

Final Project

Design Journal

Group #6

Jared Grounds
Adnane Sentoussi
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Purdue University
Tech 120

Fall 2019

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Purdue University
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Meet the Design Team

Name/Picture	Age	Year at Purdue	Major	Main role in group	Career Aspirations
 Adnane Sentoussi	19	Sophomore	Cybersecurity	<p>Kept the group on track with regards to completing the necessary work before each group meeting and suggested ideas and requirements for the project that abide by the compositional profile.</p>	<p>Adnane hopes to learn everything he can while attending Purdue University and take advantage of any research opportunities and internships that will further his knowledge in his chosen career path.</p>
 Jared Grounds	18	Freshman	Web Programming & Design	<p>Programmed the prototype and final iteration of the solution to the given problem statement.</p>	<p>He hopes to improve upon his current career path by interning at different establishments within Purdue University in order to gain the necessary knowledge for a future, paid job. After graduating, he aspires to become employed as a web developer at a company within his hometown South Bend, Indiana.</p>
 Michael Rosswurm	21	Junior	Audio Engineering Technology	<p>Researched other options during ideation and benchmarking, as well as the capabilities of other Electronic Health Record systems currently in use.</p>	<p>Michael wants to continue studying technology around sound and music productions, and work with a studio or audio technology company.</p>

Executive Summary

Our group first began by choosing problem space within an engineering grand challenge. Since some countries around the globe often take health informatics for granted, we agreed that it would be a viable topic to create a solution for. During the prototyping ideation process, we thought of various different problems that occur within health informatics, such as creating identification cards to help emergency responders with gathering information on an individual in-need, or a device that could digitize a patient's medical records as they are faxed from one hospital or clinic to another. However, after taking our literature reviews into consideration, we ultimately decided that hospital databases could be improved.

The graying population of the United States, adults 65 years of age and older, is projected to increase from 49.2% in 2016 to 94.7 in 2060, according to the US Census Bureau. Because of this, it is essential that new hospitals and clinics have access to a low-cost, low-maintenance hospital database that can be used to keep track of a patient's medical records. Not only is a solution applicable in the United States, but also in other 3rd world countries that rely on assistance from doctors around the world in order to treat ill individuals.

After deciding on the problem space, we then had to synthesize it, along with other gathered information, in order to identify our stakeholders and their point of view. Based on the statistics and other information we studied, we chose both patients and practitioners as the stakeholders. These are priority stakeholders because practitioners will be the individuals operating the patient database, so it will have to be constructed to their needs, and a patient's information will be entered, so we have to ensure that their sensitive medical records are secure.

Then, it was time to begin prototyping the hospital patient database. We began by creating a list of necessary patient information that should be entered into the program, as well as ethnographically interviewing and observing practitioners and clinicians within our problem space. After gaining insight on their time using hospital databases, Jared programmed these features into an application using Visual Basic coding language. He chose this language because it works well with Windows, an operating system that is commonly used around the world. While programming the application, he made sure to add in various security measures in order to protect a patient's medical records. In addition to this, he made the features within the application to be easily accessible to practitioners and their supervisors. During this time of prototyping, we met with other groups and shared our application in order to receive feedback, and tweaked the application according to their suggestions.

Finally, during meeting 24 of our class, we compiled the rest of the feedback we received from our peers and stakeholders into the application, and ran tests on it. Since this application is meant to raise the minimum bar in regards to what a hospital should use for a hospital patient database, we wanted to be sure that it could be run on a system with low requirements, such as a Raspberry Pi. Our application uses an average of 18mb of processing memory per second, which is substantially lower than other patient databases currently being used and each patient file is only approximately 100kb, depending on how many notes and billing statements were added to their file. This ensures that a minimal amount of storage and processing power is needed for our application to function, so the amount of countries that could benefit from this database substantially increases.

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Meeting 13 Tentative Problem Definition and Fieldwork Plans

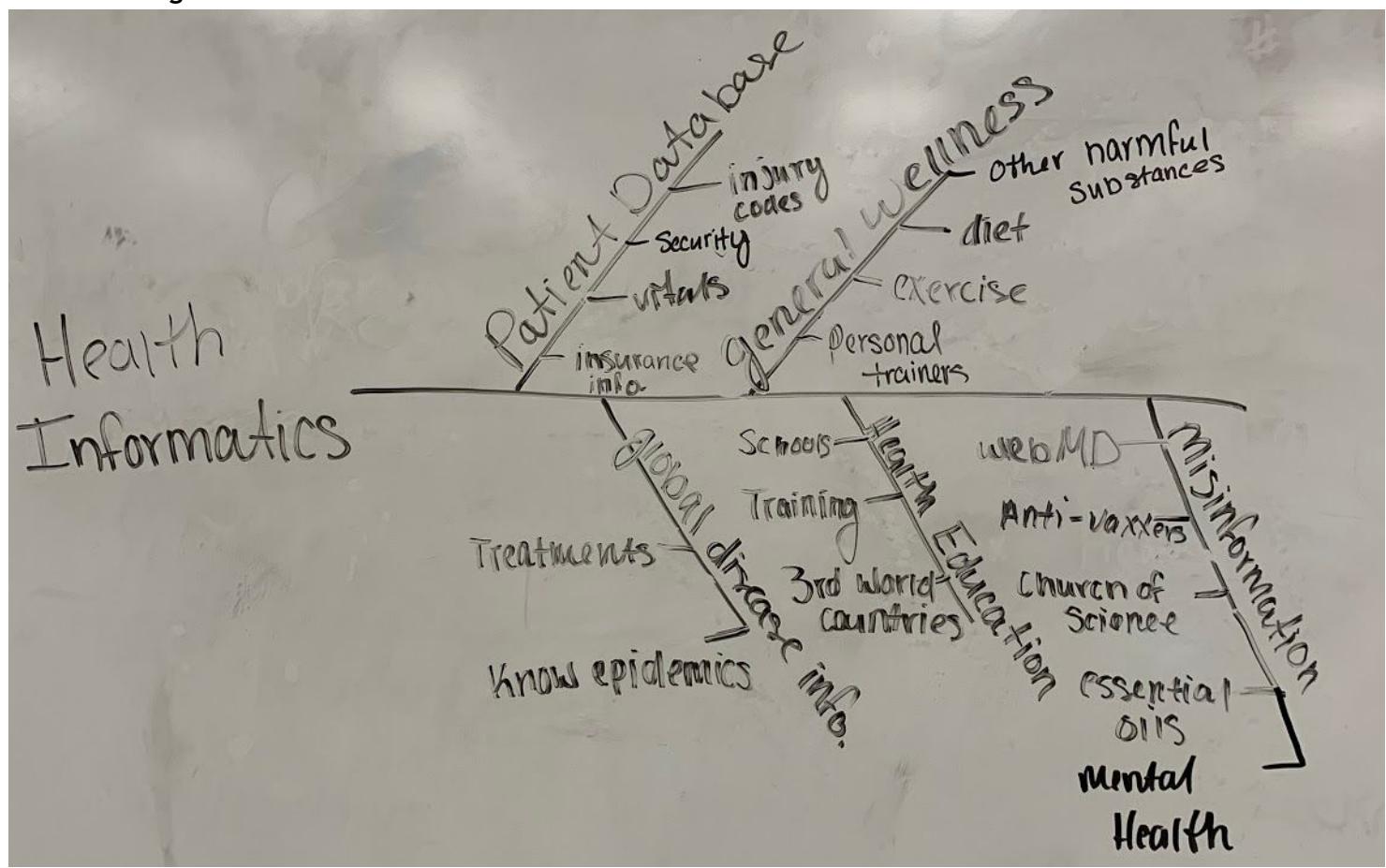
Group Member Names:

Jared Grounds, Michael Rosswurm, Adnane Sentoussi

Contact Information:

jground@purdue.edu rosswurm@purdue.edu asentous@purdue.edu

Fishbone Diagram:



Potential Stakeholders (1 per group member)

Group Member	Stakeholder
Jared	Nurses/CNAs
Michael	Patients

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Adnane	Doctors	
Fieldwork Plans - Minimum 3 in each category & a minimum of 3 per person		
Literature (Member & What to look for)	Interviews (Member & Stakeholder)	Observations (Member & Location)
Jared - Hospital, informational, database	Jared - Nurses/CNA's	Jared - Local hospital
Adnane - Effect of information systems on health, hospitals, etc.	Adnane - Doctor	Adnane Hospital or clinic, maybe even PUSH
Michael - Health misinformation	Michael - Patients	Michael - Online Health Forums

*Further Fieldwork Plan details can be found in Meeting 17

Initial Problem Statement

Potential user groups surrounding health informatics include patients, health professionals, and the general public. Hospitals currently need an efficient, secure method of storing health information online. On the other hand, the general public needs access to trusted information and education regarding health and their general wellness. This is because most hospitals rely on wireless networks and databases to communicate patients' information, and a variety of diagnosis codes they have to remember in order to understand their issues. Furthermore, the general public needs to be aware of misinformation regarding illnesses and their treatments so that they do not waste money and the doctor's time by going to an emergency room for a cold.

Meeting 14 Feedback/Insights from Peers and Instructor

Feedback/Insight	Is it something worth considering?	What needs to be changed?
Possible security breach?	Yes	We have to be very careful about how we build this program so that we prohibit any outside entities from accessing private information. Possible security measures include: sign-in page, patient data changelog, and a time-out period.
How long does it take for the data to be transferred	No	Because the computers will be linked via ethernet cables, the data transfer will be much faster than a traditional wireless connection. We will also protect against two users attempting to update a patient's file at the same time.
It may be cumbersome to set up all of the data cables.	Yes	There will be initial work needed in order to setup the new network, however it will reduce the time and money later in order to fix the multiple databases that currently exist in hospitals.
Include a changelog for the doctors	Yes	In order to update faculty on changes to the system, we will include a changelog as a splash screen.
Separate the doctor database from the patient database?	Yes	We decided to not include two databases, and to focus on fixing the issue with hospital databases.

Meeting 16 - Benchmarking

Benchmarking Existing Solutions – Group 06

Jared Grounds

Content of source

What solution was proposed :

The proposed solution is a computer-based system that generates a patient report as the patient checks in and out of a hospital in order to keep track of their condition, the various treatments they were prescribed, and other crucial information. The program automatically performs these tasks as to make the whole process more efficient.

Specific Questions:

How long does it take to implement? :

Implementation is as simple as installing the software on a computer system that has the necessary hardware requirements. It then automatically installs the necessary files and connects to the local database.

Was it successful? How was success measured?:

Yes, the program was successful. The authors measured their success in how efficiency increased within the hospital. For instance, when a task that can be completed in an average of 15 minutes is completed in 5 minutes, it was considered a success. Time that they saved could now be delegated to focus on other important tasks.

What special equipment or expertise is necessary? :

The only requirements came from the computer itself. The hardware requirements included a computer, monitor, uninterrupted power supply unit, 64GB of ram, a CD ROM, 40GB minimum of hard drive capacity, and a printer. The software requirements included the Windows XP operating system, Microsoft Access, and the Microsoft Visual Basic programming language.

What environmental effects does the solution have? :

By removing a physical media like, x-ray film, paper, and other physical medical records, this solution has the potential to reduce waste that comes from these media, and save money on resources.

What economic effects does the solution have? :

The main economic effect of this solution comes from the reduction of money spent on physical media for medical records, which can help the hospital use the money for covering the costs of unpaid medical bills that taxpayers normally pay for.

What were the successes of the product? :

The authors were able to program an application that increased the efficiency of a particular hospital that was running below average efficiency. Not only this, but they were able to save the hospital money.

What are some drawbacks of the product? :

One of the major drawbacks of this system, in my opinion, is that the database is local. This means that in order to access a patient's medical records, a practitioner must use a particular computer to do so. A better solution would be to implement a database that can be accessed from any computer within the hospital, given the correct practitioner credentials.

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About the Source

Overall Quality: High

Citation in APA format:

(APA Format: <http://owl.english.purdue.edu/owl/resource/560/07/>)

Asabe, S. A., Oye, N. D., & Monday, G. (n.d.). HOSPITAL PATIENT DATABASE MANAGEMENT SYSTEM. Retrieved October 14, 2019, from <https://pdfs.semanticscholar.org/fdea/0e60cff7ddc791c11464177a56f4732c711a.pdf>.

Search terms used:

Hospital, patient, database

Who made the solution?:

The solution was a collaboration between S. A. Asabe, N.D. Oye, and Goji Monday for a case study of General Hospital NORTH-BANK Makurdi-Nigeria.

Why is this a good solution?

1. Authority: Who made the solution?

The contributing authors of this solution are more than qualified in their authority. S. A. Asabe received her Masters' degree in computer science and is a lecturer at Modibbo Adama University of Technology. N.D. received his M.Tech degree from the Federal University of Technology Yola-Nigeria and is a lecturer in mathematics and computer science departments at his graduating university among being a PhD student in Information Systems. Goji Monday received his Bachelor's degree in mathematics and economics from MAUTECH.

2. Accuracy: The reliability, truthfulness, and correctness of the solution

This case study was submitted in the COMPUSOFT international journal of advanced computer technology, which is a credible source. The study included all of the necessary information and even included database diagrams and credible references they used for their case study.

3. Purpose: The reason the solution exists

The individuals have a reasonable purpose for constructing a solution for this problem. Not only this, but their solution can be extended to include other government establishments in order to increase their efficiency in the modern world of computers.

What solution was proposed :

The use of MEDPAR data file that contains records for beneficiaries that use hospital inpatient services.

Specific Questions:

What special equipment or expertise is necessary? :

Access to the Healthcare Cost and Utilization, and Medicare Provider Analysis and review databases

How much does it cost? :

An exact cost was not detailed within the article, however the HCUP database is free to access.

What were the successes of the product? :

Effectively removed certain limitations like the lack of clinical detail, coding variations, and time lags.

What are some drawbacks of the product? :

The information is not localized, so beneficiaries must use the external databases.

About the Source

Overall Quality ("x" one): Medium

Citation in APA format:

(APA Format: <http://owl.english.purdue.edu/owl/resource/560/07/>)

Databases Used for Hospital Quality Measures. (2015, August 21). Retrieved October 14, 2019, from <https://www.ahrq.gov/talkingquality/measures/setting/hospitals/databases.html>.

Search terms used:

Hospital, patient, database

Who made the solution?:

These solutions were collaboratively created by state and federal governments.

Why is this a good solution?

1. Authority: Who made the solution?

The solutions documented in this article are run by the state and federal governments

2. Accuracy: The reliability, truthfulness, and correctness of the solution

The article details the reliability of these databases as well as the quality that they provide to their users.

3. Purpose: The reason the solution exists

The purpose of this solution is to provide beneficiaries with an easy, efficient database to use/ While the cost of MEDPAR is not explained, the HCUP database is free to access.

Constraints and Criteria

Solution:

Computer-based system that generates a patient report as the patient checks in and out of a hospital in order to keep track of their condition, the various treatments they were prescribed, and other crucial information. The program automatically performs these tasks as to make the whole process more efficient.

Possible criteria:

- Able to be installed on computers throughout the hospital
- Program is more efficient than the current systems
- Must display necessary patient information
- Easy to access for all practitioners with the correct credentials/clearance.

Possible constraints:

- Database can be quickly accessed
- Server can still be accessed during routine maintenance
- Computers must meet minimum requirements

Meeting 16 - Benchmarking

Benchmarking Existing Solutions – Group 06

Adnane Sentoussi

Content of source

What solution was proposed : Adoption of Information systems in healthcare

Specific Questions:

How long does it take to implement?:

It depends on the size of the institution that is implementing this form of information system and also how many patients, doctors, nurses they interact with.

Was it successful? How was success measured?:

The source mentions that Information System journals aren't discussing the role of IS in healthcare, despite its importance. In addition, it mentions that this process is complex because hospitals and medical institutions are routine based because of the risk of death, whereas the use of information systems is variable and case dependent.

What special equipment or expertise is necessary?:

People who understand how to build information systems and lots of different hardware and software.

What economic effects does the solution have?:

Once again it depends on the institution and how they have implemented the use of EMRs and information systems. Usually, the ROI is positive.

How much does it cost?:

Depends on the size of the information system that is implemented and how much an institution is willing to invest.

What are some drawbacks of the product? :

It is very hard to implement these systems to hospitals because they are already working in certain ways. They will have to start working differently which leads to a lot of frustration from doctors and nurses. These frustrations lead to errors which can be very dangerous for patient health. Also, this specific source states that some professionals such as surgeons find it cumbersome to carry around devices such as tablets. The source says that the drawbacks differ because relationships and ways people work, especially in healthcare, differ. The usage of information systems also differs and is very complex.

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About the Source

Overall Quality: Medium

Citation in APA format:

Fichman, R. G., Abbasi, A., Hansen, S., Hao, H., Tong, Y., Lu, ... Yan, L. (2011, September 1). Editorial Overview-The Role of Information Systems in Healthcare: Current Research and Future Trends. Retrieved from http://foresight.ifmo.ru/ict/shared/files/201311/1_117.pdf

Search terms used: Health Information Systems, EMR

Who made the solution?:

Whoever invented the idea of IT and storing information digitally. This whole idea and concept is used in many different industries

Why is this a good solution?

1. Authority: Who made the solution?

- Who is the creator of the solution? Is it a person, group of people, an organization?
Few students
- Is he/she the original creator?
yes
- Is the person qualified? What are his/her credentials? What is his/her occupation?
Business students
- Is the source sponsored or endorsed by an institution or organization?
No

2. Accuracy: The reliability, truthfulness, and correctness of the solution

- Is the bias of the creator obvious? Is the source trying to convince you of a point of view?
No, simply informing.
- Where does the information come from? Is it supported by evidence?
All evidence
- Is the publication in which the item appears published, sponsored, or endorsed by a political or other special interest group?
no
- Does the language or tone seem unbiased or free of emotion?
yes

3. Purpose: The reason the solution exists

- What is the intended purpose of the solution: inform, teach, sale?
inform
- Does the point of view appear objective and impartial?
objective
- Are there political, ideological, cultural, religious, institutional leanings presented?
no

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Content of source

What solution was proposed : Adoption of Electronic Medical Records (EMR)

Specific Questions:

How long does it take to implement?:

It depends on the size of the institution that is implementing this form of information system and also how many patients, doctors, nurses they interact with.

Was it successful? How was success measured?:

The source mentions that medical institutions are starting to use information systems but they are still behind compared to other industries.

What economic effects does the solution have?:

Once again it depends on the institution and how they have implemented the use of EMRs and information systems. Usually, the ROI is positive.

How much does it cost?:

Depends on the size of the information system that is implemented and how much an institution is willing to invest.

What were the successes of the product?:

The source however synthesizes many sources that generally state that the implementation of these systems usually makes work much more efficient and easier for employees. In addition, it provides better service for users and higher quality patient outcomes.

What are some drawbacks of the product?:

It is very hard to implement these systems to hospitals because they are already working in certain ways. They will have to start working differently which leads to a lot of frustration from doctors and nurses. These frustrations lead to errors which can be very dangerous for patient health.

About the Source

Overall Quality: High

Citation in APA format:

Hennington, Amy and Janz, Brian D. (2007) "Information Systems and Healthcare XVI: Physician Adoption of Electronic Medical Records: Applying the UTAUT Model in a Healthcare Context," Communications of the Association for Information Systems: Vol. 19 , Article 5. DOI: 10.17705/1CAIS.01905 Available at:
<https://aisel.aisnet.org/cais/vol19/iss1/5>

Search terms used: Health Information Systems, EMR

Who made the solution?:

Final Project Journal
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Whoever invented the idea of IT and storing information digitally. This whole idea and concept is used in many different industries

Why is this a good solution?

1. Authority: Who made the solution?

- Who is the creator of the solution? Is it a person, group of people, an organization?
Two professors
- Is he/she the original creator?
yes
- Is the person qualified? What are his/her credentials? What is his/her occupation?
professors
- Is the source sponsored or endorsed by an institution or organization?
University of Memphis study

2. Accuracy: The reliability, truthfulness, and correctness of the solution

- Is the bias of the creator obvious? Is the source trying to convince you of a point of view?
No, simply informing.
 - Where does the information come from? Is it supported by evidence?
All evidence
 - Is the publication in which the item appears published, sponsored, or endorsed by a political or other special interest group?
no
 - Does the language or tone seem unbiased or free of emotion?
yes
- 3. Purpose: The reason the solution exists**
- What is the intended purpose of the solution: inform, teach, sale?
inform
 - Does the point of view appear objective and impartial?
objective
 - Are there political, ideological, cultural, religious, institutional leanings presented?
No

Constraints and Criteria

Solution: Electronic Medical Record (EMR)

Possible criteria:

- Economical Benefit
- Benefit on patient health
- Quality of work for doctors, nurses, and staff
- Improved job performance
- Better record-keeping for patient information
- Streamlined business process

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- Quality of care improvement

Possible constraints (as many as possible):

- Willingness of staff to implement and work with new systems
- Budget amount
- Amount of staff working on the project

Meeting 16 - Benchmarking

Benchmarking Existing Solutions – Group 06

Michael Rosswurm

Content of source

What solution was proposed: Additional training for medical professionals using EHRs (Electronic Health Records) in order to prevent/reduce errors caused by IT vulnerabilities and related patterns of error.

Specific Questions:

How long does it take to implement?: short/medium (training could be weeks to months)

Was it successful? How was success measured?: Solution was decently successful, but still had improvements to make/issues unaddressed. success can be measured by how long it takes the professionals to take-down/enter data and how the rate of errors changes after implementation

What special equipment or expertise is necessary?: Expert on the software would be needed to teach the training courses

What environmental effects does the solution have?: very little

What economic effects does the solution have?: can take time away from doctors in training, and consequently, can be a drain on a hospital's resources to care for patients.

How much does it cost?: Medium amount. Paying for training and to compensate trainees for their time

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About the Source

Overall Quality ("x" one): Medium

Citation in APA format:

Electronic Health Record–Related Events in Medical... : Journal of Patient Safety. (2019). Retrieved October 15, 2019, from

https://journals.lww.com/journalpatientsafety/Fulltext/2019/06000/Electronic_Health_Record_Related_Events_in_Medical.1.aspx

Search terms used: Electronic health records problems and solutions

Who made the solution?: Journal of Patient Safety

Why is this a good solution? It seems to be the only way to truly address most of our identified problems

1. Authority: Who made the solution

- Legitimate medical /research journal with a focus on patient safety

2. Accuracy: The reliability, truthfulness, and correctness of the solution

- Journal that represents the wellness interest of patients
-

3. Purpose: The reason the solution exists

- EHS related events coming up as part of malpractice claims

Content of source

What solution was proposed : Entirely rebuilding and standardizing medical records on a national scale

Specific Questions:

How long does it take to implement?: Creating a new database may take a couple of months, but there would be a longer period of finding and transferring all patients' data to the new system.

Was it successful? How was success measured?: The article for the solution had not implemented the solution, but went into detail on the existing problems and why they are problems. It says how “[switching to] one primary care electronic health record will make apparently insolvable problems solvable.”

What special equipment or expertise is necessary?: Expertise to code a new database. Servers to store and access data quickly and securely.

What economic effects does the solution have?: Large initial cost, but would save billions of dollars (at least in Canada) which are spent trying to interface many different systems, some of which are developed at hospitals for the exclusive use of that hospital or network

How much does it cost?: Very high startup cost, then lower operating and updating costs than current systems

What were the successes of the product?: Makes a universal information systems so patients going to new hospitals do not have to try to remember their own medical records, which causes omitted and incorrect data

What are some drawbacks of the product?: Possibly the biggest challenge in rebuilding a universal database would be the time, effort, and resources it would take to track down and transfer the data of every patient from different, older systems into the new system. Additionally, some different places may have differing needs in software.

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About the Source

Overall Quality ("x" one): High

Citation in APA format :

Persaud, N. (2019, January 14). A national electronic health record for primary care. Retrieved from <http://www.cmaj.ca/content/191/2/E28.short>.

Search terms used: electronic health records problems and solutions

Who made the solution?: Canada Health Act / Dr. Nav Persaud

Why is this a good solution? It seems to be the only way to truly address most of our identified problems

1. Authority: Who made the solution

- Author holds an MD

2. Accuracy: The reliability, truthfulness, and correctness of the solution

- Author is only concerned with patient wellness and the overall effectiveness of the healthcare system in Canada

3. Purpose: The reason the solution exists

- There are many EHR systems throughout Canada, and even though the Canada Health Act states that health care should be portable, the health records are not
- differing and even proprietary systems make it difficult or impossible for patient information to be shared among different healthcare facilities

Solution:

Building a new database to be implemented on a national scale.

Possible criteria:

Ease of use, quick synchronization between facilities, information security, effectiveness in reducing information errors

Possible constraints:

development costs, development time, able to be implemented universally, ability to store all possible relevant patient information.

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Meeting 16 - Multicriteria Analysis

Group Members: Jared Grounds, Adnane Sentoussi, Michael Rosswurm

Initial POV Statement

Health professionals and practitioners **need** a secure, online patient-database that both includes the necessary patient information for treatments and billing, and is easy and efficient to use **because** current hospital databases can be unprotected at times, and are often difficult for medical professionals to use daily.

Multicriteria Analysis

		Criteria					Constraints		
Solution		Improves performance of the workers	Easy to access/use	Benefits the patient's health	Streamlines business process	Shows necessary patient info.	More cost-effective than current hospital solutions	Universally implementable into hospitals	TOTAL
Computer-based patient database		9	6	7	8	10	1	1	42
Use of MEDPAR/HCUP databases		7	7	0	9	4	1	1	29
Electronic Medical Record / Electronic Health Record		9	5	7	8	10	1	1	41
Utilizing informational systems such as servers		7	9	0	8	10	0	1	35
Rebuild a new hospital database		9	5	7	8	10	1	0	40
Training medical professionals in using hospital systems correctly		7	7	8	7	0	1	1	31

Criteria:

- Improves the performance of the workers
 - Are tasks being completed on time? How much time is being saved?
 - Easy to access and use
 - Frequency of harsh reviews from medical professionals
 - It benefits the patient's health/wellbeing
 - Is patient information being misrepresented which delays treatment?
 - Streamlines business process of the hospital
 - Is the hospital business being conducted smoothly? How much money is being made?
 - Shows necessary patient information
 - Allows practitioner to easily understand patient

Constraints:

- The solution is more cost-effective than current hospital systems
 - How much cheaper is it than current systems?
 - It is able to be implemented into any hospital
 - Is it bulky? Does it cost a lot? Does it take a while to set up?

“Best” Existing Solution and Gaps Identified

The best solution, according to our analysis is S. A. Asabe's computer-system patient database created in 2013. Although the basic idea is great, it lacks in some areas that we intend to build upon. For instance, the database they chose is completely local, whereas an online database would benefit the hospital in many ways.

Furthermore, there are a couple features, like automatically generating a billing statement for a patient and security protocols, that are not included in this solution.

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Meeting 17 - Before Class Fieldwork

Ethnographic Research - Interview 1	Tech 120	Fall 2018
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Interviewer Name:	Jared Grounds	Date: October 15, 2019
		Time 5:00pm EST
Interviewee Description:	Deana is a fifty-year-old CNA at LaPorte Hospital in LaPorte, Indiana. Prior to working at LaPorte Hospital, she also worked at Miller's Merry Manor, a nursing home in New Carlisle, Indiana. Due to working at these two health care establishments, she has operated different databases to ensure that tasks are completed efficiently.	
Question/Describe-to -Me Statement 1:	Describe to me a time when a computer-related issue occurred at the hospital.	
Question/Describe-to -Me Statement 2:	How do you believe that current hospital databases can be improved. Why?	
Question/Describe-to -Me Statement 3:	Describe to me a time when a patient's information got mixed around.	
Question/Describe-to -Me Statement 4:	How vital is patient security? Why?	
Question/Describe-to -Me Statement 5:	Should all doctors have access to a patient's information? Why?	
Link to Recording:	https://drive.google.com/open?id=1zo5hBnuB-X4y9sh-jXSBtIF4xx_9qpvH	

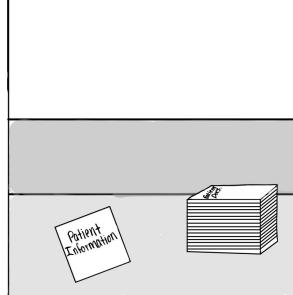
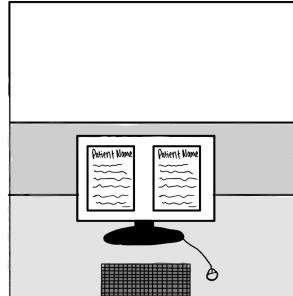
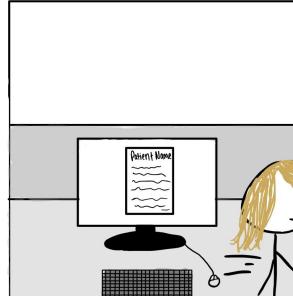
Notes, Thoughts, and Observations:
The individual I interviewed mentioned that, even though there are laws and regulations against it, nothing is preventing a practitioner from accessing unauthorized files. Each worker should have their own list of patients that they can access, but should also be able to request access to another patient's file if they are covering for another employee. The interviewee suggested a checkbox to check authorization, in order to confirm they are accessing the correct file, but I believe that the authorization process should be more secure. Her method still allows these violations to occur. Lastly, I believe that this program should be installed on a local network. This will ensure that the practitioners can still access their patient's file without needing internet from an ISP. Either it will create a "hotspot" network, or simply have each computer hardwired into the database through ethernet.

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Ethnographic Research - Observation 1	Tech 120	Fall 2018
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Observer Name:	Jared Grounds	Date:	October 12, 2019
Location Name:	Laporte Hospital	Time	8:00am CST
Description of Location at the Time of Observation:	I arrived at the hospital during a time when some practitioners were clocking out of their shift, and others were beginning their shift. The particular desk area I observed had a few file organizers in addition to a computer that could access electronic medical records. The desk areas were surprising clean, but throughout the next couple of hours, papers quickly started piling up.		
URL to Recording/ photo of observation site(s):	https://drive.google.com/file/d/1PMwxUyWu1cDcg-orv-kbpvEPOfSIPCaM/view?usp=sharing Courtesy of Northwestern Indiana Times©		

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	What? (What are they doing?)	How? (How are they doing it?)	Why? (Why are they doing it this way? Take a guess!)	Picture of Problem Observed (taken by you) Drawn to satisfy HIPAA (Health Insurance Portability and Accountability Act)
1	The individual was sorting through paperwork that accumulated on their desk.	They were performing this task at a leisurely pace, but still completing the necessary task before tending to their patients.	The task was performed in this manner in order to ensure that they were synthesizing the correct information into the electronic medical record.	
2	This practitioner was drinking coffee near their workstation.	They were focused on completing their paperwork while sipping coffee every couple minutes.	They were doing this because perhaps they were working a long shift, and needed caffeine in order to stay focused on their tasks.	
3	A CNA was entering information into the computer at their desk.	They had multiple windows opened on their monitor, and were multitasking in order to enter information efficiently.	The nursing assistant wanted to complete their task in a timely manner, so they did everything at once on their workstation.	
4	Practitioner left workstation after filling in information on their computer.	They left in a hurry, and didn't bother with closing the screen on their computer.	They possibly had to tend to a patient quickly, or were simply late for their lunch break.	
5	Multiple individuals used the same computer for their work.	They quickly logged in, performed a task, and then left the computer before another user logged in.	Maybe this was the closest workstation in their surroundings and it would be more efficient for them to log in on this computer, rather than traveling across the room to a different, unoccupied workstation.	

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Possible problems observed:	<ul style="list-style-type: none"> • Practitioners can access unauthorized files, even if they are not covering for another employee. • Multitasking can lead to incorrect information being entered into a patient's file. • Leaving a patient's file open on the monitor allows other individuals to access the file, which should not occur. • When the network is down or being worked on, practitioners cannot access their patient's file and must then resort to writing information on paper and transfer the information to the electronic medical record later.
Quantitative data related to problem:	<ul style="list-style-type: none"> • There are a lot of people using the database, so there may be some network throttling depending on how many users are on the system at once. • Each employee has their own login credentials, but may not have their own workstation.

Notes, Thoughts, and Observations:

My solution to this problem should include safety measures in order to counter problems that I observed. For instance, I could implement a login page for practitioners and only include patient files that are associated with that account. Furthermore, the page should have a certain period of inactivity allowed. If practitioners are inactive for too long, then the program should log out of their account automatically. The database should also have a minimal amount of maintenance required, so that users can still access patient files. The network won't throttle a noticeable amount with the data that's being transferred, so I don't believe it should be a priority for my team's solution.

Literature Review - Source #1

Jared Grounds

[Content from this source](#)

Citation in APA format:

Asabe, S. A., Oye, N. D., & Monday, G. (n.d.). HOSPITAL PATIENT DATABASE MANAGEMENT SYSTEM. Retrieved October 14, 2019, from <https://pdfs.semanticscholar.org/fdea/0e60cff7ddc791c11464177a56f4732c711a.pdf>.

Database used and Source Name:

Semantics Scholar: Search Engine for Scientific Journal Articles

Summarize the abstract.

Due to the increase in demand for a better quality of life in Nigeria, healthcare is becoming more important for the national government. In order to adapt to this growing importance, S. A. Asabe and his colleagues were tasked with developing a program that improves traditional, manual, medical records. This patient database allows for easier, more efficient management of a practitioner's patients, and even eliminates missing information in medical records.

What were the findings?

The authors found that the manual method of sorting and retrieving medical records is extremely inefficient, especially at a time when healthcare is growing in popularity. Some patient records excluded certain, crucial information due to human error, and others were sorted incorrectly which means they were difficult to find. This lead to their choice of creating an electronic medical record that would allow information to be sorted and retrieved almost instantaneously.

What is the source saying about your problem?

The source claims that computers are highly applicable in this situation and should be utilized in order to allow hospitals to be more efficient. While I agree with this statement, human error will still occur. This means that any solution should include countermeasures to human error, such as dialog boxes that ask to confirm an action, and prioritize details about a patient so that crucial information has to be entered before a practitioner leaves the computer.

What did you learn from the article in regards to your problem?

I learned that healthcare is growing in popularity due to a graying population, not a growing population. This means that the percentage of elderly individuals in a certain demographic is increasing, so they require more medical attention. Also, this isn't only affecting Nigeria, but also the United States and other countries. This means that healthcare should be improved in order to keep up with its demand.

Overall Quality ("x" one): High

Why did you choose that?

This scientific journal article is incredibly useful in the resource of my problem, and I can even improve upon the technology they used so that it better fits my problem space. The amount of information they provided in their case study will prove to be very useful in choosing a more precise stakeholder.

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Ethnographic Research - Interview 2	Tech 120	Fall 2018
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Interviewer Name:	Adnane Sentoussi	Date:	October 15, 2019
		Time	5:00pm EST
Interviewee Description:	I interviewed several patients and asked them questions about their experience.		
Question/Describe-to -Me Statement 1:	Describe to me your experience since you've walked in here.		
Question/Describe-to -Me Statement 2:	How has the staff been treating you here?		
Question/Describe-to -Me Statement 3:	What do you think would improve your experience as a patient here?		
Question/Describe-to -Me Statement 4:	Should patient waiting rooms like this one have some form of entertainment?		
Question/Describe-to -Me Statement 5:	What do you think about an app that would answer patient questions?		
Link to Recording:			

Notes, Thoughts, and Observations:

Most of the patients said that the staff was very helpful. Out of 10, I would say 6 people were there for problems of their own and the rest were accompanying others. Many people said that their main problem was not knowing how long it would take for their turn and also had some questions that the staff wasn't able to answer. In general patients seemed satisfied with the general experience in this specific location I went to.

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Ethnographic Research - Observation 2		Tech 120	Fall 2018
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Observer Name:	Adnane Sentoussi	Date:	10/16/2019
Location Name:	Fransiscan Hospital Lafayette	Time	4:00 pm
Description of Location at the Time of Observation:	Normal hospital waiting room is full and nurses and doctors walking around. The whole waiting room was sparkling clean but there was a lot of noise because of televisions and people walking in and out.		
URL to Recording/ photo of observation site(s):	https://images.franciscanhealth.org/locations/88.jpg		

	What? (What are they doing?)	How? (How are they doing it?)	Why? (Why are they doing it this way? Take a guess!)	Picture of Problem Observed (taken by you)
1	Patients watching TV	Sitting in front of the tv	Waiting time is too long	
2	Patients using their phone	Sitting on a chair	Waiting time is too long	
3	Patients talking to receptionist.	Patients are asking questions about their visit or explaining their problem.	Patients have questions and the waiting time is too long so they start asking questions.	
4	Patients being called into different rooms by nurses	A nurse will call their name and they'll go to the reception before entering different areas.	Some people have appointments, others are coming for visits probably.	
5	Some people are just waiting there and doing nothing.	They don't seem like they have something concrete to do at the hospital.	Maybe, they came here with someone and are simply waiting for them to finish.	

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Possible problems observed:	<ul style="list-style-type: none">• Waiting times are too long• Not enough entertainment for the waiting time.• Patients have questions and can't ask them because the staff is too busy
Quantitative data related to problem:	<ul style="list-style-type: none">• The amount of people in the waiting room was hard for the staff to manage.

Notes, Thoughts, and Observations:

The waiting room was really clean which was good for patients. There were a couple TVs and a few magazines so people had enough distractions while waiting. However, I feel like there wasn't enough staff to assist with any questions they had.

Literature Review - Source #2

Adnane Sentoussi

[Content from this source](#)

Citation in APA format:

Bleich, N. S., Emre, Murray, & JL, C. (2009, April 1). How does satisfaction with the health-care system relate to patient experience? Retrieved from https://www.scielosp.org/scielo.php?pid=S0042-96862009000400012&script=sci_arttext&tlang=pt.

Database used and Source Name:

Google scholar

Summarize the abstract.

This source tries to examine the patient's experience in the healthcare system and their overall satisfaction with the system. Some factors they looked at were immunization coverage, type of care, health status, and other societal factors that may account for overall satisfaction.

What were the findings?

They found that patients who were in worse health were less likely to be satisfied with the system. In addition, confidentiality, communication, dignity, and autonomy, were big factors in a patient's satisfaction. They found out that people were less satisfied with private health providers. Also, patient income is directly correlated with patient satisfaction.

What is the source saying about your problem?

The source says that despite similar experience in different healthcare systems around The United States and the world, people had varying levels of satisfaction. Other than the factors I listed above, there were other societal factors that the study couldn't capture.

What did you learn from the article in regards to your problem?

I learnt that a patient's experience depends on many factors. Some of them are related to the healthcare system such as the type of care, how the staff treated them etc. However, many other factors exist such as age, income and sex which are important but aren't very realistic factors that we as a group should look at. I think the factors that the study labeled as 'responsiveness domains' are going to be important for us as a group and they will be the factors that we will look at the most.

Overall Quality ("x" one): Medium

Why did you choose that?

I think this study was beneficial because it explained how patients viewed their experience in hospitals and what were the important factors they considered. However, I feel like the study could have been more conclusive on the entirety of the factors that determined satisfaction since about 70% of the factors were not recorded.

Meeting 17 - Before Class Fieldwork

Ethnographic Research - Interview 3	Tech 120	Fall 2018
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Interviewer Name:	Michael Rosswurm	Date:	10/17/2019
		Time	3 PM
Interviewee Description:	Between 50-60, mother, grandmother, 35+ years in nursing		
Question/Describe-to-Me Statement 1:	How did your office receive/send patient information in-network?		
Question/Describe-to-Me Statement 2:	Does that method ever change for other situations (e.g. out of network)?		
Question/Describe-to-Me Statement 3:	Describe to me a time where the EHR database would not work as desired, or failed completely.		
Question/Describe-to-Me Statement 4:	How might EHR systems be improved?		
Question/Describe-to-Me Statement 5:	Are there any safety or security concerns that you had about the EHR software you used?		
Q6:	What were any special functions of your EHR (e.g. detecting related symptoms, alerts for missing information or concerning data, insurance information)		
Link to Recording*:	https://drive.google.com/open?id=1F54VJyBkxTyOnZlHiRmLKvlHzoWFRCsn		

* Recording has sounds of interviewee's grandchildren in it, which can make parts harder to understand than others.

Notes, Thoughts, and Observations:
In-network, where all facilities use the same software, or interfaceable software. Out of network, usually had to use fax machine and scan in documents. Existing software is intelligent and can work as a helpful diagnostic tool for doctors (identifies patterns, such as for diabetic symptoms) and can even remind doctors and patients about what might have gone overlooked or what is upcoming. Current software seems very robust, but interconnectivity does not seem to be fully accomplished yet.

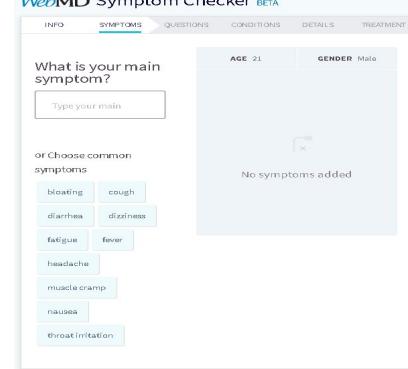
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Tech 120

Fall 2018

Ethnographic Research - Observation 3

Observer Name:	Michael Rosswurm	Date:	October 11-15 2019
Location Name:	Multiple online Health sites/forums 3 is Orthodontist office	Time	
Description of Location at the Time of Observation:	1. Online support chat rooms based on topic/ailment 2. WebMD online "Symptom Checker" tool, which first asks the user their age and biological sex		
URL to Recording/ photo of observation site(s):	Shown below in table		

	What? (What are they doing?)	How? (How are they doing it?)	Why? (Why are they doing it this way? Take a guess!)	Picture of Problem Observed (taken by you)
1	Allowing patients to connect with each other about their medical situations	Through online chat rooms separated by topic	So that patients can talk to people who understand their standpoint and offer potential advice.	
2	Allowing individuals to self-diagnose	Through an interactive online tool where users type in their perceived symptoms	So that people can have some idea of what their health situation is without taking the time or spending the money on a doctor visit.	
3	Gathering patient information for the doctor to use	With physical folders containing patient information, photos, x-rays, plans, etc.	There are no computers in the room where the doctor works with patients, so a physical file is necessary.	

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Possible problems observed:	<ul style="list-style-type: none"> ● Anecdotal, unproven advice from non-experts ● Self-diagnosis is never a good idea, and anything truly concerning should always be taken up with a professional who can understand what is or isn't likely based on an examination. ● Managing a massive amount of files takes a lot of time and carefulness
Quantitative data related to problem:	<ul style="list-style-type: none"> ● Paper databases may be more secure, because they cannot be accessed by hackers, but are also more destructible, and take much more work to use in a large-scale ● “Burnout” is listed as a cause of doctor error while entering data into EHRs, but the burnout with physical files is greater, so EHRs are less error-prone

Notes, Thoughts, and Observations:

Because there is no way to perform a home examination over the internet, these databases and information sources can only reliably be used as an indicator to visit a doctor, not a tool to take one's health into one's own hands. On the professionals' side, physical paper records are somewhat of a chore and can create more needless work, as compared to an electronic health record which can instantly bring up and store patient data with minimal human upkeep or organization.

Literature Review - Source #3

Michael Rosswurm

Content from this source

Citation in APA format:

Persaud, N. (2019, January 14). A national electronic health record for primary care. Retrieved from <http://www.cmaj.ca/content/191/2/E28.short>.

Database used and Source Name:

Google , CMAJ Group

Summarize the abstract.

While electronic health records (EHS) have been very helpful in streamlining the medical process and simplifying information access, there are still improvements to be made, especially in the areas of interoperability. Trying to get all the different EHS systems to communicate effectively becomes more difficult as more new EHRs emerge.

What were the findings?

Tons of money and resources are being thrown into making these different systems work together. While there would be a large cost in creating a new, universal database system, it would quickly make up for the costs being put into connecting old systems

What is the source saying about your problem?

The solution is not to try to connect all these different softwares and platforms, but to create a new universal one that seamlessly interfaces with hospitals nationally, securely.

What did you learn from the article in regards to your problem?

While many Hospitals already use a decently effective form of EHRs, they fall short in carrying the information over to other facilities, who may also need that information to make important decisions for the patient.

Overall Quality: Medium

Why did you choose that?

The author has an MD, and brings up many valid points, such as the fact that many hospitals still rely on mail or fax to send and receive information, which are both much slower than computerized data transfer, and generally less reliable. However, it does not seem to be structured as a formal study, which lowers my confidence in the article.

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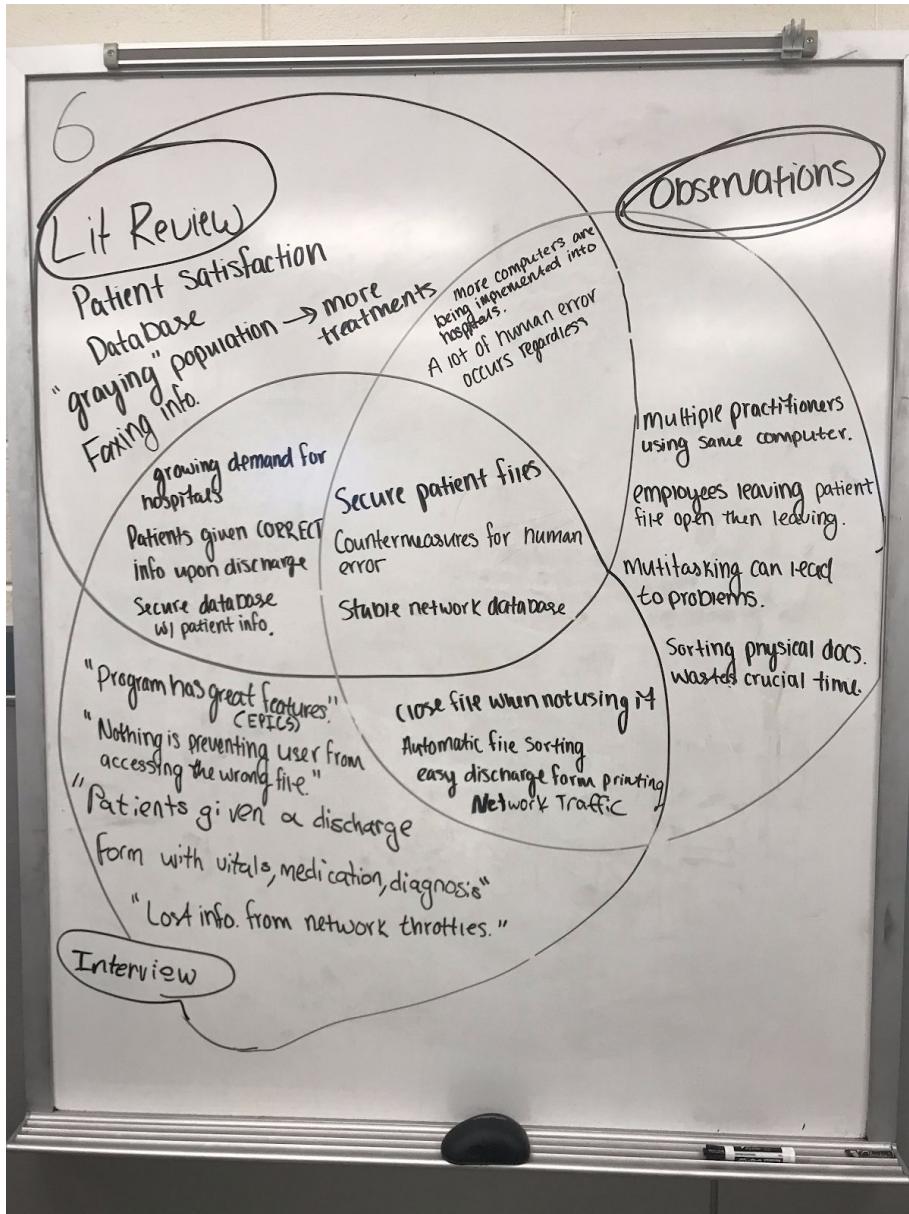
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Meeting 17 In Class - Thematic Identification & Composite Character Profile

Names: Jared Grounds, Michael Rosswurm, Adnane Sentoussi

Initial POV Statement:

Health professionals and practitioners **need** a secure, online patient-database that both includes the necessary patient information for treatments and billing, and is easy and efficient to use **because** current hospital databases can be unprotected at times, and are often difficult for medical professionals to use daily.

Thematic Identification:**Revised POV Statement:**

Health professionals and practitioners **need** a secure, error-free way to store and access patient information for treatments and billing **because** mishandling of patient information is a HIPAA violation.

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Composite Character Profile

Picture of User:



Characteristics related to the problem space and fieldwork results:

Name: Liliana Smith

Age: 31 Years Old

Kids: She has two young children. Annie is a four-year-old girl who loves playing outside and eating home-cooked meals by her mother. Her second child, Austin, was born only a year ago and needs a lot of attention from his mother.

Day-to-day life: She often works 16 hour shifts at the hospital, and is always tired at work due to taking care of her two children. Her husband, Jacob, attempts to do what he can, but has trouble balancing his construction job and taking care of his ill mother. Sometimes, the complex databases to access patient information confuse Liliana, and she fears doing things in the wrong way. Lastly, on top of taking care of her children, she has to spend more time at work transferring paperwork if the online patient database goes offline.

Meeting 18 - Before class ideation

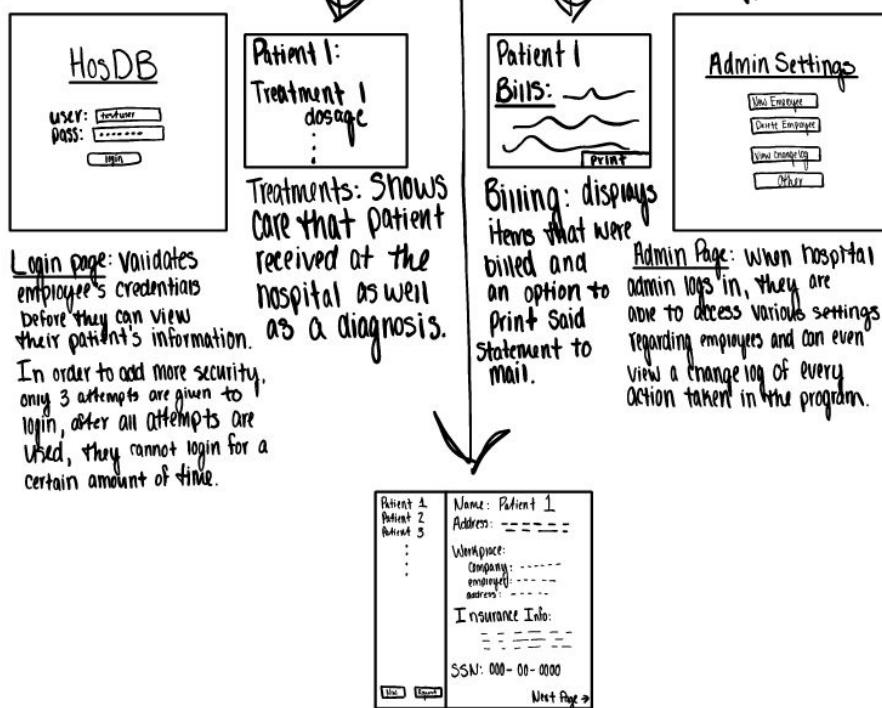
Jared Grounds

Jared Grounds

Patient Database

(displays crucial information for a practitioner's patients)

Technique: Broadening original
from Tennenhouse video.



Patient View: Only displays the logged-in user's patients, however they can request a patient from another practitioner if they are taking over a shift. They can also create/update a patient's file.

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Meeting 18 - Before class ideation
Adnane Sentoussi

Patient Database		
Function 1	Function 2	Function 3
Treatments Patient 101345 Treatment info: _____ Duration: _____ Additional info: _____	Vital Info Patient 707345 Height: _____ Weight: _____ Allergies: _____ Existing conditions: _____	Authentication Staff Number: _____ Staff pass: _____ Patient number: _____
1) System should display treatment info 2) System should display vitals for patient 3) System should verify staff and display only patients they work with. This will protect patient privacy.		
Function 4	Function 5	
Patient name: _____ Patient number: _____ Insurance info: _____ Payment info: _____	Nurse Assignment	Patient Number
	Nurse Name	_____
		<input type="button" value="Assign"/>
4) System should display info about billing and insurance for every patient 5) System should assign nurses to patients for follow-up, monitoring, etc.		

Meeting 18 - Before class ideation

Michael Rosswurm

Solution Idea 1:

Method used: input

Function needed: allow patients to access their own information, while allowing practitioners to access patient data while in office

Solution: Mobile app which stores encrypted patient data and allows access to practitioners through either GPS geolocation lock or near-field communication

Solution Idea 2:

Method used: Props

Trigger: Driver's license, which can be scanned to bring up a person's records by police

Solution: A "health card" which can be scanned to bring up a patient's file while they are in-office. Physical card has identification of person for security.

Solution Idea 3:

Method used: decomposition

Function needed: Receive patient information via fax, enter relevant data into patient's file

Solution: A device that accepts a fax signal and transfers the received document directly to a computer through USB serial communication, or to the hospital's database through wifi

Solution Idea 4:

Method used: decomposition

Function needed: Receive patient information via fax, enter relevant data into patient's file

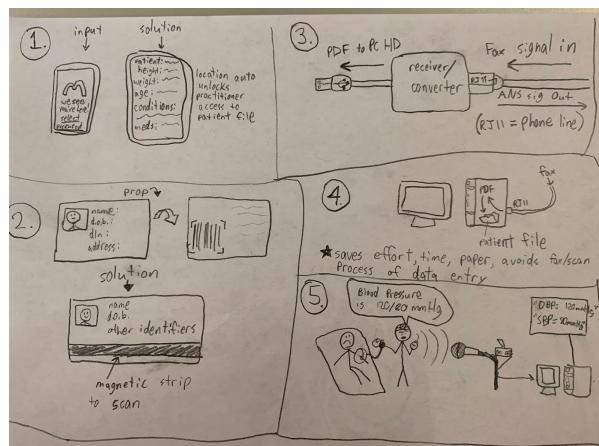
Solution: A program to be used on a desktop computer. Fax line goes into the RJ11 port, a program then waits for faxes, and converts them to PDF before doing light analysis of contents in order to store files in the correct folder.

Solution Idea 5:

Method used: props

Function needed: Easily and accurately enter all the patient data gathered during an examination

Solution: A manually activated talk-to-text system set up in examination rooms. Only records information once activated.



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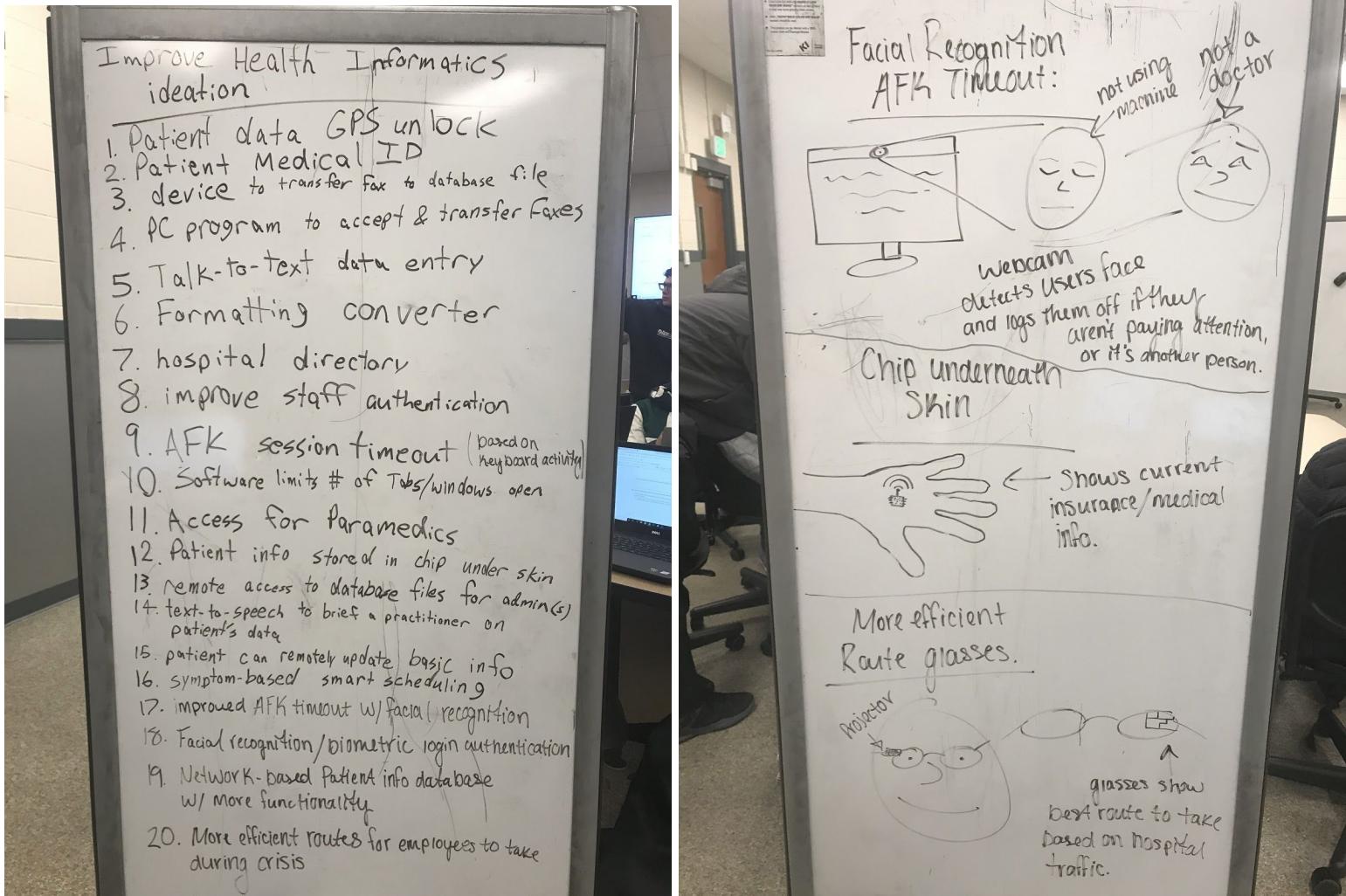
Meeting 18 - In class ideation

Names: Jared Grounds, Michael Rosswurm

POV Statement:

Health professionals and practitioners **need** a secure, online patient-database that both includes the necessary patient information for treatments and billing, and is easy and efficient to use **because** current hospital databases can be unprotected at times, and are often difficult for medical professionals to use daily.

Ideas developed:



Three grouped ideas to mock up from the above list OR from before class:

1. A dongle that converts patient record fax signal to an electronic file to be sent.
2. Innovative multilayered patient database that includes crucial information like treatments, diagnosis, billing, insurance, etc.
3. Identification card that contains an individual's current health and insurance information.

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Next steps - In class Meeting 18

Mock-up Plan:

Jared: Program a simple, yet informative mockup of a patient database

- Using Visual Studio 2019 development environment
- Includes all of the necessary screens and interface components such as login screen, patient list, admin settings page, and patient information display tab.

Michael: Construct a prototype for a dongle that can convert a fax file signal into an electronic file for a computer

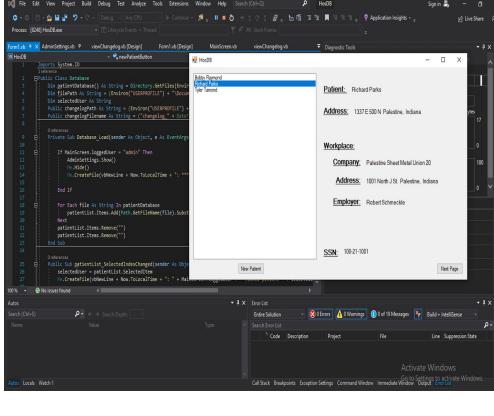
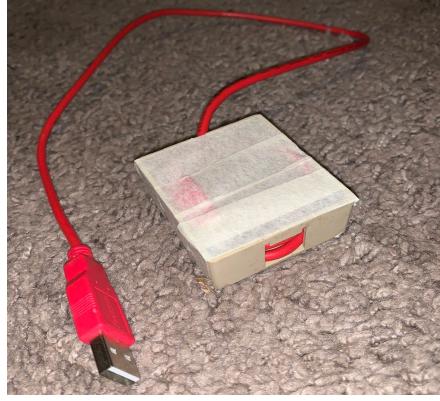
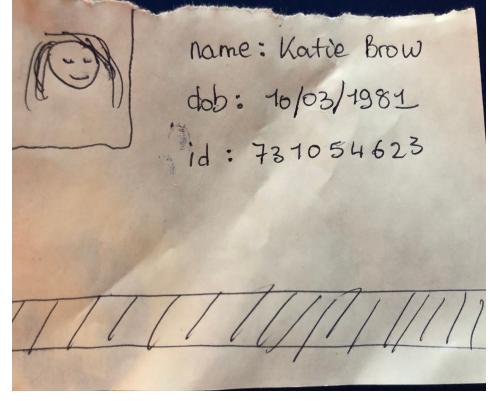
- Features an input to plug directly into a fax machine and an output that sends information into a USB port.

Adnane: Create an identification card that could be used to gather a patient's health and insurance info.

- Identification card includes magnetic strip, on the backside, that can be swiped by a medical professional
- An RFID chip is located on the frontside that can be used in order to edit information on the card
- An updated portrait and basic information about the individual is also shown on the front of the card.

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Meeting 19 - Before class Solution Analysis

Mockup #1 - Jared	Mockup #2 - Michael	Mockup #3 - Adnane
		

Pitch Outline

- Health Informatics
- This is a viable solution because it makes the process of gathering and sharing patient information more efficient than it currently is.
- Innovative because it is an all-in-one application that organizes patient information and isn't too daunting to learn.
- This aligns very closely with the main criteria and constraints. It is easy to implement, is more efficient than most solutions out there, and costs very minimal amount of money. It also displays the necessary information.
- I wrote a simple interface that is closely related to how the program will ultimately look

Pitch Outline

- Health informatics: patient data transmission reception
 - In my fieldwork, I found that one of the biggest issues in patient data communication is that many facilities need to receive data over fax, and then manually scan it back in or type the information into a patient's file
- This hardware would skip that process, converting the fax signal into a computerized format, which can easily be placed into a patient's file, without using paper which would need to be securely shredded
- This solution is a low cost method which would in turn Optimize workflow, lower ongoing costs, and can securely receive any data that the patient might need
- The mock-up roughly presents the intended size of the device, as well as inputs and outputs.

Pitch Outline

- One big problem that I noticed in literature and throughout my discussions with groupmates is that privacy is a big concern for patients.
- I think it's innovative because it allows us to solve a problem that still exists right now and in a very simple way. Also, it will act as both a way of authorization and as a staff ID card.
- It will help boost patient privacy and prevent any infringements on that.
- The card is not the exact same size but it just shows what kind of information it could contain and also the magnetic strip which will allow employees to be authorized. with one swipe of their card

Meeting 19 - In Class Solution Analysis

Names: Jared Grounds, Michael Rosswurm, Adnane Sentoussi

Feedback/Critique received after pitch:

Fax converter:

Is it bluetooth? Wireless connectivity?

Create a new protocol that acts as a firewall to make the device more secure

New database:

Alternative way to give the database more storage

Adding patient access to administrator

Medical ID:

QR code or RFID chip on the card for easier scannability

Summarize feedback-

Fax Converter:

The item that sticks out the most is a method to make the “dongle” wireless. We’d have to introduce a new protocol for information to be communicated safely.

New Database:

Need to ensure that the server has enough storage for data, so that information isn’t overwritten. Also, it’d be a good idea to add access to patient files for the hospital administrator/supervisor in addition to the changelog that they are able to view.

Medical ID:

The magnetic strip on the card will deteriorate over-time with a lot of use, so it’d be a good idea to add a QR code or RFID chip on the card in order for it to be scanned reliably, and easier.

Which solution idea is your group choosing? Why?

We are choosing the patient database idea because the problem that this solution fixes should be high priority. Having an all-in-one program that emphasizes efficiency and reliability should be the very minimum database that a hospital should have, and yet some hospitals rely on less to get the job done. In an age where the “graying population” is growing in many countries outside of the U.S. and internet “challenges” often harm younger individuals, being able to check-in a patient, give them quality treatments, and check them out with ease is crucial.

Reflect:

Does the solution you picked solve your problem? Can your solution be implemented? Will you be able to prototype and test your solution to see if it works? How do you know?

Yes. Not only does this solution solve our problem, but it can be implemented with ease in hospitals all around the globe. We will not be able to test this solution in an actual hospital, however we will be able to successfully test it in a mimicked environment. We have been testing multiple ideas so far, and we already have the development environment to program the application.

Meeting 20 - In Class Prototype Development and Planning

Names: Jared Grounds, Michael Rosswurm, Adnane Sentoussi

Develop a plan for your prototyping building and testing sequence. Be as detailed as possible (who is doing what, what materials you need, what functions you'll test, etc.). Notice the rubric before starting.

- Identify which functions the low-resolution prototypes will test. Why are these appropriate to test now?

Adnane

- Can a member of a staff login to the database
- Employee needs to access patient information
- Employee needs to create patient accounts

I think these functions above would be the most critical for a hospital database which is why we will test them first on the low-res prototype.

Understand the capabilities of the group. What can you test realistically? What are you not testing?

- With a database, we can realistically test all functions needed. However, it will not be possible to test it in a hospital environment on a hospital computer for security reasons.

- Describe the testing conditions. How do you plan on testing and gathering data? What data?

Michael

- Create mock files and mock users in the database program. Give users access to certain mock files. Attempt to access files that a user should not be able to access.
- How long do users spend entering patient data?
- How long do users spend trying to get patient data?
- Who can access what files?
- Can a user create new files for new patients?
- How much memory on the database will be designated for each patient?

- Sketch out versions of what your prototype will look like. Identify materials needed and the time/location when your team will work on building and testing the low-resolution prototypes.

Jared

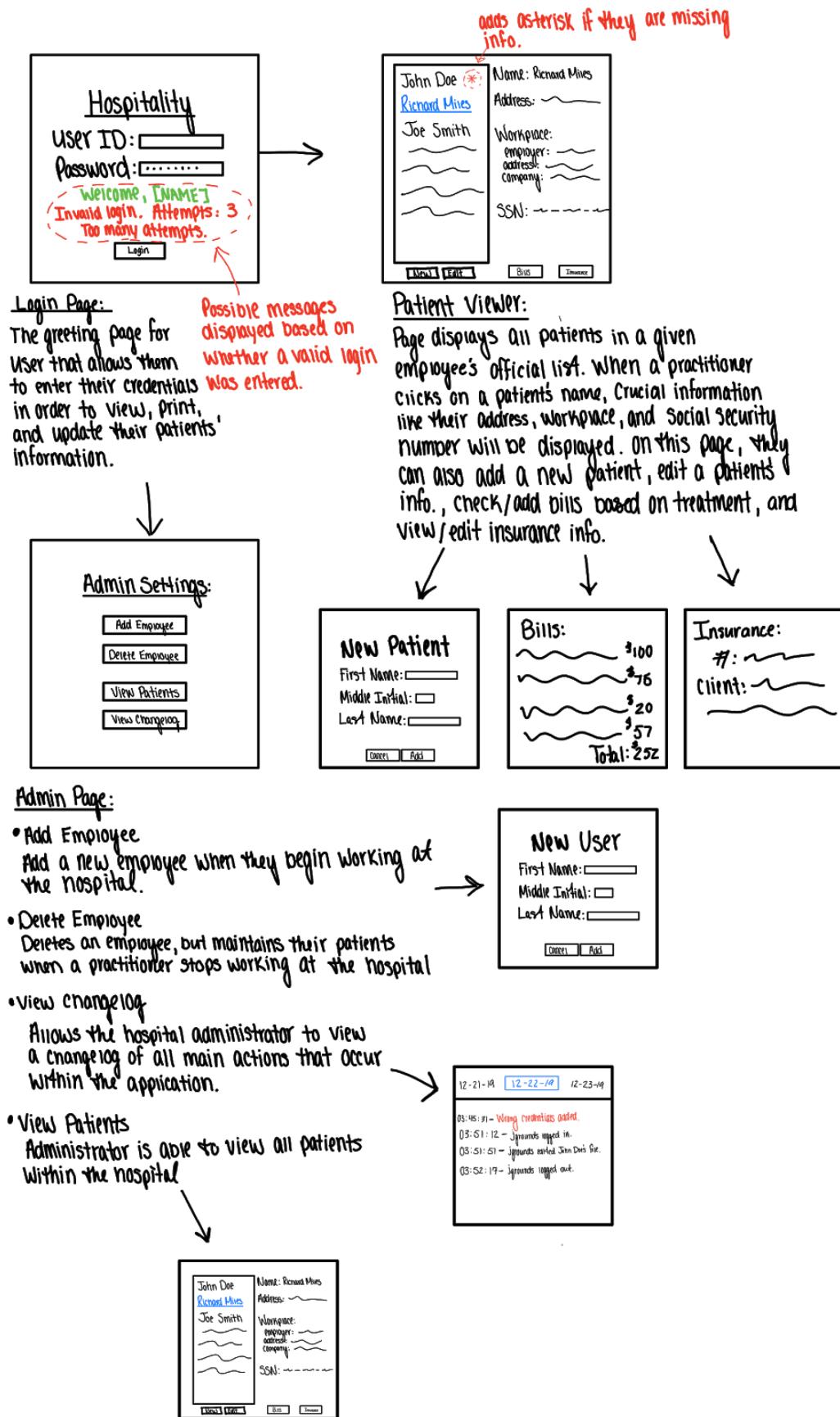
- Possible meeting times/locations:
 - McCutcheon Residence Hall
 - KNOY
 - WALC
 - Thursday, October 31st
 - Thursday, November 7th
 - Tuesday, November 5th
- Materials needed:

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- Windows computer with Visual Studio 2019 development environment
- Basic libraries/APIs for reading/writing files from a local database
- Examples of typical patient information needed by hospitals

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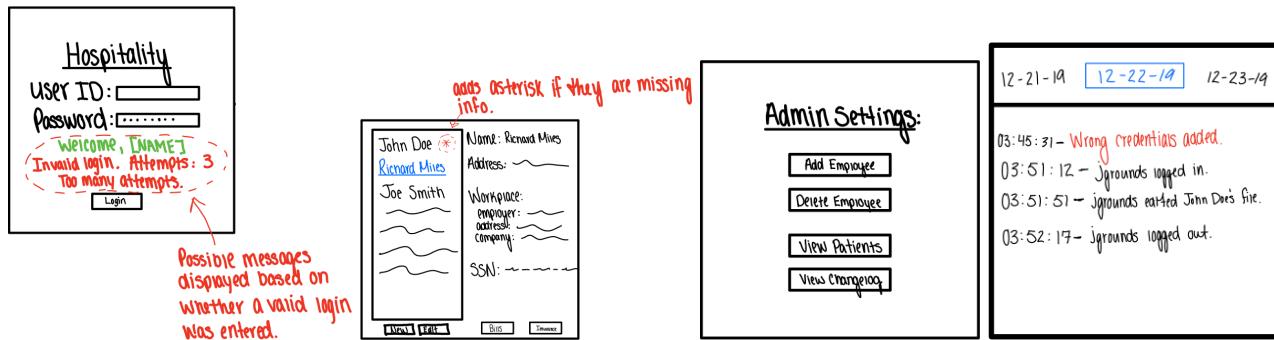
Meeting 21 - Before Class Prototype Building

Names: Jared Grounds, Michael Rosswurm, Adnane Sentoussi

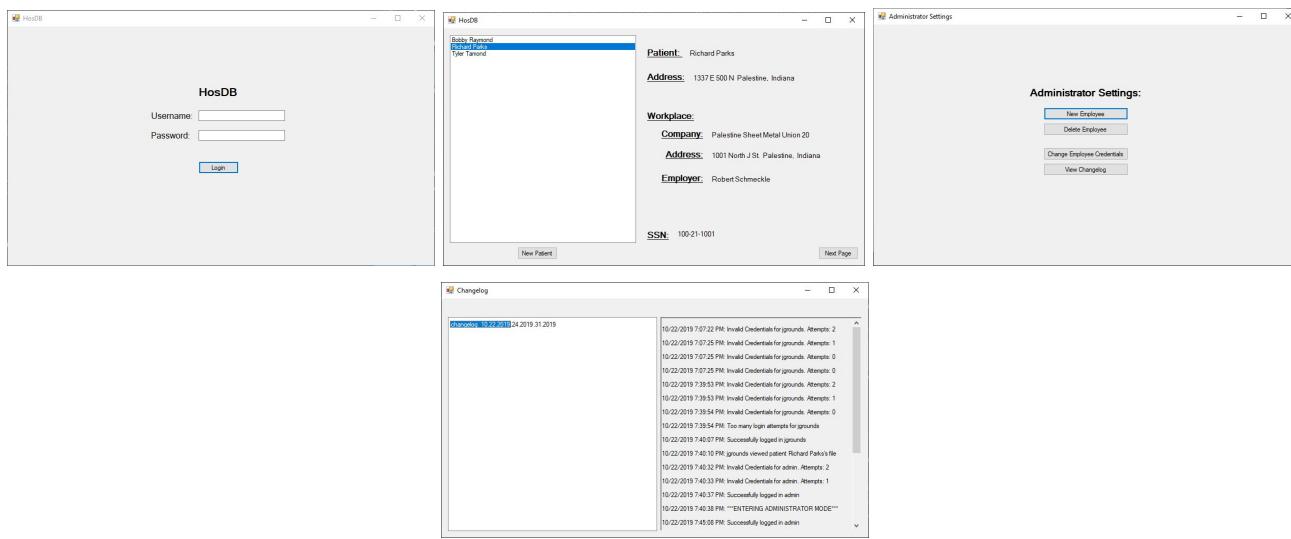
Description of the prototype:

The prototype hospital patient database is programmed in visual basic coding language using Visual Studio 2019 as the development environment. We chose this language because it works well with building a Windows form application, which will ensure that the program functions on computers using the Windows operating system.

- Preliminary sketches of prototype



- One or more pictures of the prototype



- Description of the functionality investigated by the prototype

We first began prototyping by testing various login methods and ultimately chose the traditional “username and password” system. However, when a user is signing up for the first time, a randomly-generated, secure login-key will be assigned to them by the hospital administrator. If a user fails to use the correct credentials to login 3 times, the login button will be locked for a short period of time, and the administrator will be alerted via the changelog. If they log in successfully, they will be able to create, view, edit, and print the necessary information for their list of patients. In addition to this, they can also request access to another practitioner’s

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patient if said employee is not available at that time. To add more security to the database, a user will be automatically logged out if they do not make any actions for 3 minutes.

- Description of relevant test conditions
 - Does it improve workflow?
 - We experienced an increase in workflow and efficiency, based on what we were told by the individuals we interviewed, and everything was one or two pages away. The bold titles made it easy to find certain pieces of information.
 - How long does it take to set up?
 - Setting up the application was as simple as opening the program up, and logging in. Of course if it were the first time opening the application, it'd take time to set up each employee and patient.
 - Is a large amount of data storage necessary?
 - Each patient's file, at this stage in prototyping, only takes up approximately 1kb of data. We'll strive to maintain this low data size for the files while still providing necessary information for the practitioners.

Meeting 21 - In Class Prototype Feedback/Critique

Names: Jared Grounds, Michael Rosswurm, Adnane Sentoussi

Description of design being presented:

Positive Feedback	What Still Needs Work?	Suggestion for Improvement
Ease of use is definitely a priority and we are on the right track for this prototype.	The user interface is bland and needs work.	If an individual attempts to log in too many times, it should notify the hospital supervisor.
It's great how we conveyed so much in the first prototype.	The administrator settings should include more in order to properly manage the users.	Make requesting access for another practitioner's patient more obvious.
The other group really appreciated the security measures that we added, and agree that security should be a high priority when dealing with sensitive information.	Making sure that we include everything within the application, but not adding too much unnecessary information.	Add an additional "away from keyboard" timer so that individuals are automatically logged off after a certain time interval. It should be based on whether the mouse or keyboard is moved.
It's great that we are doing an all-in-one application because so many hospitals struggle with multitasking with different applications.	Navigating pages should be more obvious.	Add designated buttons for going to the insurance information or billing section of the patient rather than the simple "next page" button.
The interface is very clean and not cluttered whatsoever.	Utilize blank space within the application or make the text fields and text larger.	Make the pages flow better from each page to the next.

Meetings 22 & 23 - Small Group Conference

Type a list of action items from your instructor and create a tentative plan of who will address them and when they need to be completed. Submit only the relevant pages for the assignment.

- Complete table at top of document (Adnane)
 - Adding in student introduction information and photos
 - Complete interview information
- Clean up journal formatting (Michael)
- Delete unnecessary things, make answers look different from questions
- Tweak program (Jared)
 - Research how this could be implemented on Raspberry Pi for poorer/underdeveloped hospitals
 - Possibly add onto user interface
 - Add image uploading functionality (How do other hospitals operate)

Meeting 24 - Before Class Prototype Iteration

We responded to multiple critiques given by our peers:

- Adding addition security
 - We updated our design with a “AFK” timer that logs the amount of time a user is inactive within the program. If they do not take any actions within this time period, they will be logged out in order to prevent authorized users from accessing private patient information.
- Completing unfinished pages
 - Many of the features presented during Meeting 21 were not functional and were only there in order to show the potential ideas for the hospital database. Since then, we have added functionality for adding a new patient to a practitioner’s account, editing patient information, and viewing bills and statements.

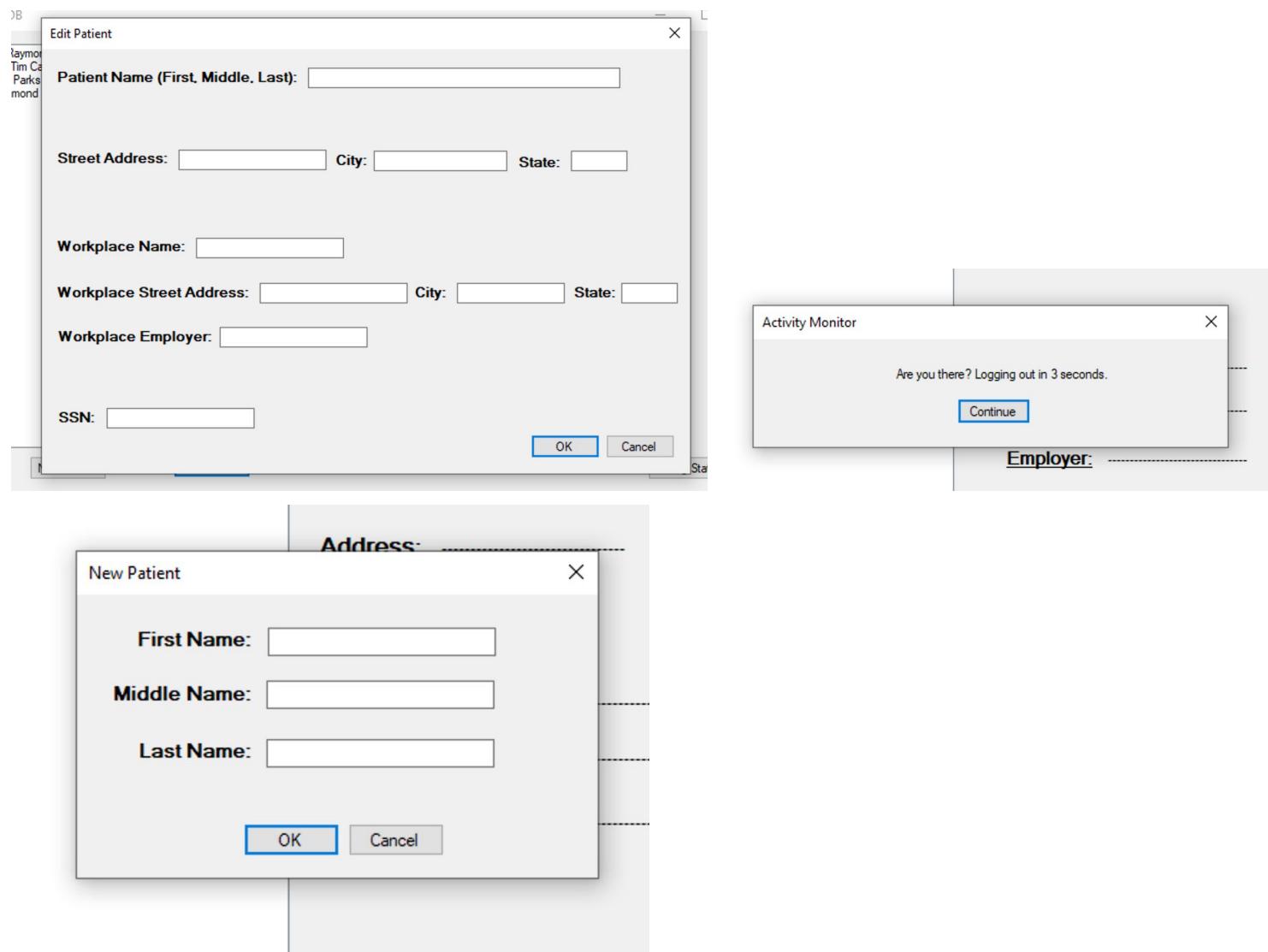
However, we still have much to do in regards to creating an efficient application, such as the ability to print a patient’s billing statement, providing a practitioner access to another’s patient when they are unable to work, and adding more supervising methods for the hospital administrator. We intend to integrate these features and test them with current practitioners and patients in order to see if A, we are displaying all of the necessary information that practitioners need, and B, we are making the workflow for a hospital more efficient with regards to patient databasing.

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Meeting 24 - In class Prototype Iteration

Documentation of feedback received in class:

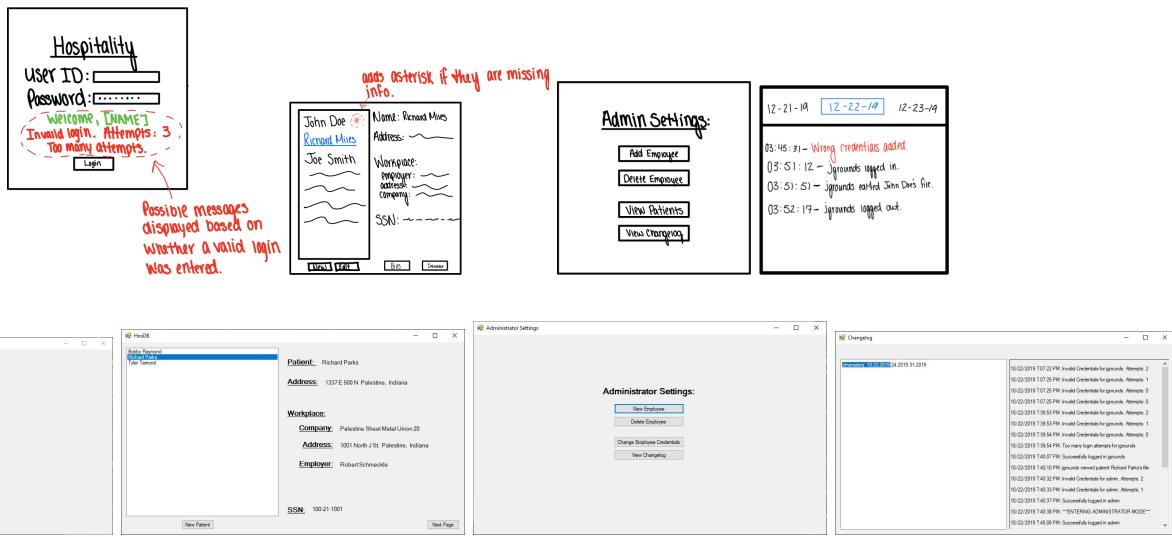
Suggestion for Improvement
Change logout timer to be longer than 10 seconds.
Assure the user that the file was successfully saved.
Instead of going back to the welcome login screen, open a dialog box.



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Meeting 25 - Before Class Prototype Finalization

- First prototype (from Meeting 21 before class assignment)
 - This is a patient database, programmed in Visual Basic, that can add and retrieve the necessary patient information. During this meeting, the prototype was extremely limited and was unable to perform tasks like adding new patients, editing their information, and viewing specific notes related to the patient.

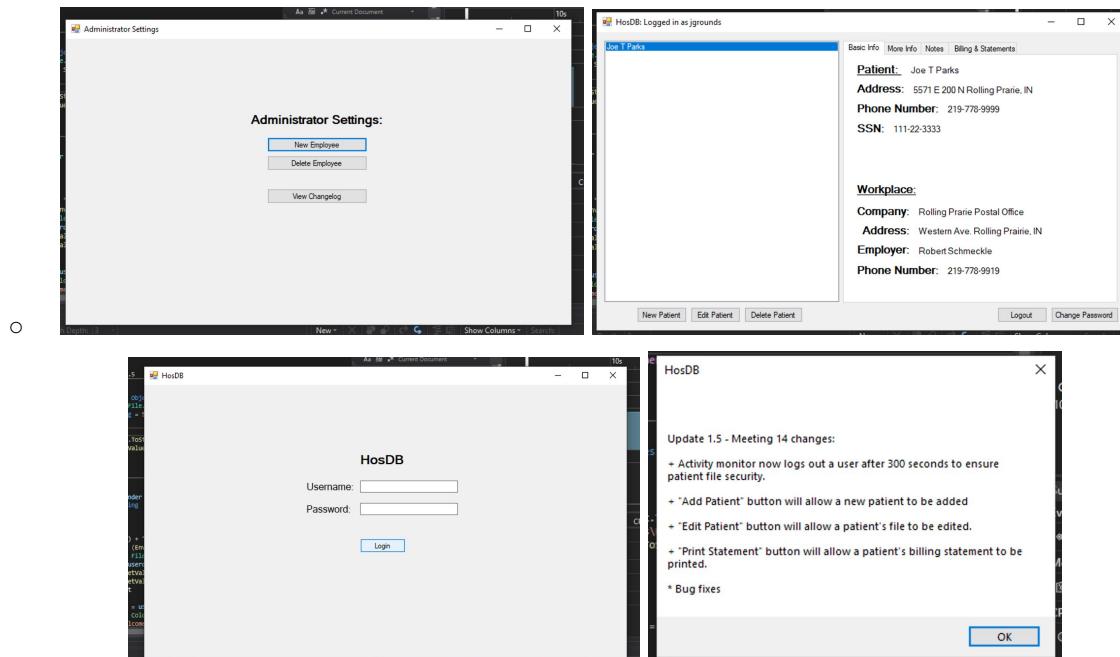


- We investigated the necessary functionalities that a basic hospital patient database should have. This included and prioritized patient information security, hospital supervisor controls, the ability to add information regarding the patient, patient notes, and a billing statement.
 - Does it improve workflow?
 - We experienced an increase in workflow and efficiency, based on what we were told by the individuals we interviewed, and everything was one or two pages away. The bold titles made it easy to find certain pieces of information.
 - How long does it take to set up?
 - Setting up the application was as simple as opening the program up, and logging in. Of course if it were the first time opening the application, it'd take time to set up each employee and patient.
 - Is a large amount of data storage necessary?
 - Each patient's file, at this stage in prototyping, only takes up approximately 1kb of data. We'll strive to maintain this low data size for the files while still providing necessary information for the practitioners.

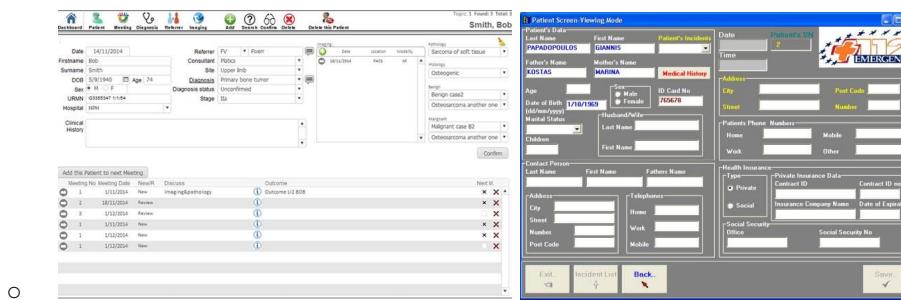
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- Finalized prototype (i.e., descriptions of changes made based on peer feedback; after Meeting 21)
 - The prototype hospital patient database is programmed in visual basic coding language using Visual Studio 2019 as the development environment. We chose this language because it works well with building a Windows form application, which will ensure that the program functions on computers using the Windows operating system.



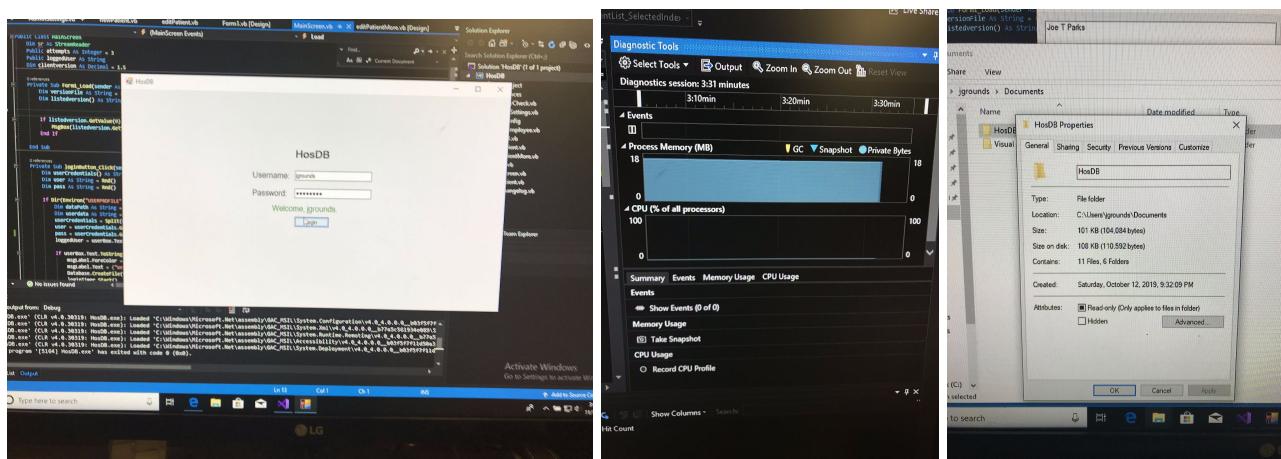
- Since meeting 21, we finished adding all of the necessary functions this program should have such as an AFK timer to log a practitioner out of their account if they are idle within the application for more than 300 seconds, the ability to add, delete, and edit a patients file, and the ability to create or delete an employee. These were all changes suggested by the peer feedback our group received.



- The main difference between our patient database and pre-existing databases is that ours isn't created for any one hospital, but rather smaller hospitals and clinics in general. Because our program has a small form factor, it can be installed onto a Raspberry PI and still function well. This program is meant to set a minimum bar for what database a hospital should have, so it will perform great in hospitals that cannot afford a program that costs a lot of money.

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- We tested every functionality within the program against our criteria and constraints: Does it improve workflow? Is all of the necessary information included? How long does it take to set up? And is a large amount of storage needed? This ensured that we were still abiding by our user composition and allowed us to catch any errors that could occur within the program. We tested this on us three members as patients, and two other practitioners that had prior experience with patient databases.
 - In conclusion, we found that we left out some information that may be necessary to the practitioner, such as patient emergency contact information and creating a separate tab for patient treatments, rather than including them within the notes section of a patient's file. This would be a great addition to our program, however we did not have enough time to add those functions.
 - So far, we are content with the functions that our prototype is capable of performing. We have completed the requirements that we've identified before starting work on the prototype. However, now that the prototype is up and working, we believe we could have done some things differently. For example, we believe that it could have been beneficial to could have added seperate tabs for different information such as treatments just to make it more organized. In addition, after showing our prototype and receiving feedback from peers and our professor, we shifted our focus to making the prototype simple and light. By light, we mean that it wouldn't require much storage and would be able to run on a small computer such as a raspberry pi. This would allow smaller hospitals and clinics in third-world countries to start exploring health informatics and developing their own information systems by building upon the prototype we've created. As a result, the employees will learn skills of their own and hopefully customize the prototype to their own liking and needs depending on the hospital and their means. Finally, if we were given more time for this project, we could have tested more practitioners in our user group and synthesize their suggestions into an even better solution for our problem.

Meeting 25 - In Class Presentation Outline

- Global Challenge: Health Informatics - **DEFINITION:** The practice of utilizing health data and applying medical concepts, along with health information technology systems, to help practitioners provide better healthcare to their patients. (We'll make sure to explain it in plain words so that everyone in the room can understand what we're talking about)
 - **Need: Stakeholders** (Michael)
 - **POV STATEMENT:** Health professionals, practitioners, patients, and local governments **need** a secure, online patient-database that both includes the necessary patient information for treatments and billing, and is easy and efficient to use **because** current hospital databases can be unprotected at times, and are often difficult for medical professionals to use daily.
 - We want to make the program a starting functional information system. Different hospitals and agencies can make changes, customize the program, and implement it in different ways depending on their individual needs and their means. This will allow the program to be implemented everywhere from the poorest clinic in third-world countries to bigger hospitals in developed countries.
 - **Need: Research** (Michael)
 - Include credible sources from the individuals we interviewed.
 - Literary Reviews about situations in other countries
 - Graying population in many 3rd world countries is currently increasing
 - Why do we need this solution? (Relate back to literary reviews)
 - **Need: Existing Solutions** (Michael)
 - Acknowledge the capabilities of modern hospital databases in the developed world
 - Explain the difference between ours and other pre-existing solutions
 - Ours is meant to set the minimum bar in terms of hospital patient database storage and not include extravagant features like A.I. or machine learning functions.
 - Small form factor allows it to be installed on a small computer, such as a Raspberry PI, and still be able to function well and increase the efficiency of the practitioners using the program.
 - **Satisfaction: Proposed Solution** (Michael)
 - Identify the requirements and functions we came up with before starting the project. Then discuss our process and different iterations of the prototype and explain the changes we made to it. Finally, we'll explain if we reached our goals and what else we would have liked to add if we had the time/skills. We want to match the answer to "Why do we need this solution? (Relate back to literary reviews)".
 - **Satisfaction: Design Viability** (Adnane)
 - Include interviews from other practitioners and patients within our user group. Were they satisfied?
 - This design was made to be a low-cost standard for hospitals with no patient database, or poorly functioning/obsolete ones. It would require very little computing resources to operate and maintain. Patient files take up very little memory, meaning thousands of patient files could be stored on a simple USB flash drive.
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3950262/>

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- **Satisfaction: Testable Prototype (Jared)**
 - Present our prototype! Why will it work?
- **Satisfaction: Testing and Data (Jared)**
 - In order to test this prototype, we created a set of fictional patients and users to demonstrate how the database would be used. Jared set up a user profile for both him and an administrator (who can manage larger aspects of the database). We attempted to add patients, enter patient information, and then retrieve the information. Additionally, we tried to do unauthorized actions, such as access a patient's file which is not linked to a certain user, in order to test that the system is secure.
- **Satisfaction: Data Analysis and Implications (Jared)**
 - Show backend of the code! How well does it run? User Tests
- **Visualization: Next Steps (Jared)**
 - We want to research ways to make it easier to be integrated and applied in different environments. As less developed countries continue to decrease the digital divide in their populations, it will become easier to implement HI systems there. In addition, a mobile app that doesn't require internet would be beneficial for remote places without electricity or internet.

NON-CONTENT POINTS ON RUBRIC

- Professionalism: Introduced selves & mentor (if applicable)
- Professionalism: Attire (DRESS BUSINESS CASUAL +)
- Professionalism: Language, poise, manner
- Professionalism: Other Resources