Module 6 Portfolio Milestone: Design Methodology

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In risk management, a risk matrix, also called a probability-and-impact matrix, is a tool used to rate and prioritize a project's risks by mapping each risk within using a two-dimensional scoring system based on a probability metric defining the probability that a risk will occur and an impact metric defining the impact on project objectives if it does occur. This report provides a probability-and-impact matrix for Project Code base, as well as a synopsis of why each identified risk scenario is plausible (trigger context) and what the potential impact would be if the risk occurs.

Project Codebase Overview

From Module 5 Portfolio Milestone: Design Methodology Report (Ricciardi, 2025)

The goal of the Project Codebase development is to design and implement an intelligent platform (AI Agent + RAG system) that helps Omega.py software engineers and AI coding agents understand complex software architectures. It utilizes a Neo4j knowledge graph and a custom markup language, DE-ML, to store and extract context such as component relationships from software project code and related data.

Risk Matrix

The risk matrix uses a percent-based probability metric and a time/cost/quality impact metric. In a probability-and-impact matrix, each cell value represents a relative risk score, which is calculated as the product of the probability and impact values assigned to the risk (Probability × Impact).

Probability Definitions

The risk matrix probability metric is based on a percent-based ratings style that aligns with the Project Management Body of Knowledge (PMBOK® Guide) (PMI, 2021). Below is a percent-based definition of the different risk levels used to rate Project Codebase risks.

Risk probability level definitions:

- High (H): > 70%
- Medium (M): 30%–69%
- Low (L): < 30%

Note that these levels have presumably been set by stakeholder consensus (Ucertify, n.d.)

Impact Definitions

Same as the probability definitions, the risk matrix impact metric is based on a Time/Cost time/cost/quality ratings style that aligns with the PMBOK® Guide. Table 1 illustrates the impact level based on the three Project Codebase constraint values: time, cost, and quality, which are used to rate the severity of risk impacts.

Table 1

Risk Impact Level

Impact Level (I)	Time Impact	Cost Impact	Quality Impact
High (H)	> 3 months	> $250K	Significant impact on key functions
Medium (M)	4–12 weeks	$50K–$250K	Some impact on key functions
Low (L)	< 4 weeks	< $50K	Minor impact on key functions

Note: The table lists the different impact levels used to rate Project Codebase risk impacts.

The overall impact value is represented as a single value in the risk matrix, as H, M, or L.

Project Risk Rating Descriptions

Table 2 provides risk rating descriptions for each identified Project Codebase risk, including the assigned probability and impact levels, the primary risk owner, and the trigger context (rationale) used to justify the assigned ratings.

Table 2

Risk Rating Descriptions

Risk ID	Risk Scenario	Prob.	Impact	Owner	Justification & Trigger Context
R1	Data leakage and security breach	M	H	Marcus Thorne (Security Lead)	External AI model access + Security Lead explicitly flagging “massive data leakage” potential.
R2	Legal/IP noncompliance	M	M	Fiona Chen (Legal Counsel)	External AI introduces licensing/liability/IP constraints; legal sign-off can block or delay release.
R3	Network latency and reliability issues	M	M	Kevin Brooks (Network Admin)	Network admin anticipates an increase in traffic/latency/auth from RAG + APIs.
R4	Neo4j schema/ingestion complexity is causing rework	M	M	Linda Wu (Data Eng) + David Kim (Architect)	Data Engineer identifies integration risk; Knowledge Graph pipeline complexity can drive 4–12 week slips.
R5	RAG/agent quality and trust issues	H	M	Elena Vance (Lead AI Engineer)	AI/RAG generation results are “unknown/uncertain,” requiring monitoring and control; as hallucination/quality issues are common.
R6	VS Code extension integration delays & adoption issues	M	M	Sam Lopes (Lead Software Engineer)	VS Code delivery + Auth + Packaging are integration-heavy (WBS 4.0); issues often surface late in the lifecycle.
R7	Cost overrun from external AI token usage	M	M	Alex Ricciardi (PM) + Linda Roberts (CFO)	Token costs are labeled “volatile” and monitored weekly; it is a consumption-based pricing that could result in significant budget variance.
R8	Integration phase exceeding the 8-Week integration window	H	M	Alex Ricciardi (PM) + Sam Lopes (Eng. Leads)	Multiple gating activities (CI/CD, security, legal, E2E, go/no-go) happen during the Integration Window (WBS 5.0), creating a high risk of exceeding allocated time.
R9	Stakeholder resistance blocking	M	M	Alex Ricciardi (PM/CPO)	Several key stakeholders are currently categorized as "Resistant" (Security, Network, Data); this may create delays.

	approvals or asking for rework				
R10	Scope creep destabilizes the baseline	M	M	Alex Ricciardi (PM/CPO)	Project warns against "Gold Plating" or expansions beyond the defined VS Code plugin scope.
R11	Skills gap and ramp-up delays	M	M	Alex Ricciardi (PM)	Budget includes funded bootcamp/training, indicating a credible risk of ramp-up delay.

Note: The table illustrates the risk rating descriptions, owners, and justifications for the identified Project Codebase risks. From "" ()

Risks Matrix

The matrix used for this project is a 3x3 matrix including Severity (columns) and Probability (rows). See Table 3 for the table definition.

Table 3

Risk Matrix Definition

Probability \ Severity	**Negligible (L)** *Less-than-minor injury/system damage; easily controlled*	**Moderate (M)** *Moderate-to-severe injury/system damage; requires immediate corrective action*	**Critical (H)** *Death or major system loss; requires immediate termination of activity*
Plausible (H) *Very likely to occur)*	Medium	High	High
Occasional (M) *Likely to have some modicum of occurrence*	Low	Medium	High
Implausible (L) *Very unlikely to occur*	Low	Low	Medium

Note: The table illustrates, based on probability and severity, the overall risk level. From "Module 6: Risk and Progress Management" (CSU Global, n.d.), modify.

The Low/Medium/Critical rating can be defined as follows:

A Low risk is a risk that needs monitoring; it may go on a watchlist.
- Occasional (M) x Negligible (L) → Low
- Implausible (L) x Negligible (M) → Low
- Implausible (L) x Moderate (M)→ Low

A Medium risk is a risk that needs a mitigation plan and periodic tracking.
- Plausible (H) x Negligible (M) → Medium
- Occasional (M) x Moderate (M) → Medium
- Implausible (L) x Critical (H) → Medium

A High risk is a risk that needs immediate attention.
- Plausible (H) x Critical (H) → High
- Plausible (H) x Moderate (M) → High
- Occasional (M) x Critical (H) → High

Table 3
The Risk Matrix

Probability \ Severity	**Negligible (L)** *<4 weeks, <$50K, minor impact on key functions*	**Moderate (M)** *4–12 weeks, $50K–$250K, significant impact on key functions*	**Critical (H)** *>3 months, >$250K, critical impact on key functions*
Plausible (H) *>70% (very likely)*	--- (Medium)	R5, R8 (High)	--- (High)
Occasional (M) *30%–69% (possible)*	--- (Low)	R2, R3, R4, R6, R7, R9, R10, R11 (Medium)	R1 (High)
Implausible (L) *<30% (unlikely)*	--- (Low)	--- (Low)	--- (Medium)

Note: The table illustrates the prioritization of Project Codebase risks by mapping them into the matrix based on their assigned probability and impact ratings

Matrix Synopsis

The following matrix synopsis justifies the overall rating of each scenario by explaining why the risk can occur for each scenario, by summarizing the potential impact if the risk materializes, in terms of time, cost, and quality.

High-Risk Scenarios

R1 - Data leakage and security breach (M x H).
This scenario risk is occasionally plausible, as one of the core functionalities of Project Codebase involves sending code snippets and sensitive documentation to external AI model providers. This functionality could trigger an incident that can have a high impact with catastrophic consequences on the project deployment, resulting in rework of the data flows and security processes. If implemented, the rework would cause the three-month timeline overrun, and costs could exceed $250K because of it. Therefore, this scenario has an overall risk rating of high, requiring immediate termination of the activity and immediate remedy if it occurs.

R5 - RAG/agent quality and trust issues (H x M).
This scenario is highly plausible as LLM models can generate incorrect outputs referred to as AI hallucinations. Project Codebase's main goal is to help engineers understand a software architecture and query codebases; however, if the AI queries provide misrepresented relationships or hallucinated responses, users will likely lose trust in the system. This impact is moderate-to-serious and usually requires a 4–12 week period to fix, and adds costs for validation and testing processes. Therefore, this scenario has an overall risk rating of high, needing monitoring and immediate attention if it occurs.

R8 - Integration phase exceeds the 8-week integration window (H x M).
This risk is highly plausible as the integration requires the implementation of dependencies such as CI/CD, security modules, legal sign-off, end-to-end testing, and go/no-go readiness that may

cause significant delay and add hidden costs. If this occurs, the impact is moderate as implementing solutions for integrations will add cost and exceed the integration phase allocated time, and delay the release by several weeks. Therefore, this scenario has an overall risk rating of high and needs monitoring and immediate attention if it occurs.

Medium-Risk Scenarios

R2 - Legal/IP noncompliance (M x M).
This scenario is occasionally plausible, as exterior AI coding agent providers and local AI agent automated processing of code/documentation can create licensing, confidentiality, and intellectual property issues needing legal and regulatory reviews. This functionality could trigger an incident that can have a moderate impact on the release of the application, that is, until contracts with the AI coding agent providers and legal and regulatory compliance are implemented. Additionally, the needed rework may include restricting what content is processed, adding user guidance, or switching AI providers, resulting in a 4–12 week slippage over the set timeline. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

R3 - Network latency and reliability issues (M x M).
This scenario is occasionally plausible, as Project Codebase depends on multiple services such as the VS Code extension, backend services, Neo4j queries, and external API calls. These services' functionality could trigger network traffic and latency issues. Moreover, if the application becomes slow or unreliable due to these issues, Omega.py software engineers may avoid using it. This impact is moderate as performance issues can require network and resource upgrades or architectural changes, delaying the project release. Additionally, the project cost may also rise due to the upgrades and rework needed. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

R4 - Neo4j schema/ingestion complexity causing rework (M x M).
This scenario is occasionally plausible, as knowledge graphs are complex data structures. Software architecture modeling includes identifying components and their relationships; therefore, identifying and performing ingestion of these elements as nodes and relationships within a knowledge graph is a complex process. This functionality could trigger an incident where the knowledge graph schema queries or injections are incorrect. If this occurs, the impact of it is moderate as the Omega.py internal AI agent needs to be adjusted/better trained/better prompted. Additionally, this can cause 4–12 week delays and may add engineering and infrastructure costs if the solution requires additional resources. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

R6 - VS Code extension integration delays and adoption issues (M x M**).**
This scenario is occasionally plausible, as the delivery of the application is constrained to only VS Code IDE environment. This functionality could trigger authentication conflicts and integration issues with Project Codebase backend services. This impact is moderate as it may

create delays from debugging VS Code environment issues, login/authentication processes, or reworking UI/UX. Additionally, this may to the cost of the project due to the needed rework. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

R7 - Cost overrun from external AI token usage (M x M).
This scenario is occasionally plausible, as the price of (external AI coding agent) tokens is based on usage and can change based on the size of the prompts and conversation context size. This functionality could trigger an incident that increases cost significantly, as IDE AI agentic coding workflow usually requires numerous frequent API calls to the providers. This impact is moderate as the team may need to enforce quotas, restrict context/prompt size, cache results, or use cheaper AI models. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

R9 - Stakeholder resistance blocking approvals or demanding rework (M x M).
This scenario is occasionally plausible, as some of the stakeholders have expressed resistance (security, network, and data roles). Stakeholders' resistance can take the form of delayed reviews, added acceptance criteria, or requests for additional information that can slow down design decisions. This impact is moderate; these stakeholders' resistance can result in schedule delays with a range of 4–12 weeks. Additionally, they can also increase the project cost due to rework. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

R10 - Scope creep destabilizes the baseline (M x M).
This scenario is occasionally plausible, as Project Codebase is a novel platform and stakeholders may request additional features as the project progresses (for example, a new IDE or browser support). The impact of this scenario is moderate as the scope baseline is destabilized by scope creep. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

R11 - Skills gap and ramp-up delays (M x M).
This scenario is occasionally plausible, as the project needs specialized skill areas such as RAG/agent engineering, Neo4j graph modeling, ingestion tooling, security/compliance controls, and VS Code extension development. Even with training, teams need time to share knowledge and implement new acquired skills. This impact is moderate as skill gaps can emerge, unknown issues appear, affecting the quality, the cost, and delivery of the project. Therefore, this scenario has an overall risk rating of medium, needing monitoring and immediate attention if it occurs.

References

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