



Lab 3 – EMRs & Patient Tools

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Exercise 1

Pros & Cons Table

	AWS	Google's HealthCare API	Microsoft's FHIR Server for Azure
HIPAA Compliance (O'Reilly-Shah & Mackey, 2016; Sunyaev, Kaletsch, & Krcmar, 2010)	<p>Pros: AWS has its own HIPAA risk management program that could comply with FedRAMP and NIST 800-53 standards.</p> <p>Cons: AWS does not endure what the customer build on the AWS is in comply with the HIPAA requirements. The clients have to double check if their product could still comply in case of new HIPAA updates.</p>	<p>Pros: Google's HealthCare API is of high security, and supports HIPAA compliance under a Business Partner Agreement (BAA). They have independent audits and reports to their clients to enforce the HIPAA standard.</p> <p>Cons: HIPAA does not provide certification. Customer and Google share responsibility.</p>	<p>Pros: Microsoft's FHIR Server for Azure is ISO 27001 certified and meet HIPAA requirements.</p> <p>Cons: Azure does not endure what the customer build on the AWS is in comply with the HIPAA requirements. The clients have to double check if their product could still comply in case of new HIPAA updates.</p>
Machine Learning Functionality for Prediction (O'Reilly-Shah & Mackey, 2016; Sunyaev et al., 2010)	<p>Pros: The Amazon Machine Learning Service is a highly automated solution. The algorithm is automatically determined based on the user's data. The user could upload data from the following resources, including Amazon RDS, Amazon Redshift, or CSV files. Thus, no data pre-processing required.</p>	<p>Pros: Users friendly. The user can choose between either the Cloud AutoML platform (for new users) or the ML engine (for data scientists). AutoML has a graphical user interface, and provide supports such as natural language processing. The ML engine supports TensorFlow and various powerful functions.</p>	<p>Pros: Users friendly. The user can choose between either the ML studio (for new users) or the Bot services (for data scientists). ML studio has a graphical user interface, and provide supports. The Bot services supports TensorFlow sklearn.</p>

	Cons: The Amazon Machine Learning Service only supports supervised learning. Unsupervised learning is not supported.	Cons: AutoML is not very powerful, while the ML engine need more background knowledge, and only supports TensorFlow.	Cons: Lacks the method to transfer data or codes between the ML studio and the Bot service.
FHIR Compatibility (O'Reilly-Shah & Mackey, 2016; Sunyaev et al., 2010)	Pro: Enable open source FHIR applications to manage on the platform as "Platform as a Service" (PaaS) Cons: Amazon does not provide detailed FHIR regulations. Developers will have to find this from other resources.	Pro: Supports data transformation between FHIR and other data types Cons: Is still under development and only provide limited functions.	Benefits: Is open source, and thus is well-maintained by a mature and active FHIR server community. All Azure FHIR services are ISO 27001 certified and meet HIPAA requirements. Cons: Only support data in Azure Active Directory (AAD) style.

Comparing the pros and cons of these three platforms, I would choose the Microsoft Azure platform for our work. This is because that the AWS does not support unsupervised learning, which is a common method utilized in healthcare data analysis. Furthermore, the Google's HealthCare API are still under development and lacks functions (O'Reilly-Shah & Mackey, 2016; Sunyaev et al., 2010).

Exercise 2

A. Differences between Apple's HealthKit, ResearchKit, and CareKit:

HealthKit is a built-in iPhone repository, which stores health data in the iPhone. With the user's your permission, apps can visit the HealthKit databased in iPhone (North & Chaudhry, 2016).

On the other hand, CareKit is not built-in, but an open source technology designed for app developers. CareKit-based apps can collect data from the user's input (body weight, action tracking, etc.) and can be made available directly to physicians or other health-care related apps (McLean, 2019).

ResearchKit is a research-based app, which gathers information from mass population as research data. Prior to data collection, ResearchKit will have to

requests user's approval to perform data collection, via HealthKit or to using other methods. Generally, HealthKit is a data management tool. ResearchKit and CareKit are data collection tools designed for collecting mass population and individual-based data, respectively (McLean, 2019).

B. Example healthcare problem these technologies can help solve:

HealthKit: HealthKit can be used to collect information such as jogging distance and time, as well as jogging route, average speed, etc., and share the said data with other apps (North & Chaudhry, 2016).

ResearchKit: ResearchKit could be developed as a tool to test children's autism. The app displays cartoon video to children, then record the children's reactions and face expressions as collected data (McLean, 2019).

CareKit: CareKit could be developed as a pregnancy helper app. It relays on the user to input basic information (weight, etc.), and push daily notifications and insights to the patients (McLean, 2019).

Exercise 3

Answer questions for each EMR vendor based on an application.

A. Allscripts

What is the application's name?

dbMotion (Ciccarese et al., 2003)

What problem does it solve?

Share datasets among groups. This is majorly used among different health providers, so even if a patient transfer to another healthcare provider, the new health provider could obtain the patient's healthcare records.

What is something novel that you found on how they solve that problem?

Allscripts enables collecting data from different health care providers available in the same database, facilitating database management and enabling many query methods.

B. Cerner

What is the application's name?

Cerner Camera Capture (O'larte, 2018)

What problem does it solve?

Cerner enables recording and save image and video content for clinical purposes using mobile device. Using the app Cerner Camera Capture, the user could share photos of area of concern (e.g. burns, bumps, etc.) without physically relocating to health care provider's position.

What is something novel that you found on how they solve that problem?

Cerner Camera Management enables interaction from the patient's mobile device to the patient's Electronic health record (EHR), which is shared among the health providers.

C. eClinicalWorks:

What is the application's name?

TeleVisits (Blucher, 2019)

What problem does it solve?

It enables the patient to visit healthcare providers without physically relocating there. Using this app, the patient could interview with physicians via internet. If the patient cannot visit the health provider's office due to various limits (cost, distance, or potential infectious disease), this app could help.

What is something novel that you found on how they solve that problem?

It enables lab interfacing and electronic prescribing.

D. Epic:

What is the application's name?

MyChart (Valdez & Brennan, 2015)

What problem does it solve?

It enables patients to schedule healthcare visits and interviews, gain access to their medical records via internet. That is, without visiting or calling the lab or clinics.

What is something novel that you found on how they solve that problem?

It saves manpower on the health care provider's side. Moreover, the app could detect keywords that the patient input, and thus simplifies and smoothens the patient's experience, saving the patient's time.

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