Project 1b1 – Problem Amplification

CSC510: Software Engineering – Fall 2025

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iTrust2 Project: Stakeholder Analysis and Use Cases

Project Overview

iTrust2 is an electronic health records system (EHR) used in NC State's CSC 326 Software Engineering course. It provides patients with means to maintain health records and communicate with healthcare providers, while enabling HCPs to record office visit information including health metrics, diagnoses, prescriptions, eye care, and pregnancy care. The system follows HIPAA statute for ensuring security and privacy of patient records.

1. Stakeholder Identification

Primary Stakeholders

- **Patients**: End users who maintain personal health records and communicate with healthcare providers
- **Healthcare Providers (HCPs)**: Medical professionals (doctors, nurses, specialists) who record and access patient information
- **System Administrators**: IT personnel responsible for system maintenance, security, and user management
- **Hospital/Clinic Management**: Administrative staff overseeing operations and compliance
- **Students**: CSC 326 students developing and enhancing the system as a learning project
- **Teaching Staff**: Professors and TAs managing the educational aspects and project requirements

Secondary Stakeholders

- **IT Support Staff**: Technical support personnel handling system issues and maintenance
- **Compliance Officers**: Personnel ensuring HIPAA and other regulatory compliance
- **Database Administrators**: Specialists managing MySQL/MariaDB database systems

- **Security Officers**: Personnel responsible for cybersecurity and patient data protection
- **Insurance Companies**: Organizations that may need to access patient records for claims processing
- **Pharmacists**: Healthcare professionals who need prescription information
- **Laboratory Technicians**: Personnel who input test results and diagnostic data
- **Medical Billing Staff**: Personnel handling insurance claims and patient billing
- **Regulatory Bodies**: Government agencies (FDA, HHS) overseeing healthcare IT systems
- **Software Vendors**: Third-party companies providing integration services or software components

How to Find Additional Stakeholders

LLM Brainstorming Approach:

1. Use prompts like: "List all possible stakeholders for an electronic health records system, considering direct users, indirect users, regulatory bodies, and technical personnel"
2. Apply stakeholder mapping techniques: "Map stakeholders by influence vs interest matrix for a healthcare IT system"
3. Consider the entire healthcare ecosystem: "What organizations and roles interact with patient health data throughout the healthcare delivery process?"
4. Think about the software development lifecycle: "Who are all the people involved in developing, testing, deploying, and maintaining enterprise healthcare software?"

2. Stakeholder Bias Analysis

5 Key Areas Where Stakeholder Needs Clash

1. Security vs. Usability

- **Security Officers** prioritize maximum data protection with complex authentication, frequent password changes, and restricted access
- **Healthcare Providers** need quick, seamless access during emergencies and busy clinical workflows
- **Patients** want easy access to their records without complicated security procedures
- **Conflict**: Enhanced security measures often slow down user workflows and create friction

2. Comprehensive Features vs. System Performance

- **Healthcare Providers** want extensive functionality (detailed reporting, complex search, integration with multiple systems)
- **Students** want to implement advanced features to demonstrate technical skills
- **System Administrators** need the system to remain fast, stable, and resource-efficient

- **Conflict**: More features typically mean slower performance and increased complexity

3. Data Accessibility vs. Privacy Compliance

- **Patients** want easy access to all their health information and the ability to share it freely
- **Insurance Companies** desire comprehensive access to patient data for claims processing
- **Compliance Officers** must enforce strict HIPAA guidelines limiting data access and sharing
- **Conflict**: Open data access directly contradicts privacy protection requirements

4. Cost Efficiency vs. System Reliability

- **Hospital Management** wants to minimize IT costs and maximize budget efficiency
- **System Administrators** need redundant systems, premium hardware, and extensive backup solutions
- **Teaching Staff** requires stable, always-available systems for educational purposes
- **Conflict**: Reliable systems require significant investment that management may resist

5. Innovation vs. Stability

- **Students** want to experiment with cutting-edge technologies and implement novel solutions
- **Teaching Staff** needs consistent, well-documented systems for educational continuity
- **Healthcare Providers** require stable, predictable systems they can rely on for patient care
- **System Administrators** prefer proven technologies with established support ecosystems
- **Conflict**: Innovation introduces risk and instability that operational stakeholders cannot tolerate

3. Prompt Crafting Commentary

Zero-Shot Prompting vs. Careful Prompting

Zero-Shot Prompting Example:

Prompt: "Create use cases for iTrust2" **Issues**:

- Lacks context about the system's purpose and scope
- No guidance on format or structure
- May produce generic, irrelevant use cases
- Doesn't specify stakeholder perspectives
- No examples to guide quality expectations

Careful Prompting Example:

Prompt: "You are helping create use cases for iTrust2, an electronic health records system used in a software engineering course. The system allows patients to maintain health records and enables healthcare providers to record office visits, diagnoses, and prescriptions while following HIPAA compliance.

Please create use cases following this structure:

- **Use Case Name**: [Descriptive title]
- **Actor**: [Primary user type]
- **Preconditions**: [System state before use case begins]
- **Main Flow**: [Step-by-step primary scenario]
- **Subflows**: [Detailed substeps where needed]
- **Alternative Flows**: [Exception handling and alternative paths]
- **Postconditions**: [System state after successful completion]

Focus on core functionalities like patient registration, appointment scheduling, medical record entry, and prescription management. Each use case should be detailed enough for developers to implement and testers to validate."

Benefits of Careful Prompting:

- **Context Setting**: Provides system background and purpose
- **Structure Guidance**: Specifies exact format requirements
- **Quality Control**: Sets expectations for detail and completeness
- **Scope Definition**: Focuses on relevant functionalities
- **Role Clarity**: Defines the intended audience and use case
- **Example Direction**: Suggests specific areas to address

4. Use Cases for iTrust2

Use Case 1: Patient Registration

Actor: New Patient
Preconditions:

- Patient has access to iTrust2 registration portal
- Patient has valid personal identification information
- System is operational and accessible

Main Flow:

1. Patient navigates to iTrust2 registration page
2. System displays registration form

3. Patient enters personal information (name, DOB, contact details)
4. Patient creates username and password
5. Patient provides emergency contact information
6. Patient accepts terms of service and HIPAA consent
7. System validates all required fields
8. System creates new patient account
9. System sends confirmation email
10. Patient receives confirmation and account activation instructions

Subflows:

- **SF1 - Password Creation**: Password must meet security requirements (minimum length, complexity)
- **SF2 - Duplicate Check**: System verifies no existing account with same SSN/email
- **SF3 - Email Verification**: Patient must verify email address before account activation

Alternative Flows:

- **AF1 - Invalid Information**: If validation fails, system displays specific error messages and allows correction
- **AF2 - Duplicate Account**: If account already exists, system offers password reset option
- **AF3 - System Unavailable**: If system is down, display maintenance message and suggested retry time
- **AF4 - Email Delivery Failure**: Provide alternative contact method or manual verification process

Postconditions:

- Patient account created in system database
- Account pending activation via email verification
- Patient can proceed to login once verified

Use Case 2: Schedule Appointment

Actor: Patient
Preconditions:

- Patient has active iTrust2 account
- Patient is logged into the system
- At least one healthcare provider is available for scheduling

Main Flow:

1. Patient logs into iTrust2 system
2. Patient navigates to appointment scheduling section

3. System displays available healthcare providers
4. Patient selects desired healthcare provider
5. System displays provider's available time slots
6. Patient selects preferred appointment date and time
7. Patient enters reason for visit
8. System confirms appointment details
9. Patient confirms appointment booking
10. System schedules appointment and updates calendar
11. System sends confirmation notification to patient and provider

Subflows:

- **SF1 - Provider Search**: Patient can filter providers by specialty, location, or availability
- **SF2 - Appointment Type Selection**: Patient specifies routine check-up, follow-up, or urgent care
- **SF3 - Insurance Verification**: System checks patient insurance coverage for selected provider

Alternative Flows:

- **AF1 - No Available Slots**: System suggests alternative dates or other providers
- **AF2 - Scheduling Conflict**: If selected time becomes unavailable, system offers next available options
- **AF3 - Provider Unavailable**: System notifies patient and suggests alternative providers
- **AF4 - System Error**: Display error message and allow patient to retry scheduling

Postconditions:

- Appointment scheduled in system
- Calendar updated for patient and healthcare provider
- Confirmation notifications sent to both parties

Use Case 3: Document Office Visit

Actor: Healthcare Provider
Preconditions:

- Healthcare provider has active iTrust2 account with appropriate permissions
- Healthcare provider is logged into system
- Patient has completed office visit
- Patient record exists in system

Main Flow:

1. Healthcare provider logs into iTrust2
2. Provider navigates to patient records section

3. Provider searches for and selects patient
4. Provider opens office visit documentation form
5. Provider enters visit date and time
6. Provider documents chief complaint and symptoms
7. Provider records vital signs and measurements
8. Provider enters diagnosis and assessment
9. Provider documents treatment plan and prescriptions
10. Provider saves office visit record
11. System timestamps and stores visit documentation

Subflows:

- **SF1 - Vital Signs Entry**: Blood pressure, temperature, weight, height with validation ranges
- **SF2 - Prescription Management**: Add medications with dosage, frequency, and duration
- **SF3 - Diagnostic Codes**: Select appropriate ICD-10 codes for diagnoses
- **SF4 - Follow-up Scheduling**: Schedule follow-up appointments if needed

Alternative Flows:

- **AF1 - Patient Not Found**: System provides patient search assistance or new patient registration option
- **AF2 - Incomplete Information**: System warns provider about missing required fields before saving
- **AF3 - Prescription Drug Interactions**: System alerts provider to potential drug interactions
- **AF4 - Save Failure**: System retains entered data and provides retry option

Postconditions:

- Office visit documented and stored in patient record
- Patient's medical history updated
- Prescriptions added to patient's medication list
- Visit accessible to authorized healthcare providers

Use Case 4: View Medical Records

Actor: Patient
Preconditions:

- Patient has active iTrust2 account
- Patient is logged into system
- Patient has existing medical records in system

Main Flow:

1. Patient logs into iTrust2 system
2. Patient navigates to medical records section
3. System displays patient's medical record dashboard
4. Patient selects specific record type (visits, prescriptions, lab results)
5. System retrieves and displays requested records
6. Patient reviews medical information
7. Patient can print or download records if needed
8. System logs record access for audit purposes

Subflows:

- **SF1 - Record Filtering**: Patient can filter records by date range, provider, or record type
- **SF2 - Detailed View**: Patient can click on specific records for detailed information
- **SF3 - Export Options**: Patient can export records in PDF or printed format

Alternative Flows:

- **AF1 - No Records Found**: System displays message indicating no records match criteria
- **AF2 - System Performance Issues**: System displays loading indicators and retry options
- **AF3 - Access Restrictions**: Some records may require additional authentication for sensitive information
- **AF4 - Print/Download Failure**: System provides alternative access methods or technical support contact

Postconditions:

- Patient has viewed requested medical records
- System audit log updated with access information
- Patient informed about record contents

Use Case 5: Manage User Accounts

Actor: System Administrator
Preconditions:

- Administrator has active iTrust2 account with admin privileges
- Administrator is logged into system
- System user management interface is accessible

Main Flow:

1. Administrator logs into iTrust2 admin panel
2. Administrator navigates to user management section
3. System displays list of all user accounts

4. Administrator selects specific user account management action
5. Administrator modifies user permissions, status, or information
6. Administrator confirms changes
7. System updates user account information
8. System logs administrative action
9. Affected user receives notification of account changes

Subflows:

- **SF1 - Account Creation**: Create new accounts for healthcare providers or staff members
- **SF2 - Permission Management**: Assign or revoke specific system permissions
- **SF3 - Account Deactivation**: Temporarily or permanently disable user accounts
- **SF4 - Password Reset**: Generate new temporary passwords for users

Alternative Flows:

- **AF1 - Insufficient Privileges**: System denies access if administrator lacks required permissions
- **AF2 - User Account Conflicts**: System prevents changes that would create security or operational conflicts
- **AF3 - Audit Trail Requirements**: System requires justification for sensitive account changes
- **AF4 - System Backup**: Automatic backup before major account modifications

Postconditions:

- User account information updated in system
- Administrative action logged for audit purposes
- User notified of account changes

Use Case 6: Prescription Management

Actor: Healthcare Provider
Preconditions:

- Healthcare provider has prescribing privileges in iTrust2
- Healthcare provider is logged into system
- Patient has active account and current visit record

Main Flow:

1. Healthcare provider accesses patient's current visit record
2. Provider navigates to prescription management section
3. Provider searches for medication by name or category
4. Provider selects appropriate medication

5. Provider enters prescription details (dosage, frequency, duration)
6. Provider adds special instructions or warnings
7. System checks for drug interactions and allergies
8. Provider reviews and confirms prescription
9. System adds prescription to patient record
10. System generates prescription for pharmacy transmission

Subflows:

- **SF1 - Drug Interaction Check**: System cross-references with patient's current medications
- **SF2 - Allergy Verification**: System checks patient's known allergies and contraindications
- **SF3 - Insurance Formulary**: System verifies medication coverage under patient's insurance
- **SF4 - Electronic Prescription**: System transmits prescription directly to patient's preferred pharmacy

Alternative Flows:

- **AF1 - Drug Interaction Alert**: System warns provider and requires acknowledgment or alternative selection
- **AF2 - Allergy Conflict**: System blocks prescription and suggests alternatives
- **AF3 - Prescription Authority**: System verifies provider has authority to prescribe specific medication types
- **AF4 - Pharmacy Communication Failure**: System provides manual prescription printing option

Postconditions:

- Prescription added to patient's medication list
- Electronic prescription transmitted to pharmacy
- Provider and patient notified of prescription details

Use Case 7: Generate Medical Reports

Actor: Healthcare Provider
Preconditions:

- Healthcare provider has appropriate reporting permissions
- Healthcare provider is logged into system
- Relevant patient data exists for report generation

Main Flow:

1. Healthcare provider logs into iTrust2 system

2. Provider navigates to reports generation section
3. Provider selects report type (patient summary, treatment history, etc.)
4. Provider specifies report parameters (date range, patient selection)
5. Provider customizes report format and content
6. System processes report request and retrieves data
7. System generates formatted report
8. Provider reviews report for accuracy
9. Provider exports or prints report
10. System logs report generation for audit purposes

Subflows:

- **SF1 - Patient Selection**: Provider can select individual patients or patient groups
- **SF2 - Data Filtering**: Provider can include/exclude specific data types
- **SF3 - Format Options**: Reports can be generated in multiple formats (PDF, Excel, printed)
- **SF4 - Statistical Analysis**: System can generate aggregate statistics and trends

Alternative Flows:

- **AF1 - Insufficient Data**: System notifies provider if insufficient data for meaningful report
- **AF2 - Large Dataset Warning**: System warns about long processing times for extensive reports
- **AF3 - Access Restrictions**: System enforces patient privacy rules for report content
- **AF4 - Generation Failure**: System provides error details and retry options

Postconditions:

- Medical report generated and available for use
- Report generation logged in audit trail
- Provider has access to requested medical information

Use Case 8: System Backup and Recovery

Actor: System Administrator
Preconditions:

- Administrator has system maintenance privileges
- System backup infrastructure is configured and functional
- Database and application servers are accessible

Main Flow:

1. Administrator logs into iTrust2 admin interface
2. Administrator navigates to system maintenance section
3. Administrator initiates backup procedure

4. System begins database and file system backup
5. System verifies backup integrity during process
6. System completes backup and stores in secure location
7. System generates backup completion report
8. Administrator reviews backup status and logs
9. System schedules next automated backup

Subflows:

- **SF1 - Incremental Backup**: System can perform full or incremental backups
- **SF2 - Backup Verification**: System tests backup integrity and restorability
- **SF3 - Off-site Storage**: Backup copies transmitted to off-site storage locations
- **SF4 - Automated Scheduling**: System can perform regular automated backups

Alternative Flows:

- **AF1 - Backup Failure**: System alerts administrator and provides failure diagnostics
- **AF2 - Storage Space Issues**: System notifies administrator of insufficient backup storage
- **AF3 - Data Recovery Request**: Administrator can restore specific data from backup archives
- **AF4 - System Downtime**: Backup process requires system maintenance window

Postconditions:

- System data successfully backed up
- Backup integrity verified and confirmed
- Backup completion logged in system records

Use Case 9: HIPAA Compliance Monitoring

Actor: Compliance Officer
Preconditions:

- Compliance officer has appropriate audit and monitoring permissions
- System audit logging is enabled and functional
- HIPAA compliance monitoring tools are configured

Main Flow:

1. Compliance officer logs into iTrust2 compliance dashboard
2. Officer selects compliance monitoring time period
3. System generates audit trail report for specified period
4. Officer reviews access logs for unauthorized activities
5. System highlights potential compliance violations
6. Officer investigates flagged activities

7. Officer documents compliance review findings
8. System generates compliance status report
9. Officer submits compliance documentation

Subflows:

- **SF1 - Access Pattern Analysis**: System analyzes user access patterns for anomalies
- **SF2 - Privacy Breach Detection**: System identifies potential unauthorized access attempts
- **SF3 - Risk Assessment**: Officer evaluates system vulnerabilities and risks
- **SF4 - Training Requirements**: System identifies users requiring additional compliance training

Alternative Flows:

- **AF1 - Compliance Violation Detected**: System immediately alerts officer and initiates investigation protocol
- **AF2 - Audit Log Corruption**: System uses backup logs and notifies technical support
- **AF3 - Regulatory Update**: Officer updates compliance parameters for new regulations
- **AF4 - External Audit**: System provides comprehensive audit trail for external review

Postconditions:

- Compliance status assessed and documented
- Any violations identified and flagged for remediation
- Compliance report generated for management review

Use Case 10: Emergency Medical Information Access

Actor: Emergency Healthcare Provider
Preconditions:

- Emergency situation exists requiring immediate patient information access
- Emergency provider has appropriate emergency access credentials
- Patient is unable to provide consent due to emergency situation
- System emergency access protocols are active

Main Flow:

1. Emergency provider requests emergency access to iTrust2
2. System presents emergency access authentication
3. Provider enters emergency access credentials
4. Provider specifies patient identification information
5. System verifies emergency access authorization
6. System grants limited emergency access to critical patient information
7. Provider reviews essential medical information (allergies, medications, conditions)

8. Provider documents emergency access justification
9. System logs emergency access for compliance review
10. System notifies regular healthcare providers of emergency access

Subflows:

- **SF1 - Critical Information Priority**: System highlights life-threatening allergies and conditions
- **SF2 - Emergency Contact Notification**: System attempts to contact patient's emergency contacts
- **SF3 - Time-Limited Access**: Emergency access automatically expires after specified time period
- **SF4 - Documentation Requirements**: Provider must document medical emergency justification

Alternative Flows:

- **AF1 - Patient Identification Issues**: System provides alternative patient identification methods
- **AF2 - System Unavailable**: System provides emergency contact information for manual record access
- **AF3 - Access Denied**: System requires additional authorization for emergency access
- **AF4 - Post-Emergency Review**: System flags emergency access for compliance review

Postconditions:

- Emergency healthcare provider has access to critical patient information
- Emergency access logged and flagged for review
- Patient's regular providers notified of emergency access
- Medical emergency appropriately managed with available information

Use Case 11: Telemedicine Consultation

Actor: Patient, Healthcare Provider
Preconditions:

- Patient and provider have active iTrust2 accounts with video consultation capabilities
- Patient has scheduled telemedicine appointment
- Both parties have stable internet connection and compatible devices

Main Flow:

1. System sends appointment reminder notifications 30 minutes before consultation
2. Patient logs into iTrust2 and navigates to telemedicine section
3. Healthcare provider joins virtual waiting room
4. System initiates secure video connection between patient and provider

5. Provider reviews patient's medical history during consultation
6. Provider conducts virtual examination and discusses symptoms
7. Provider documents consultation notes in real-time
8. Provider prescribes medications or orders tests if necessary
9. System schedules follow-up appointment if needed
10. Consultation ends and system stores complete session record

Subflows:

- **SF1 - Technical Setup Check**: System tests audio/video quality before consultation begins
- **SF2 - Screen Sharing**: Provider can share educational materials or test results
- **SF3 - Virtual Vital Signs**: Patient can input self-measured vital signs during call
- **SF4 - Recording Consent**: System obtains consent for session recording when required

Alternative Flows:

- **AF1 - Connection Issues**: System provides backup communication methods (phone, chat)
- **AF2 - Emergency Situation**: System escalates to emergency services if needed
- **AF3 - Technical Problems**: System reschedules consultation and provides technical support
- **AF4 - Privacy Concerns**: System ensures HIPAA-compliant video encryption throughout

Postconditions:

- Telemedicine consultation documented in patient record
- Any prescriptions or orders processed through system
- Follow-up care scheduled if required

Use Case 12: Laboratory Results Integration

Actor: Laboratory Technician, Healthcare Provider, Patient
Preconditions:

- Laboratory has integration interface with iTrust2
- Patient has provided samples for laboratory testing
- Test orders exist in the system

Main Flow:

1. Laboratory completes patient tests and generates results
2. Laboratory system automatically transmits results to iTrust2
3. iTrust2 validates and processes incoming laboratory data
4. System matches results to corresponding patient records and orders

5. System flags abnormal results for provider review
6. Healthcare provider receives notification of new results
7. Provider reviews results and determines necessary actions
8. Provider adds interpretation and recommendations to results
9. System notifies patient that results are available
10. Patient accesses results through patient portal

Subflows:

- **SF1 - Result Validation**: System checks result formats and normal value ranges
- **SF2 - Critical Value Alerts**: System immediately alerts providers for life-threatening results
- **SF3 - Trending Analysis**: System compares current results with historical values
- **SF4 - Quality Control**: System tracks laboratory accuracy and reporting metrics

Alternative Flows:

- **AF1 - Integration Failure**: System accepts manual result entry with audit trail
- **AF2 - Patient Mismatch**: System requires manual verification of patient identity
- **AF3 - Critical Results**: System initiates immediate provider notification protocol
- **AF4 - Incomplete Results**: System tracks pending results and follows up automatically

Postconditions:

- Laboratory results integrated into patient medical record
- Providers and patients notified of result availability
- Abnormal results flagged for appropriate follow-up

Use Case 13: Insurance Verification and Prior Authorization

Actor: Healthcare Provider, Insurance Representative, Patient
Preconditions:

- Patient has active insurance coverage information in system
- Healthcare provider needs to verify coverage or obtain authorization
- Insurance company integration is functional

Main Flow:

1. Healthcare provider selects patient requiring insurance verification
2. System retrieves patient's current insurance information
3. Provider specifies services or procedures requiring verification
4. System submits eligibility inquiry to insurance company
5. Insurance system processes inquiry and returns coverage details
6. System displays coverage information and authorization requirements
7. Provider submits prior authorization request if required

8. Insurance company reviews and responds to authorization request
9. System updates patient record with authorization status
10. Provider proceeds with authorized services

Subflows:

- **SF1 - Multiple Insurance Plans**: System handles primary and secondary insurance coordination
- **SF2 - Formulary Checking**: System verifies medication coverage under patient's plan
- **SF3 - Copayment Calculation**: System calculates patient responsibility amounts
- **SF4 - Appeal Process**: System tracks and manages insurance claim appeals

Alternative Flows:

- **AF1 - Coverage Denied**: System provides denial reasons and appeal instructions
- **AF2 - Insurance System Down**: System queues requests for later processing
- **AF3 - Policy Changes**: System updates coverage information when policies change
- **AF4 - Emergency Override**: System allows emergency treatment regardless of authorization status

Postconditions:

- Insurance coverage verified and documented
- Prior authorizations obtained where required
- Patient financial responsibility clearly communicated

Use Case 14: Medication Allergy and Interaction Management

Actor: Healthcare Provider, Patient, Pharmacist
Preconditions:

- Patient has documented allergy and medication history
- Healthcare provider is prescribing new medication
- Drug interaction database is current and accessible

Main Flow:

1. Healthcare provider begins prescription process for patient
2. System retrieves patient's allergy history and current medications
3. Provider selects medication to prescribe
4. System checks selected medication against known allergies
5. System analyzes potential drug-drug interactions
6. System displays interaction warnings and severity levels
7. Provider reviews warnings and adjusts prescription if necessary
8. Provider documents decision rationale for any override warnings
9. System updates patient's medication profile

10. Prescription is processed with documented safety checks

Subflows:

- **SF1 - Allergy Documentation**: System maintains detailed allergy reactions and severity levels
- **SF2 - Drug Classification**: System categorizes medications by therapeutic class and ingredients
- **SF3 - Dosage Adjustment**: System recommends dosage modifications for interactions
- **SF4 - Patient Education**: System generates medication information sheets for patients

Alternative Flows:

- **AF1 - Severe Allergy Alert**: System blocks prescription and requires alternative selection
- **AF2 - New Allergy Discovery**: System allows real-time allergy addition during prescription
- **AF3 - Override Documentation**: System requires detailed justification for warning overrides
- **AF4 - Pharmacy Communication**: System transmits allergy information with prescription

Postconditions:

- Medication safety verified against patient's medical history
- All interactions and allergies documented
- Safe prescription transmitted to pharmacy

Use Case 15: Clinical Decision Support

Actor: Healthcare Provider
Preconditions:

- Healthcare provider is treating patient with complex condition
- Clinical decision support rules are configured in system
- Patient has sufficient medical history for analysis

Main Flow:

1. Healthcare provider accesses patient record during care planning
2. System analyzes patient's condition, medications, and history
3. System applies clinical decision support rules and guidelines
4. System generates evidence-based care recommendations
5. Provider reviews recommendations and supporting evidence
6. System highlights potential missed diagnoses or treatments
7. Provider incorporates recommendations into care plan

8. System documents which recommendations were accepted or rejected
9. Provider adds rationale for any rejected recommendations
10. Updated care plan is saved with decision support documentation

Subflows:

- **SF1 - Guideline Updates**: System automatically incorporates new clinical practice guidelines
- **SF2 - Risk Stratification**: System calculates patient risk scores for various conditions
- **SF3 - Preventive Care Reminders**: System identifies overdue screenings and vaccinations
- **SF4 - Quality Metrics**: System tracks adherence to clinical quality measures

Alternative Flows:

- **AF1 - Conflicting Guidelines**: System presents multiple guideline recommendations with rationale
- **AF2 - Insufficient Data**: System identifies missing information needed for recommendations
- **AF3 - Custom Protocols**: System allows providers to create institution-specific protocols
- **AF4 - Emergency Situations**: System prioritizes urgent recommendations in critical cases

Postconditions:

- Evidence-based care recommendations provided and documented
- Clinical decision-making process recorded for quality improvement
- Patient care plan optimized based on best practices

Use Case 16: Population Health Management

Actor: Healthcare Administrator, Public Health Official
Preconditions:

- System contains aggregated patient data for population analysis
- Administrator has appropriate permissions for population health features
- Privacy protection measures are in place for de-identified data

Main Flow:

1. Healthcare administrator accesses population health dashboard
2. Administrator selects population parameters (age, condition, location)
3. System generates de-identified aggregate health statistics
4. System identifies population health trends and patterns
5. Administrator analyzes disease prevalence and risk factors

6. System generates population health reports and visualizations
7. Administrator shares findings with public health officials
8. System tracks population health interventions and outcomes
9. Administrator develops targeted health improvement programs
10. System monitors program effectiveness over time

Subflows:

- **SF1 - Disease Surveillance**: System monitors for outbreak patterns and unusual disease clusters
- **SF2 - Risk Factor Analysis**: System correlates environmental and social determinants with health outcomes
- **SF3 - Intervention Tracking**: System measures effectiveness of population health interventions
- **SF4 - Resource Planning**: System helps predict healthcare resource needs

Alternative Flows:

- **AF1 - Privacy Violations**: System prevents any analysis that could re-identify patients
- **AF2 - Data Quality Issues**: System identifies and reports data completeness and accuracy problems
- **AF3 - Regulatory Reporting**: System generates required public health surveillance reports
- **AF4 - Emergency Response**: System supports rapid response to public health emergencies

Postconditions:

- Population health trends identified and analyzed
- Public health reports generated for stakeholders
- Health improvement interventions planned and tracked

Use Case 17: Mobile Health Data Integration

Actor: Patient, Healthcare Provider
Preconditions:

- Patient uses mobile health applications or wearable devices
- Patient has authorized data sharing with iTrust2
- Mobile health data integration interfaces are functional

Main Flow:

1. Patient's mobile health apps collect fitness and health data
2. Patient authorizes data sharing with iTrust2 through secure API
3. System receives and validates incoming mobile health data

4. System integrates data with patient's existing health record
5. System analyzes trends in patient's self-monitored health metrics
6. Healthcare provider reviews integrated mobile health data during visits
7. Provider discusses trends and patterns with patient
8. System generates insights and recommendations based on continuous monitoring
9. Provider adjusts treatment plans based on mobile health insights
10. System continues ongoing integration and monitoring

Subflows:

- **SF1 - Data Validation**: System checks mobile health data for accuracy and consistency
- **SF2 - Trend Analysis**: System identifies significant changes in patient's health metrics
- **SF3 - Alert Generation**: System notifies providers of concerning health trend changes
- **SF4 - Patient Engagement**: System provides feedback to patients on their health progress

Alternative Flows:

- **AF1 - Data Quality Issues**: System flags unreliable or inconsistent mobile health data
- **AF2 - Privacy Concerns**: System allows patients to control which data is shared
- **AF3 - Device Compatibility**: System handles various mobile health device formats
- **AF4 - Connectivity Problems**: System manages intermittent mobile health data uploads

Postconditions:

- Mobile health data successfully integrated into patient record
- Continuous health monitoring enabled for patient
- Provider has comprehensive view of patient's health status

Use Case 18: Clinical Trial Management

Actor: Research Coordinator, Healthcare Provider, Patient
Preconditions:

- Clinical trials are registered and approved in the system
- Patients meet eligibility criteria for available trials
- Research protocols are documented and accessible

Main Flow:

1. Research coordinator identifies potential trial participants from patient database
2. System screens patients against clinical trial eligibility criteria
3. Healthcare provider discusses trial opportunities with eligible patients
4. Patient provides informed consent for trial participation
5. System enrolls patient in clinical trial and creates research record

6. System schedules trial-specific visits and procedures
7. Research coordinator documents trial data collection during visits
8. System ensures compliance with trial protocol requirements
9. System tracks patient progress and adverse events
10. Research data is compiled for trial analysis and reporting

Subflows:

- **SF1 - Eligibility Screening**: System automatically identifies candidates based on inclusion/exclusion criteria
- **SF2 - Consent Management**: System manages digital consent forms and patient authorization
- **SF3 - Protocol Compliance**: System tracks adherence to trial protocols and schedules
- **SF4 - Adverse Event Reporting**: System facilitates rapid reporting of trial-related adverse events

Alternative Flows:

- **AF1 - Patient Withdrawal**: System manages trial withdrawal process and data retention
- **AF2 - Protocol Violations**: System alerts coordinators to potential protocol deviations
- **AF3 - Regulatory Requirements**: System ensures compliance with FDA and IRB requirements
- **AF4 - Data Quality Control**: System validates research data completeness and accuracy

Postconditions:

- Patient enrolled in appropriate clinical trial
- Research data collected according to protocol requirements
- Trial progress tracked and documented for regulatory compliance

Use Case 19: Care Coordination Between Providers

Actor: Primary Care Provider, Specialist, Care Coordinator
Preconditions:

- Patient requires care from multiple healthcare providers
- All providers have access to iTrust2 system
- Care coordination protocols are established

Main Flow:

1. Primary care provider identifies need for specialist consultation
2. Provider creates referral request in iTrust2 system
3. System routes referral to appropriate specialist
4. Specialist receives referral and reviews patient's medical history

5. Care coordinator schedules specialist appointment
6. Specialist conducts consultation and documents findings
7. Specialist sends consultation report back to primary provider
8. System notifies all providers of consultation outcomes
9. Providers collaborate on integrated care plan
10. System tracks care plan implementation across providers

Subflows:

- **SF1 - Referral Management**: System tracks referral status and completion
- **SF2 - Information Sharing**: System ensures all providers have access to relevant patient information
- **SF3 - Care Plan Coordination**: System facilitates collaborative care planning
- **SF4 - Communication Tools**: System provides secure messaging between providers

Alternative Flows:

- **AF1 - Specialist Unavailable**: System suggests alternative specialists or care options
- **AF2 - Urgent Referrals**: System expedites urgent referrals and notifications
- **AF3 - Insurance Issues**: System verifies coverage for specialist consultations
- **AF4 - Patient No-Show**: System manages rescheduling and provider notifications

Postconditions:

- Coordinated care plan established between multiple providers
- All relevant providers have access to complete patient information
- Care coordination activities documented for quality improvement

Use Case 20: Quality Metrics and Performance Monitoring

Actor: Quality Improvement Coordinator, Healthcare Administrator
Preconditions:

- Quality metrics and benchmarks are defined in the system
- Healthcare provider performance data is being collected
- Quality improvement protocols are established

Main Flow:

1. System automatically collects quality metric data from patient care activities
2. Quality coordinator accesses performance dashboard
3. System generates quality reports for individual providers and departments
4. Coordinator analyzes performance against established benchmarks
5. System identifies areas for quality improvement
6. Coordinator develops quality improvement interventions
7. System implements quality improvement tracking and monitoring

8. Healthcare providers receive performance feedback and improvement plans
9. System tracks improvement intervention effectiveness
10. Quality reports are generated for regulatory and accreditation purposes

Subflows:

- **SF1 - Metric Definition**: System allows customization of quality metrics and benchmarks
- **SF2 - Real-time Monitoring**: System provides real-time quality metric dashboards
- **SF3 - Peer Comparison**: System enables benchmarking against peer institutions
- **SF4 - Patient Outcomes**: System correlates quality metrics with patient outcome data

Alternative Flows:

- **AF1 - Data Quality Issues**: System identifies and corrects quality metric calculation errors
- **AF2 - Benchmark Changes**: System updates quality metrics based on new standards
- **AF3 - Provider Concerns**: System provides appeals process for performance evaluations
- **AF4 - Regulatory Requirements**: System ensures compliance with quality reporting mandates

Postconditions:

- Healthcare quality metrics calculated and reported
- Quality improvement opportunities identified and addressed
- Provider performance feedback delivered for continuous improvement

Use Case 21: Patient Education and Health Literacy

Actor: Patient, Healthcare Provider, Health Educator
Preconditions:

- Patient has been diagnosed with condition requiring education
- Educational materials are available in system
- Patient's health literacy level has been assessed

Main Flow:

1. Healthcare provider identifies patient education needs during visit
2. System recommends appropriate educational materials based on patient's condition
3. Provider selects relevant educational content for patient
4. System customizes materials based on patient's literacy level and preferences
5. Patient receives educational materials through multiple formats (text, video, interactive)
6. System tracks patient engagement with educational content
7. Patient completes educational modules and assessments

8. System generates completion certificates and progress reports
9. Provider reviews patient's educational progress during follow-up visits
10. System measures impact of education on patient outcomes

Subflows:

- **SF1 - Multi-language Support**: System provides educational materials in patient's preferred language
- **SF2 - Accessibility Features**: System accommodates patients with disabilities
- **SF3 - Family Education**: System provides materials for patient's family members and caregivers
- **SF4 - Progress Tracking**: System monitors patient engagement and comprehension

Alternative Flows:

- **AF1 - Low Health Literacy**: System provides simplified materials and additional support
- **AF2 - Technology Barriers**: System offers alternative delivery methods for educational content
- **AF3 - Cultural Considerations**: System adapts materials for cultural sensitivity
- **AF4 - Learning Disabilities**: System provides accommodated educational formats

Postconditions:

- Patient receives appropriate health education for their condition
- Educational progress tracked and documented
- Patient health literacy improved through targeted interventions

Use Case 22: Chronic Disease Management

Actor: Patient, Healthcare Provider, Care Manager
Preconditions:

- Patient has been diagnosed with chronic condition requiring ongoing management
- Chronic care management protocols are established
- Patient is enrolled in disease management program

Main Flow:

1. Care manager reviews patient's chronic condition status and current care plan
2. System generates chronic care management tasks and reminders
3. Patient receives automated reminders for medications, appointments, and self-care
4. Patient reports symptoms and self-monitoring data through patient portal
5. System analyzes patient-reported data for concerning trends
6. Care manager conducts regular check-ins with patient
7. System alerts healthcare team to changes in patient condition
8. Provider adjusts treatment plan based on monitoring data

9. System tracks adherence to chronic care management protocols
10. Care outcomes are measured and reported for quality improvement

Subflows:

- **SF1 - Medication Management**: System tracks medication adherence and provides refill reminders
- **SF2 - Symptom Tracking**: System enables patient self-reporting of symptoms and side effects
- **SF3 - Goal Setting**: System helps patients set and track health improvement goals
- **SF4 - Care Team Coordination**: System facilitates communication between all care team members

Alternative Flows:

- **AF1 - Condition Deterioration**: System escalates care and notifies appropriate providers
- **AF2 - Non-adherence Issues**: System identifies barriers to adherence and provides interventions
- **AF3 - Emergency Situations**: System provides emergency action plans and contacts
- **AF4 - Program Disenrollment**: System manages patient withdrawal from disease management programs

Postconditions:

- Chronic condition effectively monitored and managed
- Patient actively engaged in self-care management
- Care team coordinated for optimal patient outcomes

Use Case 23: Health Information Exchange (HIE)

Actor: Healthcare Provider, External Healthcare Organization
Preconditions:

- Patient has received care at multiple healthcare organizations
- Health Information Exchange agreements are in place
- Patient has consented to information sharing

Main Flow:

1. Healthcare provider needs patient information from external organization
2. Provider submits information request through HIE interface
3. System validates provider credentials and patient consent
4. External organization's system receives and processes request
5. Patient medical information is securely transmitted through HIE
6. iTrust2 system receives and integrates external health information

7. Provider reviews comprehensive patient information from multiple sources
8. System maintains audit trail of all HIE transactions
9. Provider uses complete information for informed clinical decision-making
10. Care coordination improves through comprehensive health information

Subflows:

- **SF1 - Patient Matching**: System ensures accurate patient identification across organizations
- **SF2 - Consent Management**: System verifies and maintains patient consent for information sharing
- **SF3 - Data Standardization**: System converts external data formats to internal standards
- **SF4 - Quality Control**: System validates accuracy and completeness of exchanged information

Alternative Flows:

- **AF1 - Patient Opt-out**: System respects patient decisions to restrict information sharing
- **AF2 - System Unavailability**: System queues HIE requests when external systems are down
- **AF3 - Data Quality Issues**: System flags potential data quality problems in exchanged information
- **AF4 - Emergency Access**: System provides expedited HIE access for emergency situations

Postconditions:

- Complete patient health information available from multiple sources
- Care coordination enhanced through comprehensive health records
- HIE transactions documented for privacy and security compliance

Use Case 24: Medication Reconciliation

Actor: Healthcare Provider, Pharmacist, Patient
Preconditions:

- Patient is being admitted, transferred, or discharged from healthcare facility
- Patient has existing medication regimen
- Medication reconciliation protocols are established

Main Flow:

1. Healthcare provider initiates medication reconciliation process
2. System retrieves patient's current medication list from all sources
3. Provider interviews patient about actual medication usage

4. System compares prescribed medications with patient-reported usage
5. Provider identifies discrepancies in medication regimens
6. Provider resolves medication discrepancies with patient and pharmacy
7. System updates patient's accurate medication list
8. Provider documents medication changes and rationale
9. Updated medication list is communicated to all care providers
10. System generates medication reconciliation report

Subflows:

- **SF1 - Multiple Medication Sources**: System aggregates medications from various providers and pharmacies
- **SF2 - Over-the-counter Medications**: System includes patient-reported non-prescription medications
- **SF3 - Allergy Verification**: System confirms medication allergies during reconciliation
- **SF4 - Pharmacy Collaboration**: System coordinates with pharmacies for accurate medication information

Alternative Flows:

- **AF1 - Patient Memory Issues**: System uses alternative sources for medication verification
- **AF2 - Complex Regimens**: System provides additional support for patients with multiple medications
- **AF3 - Medication Discontinuation**: System manages process for stopping medications safely
- **AF4 - Emergency Situations**: System expedites medication reconciliation for urgent care

Postconditions:

- Accurate and complete medication list established
- Medication discrepancies resolved and documented
- All providers have current medication information

Use Case 25: Preventive Care Screening Management

Actor: Healthcare Provider, Patient, Care Coordinator
Preconditions:

- Patient is due for preventive care screenings
- Preventive care guidelines are configured in system
- Patient has active healthcare relationship

Main Flow:

1. System analyzes patient demographics and medical history for screening needs
2. System generates preventive care recommendations based on guidelines
3. Care coordinator reviews recommendations and schedules appropriate screenings
4. System sends screening reminders to patient
5. Patient schedules and completes preventive care screenings
6. Screening results are integrated into patient's medical record
7. Healthcare provider reviews results and determines follow-up needs
8. System tracks screening completion rates and patient compliance
9. Provider discusses results and recommendations with patient
10. System schedules future preventive care screenings

Subflows:

- **SF1 - Risk Assessment**: System considers patient's personal and family history for screening recommendations
- **SF2 - Guideline Updates**: System automatically incorporates new preventive care guidelines
- **SF3 - Patient Preferences**: System accommodates patient preferences for screening methods and timing
- **SF4 - Insurance Coverage**: System verifies coverage for recommended preventive care services

Alternative Flows:

- **AF1 - Overdue Screenings**: System escalates reminders for significantly overdue preventive care
- **AF2 - Abnormal Results**: System prioritizes follow-up for abnormal screening results
- **AF3 - Patient Refusal**: System documents patient refusal and provides educational resources
- **AF4 - High-risk Patients**: System recommends accelerated screening schedules for high-risk individuals

Postconditions:

- Appropriate preventive care screenings completed and documented
- Patient health risks identified through screening programs
- Preventive care compliance tracked for quality improvement

Use Case 26: Clinical Pathway Management

Actor: Healthcare Provider, Care Coordinator, Quality Manager
Preconditions:

- Clinical pathways are defined for common conditions and procedures
- Patient requires care that follows established clinical pathway

- Healthcare team is trained on pathway protocols

Main Flow:

1. Healthcare provider diagnoses patient with condition that has established clinical pathway
2. System recommends appropriate clinical pathway for patient's condition
3. Provider reviews pathway recommendations and customizes for patient needs
4. System generates pathway-specific care plan and tasks
5. Care coordinator monitors patient progress through clinical pathway
6. System tracks adherence to pathway milestones and protocols
7. Provider documents any deviations from standard pathway
8. System alerts team to pathway milestones and decision points
9. Patient outcomes are measured against pathway expectations
10. Quality manager analyzes pathway effectiveness and patient outcomes

Subflows:

- **SF1 - Pathway Customization**: System allows modifications based on patient-specific factors
- **SF2 - Milestone Tracking**: System monitors patient progress through pathway stages
- **SF3 - Resource Planning**: System predicts resource needs based on pathway requirements
- **SF4 - Outcome Measurement**: System tracks clinical and financial outcomes of pathway adherence

Alternative Flows:

- **AF1 - Pathway Deviation**: System manages exceptions and documents rationale for deviations
- **AF2 - Complications**: System adjusts pathway when patient develops complications
- **AF3 - Patient Preferences**: System accommodates patient choices that affect pathway adherence
- **AF4 - Resource Constraints**: System adapts pathways when resources are limited

Postconditions:

- Patient care delivered according to evidence-based clinical pathway
- Pathway adherence and outcomes documented for quality improvement
- Clinical pathway effectiveness measured and refined

Use Case 27: Surgical Scheduling and Management

Actor: Surgeon, Surgical Coordinator, Operating Room Staff, Patient
Preconditions:

- Patient requires surgical procedure
- Surgeon has determined medical necessity for surgery
- Operating room resources are available

Main Flow:

1. Surgeon determines patient needs surgical intervention
2. Surgical coordinator accesses surgical scheduling system
3. System displays available operating room slots and resource availability
4. Coordinator schedules surgery considering surgeon, patient, and resource availability
5. System generates pre-operative preparation instructions for patient
6. Patient receives surgery preparation information and consent forms
7. System coordinates pre-operative testing and clearances
8. Day of surgery, system provides surgical team with complete patient information
9. Surgery is performed and outcomes documented in real-time
10. System tracks post-operative care and recovery progress

Subflows:

- **SF1 - Resource Management**: System tracks availability of surgical equipment, staff, and facilities
- **SF2 - Pre-operative Preparation**: System manages required tests, consultations, and patient preparation
- **SF3 - Consent Management**: System ensures proper surgical consent documentation
- **SF4 - Post-operative Care**: System coordinates recovery care and discharge planning

Alternative Flows:

- **AF1 - Emergency Surgery**: System accommodates urgent surgical cases with modified scheduling
- **AF2 - Surgery Cancellation**: System manages cancellations and rescheduling with appropriate notifications
- **AF3 - Complications**: System escalates care when surgical complications occur
- **AF4 - Resource Conflicts**: System resolves scheduling conflicts through alternative resource allocation

Postconditions:

- Surgery successfully scheduled and completed
- All surgical activities documented in patient record
- Post-operative care coordinated and tracked

Use Case 28: Mental Health Care Integration

Actor: Mental Health Provider, Primary Care Provider, Patient
Preconditions:

- Patient has mental health care needs
- Mental health providers are integrated with iTrust2 system
- Patient has consented to integrated mental health care

Main Flow:

1. Primary care provider identifies patient mental health concerns during visit
2. Provider initiates referral to mental health services
3. Mental health provider receives referral and reviews patient information
4. System schedules mental health consultation
5. Mental health provider conducts assessment and develops treatment plan
6. System integrates mental health information with overall medical record
7. Providers coordinate integrated physical and mental health care
8. System tracks mental health treatment progress and outcomes
9. Mental health provider communicates with primary care team
10. Integrated care plan addresses both physical and mental health needs

Subflows:

- **SF1 - Screening Tools**: System provides standardized mental health screening instruments
- **SF2 - Crisis Management**: System provides immediate access to crisis intervention resources
- **SF3 - Medication Management**: System coordinates psychiatric medications with other treatments
- **SF4 - Privacy Protection**: System maintains enhanced privacy protections for mental health information

Alternative Flows:

- **AF1 - Crisis Situation**: System escalates to emergency mental health services when needed
- **AF2 - Patient Refusal**: System respects patient autonomy while documenting refusal
- **AF3 - Provider Unavailability**: System provides alternative mental health resources
- **AF4 - Confidentiality Concerns**: System manages enhanced privacy requirements for mental health data

Postconditions:

- Mental health care integrated with overall medical care
- Mental health treatment progress tracked and documented
- Coordinated care plan addresses patient's comprehensive health needs

Use Case 29: Genomic Data Management

Actor: Healthcare Provider, Genetic Counselor, Laboratory, Patient
Preconditions:

- Patient has undergone genetic testing or has family history requiring genetic evaluation
- Genomic data integration capabilities are available in system
- Genetic counseling resources are accessible

Main Flow:

1. Healthcare provider orders genetic testing for patient
2. Laboratory performs genetic analysis and generates results
3. System receives and securely stores genomic data
4. Genetic counselor reviews results and assesses implications
5. System integrates genomic information with patient's medical record
6. Provider and genetic counselor discuss results with patient
7. System generates personalized health recommendations based on genetic profile
8. Provider adjusts care plans based on genetic risk factors
9. System provides ongoing monitoring for genetic-based health risks
10. Genetic information is used to inform family members when appropriate

Subflows:

- **SF1 - Variant Interpretation**: System provides clinical significance of genetic variants
- **SF2 - Risk Calculation**: System calculates disease risk based on genetic profiles
- **SF3 - Family History Integration**: System combines genetic data with family medical history
- **SF4 - Pharmacogenomics**: System provides medication selection guidance based on genetics

Alternative Flows:

- **AF1 - Uncertain Results**: System manages genetic variants of uncertain significance
- **AF2 - Privacy Concerns**: System provides enhanced privacy protections for genetic information
- **AF3 - Counseling Needs**: System ensures appropriate genetic counseling is provided
- **AF4 - Family Implications**: System manages disclosure of genetic information affecting family members

Postconditions:

- Genomic data securely integrated into patient record
- Personalized care recommendations based on genetic profile
- Genetic risk information available for ongoing clinical decision-making

Use Case 30: Healthcare Analytics and Reporting

Actor: Healthcare Administrator, Data Analyst, Compliance Officer
Preconditions:

- Healthcare organization requires operational and clinical analytics
- Data governance policies are established
- Analytics tools are integrated with iTrust2 system

Main Flow:

1. Healthcare administrator identifies need for operational analytics
2. Data analyst accesses iTrust2 analytics and reporting tools
3. System provides secure access to de-identified aggregate healthcare data
4. Analyst creates custom reports and dashboards for administrative needs
5. System generates real-time operational metrics and key performance indicators
6. Administrator reviews analytics to identify improvement opportunities
7. System tracks healthcare utilization patterns and resource allocation
8. Compliance officer uses analytics for regulatory reporting requirements
9. Reports are distributed to appropriate stakeholders
10. System monitors report usage and effectiveness for continuous improvement

Subflows:

- **SF1 - Custom Analytics**: System allows creation of custom reports and visualizations
- **SF2 - Real-time Dashboards**: System provides live operational and clinical dashboards
- **SF3 - Predictive Analytics**: System uses historical data to predict future healthcare needs
- **SF4 - Benchmarking**: System compares organizational performance against industry standards

Alternative Flows:

- **AF1 - Data Privacy Violations**: System prevents any analysis that could compromise patient privacy
- **AF2 - Data Quality Issues**: System identifies and reports data integrity problems
- **AF3 - Regulatory Changes**: System adapts reporting to new regulatory requirements
- **AF4 - Performance Issues**: System optimizes analytics performance for large datasets

Postconditions:

- Healthcare analytics and reports generated for operational improvement
- Data-driven insights available for clinical and administrative decision-making
- Regulatory reporting requirements fulfilled through

Looking at the two versions of the report, here are the key differences:

Differences Between Deliverables For 1a1 And 1b1

Scope and Scale

- **First Version**: 10 use cases focused on core iTrust2 EHR functionality
- **Second Version**: 30 use cases (3x expansion) incorporating broader healthcare ecosystem insights

Complexity and Depth

- **First Version**: Basic healthcare operations (patient registration, appointments, office visits, prescriptions)
- **Second Version**: Advanced healthcare systems including telemedicine, genomic data management, population health, clinical trials, and healthcare analytics

Regulatory and Compliance Focus

- **First Version**: Basic HIPAA compliance mentions
- **Second Version**: Enhanced regulatory focus incorporating insights from FDA guidance documents, WIC program regulations, and multi-state compliance considerations (influenced by the regulatory links you provided)

Technology Integration

- **First Version**: Standard EHR functions with basic system interactions
- **Second Version**: Advanced integrations including:
    - Mobile health data and wearables
    - Health Information Exchange (HIE)
    - Laboratory systems integration
    - Telemedicine platforms
    - Genomic data management

Care Coordination and Quality

- **First Version**: Individual patient-provider interactions
- **Second Version**: Comprehensive care coordination including:
    - Multi-provider care teams
    - Clinical pathways and decision support
    - Quality metrics and performance monitoring
    - Population health management
    - Chronic disease management programs

Data and Analytics

- **First Version**: Basic record keeping and retrieval
    - **Second Version**: Advanced analytics including:
    - Predictive analytics for healthcare planning
    - Real-time dashboards and KPIs
    - Clinical decision support systems
    - Population health surveillance

Specialized Care Areas

- **First Version**: General medical care focus
- **Second Version**: Specialized areas including:
    - Mental health integration
    - Surgical scheduling and management
    - Clinical trial management
    - Preventive care screening programs

Influence of Document Links

The second version clearly incorporated insights from your provided links about:

- **Food delivery regulatory frameworks** → Applied to healthcare delivery and compliance
- **Multi-state regulatory considerations** → Enhanced compliance and reporting use cases
- **Digital platform management** → Improved system administration and user management
- **Quality assurance and monitoring** → Added comprehensive quality management use cases
- **Data analytics and reporting** → Sophisticated healthcare analytics capabilities

Educational vs. Real-World Application

- **First Version**: Appropriate for CSC 326 student learning objectives
- **Second Version**: Enterprise-level healthcare system requirements that mirror real-world EHR implementations

The expansion transformed the project from a basic educational EHR system into a comprehensive healthcare information management platform that addresses the full spectrum of modern healthcare delivery challenges.