

**International School**

**Capstone Project 1**

**CMU-SE 450 – C1SE.15**

**Project Proposal**

**Version 1.0**

**Date: August 22, 2025**

**CapSys - Smart DTU Capstone Project Management**

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**PROJECT INFORMATION**

|  |  |  |  |
| --- | --- | --- | --- |
| **Project acronym** | CapSys | | |
| **Project Title** | Smart DTU Capstone Project Management | | |
| **Start Date** | August 27, 2025 | **End Date** | December 12, 2025 |
| **Lead Institution** | International School, Duy Tan University | | |
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**REVISION HISTORY**

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# 1. Project Title

Smart DTU Capstone Project Management

# 2. Team Members

|  |  |  |  |
| --- | --- | --- | --- |
| **Full Name** | **Student ID** | **Email** | **Role** |
| Kiet, Vo Huynh Tuan | 28211122790 | vohtuankiet@dtu.edu.vn | Lead, Backend and AI Developer |
| Hue, Nguyen Thi Kim | 28201154111 | nguyentkimhue13@dtu.edu.vn | Frontend Developer and Tester |
| An, Ngo Nguyen Truong | 28211134788 | ngontruongan@dtu.edu.vn | Design and Frontend Developer |
| Dung, Nguyen Van | 28219050114 | nguyenvandung19@dtu.edu.vn | Design and Frontend Developer |
| Quang, Truong Minh | 28211101410 | truongminhquang@dtu.edu.vn | Frontend Developer, Tester |

# 3. Supervisor

|  |  |
| --- | --- |
| **Full Name** | Msc. Vo Dinh Hieu |
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# 4. Problem Statement

In higher education, particularly in engineering and technology programs, the management, tracking, and evaluation of Capstone projects are often performed manually or semi-automatically. This approach presents significant challenges for instructors, including difficulties in allocating time for guidance, monitoring student progress, and compiling evaluation results. The current manual methods lack systematic organization, which can lead to overlapping schedules and require a considerable amount of time for data aggregation. Amid the ongoing digital transformation in education, there is an urgent need for a comprehensive system to support instructors in managing the entire Capstone project lifecycle. Such a system would not only minimize manual processing time but also enable a more scientific, objective, and visual analysis of student progress.

## 5. Survey / Existing Solutions

Current graduation project management systems mainly operate as web-based platforms with basic functions such as managing project lists, assigning supervisors, and entering grades. Some systems have applied techniques like cloud data storage and Excel file integration, but they still lack intelligent analysis features.

Notable systems:

● **Capstone Management System – FPT University**: A simple web system that allows project registration, mentor assignment, and grading. However, it does not support AI or data analysis.

● **Thesis Management System – Ho Chi Minh City University of Technology**: Includes role-based management (Faculty, Department, Lecturer) but still relies on manual data entry and lacks recommendation features.

**Table 1.***Comparison*

|  |  |  |  |
| --- | --- | --- | --- |
| Features | Capstone Management System | Thesis Management System | CapSys |
| Project management | + | + | + |
| Suggest a suitable defense schedule | - | - | + |
| AI-based project summarization | - | - | + |
| Grade prediction using machine learning | - | - | + |

# 6. Objectives and Scope

## 6.1. Objectives

Develop a comprehensive CapSys Smart DTU Capstone Project Management in the form of a web application, supporting instructors in tasks such as creating defense committees, recording mentor evaluations, and entering defense committee grades.

The system integrates advanced AI modules to support analysis and decision making, focusing on the following features:

* **Topic idea summarization** from proposals using NLP models (such as T5, BART), helping instructors quickly grasp the main content.
* **Proposed score prediction** based on historical data and machine learning models (e.g., regression), supporting instructors in making fairer and more objective assessments.
* **Comment and feedback analysis** from mentors and defense committees through sentiment analysis and topic classification, to evaluate trends as well as common strengths and weaknesses of students across cohorts.
* A demo version will be implemented, and the system’s effectiveness will be evaluated through instructor feedback and metrics such as prediction accuracy, system reliability, and user satisfaction.

## 6.2. Scope

* **Administrators:**
  + Group students into teams.
  + Assign mentors to student teams.
  + Manage submitted proposals/topics.
  + Assign defense committees.
* **Lecturers:**
  + Evaluate and grade student projects.
* **Students:**
  + View their defense schedule.
* **AI Modules:**
  + Automatically summarize project proposals.
  + Generate detailed score suggestions based on overall evaluations.

# 7. Key Features & Requirements

## 7.1. Functional Requirements

**Table 2.***Function requirement*

|  |  |
| --- | --- |
| **FR01** | Group Students into teams |
| **FR02** | Assign mentors to student teams |
| **FR03** | Manage submitted proposals/topics |
| **FR04** | Assign defense committees |
| **FR05** | Evaluate and grade student projects |
| **FR06** | View their defense schedule |
| **FR07** | Generate detailed score suggestions based on overall evaluations |

## 7.2. Non-Functional Requirements

**Table 3.***Non****-****Function requirement*

|  |  |
| --- | --- |
| **NFR01** | Protect sensitive student data |
| **NFR02** | Usability for users |
| **NFR03** | Scalability for 200+ concurrent users |

# 8. Constraints and Assumptions

## 8.1. Constraints

* Limited time (Aug-Dec 2025)
* Tools: C#, ASP.NET Core, ReactJS, Python
* Database: MS SQL Server.

## 8.2 Assumptions

* Students and lecturers have internet access.
* Users have basic computer literacy.

# 9. Target Users / Stakeholders

|  |  |
| --- | --- |
| **Stakeholders** | **Benefit** |
| Faculty members | Evaluate and grade student projects |
| Students | Check schedules for defense |
| Admin | Manage accounts, assign mentors/committees, manage committees |

# 10. Technology Stack

**Database:**

* Storage: MS SQL Server

**Backend:**

* Programming Language: C#.
* Framework: ASP.NET Core.

**Frontend:**

* Programming Language: JavaScript
* Framework / Libraries: ReactJS, Tailwind
* Web Browser: Chrome, Firefox, Microsoft Edge.

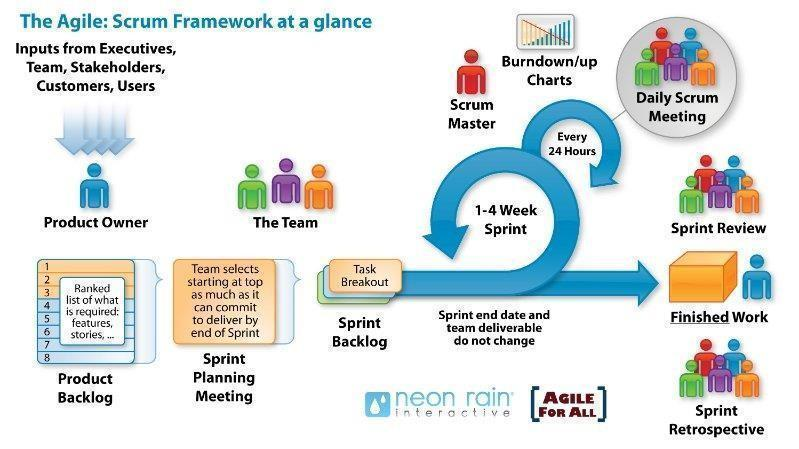
**AI core:**

* Classification Algorithm: Scikit-learn (Random Forest Classifier)
* Regression Algorithm: Scikit-learn (Random Forest Regressor)
* Natural Language Processing - NLP: TensorFlow (T5, BART models), Scikit-learn (sentiment and topic classification)

# 11. Methodology & Development Plan

## 11.1. Methodology

We will follow an Agile methodology, developing the AI-based platform in iterative sprints. The project will use the following technologies: C# ([ASP.NET](http://asp.net) Core) for the backend development, scikit-learn and TensorFlow for implementing classification and regression algorithms, and React for the front-end interface.

****

**Figure 1.***Scrum Process*

* Scrum is an iterative and incremental agile software development framework for managing software projects and product or application development.
* Scrum focuses on project management institutions that are difficult to plan.
* Mechanisms of empirical process control, where feedback loops that constitute the core management technique are used as opposed to traditional command-and-control management.
* Its approach to planning and managing projects is to bring decision-making authority to the level of operational properties and certainties.

## 11.2. Development Plan

**Table 4.***Development plan*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Task Name** | **Duration (Day(s))** | **Start** | **Finish** | **Effort work**  **(hrs.)** |
| **1** | **Development** | **69** | **05/09/2025** | **10/12/2025** | **2180** |
| 1.1 | Sprint 1 | 10 | 05/09/2025 | 18/09/2025 | 400 |
| 1.2 | Sprint 2 | 10 | 19/09/2025 | 02/10/2025 | 320 |
| 1.3 | Sprint 3 | 10 | 03/10/2025 | 16/10/2025 | 240 |
| 1.4 | Sprint 4 | 10 | 17/10/2025 | 30/10/2025 | 240 |
| 1.5 | Sprint 5 | 10 | 31/10/2025 | 13/11/2025 | 400 |
| 1.6 | Sprint 6 | 10 | 14/11/2025 | 27/11/2025 | 180 |
| 1.7 | Sprint 7 | 9 | 28/11/2025 | 10/12/2025 | 400 |
| **2** | **Project Meeting** | **2** | **08/12/2025** | **09/12/2025** | **10** |
| **3** | **Final Release** | **3** | **10/12/2025** | **12/12/2025** | **15** |
|  | **Duration** | **71** | **04/08/2025** | **12/12/2025** | **2205** |

# 12. System Architecture Overview

## 12.1. Architecture

* Web-based client-server system with role-based access.
* Includes AI modules integrated into backend services.

## 12.2. System Context diagram

A diagram of a project management

AI-generated content may be incorrect.

**Figure 2.***System Context Diagram*

# 13. Potential Risks and Mitigation Strategies

**Table 5.***Risk and Mitigation*

|  |
| --- |
| **Technical Risks** |
| **Risk:** AI Model Inaccuracy  **Mitigation:** Regularly retrain and validate models with updated datasets, compare outputs with lecturer assessments, and ensure AI acts as a support tool only, not a replacement. |
| **Risk:** Installation or Environment Configuration Issues  **Mitigation:** Standardize installation guidelines, package the system with Docker or setup scripts, and test on multiple machines to ensure reproducibility. |
| **Risk**: Data Security on Personal Computers  **Mitigation**: Encrypt database files, restrict access to local storage folders, and avoid sharing sensitive data via unsecured channels. |
| **Financial Risks** |
| **Risk:** Unexpected Software or Tool Costs  **Mitigation:** Prioritize free/open-source tools (e.g., SQL Server, Scikit-learn), and leverage academic licenses when available. |
| **Risk:** Hardware Failure on Personal Devices  **Mitigation:** Perform regular database backups to external storage (USB/HDD/Google Drive), and prepare alternative devices when needed. |
| **Time-Related Risks** |
| **Risk:** Project Delays due to Environmental Issues or Member Dependency  **Mitigation:** Ensure all team members can run the system locally, use Git for version control, and synchronize development work to avoid bottlenecks. |
| **Risk:**  Slow Testing due to Manual Deployment  **Mitigation:** Automate build and test processes with scripts, and modularize system components for independent testing. |
| **Operational Risks** |
| **Risk:** Data Loss from Local Machine Errors  **Mitigation:** Schedule regular SQL backups, commit code frequently to GitHub, and maintain copies of important data on external drives. |
| **Risk:** User Resistance or Difficulty Adopting the System  **Mitigation:** Provide user manuals, design an intuitive interface, and conduct live demos during defense sessions to improve acceptance. |

# 14. Expected Outcomes / Deliverables

* Website capstone management
* Source code
* Technical documents

# 15. References

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