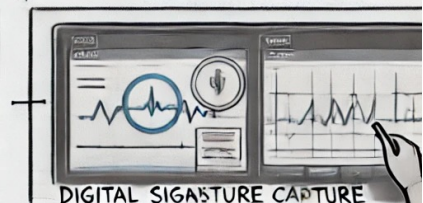


# APOTimizer



CAMERAS, SENSORS

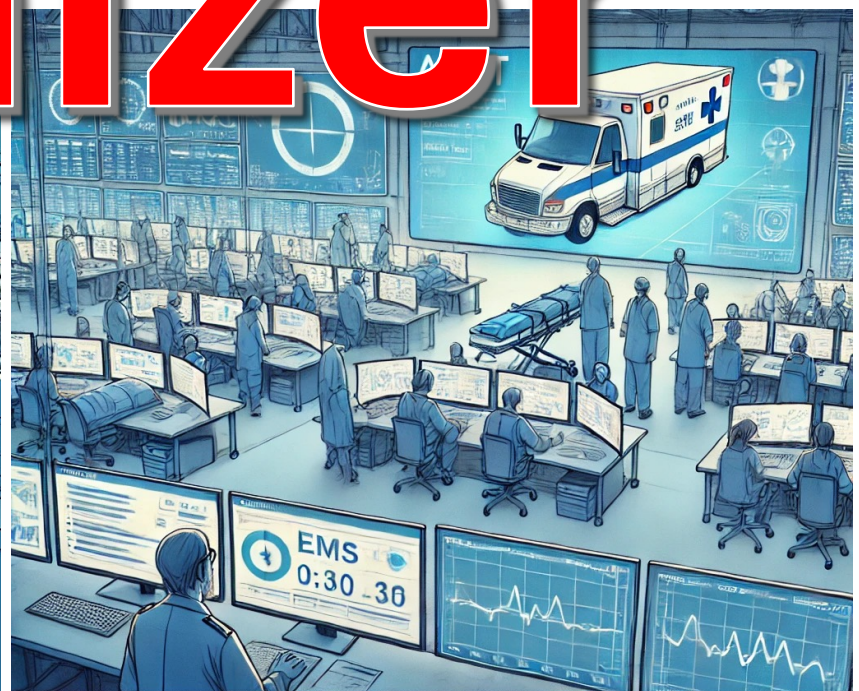
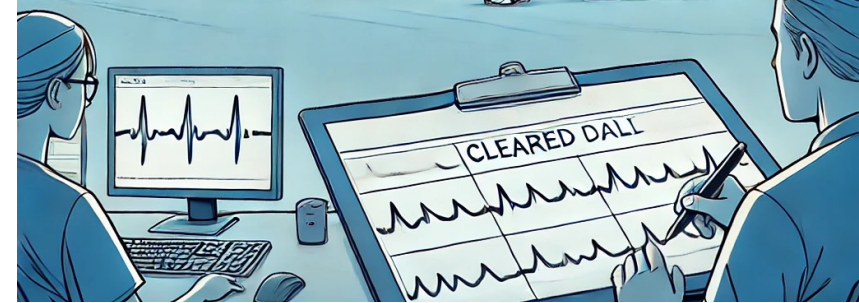


DIGITAL SIGNATURE CAPTURE

GPS



DIGITAL SIGNATURE CAPTURE



## Problem Focus

- **Delays** in transferring patients from ambulances to hospital emergency departments, **impacting patient care and emergency response times.**

- **Manual processes** for capturing arrival and handoff times, leading to **inefficiencies** and **inaccuracies.**

- **Lack of integration** between EMS and hospital systems, **causing delays** in information sharing.



**APOpTimizer**



**APOptimizer**



**APOpTimizer**



**APOpTimizer**



# AUTOMATE

APOpTimizer

## **Solution Overview**

A prototype for an integrated system that tracks ambulance arrivals and automates the signature process for patient handoff, improving efficiency and compliance with APOT regulations.

### **3. How / Tech**

The solution works by leveraging **GPS or Sensors, RFID/NFC technology**, and a **digital signature system** to streamline and automate the tracking of ambulance arrivals and patient handoff processes.



## **Process Flow:**

### **1. Ambulance Arrival:**

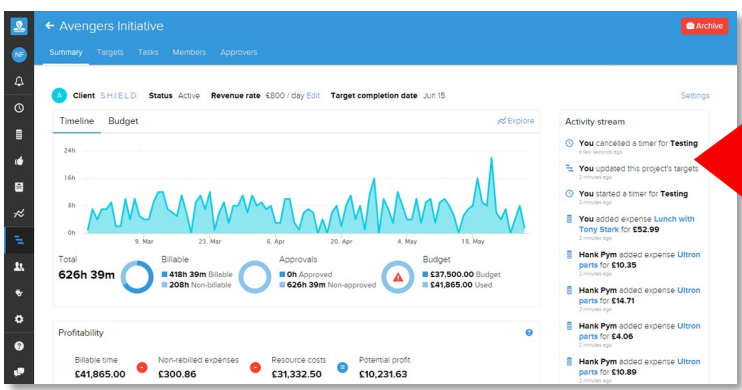
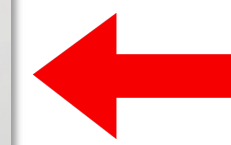
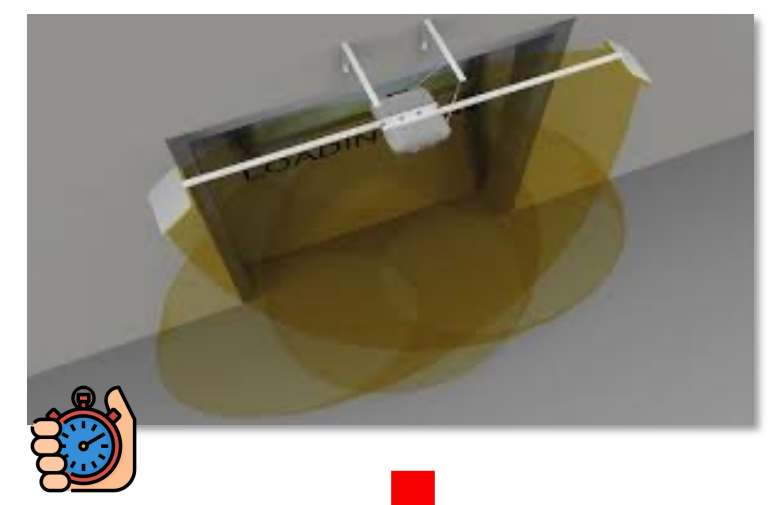
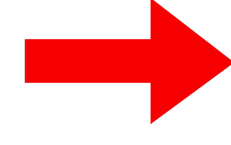
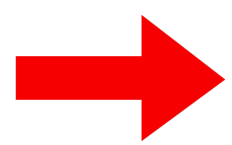
1. GPS or Sensors tracks the ambulance in real-time and logs the arrival time at the hospital.
2. RFID/NFC tags installed at the hospital entry points detect the ambulance's arrival and log it in the system.

### **2. Patient Handoff:**

1. EMS personnel and hospital staff use a mobile device to capture digital signatures during the patient handoff.
2. The system automatically records the timestamp of the handoff, ensuring accurate APOT data.

### **3. Data Integration:**

1. The collected data is integrated with existing EMS and hospital information systems using interoperability / integrations.
2. Real-time updates and reports are generated, and alerts are triggered if the offload time exceeds the set standard.

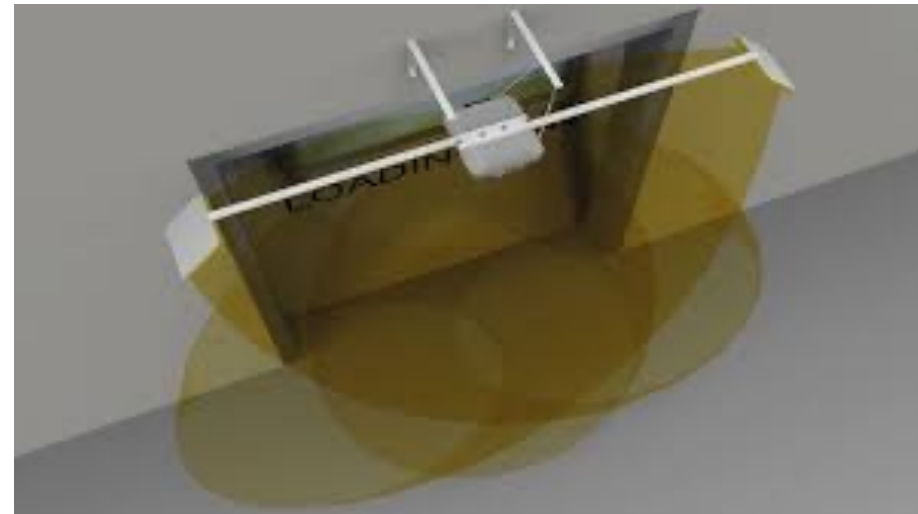


**APOpTimizer**

## Process Flow:

### 1. Ambulance Arrival:

1. GPS or Sensors tracks the ambulance in real-time and logs the arrival time at the hospital.
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## 2. Patient Handoff:

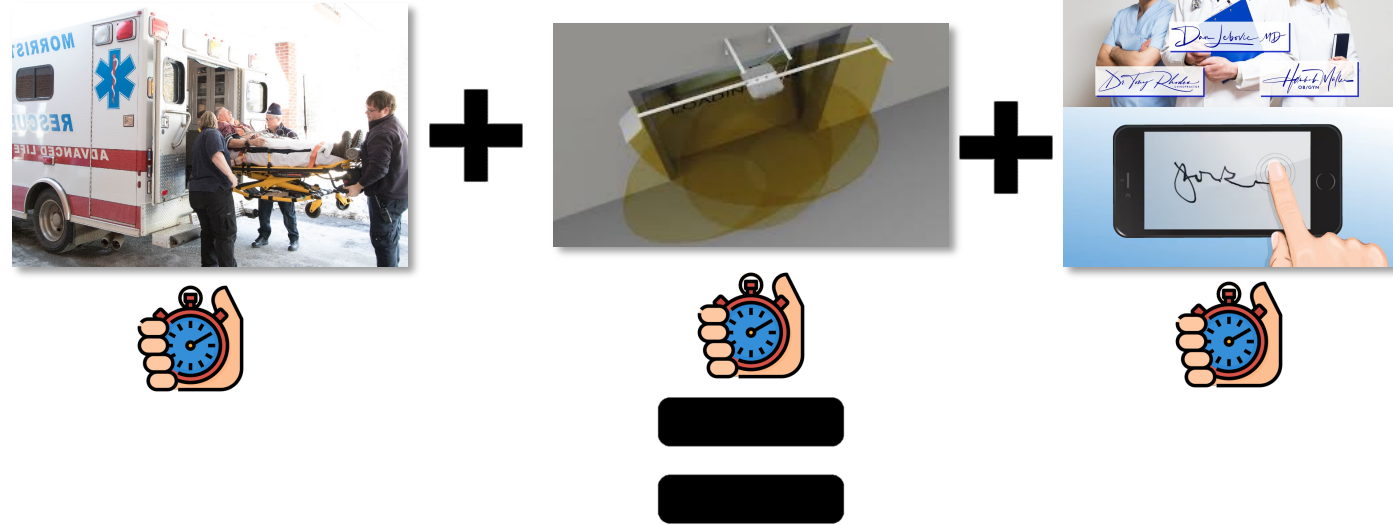
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## Process Flow:

### 3. Data Integration:

1. The collected data is integrated with existing EMS and hospital information systems using interoperability / integrations.
2. Real-time updates and reports are generated, and alerts are triggered if the offload time exceeds the set standard.



**APOptimizer**

# Why This Approach?

- **Increased Efficiency:** Automated tracking and digital signature capture streamline the patient handoff process, reducing APOT.
- **Improved Data Accuracy:** Real-time and automated data collection ensures accurate and reliable APOT documentation.
- **Enhanced Compliance:** The solution meets state regulations for APOT documentation and improves overall system transparency and accountability.

# Storyboard

## 5. Storyboard

### **STORYBOARD FRAME 1: Ambulance in Transit**

**Description:** An ambulance equipped with a GPS module is on its way to the hospital. The GPS tracks its location in real-time and transmits the data to the central system.

### **STORYBOARD FRAME 2: Arrival at Hospital**

**Description:** The ambulance arrives at the hospital emergency department bay. RFID/NFC tags at the entry point detect the ambulance's arrival and log the time in the system.

### **STORYBOARD FRAME 3: Patient Handoff**

**Description:** EMS personnel use a mobile device to capture digital signatures from both EMS and hospital staff during the patient handoff. The system automatically records the timestamp.

### **STORYBOARD FRAME 4: Data Integration**

**Description:** The data from the GPS tracking and digital signature capture is integrated with the hospital's information system. Real-time updates and reports are generated, showing the APOT data.

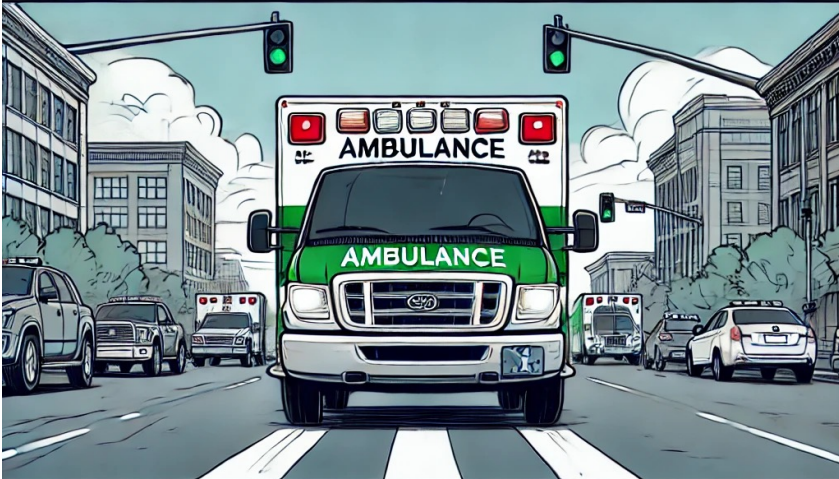
### **STORYBOARD FRAME 5: Monitoring and Alerts**

**Description:** The central system monitors APOT and triggers alerts if the offload time exceeds the standard. EMS and hospital staff can view real-time data and make informed decisions.

### **STORYBOARD FRAME 6: Post-Handoff**

**Description:** The ambulance is cleared and ready for the next call. Hospital staff can review the logged data for compliance and reporting purposes.





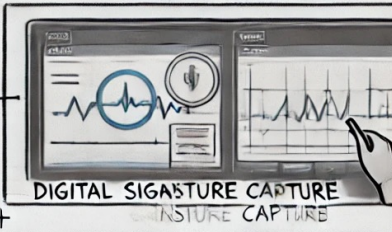
# Storyboard 3



CAMERAS, SENSORS



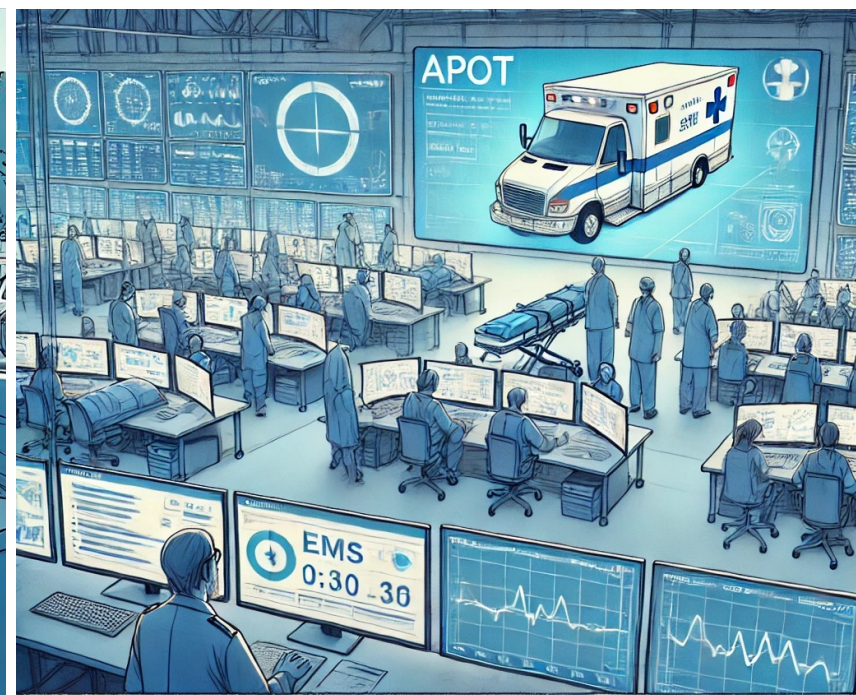
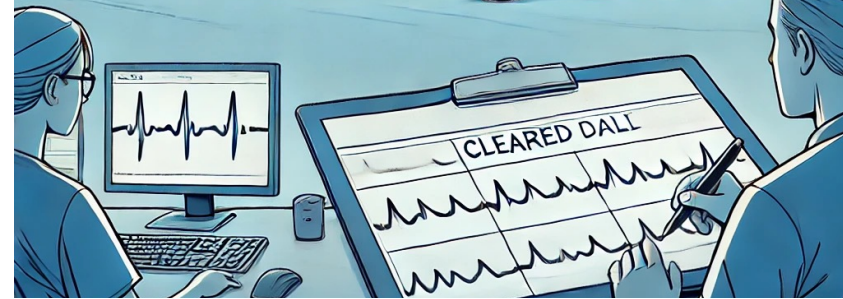
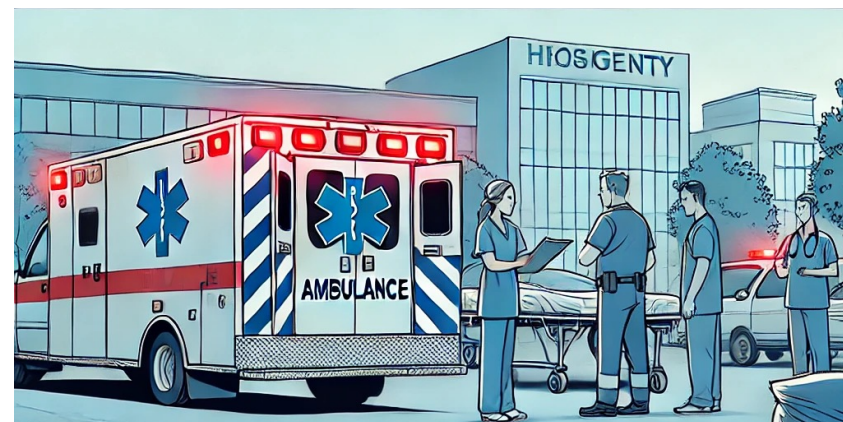
GPS

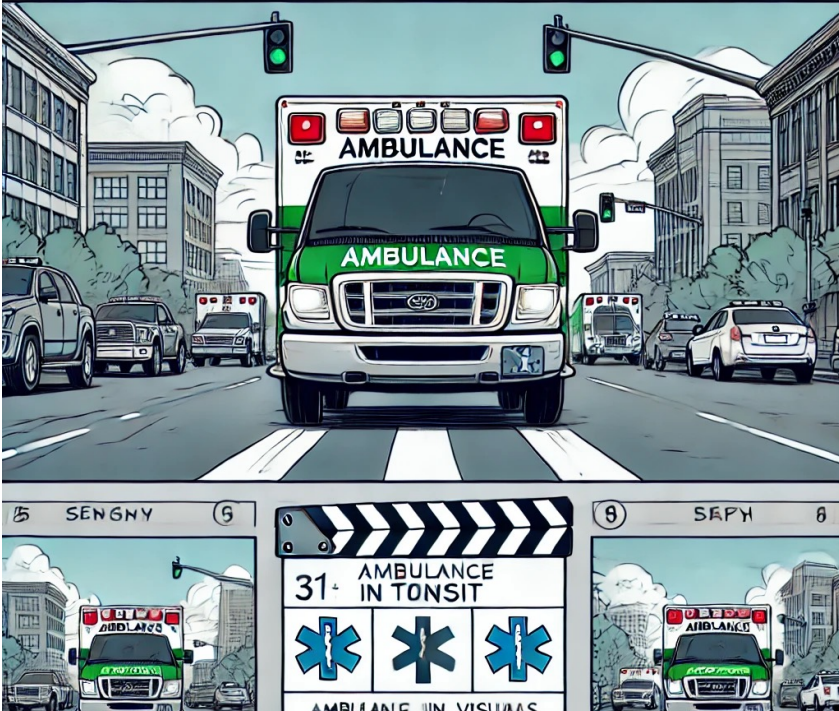


DIGITAL SIGNATURE CAPTURE



DIGITAL SIGNATURE CAPTURE





## STORYBOARD FRAME 1:

### Ambulance in Transit

**Description:** An ambulance equipped with a GPS module is on its way to the hospital. The GPS tracks its location in real-time and transmits the data to the central system.



## STORYBOARD FRAME 2:

### Arrival at Hospital

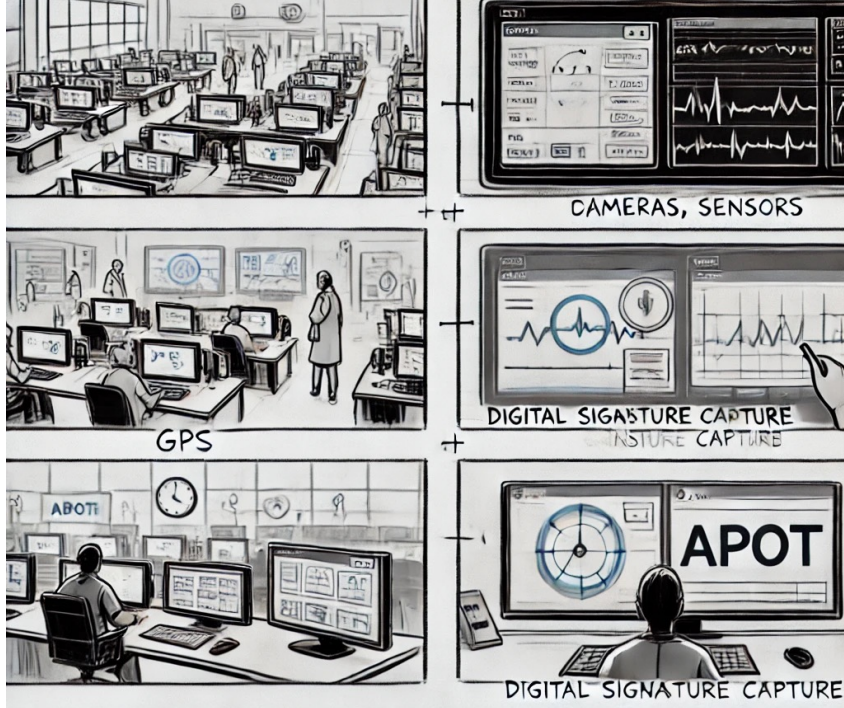
**Description:** The ambulance arrives at the hospital emergency department bay. RFID/NFC tags at the entry point detect the ambulance's arrival and log the time in the system.



## STORYBOARD FRAME 3:

### Patient Handoff

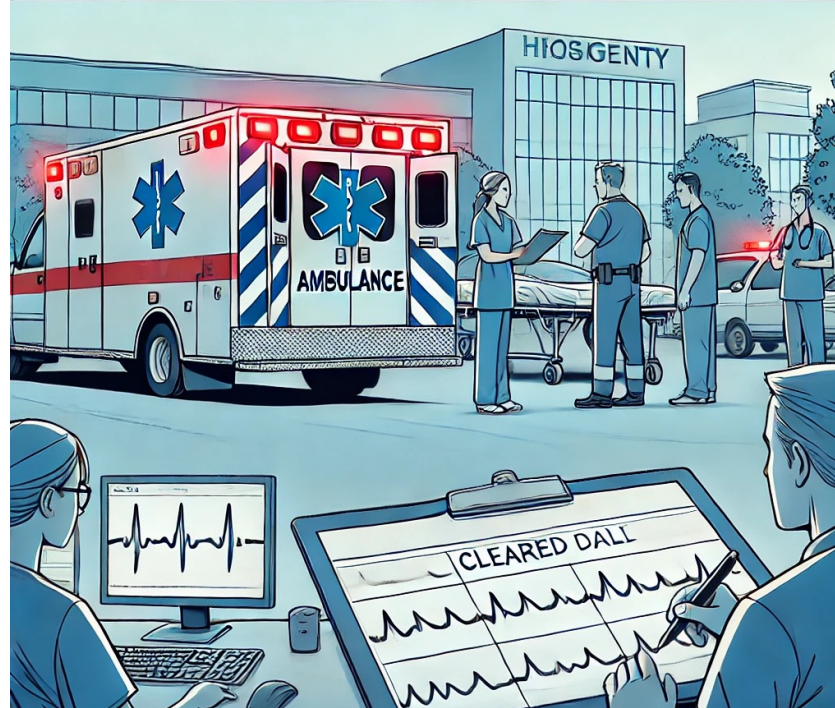
**Description:** EMS personnel use a mobile device to capture digital signatures from both EMS and hospital staff during the patient handoff. The system automatically records the timestamp.



## STORYBOARD FRAME 4:

### Data Integration

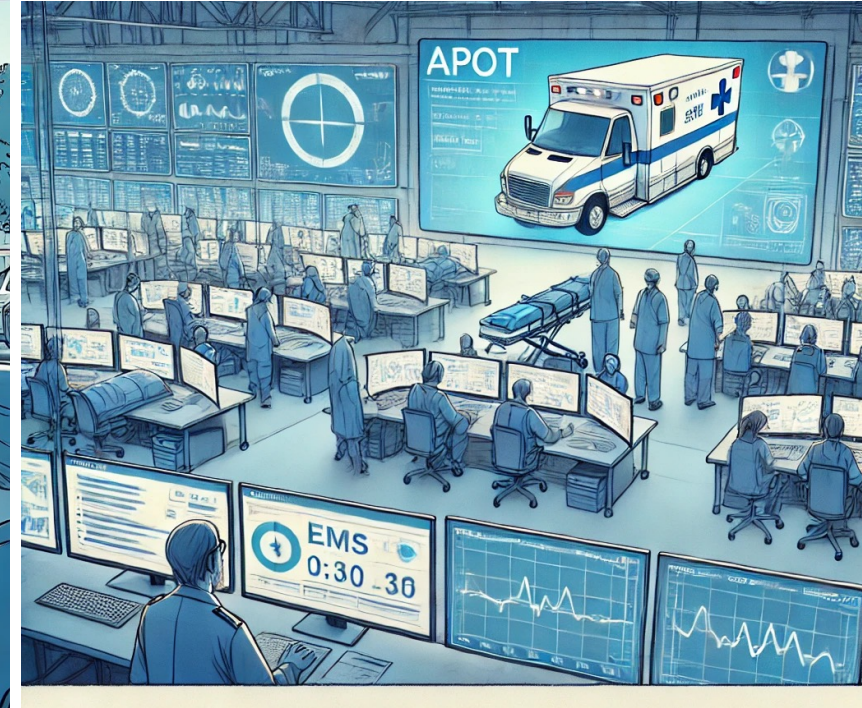
The data from the GPS tracking and digital signature capture is integrated with the hospital's information system. Real-time updates and reports are generated, showing the APOT data.



## STORYBOARD FRAME 5:

### Monitoring and Alerts

The central system monitors APOT and triggers alerts if the offload time exceeds the standard. EMS and hospital staff can view real-time data and make informed decisions.



## STORYBOARD FRAME 6:

### Post-Handoff

The ambulance is cleared and ready for the next call. Hospital staff can review the logged data for compliance and reporting purposes.

**APOptimizer**

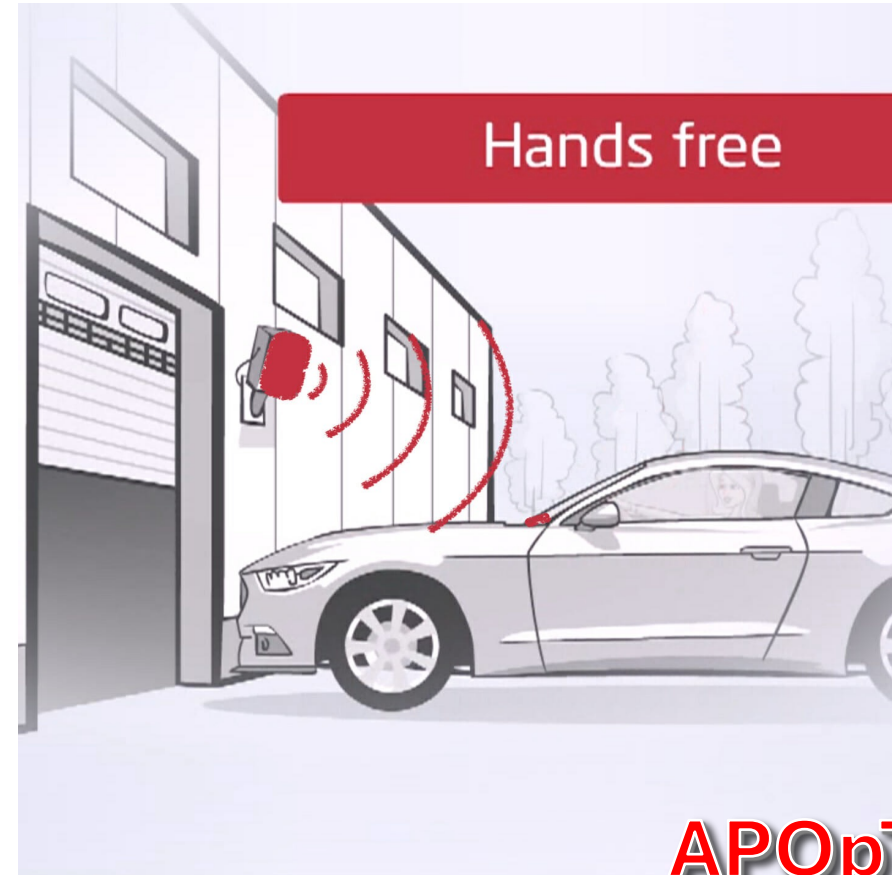
## **Prototype Overview**

The prototype is an integrated system that includes a GPS module or Sensors, RFID/NFC technology, and a digital signature application.

**1. GPS Tracking or Sensors:** Each ambulance is equipped with a GPS module to provide real-time location data to the central system. Each parking bay + overflow parking spaces equipped with sensor to track arrival time.



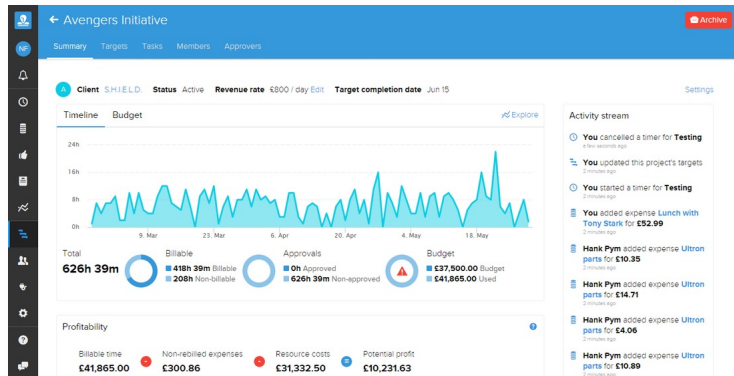
**1.RFID/NFC/Sensor Detection:** RFID or NFC tags at hospital entry points automatically detect the ambulance's arrival and log the time.



**APOptimizer**

**1. Digital Signature Capture:** A mobile application is used by EMS and hospital staff to capture digital signatures and automatically timestamp the patient handoff.

**2. Data Integration:** The system integrates the collected data with existing EMS and hospital information systems, providing real-time updates and generating reports.



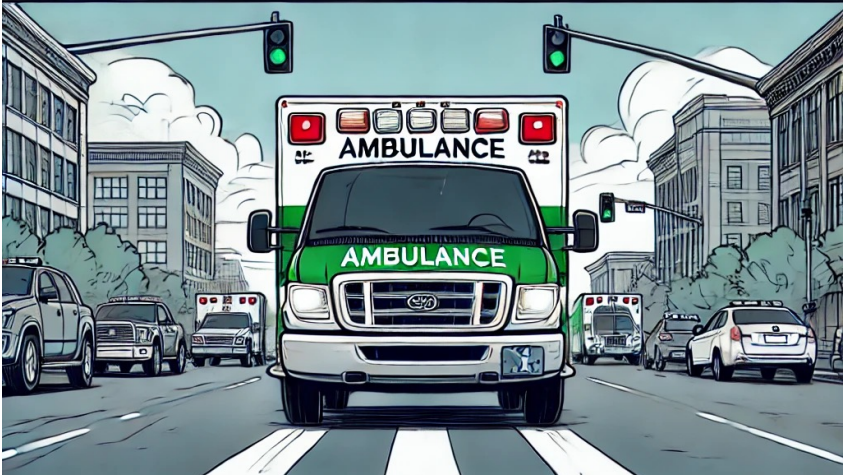
## What We Need

- **Funding:** Financial support to develop and implement the prototype, including hardware and software components.
- **Stakeholder Collaboration:** Cooperation from EMS providers and hospitals to participate in pilot testing and provide feedback.
- **Regulatory Support:** Assistance from regulatory bodies to ensure the solution meets all legal and compliance requirements.



## **Success Criteria**

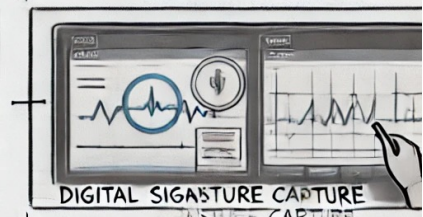
- **Reduced APOT:** Demonstrable reduction in ambulance patient offload time, improving emergency response efficiency.
- **Accurate Data Collection:** High accuracy and reliability of data collected for APOT documentation.
- **Compliance:** Full compliance with state regulations regarding APOT documentation and reporting.



# APOptimizer

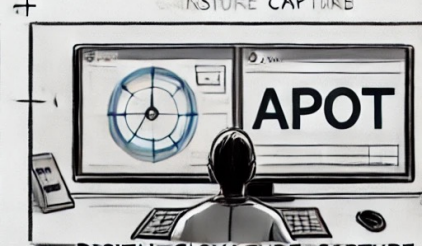


CAMERAS, SENSORS



DIGITAL SIGNATURE CAPTURE

GPS



DIGITAL SIGNATURE CAPTURE



CLEARED CALL

# Let's **APOTomate** this Process Together!

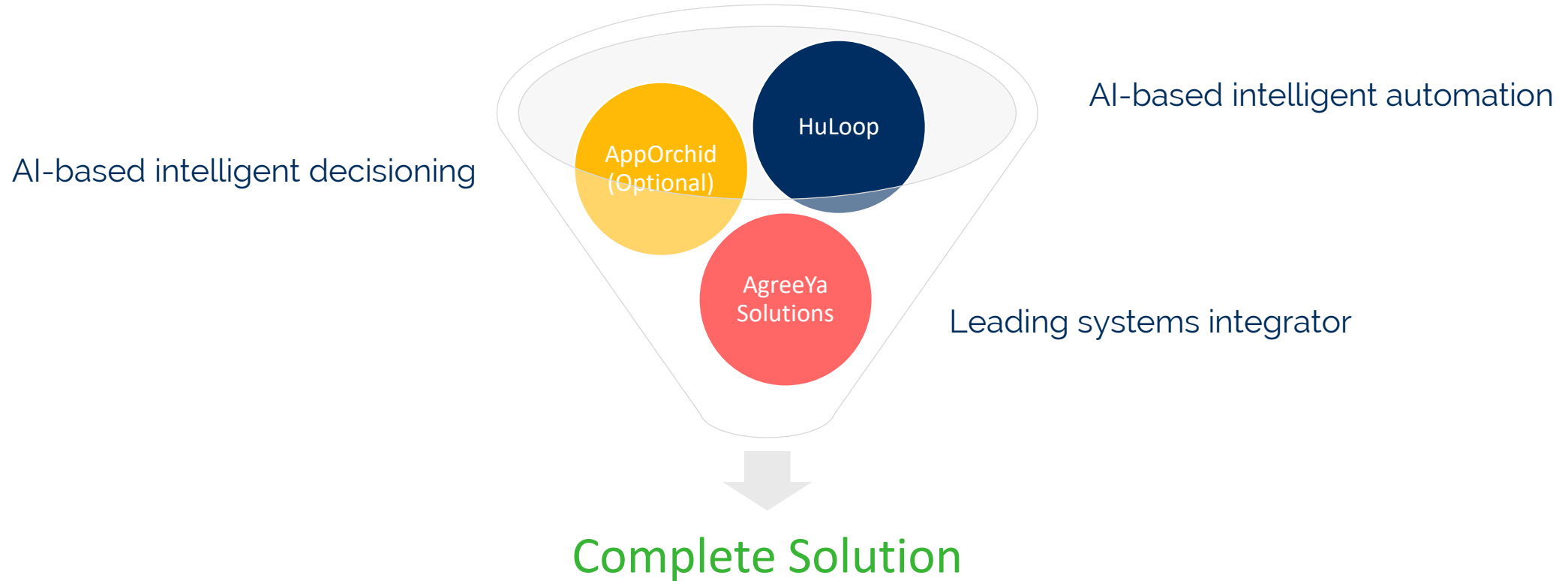


## HuLoop

Human-in-the-Loop Intelligent Automation



# The Three Innovation Amigos...(Plus 1)



Optional - Evaluate JAPA's real-time parking sensors into our proposed solution for Ambulance Bay optimization, but viability discussions have not taken place yet

HuLoop proposes to be the point of contact for this solution



# Problem Areas in Focus

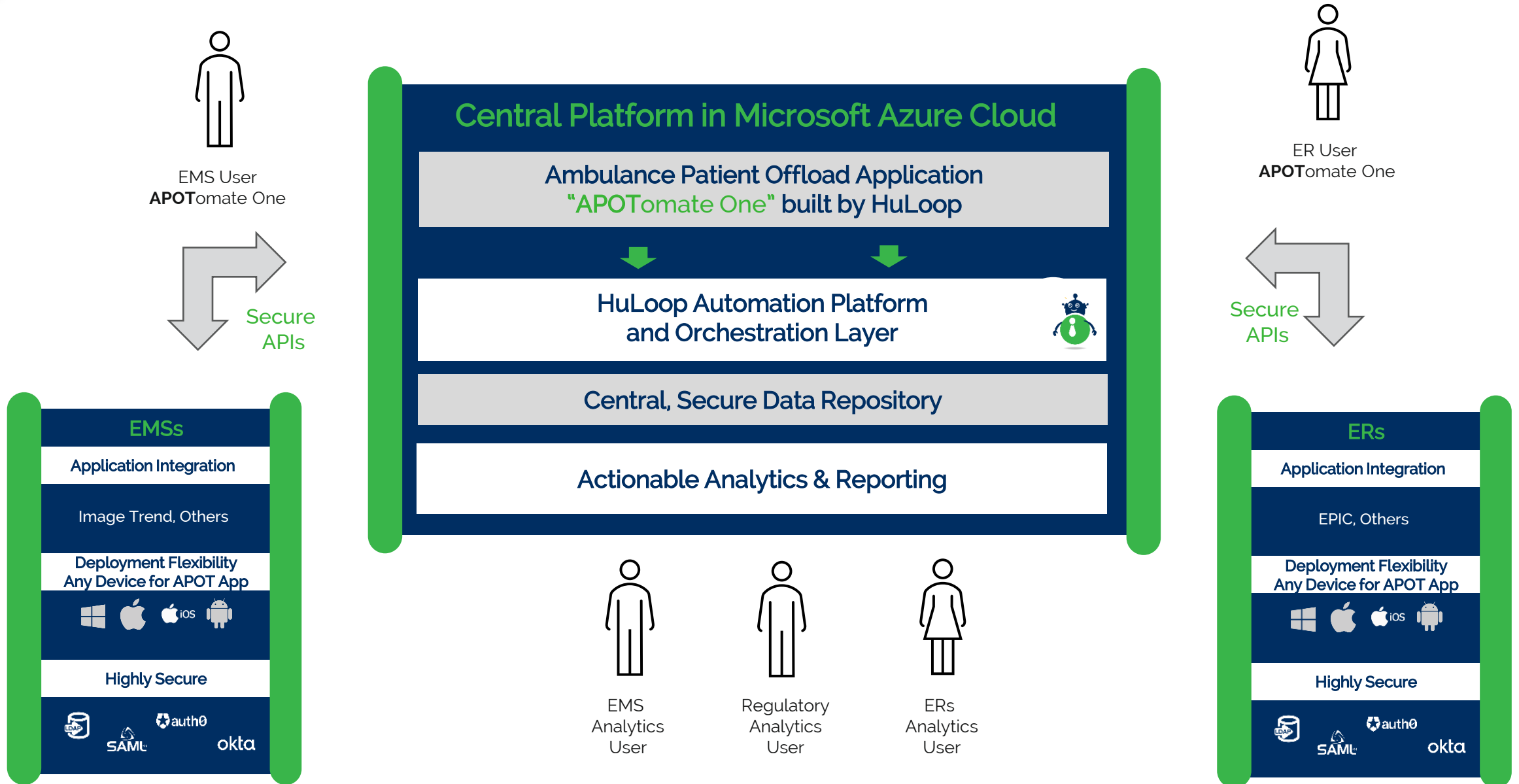
1. Inbound Patient Care Activities and Workflows
  - EMS Dispatch → ER Selection → Routing w/ETA → Advanced ePCR Sent to MICN → EMS Arrival (APOT Clock Starts)
2. ER On-Premises Patient Processing Activities and Workflows
  - Registration → Patient Triage → Bed / Room Assignment → Move Patient → Transfer Care (Bedside Nurse) → eSignature (APOT Clock Stops)
3. Concluding Activities and Workflows
  - Complete ePCR → Clean Rig → Ready for Next Assignment
4. Reporting and Analytics
  - Measure and report on elapsed time and queues per step above
  - Trends by location, time of day, day of week, etc.
  - Accumulate predictive, prescriptive insights for optimization
  - Stakeholder specific views (EMS, ER, State, etc.)



# Solution Overview

- Led by HuLoop, along with our partners, we will deliver a multi-tenant, location-aware, device-agnostic application for EMS and ER stakeholders, capable of interacting with EPIC, Image Trend (and other systems), managing all four problem areas associated with Ambulance Patient Offload Time.
  1. Inbound Patient Care Activities and Workflows
  2. ER On-Premises Patient Processing Activities and Workflows
  3. Concluding Activities and Workflows
  4. Reporting and Analytics
- We will build a solution that complies with AB40

# Proposed Solution Overview





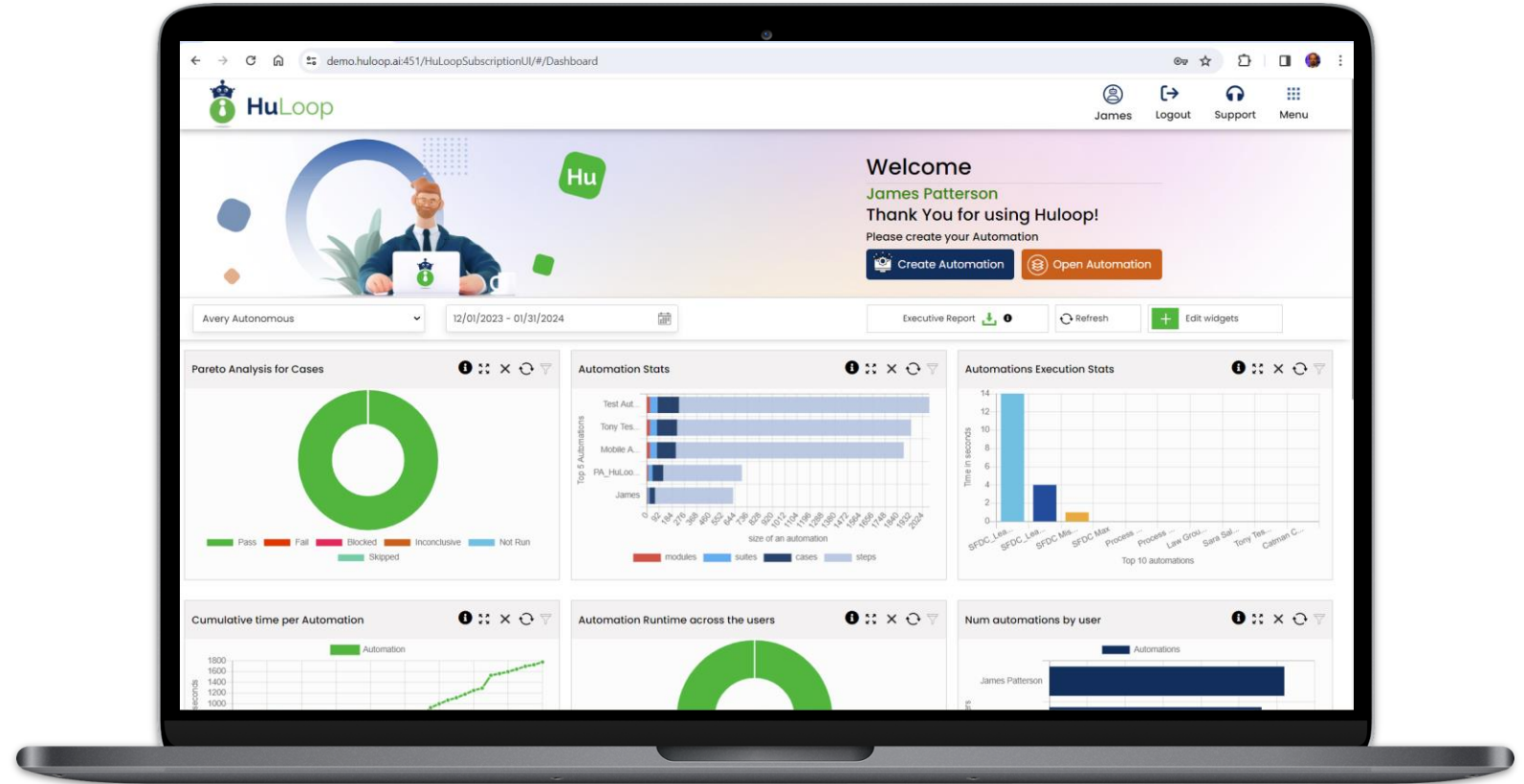
# We Will Use Leading Solution Components

## APOTomate One...

- HuLoop Platform
- AppOrchid (Optional)
- Azure Cloud

## Built with...

- Industry leading tools for deployment flexibility
- Permissions based security, privacy (HIPPA, CDPR)
- Incorporate applied and generative AI where sensible





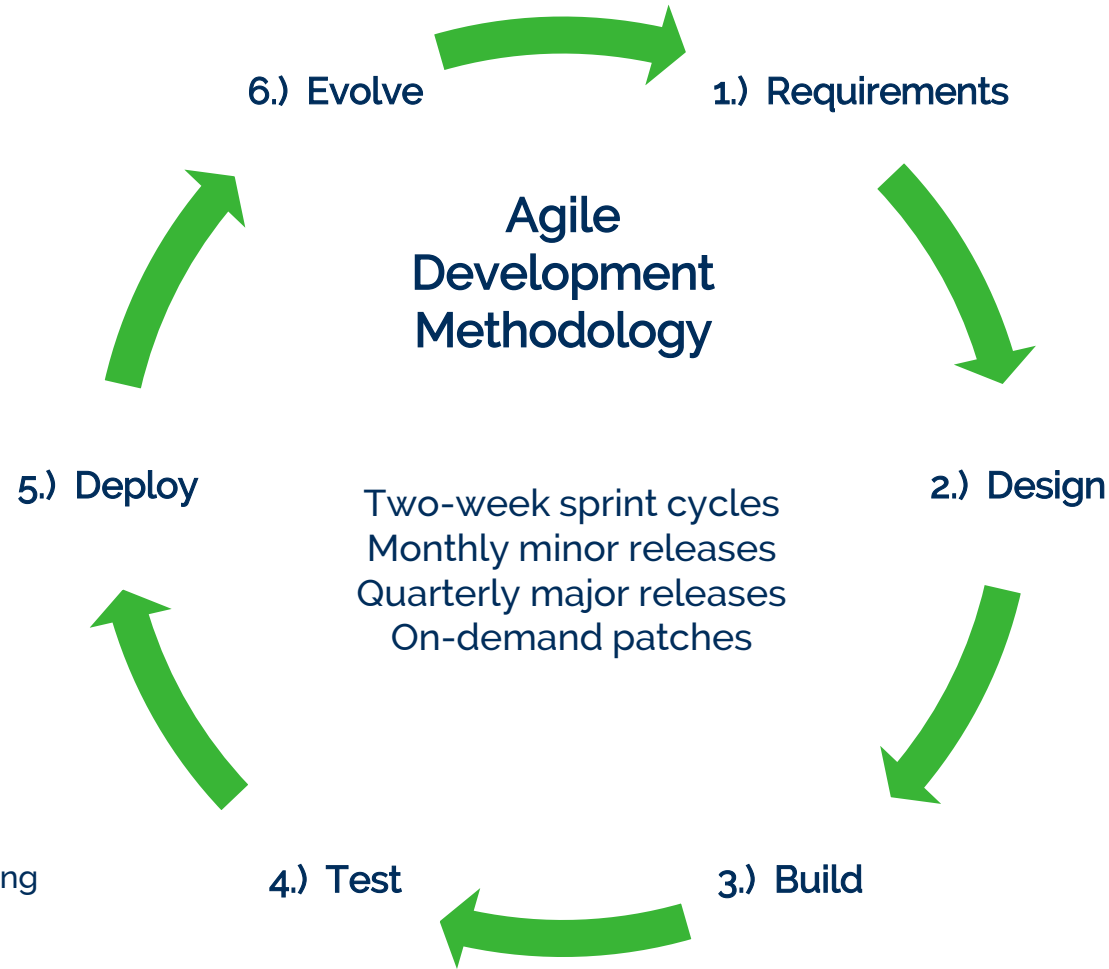


# Why This Approach?

- Satisfies requirements associated with AB40
- Automates activities between EMS and ER stakeholders
- Reduces APOT, provides visibility to excessive queues
- Assists EMS and ERs with resource planning, optimization



# Software Development Life Cycle (SDLC)



- GitHub for Version, Releases, Branching
- Jira for Bug Tracking, Sprint Planning
- Azure Dev Ops (for CI/CD)
- HuLoop for Automated Testing



# Proven Development and Delivery Approach

1	Requirements	<ul style="list-style-type: none"><li>EMS Providers</li><li>ERs</li></ul>	
2	Design	<ul style="list-style-type: none"><li>Create Wireframes</li><li>Create High Fidelity Screens</li><li>Create Workflow Prototype</li></ul>	FIGMA JIRA
3	Build	<ul style="list-style-type: none"><li>Create Hybrid Application for iOS, Android, Windows, ideal for Tablets, Mobile Devices and PCs</li><li>Develop frontend modules</li><li>Develop backend CMS system, database systems, cloud infrastructure, and collections of REST APIs</li></ul>	Flutter SDK, Dart Azure, SQL, DynamoDB, WordPress, and Postman
4	Security	<ul style="list-style-type: none"><li>HIPAA, CDPR &amp; Data protection security throughout</li></ul>	
5	Testing	<ul style="list-style-type: none"><li>Create comprehensive test plan to ensure the secure and accurate data transfer through multiple systems</li></ul>	
6	Reporting	<ul style="list-style-type: none"><li>Create a dashboard to visualize the data metrics. This will be based upon user roles - Paramedic, ER Nurse, Supervisor...</li></ul>	
7	Deployment	<ul style="list-style-type: none"><li>Deploy the application on private staging environment</li></ul>	Private publish on Apple & Google App Store



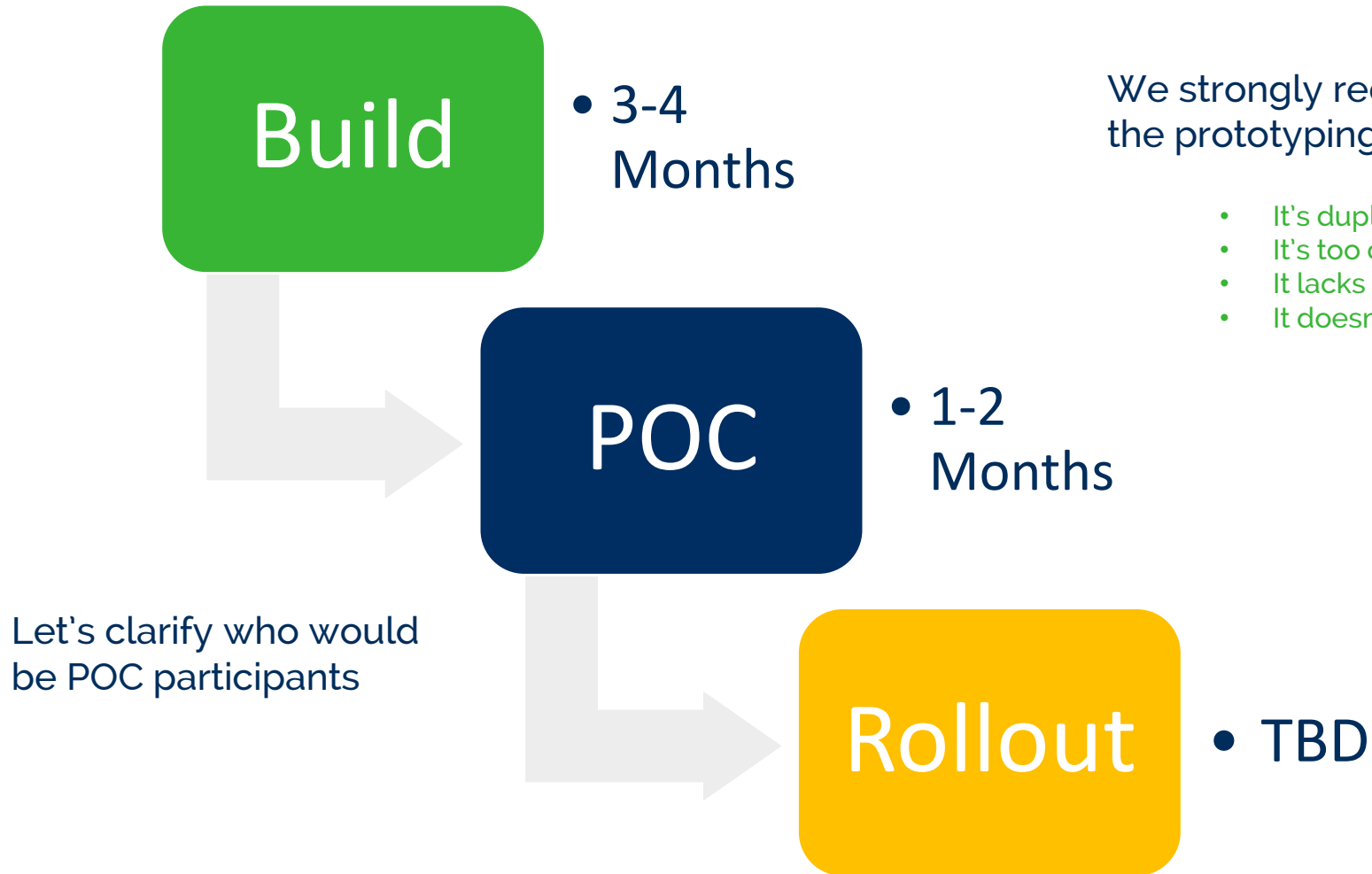
# Estimates to Build Solution:

SDLC Component	% of effort	Effort (Hours)
- Construction	50%	1500
- Requirements	8%	250
- Design	8%	250
- Testing	13%	400
- UAT	3%	100
- Project Management	10%	300
- Documentation & Training	7%	200
Estimated Project Effort		3000

This is an estimate only, and is subject to change depending on scope refinement



# High Level Schedule



We strongly recommend and prefer to skip the prototyping step outlined in the process.

- It's duplicative with steps in the POC
- It's too costly and time consuming for startups
- It lacks "skin-in-the-game" from stakeholders
- It doesn't enhance the output



# Anticipated Commercial Model:

- ER Users
  - APOTomate One Subscription (Location & User Based)
    - Includes HuLoop Components
    - Potentially Include AppOrchid Components
- EMS Users
  - APOTomate One Subscription (Location & User Based)
    - Includes HuLoop Components
    - Potentially Include AppOrchid Components
- State Users
  - APOTomate One Reporting Subscription (Location & User Based)
    - Includes HuLoop Components
    - Potentially Include AppOrchid Components

Initial pricing model needs to be determined.



# What We Need

- Clear executive sponsorship
- Adherence to Project Change Control Process
- Willingness of participating stakeholders to work together and to tear down legacy technology silos.
- Working group of motivated people from stakeholder community to participate in detail design workshops.
- Sufficient budget to accomplish build and POC activities in an efficient, timely, and high-quality fashion.



# Success Criteria

1. Build, test, deliver, pilot successfully...and on-time, on-budget!
2. Ensure committed and delighted stakeholders on all-sides!
3. Key stakeholders will want to buy the solution!





# Thank You!

**Todd P. Michaud**

President & CEO

**HuLoop Automation, Inc.**

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Auburn, California 95603

(530) 820-3390 - Office  
(530) 906-1758 - Mobile

E-mail - [todd@huloop.ai](mailto:todd@huloop.ai)  
Web - [www.huloop.ai](http://www.huloop.ai)

Human-in-the-Loop Intelligent Automation



**HuLoop**



**HuLoop**

Human-in-the-Loop Intelligent Automation

# VISTA

## App Orchid

# App Orchid Problem Focus

- **Real-Time Access to Data**
- **Enhance System Transparency**
- **Improve Decision Support to Optimize Processes to Reduce APOT**
- **Reduce friction, variability and improve operational tower control for key stakeholders across multiple agencies**

# App Orchid Problem Focus

HMW...

## Get real-time access to APOT data?

**Who:** Data Deb and EMS Agency Annie

**What:** Only an aggregate total is available, and only after data is submitted days later.

**When:** During dispatch.

**Why:** Cannot optimise and improve in real-time what cannot be measured in real-time.

HMW...

## Reduce arrival time variability?

**Who:** Charge Nurse Charlie

**What:** Variability in arrival time. Hospital required to be ready to accept, but has no control.

**Where:** Ambulance Bay

**Why:** Delays patient throughput, increases APOT

HMW...

## Get insight into where time is spent?

**Who:** Data Deb or ED Tech

**What:** No visibility into why the APOT was a certain value (i.e. no milestones/waypoints captured). No insight into how to improve it. Only an aggregate total is available.

**When:** During analytics and reporting periods.

**Why:** Cannot improve what cannot be measured.

HMW...

## Establish consistent ToC practices?

**Who:** Paramedic Paul

**What:** There is little consistency between different ED/hospital systems. Paul's guidance for when to press stop does not necessarily match the hospital's expectation of the same.

**Where:** In the ED (bedside, hallway, etc)

**Why:** Creates friction and costs extra time. Increases APOT. Prevents EMS from getting back into service.

# Solution overview

- **A platform that collects and presents real-time, relevant APOT data from multiple, disparate record-keeping systems (APOT, EMS, EPIC EHR) and externally available data (e.g., census, holidays, weather).**
- **Enhanced visibility into the activities/patterns, generates data-driven and GenAI insights to support decision making so all agencies can improve the APOT Actual Interval to the APOT Standard Interval.**

# Solution boundaries

- **EA Vista is an important part of the overall solution.**
- **EA Vista delivers a unified source of data to allow users to do analysis, insights and use AI to optimize decision.**
- **EA Vista leverages data to provide deep visibility into how to optimize people, processes and technology.**
- **EA Vista can be easily integrated to our partner platform/HuLoop which can support the intelligent process and task orchestration**

# How the solution works

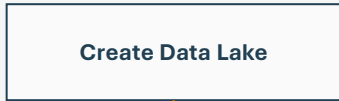
- Create a real-time data lake from multiple, disparate systems and create a knowledge map
- Enrich the data lake with relevant external datasets like holidays, traffic and weather data
- Easy to use, rich dynamic user experience (NLQ/Dashboards) to view real-time data
- Native data-driven insights and GenerativeAI (private) insights enable faster analysis and time-to-decision.
- Native AI/ML models to support historical causal analysis and predictive analytics based on future trends and events.

# AO Platform | Solve the hard problems



## INGEST/CONNECT

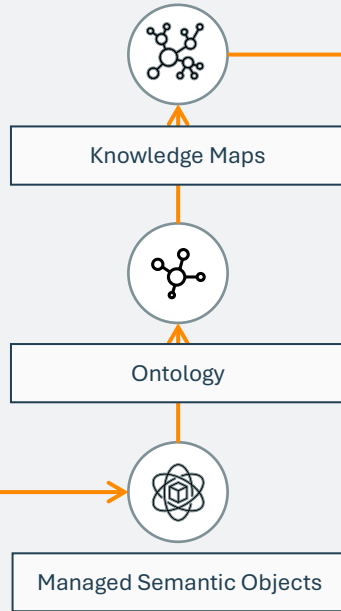
Complex structures and unstructured data sources



Normalize

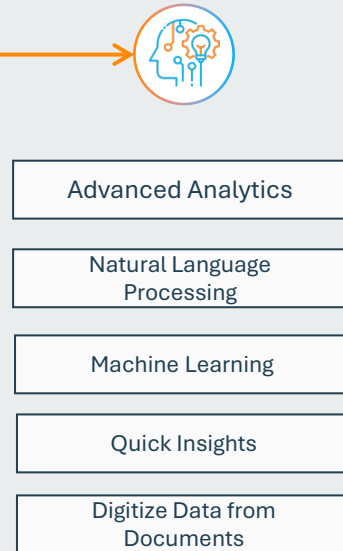
## STRUCTURE

Data to understand and apply AI/ML



## BUILD INTELLIGENCE

Apply AI/ML techniques to build knowledge



## USER ENGAGEMENT

Real-Time Dashboards & Data Driven Insights



ML Historic & Predictive Apps

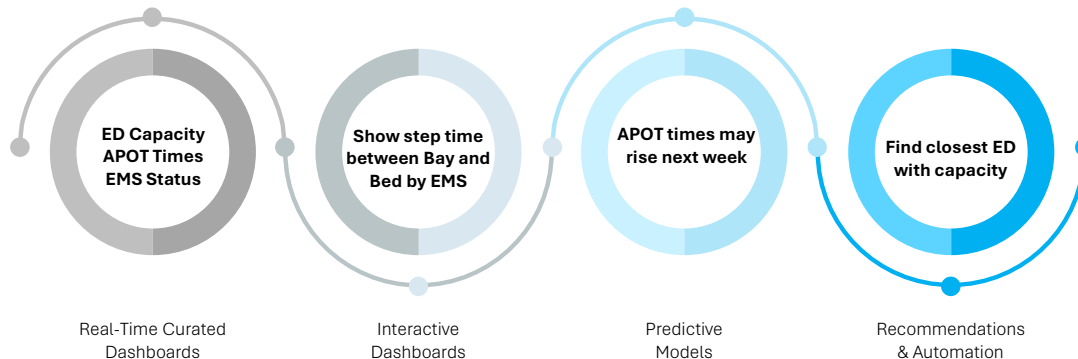
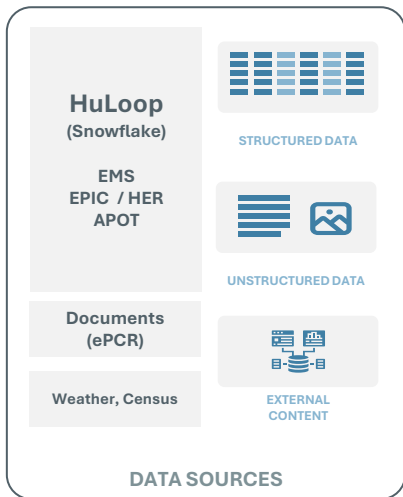


AskAO for GenAI

What is causing APOT delays?



# Easy Answers for Every Question



**ACTION**

# Knowledge map enables one model with different perspectives



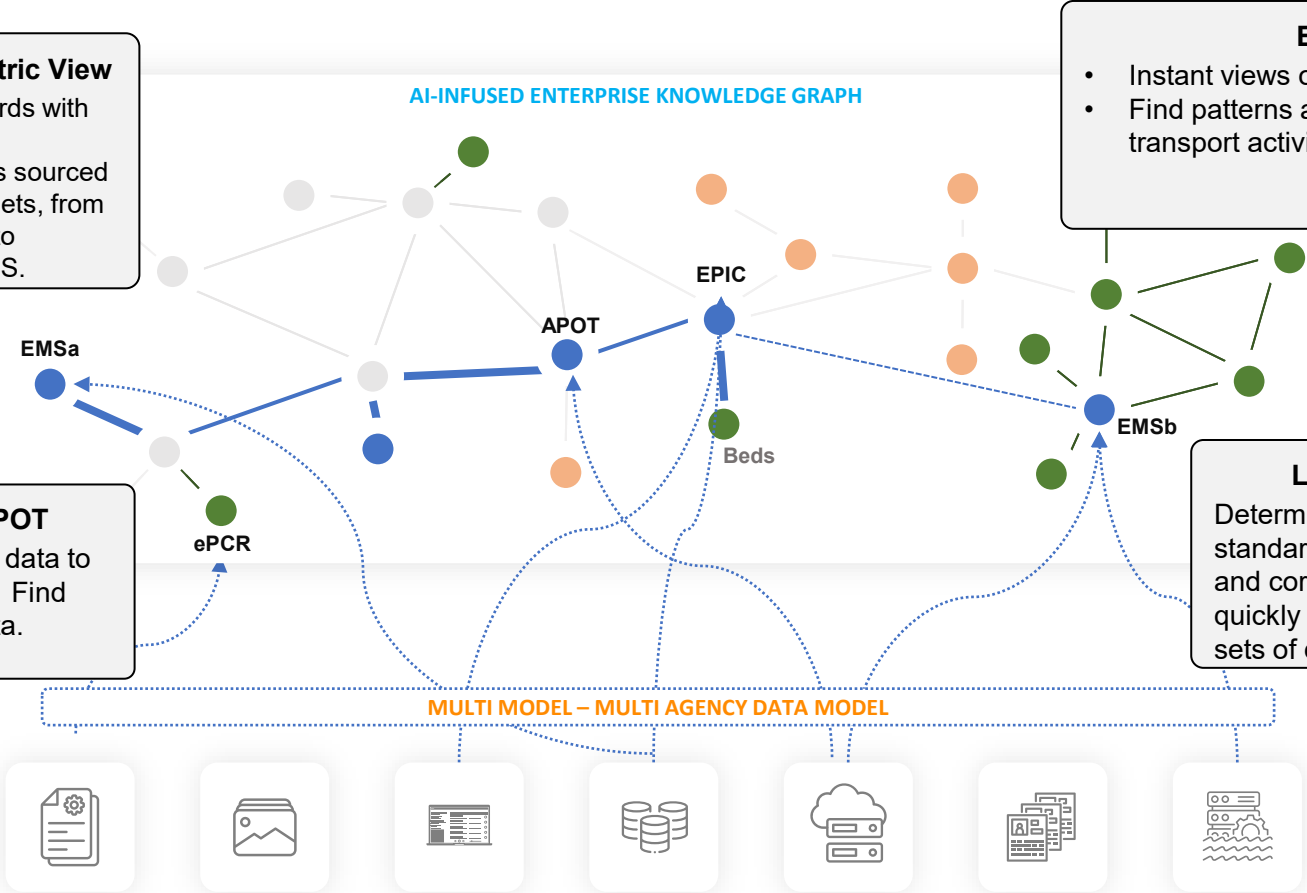
**ED/Hospital Centric View**  
Real-time dashboards with quick insights, predictions/patterns sourced from diverse data sets, from individual patients to communities to EMS.

**CEMSIS - APOT**  
Provide access to data to support reporting. Find patterns in the data.

**EMS**

- Instant views or real-time activity
- Find patterns and insights on transport activity (wall times, etc.)

**LEMSYS VIEW**  
Determine adherence to standards and find patterns and correlations with by quickly querying broad data sets of data.



# Why this approach



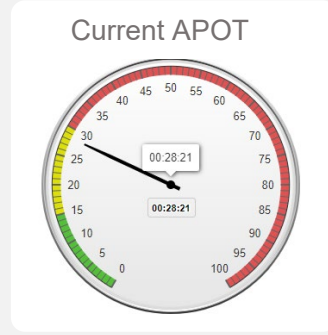
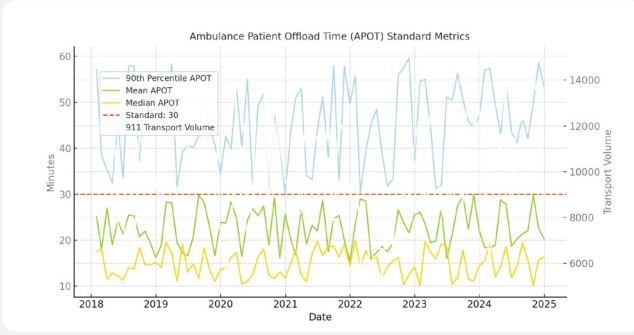
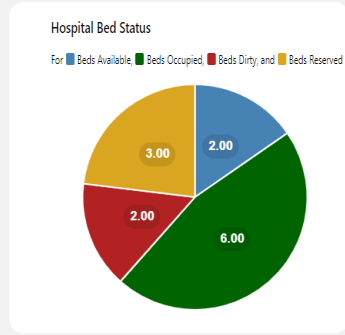
- **The ultimate solution must include a mechanism for both task automation and reporting across multiple disparate systems to ensure all stakeholders are striving to achieve APOT Standard Intervals.**
- **The AO Platform is purpose-built to quickly unify and harmonize multiple data sources and deliver easy to user persona-based reports/dashboards, data-driven and Generative AI insights.**
- **The AO solution will help ensure all parties can consistently adhere to regulatory reporting and standards requirements.**
- **Further, AO can support the ability to ingest external datasets to help further optimize / plan for unpredicted future events (e.g., predict patient counts during holiday weekends based on past data or use real-time weather data to plan to accommodate weather driven events)**

# Storyboard

# Storyboard : Persona based reporting and insights

Navigation icons: Home, Search, Microphone, Refresh, 12 notifications, Heart, Pencil, Clipboard, Bell, JS profile.

Search bar: show APOT wait times for the past ten days



### ER Wait Time

49 min \*

ENROUTE: 3  
BAY: 2  
HELI PAD: 0  
WALL: 3

Focused <sup>12</sup> Other Insights

Showing 4 of 12 insights

APOT times were impacted by a high number of incoming patients over a long holiday weekend during which there was predicted firework usage, high heat index and increased traffic and hospital staffing levels were below average due to increased employees on paid time off.

San Jose reported highest number of traffic incidents over the July 4 weekend requiring EMS patient transport.

# AO Platform Persona Based APOT Analytics and Insights

## MICN - Mickey

While patient is in-route, access real-time curated dashboard to view relevant metrics to help decide where to put the patient before arriving:

APOT Time  
APOT Trend  
ED Capacity  
ED Wait Times

*AI/ML models could provide lobby / wall / bed reservation recommendations*

## ED – Charge Nurse Charlie

Real-time access to curated dashboard to view top metrics required to run an efficient, patient-centric ED :

APOT Time  
APOT Trend (hour/day)  
EMS Status by Type  
(e.g., enroute, bay: bus, heli, etc.)  
ED Capacity  
ED Wait Times

*AI/ML models could provide lobby / wall / bed reservation recommendations*

## EMS – Agency Anne

Real-time access to curated dashboards will ability to filter data as necessary. Single reporting system will speed time-to-report interval, reduce/eliminate need to manually send data to hospitals, and get more granular data.

## ED Radio – Data Deb

Real-time access to curated dashboards with ability to filter data as necessary to reduce/eliminate the manual effort to rationalize data between multiple systems and speed time-to-dispute: ePCR, EPIC and APOT.

## SCEMSA - Larry

Real-time access to curated dashboard to show relevant metrics about EMS response to improve EMS efficiency and reduce unnecessary 'Wall Time':

APOT Time by ED  
APOT Time by Paramedic  
Number of Transports by Paramedic by Type and Location  
ED Capacity by Location

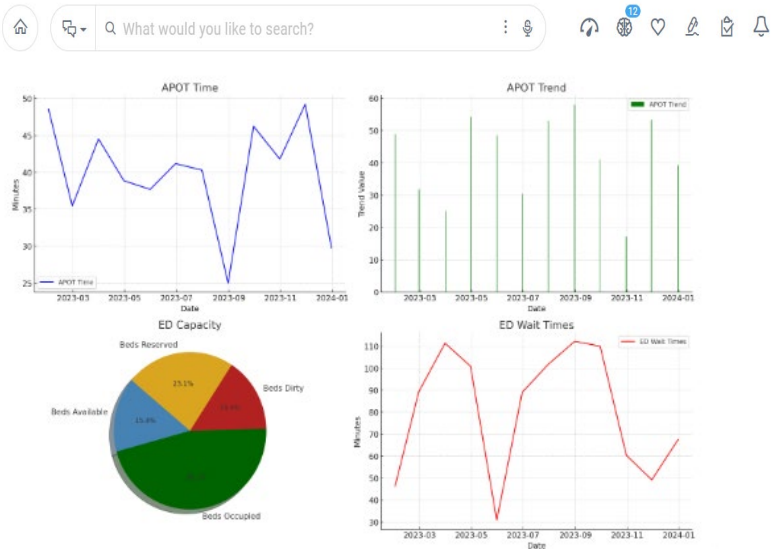
AFTER new automated system implemented, granular visibility into the incremental intervals that make up the overall APOT and improved accuracy / agreement between all parties.

**Objective is to achieve n+% reduction in APOD (Ambulance Patient Offload Delay) through access to real-time data and metrics. And improve accuracy of reporting to CEMISIS to reduce data transfers, data reconciliation and APOT time disputes.**

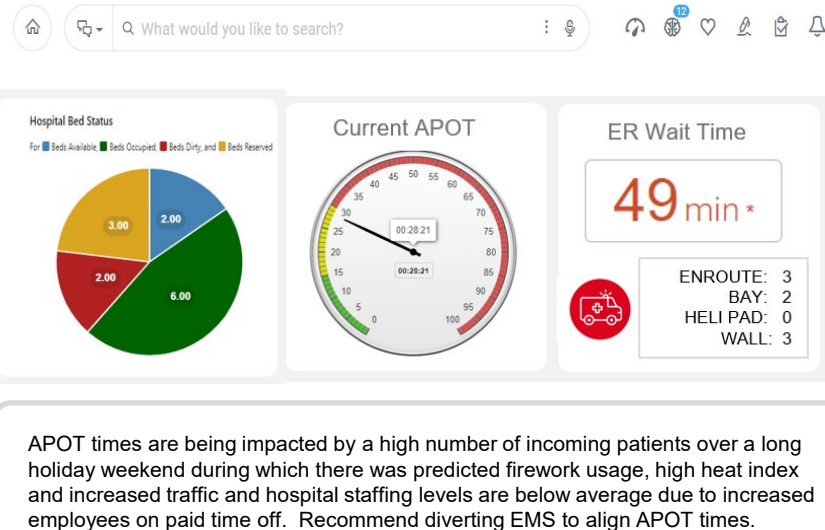
# Sample Persona Based Experience



## MICN - Mickey



## ED – Charge Nurse



# Prototype overview

## How does the prototype itself work?

- AO will use our proven Agile-for-POC methodology for a single configuration sprint.
- AO will set up an instance and configure based on provided datasets.
- AO will present 'showcase' demos during the configuration to get feedback from all stakeholders
- AO will host a training event to enable participants to login to a clickable platform.
- AO will schedule check-points with the participants to provide support and get feedback.



# What we need

**Data:**

Access to all stakeholder systems and/or sample data views

**Subject Matter Expertise:**

Support and active participation from knowledgeable resources, both from a technical and business perspective, who can give context to the data by explaining the relationships and offer suggestions and improvements during the project.

**Alignment and Commitment:**

Executive alignment of clear goals, objectives, outcomes and timelines

Cross-organization alignment and commitment to provide resources to support our work.

# Success Criteria for PoC

## **Functional:**

Showcase the requirements for real-time visibility of data and actionable insights from multiple systems by connecting with ease.

## **Flexible and Extensible:**

Demonstrate the ability to quickly configure the system to requirements.  
Showcase the ability to incrementally add new stakeholders and datasets.

## **User Acceptance:**

Users should grade the system relative to intuitive, easy-to-use with little to no training.  
They should be able to see how the system will help them in their daily activities.