



Northeastern University

College of Professional Studies

PJM 6015 - Project Risk Management

Under the guidance of: Prof. Kristen Drobnis

Submitted by: Team 5

Group Members: Himanshu Mandloi, Kuldeep Kishor Owalekar, Sowmiya Mankala, Urvi Tank

Urvashi Burman, Yasaswi Madala

Date: March 27, 2023

MAZDA AUTODRIVE
RISK MANAGEMENT PLAN

Version *<1.2>*

<03/27/2023>

VERSION HISTORY

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	Team 5	03/15/2023	Project Sponsor	03/15/2023	Initial Risk Management Plan draft
1.1	Team 5	03/22/2023	Project Sponsor	03/22/2023	Updated Version
1.2	Team 5	03/27/2023	Project Sponsor	03/27/2023	Final Draft: Risk Management Plan
1.3	Team 5	04/01/2023	Project Sponsor	04/01/2023	Final: Risk Management Plan

Revision Date: Error! Unknown document property name.

Risk Management Plan Template

TABLE OF CONTENTS

1 INTRODUCTION.....	1
1.1 Purpose Of The Risk Management Plan	1
1.2 The Project Background	1
1.3 The Parent Organization Background	1
1.4 The Project Organization Structure	1
2 RISK MANAGEMENT PROCEDURE	3
2.1 Process.....	3
2.2 Risk Identification	3
2.3 Risk Analysis.....	5
2.3.1 Qualitative Risk Analysis	5
2.3.2 Quantitative Risk Analysis	6
2.4 Risk Response Planning	8
2.5 Risk Response Implementation	1
2.6 Risk Monitoring, Controlling, And Reporting	9
3 ROLES AND RESPONSIBILITIES.....	10
4 BUDGETING	17
5 TIMING	17
6 RISK BREAKDOWN STRUCTURE/ CATEGORIES	18
7 STAKEHOLDER RISK TOLERANCESE.....	18
RISK MANAGEMENT PLAN APPROVAL	22
APPENDIX A: REFERENCES.....	23
APPENDIX B: KEY TERMS.....	25

1 INTRODUCTION

1.1 PURPOSE OF THE RISK MANAGEMENT PLAN

The purpose of this risk management plan is to identify potential risks that could impact the success of the project and to develop strategies to mitigate those risks. This plan will be continuously updated throughout the project's lifecycle to ensure that it remains relevant and effective.

The procedures for identifying, analyzing, and managing risks connected with the Mazda AutoDrive project are outlined in this risk-management plan. The risk management plan outlines how risks will be identified and documented, their likelihood and impact assessed, and risks prioritized and analyzed. The plan describes how risk responses will be developed and implemented, as well as how risks will be tracked and managed throughout the project.

The risk management plan is intended for the project sponsor, project team management, and external advisory team. It will be reviewed and updated regularly to ensure that it remains relevant and effective. The goal of this risk management plan is to limit the chance of mishaps or other undesirable effects that might affect the project's success. We can ensure that the project is finished on schedule, within budget, and to the satisfaction of all stakeholders by detecting and minimizing any risks.

1.2 THE PROJECT BACKGROUND

The goal of Mazda AutoDrive is to enhance driver safety and convenience by incorporating advanced driver assistance systems (ADAS) and automated driving technologies into Mazda vehicles. In recent years, there has been a growing trend in the automotive industry towards autonomous driving, which has the potential to reduce accidents and save lives. Mazda AutoDrive will build on this trend by offering a range of features that will make driving safer, easier, and more enjoyable for Mazda customers.

Mazda AutoDrive will be designed to operate on highways and other controlled-access roads, and will incorporate features such as adaptive cruise control, lane keeping assistance, and automatic emergency braking. These features will allow Mazda vehicles to automatically adjust their speed, stay within their lane, and avoid collisions with other vehicles or obstacles on the road.

Mazda AutoDrive will be powered by advanced sensors, cameras, and artificial intelligence (AI) algorithms, which will allow the system to perceive the environment around the vehicle and make decisions based on real-time data. This technology will be integrated seamlessly into Mazda vehicles, providing a user-friendly interface that will allow drivers to easily activate and control the system.

Overall, Mazda AutoDrive has the potential to transform the driving experience for Mazda customers by offering a range of advanced features that enhance safety, convenience, and enjoyment.

1.3 THE PARENT ORGANIZATION BACKGROUND

Mazda Motor Corporation is a Japanese multinational automaker headquartered in Hiroshima, Japan. It was founded in 1920 as a machine tool manufacturer called Toyo Cork Kogyo Co., Ltd. In 1931, the company began manufacturing automobiles under the Mazda brand name.

Today, Mazda produces a range of vehicles, including sedans, hatchbacks, SUVs, and sports cars, and is known for its emphasis on driving pleasure and innovative engineering. The company has operations in more than 130 countries and regions around the world.

In addition to its automotive business, Mazda is also involved in the development and production of engines, transmissions, and other automotive components, as well as in the design and construction of industrial machinery and equipment. The company is committed to sustainability and has set a goal of achieving carbon neutrality by 2050.

1.4 THE PROJECT ORGANIZATION STRUCTURE

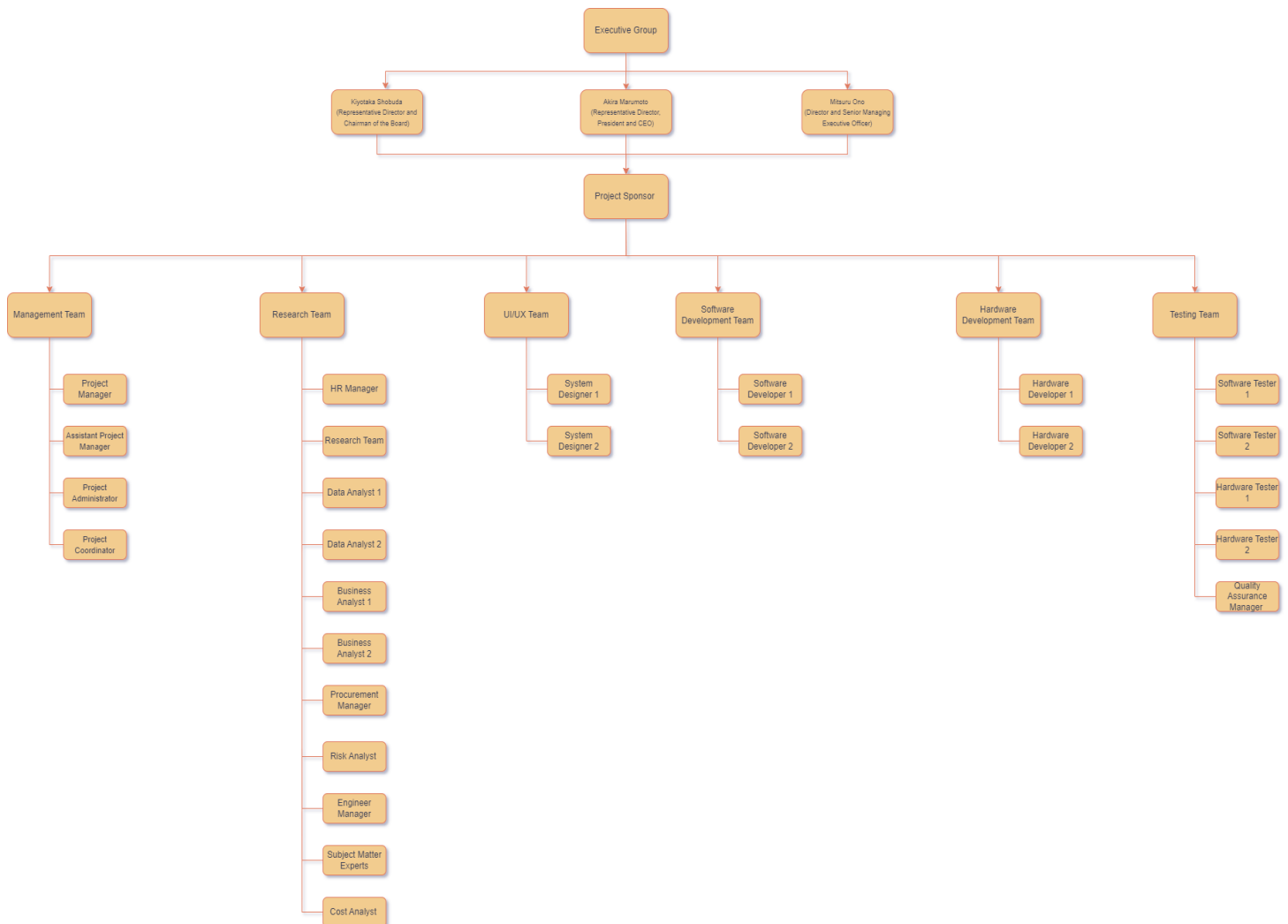


Fig. 1: Project Organization Structure

2 RISK MANAGEMENT PROCEDURE

2.1 PROCESS

The risk management strategy must be based on a clearly defined framework that includes both the associated stakeholders and the project's management group. The risk management process used for this project is divided into six stages.

1. Identify potential risks: The first step in any risk management procedure is to identify potential risks associated with the Autosense auto pilot feature. This includes risks to the driver, passengers, pedestrians, and other vehicles on the road.
2. Assess the likelihood and impact of risks: Once potential risks have been identified, it is important to assess the likelihood and impact of each risk. This can be done by considering factors such as the frequency of occurrence, severity of harm, and the number of people who could be affected.
3. Develop risk management strategies: Based on the likelihood and impact of the risks, develop risk management strategies to mitigate or eliminate those risks. This may involve modifying the Autosense feature, changing the way it operates, or adding additional safety features.
4. Implement risk management strategies: Once risk management strategies have been developed, they should be implemented in the Autosense feature. This may involve updating software or hardware components or providing training to drivers.
5. Monitor and review: It is important to monitor the effectiveness of the risk management strategies and review them regularly. This will ensure that the Autosense feature continues to operate safely and effectively.
6. Continuously improve: Finally, it is important to continuously improve the risk management process by incorporating new information, technology, and best practices. This will ensure that the Autosense feature remains safe and reliable as technology and driving conditions continue to evolve.

2.2 RISK IDENTIFICATION

1. Gather input from stakeholders: The first step in identifying risks is to gather input from stakeholders. This can be done through interviews, workshops, surveys, or other forms of communication. It is important to involve all relevant stakeholders, including project team members, subject matter experts, customers, and other stakeholders who may be impacted by the project.

2. Brainstorm potential risks: Based on the input gathered from stakeholders, hold a brainstorming session to identify potential risks. This can be done by using a risk identification template, which provides a framework for brainstorming risks related to different aspects of the project, such as scope, schedule, budget, resources, technology, and stakeholders.
3. Analyze historical data: Historical data from similar projects or situations can be used to identify potential risks. This can include reviewing project data, industry reports, or consulting with experts.
4. Conduct a risk assessment: Once potential risks have been identified, assess the likelihood and potential impact of each risk. This can be done through a risk assessment process that considers factors such as the probability of the risk occurring and the potential consequences. A risk matrix can be used to help prioritize risks based on their likelihood and impact.
5. Document risks in a risk register: The risk register is a document that captures all identified risks and their associated details. It includes information such as the risk description, likelihood, impact, risk owner, risk response strategy, and risk mitigation plan. The risk register is updated throughout the project as new risks are identified, assessed, and managed.

The risk register is a critical tool for risk management. It provides a central location for recording and tracking identified risks, as well as the status of risk mitigation efforts. By documenting risks in a risk register, the project team can ensure that risks are properly managed, and that risk response strategies are implemented in a timely and effective manner. The risk register also serves as a reference for risk management activities and can be used to communicate risks to stakeholders.

2.3 RISK ANALYSIS

A risk register is a tool for documenting the outcomes of a risk analysis. It primarily defines the risk, the chance of the risk occurring, the possible consequence of the risk, and the suggested risk mitigation action. Firms may prioritize and track risk management activities with the aid of this documentation, making educated decisions and ensuring that resources are used efficiently to minimize the most significant risks.

2.3.1 Qualitative Risk Analysis

This procedure consists of three steps:

Identify Risks: To identify all foreseeable possible project risks, trade-off project needs, and resource availability, we held brainstorming sessions. We were able to identify potential threats to the project's schedule. To keep track of newly discovered dangers, we also built a risk registry.

Evaluating Risk: We developed a risk matrix and utilized it to determine the chance and effect of each risk to assess the hazards. A risk score was calculated using the formula, Risk score = Impact * Probability.

Planning and Controlling: Based on the risk score, risks are categorized as high, medium, and low, and mitigation strategies are developed. The project's risks will be closely watched, and the risk register will be frequently updated.

Qualitative risk analysis is the cornerstone of quantitative risk analysis. This largely reduces project uncertainty and concentrates on high-impact risks.

Impact of Risk		Costs	Schedule	Scope	Quality
Very Low	1	0 - \$99,999	0 - 7	Scope impact barely discernable	Minor defects in production
Somewhat Low	2	\$100,000 - \$199,999	8 to 14	Minor areas of scope impaired	Small number of moderate defects in prod
Moderate	4	\$200,000 - \$299,999	15 to 21	Many minor areas of scope impaired	Moderate number of moderate defects in prod
Somewhat High	6	\$300,000 - \$399,999	22 to 28	Major areas of scope impaired	High number of moderate defects in prod
High	8	\$400,000 - \$499,999	29 to 34	Scope reduction unacceptable	Major defects in prod
Extremely High	9	\$500,000 +	35 days +	Final product undeliverable or useless	Final product is inoperable

Fig. 2: Risk Impact

Very Unlikely	1
Somewhat unlikely	3
50-50 possibility	5
Somewhat likely	7
Very likely	9

Fig. 3: Probability Matrix

outcomes and the possibility that its goals will be met. Setting reasonable objectives for the scope, price, and timeline is made simpler as a result.

Risk Score= Impact*Likelihood	Quantitative Analysis			Risk Action
	Impact	Probability	EMV Cost(USD)= Cost*Probability	
56	8	7	70% of 450,000 = \$315,000	Establishing a stringent approach for quality control that involves routinely testing and validating hardware and software components. Additionally, creating a thorough budget for the project that accounts for all expenses related to the integration of hardware and software. Spending should be regularly monitored, and the budget should be adjusted as needed to prevent cost overruns.
27	9	3	30% of 250,000 = \$75,000	By performing testing with real data, different items, and unexpected events. Working on system modifications, performing rigorous regression testing and evaluating the system's ability. Working closely with the programmers to make sure that the system is made to correctly identify objects and take care of any problems that are found during testing.
6	2	3	30% of 110,000 = \$33,000	By carrying out detailed research and doing an excellent competitive analysis, businesses may discover new competitors or emerging industry trends. While extensive research and competition analysis can be helpful for discovering opportunities and boosting business performance, they can also lead to a focus on present rivals and trends rather than on innovation or chasing new markets.

Fig. 6: Quantitative Risk Analysis

2.4 RISK RESPONSE PLANNING

Risk response planning is an important aspect of the risk management process, which involves developing appropriate actions to address identified risks. In order to create effective risk response plans, it is important to tie them to the analysis work done above, which typically involves identifying and analyzing the risks. By initially identifying the specific risks and evaluating their likelihood and possible impact, the risk response strategies may be created. This may be accomplished using a variety of methods, including expert judgment, risk assessment matrices, and brainstorming. Once the risks are identified and analyzed, appropriate strategies can be developed to address them.

There are two broad categories of risks: For negative risks, common strategies include avoidance (eliminating the risk altogether), mitigation (reducing the likelihood or impact of the risk), transfer (shifting the risk to a third party), or acceptance (accepting the risk and developing a contingency plan). For positive risks, common strategies include exploitation (taking steps to maximize the potential benefits of the risk), sharing (collaborating with others to maximize the benefits), or enhancement (increasing the likelihood or impact of the risk).

It is generally recommended to have a response plan for all identified risks, regardless of their level of severity, when determining which level of risks need one. But, depending on the level of risk, different steps will be taken. Higher levels of planning and mitigation may be necessary for high-risk events compared to low-risk ones.

A contingency plan is a particular kind of reaction strategy created to deal with the probable effects of particular circumstances. Contingency plans are often developed for high-risk situations that might significantly affect the outcome of the project. In the event that the risk event materializes, the plan explains the actions to be done, along with who will be in charge of each action and what resources would be needed.

The risk register is an important tool used to document risk analysis. It contains a comprehensive list of all risks that have been found, together with information on each risk's description, probability, potential effects, and mitigation measures. The risk register is continually updated during the project to guarantee that it is up to date and that new risks are discovered and dealt with as soon as possible. It is also used to inform project stakeholders about risks and monitor the development of risk response strategies.

2.5 RISK RESPONSE IMPLEMENTATION

The process of carrying out the planned actions to recognize risks is known as risk response implementation. The risk management implementation process is crucial because it ensures that the project team takes proper action to minimize or exploit risks.

To document how the risk response plan will be implemented, you can follow the steps outlined below:

- A. Identify and prioritize risks: Start by identifying and prioritizing the risks that are most likely to occur and that would have the greatest impact on the project. This will help you focus your efforts on the risks that require the most attention.
- B. Develop response strategies: Once you have identified the risks, develop strategies for how you will respond to each one. For example, you may decide to mitigate the risk by taking steps to reduce its likelihood or impact, transfer the risk to a third party, or simply accept the risk.
- C. Assign responsibility: Assign responsibility for implementing the risk response plan to specific individuals or teams. Make sure that everyone involved understands their role and what is expected of them.
- D. Establish a timeline: Establish a timeline for implementing the risk response plan. This should include specific milestones and deadlines for each step of the process.
- E. Monitor and review: Monitor the implementation of the risk response plan and regularly review its effectiveness. Adjust as necessary to ensure that the plan continues to address the risks effectively.

Generally, the approach for implementing the risk response plan will be determined by the specific risks involved as well as the resources available to handle them. The key is to be proactive, to communicate effectively with all stakeholders, and to constantly analyze and adapt the strategy as necessary.

2.6 RISK MONITORING AND REPORTING

Effective risk management must include ongoing risk monitoring and control. To make sure that risks are monitored and managed throughout the project lifetime, the following actions can be taken:

Define risk monitoring criteria: Determine the criteria for risk monitoring, such as frequency, the types of risks to be monitored, and the metrics to be used for assessing risk levels.

Establish monitoring procedures: Develop procedures for monitoring identified risks. These may include regular progress updates, status reports, or other forms of communication with relevant stakeholders.

Continuously monitor risks: Monitor risks throughout the project lifecycle. This may involve reviewing progress reports, conducting risk assessments, or other monitoring activities.

Control risks: Implement appropriate risk control measures to reduce the likelihood and impact of identified risks. These may include contingency planning, risk mitigation strategies, or other risk control measures.

Report on risk management: Report regularly on risk management activities to stakeholders, including the identification and assessment of risks, risk control measures, and the effectiveness of the risk management plan.

In addition to ongoing risk monitoring and control, it is also important to consider how risk management ties into issue and change management. Issues that arise during the project may need to be addressed through the risk management plan, and changes to the project scope or objectives may require a reassessment of risks and adjustments to the risk management plan.

A proactive approach to risk management is necessary for effective problem and change management, including regular reviews of the risk management strategy and the detection of possible issues and changes that might have an influence on the project. Project teams may make sure that risks are efficiently handled over the course of the project lifecycle and that any issues or changes are dealt with quickly and effectively by integrating risk management, issue management, and change management.

3 ROLES AND RESPONSIBILITIES

Roles	Responsibilities
Board of Director	<ul style="list-style-type: none">• Setting the company's overall strategic direction and goals• Monitoring and overseeing the company's financial performance and risk management• Appointing and evaluating the performance of the company's senior executives, including the CEO and other top managers• Ensuring that the company is complying with all relevant laws and regulations.• Approving major investments, acquisitions, or divestitures

	<ul style="list-style-type: none"> • Approving the company's annual budget and financial statements • Setting and monitoring ethical standards and ensuring that the company is operating in a socially responsible manner.
CEO	<ul style="list-style-type: none"> • Develop and implement strategies to achieve the company's goals and objectives, such as increasing revenue, market share, and profitability, while ensuring the company's long-term sustainability and reputation. • Lead and motivate a diverse team of managers, employees, and stakeholders to achieve their full potential, maintain a positive company culture, and foster innovation, collaboration, and continuous improvement. • Foster strong relationships with customers, suppliers, partners, regulators, and other external stakeholders, representing the company's interests, needs, and values, and building trust, credibility, and mutual benefits.
Engineering Team	<ul style="list-style-type: none"> • Design and develop new vehicles and vehicle components using advanced technology and engineering principles. • Conduct research and testing to improve vehicle safety, performance, and efficiency. • Collaborate with other teams, such as marketing and manufacturing, to ensure that vehicles meet customer needs and are produced efficiently. • Create and maintain detailed engineering documentation, including schematics, blueprints, and technical reports. • Stay up to date with the latest advancements in automotive technology and apply them to new vehicle designs. • Analyse data and performance metrics to identify areas for improvement and optimization. • Develop and implement quality control measures to ensure that vehicles meet safety and performance standards.

Revision Date: Error! Unknown document property name.

Project Manager	<ul style="list-style-type: none"> • Develop and maintain project plans, timelines, and budgets. • Coordinate project activities and ensure tasks are completed on time and within budget. • Identify project risks and develop strategies to mitigate or avoid them. • Communicate project progress to stakeholders and senior management. • Monitor project performance and adjust plans as needed to ensure successful delivery. • Manage project team members and ensure they have the resources and support needed to complete their tasks. • Foster a collaborative and productive team environment. • Ensure project documentation is complete, accurate, and organized. • Facilitate project meetings and ensure action items are tracked and followed up on.
Research Team	<ul style="list-style-type: none"> • Researching and analysing existing autonomous driving technologies and features in the market. • Identifying technical requirements and constraints for implementing the auto drive feature in Mazda cars. • Conducting user studies and surveys to understand drivers' needs, preferences, and behaviours related to autonomous driving. • Developing and testing various algorithms and models for autonomous driving, such as object detection and recognition, path planning, and decision-making. • Ensuring the auto drive feature meets safety and regulatory requirements, such as those set by the National Highway Traffic Safety Administration (NHTSA) and the Society of Automotive Engineers (SAE) • Conducting continuous monitoring and evaluation of the auto drive feature's performance, reliability, and user satisfaction

	<ul style="list-style-type: none"> Contributing to patent applications and scientific publications related to the auto drive feature.
Design Team	<ul style="list-style-type: none"> Conduct user research and design studies to understand the needs, preferences, and behaviours of potential users of the auto drive system and incorporate their feedback into the design. Develop a visual and user interface design for the auto drive system that is intuitive, attractive, and consistent with Mazda's brand identity. Create detailed technical specifications and design documentation for the auto drive system and communicate these to the development and testing teams. Collaborate with suppliers and manufacturing partners to ensure that the auto drive system can be produced and assembled efficiently and cost-effectively, while maintaining its quality and performance. Continuously iterate and improve the design of the auto drive system based on user feedback, testing results, and new technological developments.
Development Team	<ul style="list-style-type: none"> Write code and test it thoroughly to make sure it works as intended. Collaborate with other teams at Mazda to integrate Mazda Auto Drive with other parts of the car, such as the sensors and communication systems. Continuously improve Mazda Auto Drive by fixing bugs, optimizing performance, and adding new capabilities. Follow established development processes and best practices, such as using version control, documenting code, and conducting code reviews. Stay up to date with the latest technologies and trends in self-driving cars and use that knowledge to make Mazda Auto Drive better. Communicate clearly and frequently with other team members, project managers, and stakeholders to

	<p>ensure everyone is on the same page and working towards the same goals.</p> <ul style="list-style-type: none">• Work efficiently and effectively to meet deadlines and deliver high-quality software.• Be adaptable and willing to learn new skills and technologies as needed.
Quality Team	<ul style="list-style-type: none">• Collaborating with other teams to improve product design, manufacturing processes, and quality control methods.• Analysing data to identify trends and patterns that may impact product quality and taking action to address any issues.• Providing training and support to employees on quality control procedures and best practices.• Communicating with customers and suppliers to gather feedback and address any quality concerns or complaints.• Continuously reviewing and improving quality control procedures to ensure that they are effective and efficient.• Conducting root cause analyses to determine the underlying causes of quality issues and developing and implementing corrective actions.• Ensuring that all necessary documentation and records related to quality control are maintained and up to date.• Maintaining compliance with all relevant quality standards and regulations.
Analyst Team	<ul style="list-style-type: none">• Analysing data related to various aspects of the business, such as sales, customer behaviour, and market trends.• Developing and maintaining databases to store and organize large amounts of data.• Creating reports and visualizations to communicate insights and findings to other teams within the company.

	<ul style="list-style-type: none">• Identifying patterns and trends in data that could be used to improve business processes or develop new strategies.• Collaborating with other teams within the company to understand their needs for data and analysis, and providing them with relevant information• Conducting research and staying up to date with industry trends and best practices in data analysis• Identifying and addressing data quality issues, such as missing or inconsistent data• Providing recommendations based on data analysis to help drive business decisions and improve overall performance.
Testing Team	<ul style="list-style-type: none">• Develop and execute test plans and test cases to ensure the quality of Mazda Auto Drive software.• Identify and report software defects, issues, and bugs to the development team for resolution.• Collaborate with cross-functional teams, including developers, designers, and product managers, to ensure that software meets user requirements and design specifications.• Conduct manual and automated testing of Mazda Auto Drive features and functionality, including regression testing, smoke testing, and exploratory testing.• Use testing tools and methodologies to improve the efficiency and effectiveness of the testing process, such as test automation, performance testing, and usability testing.• Monitor and analyse software performance and usage data to identify areas for improvement and optimize the user experience.

RAM Table

Situation	Executive Director and Board of Directors	Management Team (Project Manager)	Research Team	Design Team	Development Team	Testing Team	Quality Team
Scope	R	A	C	C	C	C	C
Budget	R	A	C	C	C	C	C
Schedule	R	A	C	C	C	C	C
Identifying Risks / Defining Risks	R	R/A	C/I	C/I	C/I	C/I	C/I
Project risk policy and strategy development	R	R/A	C/I	C/I	C/I	C/I	C/I
Project Design Process	I	R	R/C	R			C
Project Development Process	I	R	R/C	C	R		C
Project testing process	I	R	R/C	C	C	R	C

R: Responsible **A:** Accountable **C:** Consulted **I:** Informed

4 BUDGETING

Budgeting for risk work is a critical component of effective risk management in a project. It entails calculating the costs related to risk management activities, allocating resources for risk management, including contingency funds in the project budget, and considering risk financing options. By doing this, project teams can ensure they have enough resources to handle risks over the course of the project.

The budget for risk work should be developed in conjunction with the overall project budget, taking into account the specific risks involved and the resources required to effectively manage those risks. This may involve adjusting the project schedule to allow for additional time for risk management activities, allocating team members' time to conduct risk assessments and develop risk response plans, and including contingency funds in the project budget to cover the costs of any unforeseen risks that may occur.

An approach to minimize the financial effect of potential risks is to consider possible risk financing options, such as insurance or other risk transfer mechanisms. To guarantee that there are enough resources for risk management activities and that any expenses connected with risks that do materialize are covered within the project budget, the budget for risk work should be constantly evaluated and modified throughout the project.

5 TIMING

Timing is a crucial aspect of risk management in a project. It involves establishing a schedule for reviewing and updating the risk management plan, risk register, and other risk-related documentation. By doing so, project teams can ensure that they are able to effectively identify, assess, and manage risks throughout the project lifecycle.

To establish a schedule for risk management activities, project teams should consider the complexity of the project, the level of risk involved, and other relevant factors. They should also establish a regular cadence for reviewing and updating the risk management plan and risk register, such as monthly or quarterly for the plan and weekly or bi-weekly for the register.

Tracking risks is another key aspect of risk timing in a project. This involves monitoring the likelihood, impact, and status of risks on an ongoing basis and updating the risk register accordingly. Project teams should also communicate risks regularly to relevant stakeholders, such as through risk status reports and other forms of communication.

Overall, establishing an effective schedule for risk management activities is crucial to ensuring that project teams can effectively manage risks and avoid potential project disruptions. By regularly reviewing and updating the risk management plan and risk register, tracking risks, and communicating risk status to relevant stakeholders, project teams can ensure that they are able to effectively manage risks throughout the project lifecycle

6 RISK BREAKDOWN STRUCTURE/ CATEGORIES

The Risk Breakdown Structure (RBS) is a hierarchical structure that helps in categorizing risks into different categories and offers a systematic approach to risk identification, evaluation, and management. Each level of the RBS reflects a risk category that might have an influence on the project.

Here are six possible categories that can be included in a RBS for the project:

Technical risks: There are risks associated with the technology and software systems utilized in the AutoDrive feature, including difficulties with hardware or software, cybersecurity threats, and system compatibility.

Operational risks: These are risks related to the day-to-day operations of the AutoDrive feature, such as human error, maintenance and repair issues, and supply chain disruptions.

Regulatory risks: There are risks associated with the following laws, regulations, and standards, such as liability concerns, data privacy regulation, and car safety requirements.

Environmental risks: These risks are connected to how the AutoDrive feature may affect the environment, including emissions, energy use, and waste management.

Financial risks: These are risks related to the project budget and funding, such as cost overruns, budget cuts, and changes in market conditions.

Schedule risks: There are risks that might affect the project schedule, such as delays, budget constraints, and unforeseen circumstances.

These categories can be used to ensure that all potential risks are identified and analyzed, and that appropriate risk management strategies are developed for each category. The RBS can also be integrated into the risk register by assigning each risk to the appropriate category and using the RBS as a reference to ensure that all risks are captured and appropriately managed throughout the project.

7 STAKEHOLDER RISK TOLERANCE

To determine the stakeholders' risk tolerance level, we will need to conduct a stakeholder analysis and engage with them to understand their expectations and requirements. The stakeholder analysis should consider the stakeholders' role in the project, their level of interest and influence, and their attitude towards risk. Some stakeholders may have a high tolerance for risk and may be willing to accept more significant risks to achieve higher rewards, while others may be risk-averse and prefer to minimize risk as much as possible.

Once we have identified the stakeholders' risk tolerance level, we can use it to guide how much risk management work needs to be done in the project. For example, if stakeholders have a low tolerance for risk, you may need to invest more time and resources in risk

identification, analysis, and mitigation strategies to minimize risk exposure.

In summary, the stakeholder risk tolerance level is a crucial factor in developing a risk management plan and understanding it will help us tailor the plan to meet stakeholders' expectations and requirements.

8 COMMUNICATION: REPORTING FORMATS

FORMAT	DESCRIPTION	COMMUNICATION CHANNEL
Risk Register	A document that lists all identified risks along with their likelihood, impact, backup plans, and current state.	shared via email, online project management tools, and project status meetings with the project team, stakeholders, and top management.
Risk Assessment Report	a brief report that analyzes possible risks, their likelihood, effects, and suggested countermeasures.	shared via email, project progress meetings, and presentations with top management and important stakeholders.
Risk Dashboard	a heat map of the risks and key risk indicators, as well as a visual	Using online project management tools and project status meetings, information is disseminated

	representation of the risks and their state.	to project team members, stakeholders, and top management.
Risk Response Plan	A comprehensive strategy that describes the risk response tactics, steps, roles, and due dates.	Email and project status meetings were used to communicate with the project team, stakeholders, and top management.
Risk Management Plan Risk	A detailed plan outlining the risk management strategy, duties and responsibilities, communication strategy, and risk management procedures.	Email, project status meetings, and project management tools were used to communicate with the project team, stakeholders, and top management.
Communication Plan	A strategy that outlines how to communicate with stakeholders about project hazards and risk mitigation measures.	Shared electronically with project team members and stakeholders.

RISK MANAGEMENT PLAN APPROVAL

The undersigned acknowledge they have reviewed the **Risk Management Plan** for the Mazda AutoDrive project. Changes to this Risk Management Plan will be coordinated with and approved by the undersigned or their designated representatives.

Signature:	KS	Date:	03/27/2023
Print Name:	Kiyotaka Shobuda		
Title:	Representative Director and Chairman of the Board		
Role:	Mandatory Approver		
Signature:	AM	Date:	03/27/2023
Print Name:	Akira Marumoto		
Title:	Project Sponsor		
Role:	Mandatory Approver		
Signature:	MO	Date:	03/27/2023
Print Name:	Mitsuru Ono		
Title:	Risk Analyst		
Role:	Mandatory Approver		

APPENDIX A: REFERENCES

The following table summarizes the documents referenced in this document.

Document Name and Version	Description	Location
Risk Management Plan	A risk management plan is a written document that describes the methods and procedures to be utilized to recognize, evaluate, and control risks in a project.	On Team members Machines
Risk Register	It is a crucial tool for systematically identifying, recording and keeping tabs on risks throughout a project's or an organization's life cycle.	On Team members Machines
Risk Matrix	A risk matrix is a visual tool that is used to assess and prioritize risks based on their likelihood and potential impact	On Team members Machines

Qualitative Analysis			
(The Risk of)	Reasoning (Caused by)	Resulting in	Impact
Intergration of software along with the hardware in the development	software code bugs and wireframes design errors	Increase of the timeline in development phase and longer testing phase in the project	High Impact: A delay in the final approval by 30 days and an additional cost of 450,000 USD will be incurred.
Auto pilot feature not detecting an object	Because of software system failure	This will affect the functionality of the system leading to performance issues.	Moderate Impact: Releasing of the product will get delayed by 20 days with an additional cost of 250,000 USD.
Conducting extensive research with better competitive analysis	performing a detailed analysis with a good Research & development team.	The reduction in project timeline and schedule along with the sustaining the brand name with improved quality.	Somewhat Low Impact: Building a better product which will result in early finish of the project by 10 days with a cost reduction of 110,000USD

QUALITATIVE ANALYSIS

Risk Score= Impact*Likelihood	Quantitative Analysis			Risk Action
	Impact	Probability	EMV Cost(USD)= Cost*Probability	
56	8	7	70% of 450,000 = \$315,000	Establishing a stringent approach for quality control that involves routinely testing and validating hardware and software components. Additionally, creating a thorough budget for the project that accounts for all expenses related to the integration of hardware and software. Spending should be regularly monitored, and the budget should be adjusted as needed to prevent cost overruns.
27	9	3	30% of 250,000 = \$75,000	By performing testing with real data, different items, and unexpected events. Working on system modifications, performing rigorous regression testing and evaluating the system's ability. Working closely with the programmers to make sure that the system is made to correctly identify objects and take care of any problems that are found during testing.
6	2	3	30% of 110,000 = \$33,000	By carrying out detailed research and doing an excellent competitive analysis, businesses may discover new competitors or emerging industry trends. While extensive research and competition analysis can be helpful for discovering opportunities and boosting business performance, they can also lead to a focus on present rivals and trends rather than on innovation or chasing new markets.

QUANTITATIVE ANALYSIS

APPENDIX B: KEY TERMS

The following table provides definitions for terms relevant to the Risk Management Plan.

Term	Definition
RBS(Risk Breakdown Structure)	The Risk Breakdown Structure (RBS) is a hierarchical structure that helps in categorizing risks into different categories and offers a systematic approach to risk identification, evaluation, and management.