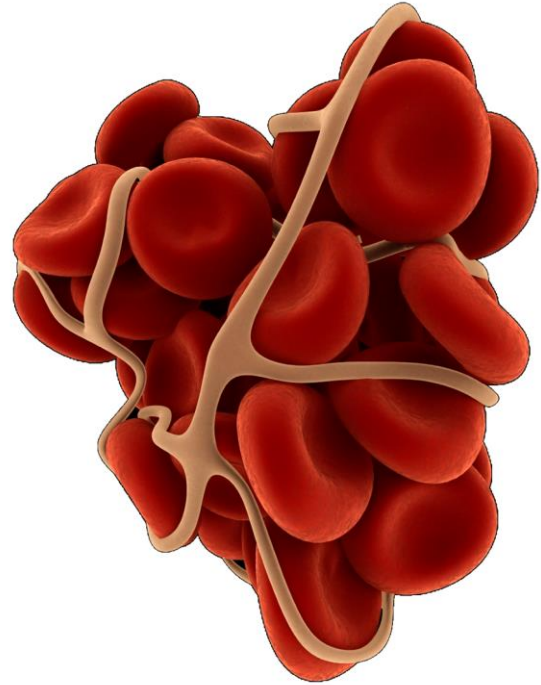# Automated VTE Surveillance and Quality Assurance

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Venous Thromboembolism (VTE)

- A combination of:
  - Deep vein thrombosis (DVT)
  - Pulmonary embolism (PE)
- ⅓ of DVT patients get PE
- Diagnosed with various imaging modalities
- Treatments include anti-coagulants and surgical intervention
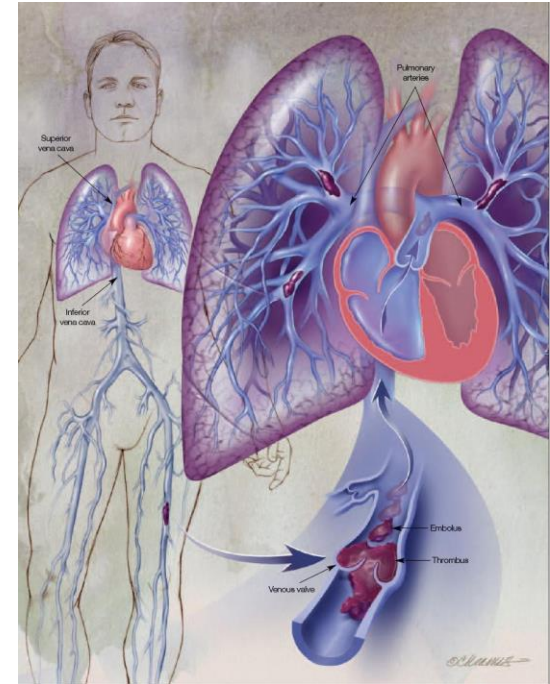
Relevance

- ⅔ of the cases happen during hospitalization
    - Due to lack of mobility and being sick
    - Responsible for over 800,000 deaths each year
- Difficult to diagnose
- Immediate treatment is difficult to coordinate due to lack of rapid identification
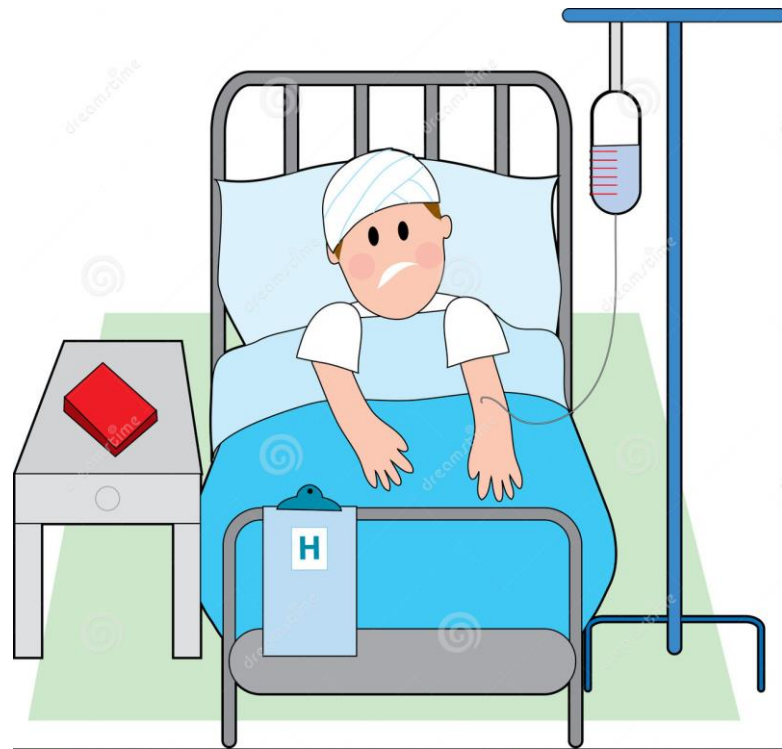
Technical Summary of Approach

Current Status:
- APL has developed an NLP tool to read clinical documents
  - Input: radiography narratives
  - Output: annotated scans with physiology of blood clots

Technical Summary of Approach

Our Goal:

- Research
  - Create a database to represent clot artifacts in CT and Duplex Ultrasounds
- Clinical
  - Send prompt, automatic notifications to on-call clinicians
  - Present useful patient information upon notification

Research Implementation

- Database organizes patient scans based on existence of clots
- Allows for isolation of causal factors
- Determine positive and negative treatment methodologies

- Important factors:
  - Time of scan
  - Location of clot
  - Current symptoms
  - Associated patient history
  - Location of patient during scan (Variable for Ultrasound)
  - Current treatment

Clinical Implementation/Workflow
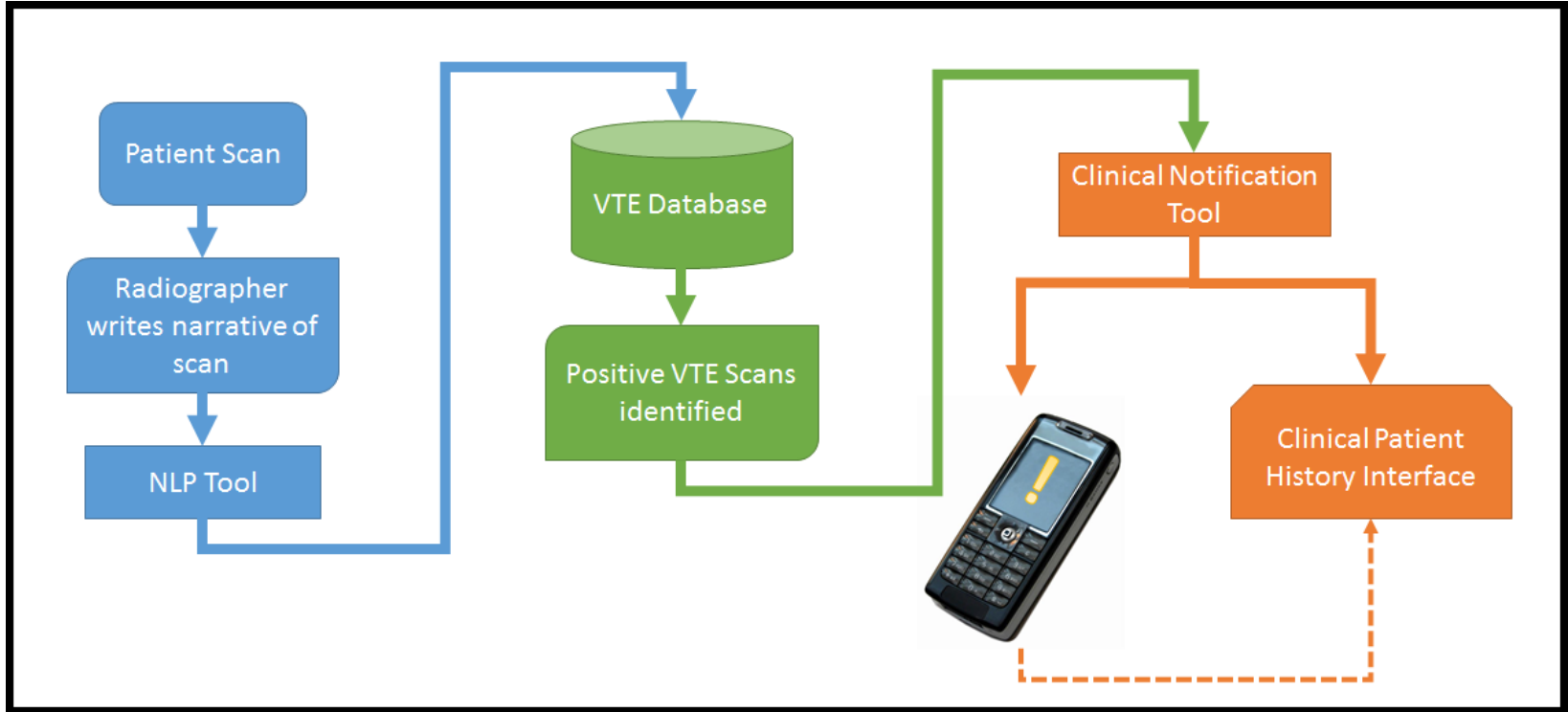
Deliverables

Minimum:
- Create a database that provides results to basic queries based on patient scan annotations from NLP tool

Expected:
- Incorporate patient history and current treatment plan in patient record into database
- Integrate automation of clinical workflow in cases of VTE to the system

Maximum:
- Perform statistical modeling with the database to identify potential causal factors for VTEs and assess the efficacy of different treatments
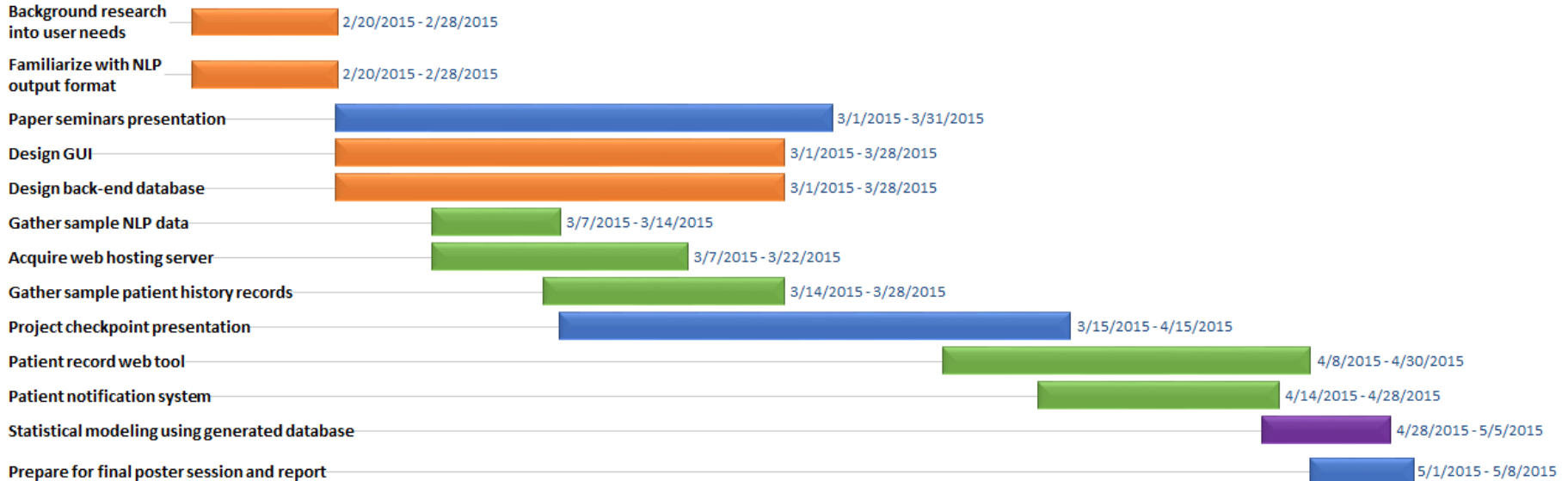
Assigned Responsibilities

Stephen:

- Background research
- Front-end Research GUI
- Familiarize with NLP format
- Gather NLP data
- Patient Record web tool

Vamsi:

- Background research
- Back-end database
- Gather patient history records
- Acquire web hosting service
- Clinical Notification system

Dependencies

1. Web hosting server
   a. Amazon web services or custom hosting service provided by mentors - possibly cost ~$100
2. Pager or applicable notification tool (if standard smartphone, then not a dependency)
3. Annotated CT and Duplex Ultrasound Scans
4. Patient history records

Management Plan

- Meet together twice every week (2 hours)
- Meet with mentors bi-weekly at JHMI
- Keep track of progress using Asana Management Tool
- Source control using GitHub

Reading List

- Lau BD, Haider AH, Streiff MB, et al. Eliminating Health Care Disparities With Mandatory Clinical Decision Support: The Venous Thromboembolism (VTE) Example. Med Care. 2015;53(1):18-24.
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