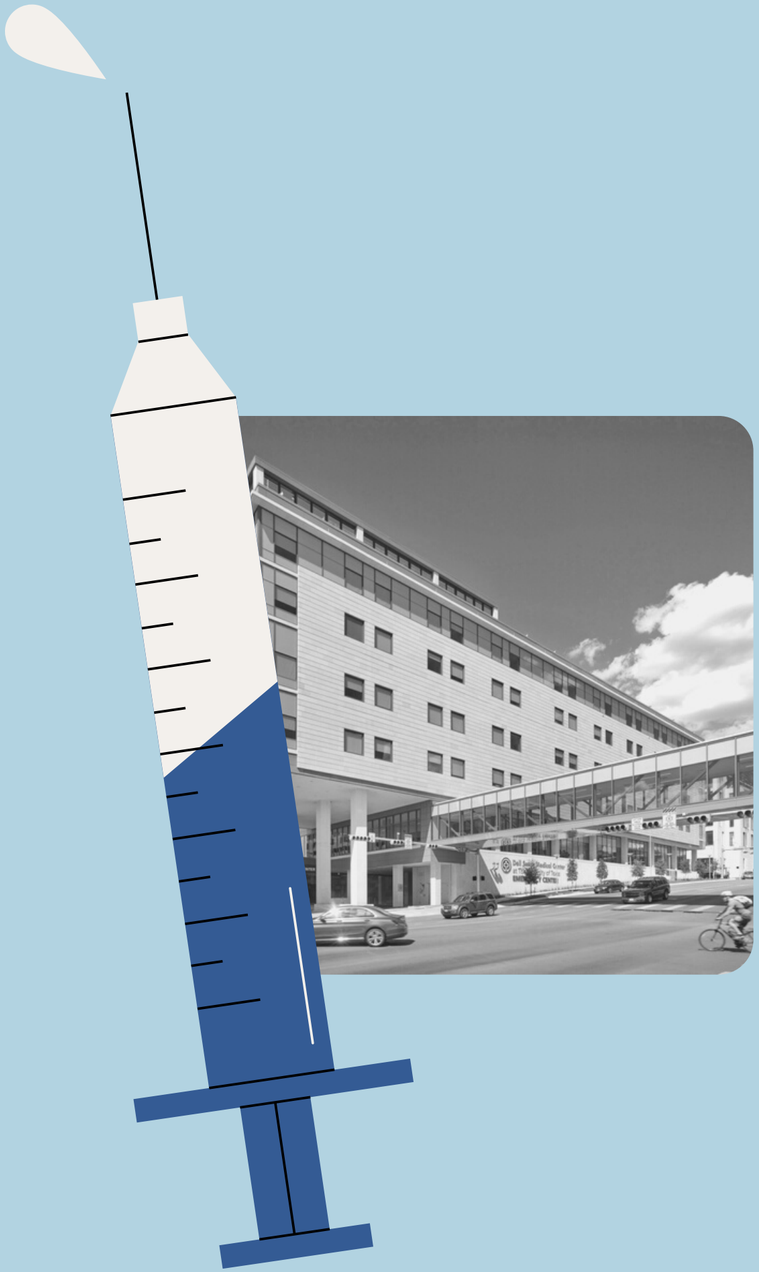
Healthcare Data Management

Cole, Preeti, Ihsan, Vennela, Alyssa, Kevin

DELL SETON MEDICAL CENTER



Dell Seton Medical Center

Our healthcare facility of choice.

A destination for specialty care - including heart and vascular health, stroke care, brain and spine conditions, radiology and neurorehabilitation. It offers a wide range of procedures, imaging, lab tests and rehabilitation services, all on one campus.

DELL SETON MEDICAL CENTER

DATA STRATEGY

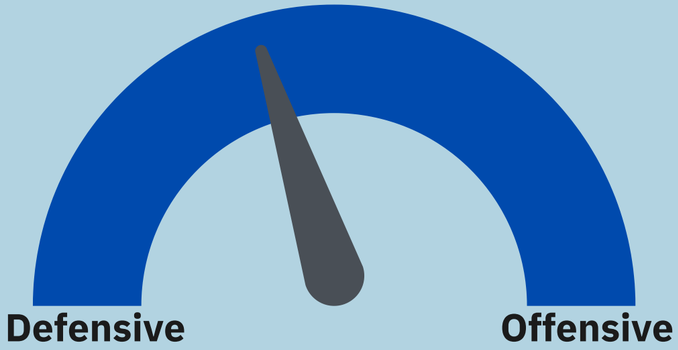
DEFENSIVE

Dell Seton Medical Center should adopt a more defensive strategy rather than an offensive one. More specifically, it should act less offensive than innovative markets like consumer tech, but more offensive than a traditional healthcare company.

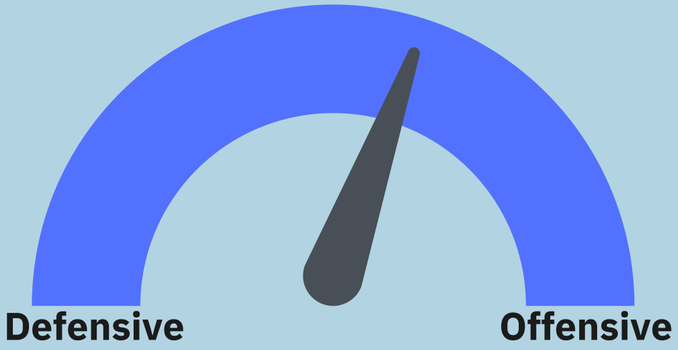
Why? Growing trend of consumer-centric healthcare, which involves a more targeted approach to healthcare.

DELL SETON MEDICAL CENTER

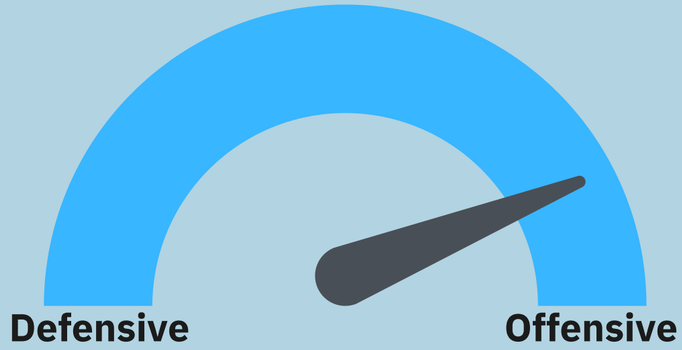
Strategy Comparison



Dell Medical



Chase Bank



Apple

DELL SETON MEDICAL CENTER

Data Management Standards

Key objectives

Defensive since the goal of Dell Seton Medical Center is to ensure data security, privacy, integrity, quality, regulatory compliance, and governance

Core activities

Supported by both defensive and offensive strategies since they want to explore the data and encourage data analytics, but also want to optimize the storage and retrieval of patient data as well as protect it. Targeted marketing and communication goals shifts this section into a more offensive approach than it would have been in the past

Data Management Standards

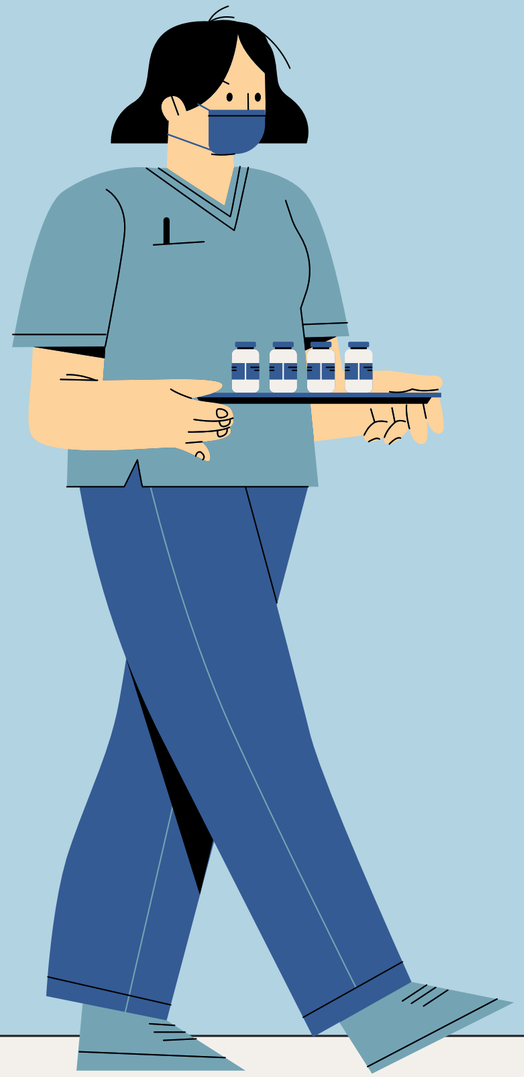
Data-Management Orientation

Defensive because they want to have control over the data at all times and must be sure who has access to what

Enabling Architecture

Defensive because the hospital needs to have a single source of truth (SSoT). Using a SSOT method for data means that every data element is edited in one place. There is a primary source that contains all of the updated data. This is critical for EHRs because a patient's record could be updated a lot, in different departments or locations, who use different software to access the information

DELL SETON MEDICAL CENTER



Organization

Top-down Approach

Leaders must be involved in the data strategy, followed by domain owners for specific departments. Governance Committee.

Central Authority

Dell Seton should follow a centralized operating model where a central authority determines the rules of how to govern data in the organization.

Governance

Governance Committee

A governance committee will decide on: policies, procedures, resources, roles, technology, and designate domain experts

Stewardship

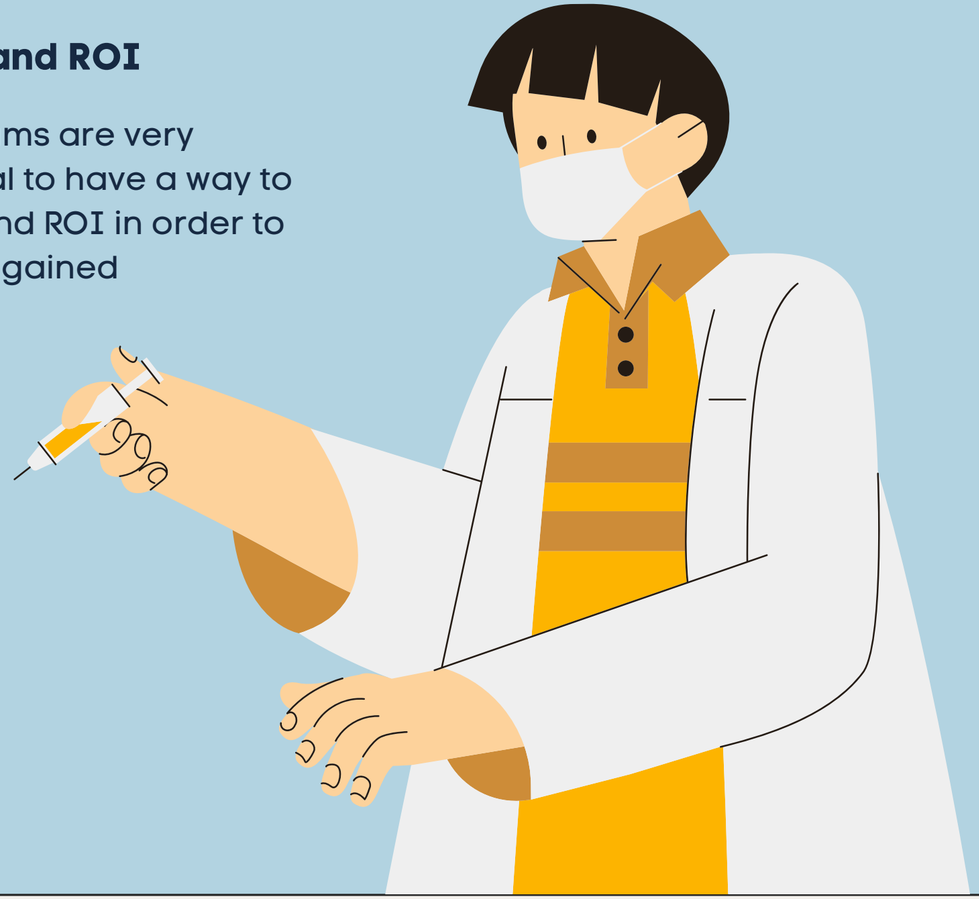
Educate

Properly educate employees on data management, create a culture around the organization's data management strategy in order to have advocates throughout the organization, most importantly have domain experts who are responsible for upholding governance standards for the data and business process in a given domain

Performance

Monitor Performance and ROI

Technology and data teams are very expensive so it is essential to have a way to measure performance and ROI in order to make sure value is being gained



Key Opportunities

Of A Well Defined Operating Model

Value

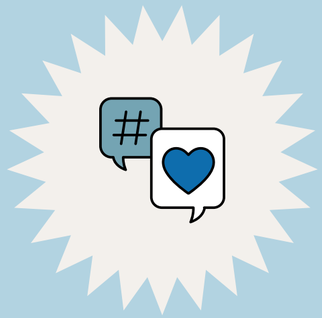
Optimized value from your data assets

Clarity

Increased clarity around the results and performance metrics. Reduced complexity, costs, and execution time by removing organizational layers and increasing span of control

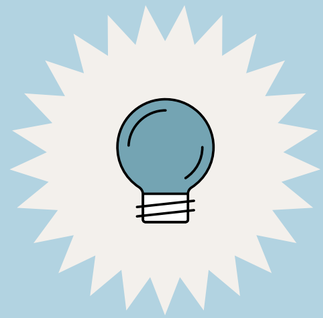
Speed

Improved speed of execution and elimination of redundancy by having a clear understanding of who does what and how things get done



Collaboration

Increased collaboration, improved results, and clear understanding of ROI on technology and data teams



Impact

Helps break through the organisational and technical silos within a business

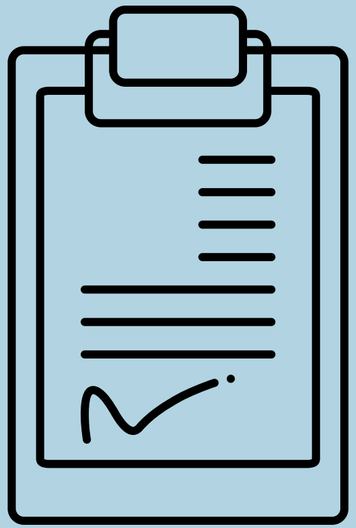
DELL SETON MEDICAL CENTER

OLTP Systems

Model and Implement

Patient medical care management

Hospital's Accounts Receivable



Patient medication and info management

Sending Data to Patient's Pharmacy

Medical supplies management

Hospital's Accounts Payable

DELL SETON MEDICAL CENTER

Patient Medical Care Mgmt.

Insurance_Providers

PK	Insurance_ID
	Provider_Name
	Provider_Phone_Number

Bill_Details

PK	Bill_Details_ID
FK	Patient_ID
FK	Bill_ID

Bills

PK	Bill_ID
	Bill_Total
	Bill_Status
	Bill_Issued_Date
	Bill_Notes

Insurance_Details

PK	Insurance_Details_ID
FK	Insurance_ID
FK	Patient_ID
	Group_Number
	Coverage_Date
	Identification_Number
	First_Name
	Last_Name

Patients

PK	Patient_ID
FK	Medical_Record_ID
	First_Name
	Last_Name
	Email
	Phone_Number
	City
	State
	Zip
	Street_Address
	Birthdate

Visits

PK	Visit_ID
FK	Patient_ID
FK	Doctor_ID
FK	Room_ID
FK	Bill_ID
	Reason
	Diagnosis
	Follow_Up_Date

Doctors

PK	Doctor_ID
	First_Name
	Last_Name
	Specialty

Medical_Records

PK	Medical_Record_ID
	EMR_ID

Rooms

PK	Room_ID
	Room_Number
	Room_Floor

DELL SETON MEDICAL CENTER

Patient Medication Management

Insurance_Providers	
PK	Insurance_ID
	Provider_Name
	Provider_Phone_Number

Insurance_Details	
PK	Insurance_Details_ID
FK	Insurance_ID
FK	Patient_ID
	Group_Number
	Coverage_Date
	Identification_Number
	First_Name
	Last_Name

Patients	
PK	Patient_ID
FK	Pharmacy_ID
	First_Name
	Last_Name
	Email
	Phone_Number
	City
	State
	Zip
	Street_Address
	Birthdate

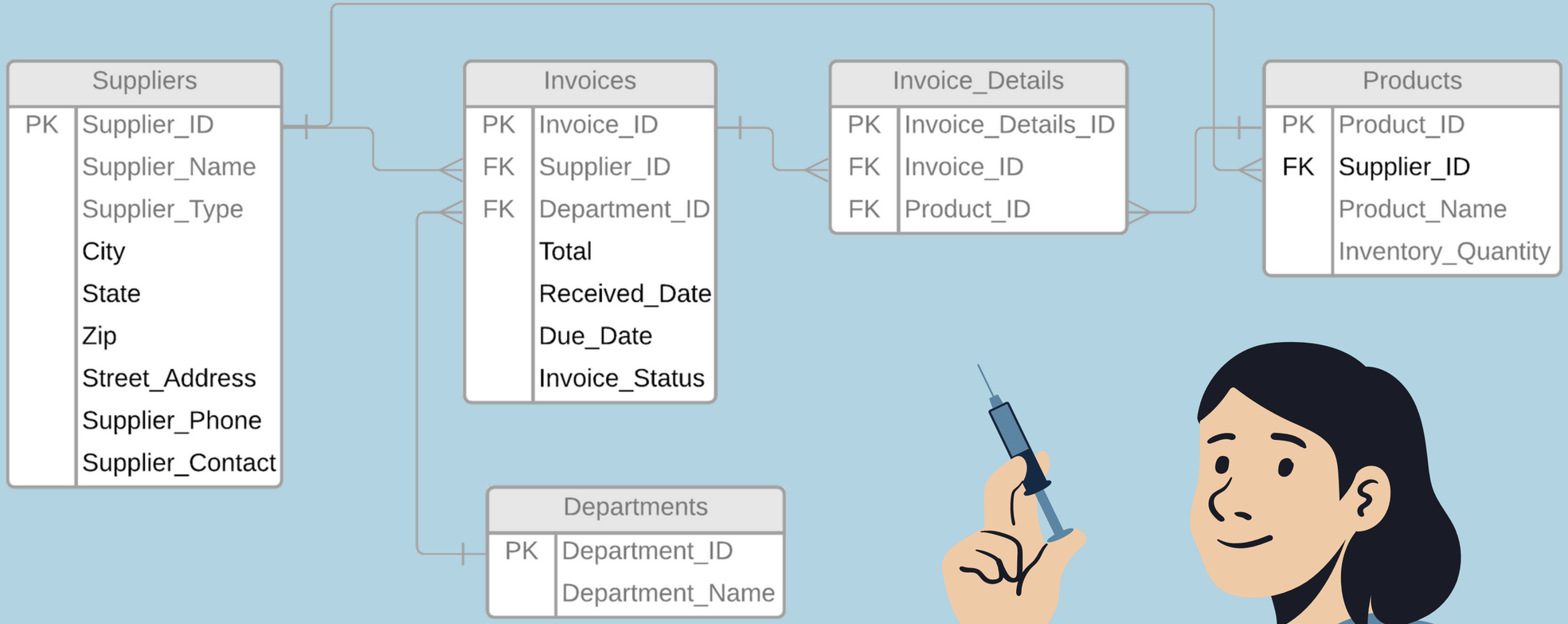
Pharmacy_Details	
PK	Pharmacy_Details_ID
FK	Pharmacy_ID
FK	Patient_ID

Pharmacies	
PK	Pharmacy_ID
	Pharmacy_Name
	Street
	City
	State
	Zip
	Street_Address
	Phone_Number
	Email
	Notes

Medication_Details	
PK	Medication_Details_ID
FK	Patient_ID
FK	Medication_ID
	Dosage
	Quantity
	Number_Of_Refills
	Notes

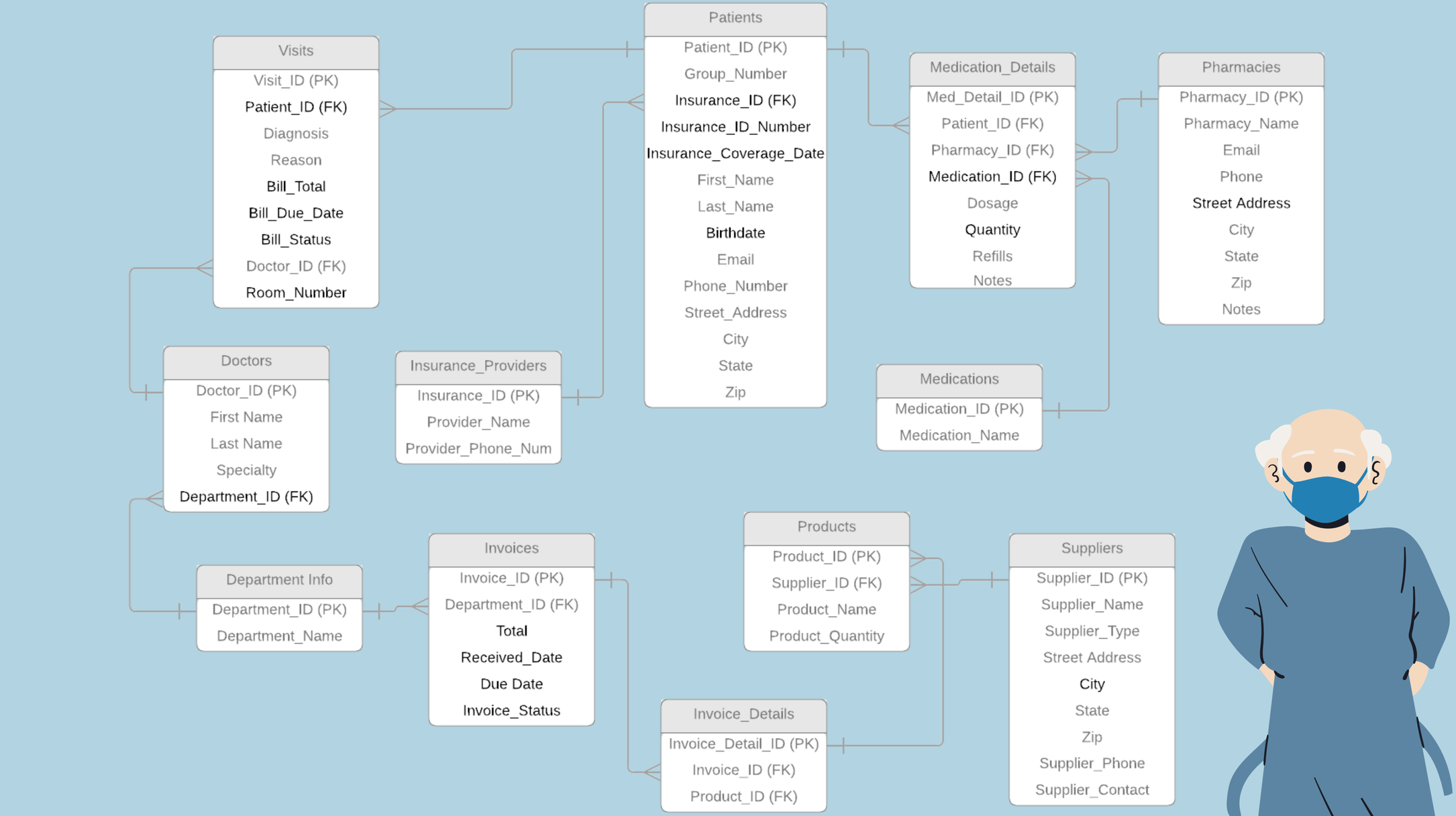
Medications	
PK	Medication_ID
	Medication_Name

Medical supplies management



DELL SETON MEDICAL CENTER

Data Warehouse



DELL SETON MEDICAL CENTER

Types of Unstructured Data

Written Text

Mainly written text is doctor's prescription. This data is quite useful to store to automate the process of ordering medicines and later running analysis on it as well.

Radiological Images

Radiological images are important data since they can be used in future for prediction of various diseases.

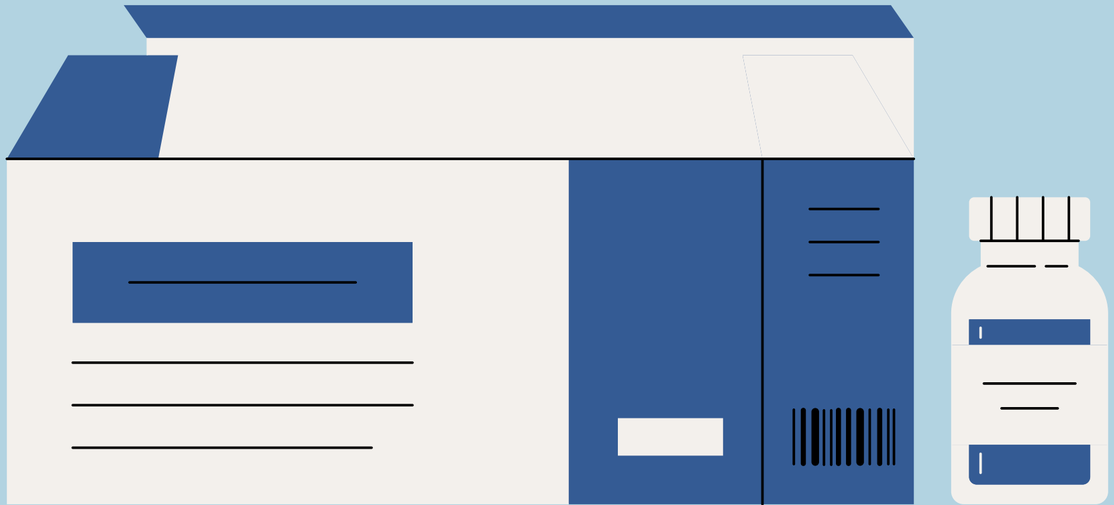
Doctor Audio Files

In absence of scribes, some doctors use audio notes to notate what occured during the patient visit.

Exploiting Unstructured Data

"Most importantly, the ability to analyze unstructured data plays a pivotal role in the success of big data in healthcare settings since 80% of health data is unstructured."

Dell Seton Medical Center will need to run image recognition and image segmentation models to extract information out of the radiological images. Dell Seton Medical Center will need to run NLP models to extract written text information. After unstructured data has been gathered across multiple healthcare units, it can be stored in a Hadoop distributed file system and NoSQL database that can maintain it until it can be called up in response to users' requests. NoSQL databases support the storage of both unstructured and semi-structured data from multiple sources in multiple formats in real time.



Auth Matrix - Patient Medical Care

	PATIENT	DOCTOR	RECEP-TIONIST	BILLING CLERK
MEDICAL RECORDS	R, U	R, U		
APPOINTMENTS	C, R, U, D	R	C, R, U, D	R
INSURANCE DETAILS	C, R, U, D	R	C, R, U, D	R, U
INSURANCE PROVIDERS	R	R	R	R
PATIENT INFORMATION	C, R, U	R, U	C, R, U	R
BILL DETAILS	R	R	R	C, R, U, D
BILLS	R	R	R, U	C, R, U, D
ROOMS	R	R	R	
DOCTORS	R	R, U	R	R
PRESCRIPTION INFO	R	C, R, U, D		

Data Governance

HIPPA, PHI & Data Class.

We would employ an algorithm that actively seeks out data that looks like a patient name, birthdate, social security number, etc. and label that data. Then we would employ policies to protect that data such as encrypting that data when being attached to emails, masking the data when nonessential providers view the data, etc.

Data Retention

We would also build a data retention policy and structure it around deleting data when the hospital is legally allowed to dispose of the data as to reduce the likelihood of data being compromised. We understand some data is needed in the long term, and would consult healthcare experts and hospital employees.

Least Privilege Access

By implementing least privilege access, we also can be sure that we are in a least governance state – by ensuring access to those roles who are necessary. By employing LPA, we mitigate risk to our data.

What did you learn?

Operation

We learned more about how a hospital operates based on their data strategy. We learned how changing the data strategy can affect different stakeholders. We learned how different OLTPs are designed within a healthcare organization.

Authorization

We learned that data authorization provides more security on data and restricts unauthorized individuals from accessing the data. Giving access by the role is the efficient and time saving way to give authorization.

Unstructured Database

We learned that using an unstructured database would be the most effective way to store data from hospitals. It often includes data like radiological images and audio files, which is challenging to store in a structured database like SQL.

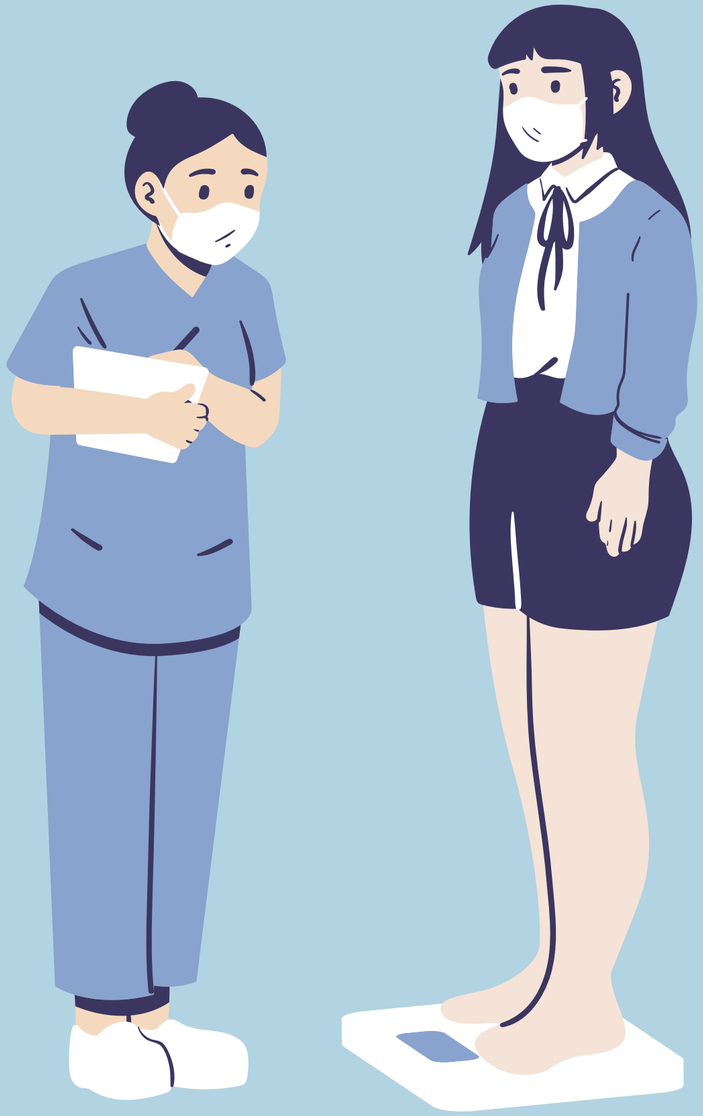
What was most valuable?

Data Strategy

Data strategy information. Understanding how different companies have different data strategies is important.

Access

It was valuable understand who has access to what data in the healthcare system. Because there are many federal rules and regulations regarding healthcare data such as “HIPAA”, it was important to take into consideration those ideals when developing role/access matrix. Realizing that even doctors don’t have complete CRUD access to all information is important, and just shows the importance of data protection in the healthcare system.



How can you use this learning going forward?

Architecture

This learning will be useful in designing and implementing complex data management architectures

Unstructured Data

In the future when working with an organization we can work towards identifying its unstructured sources of information, explore and exploit them for the organization’s benefit.

DELL SETON MEDICAL CENTER

Questions or comments?

DELL SETON MEDICAL CENTER