nurse) scans in QR code on their badge to identify as privileged user.
2) Privileged User (Doctor/Nurse) selects column to edit and hits the edit key for fields they have permission to update
3) Privileged User (Doctor/Nurse) updates the field with new data which may include 'null'
4) Privileged User (Doctor/Nurse) commits new data
5) Application pushes new data to overwrite existing data in the backend database
6) Application queries database to refresh given view to confirm that data has been changed.

Subflows:
Alternative/Exception Flows:

1) System sends error message if user attempts to delete elements that require data in the field.
2) System fails to connect to the DB (sends error message)

For using the Digital ID app on a personnel's device in conjunction with tracking bracelets.



User-Case Name: Registration Desk (Check-In)
ID: 6
Importance Level: High
Primary Actor: Registration Desk
Stakeholders and Interests: Registration Desk, Patients
Brief Description: The user arrives at an ABGH facility. User identifies themselves with the Digital Identity. Registration Desk confirms the identity and issues a tracking bracelet to assist in identifying the person and for location information during their stay. Bracelet issuing requires Registration Desk to connect the patient ID and the bracelet ID.
Trigger: User arrives at ABGH facility for treatment.
Type: Internal
Relationships:
- Association: Registration Desk, Patient
- Include: User Identifies themselves with Digital ID
- Extend: Personnel Locate Bracelet/Patient, Registration Desk (Check-Out)
- Generalization:

Normal Flow of Events:

1. User (Patient) approaches Registration Desk and identifies themselves with their digital ID
2. Registration Desk pulls up User's profile to confirm treatment and attending physician
3. Registration Desk takes unused bracelet out of storage
4. Registration Desk confirms that the bracelet is charged, functioning to demonstrate location, and not currently issued to an existing patient.
5. Registration Desk updates ownership to the patient
6. Registration Desk affixes bracelet to patient
7. Registration Desk has patient sit in waiting area and notifies attending physician

Subflows:
Alternative/Exception Flows:

1. Bracelet nonresponsive/battery dead (obtain alternate bracelet)
2. Bracelet issued to other patient (Put in query to attending physician of patient and obtain alternate bracelet)

User-Case Name: Registration Desk (Check-Out)
ID: 7
Importance Level: High
Primary Actor: Registration Desk
Stakeholders and Interests: Registration Desk, Patients
Brief Description: The user departs an ABGH facility. User identifies themselves with the Digital Identity. Registration Desk confirms the identity and relinquishes tracking bracelet. Bracelet turn-in requires Registration Desk to disconnect the patient ID and the bracelet ID.
Trigger: User departs ABGH facility post treatment.
Type: Internal
Relationships:
Association: Registration Desk, Patient
Include: User Identifies themselves with Digital ID, Registration Desk (Check-In)
Extend:
Generalization:
Normal Flow of Events:

1. User (Patient) approaches Registration Desk and identifies themselves with their digital ID
2. Registration Desk pulls up User's profile to confirm treatment and attending physician
3. Registration Desk confirms that the bracelet is charged, functioning to demonstrate location, and not currently issued to an existing patient.
4. Registration Desk updates ownership to a default code for the facility
5. Registration Desk returns bracelet to storage
6. Registration Desk notifies attending physician of departure

Subflows:
Alternative/Exception Flows:

1. Bracelet nonresponsive/battery dead (send to maintanence)

User-Case Name: Personnel Locate Bracelet/Patient
ID: 8
Importance Level: High
Primary Actor: Registration Desk, Personnel (Doctors/Nurses)
Stakeholders and Interests: Patients, Registration Desk, Personnel (Doctors/Nurses)
Brief Description: ABGH personnel (Registration Desk, Personnel (Doctors/Nurses)) use personnel device to identify the location of a bracelet/patient.
Trigger: Registration Desk, Personnel (Doctors/Nurses) access application to find bracelet/patient location.
Type: Internal
Relationships:
Association: Registration Desk, Personnel (Doctors/Nurses)
Include: Registration Desk (Check-In)
Extend:
Generalization:
Normal Flow of Events:
1. Registration Desk, Personnel (Doctors/Nurses) pull up application on personnel device and search by either location or patientID to confirm location of bracelet/patient.
2. Application pulls location information from the DB
3. Application displays location of bracelet/patient information

Subflows:
Alternative/Exception Flows:
1. Patient not actively associated with a bracelet ID
2. Bracelet ID heartbeat not detected (bracelet removed from premise or battery depleted). Threshold for failure to respond = 15 minutes.

User-Case Name: Tracking Data Updated
ID: 9
Importance Level: High
Primary Actor: Internal System
Stakeholders and Interests: Registration Desk, Personnel (Doctors/Nurses)
Brief Description: Bracelets will continue to update their location data based on the approved technology for WiFi triangulation such as the WifiRttLocator App developed with Google. Every five minutes the system will poll all of the "active" devices in the system associated with that location. The system will then update the database with the new location data.
Trigger: Automatically
Type: Internal
Relationships:
Association:
Include:
Extend:
Generalization:
Normal Flow of Events:
1. Bracelet continually updates location information

2. System connects to bracelet via api ID/password and queries location information every five (5) minutes
3. System updates the DB with new information

Subflows:

Alternative/Exception Flows:

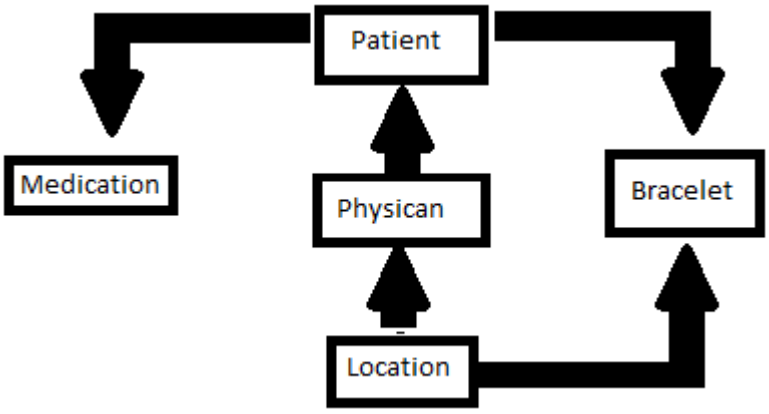
1. Bracelet not responding. Stolen/Battery depleted/moved outside of range of WiFi
2. Failure to connect to the DB (Wait and retry)

6. Data Model: A class diagram for the proposed system based on data dictionary without methods

For the class diagrams, per the lecture example they will be:
Patient
Physician
Medications
Locations

Patient has some items updateable by the patient identified in the data dictionary. All other fields are privileged and able to be updated/corrected by an authorized administrator such as a doctor.

Additionally, there is a class that functions autonomously from human input and it is when the app requests the locations calculated by the tracking bracelets. We will simply call that: Bracelet



Patient	**Description**
-patientID: integer (key)	Unique Identifier of patients
-name: string	Name of patient

-address: string	Address of patient - Patient Can Update
-startDate: date	First date of patient enrollment
-phoneNumber: string	Phone number of patient- Patient Can Update
-insuranceProvider: string	Insurance provider of patient- Patient Can Update
-insurancePlanID: string	Insurance plan of patient- Patient Can Update
-insuranceGroupID: string	Insurance group Id of patient- Patient Can Update
- dateOfBirth: date	Date of Birth of patient
-physicianID: integer	Physician ID of patient

Physician	**Description**
-physicanID: integer(key)	Unique Identifier of physician
-name: string	Physician Name
-locationID: integer	Location ID for display and to send to GPS/maps as needed
-phoneNumber: string	Phone number for display and to send to phone as needed

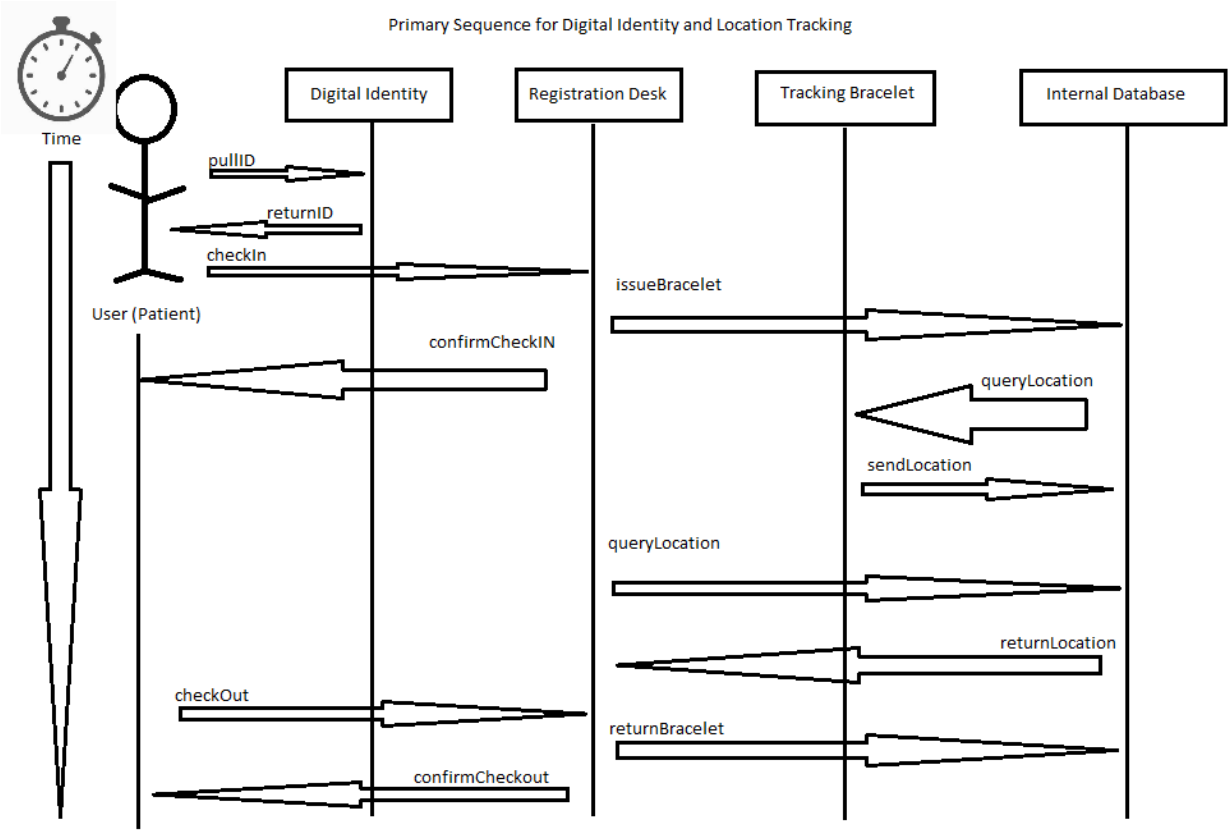
Medications	**Description**
-medicationID: Integer (key)	Unique Identifier for the line item
-patientID: integer	Ties to patientID
-medName: string	Name of the medicine or generic
-medDosage: string	Dosage of medicine, typically in mg
-medFrequencyindays: string	Frequency in days. Example 1 would be 1 per day. 1/30 would be monthly. 4 would be four times a day.
-medDateStarted	Date starting the medicine.
-medDateEnded	Date medicine most recently stopped. If 'null' then medicine currently in use. Note: Records do not get deleted, instead reset this field if it becomes used again.

Locations	**Description**
-locationID: integer (key)	Location ID needs to include a base location for the building and then a unique identifier for each room in a building/floor/room combination.
-address1: string	Street location of address
-address2: string	Second location for address such as a building number in a complex
-city: string	City location of address
-state: string	State location of address
-zip: string	Zipcode location of address
-floor: string	Floor location at the given building

-room: string	Room location on a given floor in a given building
-phoneNumber: string	Phone number of the building/room/office if applicable. May be 'null'

Bracelet	**Description**
-braceletID: Integer (key)	Unique identifier of bracelet hardware.
-patientID: integer	Patient ID associated to the bracelet as part of checkin process.
-locationID: integer	Location ID associated to the bracelet. Requested from bracelet at the provided time interval such as every minute. Calculated when requested based on triangulation from wifi hotspots in location.

7. Object Behavior Model: A Sequence Diagram for the major Use Case in the proposed system



8. Documentation of all data used in the above models using the data structure notation.

Patient:
patientID: Integer (Primary Key) - Unique Identifier of patients
name: String - Name of patient
address: String - Address of patient (Updatable by Patient)
startDate: Date - First date of patient enrollment
phoneNumber: String - Phone number of patient (Updatable by Patient)
insuranceProvider: String - Insurance provider of patient (Updatable by Patient)
insurancePlanID: String - Insurance plan of patient (Updatable by Patient)

insuranceGroupID: String - Insurance group ID of patient (Updatable by Patient)
dateOfBirth: Date - Date of Birth of patient
physicianID: Integer (Foreign Key) - Physician ID of patient

Physician:
physicianID: Integer (Primary Key) - Unique Identifier of physician
name: String - Physician Name
locationID: Integer (Foreign Key) - Location ID for display and to send to GPS/maps as needed
phoneNumber: String - Phone number for display and to send to phone as needed

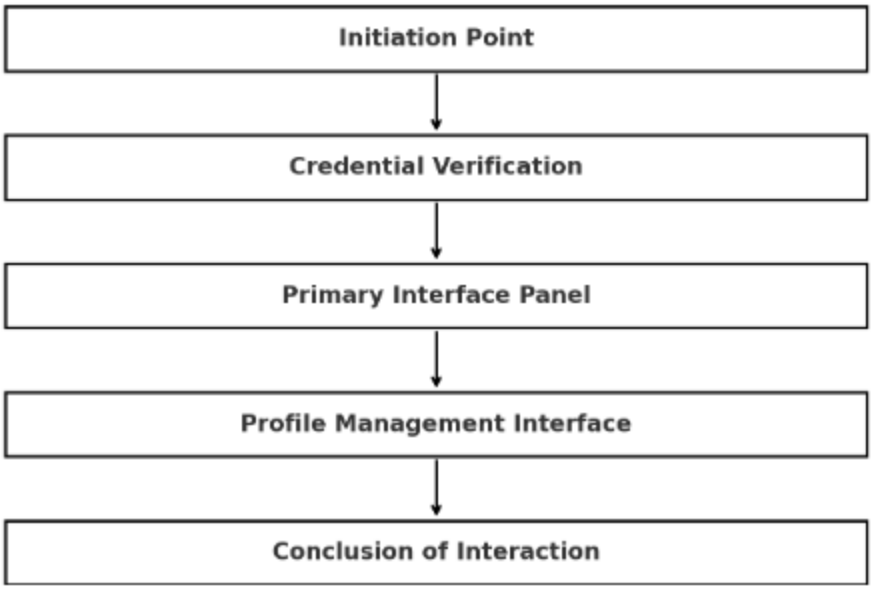
Medications:
medicationID: Integer (Primary Key) - Unique Identifier for the line item
patientID: Integer (Foreign Key) - Ties to patientID
medName: String - Name of the medicine or generic
medDosage: String - Dosage of medicine, typically in mg
medFrequencyindays: String - Frequency in days.
medDateStarted: Date - Date starting the medicine.
medDateEnded: Date - Date medicine most recently stopped.

Locations:
locationID: Integer (Primary Key) - Location ID including a base location for the building and unique identifier for each room
address1: String - Street location of address
address2: String - Secondary location for address
city: String - City location of address
state: String - State location of address
zip: String - Zipcode location of address
floor: String - Floor location at the given building
room: String - Room location on a given floor in a given building
phoneNumber: String - Phone number of the building/room/office

Bracelet:
braceletID: Integer (Primary Key) - Unique identifier of bracelet hardware.
patientID: Integer (Foreign Key) - Patient ID associated with the bracelet.
locationID: Integer - Location ID associated with the bracelet.

9. Functional Specification Document for the proposed system Design

This diagram illustrates the user's path through the system, showing the order of interactions from the first interaction to the end of the session.



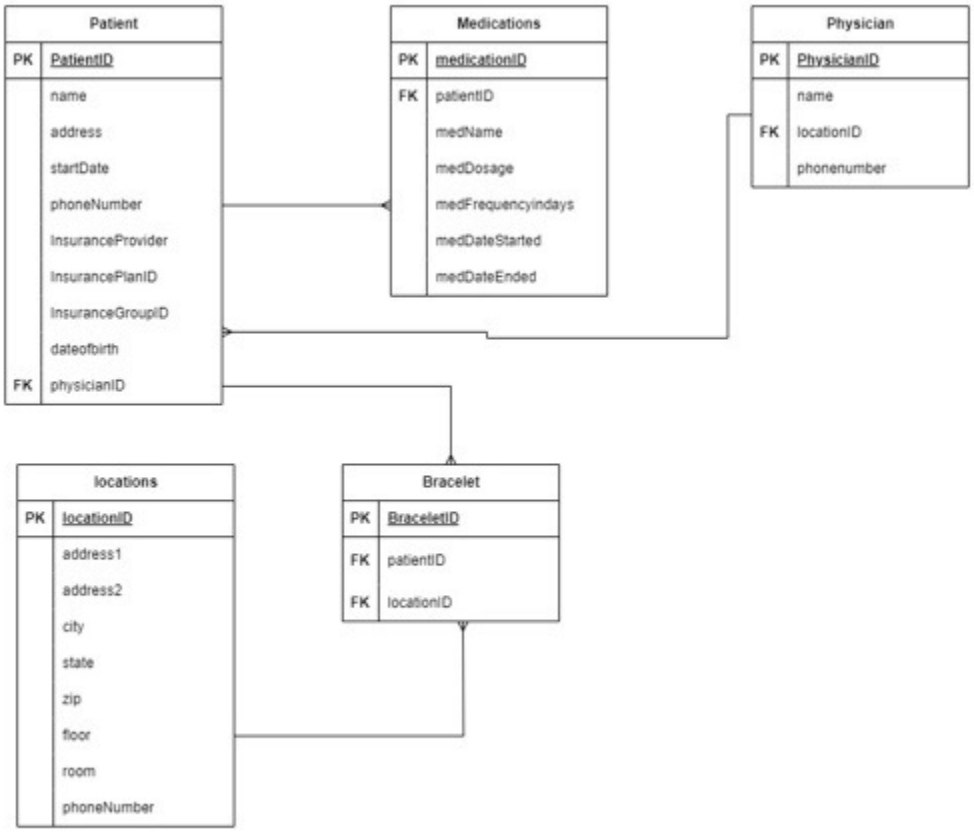
- **Initiation Point:** Indicates when a user first interacts with the platform.
- **Credential Verification** (Sign-In/Enrollment): This phase involves users proving who they are by logging in or enrolling on the website, which grants them access.
- **Primary Interface Panel:** Following verification, users reach the primary interface panel, which functions as the main control panel for using the functionalities of the system.
- **Profile Management Interface:** This interface gives users control over their data by letting them see and edit their account and personal information.
  Conclusion of Interaction: This indicates that the user is done interacting with the system and can log out or terminate their session.

10. **Interface Design: Layout of the interfaces used to interact with the system to use the features you have proposed. You can use any of the visual development tools to design the interfaces**

Login: The portal via which users verify their identity.
Main Menu: The focal point of the program, from which you may access all of its primary functionalities.
Profile: Users can access and amend their personal and medical information in the profile area.
Settings: this is where users adjust their preferences and app settings.
Navigation: Users may traverse the app with this capability, which can also be integrated with the physical navigation at healthcare facilities.
Map View: Shows the healthcare facility's layout on a map, making it easier for users to find specific departments, rooms, or amenities.
Details: Offers comprehensive details on the chosen place or service.

Help: Provides answers to frequently asked questions, contact details, and live chat as well as user support choices.
The application's navigation paths are indicated by the arrows, which make sure that the user's journey is visibly recorded.

11. Database Design: You need to simply show all the tables with their attributes, keys, foreign keys, and constraints. There is no need to implement the database.



12. Complete Class Diagram that includes attributes and methods for each class based on data dictionary and sequence diagrams

This deliverable was assigned to Sowmya who had a death in the family and was unable to complete.

13. Software Design: Document at least 5 methods using contracts. Specify the algorithms for these 5 methods using Structured English. Choose the most complex methods in your system for these specifications.

1) **updatePatientInformation**

Input – patientID (integer)

Output – Success (Boolean)

Object – newInformation (string)

It updates the patient information with the new information provided by the patient based on the **patientID.**

Algorithm:

Validate inputs: check whether the patient information and patientID is valid and the new information entered is not empty.

If inputs are true and valid:

a) Get the patient record using patientID
b) Update the patient record with the newInformation
c) Save the record which is updated.
d) Set success to true.

Else

Set success to false.

Return Success.

2) **locatePhysician**

Input – physicianID (integer)

Output – physicianLocation (string)

Retrieves the location of the physician based on the physician ID

Algorithm:

Validate Input – Check if physicianID is valid.

If the input is valid:

a) Get the physician record using physicianID
b) Fetch the location from the record.

Else

Set physician location is null.

Return physicianLocation.

3) **addMedication**

Input – patientID (integer) and medInfo (Object)

Output – medicationAdded (boolean)

This adds a new record for the patient medication based on the information provided.

Algorithm:

Validate input: Check if patientID is valid and entered new information is not empty.

If inputs are valid:

a) Create a new record with patientID and medicationInfo.
b) Save the record .
c) Set medicationAdded to true .

Else

Set medicationAdded to false.

Return medicationAdded.

4) **checkOutPatient**

Input – braceletID

Output – patientCheckedOut (Boolean)

It checks out the patient and all related information based on the braceletID.

Algorithm:

Validate Input – Check if braceletID is valid.

If output is valid:

a) Get the bracelet information from the bracelet record using braceletID.
b) Reset the information of location.
c) Save the record with the updated information.
d) Set patientCheckOut to true.

Else

Set the patientCheckOut to false.

Return patientCheckOut.

5) **updatePhysicianContact**

Input – physicianID (Integer) and newContactInfo (object)

Output – contactUpload (Boolean)

Based on the physicianID update the contact of physician.

Algorithm

Validate input – Verify physicianID and make sure newContactInfo is not empty.

If physicianID is valid:

a) Get the record of the physician based on physicianID.
b) Update the contant information with newContactInfo.
c) Save the record with the information updated.
d) Set contactUpdated to True.

Else

Set contactUpdated to False.

Return contactUpdated.

14. Presentation: Prepare a 10-minute presentation (voice over ppt) of your project. All team members should participate in it,

References

Raynes & Lawn (2023). *Wrong-Site Surgery and Liability: Who is at Fault?* Raynes & Lawn. https://rayneslaw.com/wrong-site-surgery-and-liability-who-is-at-fault/

Simonite, T. (2020, April 2). *Wi-Fi trick gives devices super-accurate indoor location fixes*. MIT Technology Review. https://www.technologyreview.com/2015/10/16/165765/wi-fi-trick-gives-devices-super-accurate-indoor-location-fixes/

Tieche, M (2023, June) *U.S. hospital revenue and expense trends*. Definitive Healthcare. https://www.definitivehc.com/blog/revenue-trends-at-u.s.-hospitals

Wrong-site, wrong-procedure, and wrong-patient surgery. Patient Safety Network. (n.d.). https://psnet.ahrq.gov/primer/wrong-site-wrong-procedure-and-wrong-patient-surgery

Project Management Deliverables

1. Project Activities
2. Allocation of activities to team members
3. Planned timeline
4. Execution timeline
5. Minutes of project meetings (date, time, team members present, topic discussed)

Task Description	Task Owner			Target Date	Completion Date	Notes
	Pavankumar Bhavanasi	Matthew Dorrance	Sowmya Yella			
Team Formation	X	X	X	8/30/2023	8/30/2023	
Brainstorming Topics for processes/improvements/firms	X	X	X	9/23/2023	9/23/2023	
Confirm System/major functions	X	X	X	11/19/2023	11/19/2023	
Executive Summary Write Up	X	X	X	11/30/2023	11/30/2023	
Problem Statement	X	X	X	11/30/2023	11/30/2023	
ANALYSIS						
Business Process Model		X		12/2/2023	12/2/2023	
Context Diagram		X		12/2/2023	12/2/2023	
Process Model		X		12/2/2023	12/2/2023	
Data Model		X		12/5/2023	12/5/2023	
Object Behavior Model		X		12/5/2023	12/5/2023	
Documentation (Data Structure Notation)	X			12/6/2023	12/6/2023	
Functional Specification Document	X			12/6/2023	12/6/2023	
DESIGN						
Interface Design	X			12/7/2023	12/7/2023	

Database Design			X	12/7/2023	12/7/2023	
Class Diagram			X	12/7/2023		Sowmya had a death in the family and was unable to complete
Software Design			X	12/7/2023	12/7/2023	
PM Documentation						
Develop Timeline		X		9/23/2023	9/23/2023	
Timetable Check-in One		X		11/19/2023	11/19/2023	
Timetable Check-in Two (Delegate all remaining action items)		X		11/30/2023	11/30/2023	
Final Meeting Minutes (Document final assembly		X		12/8/2023	12/8/2023	

Meeting Minutes:

Meetings consisted of team meetings including video/audio and screen sharing. Additionally, meetings took place as ongoing discussions in our group chat in Microsoft Teams (Group 6 SAPM). The ongoing chat allowed us to meet up asynchronously to discuss, plan, delegate, share evidence, critique and execute sections of the project. I have documented here either chat or meeting discussions.

Date/Time: 8/30/2023 8:15PM

Method: Chat

Attendees: Matthew Dorrance, Sowmya Yella

Discussion Topics: Initial forming of the team. Bhavanasi was not able to attend. Dorrance and Yella discussed the class up to this point, expressed interest in teaming with each other and talked through a few ideas for firms. Nothing solid at this point.

Date/Time: 9/23/2023 4:47PM

Method: Audio Chat

Attendees: Pavankumar Bhavanasi, Matthew Dorrance, Sowmya Yella

Discussion Topics: The team properly formed. Dorrance was identified as the PM for the semester. Brainstormed topics for firms and processes. Outlined general timeline. Understanding that the team would need to resume after some time and choose topics and build out problem statement.

Date/Time: 11/19/2023 12:00PM

Method: Audio Chat and Team Chat

Attendees: Pavankumar Bhavanasi, Matthew Dorrance, Sowmya Yella

Discussion Topics: Team met to formally identify the firm (ABGH) and the project ideas for the Digital Identity and tracking bracelets. Dorrance was having back surgery on 11/20 and very much had the medical industry on his mind. Outlined the executive summary and problem statement. The team created an outline/skeleton of the idea. Dorrance finished fleshing out the write ups offline. Timeline Check-in 1, with a plan to meet up the following week after Dorrance recovered from surgery to delegate remaining tasks.

Date/Time: 11/30/2023 – throughout the day

Method: Microsoft Teams Chat

Attendees: Pavankumar Bhavanasi, Matthew Dorrance, Sowmya Yella

Discussion Topics: Presentation of project completed up to this point. Delegation of remaining tasks and check-in 2 for existing timetable elements. Discussion on if we were to complete the presentation which was pending getting all the remaining elements before the deadline.

Date/Time: 12/1/2023 3:30PM

Method: Audio Call

Attendees: Pavankumar Bhavanasi, Matthew Dorrance, Sowmya Yella

Discussion Topics: Talk through of the current status of data elements with a lot of content created. Discussed expectations of deliverables through out the next week leading to the deadline.

Date/Time: 12/1/2023 3:30PM

Method: Audio Call

Attendees: Pavankumar Bhavanasi, Matthew Dorrance, Sowmya Yella

Discussion Topics: Talk through of the current status of data elements with a lot of content created. Discussed expectations of deliverables through out the next week leading to the deadline.

Date/Time: 12/3/2023 10:00AM

Method: Audio Call

Attendees: Pavankumar Bhavanasi, Matthew Dorrance, Sowmya Yella

Discussion Topics: Talk through of the current status of data elements with a lot of content created. Teamed together to clarify asks on certain elements.

Date/Time: 12/7/2023 throughout the day

Method: Microsoft Teams chats

Attendees: Pavankumar Bhavanasi, Matthew Dorrance, Sowmya Yella

Discussion Topics: Submitted and collated final data elements thusfar. Yella has had a death in the family, so some elements not completed. Dorrance will try to complete remaining tasks prior to submission.
