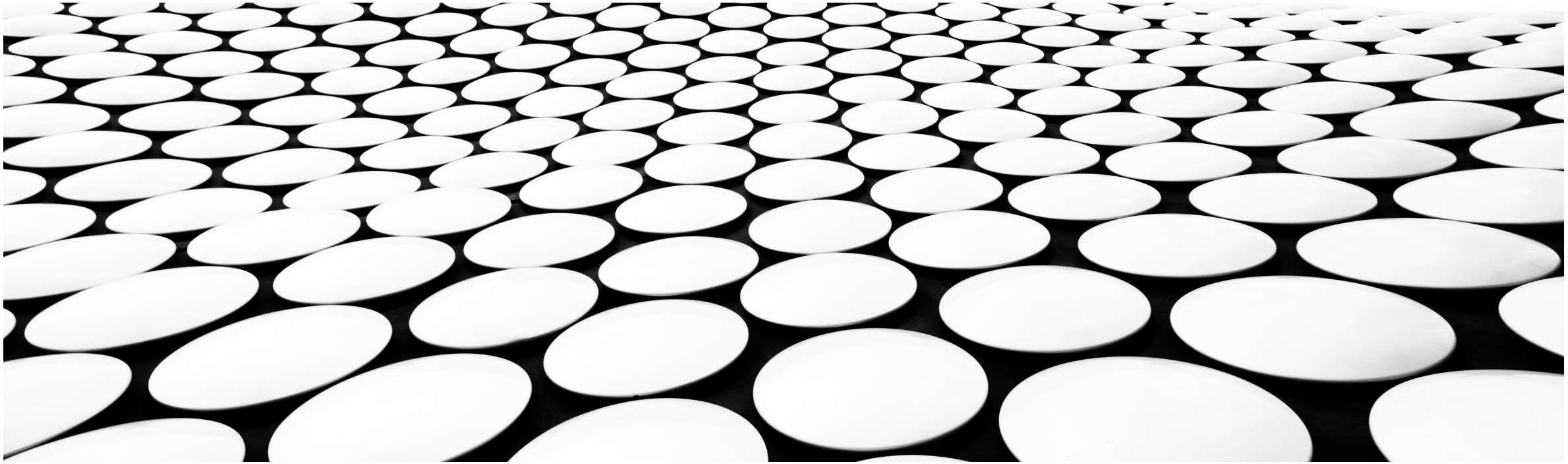
MEDICAL INFORMATION SIMULATIONS

TTU CAPSTONE PROJECT PROPOSAL

AUGUST 2024



Laboratory Information Systems (LIS) Training Simulator

Objective

Develop a web-based educational training simulator for a laboratory information system (LIS) used in pathology labs.

- Simply put: you will be creating a simulator to train Medical Laboratory Science students on the computer software used to run a hospitals Pathology Lab and send diagnostic information to the patients physician.

Requirements

1. **Data Handling:** Manage data with utmost discretion.
2. **Contractual Compliance:** Uphold NDA requirements for data integrity.
3. **Accountability:** Meet weekly with Project Lead and MIS Team for updates, trouble shooting, and milestone checkpoints.

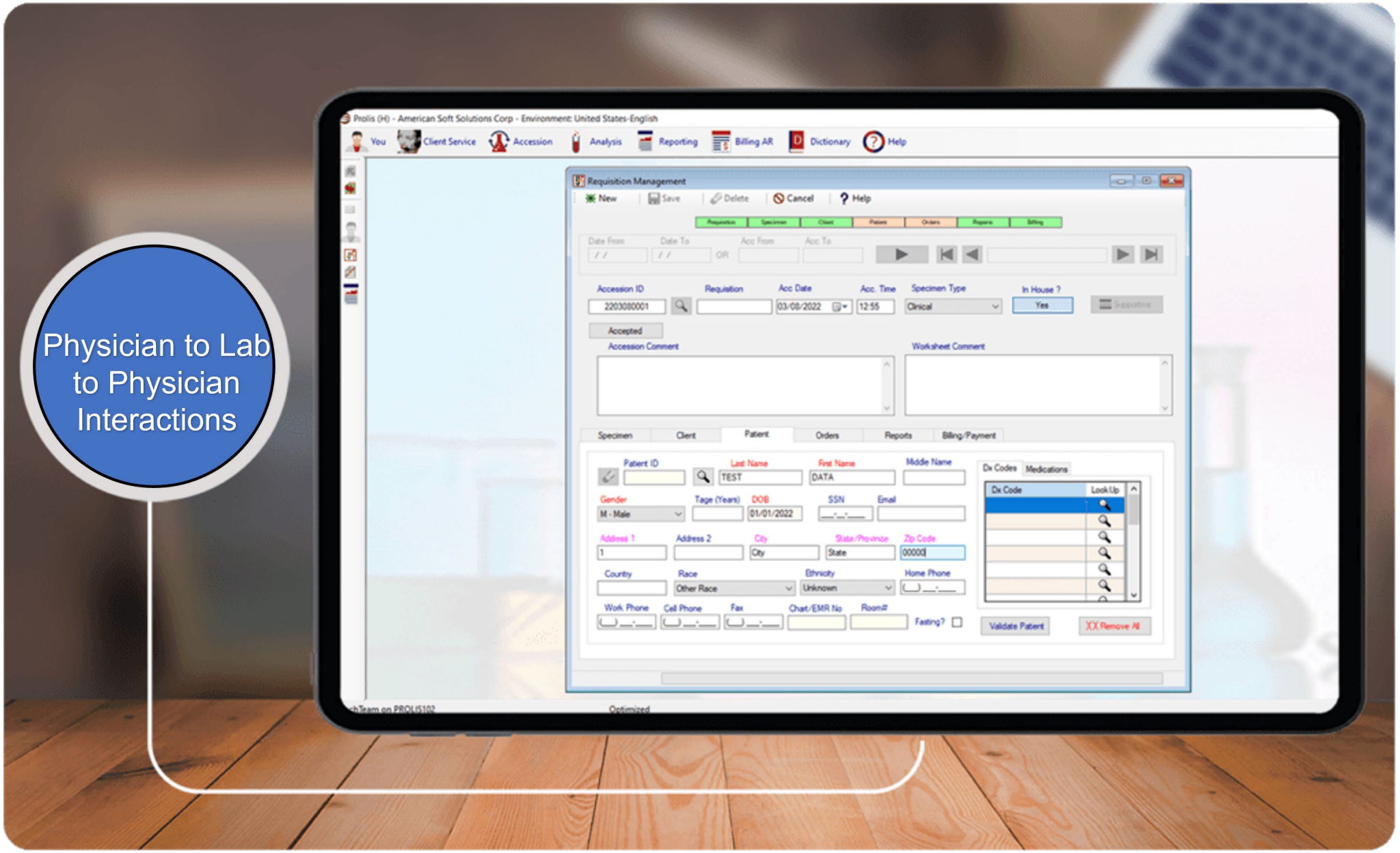
Approach

1. **Data Content:** Students work with data content as instructed by project Lead and Medical Information Simulations, LLC (MIS) to build an LIS Training Simulator.
2. **Collaboration:** Work closely with MIS Team for content updates and data sample sets.
3. **Limited Scope:** Focus the project on specific sections of a laboratory department.
4. **Progress Tracking:** Ensure regular progress reports and milestone tracking.

Today's Agenda

1. Vetting Requirements
2. Project Proposals (6 project ideas)
3. Conceptual Schedule

Current Pathology Lab Software: Not available to students



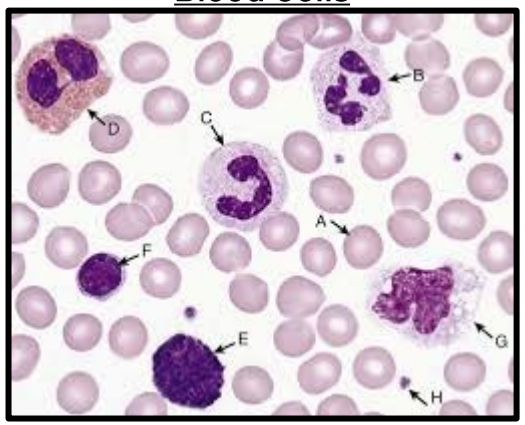
COMPLIANCE AND CONFIDENTIALITY REQUIREMENTS

- **COI Letter:** Statement from Medical Information Simulations, LLC (MIS) disclosing any possible conflict of interest that may occur between our faculty positions at TTUHSC and being owners of a company.
  - Students must sign the one copy of the COI letter acknowledging its receipt.
- **Mutual NDA:** Stress to students importance of not sharing sensitive information due to mutual non-disclosure agreements (NDAs).
  - Students must fill out and return the NDA agreement with Medical Information Simulations, LLC.

- Forms to be sent to Dr. Dang before acceptance to a project.

MIS CAPSTONE PROJECT (1 OF 6)

Blood Cells



Project 1: Hematology/Coagulation Diagnostic Dashboard

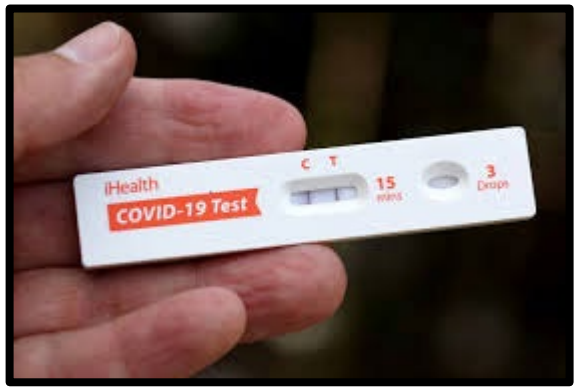
Objective: Develop a real-time dashboard for the Hematology/Coagulation department of the LIS training simulator. Section development to include:

- Quality Control
- Patient/Order Entry
- Results in Progress
- Patient Reports
- Assignments
- Gradebook
- Quizzes
- Case Studies
- Training Videos for students & faculty

- **Benefits:** Provides information systems training software that simulates "Real-World" pathology lab workflow conditions, provide students with clinical correlation to increase diagnostic comprehension, and eliminate gaps in laboratory analysis knowledge in order to reduce adverse healthcare events.
  - Hematology – the study of blood components (which include white blood cells, red blood cells, and platelets) and blood disorders (such as bleeding or clotting disorders, anemias, and hematological cancers).
- **Capstone Challenges:**
  - Learn HCI standards for building a user interactive interface
  - Build a functional and responsive client/server architecture application
  - Learn to organize and design an encrypted database, integrate authentication/authorization functions
  - Design, implement, and test the application on active users
- **Data Sample Sets:** Communication between faculty and student accounts for the Hematology section of the LIS simulator, content data storage.

MIS CAPSTONE PROJECT (2 OF 6)

COVID Antigen Test



Project 2: Serology Diagnostic Dashboard

Objective: Develop a real-time dashboard for the Serology department of the LIS training simulator. Section development to include:

- Quality Control
- Patient/Order Entry
- Results in Progress
- Patient Reports
- Assignments
- Gradebook
- Quizzes
- Case Studies
- Training Videos for students & faculty

- **Benefits:** Provides information systems training software that simulates "Real-World" pathology lab workflow conditions, provide students with clinical correlation to increase diagnostic comprehension, and eliminate gaps in laboratory analysis knowledge in order to reduce adverse healthcare events.
  - Serology – the study of blood serum, especially with regard to the response of the immune system to pathogens and introduced substances (includes antigen and antibody interactions).
- **Capstone Challenges:**
  - Learn HCI standards for building a user interactive interface
  - Build a functional and responsive client/server architecture application
  - Learn to organize and design an encrypted database, integrate authentication/authorization functions
  - Design, implement, and test the application on active users
- **Data Sample Sets:** Communication between faculty and student accounts for the Serology section of the LIS simulator, content data storage.

MIS CAPSTONE PROJECT (3 OF 6)

Urinalysis Test

Project 3: Urinalysis/Body Fluids Diagnostic Dashboard

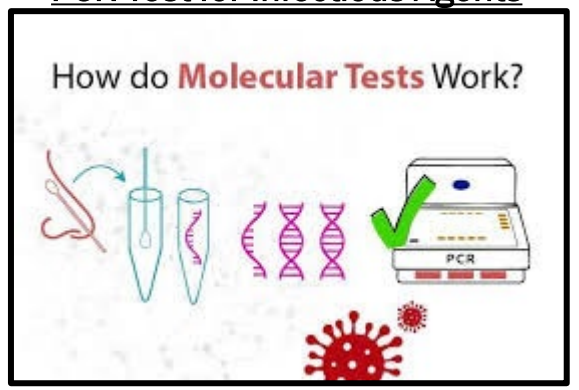
Objective: Develop a real-time dashboard for the Urinalysis/Body Fluids department of the LIS training simulator. Section development to include:

- Quality Control
- Patient/Order Entry
- Results in Progress
- Patient Reports
- Assignments
- Gradebook
- Quizzes
- Case Studies
- Training Videos for students & faculty

- **Benefits:** Provides information systems training software that simulates "Real-World" pathology lab workflow conditions, provide students with clinical correlation to increase diagnostic comprehension, and eliminate gaps in laboratory analysis knowledge in order to reduce adverse healthcare events.
  - Urinalysis – the study of urine samples performed to detect a wide range of disorders, such as kidney disease, diabetes, and urinary tract infections.
  - Body Fluids – study of bodily fluids, such as cerebrospinal fluid, synovial fluid, pleural fluid, and semen to monitor a wide range of body functions and to detect disorders.
- **Capstone Challenges:**
  - Learn HCI standards for building a user interactive interface
  - Build a functional and responsive client/server architecture application
  - Learn to organize and design an encrypted database, integrate authentication/authorization functions
  - Design, implement, and test the application on active users
- **Data Sample Sets:** Communication between faculty and student accounts for the Urinalysis/Body Fluid section of the LIS simulator, content data storage.

MIS CAPSTONE PROJECT (4 OF 6)

PCR Test for Infectious Agents



Project 4: Molecular Diagnostic Dashboard

Objective: Develop a real-time dashboard for the Molecular department of the LIS training simulator. Section development to include:

- Quality Control
- Patient/Order Entry
- Results in Progress
- Patient Reports
- Assignments
- Gradebook
- Quizzes
- Case Studies
- Training Videos for students & faculty

- **Benefits:** Provides information systems training software that simulates "Real-World" pathology lab workflow conditions, provide students with clinical correlation to increase diagnostic comprehension, and eliminate gaps in laboratory analysis knowledge in order to reduce adverse healthcare events.
  - Molecular Diagnostic testing – the study of DNA and RNA sequences in order to identify diseases in the areas of inherited disease, cancer identification, and infectious diseases.
- **Capstone Challenges:**
  - Learn HCI standards for building a user interactive interface
  - Build a functional and responsive client/server architecture application
  - Learn to organize and design an encrypted database, integrate authentication/authorization functions
  - Design, implement, and test the application on active users
- **Data Sample Sets:** Communication between faculty and student accounts for the Molecular section of the LIS simulator, content data storage.

MIS CAPSTONE PROJECT (5 OF 6)

Units of Blood for Transfusion

Project 5: Blood Bank Diagnostic Dashboard

Objective: Develop a real-time dashboard for the Blood Bank department of the LIS training simulator. Section development to include:

- Quality Control
- Patient/Order Entry
- Results in Progress
- Patient Reports
- Assignments
- Gradebook
- Quizzes
- Case Studies
- Training Videos for students & faculty

- **Benefits:** Provides information systems training software that simulates "Real-World" pathology lab workflow conditions, provide students with clinical correlation to increase diagnostic comprehension, and eliminate gaps in laboratory analysis knowledge in order to reduce adverse healthcare events.
  - Blood Bank – the study of Red Blood Cell antigens and antibodies associated with blood transfusions. Analysis includes blood typing and crossmatching for donor and recipient compatibility.
- **Capstone Challenges:**
  - Learn HCI standards for building a user interactive interface
  - Build a functional and responsive client/server architecture application
  - Learn to organize and design an encrypted database, integrate authentication/authorization functions
  - Design, implement, and test the application on active users
- **Data Sample Sets:** Communication between faculty and student accounts for the Blood Bank section of the LIS simulator, content data storage.

MIS CAPSTONE PROJECT (6 OF 6)

Bacterial Infection Identification

Project 6: Microbiology Diagnostic Dashboard

Objective: Develop a real-time dashboard for the Microbiology department of the LIS training simulator. Section development to include:

- Quality Control
- Patient/Order Entry
- Results in Progress
- Patient Reports
- Assignments
- Gradebook
- Quizzes
- Case Studies
- Training Videos for students & faculty

- **Benefits:** Provides information systems training software that simulates "Real-World" pathology lab workflow conditions, provide students with clinical correlation to increase diagnostic comprehension, and eliminate gaps in laboratory analysis knowledge in order to reduce adverse healthcare events.
  - Microbiology – the study of microscopic infectious organisms associated with diseases and disorders in humans. Infectious organisms include: bacteria, viruses, fungi, and parasites.
- **Capstone Challenges:**
  - Learn HCI standards for building a user interactive interface
  - Build a functional and responsive client/server architecture application
  - Learn to organize and design an encrypted database, integrate authentication/authorization functions
  - Design, implement, and test the application on active users
- **Data Sample Sets:** Communication between faculty and student accounts for the Microbiology section of the LIS simulator, content data storage.

SUB-SECTIONS FOR EACH PROJECT

1. Quality Control QC Build: Panels and Individual Tests (Quality Control/QC Builder)
   - Order (Quality Control/Order Controls)
   - QC Result (Results in Progress/QC Results)
   - Review (Quality Control/Review Controls)
   - Print QC (Quality Control/Review Controls)
     - QC Reports & QC Review: Levey-Jennings Charts/Qualitative Analysis
       1. Review: Date range selection, Review Comment , Print options, Communicate between F and S version
     - Old file retrieval or deletion – reference files ?
   - Communicate between F and S version
   - Training videos/Function Overviews
2. Order Entry (Creating a patient)
   - Search Existing Patient (Order Entry/Search Existing Patient)
   - Create New Patient
   - Patient Test Builder
     - Test names and acronyms
       1. Critical alert range, Normal ranges
   - Sample Order: Panel and Individual Tests
   - Sample cancel requirements (Results in Progress/Patient Results)
   - Patient result screen (Results in Progress/Patient Results)
   - Critical Value: alerts and comments (Results in Progress/Patient Results)
   - Communicate between F and S version
   - Patient previous result retrieval
   - Training videos/Function Overviews
3. Results in Progress
   - QC Result (Results in Progress/QC Results)
   - Patient result screen (Results in Progress/Patient Results)
   - Training videos/Function Overviews
4. Patient Reports
   - Patient search
   - Order history report (Order Entry/Patient Information)
   - Training videos/Function Overviews
5. Assignments (Student & Faculty View)
   - Students – report/assignment submission per department
   - Faculty - report/assignment submission per department
6. Gradebook (Student & Faculty View)
   - Build Gradebook/Departmental Sections
   - Assignment Feedback
7. Quizzes
   - Question bank
     - QC questions, order entry questions, patient result questions, reports questions
   - Image addition, Video addition, Communicate between F and S version, Training videos/Function Overviews
8. Case Studies
   - Patient previous result retrieval, Image addition, Video addition, Communicate between F and S version, Training videos/Function Overviews