**PROJECT PLAN**

**Project Number** 35  
Platinum AR/XR Project  
**Prepared By:** Team 35  
**Team Members:** John Sullins, Alex Allen, Mitchell Allen, Brayden Brown, Bryce Marrello  
**Date:** 9/26/2025  
SER 401 Project Plan

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**PROJECT DESCRIPTION**

**Overview (ABET-2)**

This project is part of the SER 401 course at Arizona State University.

Our team is developing an Augmented Reality (AR) / Extended Reality (XR) application as part of the Mission To Psyche Platinum project. The final deliverable will include a functioning prototype, supporting documentation, and any artifacts required to ensure the solution is maintainable. The system will be developed using modern software engineering practices.

**Key Requirements (SER-2)**

At a high level, all SER 401 projects must:

* Be functional and demonstrate core client-requested features.
* Provide secure handling of data.
* Include proper documentation and testing.
* Be maintainable and scalable.
* Runnable on both IOS and android devices   
  Detailed functional/technical requirements will be written once the topic is finalized.

**DELIVERABLES (SER-1)**

Expected deliverables for any SER 401 project:

* Project plan document (this report).
* Requirements specification document.
* Design and architecture documentation (UML diagrams, etc.).
* Functional software prototype.
* Test plan and results.
* Final report and presentation.  
   Dependencies and order of deliverables will depend on the chosen project.

**ACRONYMS AND ABBREVIATIONS (ABET-3)**

|  |  |
| --- | --- |
| **Acronym** | **Definition** |
| SER | Software Engineering |
| ASU | Arizona State University |
| UML | Unified Modeling Language |
| TBD | To Be Determined |
| AR | Augmented Reality |
| JS | JavaScript |
| HTML | HyperText Markup Language |
| CSS | Cascading Style Sheets |
| OFL | Open font license |

**Global Trends (EM@FSE-E)**

This project fits squarely within a global trend towards the digitization of education. Over the past decade or so the number of digital educational tools and applications has increased markedly. This is best indicated via the expected CAGR (Compounding Annual Growth Rate) of the EdTech (Education Technology) market. According to [Business Research Insights](https://www.businessresearchinsights.com/market-reports/education-technology-edtech-market-117665) the edtech market has an expected CAGR of 20.83% from 2025 to 2034 increasing the Market size from 193.7 billion dollars to 1.284 trillion.

**Market Analysis (EM@FSE-K)**

This is a government project, so there is no market analysis needed. The product will be on display for anyone to access at exhibits.

**Security Considerations (SER-2)**

General considerations will include:

* Protecting sensitive user information, no account creation or personal info will be needed from users.
* Preventing unauthorized access to the application.
* Mitigating data loss, corruption, or downtime.  
   More specific considerations will be added once the project scope is defined.

**ACRONYMS AND ABBREVIATIONS (ABET-3)**

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| UML | Unified Modeling Language |
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**Design and Architecture**

**Design Description (ABET-1, ABET-2)**

Our project will be built around a physical model of the asteroid Psyche and will help facilitate interaction and interest in the mission. The model itself will feature a series of QR codes placed around key areas of the asteroid that will link the user to our developed games and interactive, digital elements.

Once scanned, the QR codes will send users to the site, hosted on github pages, through their native browser. The content will be stored on the web platform with GitHub pages which will allow for easy management and updates to each QR code endpoint without requirement changes to the physical model.

The hosted site will serve as a hub for handling interactions with the users native browser. Each QR link will lead to a unique page within the module.This design allows us to remain flexible with implementation with multiple QR codes and lead to a more varied and engaging experience for the user.

**Alternate Design Possibilities (EM@FSE-B)**

Some alternative design possibilities would be to use embedded NFC tags instead of QR codes. Instead of scanning a code, users could tap their phone to the location and be directed to different sites. This would potentially offer a more streamlined process but require more hardware and setup.

Another alternative could be to use a single mobile app for user interaction instead of a web based option. While this may give more control over the end user experience and allow for more complexity in design it would introduce additional barriers to use to the user and harm our efforts at seamless integration.

**Implementation Strategy**

**High-Level Work Breakdown (SER-1)**

1. Project plan document

1.1 Define scope and objectives

* Work Scope: Outline project goals, stakeholders and deliverables
* Skillset Required: Project management,k technical writing
* Estimated Time: 10h

1.2 Develop Timeline

* Work Scope: Create schedule with milestones and dependencies
* Skillset Required: Project management, scheduling tools
* Estimated Time: 8h

1.3 Draft and Review

* Work Scope: Write and revise plan with team input
* Skillset Required: Technical writing, collaboration.
* Estimated Time: 12h

1. Requirements specification document.

2.1 Gather Requirements

* Work Scope: Consult stakeholders for educational and technical needs
* Skillset Required: Stakeholder communication, requirements analysis
* Estimated Time: 1h

2.2 Define Requirements

* Work Scope: Specify functional and non-functional requirements
* Skillset Required: Systems analysis
* Estimated Time: 6h

2.3 Document and validate

* Work Scope: Compile and validate requirements with stakeholder
* Skillset Required: Technical writing, stakeholder engagement
* Estimated Time: 6h

1. Design and Architecture Documentation

3.1 Develop Software Architecture

* Work Scope: Design web page architecture and QR code integration
* Skillset Required: Software architecture, web development
* Estimated Time: 12h

3.2 Create and Review Documentation

* Work Scope: Produce UML diagrams and compile design documentation
* Skillset Required:UML modeling, technical writing
* Estimated Time: 12h

1. Functional software prototype.

4.1 Develop Github pages applications

* Work Scope: Build static web pages for the project on Github pages
* Skillset Required:Web development
* Estimated Time: 40h

4.2 Integrate and Test

* Work Scope: Deploy web pages and link QR codes and test functionality
* Skillset Required: System integration, testing
* Estimated Time: 20h

1. Test plan and results.

5.1 Develop Test Plan

* Work Scope: Define test cases for QR scanning and web pages
* Skillset Required: Quality assurance
* Estimated Time: 8h

5.2 Conduct Testing

* Work Scope: Test QR code and web page functionality
* Skillset Required: Testing
* Estimated Time: 15h

1. Final report and presentation.

6.1 Draft Report

* Work Scope: Summarize project outcomes and challenges
* Skillset Required: Technical writing
* Estimated Time: 12h

**Schedule/Timeline**

* **Milestone 1: Project Planning & Requirements (Oct 20, 2025)**
  + Deliverables: Project Plan Document, Requirements Specification Document.
  + Activities: Define scope, gather requirements, outline system functionality, and establish constraints.
* **Milestone 2: Design & Architecture (Nov 24, 2025)**
  + Deliverables: Design and Architecture Documentation (including UML diagrams).
  + Activities: Develop component-level design, QR-to-content mapping, and hosting strategy.
* **Milestone 3: Functional Prototype (Mar 2, 2026)**
  + Deliverables: Functional Software Prototype.
  + Activities: Build initial website module, generate/test QR codes, validate basic scanning workflow.
* **Milestone 4: Testing & Refinement (Apr 6, 2026)**
  + Deliverables: Test Plan and Results.
  + Activities: Conduct system tests, record outcomes, refine digital modules.
* **Milestone 5: Final Integration & Presentation (May 5, 2026)**
  + Deliverables: Final Report and Presentation.
  + Activities: Assemble full system

**Schedule/Timeline**

* Week 1–3: Requirements gathering
* Week 4–6: Design and architecture
* Week 7–12: Prototype implementation
* Week 13–15: Testing and presentation prep

**Required Hardware**

The hardware requirements for this project are minimal, as the work primarily involves developing and testing a web-based system. The main hardware needed will be mobile devices such as smartphones and tablets, which will be used to scan QR codes and validate that the hosted content displays and functions properly across different platforms and browsers. These devices will be provided by team members and do not require additional procurement.

**Third Party Content**

In this project we will incorporate some third-party content to help provide accurate and engaging educational material This will largely include the NASA Psyche mission resources, namely: images, diagrams, facts and other publicly accessible resources. These resources will allow us to ensure that all information and visuals presented in the interactive module are scientifically accurate and aligned with the mission’s goals.

In addition, the project may use open-source fonts and icon libraries to improve the clarity and accessibility of the user interface. These assets will be distributed under the open font license (OFL), which will allow their free use and redistribution. All third party content used will be documented and credited appropriately.

**Quality**

This project will have a quality focus on usability, reliability and maintainability with the largest emphasis on usability. Our primary objective is to ensure that users have a seamless experience with our product with little to no barriers to entry and as little friction as possible. To ensure this we will be using a web based structure and we will ensure that it runs on all the major web browsing applications ensuring that any user with a smartphone is able to seamlessly use our service. This metric will be measured by a 100% success scan-to-content rate during testing.

With reliability, we will verify that each QR code has an accurate link to our web pages and has no rendering errors. We will measure the number of broken links and have a zero broken link tolerance. We will also use continuous integration and ensure that all links work prior to any change to the web pages.

Our last major quality measure is maintainability. For this we will ensure that all code is written in a clean and modular style using standard conventions for each language. Code will also contain clear comments and follow consistent formatting to enhance readability and allow for future extension if needed.

**References/Sources for Information**

For this project we will need to gather information on many different topics, these include, the Psyche mission, QR code integration, GitHub pages/web hosting. Information on the Psyche mission is needed to understand the objectives, details and characteristics of the mission and to properly develop our product with those details in mind. QR codes will be used to link our users to our web pages and knowledge on how to develop and integrate them will be key to developing a reliable system. Lastly, understanding of Github pages and web hosting is what will allow us to deploy our project to the users and understanding of this is key to developing a reliable system.

* Psyche mission
  + NASA Psyche Mission Website: https://www.nasa.gov/psyche
  + Provides official mission details, like launch date and spacecraft instruments.
* QR code integration
  + QR Code Generator Documentation: https://www.qr-code-generator.com/guides/
  + Explains QR code creation, URL linking, and best practices for scannability.
  + ZXing Project: https://github.com/zxing/zxing
  + Open-source library for QR code generation and decoding in Java
* Github pages/Web hosting
  + GitHub Pages Documentation: https://docs.github.com/en/pages
  + Official guide for setting up and deploying static sites on GitHub Pages.
  + React Documentation: https://react.dev/learn
  + Elaborates on building a static React-based web app suitable for GitHub Pages.

**Scaleability**

The project is designed with scalability in mind, as additional QR codes and interactive modules can be added to the asteroid model over time. Each QR code will link to a unique page hosted on GitHub Pages, making it simple to extend the experience without requiring physical modifications to the existing model.

If interest expands beyond the Psyche mission, the platform can be adapted to support other NASA missions or educational outreach efforts by swapping or adding new QR endpoints. Limitations such as server capacity or browser performance are minimal given the lightweight nature of the planned modules.

**Other Special Considerations**

* **Accessibility:** The activities will be designed to be intuitive for all age groups, including children, by keeping interactions short, simple, and visually clear.
* **Device Compatibility:** Ensuring compatibility across iOS and Android devices without requiring app downloads or account creation.
* **Exhibit Environment:** The asteroid model will likely be in a museum or event space; the activities should function well under variable lighting, noise, and network conditions.
* **Future Reuse:** The QR-code based design allows the project to be reused or repurposed for other outreach exhibits.
* **Sponsor Requirements:** Content accuracy and alignment with NASA Psyche mission branding and messaging must be maintained

**PROCESS**

**Process Description and Justification (SER-1)**

We will use an **Agile-based process** for development. Agile allows for iterative delivery, regular feedback from the sponsor, and flexibility to adapt requirements. Bi-weekly sprints and sprint reviews will keep the team aligned with sponsor expectations.

**Tools (SER-1, EM@FSE-O)**

* **Version Control:** Git/GitHub (for source code and documents).
* **Task Tracking:** Taiga
* **Collaboration:** Slack / Discord / Zoom for communication.
* **Documentation:** Google Docs / git
* **Development Environment:** VSCode, VIM/NVIM

**Roles and Responsibilities (SER-1)**

* **Team Lead / Scrum Master:** Organizes meetings, ensures progress.
* **Product Owner Liaison:** Maintains communication with sponsor.
* **Developers:** Build and test the software.
* **Documentation Lead:** Ensures reports, diagrams, and artifacts are maintained.  
   Roles may rotate if needed to balance workload.

**Location of Project Artifacts (SER-1)**

Artifacts (code, documents, diagrams) will be stored in a private GitHub repository, there will also be a working copy kept on google drive. All members will have access, and version control will ensure reliability and traceability.

**Sponsor Communications (ABET-3)**

Team will meet with the sponsor bi-weekly via Zoom or similar tool. Meeting notes will be documented and stored in the repository for accountability. Will also have sponsor meetings on slack.

**RISK MANAGEMENT**

**Identified Potential Risks (SER-2)**

* **Team availability** – scheduling conflicts or uneven workload distribution.
* **Technical challenges** – unfamiliar frameworks, libraries, or platforms.
* **Integration issues** – third-party content or APIs may fail or change.
* **Timeline constraints** – academic deadlines may limit development time.
* **Project specifications** - open ended and nebulous requirements

**Mitigation Strategies (SER-2)**

* Frequent sponsor communication to clarify requirements.
* Clear task breakdowns and workload distribution.
* Research and training buffer time for new tools.
* Built-in buffer in project schedule for unexpected delays.
* Frequent meetings and communication with our sponsor to ensure project deliverables meet sponsor expectations.