SE 4485: Software Engineering Project

Fall 2024

Project Management Plan

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| **Group Number** | **Group 11** |
| **Project Title** | **O.A.S.I.S - Observational Analytics and Space Intelligence System** |
| **Sponsoring Company** | **Raytheon (RTX)** |
| **Sponsor(s)** | **Marc Perna, Trevor Lang, Ryan Havens** |
| **Students** | **1. Josh Duke (Group Leader)**  **2. Ashlynn Norris**  **3. Clara Connor**  **4. Al Altaay**  **5. Tsion Yigzaw** |

**Predictive Analysis Application O.A.S.I.S.**

**Observational Analytics and Space Intelligence System**

**Project Management Plan**

**Project: O.A.S.I.S.**

*“Perfect is the enemy of good.”*

**-***Montesquieu*

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# Abstract

This Project Management Plan outlines the development strategy for the Observational Analytics and Space Intelligence System (O.A.S.I.S.), a predictive analytics application designed to assess and forecast near-Earth space environments for satellite operations and space missions. Developed by Group 11 for Raytheon (RTX), O.A.S.I.S. will integrate data from NASA, NOAA, and other open-source datasets to provide critical insights for space operations planning. The document details our team structure, consisting of five members with diverse roles including project management, data engineering, frontend and backend development, and data science. We adopt an Agile development methodology, specifically the Scrum framework, to ensure flexibility and responsiveness to evolving project requirements. Key components of O.A.S.I.S. include data ingestion from multiple sources, advanced data processing and storage, development of a space environment rating model, and the creation of interactive 3D visualizations. The plan addresses potential risks such as data quality issues, technical complexity, and integration challenges, providing mitigation strategies for each.

Resource requirements, project timeline, and monitoring mechanisms are outlined to ensure efficient project execution. We also establish professional standards and configuration management practices to maintain high-quality development processes. This comprehensive plan serves as a roadmap for the successful development of O.A.S.I.S., aiming to deliver a tool that enhances decision-making in space operations and contributes to the advancement of space exploration and satellite technology.

# Revision History

Please ensure that if you make any notable changes to the Project Management Plan (PMP) that you update the Revision History with the Version Number, Publisher Name and Date the changes were made.

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# 1.0 INTRODUCTION

This Project Management Plan serves as the guiding document for the development of the Observational Analytics and Space Intelligence System (O.A.S.I.S.) by Group 11. It provides a comprehensive overview of our strategy, organization, and processes for our team members and our sponsors at Raytheon (RTX). Within these pages, we detail our project's objectives, team structure, development approach, risk management strategies, and resource requirements, ensuring all stakeholders have a clear understanding of our path forward.

O.A.S.I.S. is an ambitious predictive analytics application designed to allow for the assessment and forecasting of near-Earth space environments for satellite operations and space missions. By harnessing data from NASA, NOAA, space-track.org, and other open-source datasets, our system aims to provide critical insights that will enhance space operations and mission planning. The core of O.A.S.I.S. lies in its sophisticated data pipeline, which begins with the ingestion of diverse space environment datasets. This data undergoes rigorous processing, including cleaning, normalization, and integration, before being stored in an optimized database schema designed for efficient querying and analysis.

At the heart of O.A.S.I.S. is a powerful space environment rating model. This model takes into account a multitude of factors, including space weather conditions, orbital debris density, radiation levels, and atmospheric drag. By analyzing these elements, O.A.S.I.S. will offer predictive capabilities for space operations. Users of our system will be able to visualize these predictions through interactive 3D representations of near-Earth space environments, complete with rating heatmaps for different orbital regions and time-based visualizations that illustrate changing conditions over time.

The applications of O.A.S.I.S. are far-reaching within the space industry. It will enable more accurate predictions of optimal launch windows, taking into account forecasted space environment conditions. Space mission planners will be able to optimize satellite constellation configurations, enhancing their resilience against adverse space conditions. Furthermore, O.A.S.I.S. will provide valuable risk assessments for specific types of space missions or satellite hardware, contributing to the overall safety and success of space operations.

This document is structured to provide a comprehensive overview of our project's execution. We begin by outlining our project organization, detailing the roles and responsibilities within Group 11. We then describe our chosen lifecycle model, explaining our development approach and the rationale behind it. A thorough risk analysis follows, identifying potential project challenges and our strategies for mitigation. We detail our software and hardware resource requirements, including our use of Java, JavaFX, Maven, and necessary data science tools. Our deliverables and schedule section lays out our project timeline and key milestones. We also describe our monitoring and control mechanisms, ensuring transparent progress tracking and reporting to our Raytheon sponsors. The document concludes with our professional standards and configuration management approach, underlining our commitment to quality and best practices in software development and space systems engineering.

# 2.0 | PROJECT ORGANIZATION

The success of the O.A.S.I.S. project hinges on the effective organization and collaboration of our team. Group 11 consists of five dedicated members, each bringing unique skills and perspectives to the project. Our team structure is designed to maximize efficiency, foster innovation, and ensure clear lines of communication both internally and with our sponsors at Raytheon. By leveraging each member's strengths and establishing defined roles, we aim to create a dynamic and responsive team capable of meeting the complex challenges inherent in developing a sophisticated space environment analysis system.

Group 11 is structured so that each individual owns a specific area of the project, while also providing the leeway to effectively collaborate and provide feedback to other areas of the project. This structure is detailed in the following table:

**Table 2.1 - Group 11 Organizational Structure & Responsibilities**

|  |  |  |
| --- | --- | --- |
| **Name** | **Position** | **Responsibilities** |
| Josh Duke | Project Lead | Project Management, Design Architecture, Stakeholder Communication, Risk |
| Tsion Yigzaw | Data Engineer | Data Ingestion, Data Processing, ETL Pipeline Development, |
| Clara Connor | Frontend Developer | UI/UX Design, React, Data Visualization |
| Al Altaay | Backend Developer | API Development, Database Design, Server-side Logic |
| Ashlynn Norris | Data Scientist | Predictive Modeling, Machine Learning, Statistical Analysis |

# 3.0 | LIFECYCLE MODEL USED

For the development of O.A.S.I.S., our team has chosen to adopt an Agile development methodology, specifically the Scrum framework. This approach is well-suited to our project's complex and evolving nature, allowing us to remain flexible and responsive to changing requirements and new insights as we progress. While we don’t expect there to be many significant changes to the requirements, we want to select a lifecycle model that affords us the opportunity to make changes quickly should the need arise.

The Scrum framework divides our development process into short, iterative cycles called sprints, typically lasting two weeks. Each sprint begins with a planning meeting where we select and prioritize tasks from our product backlog. Weekly meetings keep the team aligned and address any obstacles promptly. At the end of each sprint, we conduct a review to demonstrate progress to stakeholders and gather feedback. This is followed by a retrospective where we reflect on our processes and identify areas for improvement. (This period will be short lived due to time constraints, but is included for the sake of adherence to the model)

Our rationale for choosing this model is multifaceted. Firstly, the iterative nature of Agile development aligns well with the exploratory aspects of our data analysis and predictive modeling tasks. It allows us to incrementally refine our algorithms and **visualizations** based on ongoing discoveries and stakeholder feedback. Secondly, the frequent delivery of working software enables us to maintain transparency with our Raytheon sponsors, ensuring that the project remains aligned with their expectations. Lastly, the emphasis on team collaboration and continuous improvement in Scrum helps us leverage the diverse skills of our team members effectively, hopefully fostering innovation and problem-solving.

To support this lifecycle model, we will utilize tools such as Excel for project tracking and GitHub for version control, enabling collaboration and progress monitoring. Regular check-ins with our Raytheon sponsors will be integrated into our sprint reviews, ensuring that their input is consistently incorporated into our development process.

By employing this Agile approach, we aim to deliver a high-quality, adaptable system that meets the requirements of space environment analysis while maintaining the flexibility to adjust to changing requirements and incorporate new data sources and analytical techniques as they become available throughout the development process.

# 4.0 | RISK ANALYSIS

The development of O.A.S.I.S. involves several potential risks that could impact the project's success. By identifying these risks early and developing mitigation strategies, we aim to minimize their potential impact. We will regularly review and update this risk analysis throughout the project lifecycle. Our Agile approach allows us to quickly adapt our strategies as new risks emerge or as the likelihood and impact of identified risks change. By maintaining open communication within the team and with our Raytheon sponsors, we aim to address potential issues proactively and ensure the successful delivery of O.A.S.I.S.

To effectively manage these risks, we have implemented a risk management process. This includes weekly risk assessment discussions during our regular meetings where team members can raise concerns and discuss potential new risks. We will maintain a risk register that is updated after each sprint, tracking the status of known risks and the effectiveness of our mitigation strategies.

**Table 4.0 - Risk Assessment Matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk Matrix** | | **Severity** | | |
| **Low** | **Medium** | **High** |
| **Likelihood** | **Low** | Low | Low Medium | Low High |
| **Medium** | Medium Low | Medium | Medium High |
| **High** | High Low | High Medium | High |

**Here are the key risks we've identified:**

**Table 4.1 - Data Quality & Availability Risk Overview**

|  |  |
| --- | --- |
| **Data Quality & Availability** | |
| **Risk** | Inconsistent or incomplete data from various sources could affect the accuracy of our predictions. |
| **Likelihood** | Medium |
| **Impact** | High |
| **Mitigation** | Implement robust data validation processes, establish backup data sources, and develop algorithms that can handle missing or inconsistent data. |
| **Retirement** | Expect to retire by the completion of Sprint 2, once the basic data processing and storage system is complete. |

**Table 4.2 - Technical Complexity Risk Overview**

|  |  |
| --- | --- |
| **Technical Complexity** | |
| **Risk** | The integration of multiple data sources and development of advanced predictive models may prove more complex than anticipated. |
| **Likelihood** | High |
| **Impact** | Medium |
| **Mitigation** | Break down complex tasks into smaller, manageable components. Allocate additional time for research and prototyping. Leverage team expertise and consider consulting with external experts when necessary. |
| **Retirement** | Expect to retire by Sprint 3, once the core analysis engine has been finalized and initial validation of the models is complete. |

**Table 4.3 - Performance Issues Risk Overview**

|  |  |
| --- | --- |
| **Performance Issues** | |
| **Risk** | Large datasets and complex calculations could lead to slow system performance. |
| **Likelihood** | Low |
| **Impact** | Low |
| **Mitigation** | Implement efficient data storage and retrieval methods, optimize algorithms, and consider cloud computing solutions for scalability. |
| **Retirement** | Expect to retire by Sprint 5, once system integration and testing has begun. By this point, necessary functional components will be implemented and any performance bottlenecks can be addressed. |

**Table 4.4 - Team Member Availability Risk Overview**

|  |  |
| --- | --- |
| **Team Member Availability** | |
| **Risk** | Unforeseen circumstances could affect team member availability. |
| **Likelihood** | Low |
| **Impact** | Medium |
| **Mitigation** | Cross-train team members on different aspects of the project. Maintain clear documentation to facilitate knowledge transfer. |
| **Retirement** | Expect to retire by Sprint 3, once team members have had adequate time to establish a workflow, clearly document progress, and cross-train in different project aspects. Cross-training and clear documentation can minimize the impact of any unforeseen absences. |

**Table 4.5 - Integration Challenges Risk Overview**

|  |  |
| --- | --- |
| **Integration Challenges** | |
| **Risk** | Difficulties in integrating various components (data pipeline, analysis engine, visualization tools) into a cohesive system. |
| **Likelihood** | Medium |
| **Impact** | High |
| **Mitigation** | Adopt a modular design approach. Conduct regular integration tests throughout the development process. |
| **Retirement** | Expect to retire by Sprint 5, once the team is in the midst of system integration and testing. At this stage, the integration tests will ensure all components work together cohesively. Testing will continue into Sprint 6 to improve performance and efficiency. |

# 5.0 | SOFTWARE AND HARDWARE RESOURCE REQUIREMENTS

To successfully develop and deploy the O.A.S.I.S. project, our team requires a specific set of software and hardware resources. These requirements have been carefully considered to ensure optimal performance, compatibility, and efficiency throughout the development process.

**Software Requirements:**

**1. Development Environment:**

* Java Development Kit (JDK) 17 or later
* Eclipse IDE, or VSCode for Java development
* React with TypeScript for UI development
* Maven for project management and dependency handling

**2. Version Control and Collaboration:**

* Git for version control
* GitHub for code repository and collaboration

**3. Database Management:**

* PostgreSQL 13 or later for relational data storage
* SQL Server Management Studio (SSMS) or pgAdmin for database administration
* Hibernate ORM for object-relational mapping in Java.

**4. Data Processing and Analysis:**

* Python 3.9 or later for data processing scripts
* Pandas and NumPy libraries for data manipulation
* Scikit-learn and TensorFlow for machine learning and predictive modeling

**5. Visualization Tools:**

* JavaFX 3D or other 3D software for creating interactive 3D visualizations of space environments
* SceneBuilder (optional) for designing JavaFX user interfaces

**6. API Integration:**

* Apache HttpClient or OkHttp for making HTTP requests to existing APIs
* Jackson or Gson library for JSON parsing

**7. Testing Tools:**

* JUnit for Java unit testing

**8. Project Management:**

* Excel / Google Sheets for agile project management and issue tracking

**Rationale:**

Our software choices for O.A.S.I.S. focus on creating an efficient, integrated development environment tailored to our project's needs. React will form the core, providing a robust foundation for both backend processing and advanced visualizations. The selection of industry-standard IDEs, version control, and project management tools ensures smooth collaboration and code quality. A SQL database with Hibernate ORM offers reliable data management, while Python libraries complement Java for specialized data analysis tasks. This carefully curated stack balances familiarity with powerful capabilities, enabling us to effectively tackle the complex challenges of space environment analysis and visualization while maintaining a cohesive development process.

**Hardware Requirements:**

**1. Personal Development Machines:**

Each team member will use their personal computer for development. While specifications may vary, the following are recommended minimum requirements: (Verified with the team, we all meet this standard.)

* Processor: Intel Core i5 / AMD Ryzen 5 or better
* RAM: 8GB minimum, 16GB or more recommended
* Storage: At least 256GB SSD
* Graphics: Integrated graphics sufficient; dedicated GPU beneficial for 3D visualizations
* Operating System: Windows 10/11, macOS, or Linux distribution capable of running Java and required software

**2. Networking:**

* Reliable internet connection for each team member (recommended minimum 25 Mbps)
* Access to UTD's VPN service for secure remote work if necessary. (GlobalSource)

**Rationale:**

By utilizing personal machines, we ensure that each team member has immediate access to a development environment they are comfortable with. This approach eliminates the need for shared hardware resources and allows for flexible work arrangements, including remote development. The recommended specifications are set to ensure smooth running of development tools, data processing tasks, and basic visualizations.

# 6.0 | DELIVERABLES AND SCHEDULE

The O.A.S.I.S. project will be developed over a 12-week period from August 31st to November 24th, 2024, divided into 6 two-week sprints. This schedule aims for project completion one week before the final deadline of December 1st.

**TENTATIVE DEVELOPMENT SCHEDULE**

**Setup & Planning (Aug 26–Sept 8):**

* Complete project management plan
* Complete initial system architecture design
* Set up development environment and version control
* Weekly Stakeholder Meeting

**Sprint 1 (Sept 9–Sept 15)**

* Develop data ingestion module
* Begin implementation of data processing system
* Weekly Stakeholder Meeting

**Sprint 2 (Sept 16–Sept 29):**

* Complete basic data processing and storage system
* Start development of space environment rating model
* Weekly Stakeholder Meeting

**Sprint 3 (Sept 30–Oct 13):**

* Finalize core analysis engine with preliminary predictive algorithms
* Weekly Stakeholder Meeting

**Sprint 4 (Oct 14–Oct 27):**

* Complete basic JavaFX 3D visualization of space environment
* Develop user interface for data interaction
* Weekly Stakeholder Meeting

**Sprint 5 (Oct 26–Nov 8):**

* System integration and comprehensive testing
* Finalize documentation and user guide
* Weekly Stakeholder Meeting

**Sprint 6 (Nov 9–Nov 22):**

* System integration and comprehensive testing
* Finalize documentation and user guide
* Weekly Stakeholder Meeting

**Final Week (Nov 23–Nov 24):**

* Buffer for any remaining tasks or refinements
* Prepare final presentation for Raytheon sponsors
* Weekly Stakeholder Meeting

Each sprint will conclude with a progress demo and feedback session with our Raytheon sponsors. This schedule allows us to complete development by November 24th, giving us a one-week buffer before the December 1st deadline for any unforeseen challenges or final polishing.

**Deliverables:**

**1.** Functional data ingestion and processing system

**2.** Implemented space environment rating model and predictive algorithms

**3.** User-friendly interface for data interaction and analysis

**4.** Comprehensive documentation and user guide

**5.** Final O.A.S.I.S. application, fully tested and integrated

This timeline ensures we maintain a steady pace of development while allowing flexibility to adapt to challenges and sponsor feedback throughout the project.

# 7.0 | MONITORING, REPORTING, AND CONTROLLING MECHANISMS

To ensure the successful delivery of O.A.S.I.S., we have established monitoring, reporting, and controlling mechanisms. These processes are designed to keep the project on track, maintain transparency with our Raytheon sponsors, and allow for timely adjustments as needed.

**Sprint Planning and Review:**

* Bi-weekly sprint planning meetings to set goals and assign tasks
* Sprint review sessions at the end of each two-week sprint to demonstrate progress to stakeholders
* Sprint retrospectives to reflect on process improvements

**Weekly Team Meetings:**

* 1 hour weekly team meetings to discuss progress, plans, and obstacles
* Quick identification and resolution of bottlenecks

**Project Management Tool:**

* Use of Excel for time tracking, roadmapping, sprint management, and burndown charts
* Real-time visibility into project progress for all team members and stakeholders

**Version Control Monitoring:**

* Regular code reviews using GitHub's pull request feature
* Monitoring of commit frequency and code quality metrics

**Sponsor Reporting:**

* Bi-weekly progress reports sent to Raytheon sponsors
* Monthly in-depth review meetings with sponsors to discuss project status, challenges, and upcoming milestones

**Risk Management:**

* Weekly risk assessment meetings to identify and mitigate potential issues
* Maintenance of a risk register, updated after each sprint

**Quality Control:**

* Continuous integration setup to run automated tests on each commit
* Regular code quality checks using static analysis tools

**Performance Metrics:**

* Tracking of key performance indicators such as sprint velocity, bug resolution time, and test coverage
* Monthly analysis of these metrics to identify trends and areas for improvement

**Rationale:**

By implementing these mechanisms, we aim to maintain a high level of project control while remaining agile and responsive to change. This approach ensures that any deviations from the plan are quickly identified and addressed, maintaining alignment with project goals and sponsor expectations throughout the development process.

# 8.0 | PROFESSIONAL STANDARDS

The O.A.S.I.S. project team is committed to maintaining the highest professional standards throughout the development process. These standards ensure the quality of our work, the integrity of our team, and the success of our project. All team members are expected to adhere to the following standards:

**Code of Conduct:**

Treat all team members, sponsors, and stakeholders with respect and professionalism

Maintain confidentiality of project details and any sensitive information

Adhere to UTD's academic integrity policies and Raytheon's professional guidelines

**Quality of Work:**

* Strive for excellence in all deliverables
* Follow agreed-upon coding standards and best practices
* Thoroughly test and document all work

**Time Management:**

* Meet all deadlines for assigned tasks and deliverables
* Attend all scheduled meetings punctually
* Communicate proactively if delays or issues arise

**Communication:**

* Respond to team communications in a timely manner
* Provide clear and concise updates during daily stand-ups
* Document decisions and important discussions

**Continuous Learning:**

* Stay updated with relevant technologies and methodologies
* Ask Questions, lean on the experience of our sponsors and mentors.
* Share knowledge and insights with the team
* Be open to feedback from all sources and continuously improve skills

**Ethical Considerations**:

* Ensure all data usage complies with relevant regulations and ethical standards
* Consider the potential implications and applications of our work in the space industry

**Conflict Resolution:**

* Address conflicts or disagreements professionally and constructively
* Escalate unresolved issues to the project lead or faculty advisor when necessary

**Accountability:**

* Take ownership of assigned tasks and responsibilities
* Be transparent about progress and challenges
* Support team members and contribute to a collaborative environment

**Rationale:**

Adherence to these standards is crucial for maintaining a positive team dynamic, ensuring project success, and preparing team members for professional environments. Regular discussions about these standards will be held to reinforce their importance and address any concerns.

Any breach of these standards will be addressed promptly, first through team discussion and, if necessary, through consultation with our faculty advisor (Dr. Wong) or Raytheon sponsors.

# 9.0 | CONFIGURATION MANAGEMENT

Our approach ensures version control, maintains system integrity, and facilitates collaborative development. We will use Google Docs as our primary configuration management tool for documentation, allowing real-time collaboration and version tracking.

1. **CM Tool**: Google Docs
2. **Version Control Process**:
   * Google Docs automatically saves versions as changes are made.
   * We will use the "Version history" feature to track changes and revert if necessary.
   * Major versions will be manually labeled for easy reference (e.g., "v0.0.1", "v0.0.2", etc.).
3. **Check-in/Check-out Process**:
   * Before making significant changes, team members will announce their intention in our team chat.
   * The current version number will be noted before editing (check-out) in the revision history.
   * After completing edits, the team member will create a new labeled version (check-in).
4. **Version Tracking**:
   * We will maintain a version log in each document with the following information:
     + Version number
     + Date of change
     + Author of change
5. **Review Process**:
   * For each significant change or new version:
     + At least two team members (other than the author) must review the changes.
     + Reviewers will use the "Suggesting" mode in Google Docs to provide feedback.
     + After addressing feedback, reviewers must provide a "ship-it" approval in the comments.
     + Only after receiving two "ship-it" approvals can the changes be considered final.
6. **Difference Tracking**:
   * We will use the "Compare versions" feature in Google Docs to generate a detailed list of changes between versions.
7. **Additional Information**:
   * All team members will be given edit access to project documents.
   * We will use the "Comments" feature for discussions about specific parts of the document.
   * Monthly backups of all project documents will be downloaded and stored in a shared Google Drive folder.

# 10.0 | ENGINEERING STANDARDS AND CONSTRAINTS

o IEEE Std 1058-1998: Software Project Management Plans [[pdf](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=741937)]

o PMBOK® Guide: Project Management Body of Knowledge [pdf]

o IEEE Std 12207: Software Life Cycle Processes [[pdf](https://cdn.standards.iteh.ai/samples/63712/0bc6d9107eeb46d88dbc7b628b12cf4b/ISO-IEC-IEEE-12207-2017.pdf)]

o IEEE Std 15939: Measurement Process [[pdf](https://cdn.standards.iteh.ai/samples/71197/1c61ba3beaa343dda09217cc4c58844d/ISO-IEC-IEEE-15939-2017.pdf)]

o ISO/IEC/IEEE Std 29148-2018: Systems and Software Engineering

* Life Cycle Processes
* Requirements Engineering [[pdf](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8559686)]

# 11.0 | ADDITIONAL REFERENCES

* Larson, E. and Gray, C., 2014. Project Management: The Managerial Process. McGraw Hill
* Humphrey, W.S. and Thomas, W.R., 2010. Reflections on Management: How to Manage Your Software Projects, Your Teams, Your Boss, and Yourself. Pearson Education
* National Aeronautics and Space Administration (NASA). (2023). Space Weather. <https://science.nasa.gov/heliophysics/focus-areas/space-weather/>
* National Oceanic and Atmospheric Administration (NOAA). Space Weather Prediction Center. <https://www.swpc.noaa.gov/>
* NASA. (2023). Near Earth Object Program. <https://cneos.jpl.nasa.gov/>
* NOAA National Environmental Satellite, Data, and Information Service (NESDIS). (2023). Space Weather. <https://www.nesdis.noaa.gov/news/space-weather-follow-program>
* NASA. (2023). Van Allen Probes. <https://www.nasa.gov/mission_pages/rbsp/main/index.html>
* NOAA. (2023). Space Weather Scales. <https://www.swpc.noaa.gov/noaa-scales-explanation>
* NASA Science. (2023). Solar System Exploration: Asteroids, Comets & Meteors. <https://solarsystem.nasa.gov/asteroids-comets-and-meteors/overview/>
* NOAA. (2023). Geomagnetic Storm Database. <https://www.ngdc.noaa.gov/stp/geomag/indices.html>

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# Appendix A.

The following provides a professional standards guideline for the teams. This guideline may be tailored. The professional standards must be agreed upon by each member in the team.

**Guideline:**

On the first occurrence of unacceptable behavior, determine the circumstances involved, resolve the problem, and document the event in the meeting minutes.

On a second occurrence, notify the instructor of the problem. A meeting will be set up to evaluate the situation and resolve the problem.

On a third occurrence, again notify the instructor of the problem. A meeting will be set up to evaluate the situation and resolve the problem. At this point, the team will have the *option* of removing the team member. If removed, then the team member receives a prorated grade based on the number of weeks they have participated in the group.

Examples of unacceptable behavior may include not delivering on time, delivering poor quality work, missing team meetings, being unprepared for team meetings, disrespectful or rude behavior, etc. Reasons such as “too busy” or “I forgot”, or “my dog ate my design model” are unacceptable.

Valid reasons that must be considered include those listed for obtaining an incomplete standing in a course (illness, death in the family, travel for business or academic reasons, etc.)