Codacity - Automated Code Review System

Presented to: Dr. Joumana Dargham

Submitted by: Team 9
Darsh Patel - 40232273
Prachi Kalpeshbhai Patel - 40291762
Krishna Alpeshkumar Patel - 40232651
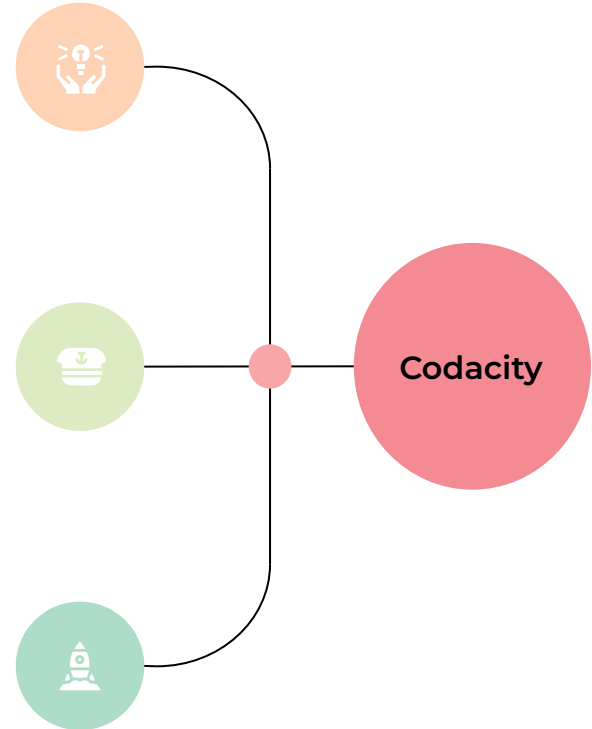Rikin Dipakkumar Chauhan - 40269431
Bharti Chhabra - 40294202

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Introduction

Problem

Did you know **80%** of software bugs are caused by poor reviews?

Manual code reviews are slow, inconsistent, and prone to human error.

Opportunity

Organizations need **faster, reliable, and scalable solutions** to ensure code quality in CI/CD workflows.

Solution

Codacity: a robust AI-driven code review system offering **real-time feedback, seamless integrations,** and unmatched consistency.

Market Analysis

Market Growth

The global software development market is growing at **10%+ annually,** driven by the increasing need for digital transformation.

Cost of Poor Code Quality

Average data breach costs:

$10.93M in healthcare.

$5.97M in finance.

Metric	Value	Source
Market Growth Rate	10%+ CAGR	Statista
Cost of Poor Code Quality	$10.93M (healthcare)	IBM Data Breach Report 2023
Automation Adoption Rate	85% of DevOps teams	GitLab DevSecOps 2023

Assess the feasibility and viability of Codacity

Technical Feasibility

Evaluates whether the chosen technology stack, infrastructure, and integrations can support Codacity's requirements.

Includes the use of Python, TensorFlow, Django, React, cloud hosting, and secure APIs.

Operational Feasibility

Focuses on how Codacity will integrate into existing workflows without disrupting productivity.

Covers changes in roles, training needs, and strategies for smooth user adoption.

Economic Feasibility

Assesses whether the project is cost-effective in the short and long term.

Includes cost breakdown (development, operations) and revenue projections to determine ROI.
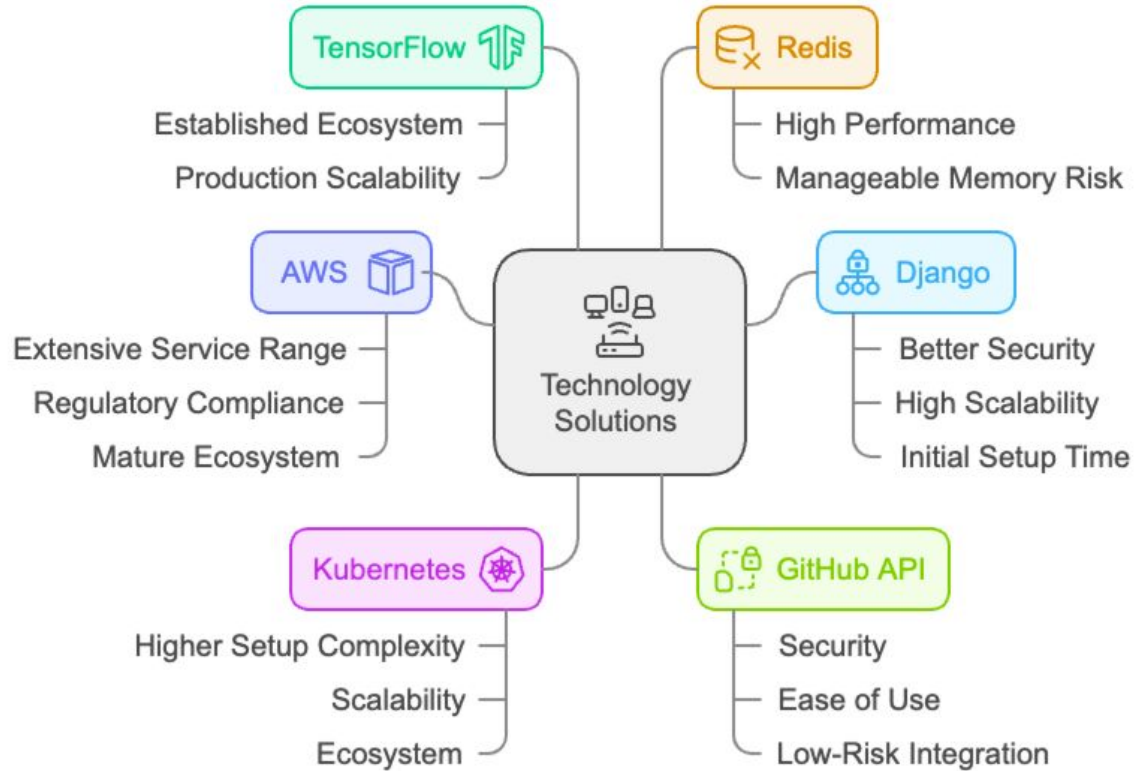
Technical Feasibility

Technology Stack

Python, TensorFlow, Django, React

Infrastructure

Cloud hosting (AWS/Google Cloud), GPU-accelerated servers

Security Measures

TLS/SSL encryption, RBAC, MFA

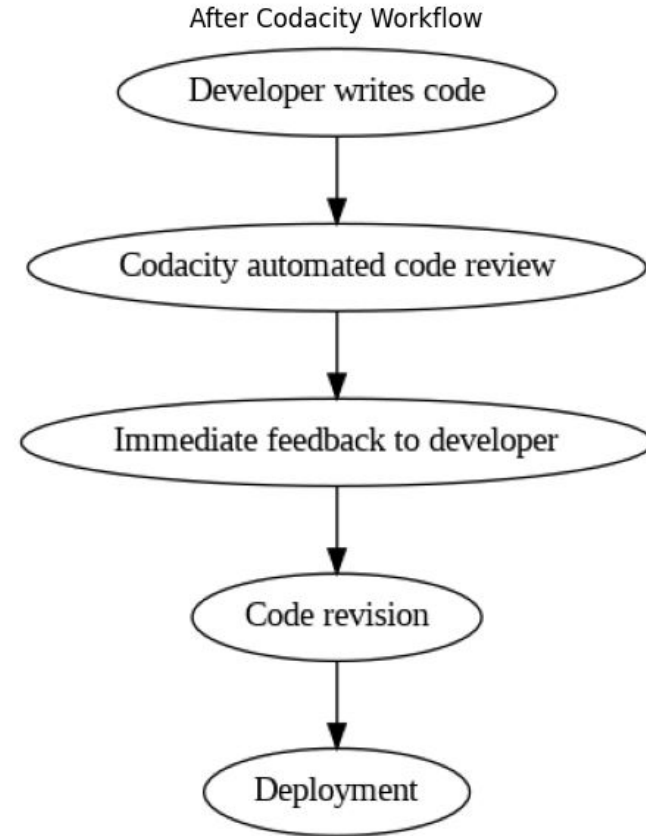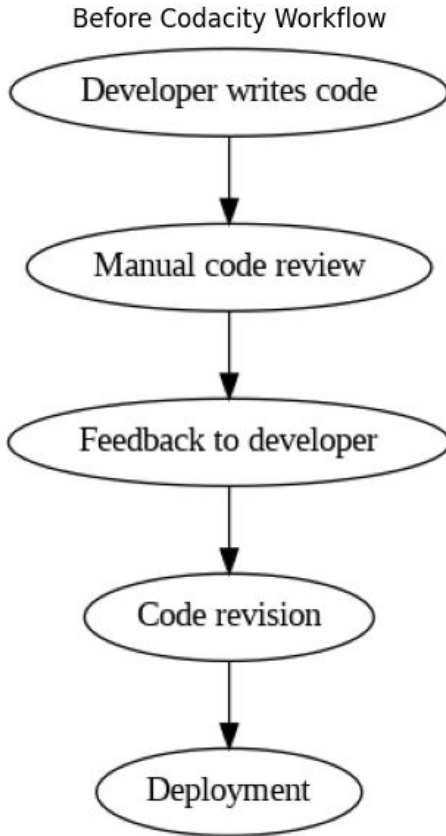*Selected technology Reward visual Representation*

Operational Feasibility

Workflow Improvements

- Automated real-time code reviews
- Reduced developer workload on manual reviews
- Immediate feedback for faster issue resolution

User Adoption

- Gradual rollout with targeted training and phased feature introduction

Before Codacity Workflow

- Developer writes code
- Manual code review
- Feedback to developer
- Code revision
- Deployment

After Codacity Workflow

- Developer writes code
- Codacity automated code review
- Immediate feedback to developer
- Code revision
- Deployment

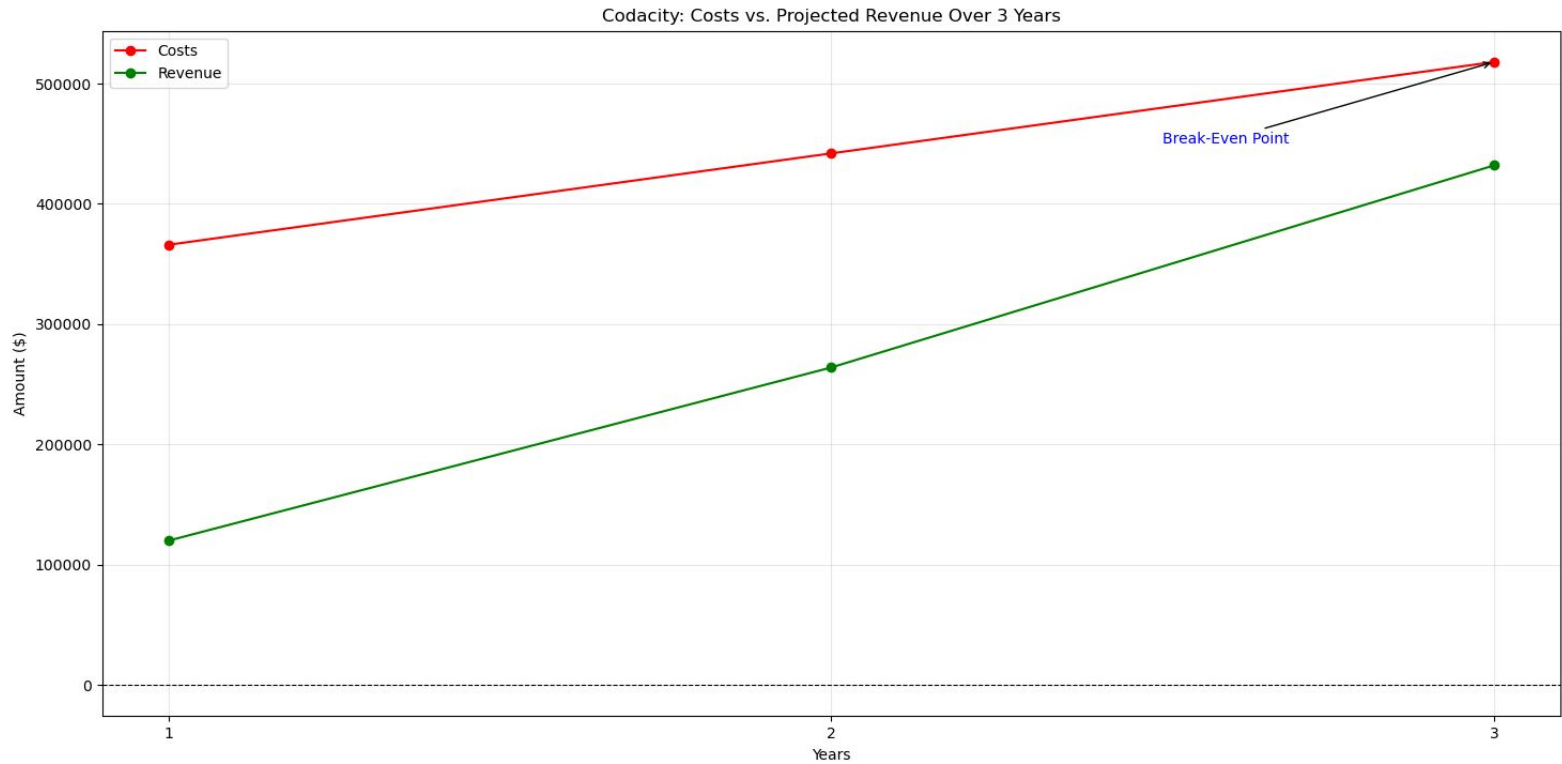*Workflow chart before and after Codacity implementation*

Economic Viability

Cost Analysis

- Development costs: $366,000 (team, tools, infrastructure)
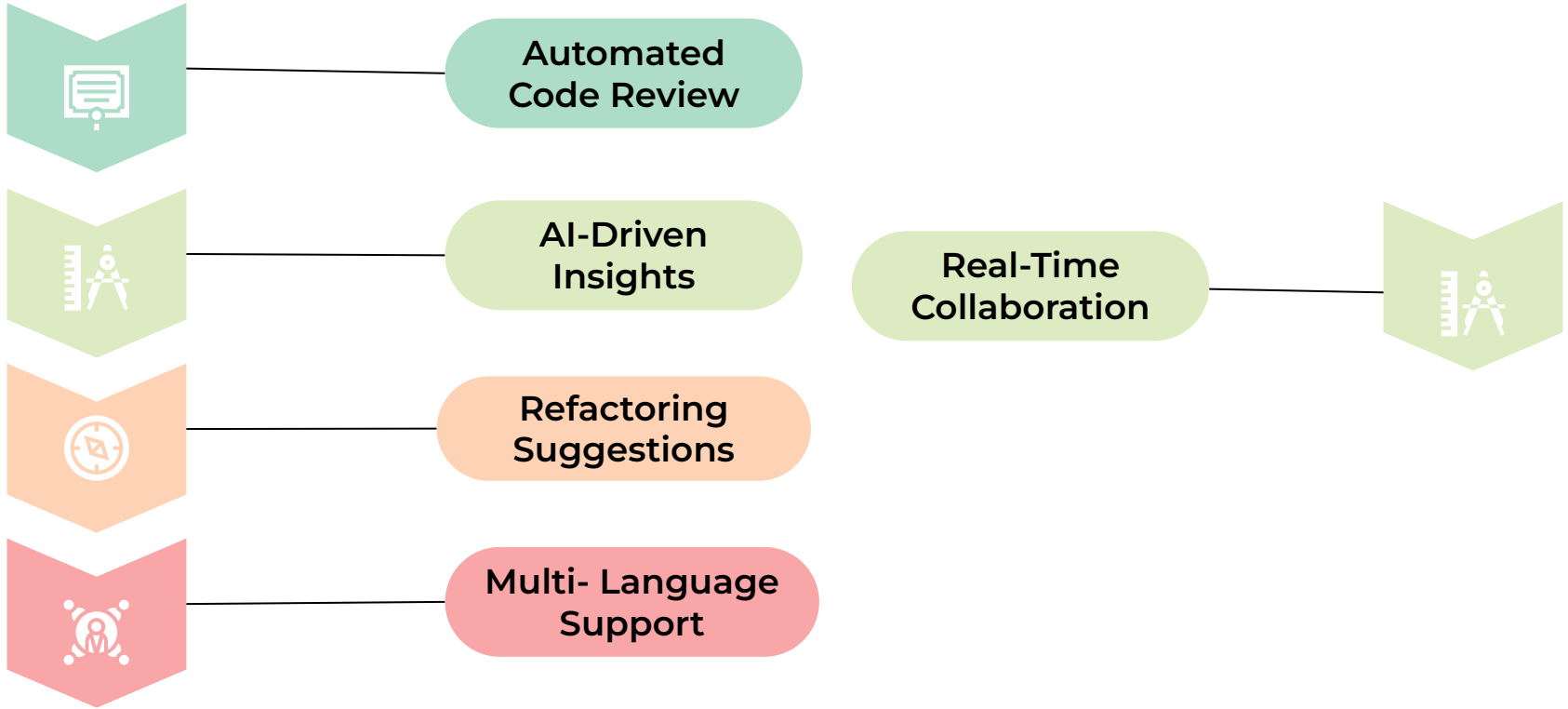- Operational costs: $76,000/year (hosting, support, maintenance)

ROI & Revenue Streams

- Subscription-based model at $200/month/team
- Break-even in ~3 years with scalable growth

Graph illustrating costs vs. projected revenue over three years

Solution Highlights

Automated Code Review

AI-Driven Insights

Real-Time Collaboration

Refactoring Suggestions

Multi- Language Support

Project Plan

Gantt Chart with Key Milestones and Vertical Indicators for Codacity Project
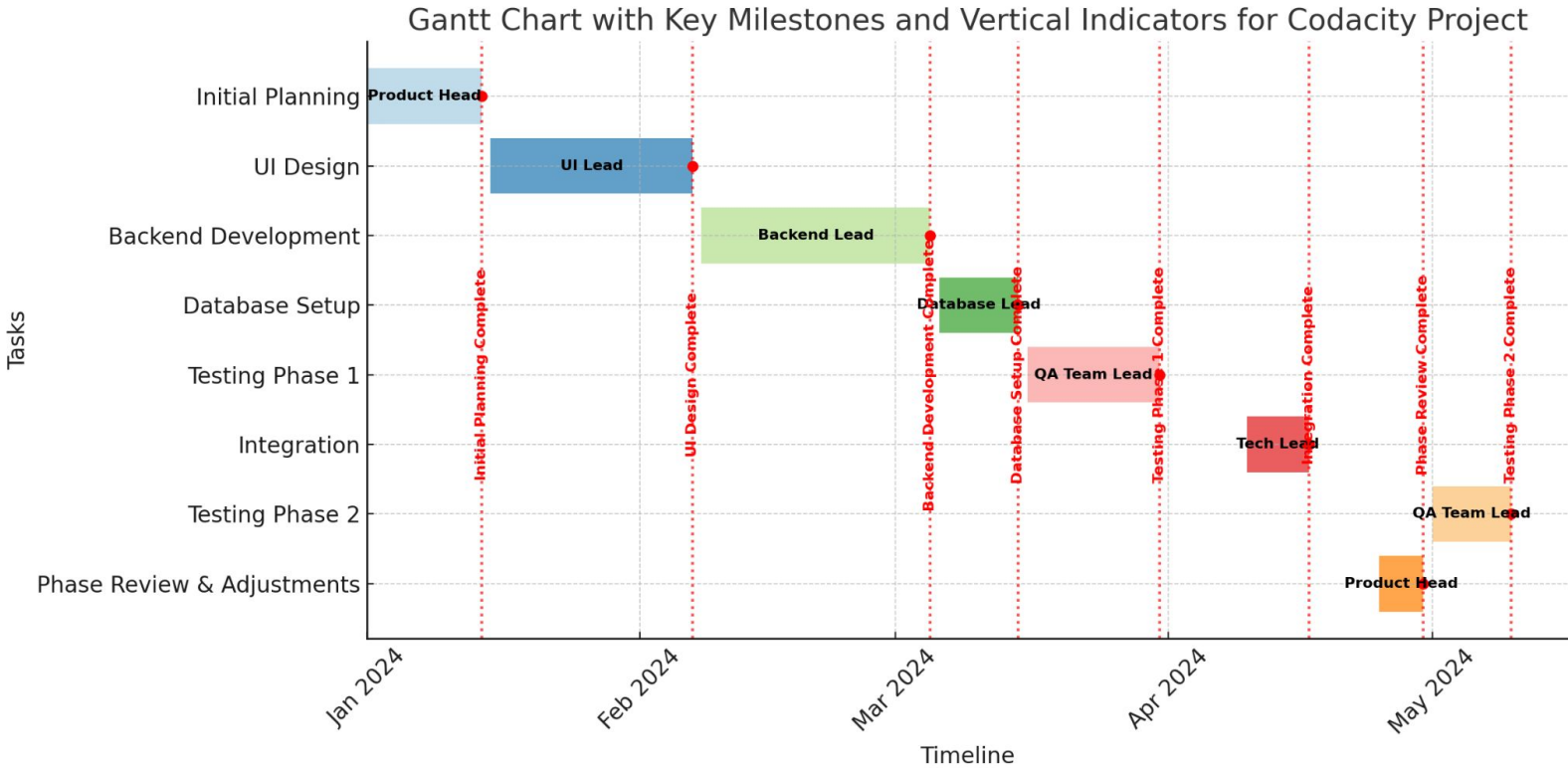
Resource Allocation

- Development team focused on backend, frontend, and AI/ML components (70% of resources).
- QA team dedicated to testing and debugging (20% of resources).

Risk Assessment

Technical

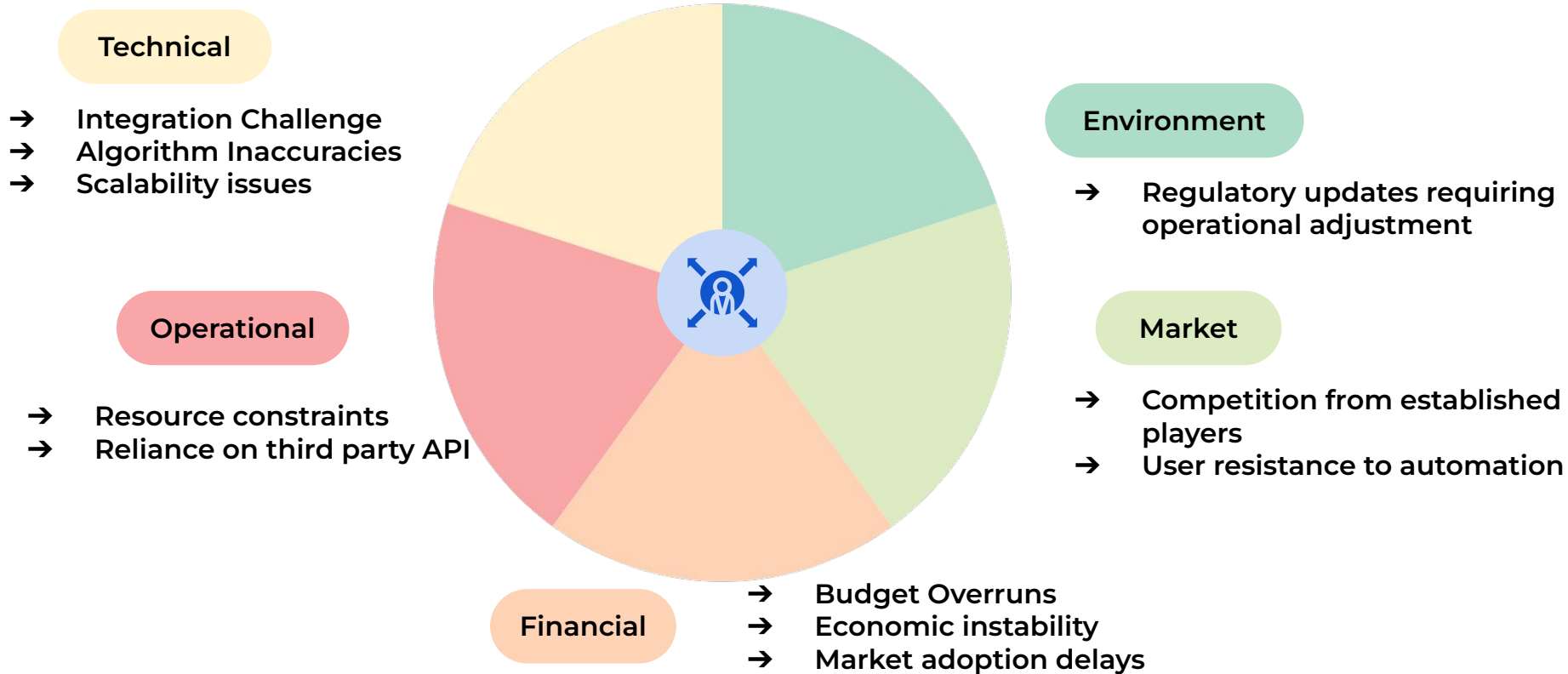➔ Integration Challenge
➔ Algorithm Inaccuracies
➔ Scalability issues

Operational

➔ Resource constraints
➔ Reliance on third party API

Environment

➔ Regulatory updates requiring operational adjustment

Market

➔ Competition from established players
➔ User resistance to automation

Financial

➔ Budget Overruns
➔ Economic instability
➔ Market adoption delays

Risk Impact Analysis - Prioritized Risk

Risk	Impact	Likelihood
Data Security & Compliance Risk	Very High	Moderate
Algorithm Inaccuracy & ML Model Adaptability	Very High	High
Integration Complexity with CI/CD	High	Moderate
Increased Competition in Automated Code Review Solutions	High	High
Budget Overruns	High	Moderate

Risk Mitigation & Contingency Plan

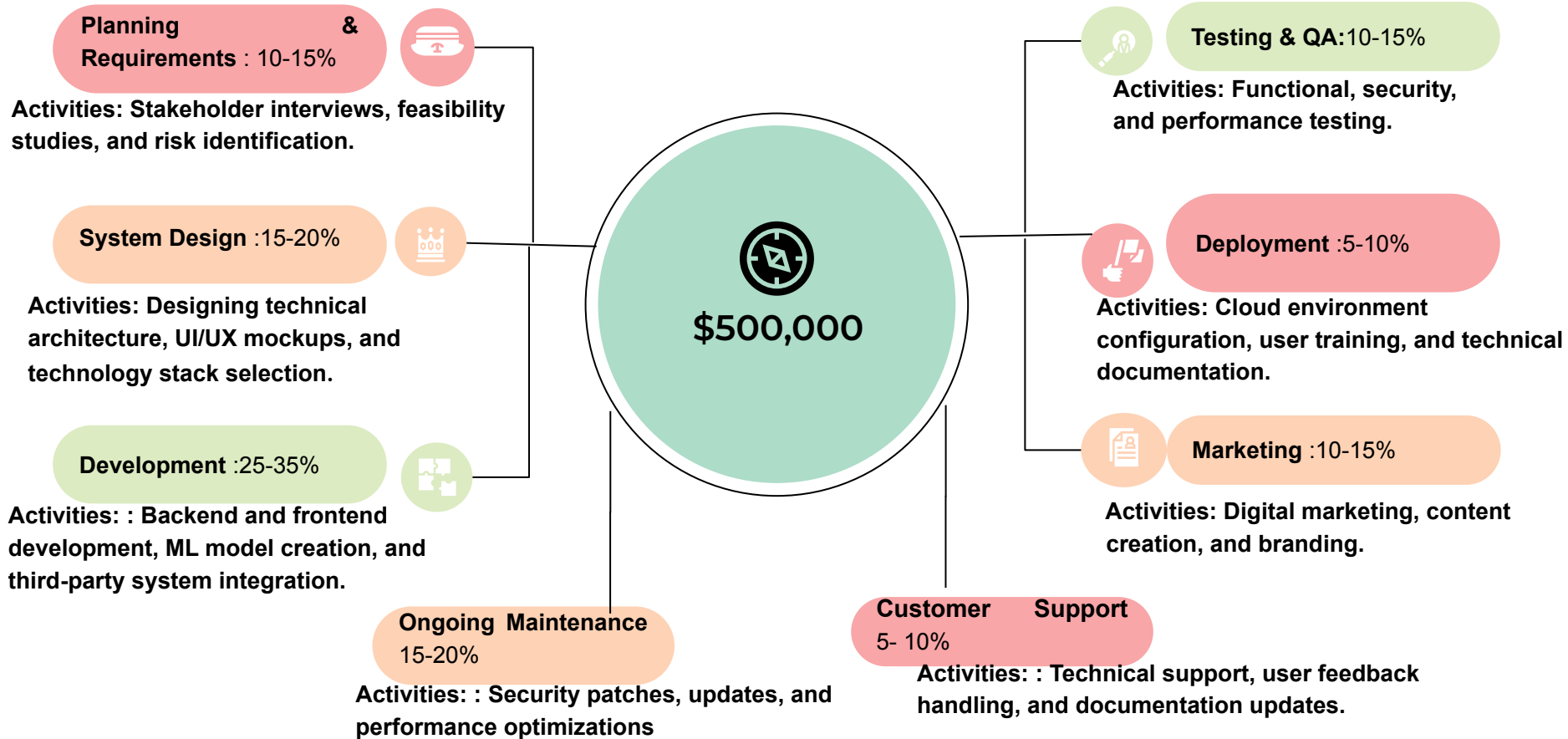| **Data Security Risk**	**Algorithm Inaccuracy**	**CI/CD Integration**	**Market Competition**	**Economic Stability**	**Budget Overrun**
Use robust encryption, regular audit & compliance partnership	Train ML model with real-world data and regular updates.	Modular architecture with compatibility testing for seamless integration	Incorporate user-driven features and highlight unique selling point	Offer flexible pricing model to retain customer during challenge	Establish a contingency fund and monitor allocation regularly

Contingency Plan
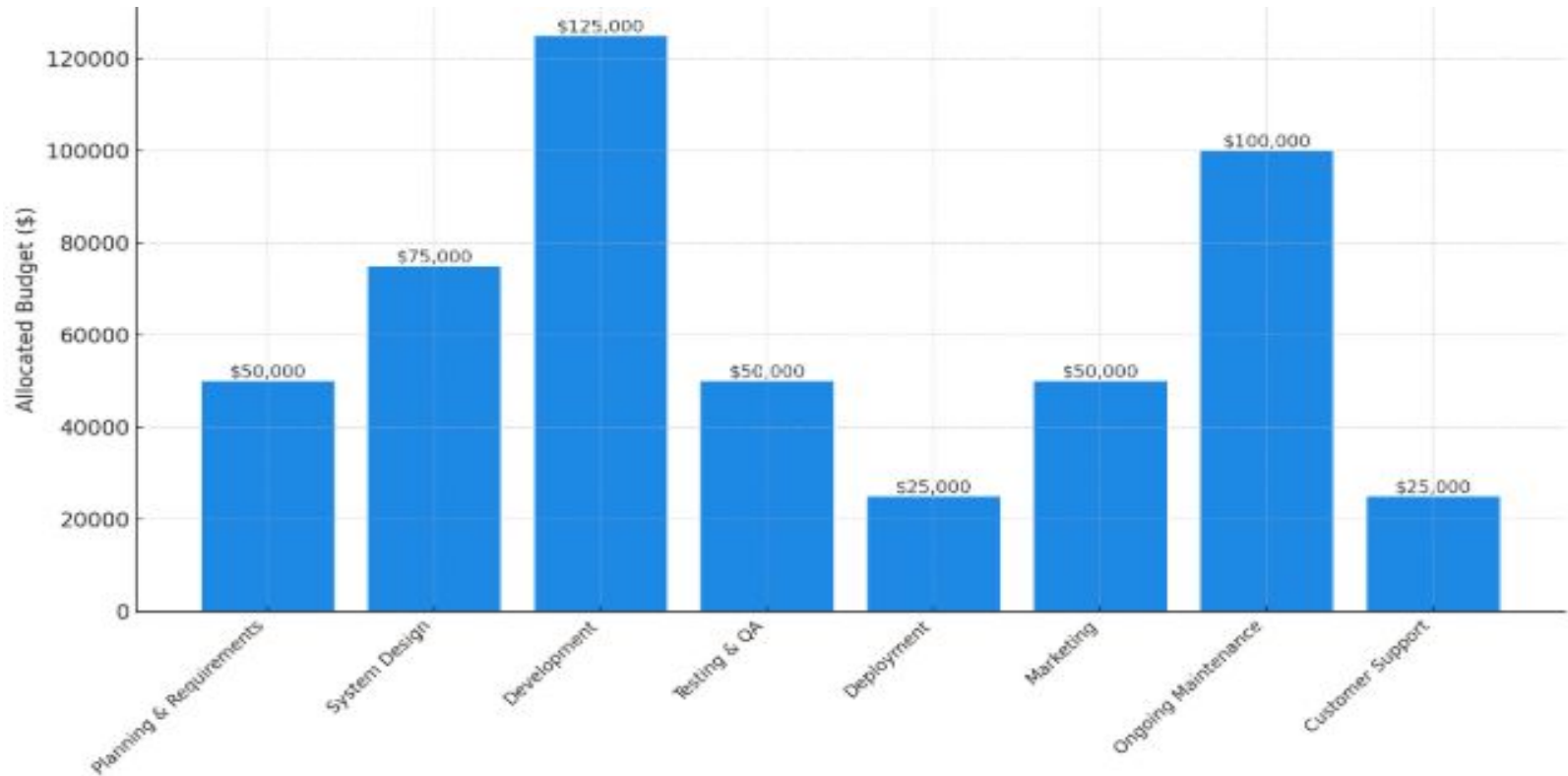
20% of budget for unseen issues (testing delays, scope creep).

Budget Breakdown

Planning & Requirements : 10-15%

Activities: Stakeholder interviews, feasibility studies, and risk identification.

System Design :15-20%

Activities: Designing technical architecture, UI/UX mockups, and technology stack selection.

Development :25-35%

Activities: : Backend and frontend development, ML model creation, and third-party system integration.

$500,000

Ongoing Maintenance 15-20%

Activities: : Security patches, updates, and performance optimizations

Testing & QA:10-15%

Activities: Functional, security, and performance testing.

Deployment :5-10%

Activities: Cloud environment configuration, user training, and technical documentation.

Marketing :10-15%

Activities: Digital marketing, content creation, and branding.

Customer Support 5- 10%

Activities: : Technical support, user feedback handling, and documentation updates.

Total Cost Breakdown

43.86 %

Human Resources

5 Backend Developer,
4 Frontend Developer
3 Quality Analyst,
2 ML/AI Developer
1 Project Manager

20%

Contingency Plan

AI/ML Development & Testing
CI/CD & Multi-Language Integration
Security Compliance & Audits
Scope Creep
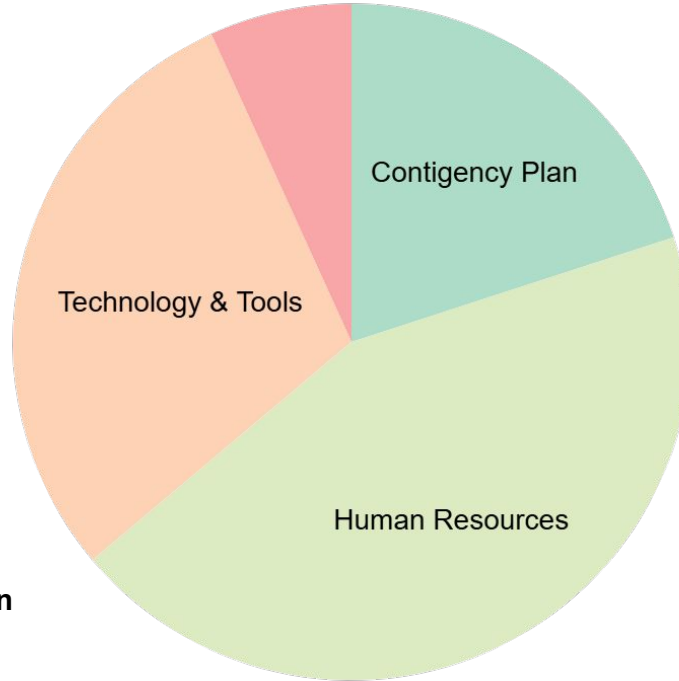
29.36%

Technology and Tools

Cloud Hosting
AI/ML tools: TensorFlow
CI/CD Tools:Jenkins,Git
Testing tools:Selenium,
JIRA)

6.8%

External Services

Security Consultant
Marketing Agency

Pie chart segments: Contigency Plan, Technology & Tools, Human Resources

Budget Allocation on Human Resources

5 **Backend Developers**

$90/hour : per hour cost
TotalCost: $90/hour × 160 hours/month × 5 PM = $72,000

4 **Frontend Developers**

$90/hour : per hour cost
TotalCost:$90/hour × 160 hours/month × 4 PM = $57,600

2 **QA/Testers**

$75/hour : per hour cost
TotalCost:$75/hour × 160 hours/month × 2 PM = $24,000

3 **AI/ML Engineers**

$100/hour : per hour cost
TotalCost: $100/hour × 160 hours/month × 3 PM = $48,000

1 **Project Manager**

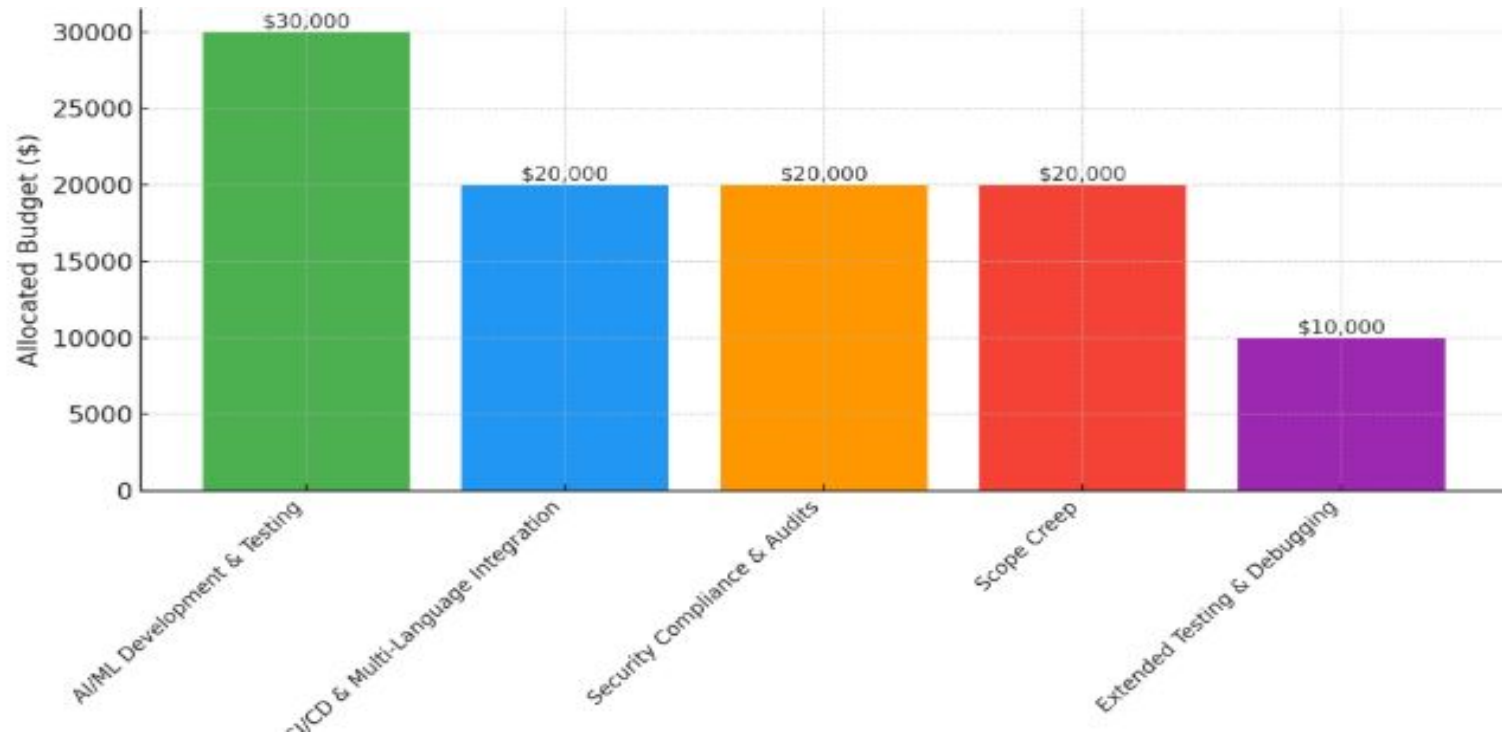$110/hour : per hour cost
TotalCost:$110/hour × 160 hours/month × 1 PM = $17,600

160 hours/month is used as a standard for full-time work, assuming 40 hours per week over 4 weeks.

Total Buget on Human Resources: $219,200 = 43.86% of total project budget

Contingency Plan Cost Allocation