COMP 4050 – Group Assignment 4

Risk Management Plan

November 10, 2023

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Introduction

The purpose of this document is to identify, describe, and provide a plan to respond to risks associated with the Chinese Railway Passenger Reservation System project provided as a case study for Chapter 2 in the *Quality Software Project Management* textbook. A total of 20 risks will be presented; at least one risk will be provided for each of the 12 categories outlined in Chapter 18 of the textbook. The risks will then be ranked from high to low, with added justification on why the risks are prioritized the way they are. Lastly, a response plan for the top 5 risks will be given which will include the person responsible for mitigating the risk, the response strategy, the action plan, and the required resources.

The following acronyms are used throughout this document:

- CRM – Chinese Railroad Ministry
- CASE – Computer Aided Software Engineering
- OOP – Object Oriented Programming

Risk Identification

Risk#	Category	Risk Event	Description	Probability	Loss	Exposure
R1	Mission and Goals	Reputational Damage	Our company prides itself on selling exceptional software products. If we take on this project, we must rely on the capability of the software development professionals provided by the CRM as we are not permitted to use our own developers. If the result of the project is subpar, this will reflect badly on the company's reputation and its employees who are dedicated to releasing high quality software.	0.1	$1,000,000	$100,000
R2	Organization Management	Internal Communication Difficulty	Our company is highly layered with adequate resources to finish the project. However, specialists for our project team are located in	0.1	$50,000	$5000

			different countries which will require constant communication. Also, there are numerous types of specialists, each with a specific skill set, so it may be difficult to determine who to discuss things with to solve a certain problem.			
R3	Customer	Intermediary Interference for Customer Information	We are allowed to interview whatever customers and end-users we require to develop the project but must do so through an intermediary (the AsiaPac marketing manager). Thus, user requirements and feedback may be filtered by the time the management team receives it, resulting in inaccurate or ambiguous information.	0.15	$200,000	$15,000
R4	Customer	Language Barrier	There is an obvious language barrier between Chinese end users and the people involved in the project who do not speak Mandarin and/or Cantonese. Despite having Chinese team members who are excellent English speakers, important details and nuances (for things like user requirements and feedback) may get lost in translation.	0.25	$250,000	$62,500
R5	Customer	Bias from Non-Diverse Customer Groups	We need access to a wide range of future customers who will most likely use the software. If we interview mostly people who buy train tickets traditionally, we may find that our list of required features is insufficient. If we interview mostly people who buy train	0.1	$200,000	$20,000

			tickets online, we may end up designing features that are too complicated for others to navigate. Either of these two scenarios can result in a decrease in the customer base.			
R6	Development Environment	Limited hardware and software support	The hardware and software provided by the CRM might not be robust enough to provide a stable development environment. Without adequate hardware and software support as a foundation for the project, the development process may be hindered, and schedule delays may occur.	0.6	$400,000	$240,000
R7	Staff	Low-productivity development team	Communication throughout the project relies on interpreters communicating with local programmers who do not speak English. Not knowing if information is being accurately conveyed can lead to inefficiencies in the software development team.	0.2	$300,000	$60,000
R8	Staff	Uncertainty about team capabilities	The local programmers don't have a lot of experience with object-oriented development. Local programmers will have to overcome a learning curve, and there is the chance that they may not be able to adapt the knowledge to properly develop the system.	0.3	$300,000	$90,000
R9	Maintenance	Lack of Debugging Capability	The local programmers might not fully understand all the details of the telecommunication technology recently acquired in China. They may face issues when	0.2	$200,000	$40,000

			trying to fix a bug in the software after the project is deployed and in the hands of customers.			
R10	Maintenance	Limited Vendor Support	The CRM doesn't provide a plan for long term vendor support with sufficient funding and resources for service maintenance or system updates to satisfy the growth of users.	0.2	$200,000	$40,000
R11	Schedule	Training	Our company's training plan, which involves all the software development organizations being trained within the next 15 months, may take longer than projected.	0.05	$500,000	$25,000
R12	Schedule	CASE tool	The project plan and prototype are projected to be finished in 90 days. However, with the CASE tool being recently acquired, there may be unforeseen issues that affect this timeline.	0.2	$100,000	$20,000
R13	Budget/Cost	Developer experience	The local programmers aren't well versed in OOP and lack typical software engineering skills; money may have to be spent on growing the team or providing additional training.	0.4	$200,000	$80,000
R14	Budget/Cost	Support for Telecommunications Software	China has recently been able to buy telecommunications software from the US. Additional hardware and software support may need to be implemented to make use of this new infrastructure within the reservation software to enable the transmission of data concerning train ticket sales, arrival times, etc.	0.2	$200,000	$40,000

R15	Project Content	Localization of Documents	When translating documents between English and Chinese, important details may be lost in the process.	0.75	$300,000	$225,000
R16	Development Process	Development Documentation	A mismatch between translation and communication can lead to inconsistent deliverables.	0.25	$150,000	$90,000
R17	Performance	Test capability	The developers have little to no knowledge of OOP, which limits the ability to test different modules sufficiently.	0.4	$250,000	$100,000
R18	Development Process	Use of defined engineer process	The development process proposed by the project managers may not be familiar to the local developers which can lead to unproductive development time.	0.2	$140,000	$28,000
R19	Project Management	Language barrier	There is a limited number of technical developers on the team who speak English. Miscommunication may occur between the project managers and the dev team, resulting in significant technical debt and delays.	0.2	$200,000	$40,000
R20	Performance	System Scalability	With an annual volume of 1.2 billion rides, the system must undergo at least 3.8 million reservations daily. During peak hours, the system may experience severe latency or crash altogether.	0.3	$350,000	$105,000

Risk Prioritization

We have decided to create three categories for prioritizing all 20 risks: high priority, medium priority, and low priority. Each risk falls within one of the three categories based on its risk exposure such that:

- **High** priority risks have a risk exposure that is equal to or greater than $100,000
- **Medium** priority risks have a risk exposure between $50,000 - $100,000
- **Low** priority risks have a risk exposure that is equal to or less than $50,000

The reason for using risk exposure as the primary measure for ranking the various risks is because it strikes a balance between the probability of a risk occurring and the actual cost it incurs. Categorizing risks with relatively high probabilities as high priority may result in a response plan that focuses too much on risks with relatively low loss costs; we would end up planning to mitigate multiple risks that are highly likely but have minor impacts on the project. On the other hand, focusing solely on the loss cost for risk prioritization may result in preparing risk mitigation for events that have such a low probability of occurrence that the effort and resources could be better spent elsewhere. By using risk exposure, we can get the best of both worlds, combining the likelihood and the cost to determine a more accurate estimate of the overall potential damage associated with each risk.

All 20 risks with their corresponding risk exposure and priority level are listed below in descending order:

High Priority (>= $100,000)

R6 ($240,000)

R15 ($225,000)

R20 ($105,000)

R1 ($100,000)

R17 ($100,000)

Medium Priority ($50,000 - $100,000)

R8 ($90,000)

R16 ($90,000)

R13 ($80,000)

R4 ($62,500)

R7 ($60,000)

Low Priority (<= $50,000)

R2 ($50,000)

R9 ($40,000)

R10 ($40,000)

R14 ($40,000)

R19 ($40,000)

R18 ($28,000)

R11 ($25,000)

R12 ($20,000)

R5 ($20,000)

R3 ($15,000)

Response Plan

From the ranking system provided in the previous section, we are able to identify the top 5 risks: **R1**, **R6**, **R15**, **R17**, and **R20.** The response plan for these key risks is outlined below:

Risk #	Risk Event	Responsible Person	Response Strategy	Action Plan	Resources
R1	Reputational Damage	Project Manager	Mitigating	Communicate with those directly involved with the development of the previous train ticket reservation software (which failed miserably). Gain insight from the challenges they faced to avoid the same pitfalls in this project.	$20,000 budget for contacting and holding meetings with developers, project managers, business managers, and HR personnel.
R6	Limited Hardware and Software Support	Project Manager	Avoiding	Verify functionality of the software tools and test the capability of the hardware before development. Purchase licenses for updated software tools. Import robust hardware.	$20,000 budget for updating hardware and purchasing additional software. Hire an expert to test the software and

					hardware sufficiently.
R15	Localization of Documents	Development Manager	Mitigating	Create a training initiative to familiarize translators with technical terminology.	$15,000 budget for a language training program. Hire a professional translator.
R17	Test Capability	Lead Developer	Mitigating	Conduct frequent meetings for code review. Implement a training program to facilitate the learning of OOP for programmers.	$10,000 budget for developer training programs. Provide tutorials and other learning material.
R20	System Scalability	Lead Developer	Mitigating	Spend more resources during the architecture design phase. Periodically assess the system to determine its capability for load balancing.	$10,000 budget for extended design efforts. Consult with an expert in load balancing tests to design sufficient tests.

Conclusion

The top 5 risk events for this project were found to be reputational damage, limited hardware and software support, localization of documents, test capability, and system scalability. The high-level risks that arise from this project are mainly due to the severe limitations that are placed on the team from the beginning as well as the need to overcome challenges we have not faced before:

1) We are only allowed to use the personnel and equipment provided by the CRM.
2) We are limited to a 4-person management team.
3) There is a clear language barrier between our English-speaking team and the Chinese employees which will complicate communication efforts, team-oriented tasks, and internal documentation.
4) The programmers provided by the CRM are inexperienced with software engineering and will likely require intensive guidance.
5) The number of concurrent users the software must support is massive, and we have never built a project of this magnitude before.

Nevertheless, with sufficient funding and risk monitoring, we can heavily mitigate or avoid the key risks detailed in this document. In relation to the resources needed for the risk response

plan, finding the right people will likely be more difficult than allocating funds. Thus, we must make the most out of our business connections in China to help lead the charge when it comes to preparing for risks and executing action plans.