Assignment 8

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| --- | --- |
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Catalyst Driving Business Excellence

Kitchener, Ontario

Generative AI Powered Voice Assistant Customer Service at Rogers

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# **Solution Selection**

## Evaluation Criteria Matrix

### Solution 1

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | Criteria | Score | Explanation |
| 1 | Performance | 8 | Outsourcing the AI platform ensures access to specialized knowledge and resources, improving performance in comprehending and answering customer inquiries. |
| 2 | Proactive | 7 | Outsourcing may provide proactive solutions, but the degree of proactiveness will depend on the service agreements and capabilities of the selected service provider. |
| 3 | Intuitive | 8 | The outsourced AI platform's user interface and interaction flow are created with the user experience in mind, guaranteeing feature accessibility and simplicity of use. |
| 4 | Responsive | 9 | Platforms for outsourced AI are usually made to be as responsive as possible to cut down on wait times and guarantee effective query resolution. |
| 5 | Adaptability | 7 | The flexibility of the outsourced platform may be constrained by vendor capabilities and contractual obligations, which might affect its capacity to satisfy Rogers' specific requirements. |
| 6 | Empathy | 8 | Even though external AI systems might not thoroughly grasp Rogers' brand voice, they can still offer sympathetic interactions by using sentiment analysis and prepared answers. |
| 7 | UI/UX | 9 | Outsourced AI systems include intuitive user interfaces that make it easy and efficient for users to navigate. |
| 8 | Productivity | 9 | Outsourced AI platforms increase productivity and improve customer service operations by automating repetitive processes and optimizing workflows. |
| 9 | Efficiency | 9 | Outsourced AI systems make call-handling procedures more efficient because they can immediately analyze and reply to customer queries. |
| 10 | Automation | 9 | Outsourced AI platforms provide a wide range of automation features that minimize human involvement and boost productivity. |
| 11 | Flexibility | 8 | Outsourced AI systems' customization possibilities and integrations allow flexibility and enable Rogers to adjust to changing demands. |
| 12 | Scalability | 8 | Scalable solutions are provided by outsourced AI systems, which can readily handle increasing contact volumes and changing customer service requirements upon request and protocols. |
| 13 | Reliability | 8 | Customer support activities are kept as unaffected as possible by service level agreements with outsourced providers, guaranteeing good reliability and uptime. |
| 14 | Incident Management | 9 | Outsourced providers provide good incident-handling processes, guaranteeing prompt issue resolution and little disruption to service delivery. |
| 15 | Knowledge Management | 8 | Comprehensive knowledge management systems are part of outsourced AI platforms, giving employees access to current, accurate information for answering customer inquiries. |
| 16 | Quality Assurance | 9 | Outsourced AI platforms employ quality assurance procedures to ensure service standards and regulatory compliance. |
| 17 | Compliance | 8 | Outsourced AI platforms are guaranteed to comply with data privacy and security regulations since they follow industry standards and regulations. |
| 18 | Security | 9 | Sensitive data is protected, and unauthorized access is prevented by security measures by outsourced AI platforms. |
| 19 | Availability | 9 | Outsourced AI platforms include reliable infrastructure, redundancy controls, and high availability to reduce downtime. |
| 20 | Data Specification | 8 | To ensure compatibility and interoperability with current data systems and protocols, outsourced AI platforms adhere to data requirements. |
| 21 | Encryption | 9 | Outsourced AI systems that adhere to encryption standards guarantee safe data transmission and storage while guarding against cyber attacks. |
| 22 | Backup Mechanisms | 8 | High backup systems offered by outsourced AI platforms guarantee the availability and integrity of data in the event of emergencies or system outages. |
| 23 | Disaster Recovery Planning | 8 | Outsourced AI platforms offer disaster recovery strategies that guarantee company continuity and minimize the impact of unanticipated incidents or disruptions. |
| 24 | Speech Recognition Accuracy | 9 | Outsourced AI platforms provide high speech recognition accuracy by utilizing complex algorithms and machine learning models. |
| 25 | Natural Language Understanding | 9 | Outsourced AI platforms have sophisticated natural language understanding capabilities that make it possible to accurately read customer inquiries and intents. |
| 26 | API Accessibility | 8 | Accessible APIs are provided by outsourced AI platforms, improving extension and interoperability through customization and interface with external systems. |

### Solution 2

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | Criteria | Score | Explanation |
| 1 | Performance | 9 | Third-party AI solutions use advanced knowledge and technology to improve performance in comprehending and answering consumer inquiries accurately. |
| 2 | Proactive | 8 | Proactive features are available in third-party AI systems, although the degree of these characteristics may differ depending on the vendor and customization choices. |
| 3 | Intuitive | 9 | Third-party AI products have user interfaces that are easy to use and guarantee feature access and navigation. |
| 4 | Responsive | 9 | Response times are kept optimized with third-party AI technologies, guaranteeing prompt query resolution. |
| 5 | Adaptability | 9 | Although third-party AI solutions offer flexibility through integrations and customization possibilities, they might not perfectly match Rogers' specific requirements. |
| 6 | Empathy | 9 | Third-party AI solutions can still offer sympathetic interactions using sentiment analysis and prepared replies, even though they might not thoroughly grasp Rogers' brand voice. |
| 7 | UI/UX | 9 | Third-party AI systems have intuitive user interfaces that make it easy for agents to explore and work efficiently. |
| 8 | Productivity | 9 | Third-party AI tools increase productivity and improve customer service operations by automating repetitive procedures and optimizing workflows. |
| 9 | Efficiency | 9 | Third-party AI solutions increase the effectiveness of call-handling procedures by rapidly analyzing and responding to customer inquiries. |
| 10 | Automation | 9 | Comprehensive automation features provided by third-party AI technologies lower the need for human involvement and boost productivity. |
| 11 | Flexibility | 8 | With integrations and customization possibilities, third-party AI solutions offer flexibility that makes it possible to adjust to Rogers' changing needs. |
| 12 | Scalability | 9 | Scalable solutions that can readily handle increasing call volumes and customer service requirements are provided by third-party AI products. |
| 13 | Reliability | 9 | Customer care operations are kept as unaffected as possible by securing excellent reliability and uptime through service-level agreements with outside suppliers. |
| 14 | Incident Management | 9 | Third-party suppliers provide robust incident management procedures, guaranteeing prompt issue resolution and minimal disruption to service delivery. |
| 15 | Knowledge Management | 9 | Comprehensive knowledge management systems, which give employees access to accurate and up-to-date data for addressing customer questions, are among the third-party AI products. |
| 16 | Quality Assurance | 9 | Third-party AI products use quality assurance procedures to fulfill regulatory compliance and service standards. |
| 17 | Compliance | 9 | Third-party AI tools guarantee data privacy and adherence to security legislation by following industry standards and regulations. |
| 18 | Security | 9 | Third-party AI products employ security measures to safeguard confidential information and prevent unauthorized access. |
| 19 | Availability | 9 | High availability, reliable infrastructure, and redundancy controls to reduce downtime are features of third-party AI systems. |
| 20 | Data Specification | 8 | Third-party AI solutions adhere to data specifications to guarantee compatibility and interoperability with existing data systems and protocols. |
| 21 | Encryption | 9 | AI products from third parties adhere to encryption requirements to guarantee safe data transit and storage while guarding against cyber threats. |
| 22 | Backup Mechanisms | 8 | In the event of system failures or natural disasters, third-party AI technologies offer reliable backup systems that guarantee the availability and integrity of data. |
| 23 | Disaster Recovery Planning | 8 | The disaster recovery plans furnished by external AI products guarantee uninterrupted business operations and mitigate the effects of unanticipated incidents or disruptions. |
| 24 | Speech Recognition Accuracy | 9 | By utilizing advanced algorithms and machine learning models, third-party AI products provide excellent accuracy in speech recognition. |
| 25 | Natural Language Understanding | 9 | Third-party AI technologies have extensive natural language understanding capabilities, making it possible to read consumer questions and intents accurately. |
| 26 | API Accessibility | 8 | To improve interoperability and extension, third-party AI technologies provide readily available APIs for customization and integration with external systems. |

### Solution 3

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | Criteria | Score | Explanation |
| 1 | Performance | 5 | Handling growing call volumes and complicated customer queries may limit performance to less optimal levels. |
| 2 | Proactive | 5 | The current platform's capacity to predict common difficulties and proactively handle consumer needs is limited |
| 3 | Intuitive | 6 | The current platform's user interface could not be very intuitive, leading to slower reaction times and less satisfied users. |
| 4 | Responsive | 6 | Response times might be slower, which would cause customers to become more impatient and wait longer. |
| 5 | Adaptability | 6 | The current platform can't adjust to a wide range of user preferences and communication styles, which would reduce how well it can serve users' demands. |
| 6 | Empathy | 8 | Humans can understand the customer's empathy understanding their problem and mood. |
| 7 | UI/UX | 6 | The current platform's user interface could be old-fashioned and less intuitive, reducing worker satisfaction and productivity. |
| 8 | Productivity | 5 | Due to the manual management of repetitive activities and a greater reliance on human agents, productivity may decline. |
| 9 | Efficiency | 5 | Call handling procedures may become less efficient, resulting in longer response times and less customer satisfaction. |
| 10 | Automation | 2 | The current platform has little to no automation, which makes it more dependent on manual labor and human interaction. |
| 11 | Flexibility | 5 | The efficiency of the current platform in satisfying customer needs may be limited by its reluctance to adjust to shifting customer service requirements and new problems. |
| 12 | Scalability | 5 | Scalability can be constrained, making it challenging to handle increasing contact volumes and customer service demands. |
| 13 | Reliability | 6 | Reliability might be compromised, increasing the frequency of service interruptions and system outages. |
| 14 | Incident Management | 6 | Incident management procedures could be less effective, which would cause delays in problem-solving and dissatisfied customers. |
| 15 | Knowledge Management | 6 | Knowledge management would be less successful, which could result in inconsistent procedures for information access and resolution. |
| 16 | Quality Assurance | 6 | Quality assurance may decline, decreasing service quality and regulatory compliance. |
| 17 | Compliance | 6 | Compliance might be complex without AI automation, which increases the possibility of breaking data security and privacy rules. |
| 18 | Security | 7 | The absence of AI automation may make systems more vulnerable to security and data breaches, even in cases when security safeguards are still in place. |
| 19 | Availability | 6 | Availability may be reduced due to humans' limited working hours, resulting in frequent system outages and service interruptions. |
| 20 | Data Specification | 5 | Data specification compliance might be uneven, affecting interoperability and compatibility with current systems. |
| 21 | Encryption | 7 | Although encryption protections might still be implemented, data encryption and security standards might have loopholes. |
| 22 | Backup Mechanisms | 6 | Data backup and recovery procedures might experience lags or delays even with backup systems. |
| 23 | Disaster Recovery Planning | 6 | Disaster recovery planning could be less thorough, resulting in longer recovery times and more downtime. |
| 24 | Speech Recognition Accuracy | 9 | Speech recognition quality can be good, leading to proper understanding and accuracy during customer interactions. |
| 25 | Natural Language Understanding | 9 | Natural language comprehension may be high due to humans understanding other humans, affecting the platform's capacity to comprehend and react to complex customer queries. |
| 26 | API Accessibility | 5 | API accessibility may be restricted, affecting the platform's capacity to interface with other programs and services. |

### Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | Criteria | Outsourcing Completely | Third-Party AI | Do Nothing |
| 1 | Performance | 8 | 9 | 5 |
| 2 | Proactive | 7 | 8 | 5 |
| 3 | Intuitive | 8 | 9 | 6 |
| 4 | Responsive | 9 | 9 | 6 |
| 5 | Adaptability | 7 | 9 | 6 |
| 6 | Empathy | 8 | 9 | 8 |
| 7 | UI/UX | 9 | 9 | 6 |
| 8 | Productivity | 9 | 9 | 5 |
| 9 | Efficiency | 9 | 9 | 5 |
| 10 | Automation | 9 | 9 | 2 |
| 11 | Flexibility | 8 | 8 | 5 |
| 12 | Scalability | 8 | 9 | 5 |
| 13 | Reliability | 8 | 9 | 6 |
| 14 | Incident Management | 9 | 9 | 6 |
| 15 | Knowledge Management | 8 | 9 | 6 |
| 16 | Quality Assurance | 9 | 9 | 6 |
| 17 | Compliance | 8 | 9 | 6 |
| 18 | Security | 9 | 9 | 7 |
| 19 | Availability | 9 | 9 | 6 |
| 20 | Data Specification | 8 | 8 | 5 |
| 21 | Encryption | 9 | 9 | 7 |
| 22 | Backup Mechanisms | 8 | 8 | 6 |
| 23 | Disaster Recovery Planning | 8 | 8 | 6 |
| 24 | Speech Recognition Accuracy | 9 | 9 | 9 |
| 25 | Natural Language Understanding | 9 | 9 | 9 |
| 26 | API Accessibility | 8 | 8 | 5 |
| Total |  | **218** | **228** | **154** |

A diagram of a graph

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## ROI

**ROI Comparison of Customer Service Solutions (Years 1-5)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cost Category | Years | Solution 1 (Outsourced Platform) | Solution 2 (Third-Party Products) | Solution 3 (Do Nothing) |
| **Implementation** | 1 | $1,500,000 | $750,000 | $0 |
|  | 2-5 | $0 | $0 | $0 |
| **Licensing** | 1-5 | $500,000/year | $200,000/year | $0 |
| **Maintenance** | 1-5 | $300,000/year | $100,000/year | $0 |
| **Operational** | 1 | -$200,000 (reduced efficiency) | -$100,000 (reduced efficiency) | $0 |
|  | 2 | -$150,000 | -$75,000 | $150,000 (increased workload) |
|  | 3-5 | -$100,000 | -$50,000 | $200,000 (increased workload) |
| **Enhancement** | 1-5 | $100,000/year | $50,000/year | $50,000 |
| **Training** | 1 | $200,000 | $100,000 | $50,000 |
|  | 2-5 | $50,000/year | $25,000/year | $50,000/year |
| **Total Cost** | 1 | $2,600,000 | $1,200,000 | $100,000 |
|  | 2 | $950,000 | $375,000 | $250,000 |
|  | 3 | $950,000 | $375,000 | $300,000 |
|  | 4 | $950,000 | $375,000 | $300,000 |
|  | 5 | $950,000 | $375,000 | $300,000 |

**Benefits (Assumed)**

* Increased Customer Satisfaction: +$500,000/year (Years 1-5)
* Reduced Customer Churn: +$500,000/year (Years 1-5)
* Increased Agent Efficiency: +$300,000/year (Years 2-5)
* Operational benefit.   
  Solution 1: $450,000 (Years 1-5)

Solution 2: $225,000 (Years 1-5)   
Solution 3: none (accrue a loss)

**ROI Calculation**

* ROI = (Total Benefit - Total Cost) / Total Cost

**Total ROI**

* Solution 1: ROI = ($8,450,000 - $6,400,000) / $6,400,000 = 32.03%
* Solution 2: ROI = ($7,325,000 - $2,700,000) / $2,700,000 = 171.30% (**Highest ROI**)
* Solution 3: ROI = Cannot be calculated (No Investment)

## Using Third-party AI Products

Considering Rogers’ current requirement, which aims to improve the customer service call system, can be done by employing third-party AI products for the AI customer service call platform, this is the best option.

1. **Enhanced Customer Experience:** Rogers may create an extremely responsive and effective customer support contact platform by incorporating well-known AI tools like IBM Watson or Amazon Comprehend. Instant access to AI-powered support will benefit customers, reduce wait times, and enhance satisfaction.
2. **Efficiency and Resource Optimization:** Rogers may reduce the amount of work employees have to do by streamlining the customer support process through third-party AI tools. Human representatives may concentrate on resolving complicated issues that require human engagement, increasing productivity, and optimizing resources, while AI takes care of common questions and provides prompt responses.
3. **Scalability and Reliability:** Reliable and scalable solutions that can handle changes in customer service demands and call traffic variations are provided by well-established AI products. Rogers could rely on third-party AI platforms' robust infrastructure and redundancy mechanisms to guarantee high availability and continuous service delivery.
4. **Customization and Adaptability:** Third-party AI technologies offer customization possibilities, enabling the solution to be tailored to Rogers' unique needs and preferences. These platforms' versatility makes integrating them seamlessly with current workflows and systems possible, guaranteeing a smooth transition and no interruption to business as usual.
5. **Compliance and Security:** Reputed companies create AI solutions with strict security and compliance requirements in mind. Rogers can maintain compliance with data privacy laws like GDPR and HIPAA while protecting sensitive client data from breaches or unauthorized access by using a reliable third-party AI platform.
6. **Cost-effectiveness:** Rogers can save money by not having to invest in as much in-house development and maintenance when using third-party AI tools. Rogers can maximize return on investment and optimize cost-effectiveness through scalable subscription plans and predictable pricing patterns.

Solution 2 aligns with the project's goals of creating an AI-powered customer service call platform that enhances customer satisfaction, increases operational effectiveness, and optimizes resource use. Solution 2 is the better option for the project, as Rogers can accomplish these objectives quickly and effectively by using well-known AI solutions.

# **Risk Log**

## Risk Log for Outsourcing AI Customer Service Call Platform

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID. No:** | **Risk Description** | **Root Cause** | **Probability** | **Impact** | **Mitigation** |
| **1** | **Data security breach** | Insufficient security measures implemented | Medium | High - Loss of customer trust, legal repercussions | Implement robust encryption protocols, conduct regular security audits, and adhere strictly to data protection regulations |
| **2** | **Vendor fails to deliver on AI platform** | Lack of expertise or resources on the vendor's part | Medium | High - Delay in project timeline, loss of investment | Thoroughly vet vendors, request references and past performance data, include penalties for missed deadlines in the contract |
| **3** | **Integration challenges with existing systems** | Incompatibility between the AI platform and current infrastructure | High | High - Disruption to operations, increased costs | Conduct comprehensive compatibility testing before implementation, engage experienced integration specialists, and have a rollback plan in place |
| **4** | **Low User Adoption** | Resistance from employees or customers to the AI platform | Medium | High - Reduced effectiveness of solution, wasted investment | Provide comprehensive training and support to employees and customers, actively address concerns and feedback, highlight benefits of the AI platform |
| **5** | **Dependency on third-party services** | Reliance on external vendors for critical components | High | High - Vulnerability to vendor changes or disruptions | Diversify vendors where possible, establish strong SLAs and contingency plans, explore alternatives for critical services |

## Risk Log for Third-party AI products

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID.NO:** | **Risk Description** | **Root Cause** | **Probability** | **Impact** | **Mitigation** |
| **1** | Inaccurate or inappropriate responses from AI | Insufficient training data or outdated knowledge base | Medium | High - Loss of customer trust, increased workload for human agents | Regularly update and refine training data, implement feedback mechanisms for continuous improvement, involve subject matter experts in AI model training |
| **2** | Legal and compliance issues | Failure to adhere to regulatory requirements | Medium | High - Legal penalties, reputational damage | Stay informed about relevant regulations, involve legal experts in the design and implementation process, conduct regular compliance audits |
| **3** | Dependency on third-party services | Reliance on external vendors for critical components | High | High - Vulnerability to vendor changes or disruptions | Diversify vendors where possible, establish strong SLAs and contingency plans, explore alternatives for critical services |
| **4** | Integration challenges with existing systems | Incompatibility between the AI platform and current infrastructure | High | High - Disruption to operations, increased costs | Conduct comprehensive compatibility testing before implementation, engage experienced integration specialists, and have a rollback plan in place |
| **5** | Low User Adoption | Resistance from employees or customers to the AI platform | Medium | High - Reduced effectiveness of solution, wasted investment | Provide comprehensive training and support to employees and customers, actively address concerns and feedback, highlight benefits of the AI platform |

## Risk Log for Do Nothing Method

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID. No:** | **Risk Description** | **Root Cause** | **Probability** | **Impact** | **Mitigation** |
| **1** | Increased operational costs | Need for more employees to handle the workload | Medium | High - Increased expenses, resource pressure | Implement continuous process improvement efforts, invest in training and development for existing staff, explore self-service options for customers |
| 2 | Reduced efficiency | Manual handling of customer inquiries | Medium | High - Slow response times, decreased customer satisfaction | Streamline processes, invest in employee training, explore automation options for routine queries |
| 3 | Limited Scalability | Difficulty in handling increasing call volumes | High | High - Backlogs, extended wait times | Invest in scalable infrastructure, implement flexible service options, continuously monitor, and adjust resource allocation based on demand |
| **4** | Missed opportunities for personalization | Inability to analyze and utilize customer data | Medium | High - Decreased customer satisfaction, missed revenue opportunities | Explore options for data analysis and personalization, invest in customer relationship management tools, conduct regular customer feedback surveys |
| 5 | Competitive disadvantage | Inability to keep up with industry trends | Medium | High - Loss of market share, decreased competitiveness | Stay informed about industry developments, invest in innovation and technology adoption, and prioritize customer experience and satisfaction |

# **Implementation Strategy**

## Phased Approach

We will adopt a phased approach to deploy the AI customer service system for Roger. Phased deployment enables progressive testing, feedback collection, and modifications, lessening the impact of possible issues on the entire system at once.

 This approach will ensure minimal disruption to ongoing operations and reduce risks. Here are the critical components of our implementation strategy:

## Phased Migration Plan

**Phase 1: Pilot Phase**

Select a subset of customer service calls by geography to use the AI-powered system for handling complaints. Identify the target section for the initial rollout, ideally by geography, so that roughly 5% of the calls are processed through the AI system. Gather feedback from representatives and customers to fine-tune the AI model and interface.

**Phase 2: Departmental Rollout**

Roll out the AI system to specific departments or call centers, gradually expanding its usage across different regions or teams.

Provide targeted training sessions and support to these departments to ensure smooth transition and adoption.

**Phase 3: Full Deployment**

Implement the AI system across all customer service channels and locations. Monitor system performance closely and provide ongoing support to address any issues or concerns. A diagram of a process

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Create a detailed release schedule with timelines for the development, testing, and deployment phases.

## Early Life Support

Offer dedicated support during the initial period after deployment to address any operational issues or user concerns.

Work closely with the incident management team to resolve issues promptly and ensure a smooth transition to the new system.

## 

## Release Closure

Document actions, update configuration management records, and validate completion criteria to close each release phase officially.

Conduct a post-implementation review to determine the success of the deployment, collect lessons learned, and suggest areas for improvement.

## Client Engagement and Training

Engage the customer throughout the implementation process, offering regular updates on progress, milestones, and modifications to the plan. Provide extensive training sessions for end users, administrators, and support staff to ensure they are comfortable using and maintaining the AI customer service system.

Customize training materials for each user group's unique needs and tasks, including hands-on experience and practical examples.

### Training Approach

**Train-the-Trainer**

Provide training sessions for a select group of client personnel who will then train their respective teams. This approach ensures the scalability and sustainability of training efforts.

**Customized Training Programs**

Develop customized training programs based on user roles and responsibilities, focusing on relevant features and functionalities of the AI customer service system.

**Continuous Learning**

Offer ongoing learning opportunities, such as webinars, workshops, and knowledge-sharing sessions, to support users in maximizing the benefits of the new system.

## Backout Strategy

Despite thorough planning and testing, there may be scenarios where it becomes necessary to revert to the previous state or system configuration. To address this, we will implement a backout strategy as follows:

### Backout Plan

Develop a detailed backout plan outlining the steps and procedures for reverting to the previous system or configuration.

### Testing Backout Procedure

Conduct testing of backout procedures during the testing phase to ensure they are practical and feasible.

### Communication Protocol

Establish clear communication channels and protocols for initiating and executing the backout plan, involving key stakeholders and support teams.

### Monitoring and Evaluation

Continuously monitor system performance and user feedback during deployment. If significant issues arise that cannot be resolved promptly, activate the backout plan to restore the previous state.

### Post-Backout Review

Following backout, conduct a thorough review to identify root causes, lessons learned, and opportunities for improvement in future deployments.

## Continuous Improvement

Post-deployment, a process for continuous improvement will be established to address evolving customer needs and optimize the AI system's performance over time.

Regular reviews and updates will be conducted based on customer and staff feedback, ensuring the system remains effective and aligned with Rogers' objectives.

## Cost and Resource Allocation

Detailed cost estimation and resource allocation plans will be provided to the client based on the chosen deployment approach and training strategy.

The client will be informed about the manpower required from their side for successful implementation, including participation in training sessions, providing feedback, and ongoing support.

By following this phased approach to implementation, engaging the client throughout the process, and providing comprehensive training and support, we aim to minimize risks and ensure a successful deployment of Roger's AI customer service system. 

# **Testing Strategy**

## Introduction

The Phased implementation strategy involves deploying the system in multiple phases or increments. Testing will be conducted iteratively, focusing on specific modules or functionalities in each phase to ensure incremental improvements and validate the stability of the system.

## Testing Types

### Unit Testing

#### Entry Criteria

* Completion of code development for individual AI modules (e.g., NLP, speech recognition).
* Availability of unit test cases covering all critical and high-priority functionalities.

#### Exit Criteria

* Successful execution of unit test cases with no critical defects related to the specific AI module.
* Code coverage of at least 80% for the unit-tested functionalities.

### Integration Testing

Verify the integration of AI modules with voice recognition engines, databases, and external APIs.

#### 2.1 Entry Criteria

* Completion of unit testing for individual AI modules.
* Availability of integration test environment with integrated AI modules and external APIs.

#### 2.2 Exit Criteria

* Successful integration of AI modules with minimal defects affecting system functionality.
* Integration test coverage of at least 70% for the integrated components.

### System Testing

Test the overall performance, reliability, and scalability of the voice assistant system under various usage scenarios.

#### 3.1 Entry Criteria

* Completion of integration testing and readiness of the system for comprehensive testing.
* Availability of system test environment replicating production-like configurations.

#### 3.2 Exit Criteria

* Successful execution of system test cases covering end-to-end scenarios with minimal defects affecting system functionality.
* System test coverage of at least 80% for critical and high-priority functionalities.

### User Acceptance Testing (UAT)

Validate the user experience, accuracy of responses, and alignment with user requirements.

#### 4.1 Entry Criteria

* Completion of system testing and readiness for client validation.
* Availability of UAT environment resembling the production environment.

#### 4.2 Exit Criteria

* Acceptance of the system by stakeholders with minimal critical defects affecting usability.
* Successful completion of user acceptance test cases covering all defined acceptance criteria.

### Performance Testing

Evaluate the system's response time, throughput, and resource utilization under different loads to ensure optimal performance.

#### 5.1 Entry Criteria

* Completion of system integration testing and readiness of the voice assistant system for performance testing.
* Availability of performance testing environment resembling the production environment.

#### 5.2 Exit Criteria

* Response time for processing user queries meets predefined performance objectives under normal and peak load conditions.
* Stability of the voice assistant system is verified through prolonged load testing without significant performance degradation or system failures.

### Security Testing

Identify vulnerabilities and ensure the system's resistance to unauthorized access, data breaches, and privacy violations.

#### 6.1 Entry Criteria:

* Completion of system integration testing and readiness of the voice assistant system for security testing.
* Availability of security testing environment with tools and configurations necessary for security assessments.

#### 6.2 Exit Criteria:

* No critical security vulnerabilities (e.g., authentication bypass, injection flaws, sensitive data exposure) are present in the voice assistant system.
* Compliance with security standards and best practices (e.g., OWASP Top 10, GDPR) is validated, ensuring the confidentiality, integrity, and availability of user data.

## Testing Approach

### Process of Testing

* The testing process will follow the Agile methodology, with testing activities integrated into each sprint.
* Continuous testing will be integrated into the development process to ensure early defect detection and resolution.

### Testing Levels

* **Unit testing:** Validate the functionality of individual AI modules such as natural language processing (NLP) and speech recognition.
* **Integration Testing:** Verify the integration of AI modules with other system components and external APIs.
* **System Testing:** Test the end-to-end functionality of the voice assistant system, including voice recognition, response generation, and interaction with users.
* **User Acceptance Testing (UAT):** Validate the system's usability and effectiveness in real-world scenarios, ensuring alignment with user requirements.

### Roles and Responsibilities

* **Test Team Lead**: Responsible for overall test planning, strategy, and coordination with development and other stakeholders.
* **Test Engineers**: Design and execute test cases, identify defects, and collaborate with developers to resolve issues.
* **AI Developers:** Collaborate with testers during unit and integration testing and address defects related to AI algorithms and models.
* **Product Owner:** Provides acceptance criteria and validates user stories during UAT, ensuring alignment with business objectives.

## Stages of Testing

### Planning

* The testing team collaborates with the development team and product owner during planning sessions to understand phase goals and the definition of done.
* Test cases are identified and prioritized based on user stories and acceptance criteria.

### Daily Stand-ups

* + Daily stand-up meetings facilitate communication between the testing team and the rest of the team, providing updates on testing progress and any impediments encountered.

### Incremental Testing

* + - Testing activities are performed incrementally throughout the phase as development tasks are completed.
    - Unit testing, integration testing, and system testing are conducted continuously to validate each increment of the product.

### Review

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* At the end of each phase, a review meeting is conducted to demonstrate the completed increment to stakeholders.
* Feedback obtained during the review meeting is used to refine the product backlog and inform future testing efforts.

### User Acceptance Testing (UAT)

* User acceptance testing is conducted in parallel with development and testing activities throughout the phase.
* Stakeholders proxying as End-users actively participate in validating the increment against acceptance criteria and providing feedback for improvement.

## Defect Management

### Adding new defects

* Defects will be logged into the defect tracking system (e.g., Jira) by test engineers or any team member who identifies an issue during testing.
* Each defect entry will include detailed information such as: Defect description, Steps to reproduce, Severity (e.g., Critical, Major, Minor), Priority (e.g., High, Medium, Low), Attachments (e.g., screenshots, logs)

### Defect Re-testing

Fixed defects will be retested by testers and closed.

### Defect Triage

* Defect triage meetings will be conducted regularly, involving key stakeholders, including the test team lead, developers, product owner, and project manager.
* During defect triage, each reported defect is reviewed and prioritized based on severity, impact on system functionality, and urgency for resolution.
* Defects are categorized into different priority levels (e.g., P1, P2, P3) and assigned to development teams for resolution based on their priority and available resources.

### Defect Flow

A diagram of a software process

Description automatically generated

## Test Environment

### Development Environment

* **Number of Environments:** One development environment will be established for development and unit testing purposes.
* **Setup Required:** The development environment will include development tools, integrated development environments (IDEs), version control systems (e.g., Git), and necessary libraries and frameworks for AI model development.
* **Backup of Test Data and Restore Strategy**: Test data will be stored in version control repositories alongside the codebase. Frequent commits and branching strategies will be employed to track changes and maintain version history.

### Integration Environment

* **Number of Environments**: One integration environment will be set up for integration testing.
* **Setup Required**: The integration environment will include the voice assistant system components, integrated AI models, external APIs, and simulated user interfaces for testing interactions.
* Ba**ckup of Test Data and Restore Strategy:** Test data used for integration testing will be backed up regularly using automated scripts or database snapshots. A rollback strategy will be in place to restore the environment to a previous state if necessary.

### System Testing Environment

* **Number of Environments**: One system testing environment will be established for end-to-end testing.
* **Setup Required**: The system testing environment will replicate the production environment setup, including servers, databases, network configurations, and external dependencies.
* **Backup of Test Data and Restore Strategy:** Test data in the system testing environment will be backed up regularly using automated backup solutions. Database backups and file system snapshots will be stored securely and encrypted for data protection.

### User Acceptance Testing (UAT) Environment

* **Number of Environments**: One UAT environment will be provisioned for user acceptance testing.
* **Setup Required**: The UAT environment will closely resemble the production environment, providing a realistic testing environment for end-users.
* **Backup of Test Data and Restore Strategy**: Test data for UAT will be backed up and restored using the same strategy as the production environment to ensure data consistency and integrity.

## Testing Tools

* **Test Management Tool (Jira):** Jira will be used for managing test cases, tracking defects, and overall project management.
* **Automation Tool (Custom Automation Frameworks):** Custom automation frameworks will be developed specifically for testing the AI models and backend APIs of the voice assistant system. These frameworks will interact with the system's APIs and perform automated testing to validate the accuracy and functionality of the AI responses.
* **Security Testing Tool (OWASP ZAP):** OWASP ZAP will be used to perform security testing on the backend APIs and server-side components of the voice assistant system. It can help identify vulnerabilities such as injection flaws, authentication issues, and sensitive data exposure.
* **Performance and Load Testing Tool (Apache JMeter):** Apache JMeter will be utilized to conduct performance and load testing on the backend infrastructure of the voice assistant system. It can simulate concurrent requests and measure the system's response time, throughput, and scalability under different load conditions.

## Test Sign off

* Test sign-off will be conducted at the end of each testing phase (e.g., sprint, release) by the test team lead or QA manager.
* Test sign-off may require verification of exit criteria such as:
* Completion of test case execution
* Resolution of critical defects
* Achievement of test coverage goals

## Risks and Mitigation

* Risks related to time constraints, scope changes, and resource availability are mitigated through effective phase planning, prioritization, and collaboration within the development team.
* Regular retrospectives are conducted to identify and address process improvements and optimize testing practices for future phases.

# **References**

* Thomas Hamilton. “How to Create Test Strategy Document (Sample Template).” *Guru99.com*, 11 Dec. 2019, www.guru99.com/how-to-create-test-strategy-document.html.