

# CAPSTONE PROJECT

INTERNSHIP

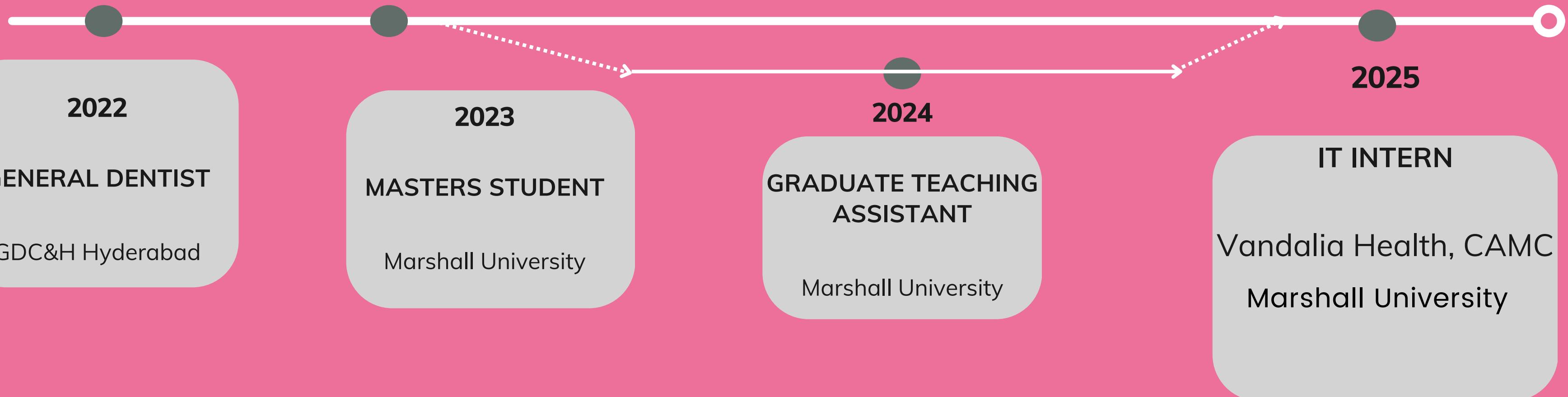
JAN 6 - MAY 9

VANDALIA HEALTH

-DR. KASI GORLI



# Experience



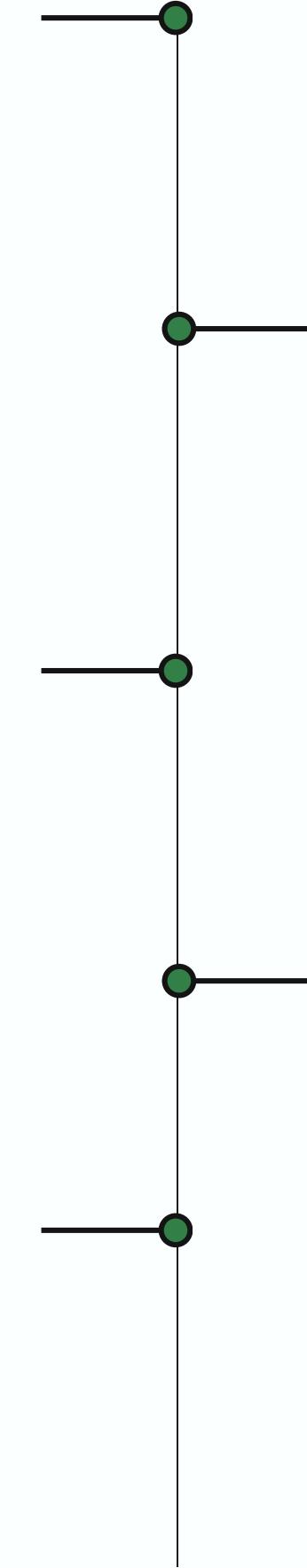
# Table of Contents

- Part 1:** Technical Foundations & IT Operations
- Part 2:** Healthcare Informatics & Clinical Workflows
- Part 3:** Data Analytics & Visualization
- Part 4:** Project Implementation & Career Readiness

## 4 months internship

This is my plan to complete the regular rotatory internship and the projects and tasks i am assigned to

# MY Roadmap



**FEB Goal:**  
Building on IT fundamentals, the second month is dedicated to learning about Cerner EHR, data standards, and system uptime management, and also started working on the Dashboard Project.

**April Goal:**  
In the fourth month, the focus transitions to completing the healthcare data analytics and visualization using SQL and Tableau and built a dashboard

# IT Services Workflow From Request to Resolution

## 01 Service Request Intake

Receive service requests from users/customers via various channels (e.g., email, ticketing system, phone).



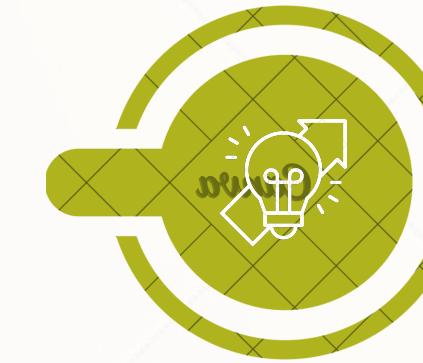
## 02 Ticket Creation

Create a ticket in the IT service management (ITSM) system for each service request.



## 03 Initial Triage

Review the ticket to determine its priority and assign it to the appropriate support team or individual.



## 04 Investigation

The assigned support team or individual investigates the reported issue or fulfills the requested service.



## 05 Communication

Keep the requester informed about the progress of their ticket, including any findings, troubleshooting steps, or estimated time for resolution.



## Resolution 06

Document the steps taken, changes made, and any additional information relevant to the ticket.



## Testing and Verification 07

Validate the resolution or service delivery to ensure it meets the requester's requirements and resolves the reported issue.



## Ticket Closure 08

Update the ticket status to reflect the resolution or service completion.



## Knowledge Base Update 09

Document the troubleshooting steps, solutions, and any new knowledge gained during the process.



## Continuous Improvement 10

Analyze trends and patterns in service requests and resolutions to identify recurring issues or areas for process improvement.



# IGEL

- IGEL OS is a next-gen edge operating system designed for **secure, cloud-based delivery** of applications and desktops.
- **Centralized endpoint management – Easily control multiple devices across locations.**
- **Read-only OS – Prevents unauthorized changes and increases security.**
- **Fast deployment & configuration – Ideal for large hospital systems.**
- **Integration with VDI (e.g., Citrix, VMware, Microsoft WVD).**
- Globally, **over 17,000 healthcare organizations use IGEL for secure and scalable endpoint management.**

Kasi Gorli

has successfully completed the IGEL certification exam and is recognized as an



A handwritten signature in black ink.

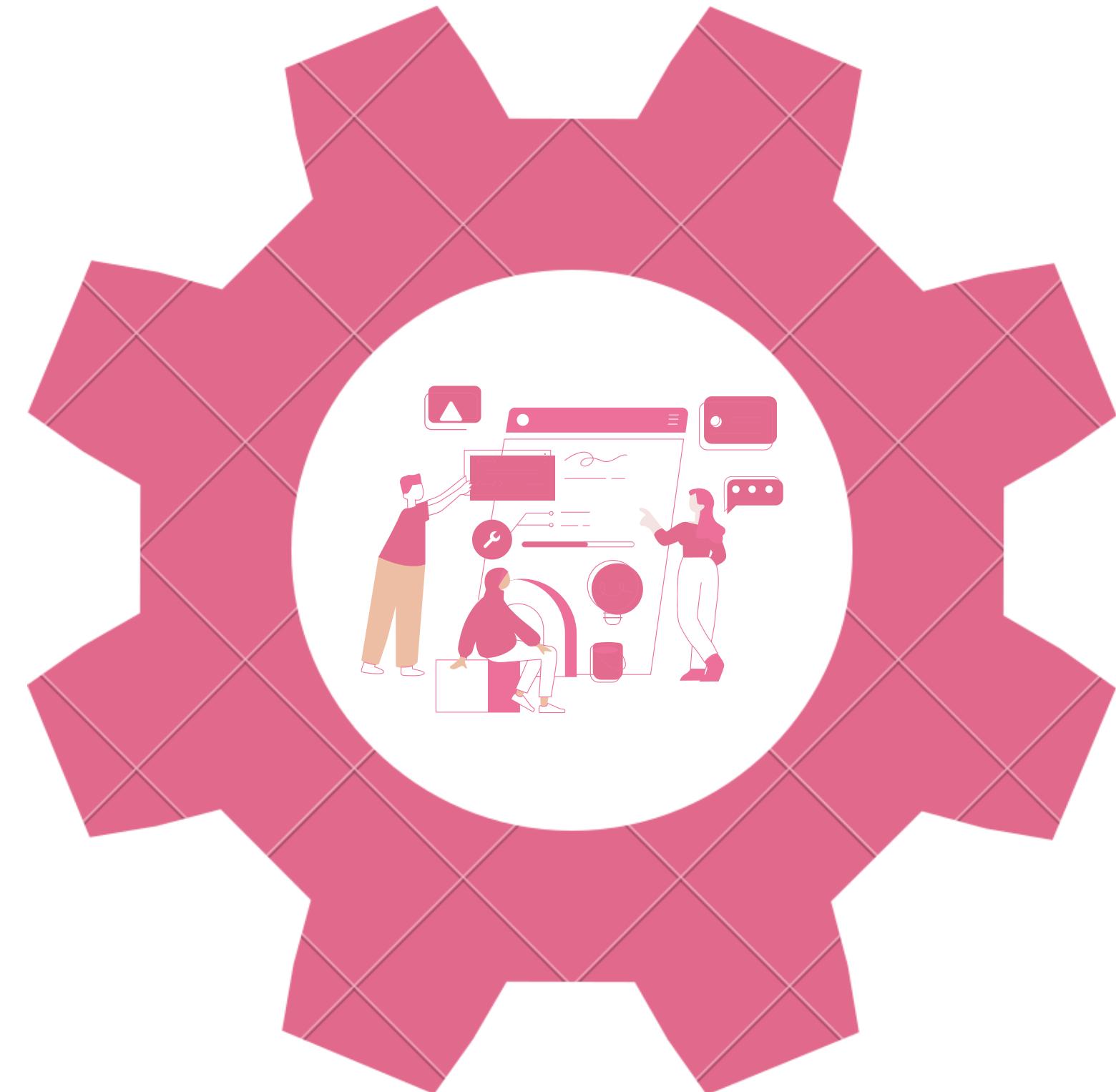
KLAUS OESTERMANN  
Chief Executive Officer  
IGEL

Certified on 2/9/2023 (Certification valid for 2 years from this date)

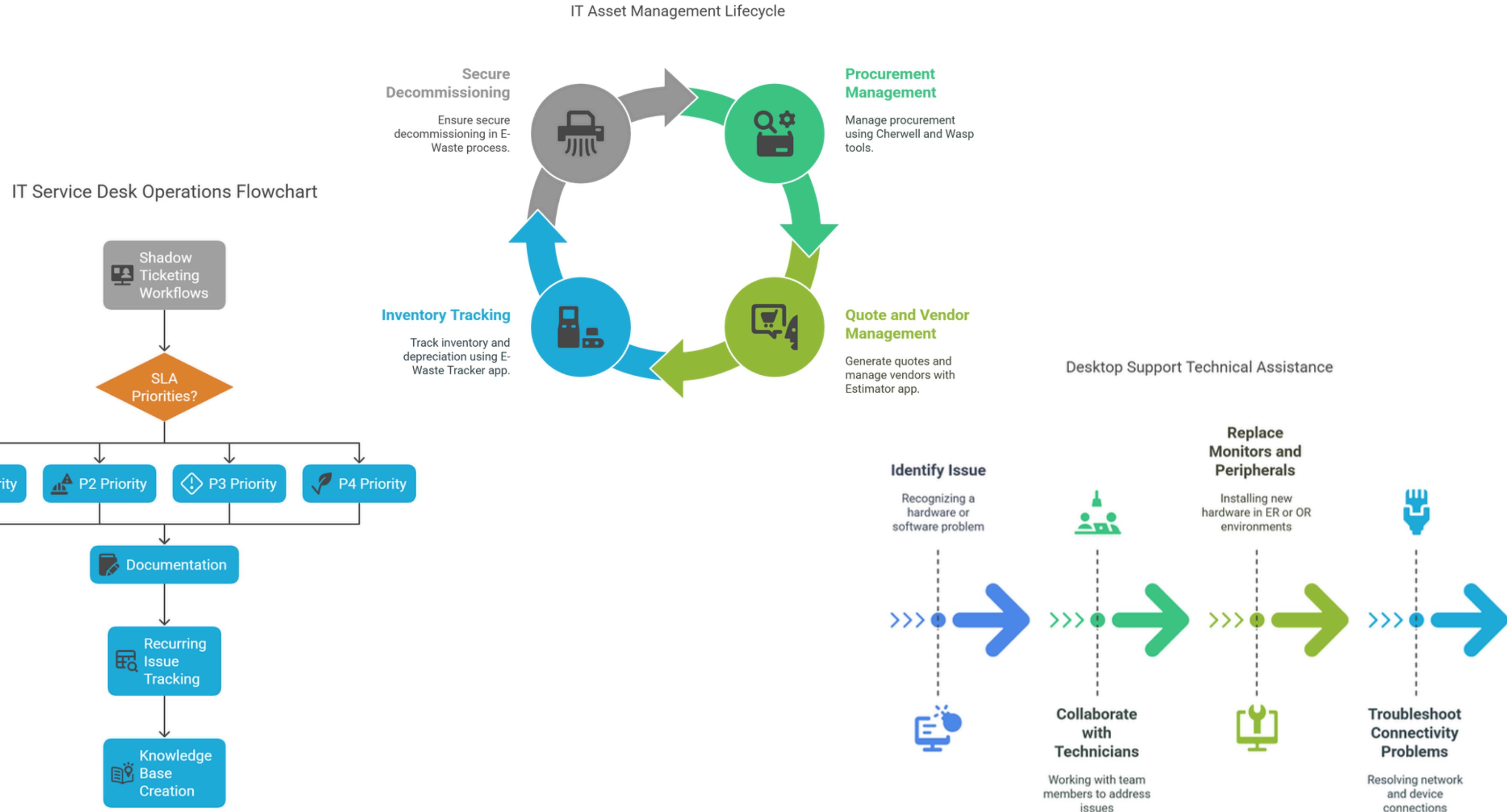
IGEL Academy  
CERTIFICATIONS  
Certificate #: C30932

# ITIL 4

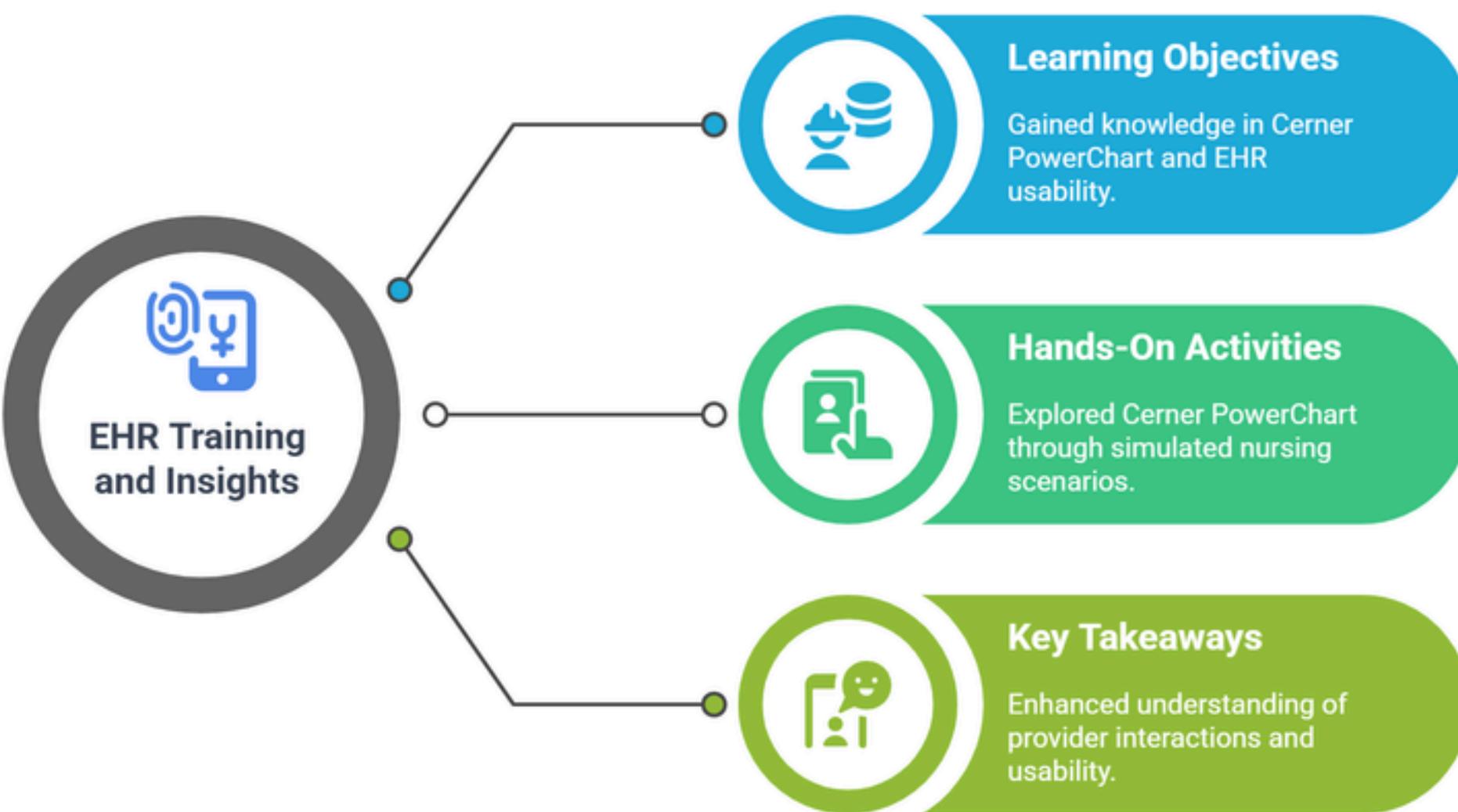
- ITIL (Information Technology Infrastructure Library) is a **best-practice framework** for IT service management.
- Focuses on aligning IT services with the needs of the business through structured processes.
- Core practices include **Incident Management, Problem Management, Change Management, and Service Desk**.
- ITIL is adopted by organizations globally, with over 2 million certified professionals.
- **Improves service delivery, enhances customer satisfaction, and supports continuous improvement.**



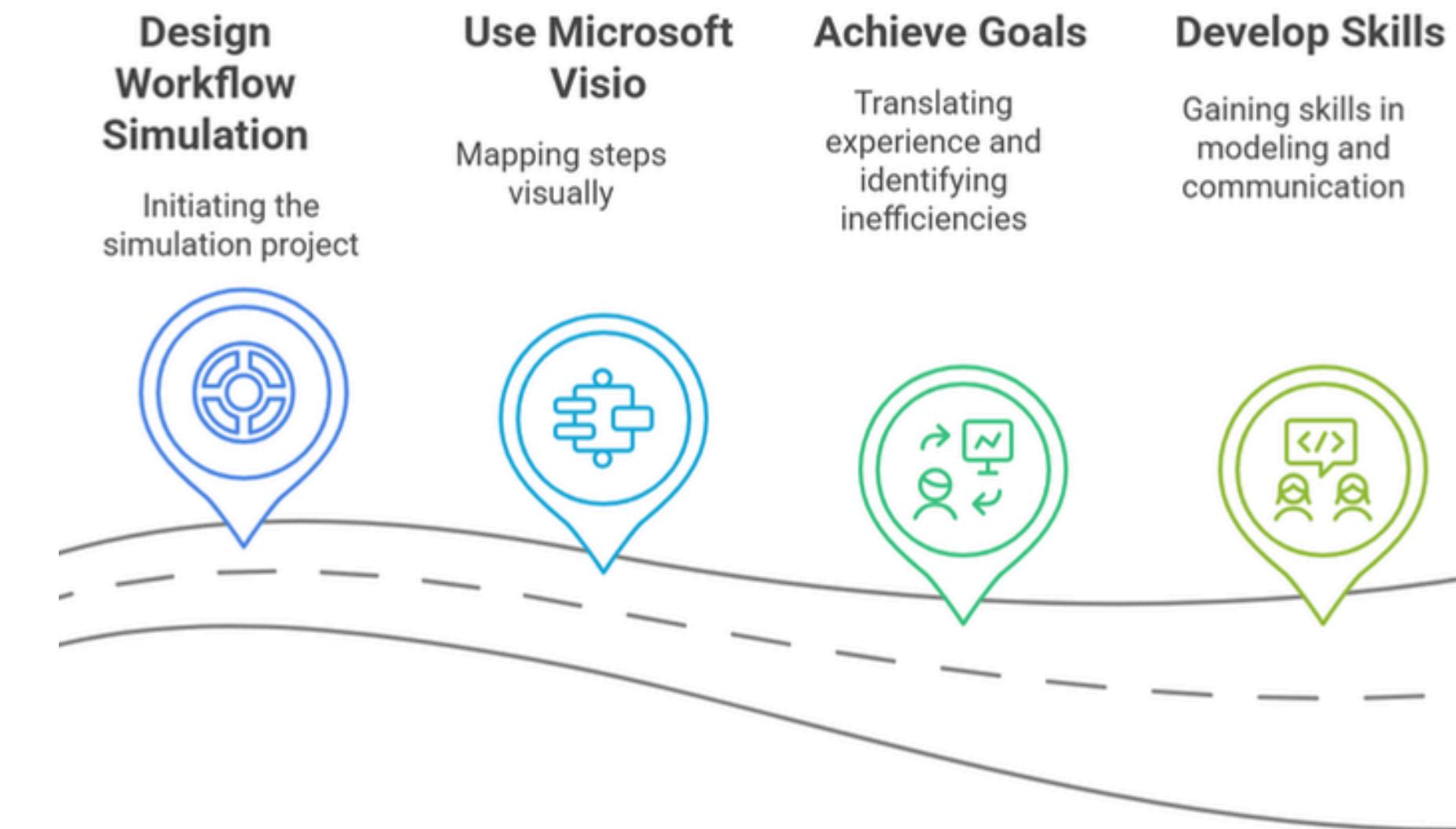
# IT SERVICE DESK, DESKTOP SUPPORT & ASSET MANAGEMENT – FOUNDATIONS OF HEALTHCARE IT SUPPORT



## Exploring EHR Training and Insights

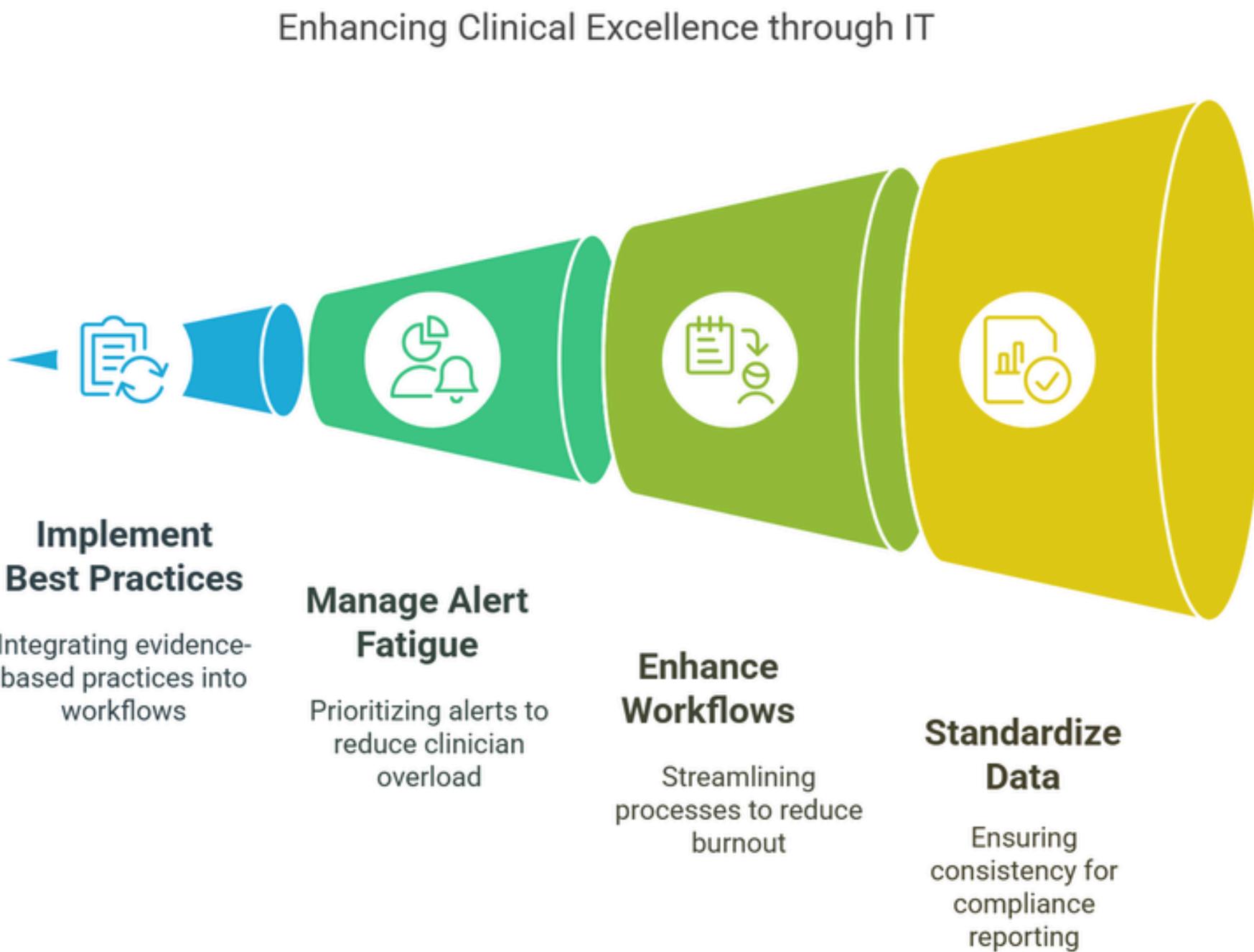


## Workflow Simulation in Clinical Informatics

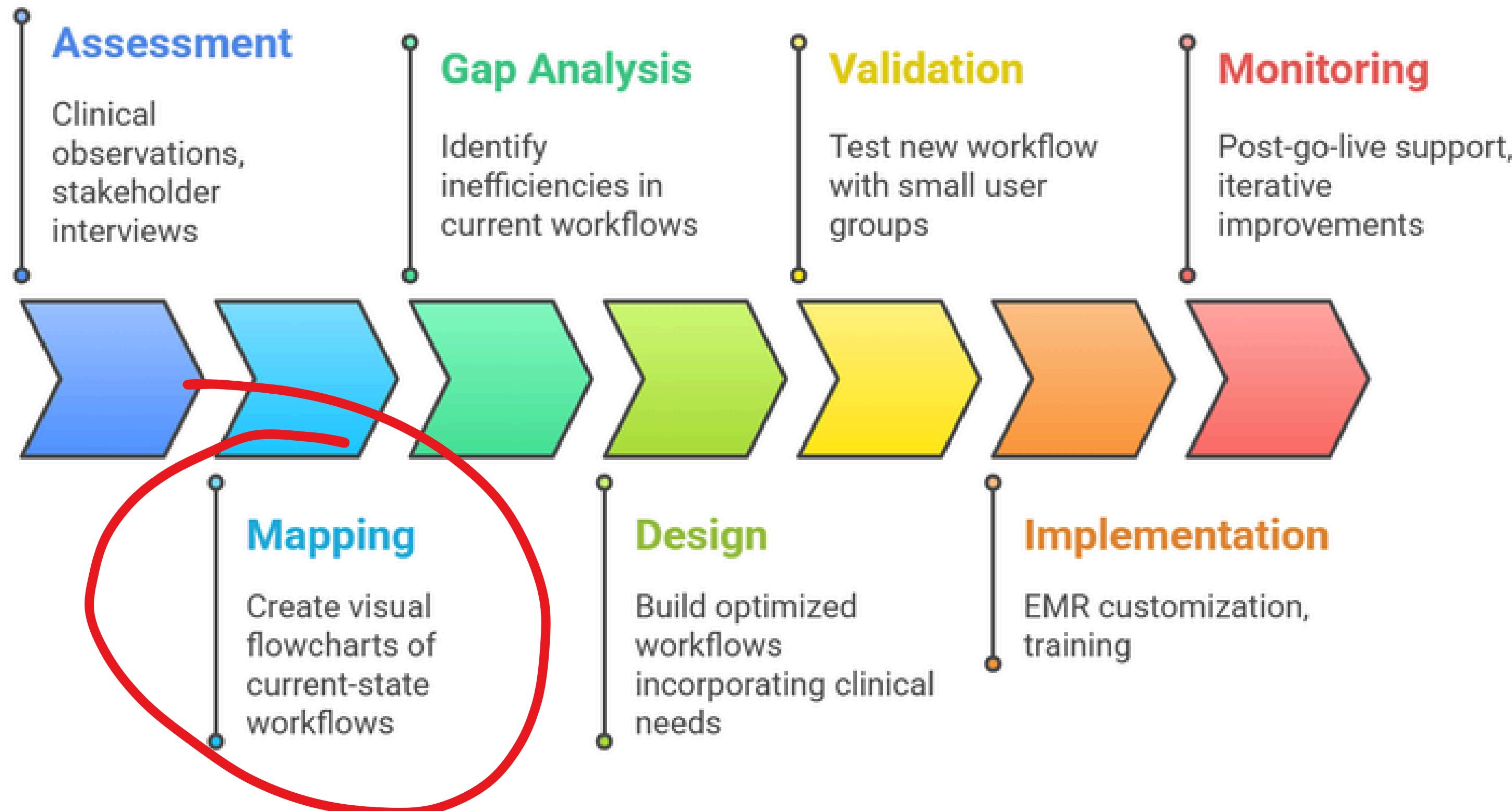


# CLINICAL FOUNDATIONS & DECISION SUPPORT – BRIDGING IT WITH CLINICAL EXCELLENCE

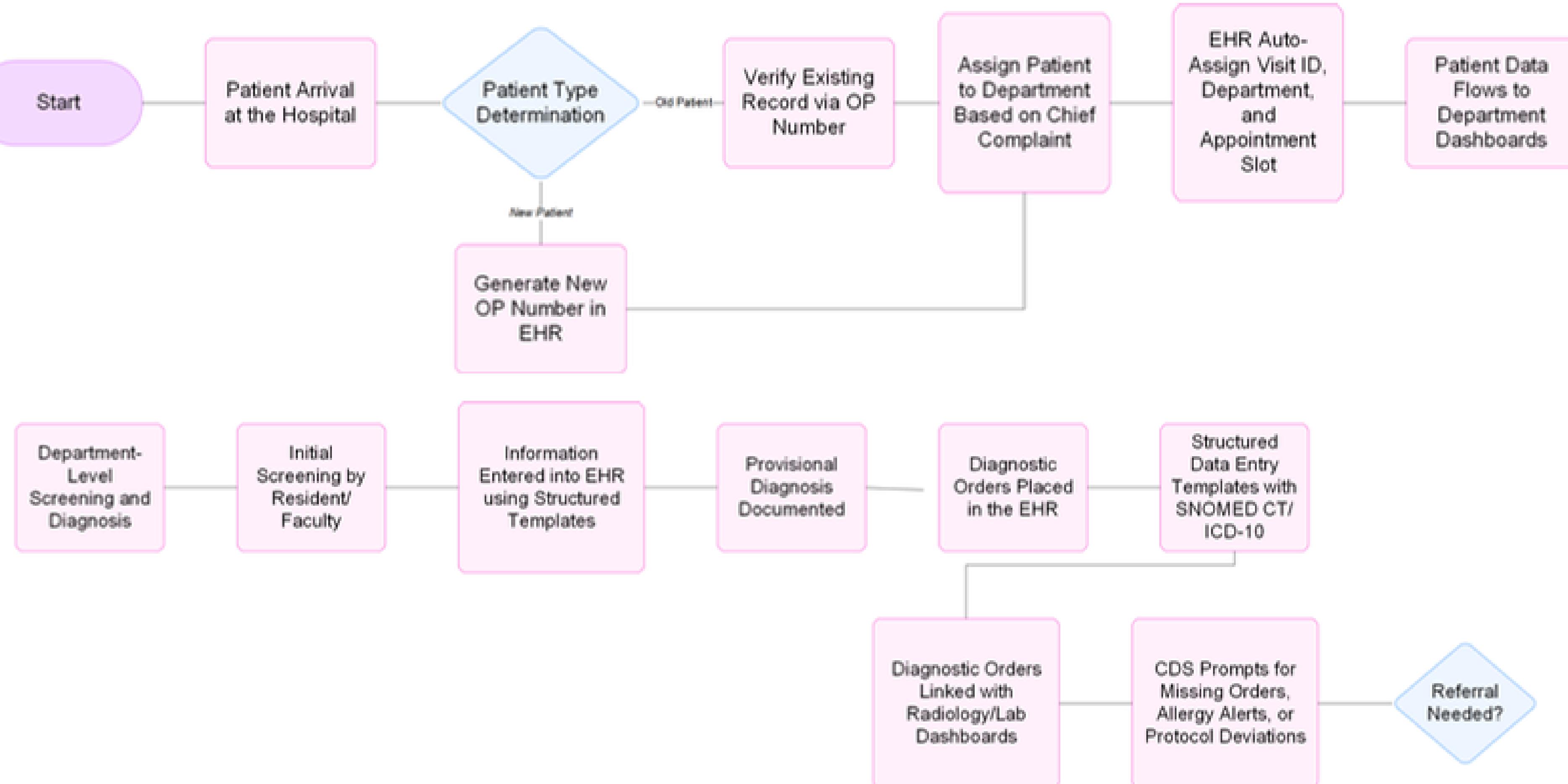
# CYBERSECURITY – SAFEGUARDING DATA & DRIVING DECISIONS



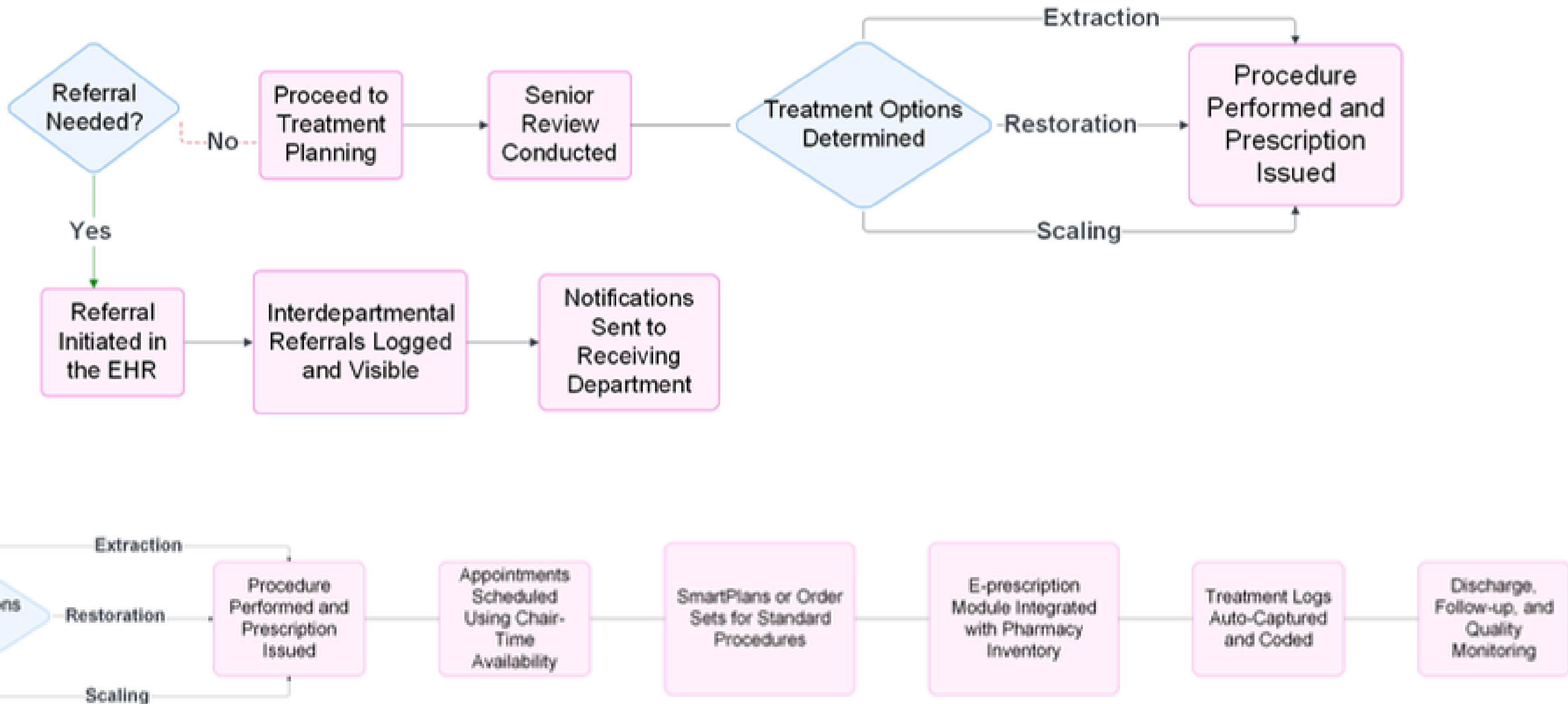
## Streamlining Clinical Workflows for Efficiency



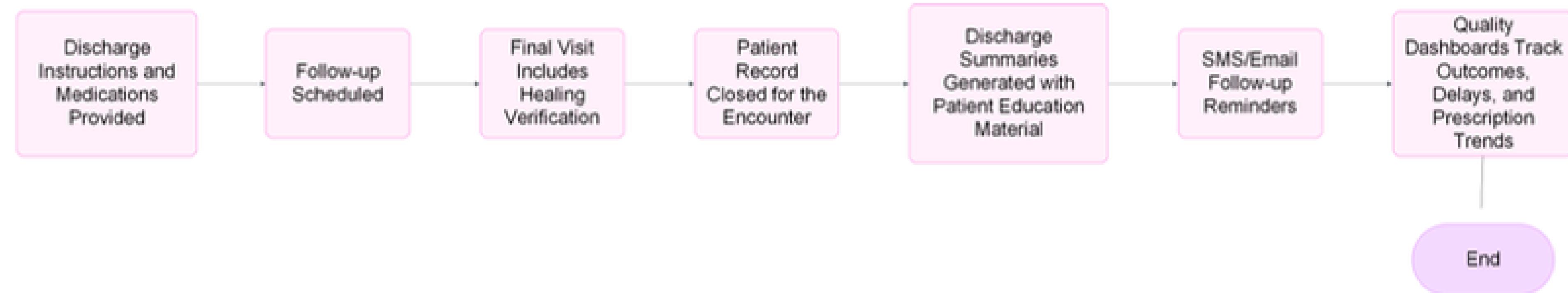
# WorkFlow GDC



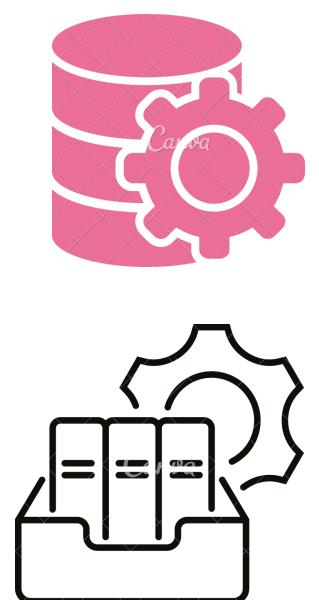
# WorkFlow GDC



# WorkFlow GDC



## Planning & Preparation



### Interest Development

Developed a strong interest in visualizations



### Data Practice

Engaging with public datasets from Mackarao and Synthea.

### Software Installation

Installing Tableau Public on a laptop.

### Dashboard Creation

Building dashboards on various topics.

### KPI & Storytelling

Learning about KPIs and visual storytelling.



### Internship Transition

Confidently applying skills in a real-world internship.



**DEFINITION:** Health data analytics is a comprehensive approach that turns a large amount of basic healthcare data into useful insights. These insights aim to improve care for patients and make healthcare operations more efficient. The process involves gathering, keeping, sharing, and studying health information from various sources like Electronic Health Records (EHRs), Personal Health Records (PHRs), electronic prescriptions, and online patient services.

## HISTORY:

- 1920S TO 1940S: MEDICAL RECORDS AND SOCIAL SECURITY
- 1940S TO 1950S: ADVANCEMENTS IN MEDICINE AND HEALTHCARE
- 1960S TO 1970S: NEW HEALTH INFORMATION MANAGEMENT
- 1980S TO 1990S: EVOLUTION OF EHR AND HIPAA
- 2000S TO TODAY: DIGITIZATION WITH HEALTHCARE IT SERVICES

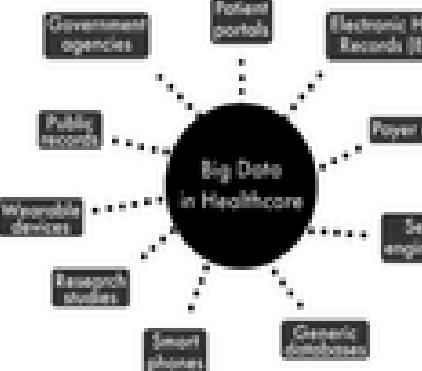


## TYPES OF HEALTH DATA ANALYTICS:

- Descriptive analytics, which uses historical patient data to gain insights into benchmarks and trends.
- Prescriptive analytics, which relies on machine learning to propose different strategies.
- Discovery analytics, which, like prescriptive analytics, uses AI(Artificial Intelligence).
- The difference, however, is that analytics employs AI(Artificial Intelligence) to examine study data to determine patterns that could offer actionable insights.
- Predictive analytics in healthcare, which employs forecasting and modeling to predict what will most likely happen in the future.

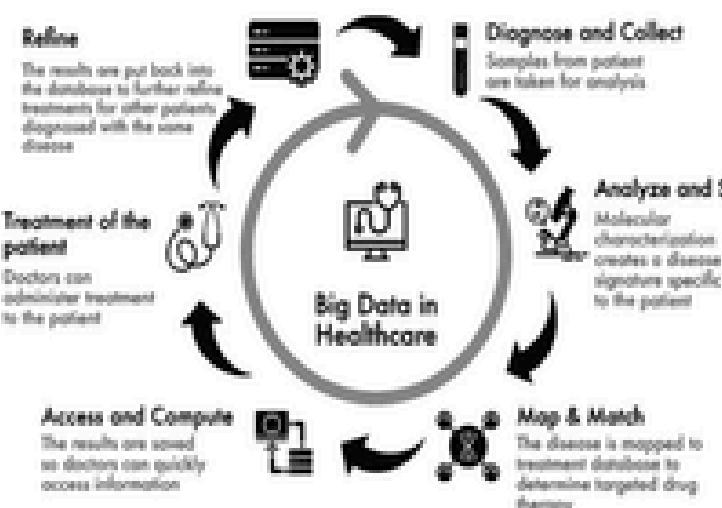
## Sources

- Government agencies
- Patient portals
- Electronic health records (EHR)
- Payer records
- Search engine data
- Generic databases
- Smart phones
- Wearable devices
- Public records
- Research studies



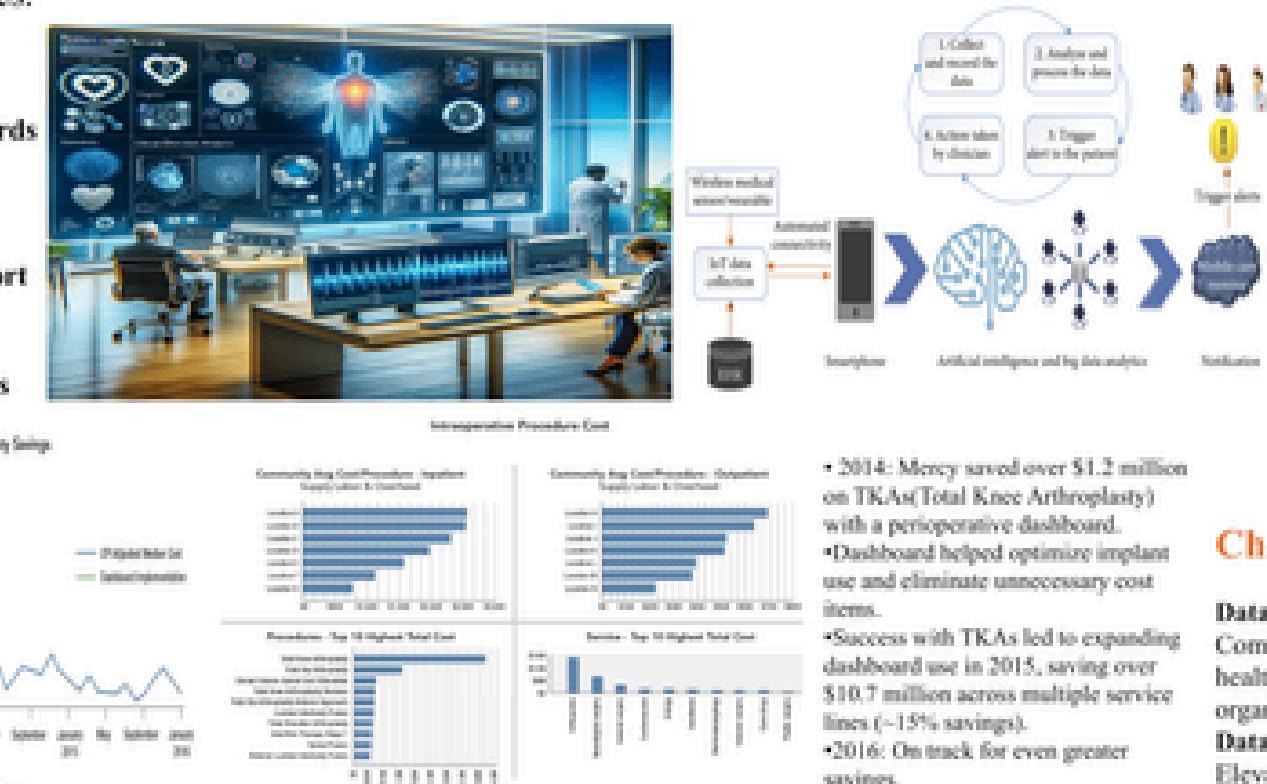
## Benefits and Impact

- Advanced technologies and data-driven approaches enhance patient outcomes and satisfaction.
- Personalized treatment plans and precise diagnoses lead to more effective care.
- Proactive health monitoring increases patient trust in the healthcare system.
- Telemedicine and predictive analytics help reduce healthcare costs.
- Remote monitoring and early intervention decrease hospital admissions.
- Efficient resource use leads to lower treatment expenses, benefiting both providers and patients.



## Tools

- Electronic Health Records (EHRs)
- Predictive Analytics in Healthcare
- Clinical Decision Support Systems (CDSS).
- Data Visualization Tools



- 2014: Mercy saved over \$1.2 million on TKAs(Total Knee Arthroplasty) with a perioperative dashboard.
- Dashboard helped optimize implant use and eliminate unnecessary cost items.
- Success with TKAs led to expanding dashboard use in 2015, saving over \$10.7 million across multiple service lines (~15% savings).
- 2016: On track for even greater savings.

## Challenges

### Data Mining

Complexity in managing unstructured healthcare data across various organizations.

### Data Storage

Elevated expenses due to the massive amount and diversity of long-term healthcare data storage.

### Data Sharing

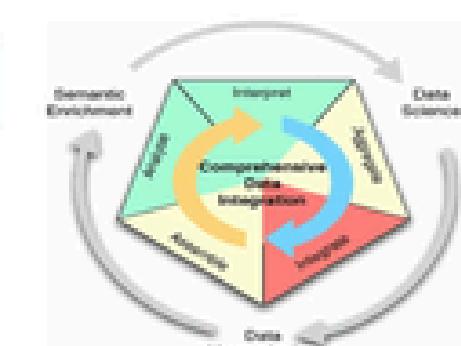
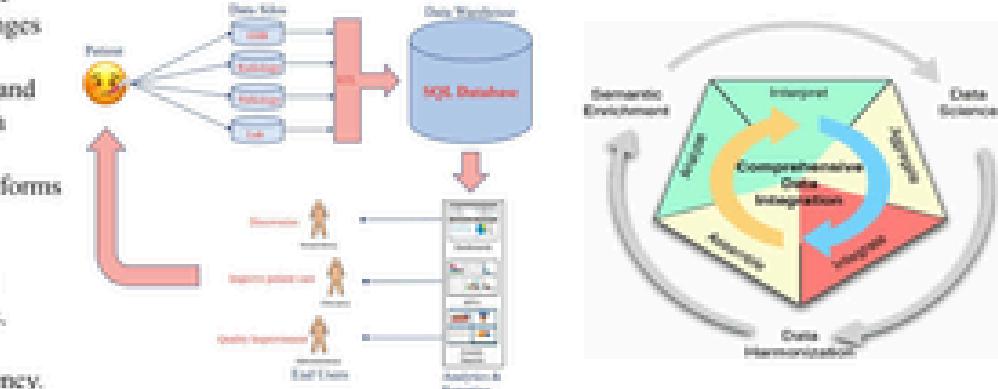
Challenges in standardization and scattered data impede efficient information exchange in healthcare.

### Data Privacy

Critical need to safeguard sensitive healthcare data against breaches and unauthorized identification.

### Data Technologies and Talent

Escalating demand for skilled professionals to navigate the growing complexity of healthcare data.



## Solutions:

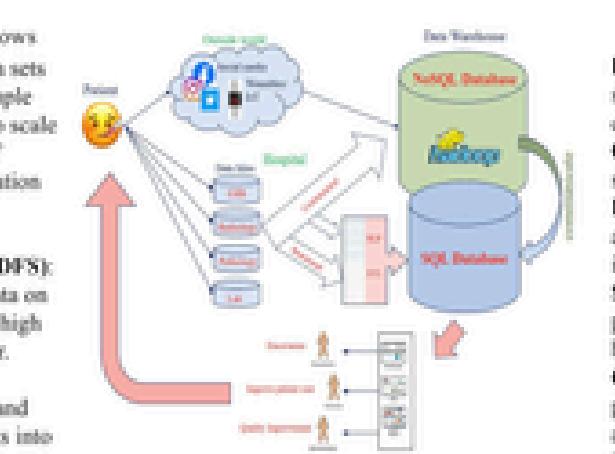
**Develop Advanced Analytical Tools:** Focus on creating more sophisticated tools for efficiently mining and analyzing unstructured data.

**Optimize Data Storage Solutions:** Invest in scalable and secure data storage solutions to manage costs and improve data handling.

**Enhance Data Standardization:** Establish uniform data standards and interoperable systems to facilitate easier data sharing and integration.

**Strengthen Data Privacy Measures:** Implement robust privacy protection measures, including advanced encryption and secure data handling practices.

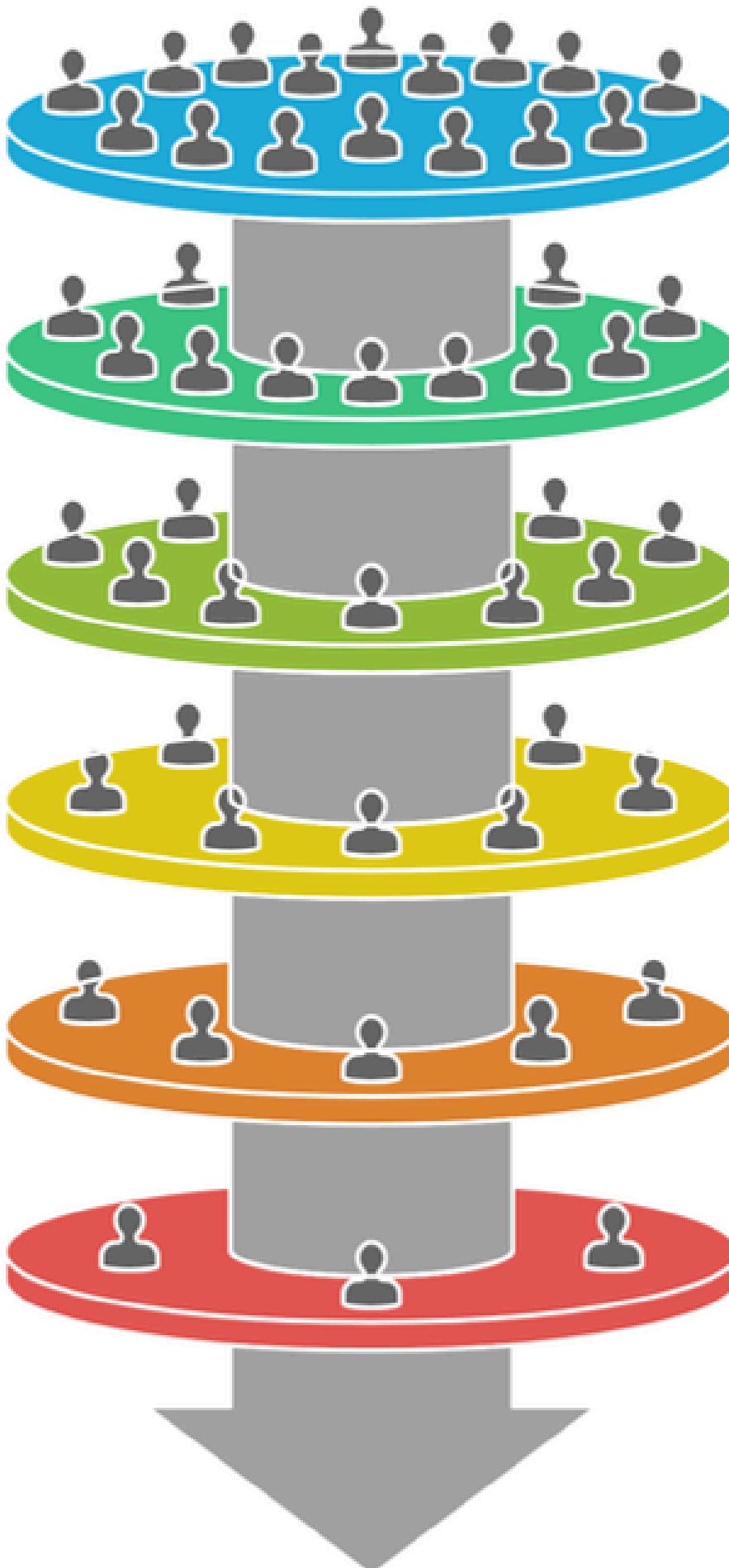
**Cultivate Talent and Technology:** Invest in education and training programs to grow talent in data science and healthcare informatics, and encourage the development of new technologies to address Big Data challenges.



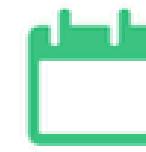
# PROJECT

Population  
Health

## Key Metrics



Admissions Analysis



Discharge Patterns



Encounter Review



Mortality and LOS



Readmission Insights



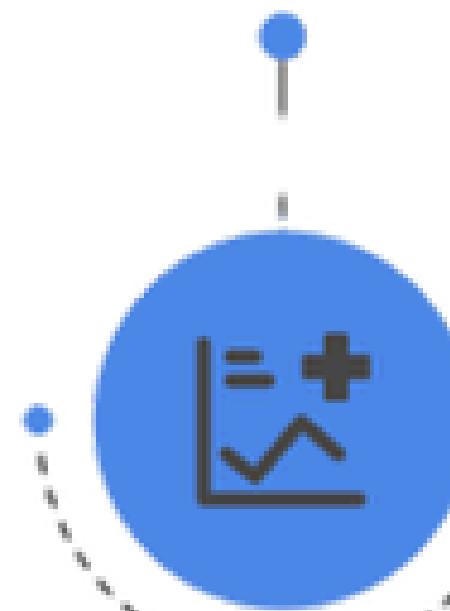
Powerplan Utilization

- **Admissions** (including time of day if possible, most interested number between 7a-7p and 7p-7a) narrow down to the providers, and add hospitalists)
- **Discharges** (Including time of day if possible, most interested in before 10 am and 2pm and then after)
- **Encounters**
- **Mortality**
- **LOS avg**
- **30 Day Readmission** (general and by condition, CHF, COPD, Stroke, Sepsis)
- **Number of Consults** (Order- Consult to Physician) (she needs the hospitalists, and which department needs.

# Hospital Data Analysis and Dashboard Creation Process

## Understand Hospitalist Needs

Identifying key performance indicators and requirements



## Data Extraction from Cerner

Gathering data from Cerner sources

## Data Cleaning and Preparation

Ensuring data is accurate and ready for analysis



## Creating Calculated Fields

Developing fields for metrics like LOS and readmissions

## Data Blending and Joins

Combining data from multiple tables for a comprehensive view



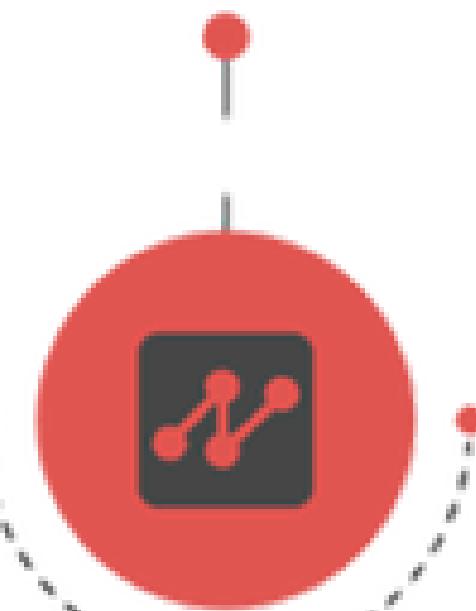
## Building Tableau Dashboards

Designing visual representations of the data



## Iteration with Team Feedback

Refining dashboards based on team input





**Year of Arrival**  
(Multiple values)

**Account Organization Name**  
(Multiple values)

## Admissions by Time

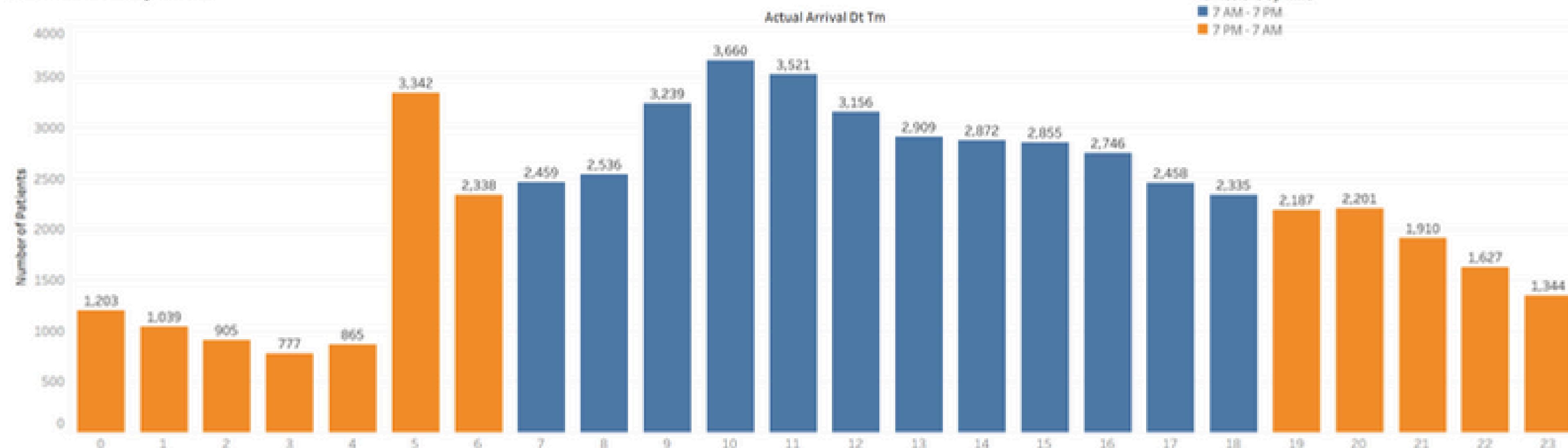
**Encounter Type**  
 (Multiple values)

**Day Shift Admissions**

**Night Shift Admissions:  
17,116**

**Total Admissions:  
30,935**

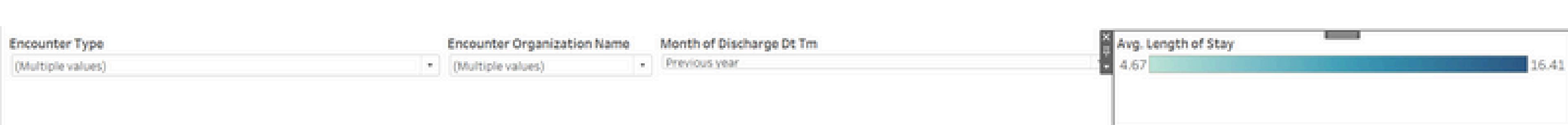
## Admissions By TIME



## Heat Map

A heatmap illustrating the distribution of actual arrival times across a 24-hour period, categorized by the day of the week. The x-axis represents the hour of the day (0-23), and the y-axis represents the day of the week (Sunday through Saturday). The color intensity indicates the frequency of arrivals for each specific day and hour combination.

The distribution shows a strong weekly pattern, with most arrivals occurring between 15:00 and 21:00 on Saturday. There is a noticeable dip in activity during the early morning hours (00:00-06:00) and a slight increase in the late afternoon (18:00-21:00).



## Heat Map

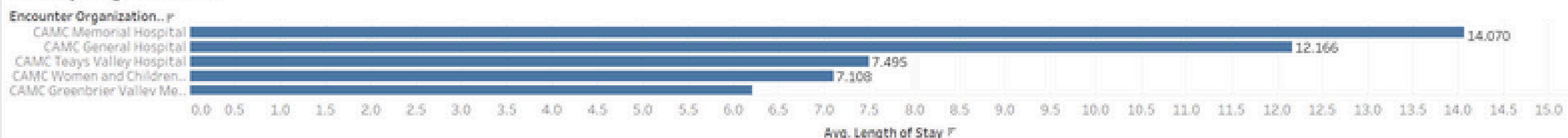
Encounter Organization Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CAMC General Hospital	10.45	8.96	11.07	11.05	12.01	10.57	11.46	12.45	11.56	12.14	12.70	15.43
CAMC Greenbrier Valley Med Ctr	5.87	9.26	6.37	5.51	4.78	5.81	5.52	6.43	5.48	6.07	6.57	6.82
CAMC Memorial Hospital	11.42	13.24	14.61	14.44	12.68	15.52	16.41	13.40	15.11	14.50	11.79	13.95
CAMC Teays Valley Hospital	7.41	7.64	6.67	7.52	5.82	6.97	8.01	7.76	9.22	7.53	7.90	7.05
CAMC Women and Children's Hos..	4.67	7.94	8.95	6.73	7.02	6.55	7.00	7.56	6.30	6.87	11.16	4.70

## Length of Stay by Physician

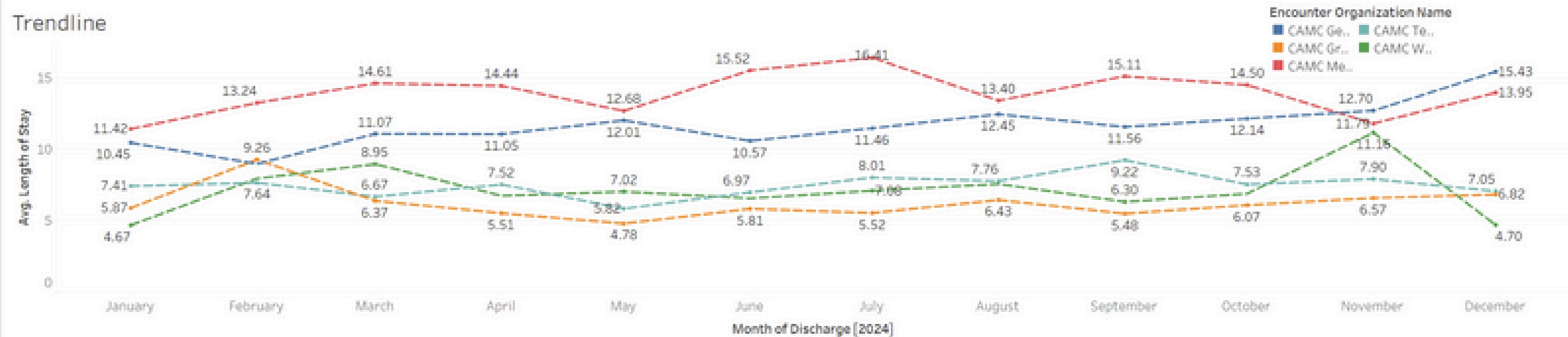
Provider NPI	Provider Name	Avg. Length of Stay
1003305541	Davies, DO, Robe..	12.2487
1023233566	Kasem, MD, Hoda	12.2487
1033406715	Knopf, MD, Rose..	12.2487
1033599113	Hess, DO, Micha..	12.4532
1043699085	Myers, MD, Andr..	12.2487
1093929580	Hamad, MD, Eze..	12.2487

**AVG LOS: 12.44 days**

## LOS by Organization



## Trendline



# OBSERVATIONS FROM MY RESEARCH & INTERNSHIP

## From My Ransomware Research:

- Hospital operations are heavily disrupted during cyberattacks.
- Patient care is delayed or halted due to:
- Inaccessibility of critical systems.
- Unavailability of patient charts and medication records.
- These gaps in access put patients at serious risk.

## From My Internship Rotations

- During planned downtimes, hospitals switch to paper-based documentation.
- This creates two major challenges:
  1. Physicians unfamiliar with paper charts struggle to document correctly.
  2. After downtime, staff must re-enter all paper documentation into the EHR, leading to:
    - Errors
    - Clinical burnout
    - Delayed patient care
    - Workflow discontinuity

# Cerner 724Access DTV



- Retention: ~7 days (default setting).
- Only stores active clinical data for current inpatients or recent discharges.
- Limited to recent activity for safety, performance, and storage efficiency.
- Not designed to store older records or long-term history.
- short-term downtime (1–2 days) with current inpatient focus.
- If the hospital's entire network or Cerner backend is compromised, 724Access may become unavailable, or even infected if not properly isolated.

# Risks During Downtime

## Vital Sign Trends

Difficulty in tracking vital signs can delay response.



## Transfer of Care Problems

Inefficient transfer of information between departments.



## Discharge Issues

Problems with discharge paperwork can affect continuity of care.



## Delayed Documentation

Delays in recording patient information can lead to errors.



## Inaccurate Records

Incomplete records may cause adverse drug reactions.

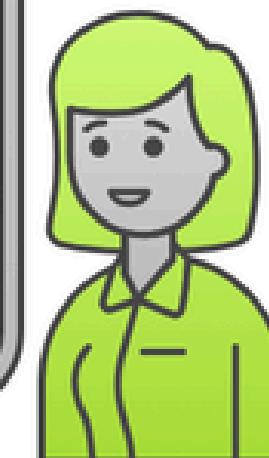
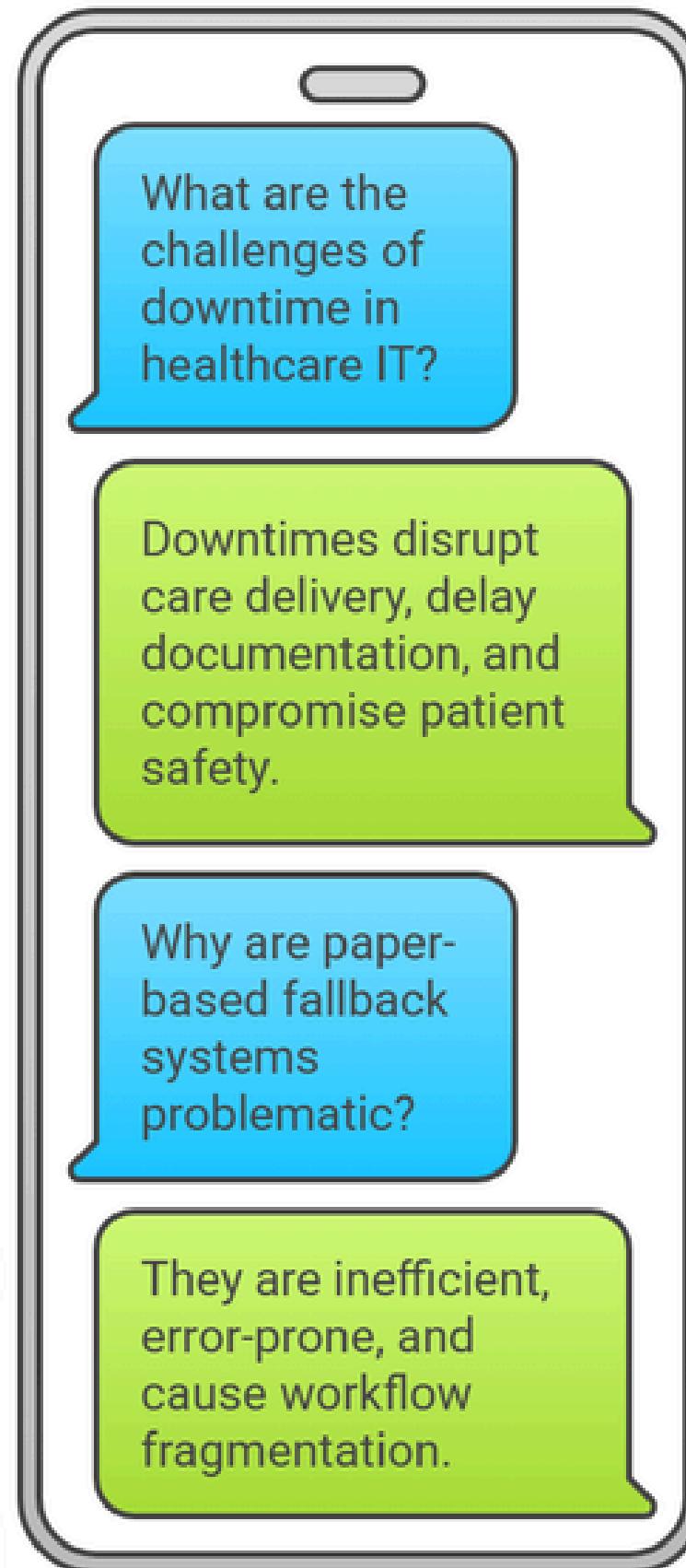
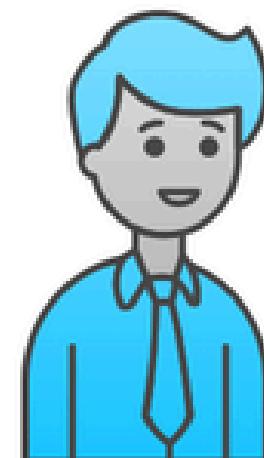


## Poor Medication Management

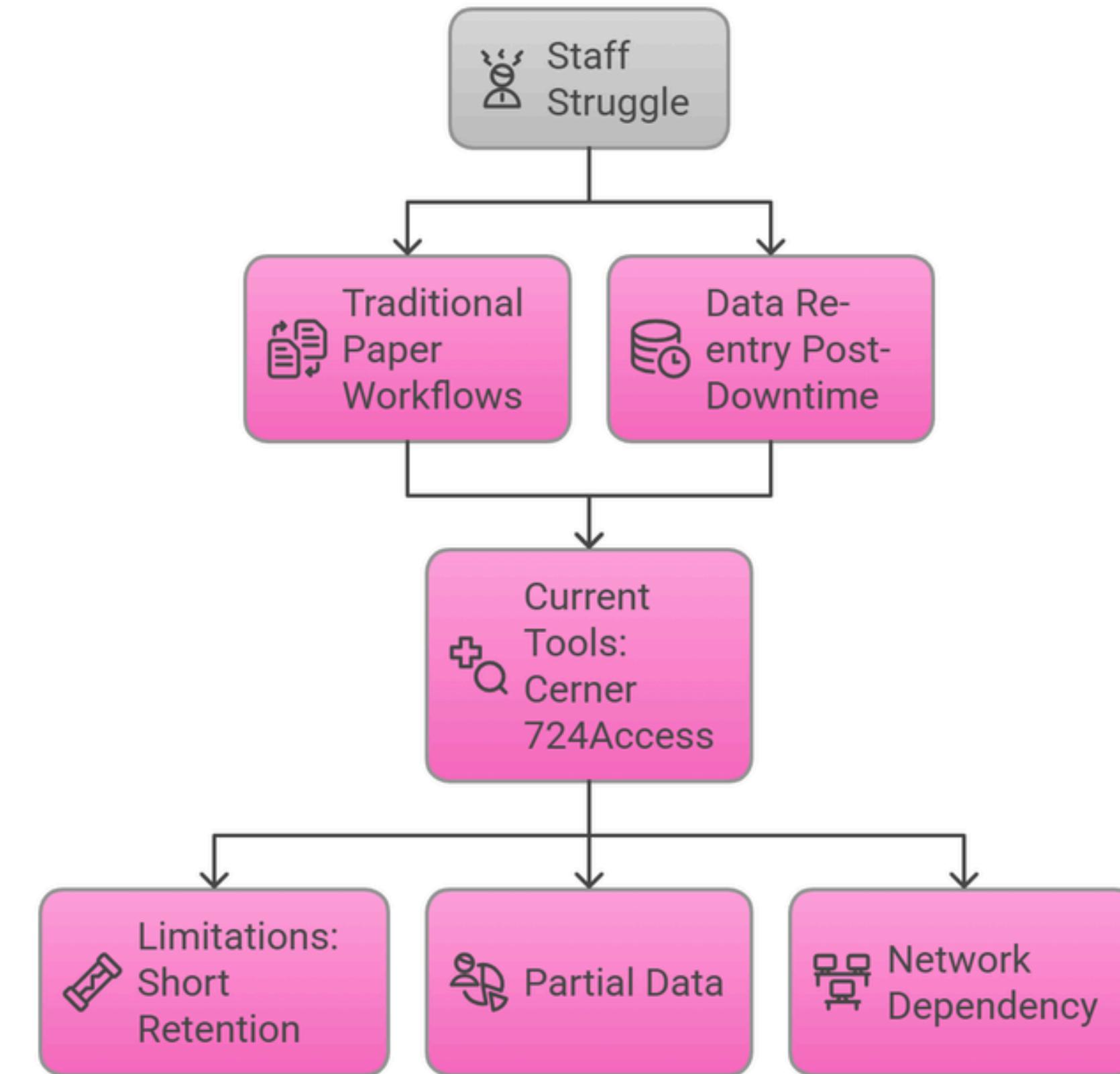
Ineffective management of medication doses increases risk.



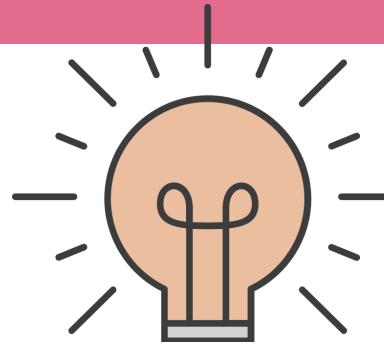
# Addressing Downtime in Healthcare IT



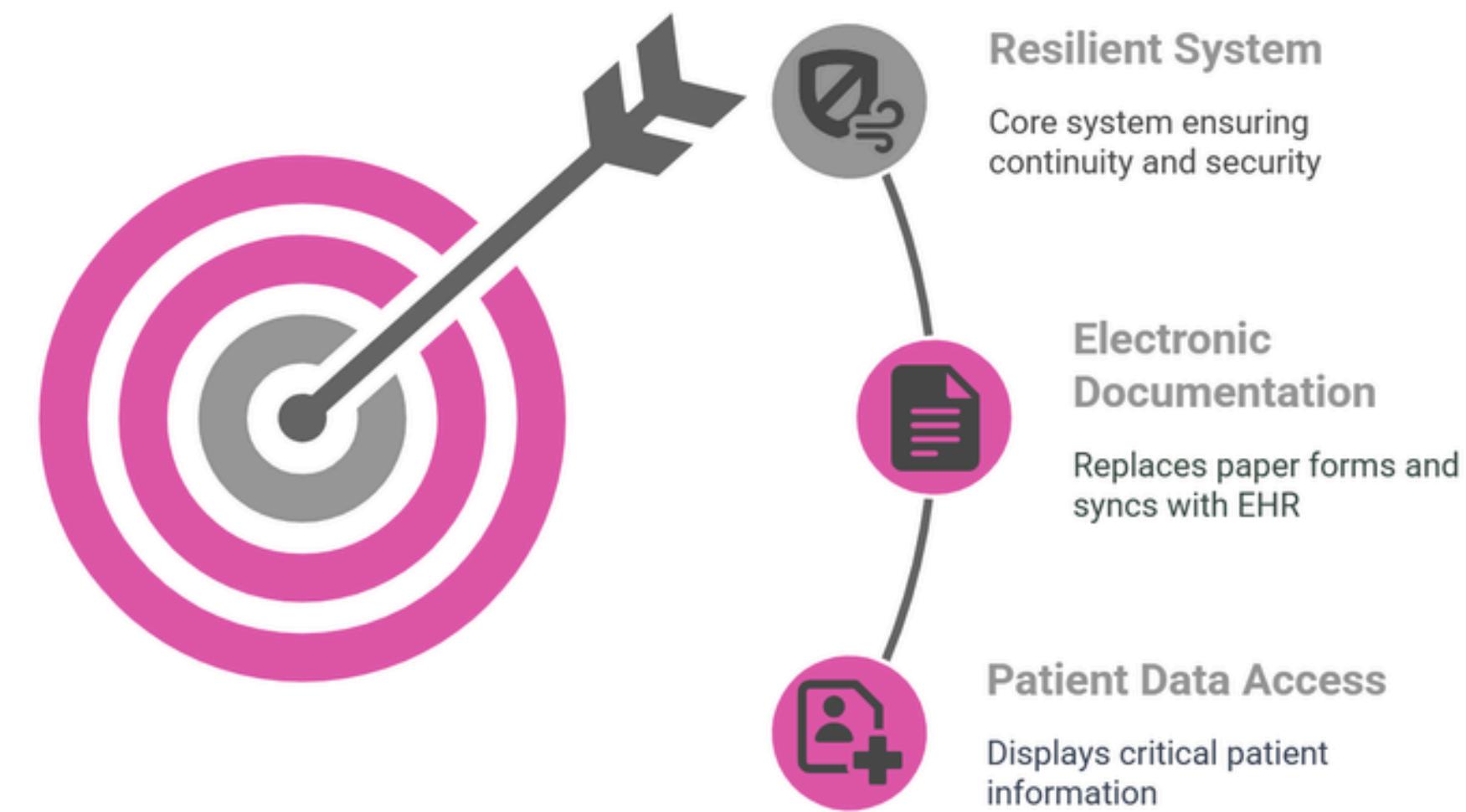
## Observations on Workflow Challenges



# What Can Be Done?



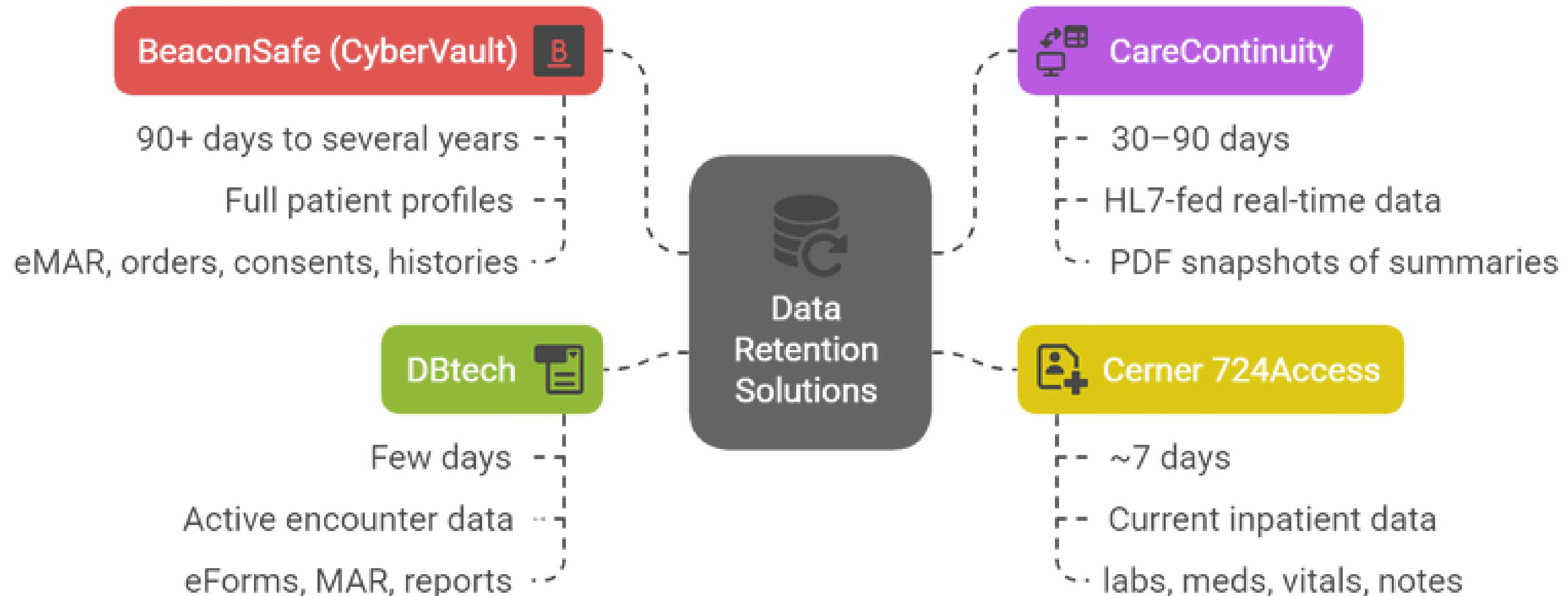
## Healthcare System Downtime Solutions



## Transition to Digital Healthcare Solutions



# Data Retention Solutions



# Interbit Data BeaconSafe (CyberVault)

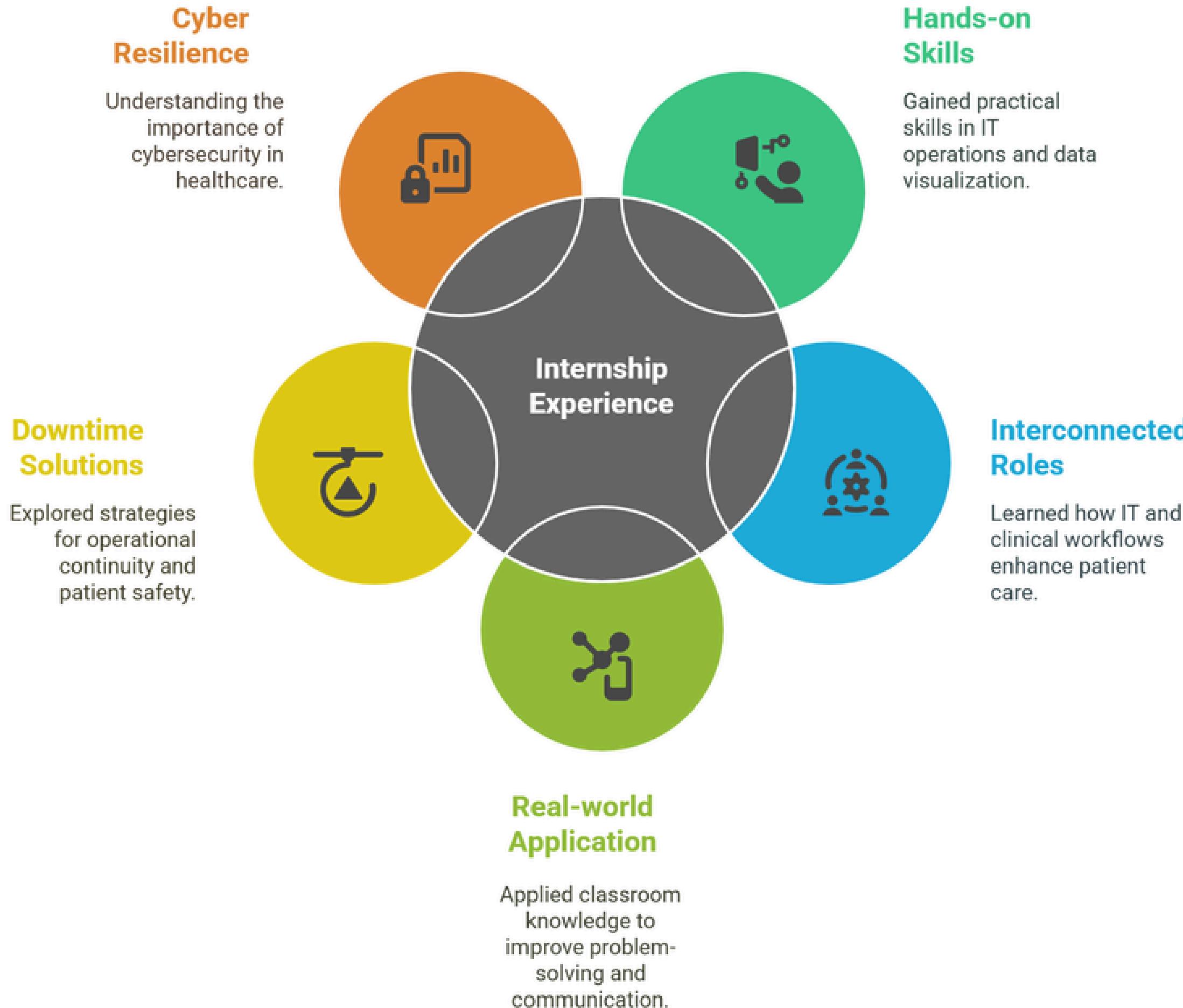
**Retention**  
**Days to several years**

Stores previous encounters, discharges, forms, and reports – not just current inpatients.

**Still works if Cerner, network, or internet is down.**

**Electronic eForms & Document activities during downtime and resync with host when available**

# What I Gained During My Internship



# Tools & Resources

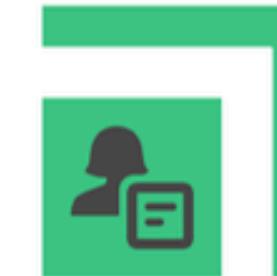


-  Cerner Power Chart
-  Chat GPT
-  Microsoft Visio
-  napkin AI
-  HelatheAnalytics
-  Tableau
-  Plural Sight, IGEL
-  PubMed, Google scholar, HIIMS, AHIMA
-  Canvas

## Key Areas Improved

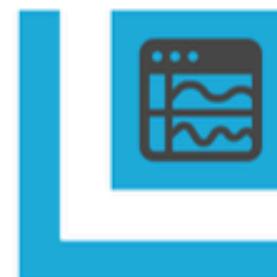
### Research-Driven

Combines research with cybersecurity and teamwork.



### Data Analytics

Utilize SQL and Tableau for insightful data visualization.



### EHR Optimization

Enhances electronic health record systems for better patient care.

### Healthcare IT Management

Manages IT services and asset tracking in healthcare.

### Next Steps



#### Experience Contribution

Leverage experience for healthcare transformation.



#### Continuous Learning

Focus on learning and networking in the field.

#### Career Goals



# Thank you