Reflection and Traceability Report on MES-ERP

Team #26, Ethical Pals
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[Reflection is an important component of getting the full benefits from a learning experience. Besides the intrinsic benefits of reflection, this document will be used to help the TAs grade how well your team responded to feedback. Therefore, traceability between Revision 0 and Revision 1 is and important part of the reflection exercise. In addition, several CEAB (Canadian Engineering Accreditation Board) Learning Outcomes (LOs) will be assessed based on your reflections. —TPLT]

1 Changes in Response to Feedback

1.1 Changes in Response to Usability Testing

1.2 SRS and Hazard Analysis

1.2.1 Changes Made to the SRS

1.2.2 Changes Made to the Hazard Analysis

The document has been thoroughly revised to address feedback from a rubric. Here are the key changes:

1.2.3 Document Structure Improvements

- Added Table of Contents, List of Tables, and List of Figures
- Improved document organization with appropriate page breaks
- Updated revision history table with current changes
- Added proper labels to Safety/Security Requirements (SSR-1, SSR-2, SSR-3)

1.2.4 Content Enhancements

1. **Introduction & Scope**:
   - Refined hazard definitions specifically for MES-ERP financial operations
   - Expanded scope to clearly include all system components (frontend, backend, database, auth)
   - Added clearer document roadmap
2. **System Boundaries & Components**:
   - Added technology specifics (Supabase/PostgreSQL, Next.js/React)
   - Enhanced hazard descriptions with concrete examples
   - Added new hazards (race conditions, XSS vulnerabilities, session hijacking)
3. **Critical Assumptions**:
   - Clarified existing assumptions
   - Added a fifth assumption about security of underlying infrastructure
4. **FMEA Implementation**:
   - Created a complete FMEA table with severity, occurrence, and detection ratings
   - Calculated Risk Priority Numbers (RPN)
   - Added specific mitigation strategies for each failure mode
   - Cross-referenced Safety/Security Requirements
5. **Safety Requirements**:
   - Added formal labels and improved descriptions
   - Enhanced rationales for implementation
6. **Roadmap**:
   - Improved immediate implementation items with technical specifics
   - Added cross-references to SSRs
   - Added new future implementation item (Security Penetration Testing)

The revisions make the document more precise, technically detailed, and better aligned with software engineering best practices for hazard analysis.

All changes were made to address the rubric feedback, with special attention to improving the technical specificity of hazard descriptions, creating a

proper FMEA analysis, and ensuring consistent cross-referencing between identified hazards and safety requirements. The revisions significantly enhanced the document's precision and alignment with software engineering best practices for hazard analysis of financial systems.

1.3 Design and Design Documentation

1.4 VnV Plan and Report

2 Challenge Level and Extras

2.1 Challenge Level: General

The general challenge level comes from the integration of several complex components: a multi-group RBAC system, database interactions for real-time budget/request tracking, form handling with file uploads and OCR, automated notifications, and data visualization, all within a modern web framework. Ensuring data consistency, security, and a usable interface across different user roles presents a significant challenge. This must be done while maintaining stability and performance.

2.2 Extras

1. **Usability Testing** Conducted formal usability testing with 8 stakeholders (4 student leaders, 2 MES administrators, and 2 regular club members) to evaluate platform usability. Testing was performed remotely via screen sharing using a think-aloud protocol, with participants completing four core tasks: submitting a reimbursement request, tracking request status, approving requests (administrators only), and updating account information. Both quantitative metrics (task completion rates, time, ease-of-use ratings) and qualitative feedback were collected. The testing achieved an overall 96.9% task completion rate with an average satisfaction score of 4.3/5. Key improvements implemented based on testing results included enhanced OCR feedback, improved payment method interface clarity, and identification of future enhancements for form layout optimization.

2. **User Documentation** Created comprehensive user documentation in the form of written guides and video tutorials that guide end-users through key tasks like submitting requests, managing budgets (for admins), and navigating the platform. This documentation serves different user roles within the system and provides step-by-step instructions for all critical workflows.

3. **User Guide Page** Implemented a dedicated help section directly within the application to provide contextual assistance and guidance for users as they navigate through different features of the platform. This integrated

support system helps users understand complex processes and reduces the learning curve for new users.

4. **Demo/Instructional Video** Developed a comprehensive video demonstration of the system's functionality that serves both as a promotional tool and an instructional guide for new users to understand the workflow and features of the MES-ERP platform. The video covers all major user journeys and highlights the efficiency gains compared to the previous manual process.

3 Design Iteration (LO11 (PrototypeIterate))

[Explain how you arrived at your final design and implementation. How did the design evolve from the first version to the final version? —TPLT]

[Don't just say what you changed, say why you changed it. The needs of the client should be part of the explanation. For example, if you made changes in response to usability testing, explain what the testing found and what changes it led to. —TPLT]

4 Design Decisions (LO12)

[Reflect and justify your design decisions. How did limitations, assumptions, and constraints influence your decisions? Discuss each of these separately. —TPLT]

5 Economic Considerations (LO23)

[Is there a market for your product? What would be involved in marketing your product? What is your estimate of the cost to produce a version that you could sell? What would you charge for your product? How many units would you have to sell to make money? If your product isn't something that would be sold, like an open source project, how would you go about attracting users? How many potential users currently exist? —TPLT]

6 Reflection on Project Management (LO24)

[This question focuses on processes and tools used for project management. —TPLT]

6.1 How Does Your Project Management Compare to Your Development Plan

[Did you follow your Development plan, with respect to the team meeting plan, team communication plan, team member roles and workflow plan. Did you use the technology you planned on using? —TPLT]

6.2 What Went Well?

[What went well for your project management in terms of processes and technology? —TPLT]

6.3 What Went Wrong?

[What went wrong in terms of processes and technology? —TPLT]

6.4 What Would you Do Differently Next Time?

[What will you do differently for your next project? —TPLT]

7 Reflection on Capstone

[This question focuses on what you learned during the course of the capstone project. —TPLT]

7.1 Which Courses Were Relevant

[Which of the courses you have taken were relevant for the capstone project? —TPLT]

7.2 Knowledge/Skills Outside of Courses

[What skills/knowledge did you need to acquire for your capstone project that was outside of the courses you took? —TPLT]