COMS 4090: Homework 2

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1. Deriving Scenarios (from the Product Use Cases)

   i) Record waveform blood-pressure reading

   - PUC name: record waveform bp reading
   - Trigger: The user initiates a blood pressure measurement using the Device.
   - Preconditions: The Device is connected, has battery, is connected, and functioning; bpMON app is installed on the user's phone.
   - Interested stakeholders: User, Healthcare providers
   - Actor: User
   - Steps:
     i. Users open the bpMON app on their smartphone.
     ii. The app connects with the Device.
     iii. The Device measures and transmits continuous waveform bp data to the app.
     iv. The app records the waveform reading and displays it to the user.
   - Outcome: The waveform bp reading is successfully recorded in the app, user can look at their previous bp readings at any time.

   ii) Add user's notes at the time to data

   - PUC name: add user's note at the time to data
   - Trigger: The user wants to add contextual information about their condition during a bp reading.
   - Preconditions: There is a bp reading record; The app is opened and displaying the recorded reading.
   - Interested stakeholders: User
   - Actor: User
   - Steps:
     i. After the app records the waveform bp reading, the user is prompted to add notes.
     ii. The user selects the option to add a note.
     iii. A text input field appears for the user to enter their notes.
     iv. The user types in their notes.
     v. The user saves the note which is associated with the corresponding bp reading.
   - Outcome: The user's notes are successfully added and saved with the recorded waveform bp reading, providing context for future reference. Notes can be managed and deleted by the user.

iii) Display results, including alert to contact healthcare provider

- PUC name: display results, including alert to contact healthcare provider
- Trigger: The user completes a blood pressure reading, and the app evaluates the results.
- Preconditions: A waveform bp reading is recorded; The app has processed the data
- Interested stakeholders: Users, Healthcare providers
- Actor: User
- Steps:
    i. After a waveform reading is recorded, the app processes the data.
    ii. The app evaluates the reading against predefined normal bp ranges.
    iii. The app displays the results, including the waveform graph and other information such as the maximum and minimum values.
    iv. If the reading is outside of the normal bp range, the app triggers an alert notification to the user. This will produce a log along with the reading with further details.
    v. The alert suggests the users to contact their healthcare provider for further evaluation.
- Outcome: The results from the waveform bp reading are displayed to the user, along with alerts and suggestions for contacting a healthcare provider if necessary.

2. Gaining Knowledge of the Domain

Users & Providers

I. Both the health care providers and the user base should have a product that is easy to enough to use without referencing auxiliary resources.
II. Both health care providers and end-users will be open to learning and implementing this technology.
III. Our project scope reasonably meets end-users and health care providers needs.
IV. Their will be proper systems in check (error messages, fail-safes, instructions etc.) to handle edge cases of product misuse.
V. Only one user will be using the device.

Technology

I. The device will always give accurate readings or detect inaccuracies and alert the user and or the health care provider.
II. Other smartphone apps and health care facilities have the capability to sync with our blood pressure data.
III. Any technology used in our software will be as future proof as possible, through modular design, regular updates, and compliance with ever changing standards.
IV. The encryption and other possible security protocols will be sufficient in protecting user and health care provider data. A persistent data layer will ultilize something like a SHA-512 encryption preventing unwanted actors from accessing sensitive data.
V. The developer's chosen architecture and technology will be sufficient in handling a reasonable amount of user and data growth.

Development Team & Process

I. The development team has all the necessary skills (or is willing to obtain them), experience, knowledge, and resources to develop this application without major hindrances.
II. The client and developers will be actively communicating during the entire development process.
III. The agreed upon requirements will not change drastically during the development process.
IV. The client and developers have worked together to agree on a realistic budget, time constraint, scope, and discussed any additional resources required before development begins.
V. The development team has been taught the basic knowledge needed to understand the goal of this software before the development process begins (ie. what a waveform BP reading is).

New or Remaining Open Questions

I. What is the estimated amount of users expected to use this application and Device upon launch?
II. What is the likelihood of the Device measuring inaccurately?
III. What are ther specific security concerns for persistent medical data?
IV. Do security regulatory compliances dictate specificity in the use of cloud vs local data storage?
V. What measures will be in place for user support and trouble shooting?

3. Specifying Functional Requirements

EARS: Record Waveform blood-pressure reading

I. When the user opens the application, the application shall automatically connect to the Device via bluetooth.
II. When the user triggers a blood pressure reading using the Device, while the Device is taking the measurement, the application shall display a ‘currently measuring’ message.
III. When the Device finishes its reading, the application shall save the reading data locally and display the reading to the user.
IV. When the application saves the reading data to the cloud, the application shall encrypt (SHA-512) the data.
V. When the user wants to look at previous readings, the application shall display relevant data for each previous reading (ie. date, time, notes, measurement, etc).
VI. If the Device disconnects, then the application shall display instructions on how to reconnect the Device.
VII. While the Device is connected and functioning, if it cannot take a measurement due to user error, then the application shall display troubleshooting steps.
VIII. While taking a reading, if the Device malfunctions, then the application shall instruct the user to retry the measurement.
IX. While taking a reading, if the Device malfunctions on its third attempt, then the application shall instruct the user to contact their health care provider.
X. While saving the measurement, if the application crashes, then the application shall attempt to recover lost data.
XI. If the application cannot recover the data, then the application shall notify the user to redo the reading.

EARS: Add user’s notes at the time to data

I. When the waveform bp reading is recorded, the software shall display a prompt with options to “Add notes” and “Cancel”
II. The software shall be able to store waveform bp readings.
III. The software shall be able to store user notes.
IV. If the user selects “Cancel” when prompted to add notes, the software shall close the prompt and no notes will be added.
V. When the user selects “Add notes”, the software shall display a text box of sufficient size.
VI. While the user is typing their notes in the text box, the software shall correctly display the characters in the text box.
VII. The software shall correctly associate the stored notes with the correct waveform bp reading.

VIII. When the user selects “save notes”, the software shall correctly store the notes.
IX. While the software is saving the notes, if the user closes out of the application, the software shall save notes up until the point of exit.
X. Where a user’s phone is using voice diction, the software shall process voice into text for the notes.

EARS: Display results, including alert to contact healthcare provider

I. The software shall process waveform bp readings into meaningful data that can be interpreted by the user.
II. When the Device is done reading the waveform bp, the software shall receive the data.
III. While the Device is reading the bp, the software shall display that the Device is currently reading blood pressure.
IV. The software shall store normal blood pressure ranges.
V. When the Device is done reading waveform bp, the software shall calculate and compare the blood pressure to that of the normal range.
VI. When the Device is done reading waveform bp, the software shall display the waveform graph.
VII. When the Device is done reading waveform bp, the software shall calculate maximum, minimum, and mean bp.
VIII. The software shall store information about verified healthcare providers.
IX. If the calculated bp is outside the normal range, the software shall alert the user.
X. If the calculated bp is outside the normal range, the software shall alert the healthcare provider that is chosen by the user.

EARS: Sync data to other smartphone applications

I. The software shall have an option for a user to sync bp data.
II. The software shall have a list of known third party applications that it knows how to sync data back and forth.
III. When the user selects the application to sync, the software shall process the bp data into an acceptable format for the selected application.
IV. When synced with another application, everytime a new reading is processed by the bpMon application, the software shall send this data to all applications which are synced
V. If data synchronization fails, the software shall send a message to the user indicating the reason for the failure.
VI. When synchronization with another application is complete, the software shall send a message of completion to the user.
VII. When an application is synced, the software shall send any previous data that was stored to the other application to make sure it has all the data.

4. Specifying Non-Functional Requirements
    I. The application shall have a user interface that is easy to learn and is intuitive to use. (Usability and Humanity Requirements)
    II. The software shall encrypt user data that is being stored in the cloud (Security Requirements)
    III. The software shall notify users of changes to health care provider (Security Requirements)
    IV. The user interface shall be attractive to users (Style Requirements)
    V. The application shall take no longer than 5 seconds to connect to the Device (Performance Requirements)
    VI. The application shall take no longer than 5 seconds to display results to the user after receiving readings from the Device. (Performance Requirements)
    VII. The user interface shall resize appropriately based on the size of the screen (Look and Feel Requirements)
    VIII. The application shall use the American English spelling of all words (Cultural Requirements)
    IX. The application shall be able to run on iOS and Android (Maintainability and Support Requirements)
    X. The software shall ensure that data sent to other applications is the same as what would be sent to the bpMon application (Security Requirements)
    XI. The application should be accessible to users with disabilities
    XII. The application should anonymize the users data so in case of a database attack their is no decipherable link for the data to the user