Food Tracker App

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Agenda

- Project Overview – 5 Mins
- RMP Overview – 5 mins
- Risk Assessment – 20 Mins
- Risk Mitigation – 15 Mins
- Conclusion – 2 Mins

Project Overview

SMART REFRIGERATOR

Project Introduction & Background

- Every American throws away **103 pounds** of expired food each year
- 103 pounds of food = **$2,798 per year, or $53.81 per week** [1]

- 2019 Bosch Home Appliances market research
  - 52% of those surveyed said they throw food away because it will expire before they are able to use all of it
  - 36% of participants noted that their fridge was not organized well
  - 25% said that their refrigerators were “completely disorganized” [1]

- [1] SWNS, "Americans waste a shocking amount of food every year," New York Post, 19 September 2019. [Online]. Available: https://nypost.com/2019/09/19/americans-waste-a-shocking-amount-of-food-every-year/.

Project Introduction & Background

- Resources, Conservation and Recycling study
  - Almost 80% of the time, people surveyed expected to completely consume the items they purchased. In reality, only about 46% of these items were fully utilized [2]

- ***Purpose:***

The Fridge Food Tracker App aims to bridge the gap between intentions and reality when it comes to food utilization by keeping track of and alerting customers of items that are underutilized or nearing their expiration date.

- [2] M. Davenport, D. Qi and B. Roe, "Food-related routines, product characteristics, and household food waste in the United States: A refrigerator-based pilot study," Resources, Conservation and Recycling, vol. 150, 2019.

Project Introduction & Background

- ***Objectives***
  - ***Scope:*** mobile application that tracks items, their expiration dates, and their usage rates, through information transmitted via the in-refrigerator camera; the camera device is out of scope; app will be developed for both Android and iOS systems
  - ***Time:*** development time is 5 months; ready for release by January 2024
  - ***Cost*:** The goal is to keep development and testing costs to $75,000 or less.
  - ***Quality/performance:*** app needs to be able to connect with the camera via Bluetooth/Wi-Fi in order for the product to operate as expected; information transmission time from camera to app under 10 seconds so that user always sees most updated information; The application shall be capable of accurately identifying and capturing at least 30 items per second at 1080p.

- ***Assumption:*** the camera is already embedded into the refrigerator, refrigerator is connected to WIFI, and app just needs to connect to the respective in-fridge camera

- ***Constraints:*** customer base is limited to those who already have refrigerators with these built-in cameras.

Key Stakeholders

- Refrigerator Manufacturers
- Software Developers
- Project Manager
- Risk Champion
- Internal Company Executives

Project WBS

1. Fridge Food Tracker

1.1 Initiation

1.1.1 Project Scope Statement

1.1.2 Stakeholder List and Analysis

1.2 Requirements Gathering

1.2.1 User requirements document

1.2.2 Functional and Non-functional requirements specifications

1.3 Design

1.3.1 UI Design

1.3.1.1 UI Mockup Screens

1.3.2 Database Design

1.3.2.1 Database Schema

1.3.3 Camera Integration Design

1.3.3.1 Camera Features Specification

Project WBS Con’t

1.4 Software Development

1.4.1 Backend

1.4.1.1 Backend API’s

1.4.2 Frontend

1.4.2.1 Food Item Tracking UI

1.4.2.2 User Login/Registration UI

1.4.3 Camera Integration

1.4.3.1 Camera Functionality Implementation

1.5 Testing

1.5.1 Frontend/Backend Unit Tests

1.5.2 Database/Camera Integration Tests

1.6 User Documentation

1.6.1 User manuals

Project WBS Con’t

1.7 Deployment

1.7.1 App Deployment

1.7.2 Production testing

1.8 User Training and Support

1.8.1 User training sessions

1.8.2 Customer support setup

1.9 Maintenance and Updates

1.9.1 Performance Monitoring

1.9.2 Software updates

Performance Measures – Technical/Performance

ID	Key Performance Measure	Units	Planned	Goal	Threshold
T1	The application shall be capable of accurately identifying and capturing at least 30 items per second at 1080p.	Items	45	40	30
T2	The application shall load upon launching at less than 450 milliseconds to improve user experience.	Milliseconds	425	400	450
T3	The application shall have a response time for key interactions with at less than 300 milliseconds to improve user experience.	Milliseconds	275	250	300
T4	The control system shall have a baud rate of at least 9600 bits per second to communicate with the software effectively.	Bits Per Second	19200	19200	9600
T5	The software storage repository shall be formatted every 7 days to ensure no lack of storage to process data and assign functionality from via the code accordingly.	Days	7	7	7
T6	The software system shall transmit real time data to the connected device with a delay of less than 10 seconds.	Seconds	5	3	9
T7	The software update and installation shall not take more than 10 minutes.	Minutes	5	7	10
T8	The application size shall not be greater than 1500 MB.	Mega Bytes	800	1100	1500

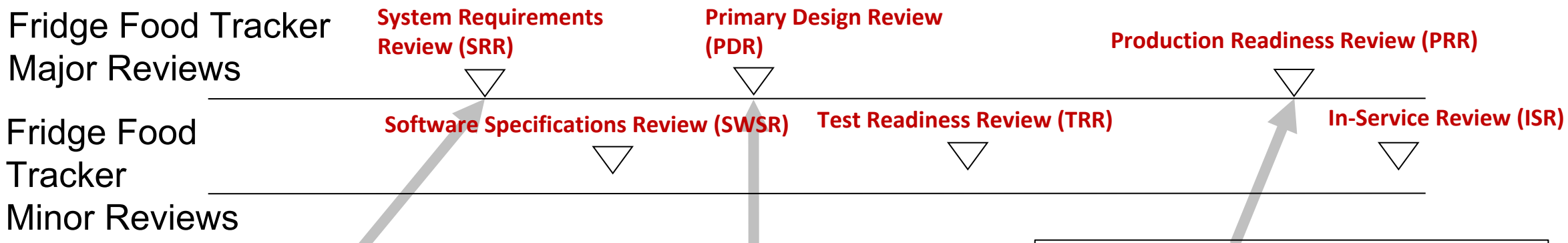
Performance Measures – Cost and Schedule

ID	Key Performance Measure	Units	Planned	Goal	Threshold
C1	The costs for using software licenses, development tools, and other 3rd party services required during development and operation should not exceed $6,000.	Dollars	$5,500	$5,000	$6,000
C2	The development and testing costs for the system application shall not exceed $75,000.	Dollars	$60,000	$60,000	$75,000
S1	The system shall have a MTBM of at least 6 months.	Months	12	9	6
S2	The configuration time for a single setup shall be less than 25 minutes	Minutes	20	18	25

Project Integrated Master Schedule and Resources

2023	September				October				November				December				2024 January			
System Review Milestones/WBS Elements	SRR		SWSR			PDR						TRR		PRR			ISR			
User req specs	Req. Definition		Design				Procure		Assemble		Test		Integrate				ILC			
UI Mockup Screens					Design		Procure													
Database Schema			Design				Develop				Test		Integrate							
Camera Features specs			Design				Procure		Develop		Test		Integrate							
Front end/Back end Development					Design		Procure						Integrate							
Unit/Integration Tests			Design				Develop				Test		Integrate							
User Documentation					Procure		Training & Testing													
Customer Support setup			Procure				Training & Testing													
Engineering Head count	4	4	4	4	4	4	4	6	6	6	6	6	4	4	4	4	4			
Primary Stakeholder	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			

Scheduled Reviews



- ✓ Project objectives, scope, stakeholders, and initial requirements
- ✓ Finalize user, functional, and non-functional requirements
- ✓ System Requirements Document

- ✓ Detailed Design Requirements Satisfied
- ✓ **Risks Identified, Analyzed, Prioritized in Risk Register**
- ✓ Systems Integration Verification
- ✓ Product Prototype
- ✓ **Risk Response Plans**

- ✓ Production & procurement of all parts and install app
- ✓ **Risk Reviews and updated Risk Register**
- ✓ Deploy app to app stores
- ✓ Final Risk Report

Key Accomplishments

Entry	Exit
Draft or Production Complete	Draft Approved, Formal Authorization

Legend

Risk Management Plan

RMP Overview – Purpose and Scope

- Purpose of the RMP
  - Identify, analyze, mitigate, monitor, and control risks
  - Achieve objectives while minimizing adverse impacts
- Scope of Risk Management for Food Tracker app
  - Develop a mobile application
  - Camera device is not included in the project scope
- Time Frame
  - The application is scheduled for completion in 5 months

RMP Overview - Application of the Risk Management Process

- RM process

1. Initiation – We will be recognizing the objectives and scope of the project. This will occur in the beginning of the project when proposing the project to our stakeholders.
2. Identification – We will be recognizing the known risks and unknown risks that may occur in our project. This will occur after gathering the necessary requirements from the user.
3. Assessment – We will discover the likelihood of each risk occurring, the impact on the project objectives of these risk if it does occur. This will occur after gathering the necessary requirements from the user.
4. Response Planning – Each Risk Owner will figure out the appropriate timely and response and action to their given risk. This will occur after gathering the necessary requirements from the user.
5. Reporting – We will report the results from the First Risk Assessment to show and communicate the changes if any to the project's exposure to risk to our stakeholders. This will occur throughout the project.
6. Implementation – We will perform the necessary actions to reduce the likelihood, the impact, or both, of the risks throughout the duration of the project. This will occur throughout the project.
7. Review – We will have major/minor reviews that will perform the same activities as the First Risk Assessment but on a smaller scale. This will occur throughout the project.
8. Post Project Review – We will conclude the ATOM process with a lesson learned report and an agreement on the final Risk Register. This will occur after the project has been concluded.

RMP Overview - Application of the Risk Management Process

- Schedule for Risk Activities
  - We will use the major and minor reviews by having a major review look through all the current risks in the Risk Register while a minor review look through all the current high priority risks in the Risk Register, identifying new risks and updating the Risk Register, if necessary, with each will producing a report. In each review, we will iterate through the identification, assessment, response planning, reporting, and implementation phases throughout the project.

Tool and Techniques

- Tools/Techniques
  - Cost and Schedule Analysis
  - Brainstorming
  - Systems Engineering Analysis and Risk Assessments
  - Quad Sheet
  - Root Cause Analysis
  - SWOT Analysis
  - 5 Whys Analysis

Roles and Responsibilities

Stakeholder	Area of interest	Attitude (+/-)	Power (+/-)	Interest (+/-)	Stakeholder type
End Consumer	Using product	+	+	+	Savior
Refrigerator Manufacturers	Manufacture Fridge Food Tracker	+	-	+	Friend
Software Developers	Phone app	+	-	+	Friend
Project Manager	Oversees the project as a whole	+	+	+	Savior
Risk Champion	Oversees the risk management process as a whole	+	+	+	Savior
Internal Company Executives	Concerned about the reputation of the company	+	+	-	Sleeping Giant

Consequence Map

Consequence Map							
Type	Key Performance Measure	Consequence					Units
		VLO	LOW	MED	HI	VHI	
T1	The application shall be capable of accurately identifying and capturing at least 30 items per second at 1080p.	<25	<20	<15	<10	<5	Items
T2	The application shall load upon launching at less than 450 milliseconds to improve user experience.	>500	>600	>700	>800	>900	Milliseconds
T3	The application shall have a response time for key interactions with at less than 300 milliseconds to improve user experience.	>350	>500	>650	>800	>850	Milliseconds
T4	The control system shall have a baud rate of at least 9600 bits per second to communicate with the software effectively.	<9000	<7000	<5000	<3000	<2000	Bits Per Second
T5	The software storage repository shall be formatted every 7 days to ensure no lack of storage to process data and assign functionality from via the code accordingly.	8-9	10-11	12-13	14-15	15+	Days
T6	The software system shall transmit real time data to the connected device with a delay of less than 10 seconds.	>11	>12	>13	>14	>15	Seconds
T7	The software update and installation shall not take more than 10 minutes.	>12	>17	>22	>27	>32	Minutes
T8	The application size shall not be greater than 1500 MB.	>2500	>3500	>4500	>5500	>6500	Mega Bytes

Consequence Map/Impact Scales Development

Consequence Map							
Type	Key Performance Measure	Consequence					Units
		VLO	LOW	MED	HI	VHI	
C1	The costs for using software licenses, development tools, and other 3rd party services required during development and operation should not exceed $6,000.	>6500	>7000	>7500	>8000	>8500	Dollars
C2	The development and testing costs for the system application shall not exceed $75,000.	>80,000	>85,000	>90,000	>95,000	>100,000	Dollars
S1	The system shall have a MTBM of at least 6 months.	<5	<4	<3	<2	<1	Months
S2	The configuration time for a single setup shall be less than 25 minutes	>30	>35	>40	>45	>50	Minutes

Probability Scales Definition

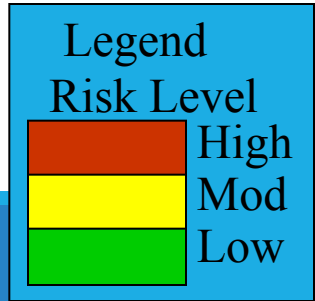
Scale	Probability
VHI	71–99%
HI	51–70%
MED	31–50%
LO	11–30%
VLO	1–10%

Consequence Scales Definitions

Rating	Scale	Probability	Objective - Impact		
			Time in Weeks	Cost in $	Performance
5	VHI	71% - 99%	16 - 20	> 65,000	**Total change or failure** in KPIs or Irreversible safety / security related risks.
4	HI	51% - 70%	11 - 15	35,001 – 65,000	**Significant** decrease in key performance metrics or reversible security issues.
3	MED	31% - 50%	6 - 10	10,001 – 35,000	**Moderate effects** on the KPIs.
2	LO	11% - 30%	3 - 5	3,000 – 10,000	**Minimal degradation** of performance with respect to KPIs.
1	VLO	< 11%	< 2	< 3,000	**No changes or negligible changes** that do not affect KPIs.

P-I Matrix

	IMPACT / CONSEQUENCE					
		1 VLO	2 LO	3 MED	4 HI	5 VHI
PROBABILITY	5 VHI					
	4 HI					
	3 MED					
	2 LO					
	1 VLO					



P-I Matrix Contd

	Low	Minor or no negative effect on the cost, schedule, or performance of the Smart Refrigerator Application. This area of risk is **usually monitored always but addressed only when considered necessary** or to improve the customer experience/delight them.
	Moderate	This area **demands corresponding mitigation and action plans from low-medium to medium-high levels of importance** with respect to the situation at hand. Risks closer to the minor spectrum are usually considered low-medium and the ones closer to the critical end of the spectrum are considered medium-high.
	High	Any scenario considered in this area **requires immediate attention and high priority action plans** to eliminate or mitigate the potential modes of impact or failure. Risks in this area significantly affect the objectives and goals of the business or system with a high criticality factor.

Risk Breakdown Structure

1. Technology Risks
    1.1. Requirement Risk
        1.1.1. Object detection
        1.1.2. Response Time
        1.1.3. Availability
    1.2. Design Risk
        1.2.1. AI/ML Models
    1.3. Functionality Risk
        1.3.1. Operational Concept
        1.3.2. User Interface
        1.3.3. Component level Working
    1.4. Production Risk
        1.4.1. Server/Software Licensing
    1.5. Integration
        1.5.1. Emergence Testing
    1.6. Verification and Validation Risk
        1.6.1. Verification Risk
        1.6.2. Validation Risk
2. Internal Risks
    2.1. Resources Management
        2.1.1. Budget
        2.1.2. Developers
    2.2. Infrastructure
        2.2.1. Update Center
    2.3. Decision Management
        2.3.1. Internal Control Risks
3. External Risks
    3.1. Government Policies and Standards
        3.1.1. Data Encryption
    3.2. Contract Management
        3.2.1. Terms & Conditions
    3.3. Environmental Risks
        3.3.1. Artificial Risks
    3.4. Cyber Risks
        3.4.1. SW Hazards
        3.4.2. Trojan Transmission
    3.5. Parallel Organizations
        3.5.1. Competition
        3.5.2. Marketing
        3.5.3. Product Success Factor

Risk Assessment

Risk Identification and Screening-Brainstroming

Project RBS Level 0	Level 1	Level 2	Level 3	Risks	Is it Applicable - Yes/No/Not Applicable/Do Not Know
	1.Technology Risk	1.1 Requirement Risk	1.1.1 Object Detection	Unknown/new object detection	Yes, it must detect all object kept inside without fail
			1.1.2 Response Time	Response time requirements is not met (app too slow)	Yes, the user must have the most up-to-date info without any delays
			1.1.3 Availability	Data input to the software is not available due to Wi-Fi problem	Yes, the application needs real-time input to function as expected
		1.2 Design Risk	1.2.1 Programming Platform Compatibility	Programming language is too difficult for software developers.	No, as long as the programming concept works and is integrable
			1.2.2 AI/ML Models	Inaccurately trained AI/ML models	Yes, as it loses the ability to detect unknown or unspecified objects
		1.3 Functionality Risk	1.3.1 Operational Risk	Application is not responding after input	Yes, it does affect the project objectives
			1.3.2 User Interface	The UI design is not cohesive with the rest of the app	Yes, it does affect the project objectives
			1.3.3 Component Level Working	The app gets inaccurate information from the customer profile	Yes, it does affect the project objectives.
		1.4 Production Risk	1.4.1 Supply chain and Material	Cloud servers are not available for everyone	No, it does not affect the project objectives
		1.5 Integration	1.5.1 Chaos Identification	Application crashes	No, it does not affect the project objectives
			1.5.2 Emergence Testing	Camera does not recognize software	Yes, it does affect the project objectives.
		1.6 Verification & Validation Risk	1.6.1 Verification Risk	The application fails to format data every 7 days	Yes, it does affect the project objectives
			1.6.2 Validation Risk	Camera fails to link to the right customer.	Yes, it does affect the project objectives
	2.Internal Risk	2.1 Resource Management	2.1.1 Budget	Changes to working capital	Yes, it affects the development of the software
			2.1.2 Developers	Unexpected absence from the working personnel	Do not know, depends on the situation

Risk Identification and Screening-Brainstroming

			2.1.4 Database	Privacy concern for data collection and usage	Not applicable, as it is a standard imposed onto the app
		2.2 Infrastructure	2.2.1 Development center	Work environment unavailability while working on-site	No, it can affect the development of the app but not an in-scope of our system
		2.3 Facilities	2.3.1 System Requirements for Developers	Higher computational power requirement from the development systems	No, it is a requirement but is usually addressed by the company before development starts.
		2.4 Decision Management	2.4.1 Internal Control Risks	Inter department conflicts related to priorities and deadlines	Do not know, it depends on the nature of the conflict
	3.External Risks	3.1 Government Policies and Standards	3.1.1 Privacy Requirements Permission	Camera component could be considered as a privacy breach	Not applicable, it is a requirement for the app to function as required.
			3.1.2 Data Encryption	Poor encryption can lead to data theft	Yes, system user data must be encrypted safely to prevent hacks or unwanted changes to it
		3.2 Regulatory Bodies	3.2.1 Food Control Boards	FDA thinks app poses risk if people rely too heavily on it to determine safety of eating food based on expiration	Not applicable, as the food safety is not entirely dependent only on the expiry date

		3.3 Contract Management	3.3.1 Terms & Conditions	Terms and conditions are not well-written and don't protect company from user law suits due to illness from food	Do not know, it depends on the nature of the conflict
			3.3.2 Boundary Setting	Boundaries of the application function and scope is not clear	Yes, In and Out scopes tell what is and is not a part of our system and objectives
		3.4 Environmental Risks	3.4.1 Natural Risks	Fog in fridge prevents camera from capturing accurate data	Yes, this hinders the optimal performance of the camera
			3.4.2 Artificial Risks	Cyber hacks	Yes, this can potentially lead to software hacks as the firewall is not 100% secure against every threat at any given time
		3.5 Parallel Organizations	3.5.1 Competition	Fridge manufacturers or other companies create similar application	No, this affects the business or marketing side of the project and not the system of interest or its working
			3.5.2 Inbound Marketing	Customer retention risks	No, this affects the market and not the system functions

Risk Identification and Screening – Lessons learnt

What Are The Highest Risks In The Mobile App Development Industry, And How To Avoid Them? - Blogs (darkbears.com)

I. Inaccurate input validation for authenticating user or admin access
II. Outsourcing things like UI and UX designs without establishing clear rules, requirements, or boundaries.
III. Building app on a platform like google play or app store which could be shut down at any point.
IV. UI and UX design are not cohesive to users.
V. Not striking the proper balance between the right number of features and delights. Too many features with less quality or a smaller number of features will deteriorate the project.
VI. Lack of proper market research to propel the product in a competitive environment by making it unique.
VII. Lack of budget to design for cross-platform functionality
VIII. App not being able to handle the user traffic with its server.
IX. Not following continuous improvement methodology with respect to system capability and user needs

Risk Identification and Screening – Assumptions and Constraints

Assumption or Constraint	Could this prove false? (Y/N)	If false, would it affect the project? (Y/N)	Convert to a risk? (Y/N)	Associated Risk (if any)
Users have smartphones compatible with the app.	Y	N	N	
Most refrigerators have the necessary conditions (lighting, space) for the app's camera functionality.	Y	Y	Y	Camera may fail to capture accurate data; reduced app functionality.
Data collected is accurate and consistently updated.	Y	Y	Y	Inaccurate data could lead to incorrect suggestions or misinterpretations.
Users understand and adhere to app terms & conditions.	Y	N	N	
The camera can accurately detect and assess all food items.	Y	Y	Y	Incorrect food item detections could lead to wrong suggestions.
Limited budget for app development.	N	Y	N	
The app must adhere to government policies, especially those related to privacy.	N	N	N	
The app must meet the standards set by the Food Control Board.	N	N	N	
The app must be developed within a set timeframe.	N	Y	N	
There's a limit to how much data the app can process in real-time.	Y	Y	Y	Slower app response, crashing, or inability to provide real-time suggestions.
Camera is already embedded in the refrigerator	N	Y	N	
Camera works properly	Y	Y	Y	Camera is damaged/not functioning properly
Refrigerators have built in Wi-Fi	N	Y	N	
App needs to connect to the respective camera	Y	Y	Y	Camera fails to connect to the customer's profile on the app
Customer based is limited to only customers who have refrigerators with these cameras	N	Y	N	

Risk Identification and Screening – Rationalizing Risks

Project RBS Level 0	Level 1	Level 2	Level 3	Risks	Is it Applicable - Yes/No/Not Applicable/Do Not Know
	1.Technology Risk	1.1 Requirement Risk	1.1.1 Object Detection	Unknown/new object detection	Yes, it must detect all object kept inside without fail
				~~Bad Lighting in the refrigerator leads to inaccurate food item detections.~~	~~Yes, it does affect the project objectives. [NOT A RISK, JUST A CAUS OF A POTENTIAL RISK]~~
			1.1.2 Response Time	Response time requirements is not met (app too slow)	Yes, the user must have the most up-to-date info without any delays
			1.1.3 Availability	Data input to the software is not available due to Wi-Fi problem	Yes, the application needs real-tin input to function as expected
		1.2 Design Risk	~~1.2.1 Programming Platform Compatibility~~	~~Programming language is too difficult for software developers.~~	~~No, as long a the programming concept work and is integrable~~
			1.2.2 AI/ML Models	Inaccurately trained AI/ML models	Yes, as it lose the ability to detect unknown or unspecified objects
				~~Incorrect food item detections could lead to wrong suggestions.~~	~~Yes, it does affect the project objectives. [DUPLICATE~~
		1.3 Functionality Risk	1.3.1 Operational Risk	Application is not responding after input	Yes, it does affect the project objectives
			1.3.2 User Interface	~~The UI design is not cohesive with the rest of the app~~	~~Yes, it does affect the project objectives. [DUPLICATE~~
				UI and UX design are not cohesive to users	Yes, it does affect the project objectives
			1.3.3 Component Level Working	The component reads inaccurate information from the customer profile	Yes, it does affect the project objectives.
				~~Inaccurate data could lead to incorrect suggestions or misinterpretatio ns~~	~~Yes, it does affect the project objectives. [DUPLICATE~~
				Camera is damaged/not functioning properly	Yes, it does affect the project objectives
		1.4 Production Risk	1.4.1 Server / Software Licensing	~~Cloud servers are not available for everyone~~	~~No, it does n affect the project objectives~~
				App not being able to handle the user traffic with its server.	Yes, it does affect the project objectives.
					~~Slower app response, crashing, or inability to provide real-time suggestions.~~	~~Yes, it does affect the project objectives. [DUPLICATE, ENCOMPASSED BY RISK ABOVE]~~
			1.5 Integration	~~1.5.1 Chaos Identification~~	~~Application crashes~~	~~No, it does not affect the project objectives~~
				1.5.2 Emergence Testing	Camera does not connect to software	Yes, it does affect the project objectives.
					~~Camera fails to connect to the customer's profile on the app~~	~~Yes, it does affect the project objectives. [DUPLICATE]~~
			1.6 Verification & Validation Risk	1.6.1 Verification Risk	The application fails to format data every 7 days	Yes, it does affect the project objectives
					Inaccurate input validation for authenticating user or admin access	Yes, it does affect the project objectives.
				1.6.2 Validation Risk	Camera fails to link to the right customer	Yes, it does affect the project objectives
	2.Internal Risk	2.1 Resource Management	2.1.1 Budget	~~Changes to working capital~~	~~Yes, it affects the development of the software. [THIS IS A CAUSE NOT A RISK]~~

Risk Identification and Screening – Final Risk list

- Unknown/new object detection
- Response time requirements is not met (app too slow)
- Inaccurately trained AI/ML models
- UI and UX design are not cohesive to users
- Camera is damaged/not functioning properly
- App not being able to handle the user traffic with its server
- Camera does not connect to software
- Camera fails to link to the right customer
- Lack of budget to design for cross-platform functionality
- Unexpected absence from the working personnel
- Not following continuous improvement methodology with respect to system capability and user needs.
- Cyber hacks

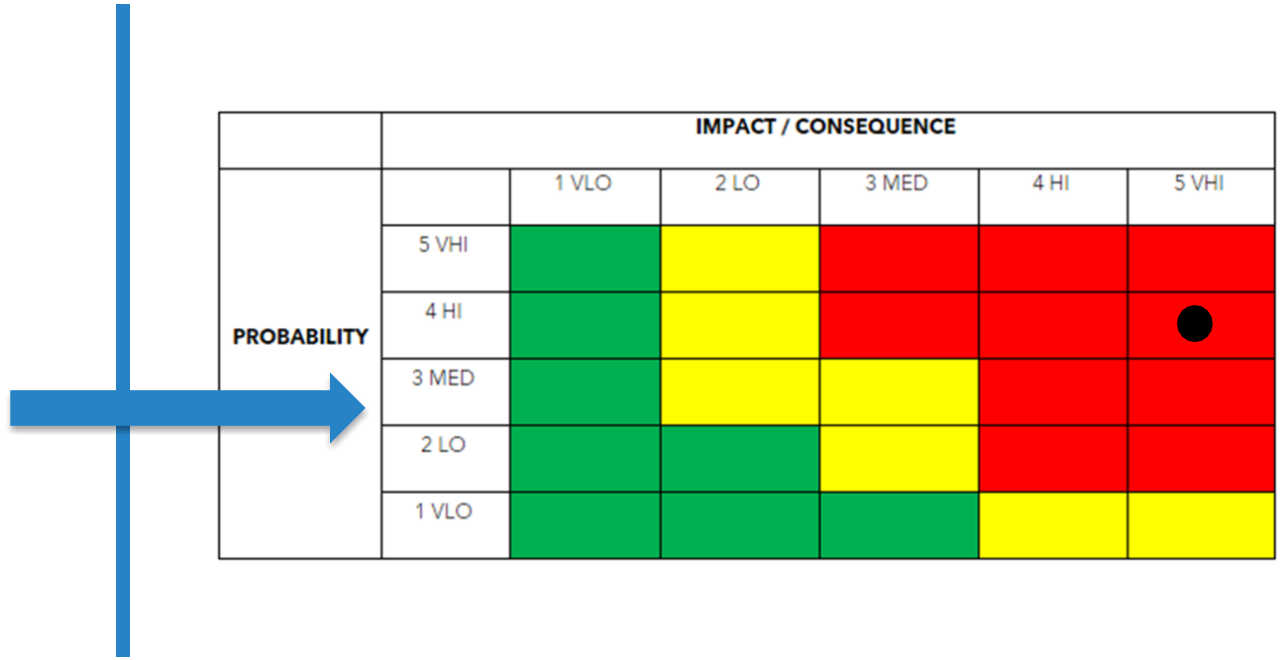
Risk Meta Language Table

Cause	Risk	Effect
Because of heavy fog in the camera…	**…the camera may be unable to accurately detect unknown/new objects…**	…which may cause inaccurate expiration dates on the items.
Due to overload on the database servers…	**…the app response time to receive information may be too slow…**	…which could lead to an overall bad user experience.
As a result of insufficient data in the database…	**…the AI/ML models used to detect food labels may be inaccurately trained…**	…which may result in food items being labeled incorrectly.
Since various third-party integrations were used on the app…	**…UI and UX design may not be cohesive to users …**	…which may result in the user being confused and less engaged.
Because of a bug in the app's code…	**… the app may read inaccurate information from the customer's profile…**	…which may result in the app developers to spend additional time to fix the bug.

Risk Register – Risk Identification

		Risk Description			
Unique Risk ID	Date Identified	Short Risk Title	Full Risk Description (in metalanguage)		
			Cause	Risk	Effect
R01	10/11/2023	Unable to detect food item	Because of heavy fog in the camera…	…the camera may be unable to accurately detect unknown/new objects…	…which may cause inaccurate expiration dates on the items.
R02	10/11/2023	Slow response time	Due to overload on the database servers…	…the app response time to receive information may be too slow…	…which could lead to an overall bad user experience.

Rating	Scale	Probability	Objective - Impact		
			Time in Weeks	Cost in $	Performance
5	VHI	71% - 99%	16 - 20	> 65,000	**Total change or failure** in KPIs or Irreversible safety / security related risks.
4	HI	51% - 70%	11 - 15	35,001 – 65,000	**Significant** decrease in key performance metrics or reversible security issues.
3	MED	31% - 50%	6 - 10	10,001 – 35,000	**Moderate effects** on the KPIs.
2	LO	11% - 30%	3 - 5	3,000 – 10,000	**Minimal degradation** of performance with respect to KPIs.
1	VLO	< 11%	< 2	< 3,000	**No changes or negligible changes** that do not affect KPIs.



Risk Analysis Proce

		Risk Description				Pre-response Assessment				
Unique Risk ID	Date Identified	Short Risk Title	Full Risk Description (in metalanguage)			Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (or N/A)			P rity R and Risk Score
			Cause	Risk	Effect		Cost	Schedule	Performance	
R01	10/11/2023	Unable to detect food item	Because of heavy fog in the camera…	camera may be unable to accurately detect unknown/new	…which may cause inaccurate expiration dates on the items.	HI	LO	LO	VHI	

Risk Analysis – unprioritized

		Risk Description				Pre-response Assessment				
Unique Risk ID	Date Identified	Short Risk Title	Full Risk Description (in metalanguage)			Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (or N/A)			Priority R, Y, G and Risk Score
			Cause	Risk	Effect		Cost	Schedule	Performance	
R01	10/11/2023	Unable to detect food item	Because of heavy fog in the camera…	camera may be unable to accurately detect unknown/new	…which may cause inaccurate expiration dates on the items.	HI	LO	LO	VHI	
R02	10/11/2023	Slow response time	Due to overload on the database servers…	…the app response time to receive information may be too slow…	…which could lead to an overall bad user experience.	LO			MED	
R03	10/11/2023	Inaccuarte AI models	As a result of insufficient data in the database…	…the AI/ML models used to detect food labels may be inaccurately trained…	…which may result in food items being labeled incorrectly.	VLO	MED	MED	VHI	
R04	10/11/2023	Uncohesive app	Since various third-party integrations were used on the app…	…UI and UX design may not be cohesive to users …	…which may result in the user being confused and less engaged.	VLO			VLO	
R05	10/11/2023	Inaccuarte customer info	Because of a bug in the app's code…	… the app may read inaccurate information from the customer's profile…	…which may result in the app developers to spend additional time to fix the bug.	MED	MED	MED	VHI	

Scoring Scheme & Scored P-I Matrix

Rank	Probability	Impact
VHI	0.9	0.8
HI	0.7	0.4
MED	0.5	0.2
LO	0.3	0.1
VLO	0.1	0.05

		IMPACT / CONSEQUENCE				
		1 VLO	2 LO	3 MED	4 HI	5 VHI
PROBABILITY	5 VHI	0.045	0.09	0.18	0.36	0.72
	4 HI	0.035	0.07	0.14	0.28	0.56
	3 MED	0.025	0.05	0.10	0.20	0.40
	2 LO	0.015	0.03	0.06	0.12	0.24
	1 VLO	0.005	0.01	0.02	0.04	0.08

Plotted Risks in Scored P-I Matrix

	IMPACT / CONSEQUENCE					
PROBABILITY		1 VLO	2 LO	3 MED	4 HI	5 VHI
	5 VHI	0.045	0.09	0.18	0.36	0.72
	4 HI	0.035	0.07	0.14 **R10**	0.28	0.56 **R1, R9**
	3 MED	0.025	0.05	0.10	0.20	0.40 **R5, R12**
	2 LO	0.015	0.03	0.06 **R2, R6, R11**	0.12	0.24 **R8**
	1 VLO	0.005 **R4**	0.01	0.02	0.04	0.08 **R3, R7**

Prioritized Risk List

TOP THREATS

Risk Description						Pre-response Assessment				
Unique Risk ID	Date Identified	Short Risk Title	Full Risk Description (in metalanguage)			Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (or N/A)			Priority R, Y, G and Risk Score
			Cause	Risk	Effect		Cost	Schedule	Performance	
R09	10/11/2023	Lack of budget	Because of the lack of investors involved in our project…	…there may be a lack of budget to design for cross-platform functionality…	… which would lead to a delay in our project until we get enough money.	HI	VHI	VHI	MED	0.56
R01	10/11/2023	Unable to detect food item	Because of heavy fog in the camera…	…the camera may be unable to accurately detect unknown/new objects…	…which may cause inaccurate expiration dates on the items.	HI	LO	LO	VHI	0.56
R12	10/11/2023	Cyber attacks to our app	Due to the lack of authorization, encryption, and secure development practices in our app…	…the app may be exposed to cyber-attacks…	…which would lead to a breach into the customer's information stored in the app causing software hazards or virus transmission.	MED	HI	MED	VHI	0.4
R05	10/11/2023	Inaccurate customer info	Because of a bug in the app's code…	… the app may read inaccurate information from the customer's profile…	…which may result in the app developers to spend additional time to fix the bug.	MED	MED	MED	VHI	0.4
R08	10/11/2023	Wrong customer camera	Since the camera is in an environment with heavy network traffic…	…the camera may fail to link to the right customer…	…which may lead to frustration, confusion, and invasion of privacy among the user.	LO			VHI	0.24
R10	10/11/2023	Insufficient amount of personnel	Due to a COVID outbreak in the company…	…there may be an unexpected absence from the working personnel…	…which may lead to the project scope to be reduced to accommodate.	HI	LO	MED	LO	0.14

Prioritized Risk List

		Risk Description				Pre-response Assessment				
Unique Risk ID	Date Identified	Short Risk Title	Full Risk Description (in metalanguage)			Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (or N/A)			Priority R, Y, G and Risk Score
			Cause	Risk	Effect		Cost	Schedule	Performance	
R03	10/11/2023	Inaccuarte AI models	As a result of insufficient data in the database…	…the AI/ML models used to detect food labels may be inaccurately trained…	…which may result in food items being labeled incorrectly.	VLO	MED	MED	VHI	0.08
R07	10/11/2023	Camera unable to connect	As a result of issues with the Wi -Fi…	…the camera may not connect to the app…	…which may result in users not being able to use our app for its intended use.	VLO			VHI	0.08
R06	10/11/2023	Overload of User traffic	Due to the insufficient amount of storage space on the app's server…	…the app may not be able to handle the user traffic…	…which may result in increase of workload to the support team.	LO	MED	MED	MED	0.06
R02	10/11/2023	Slow response time	Due to overload on the database servers…	…the app response time to receive information may be too slow…	…which could lead to an overall bad user experience.	LO			MED	0.06
R11	10/11/2023	Unable to provide software updates	As a result of insufficient amount of software developers…	…the company may not be following continuous improvement methodology with respect to system capability and user needs…	…which may result in loss of competitiveness with other apps and lower app ratings/reviews.	LO			MED	0.06
R04	10/11/2023	Uncohesive app	Since various third-party integrations were used on the app…	…UI and UX design may not be cohesive to users …	…which may result in the user being confused and less engaged.	VLO			VLO	0.005

Hot Spots – RBS Categorization

12 Risks	1.Technology Risk **8 Risks-** 1.485	1.1 Requirement Risk 2 Risks- 0.62
		1.2 Design Risk 1 Risk- 0.08
		1.3 Functionality Risk 2 Risks- 0.405
		1.4 Production Risk 1 Risk- 0.06
		1.5 Integration 1 Risk- 0.08
		1.6 Verification & Validation Risk 1 Risk- 0.24

	2.Internal Risk **3 Risks-** 0.76	2.1 Resource Management 2 Risks- 0.70
		2.2 Infrastructure 1 Risk 0.06
		2.3 Facilities
		2.4 Decision Management
	3.External Risks **1 Risk-** 0.4	3.1 Government Policies and Standards
		3.2 Regulatory Bodies
		3.3 Contract Management
		3.4 Environmental Risks 1 Risk- 0.4

Hot Spots – WBS Categorization

Project WBS Level 0	Level 1	Level 2
Fridge Food Tracker	1.1 Initiation	1.1.1 Project Scope Statement 1 Risk
		1.1.2 Stakeholder List and Analysis 1 Risk
	1.2 Requirements Gathering	1.2.1 User requirements document 1 Risk
		1.2.2 Functional and non-functional requirements specifications 3 Risks
	1.3 Design	1.3.1 UI Design 2 Risks
		1.3.2 Database Design 2 Risks
		1.3.3 Camera Integration Design 1 Risk
	1.4 Software Development	1.4.1 Backend 5 Risks
		1.4.2 Frontend 1 Risk
		1.4.3 Camera Integration 2 Risks
	1.5 Testing	1.5.1 Frontend/Backend Unit Tests 1 Risk
		1.5.2 Database/Camera Integration Tests 3 Risks
	1.6 User Documentation	1.6.1 User manuals 1 Risk

Risk Register – Risk Identification and Risk Analysis

		Risk Description				Pre-response Assessment							
Unique Risk ID	Date Identified	Short Risk Title	Full Risk Description (in metalanguage)			Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (or N/A)			Priority R, Y, G and Risk Score	Project area affected (WBS Element	Risk Source (RBS Element)	Risk Owner
			Cause	Risk	Effect		Cost	Schedule	Performance				
R09	10/11/2023	Lack of budget	Because of the lack of investors involved in our project...	may be a lack of budget to design for cross-platform functionality...	... which would lead to a delay in our project until we get enough money.	HI	VHI	VHI	MED	0.56	1.2.2	2.1.1	Kevin
R01	**10/11/2023**	**Unable to detect food item**	**Because of heavy fog in the camera...**	**...the camera may be unable to accurately detect unknown/ new objects...**	**...which may cause inaccurate expiration dates on the items.**	**HI**	**LO**	**LO**	**VHI**	**0.56**	**1.4.3**	**1.1.1**	Sophie
R12	10/11/2023	Cyber attacks to our app	Due to the lack of authorization, encryption, and secure development practices in our app...	...the app may be exposed to cyber-attacks...	would lead to a breach into the customer's information stored in the app causing software hazards or virus transmission .	MED	HI	MED	VHI	0.4	1.4.1	3.4.1	Hareish
R05	10/11/2023	Inaccuarte customer info	Because of a bug in the app's code...	... the app may read inaccurate information from the customer's profile...	...which may result in the app developers to spend additional time to fix the bug.	MED	MED	MED	VHI	0.4	1.4.1	1.3.3	Hareish

Risk Responses

R1: Unable to detect food items

- Cause: condensation or fog in the refrigerator due to temperature differences
- Initial risk score: 0.56 → Reduced risk score: 0.04
- Mitigation strategies take risk to lowest end of yellow
- Probability is reduced to minimum possible
- Impact cannot be reduced more

		IMPACT / CONSEQUENCE				
		1 VLO	2 LO	3 MED	4 HI	5 VHI
PROBABILITY	5 VHI	0.045	0.09	0.18	0.36	0.72
	4 HI	0.035	0.07	0.14	0.28	0.56
	3 MED	0.025	0.05	0.10	0.20	0.40
	2 LO	0.015	0.03	0.06	0.12	0.24
	1 VLO	0.005	0.01	0.02	0.04	0.08

R1 Mitigation Actions

1. Train model with images obscured by fog
   - ➢ *Reduces **probability***
2. Write code so that when visibility is below a certain threshold, an alert is sent to the user to provide awareness
   - ➢ *Reduces **impact***
3. Add a thermometer to device and send alert to user if fridge temperature is below 34°F
   - ➢ *Reduces **probability***
4. Develop add-on to camera that works to eliminate condensation from camera; includes a piece of plexiglass in front of camera, and a device that blows cool air between camera and plexiglass to cool down air near camera and eliminate condensation
   - Ø *Reduces **probability***

Risk Summary – R8 - Wrong Customer Camera

Risk Title: Wrong customer camera
Risk Number: R8
Risk Owner: Kevin

Date Created: 10/11/23
Date Updated: 11/2/23

RBS Element: 1.6.2 Validation Risk

WBS Element: 1.5.2 - Database/Camera Integration Tests

Risk Description:
This risk describes the possibility of the refrigerator camera being connected to the wrong customer's account.

Risk/Benefit Analysis:
While there might be perceived short-term benefits in terms of cost savings and expedited market entry of not taking on this risk, the long-term consequences of not mitigating risks in privacy, security, and functionality can far outweigh these initial gains.

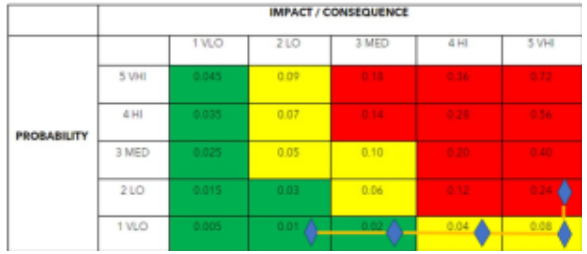
Explanation of Cause:
This can be caused by a high load of network traffic in the area where the camera is trying to connect to. For example, there can be a customer that can be connected to the same Wi-Fi in an apartment building as someone else, thus being able to connect to their camera easily.

Explanation of Consequence:
This can lead to more people becoming frustrated, being worried about other people looking at what inside their refrigerator and undermine the intended benefits of the

Score:

Level: Red	**Pf:** LO (0.3)
Score from P-I Matrix: 0.24	**Cfp:** VHI (0.8)
Cause: The camera is in an environment with heavy network traffic	**Cfs:** N/A
	Cfc: N/A

Rational: *(Explain why is this risk on your risk list?)*
This risk is in our risk list because these things can be overlooked whenever it comes to connecting devices onto the Wi-Fi. With new technology like this, it's important to take these



R8 Risk Response Planning Work Sheet

R8-Since the camera is in an environment with heavy network traffic the camera may fail to link to the right customer which may lead to frustration, confusion, and invasion of privacy among the user.

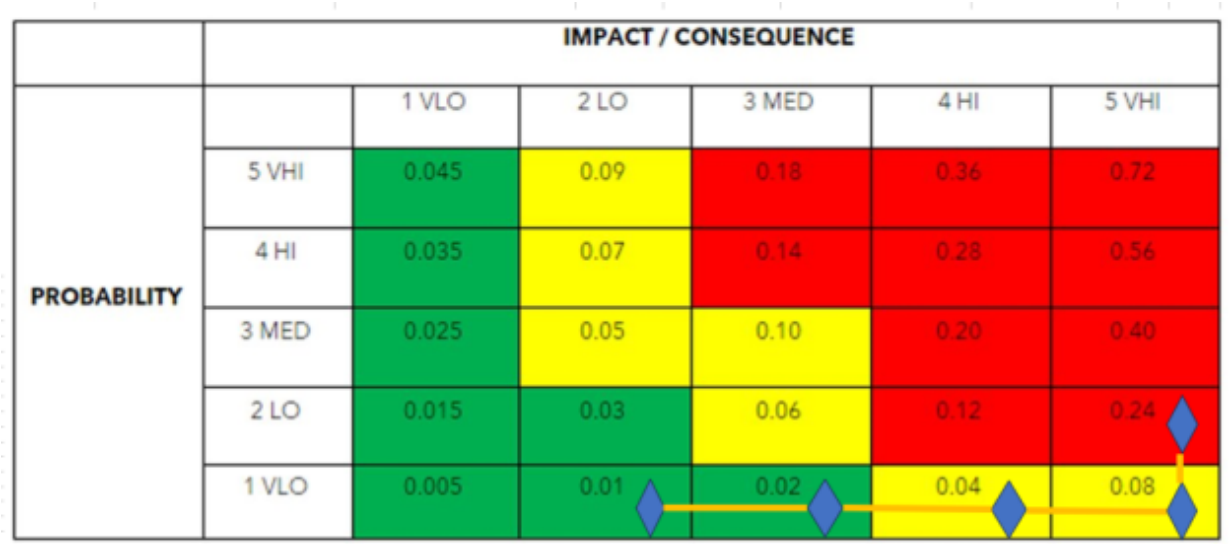
Risk ID	Risk Response Strategy	Risk Response Actions (numbered)	Action Start Date	Action Title	Exit Criteria	Workaround/Fall back	Action Owner	Risk Action Status	Risk Score and Threshold Level (R,Y,G)	Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (Performance)	Impact VLO, LO, MED, HI, VHI (Schedule)	Impact VLO, LO, MED, HI, VHI (Cost)
R08	Reduction/Mitigation	**Start**								**0.24**	**LO**	**VHI**	
	Reduction/Mitigation	1) Implement robust security measures to ensure that only authorized users can access the camera and its data such as two way authentitaction.	1/1/2024	Enhance Security and Authentication	Successful implementation of multi-factor authentication or other strong authentication methods and verification that unauthorized users are unable to access the camera	*Fall back*- allow users to access the camera with a temporary, time-limited access code sent via email or SMS.	Kevin			**0.08**	VLO	VHI	
	Reduction/Mitigation	2) Encrypt the data transmitted between the refrigerator camera and the network to protect it from eavesdropping and unauthorized access.	1/8/2024	Data Encryption	Implementation of data encryption protocols for all data transmitted and confirmation that data is properly encrypted and cannot be easily intercepted.	*Fall back*- Implement a failover to an alternative encryption method or protocol if the primary one fails	Kevin			**0.04**	VLO	HI	
	Reduction/Mitigation	3) Develop a comprehensive error-handling system that can detect potential issues related to linking the camera to the wrong customer.	1/15/2024	Error Handling	Development and implementation of an effective error-handling system and user testing to confirm that error messages are clear and easily understood.	*Workaround*- Create a user-friendly help section on the app with troubleshooting steps and contact information for customer support.	Kevin			**0.02**	VLO	MED	
	Reduction/Mitigation	4) Give users the ability to control the camera's settings on the app, including when and how it can access the network or capture images.	1/22/2024	Privacy Controls	Development and implementation of privacy controls that allow users to manage camera settings.	*Workaround*- Allow users to quickly disable the camera's network connection or enter a privacy mode if they have concerns about data collection.	Kevin			**0.01**	VLO	LO	

R8 Risk Response Burndown on Scored P-I Matrix

Rank	Probability	Impact
VHI	0.9	0.8
HI	0.7	0.4
MED	0.5	0.2
LO	0.3	0.1
VLO	0.1	0.05

Figure 6-4: Probability-Impact Scoring Scheme

			Post-Response Assessment		
Risk Response Strategy	**Risk Response Actions (w/ Owners)**	**Risk Action Status**	**Probability VLO, LO, MED, HI, VHI**	**Impact VLO, LO, MED, HI, VHI**	**Priority R, Y, G and Risk Score**
Reduce	Start		LO	VHI	0.24
	1) Implement robust security measures		VLO	VHI	0.08
	2) Encrypt transmitted data		VLO	HI	0.04
	3) Develop a comprehensive error-handling system		VLO	MED	0.02
	4) Give user's access to privacy settings		VLO	LO	0.01



Risk Summary – R10 - Insufficient amount of personnel

Risk Title: Insufficient amount of personnel
Risk Number: R10
Risk Owner: Xiehao

RBS Element: 2.1.2 - Developers

WBS Element: 1.1.1; 1.1.2; 1.2.1; 1.2.2; 1.3.1; 1.3.2; 1.3.3; 1.4.1; 1.4.2; 1.4.3; 1.5.1; 1.5.2; 1.6.1

Date Created: 10/11/2023
Date Updated: 11/8/2023

Risk Description: For this risk, COVID outbreaks in the company, staff may be absent unexpectedly, which reduce project scope to accommodate.

Risk/Benefit Analysis: The spread of COVID can lead to unpredictable occurrences, while at the same time it can lead to the loss of productivity or even the inability of staff to work. Considering this risk has the advantage of minimizing the impact on the project in the COVID outbreaks.

Explanation of Cause:

The main reason for this risk is that the unpredictability and high transmission rate of COVID means that absences can occur suddenly and with little warning, posing a significant risk to maintaining adequate staffing levels.

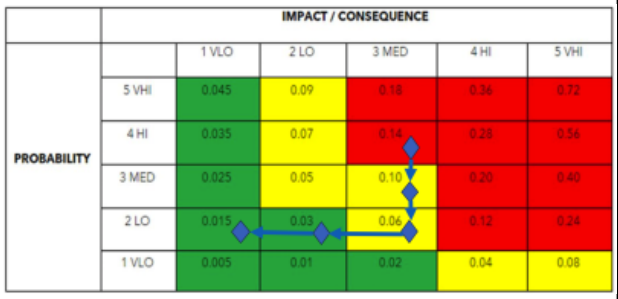
Explanation of Consequence:

If there aren't enough staff due to COVID, the project could face delays, higher costs, and reduced work quality. Overworked remaining staff might underperform, leading to more mistakes if it happeneds.

Score:

Level: Red	**Pf:** HI (0.7)
Score from P-I Matrix: 0.14	**Cfp:** LO (0.1)
Cause: Epidemic outbreaks cause unexpected staff shortage.	**Cfs:** MED (0.2)
	Cfc: LO (0.1)

Rational: *(Explain why is this risk on your risk list?)*
This risk is on the list because COVID can cause many staff to be out at once, which can slow down the project, make it cost more, and lower the quality of the work.



R10 Insufficient amount of personnel

Risk ID	Risk Response Strategy	Risk Response Actions (numbered)	Action Start Date	Action Title	Exit Criteria	Workaround/Fall back	Action Owner	Risk Action Status	Risk Score and Threshold Level (R,Y,G)	Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (Performance)	Impact VLO, LO, MED, HI, VHI (Schedule)	Impact VLO, LO, MED, HI, VHI (Cost)
R10	Reduction/Mitigation	Start							0.14	HI	LO	MED	LO
	Reduction	1) Take effective preventive measures to ensure that the probability of disease is reduced, such as vaccinating all staff members.	1/1/2024	Take preventive measures	Every employee is required to provide full proof of vaccinations	Workaround: Employees wear masks for prevention	xiehao		0.1	MED	LO	MED	LO
	Reduction	2） Prepare supplies to ensure that there is no secondary transmission when COVID occurs	1/1/2024	Prepare supplies	Establish a regular office disinfection program, prepare masks, disinfectants	Fallback: Keeping an inventory of material stocks for timely replenishment	xiehao		0.06	LO	LO	MED	LO
	Mitigation	3) Provide a variety of work styles, such as home-based work, to ensure productivity and prevent office contagion	1/1/2024	Different work styles	Prepare the basic conditions of network office and synchronize working documents in the cloud	Fallback: Changing the entire work model to an online office when the situation becomes too serious	xiehao		0.03	LO	LO	LO	LO
	Mitigation	4) Implement diverse training programs to ensure that employees are able to work on multiple projects. This reduces the risk of work stopping in the absence of key personnel.	1/2/2024	Diverse training programs	Each critical role within the project should have at least two trained backups.	Fall back: Temporary redistribution of tasks among available staff.	xiehao		0.01	VLO	LO	LO	LO

R10 Risk Response Burndown on Scored P-I Matrix

- Initial risk score: 0.14 → Reduced risk score: 0.015

Rank	Probability	Impact
VHI	0.9	0.8
HI	0.7	0.4
MED	0.5	0.2
LO	0.3	0.1
VLO	0.1	0.05

Figure 6-4: Probability-Impact Scoring Scheme

		IMPACT / CONSEQUENCE				
		1 VLO	2 LO	3 MED	4 HI	5 VHI
PROBABILITY	5 VHI	0.045	0.09	0.18	0.36	0.72
	4 HI	0.035	0.07	0.14	0.28	0.56
	3 MED	0.025	0.05	0.10	0.20	0.40
	2 LO	0.015	0.03	0.06	0.12	0.24
	1 VLO	0.005	0.01	0.02	0.04	0.08

Risk Summary – R12 - Cyber Attacks to the Application

Risk Title: Cyber-attacks to the application
Risk Number: R12
Risk Owner: Hareish

RBS Element: 3.4.1 Artificial Risks
WBS Element: 1.4.1 Backend

Date Created:10/11/23
Date Updated:11/9/23

Risk Description:

This risk describes the possibility and effects of cyber hazards to the application from external sources.

Risk/Benefit Analysis:

Overlooking this risk might be beneficial in terms of resources used initially; but in an event of cyber-attack the sole functioning and privacy data of the organization and customer will be compromised leading to total failure. Hence the Consequential loss of this possible event outweighs the profit we get by not implementing them.

Explanation of Cause:

This can be caused by any hacking-trained individual(insider/ outsider), undercover agencies, competitors, data stealing algorithms online by exploitation of loop-holes in the system. It could be as simple as the user himself attaching an infected drive into the application or system creating multiple security hazards.

Explanation of Consequence:

Cyber-attacks could lead to data breaches, financial losses, reputational damage and even the total transfer of system control to the hacker(s) giving him/her free reign over our system.

Score:

Level: Red	**Pf:** MED (0.5)
Score from P-I Matrix: 0.40	**Cfp:** VHI (0.8)
Cause: Due to the lack of authorization, encryption, and secure development practices in our app.	**Cfs:** MED (0.2)
	Cfc: HI (0.4)

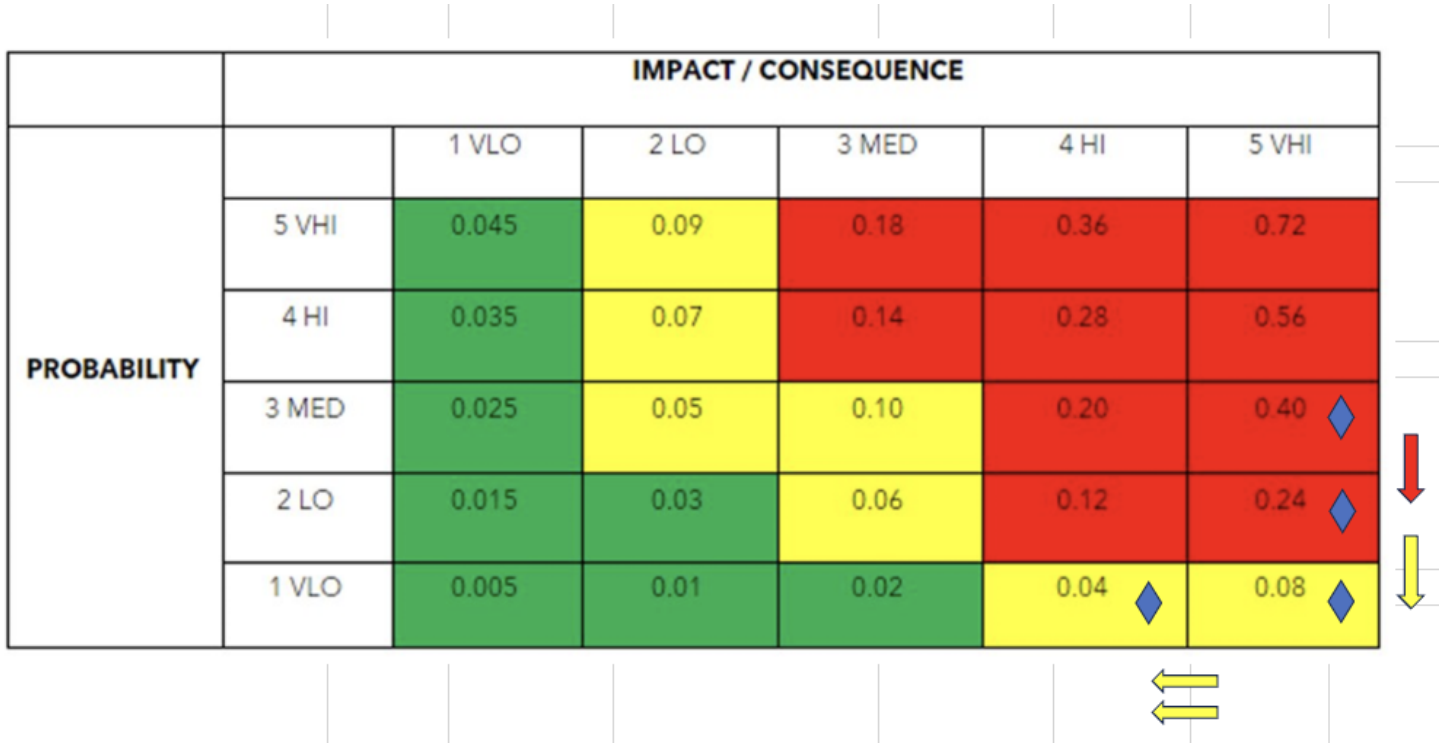
Rational: With the steady increase in cyber-attacks in this digitally connected world, it is important to give users and business the necessary security and protective measures to defend against the cyber hazards and privacy threats especially, when it is a connected service like ours which is linked to a host of other system externally as well.

R12 - Risk Response Planning Work Sheet

Risk ID	Risk Response Strategy	Risk Response Actions (numbered)	Action Start Date	Action Title	Exit Criteria	Workaround/Fall back	Action Owner	Risk Action Status	Risk Score and Threshold Level (R,Y,G)	Probability VLO, LO, MED, HI, VHI	Impact VLO, LO, MED, HI, VHI (Performance)	Impact VLO, LO, MED, HI, VHI (Schedule)	Impact VLO, LO, MED, HI, VHI (Cost)
R12	Reduction/Mitigation	Start of Mitigation					Hareish		0.4 - R	MED	VHI	MED	HI
	Reduction/Mitigation	I. Establish access control and multilayer authentication to prevent unauthorized access to the application.	1/1/2024	Authentiation / User Control	The application grants access to the user only after multi factor authentication and verification control.	Fallback: This requires development of a seperate verification platform through which the authentication occurs.	Hareish		0.24 - R	LO (Elimination of unwanted users from authentication)	VHI	MED	HI
	Reduction/Mitigation	II. Implement the concept of 'app-wrapping' by establishing integrity assurance policies enabling the administrator to govern various factors like who can download the app, what APIs are allowed and if the data can be retained on that particular device.	1/5/2024	App Wrapping	Everone's access or usage of the application is either monitored or controlled as per the norms.	Workaround: Though not as efficient, a continuous monitoring team could be set up to monitor threats manually instead of a app-wrapping system.	Hareish		0.08 - Y	VLO (Continuous monitoring of the users)	VHI	MED	HI
	Reduction/Mitigation	III. Penetration testing and installation of firewall to maximize protection against forced breach attempts to the system by means of trojans, viruses or similar threats.	1/10/2024	Deployment of Firewall Security	The firewall and cyber-security protocol for penetration testing is able to detect and protect against all known viruses and similar threats till date.	Fallback: Subscription costs for firewall and recruitment of third-party penetration testers.	Hareish		0.04 - Y	VLO	HI (Eliminate s th hacking via pen test and seurity firewall)	MED	HI
	Reduction/Mitigation	IV. Formulate a disaster recovery system to aid in operational continuity, data restoration and protection by isolating the breached zone and changing configuration of other sectors when an intrusion is detected to prevent complete seisure of functions.	1/15/2024	Disaster Recovery	The system shall enable the normal functioning of the system except for the part that was affected and the intrusion detection mechanism built-in should be able to identify the intrustion automatically and initiate the disaster recovery protocol immediately.	Fallback: Training for emergency disaster recovery plan has to be given for all the departments, Usage of seperate AI/Ml model to ensure effective scenario training is given for the automated system.	Hareish		0.04 - Y	VLO	MED (Does not affect other areas of the system)	MED	HI

R12 Risk Response Burndown on Scored P-I Matrix

			Post-Response Assessment		
Risk Response Strategy	**Risk Response Actions (w/ Owners)**	**Risk Action Status**	**Probability VLO, LO, MED, HI, VHI**	**Impact VLO, LO, MED, HI, VHI**	**Priority R, Y, G and Risk Score**
Reduce	Start		MED	VHI	0.4
	1) Multilayer authentication and access control		LO	VHI	0.24
	2) App Wrapping		VLO	VHI	0.08
	3) PEN testing and Firewall implementation		VLO	HI	0.04
	4) Disaster Recovery System		VLO	HI	0.04



Recommendation/Cost Analysis

- Given the following cost analysis, we would sign the contract because the overall Return on Investment of these risks is a good positive ROI.

Risk ID	Probability_f	Cost Impact_f	Expected Risk Exposure	Cost to Mitigate	Mitigation P_f	ERE_Mitigation	Profit	ROI	Amount	Description
R1	0.55	10000	5500	4700	0.099	6600	20000	14310	86000	Maximum Exposure
R12	0.5	65000	32500	7000	0.109	6600	15000	915	44300	Total EMV of risks
R08	0.3	1000	300	3200	0.05	6600	7600	4350	-41900	Pre-mitigation pessimistic loss
R10	0.6	10000	6000	8300	0.1	4000	1500	-7800	-200	Pre-mitigation expected loss
									11775	Total ROI

Note: Amount in $ and not all risks are shown

Thank you