Improving The Customer Service Process

of a Nordic Telecom Provider (NTP)

INN354 Systems and Process Innovation

NTP’s Customer Service Process

Background

NTP is a prominent telecommunications provider in the Nordic region, focusing on enterprise customer service processes. Analysis of their service workflow has highlighted critical inefficiencies. There are unnecessary delays present within the current system, particularly concerning the handling of service requests from corporate plan subscribers. Inconsistencies have also been discovered in activity logging and note-taking within the ERP system, indicating a clear need for process optimization.

Objectives

- **Enhance NTP's Customer Service:** Implement Salesforce Einstein AI to address identified bottlenecks, enhancing efficiency and responsiveness.
- **AI-Driven Case Handling:** Integrate AI for optimized case processing and faster resolution.
- **Agent Development and Process Improvement:** Focus on agent skill enhancement and process streamlining for a superior enterprise customer experience.
- **Seamless Customer Journey:** Ensure a responsive, high-quality service from initial contact to resolution, aligning with NTP's strategic customer service goals.
- **Document Retrival:** Implement AI in Salesforce for efficient document retrieval and workflow enhancement.
- **Agent Training and Specialization:** Provide specialized training to staff for maximized use of the new AI system

PROCESS ANALYTICS

The Current Customer Service Process

- Limitations and Sources of Error
- Overview of the process flow
- Activities and events
- Variant analysis
- Throughput time and Agent Insights
- Process control
- Service level and process capability
- Bottlenecks
- Key Insights

Limitations and Sources of Error

Pandemic Impact and Activity scope

COVID-19: Data from a year affected by the pandemic, potentially not reflective of the standard operations

Limited Activity Range: Data includes only 'Interaction', 'Email', and 'END' (Case Closure), possibly overlooking key process stages

Data Context and Inaccuracies

Anonymized Information: Lack of detailed context due to anonymization hinders in-depth analysis of case specifics and agent performance

Generalized Case Topics: Use of code numbers for case topics may oversimplify complex issues

Case Resolution Information: Lack of in-depth information of case resolution

Outlier Inclusion Rationale

Despite filtering pandemic-related data, remaining outliers were retained to ensure a comprehensive view of standard operations. These outliers may highlight exceptional yet possible scenarios within the customer service process, providing insights into the full range of activities and their durations.

Overview of Process Flow

The “As-Is” Process Flow

The current process map characterizes the current state of NTP’s process as it operates before any improvements are made. Leveraging R for process analysis on the filtered dataset, we observe that the average duration for case resolution is approximately 3,5 days (84 hours). The process efficiency varies, with the quickest case being resolved in less than a day (8.48 hours), while the longest extends to 32 days (760 hours). In this dataset, there are possibilities for 3 distinct types of events within the process flow.

Process Mapping

The process map is derived from the process analysis conducted in R. It showcases 100% of the activities and their connections within the dataset. This comprehensive representation ensures that every possible sequence of events is accounted for, providing a full picture of the process as it currently functions.

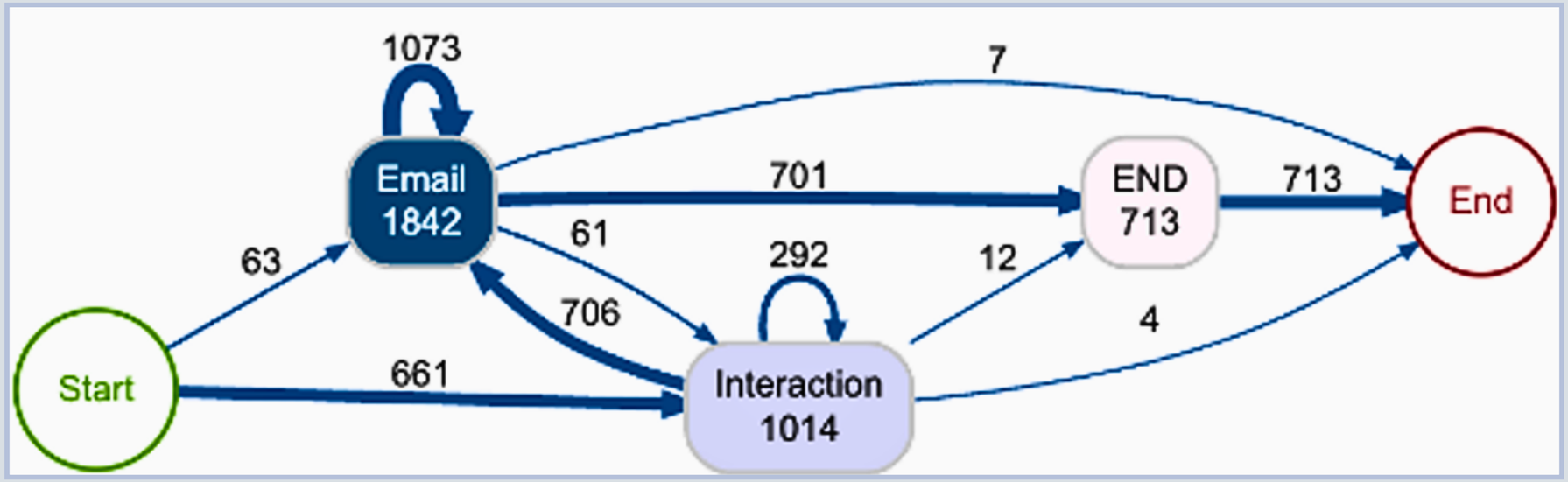

Table 1: Process map

Overview of Activities

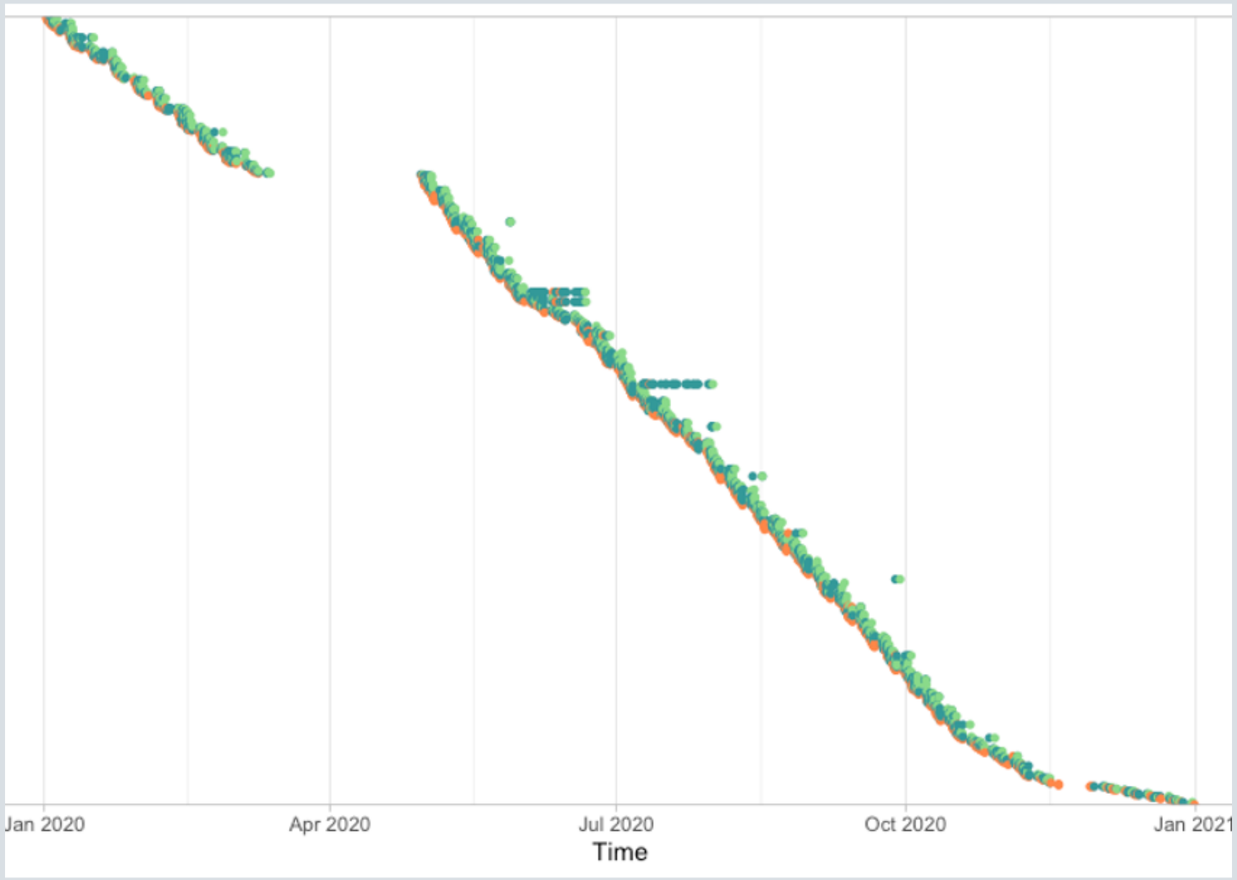

Table 2: Overview of activities 2020 to 2021

Filtered Data

To get a depiction of NTP's standard customer service process, we omitted data from weeks 11 to 17 of 2020, corresponding to the peak lockdown phase of the COVID-19 pandemic. Lockdown conditions significantly altered customer behaviors and workflows, which could skew the analysis of a typical operational process.

Advantages of This Approach

By filtering this period, we eliminate the skewing impact of abnormal conditions, allowing a clearer focus on typical process bottlenecks and efficiencies.

Drawbacks to Consider

Excluding this data means we miss a holistic view of the system's performance under extraordinary situations, which could be valuable for crisis management and understanding customer behavior during unprecedented events.

Overview of Process Flow

Filtrated Process Map

Adjusted to remove COVID-19 irregularities, this map offers a clearer reflection of NTP's standard operations. With filtration, the average resolution time decreased to 82.8 hours from 84 hours. The fastest resolutions remain at 8.48 hours, while the longest cases take around 651 hours. This refined map underscores a typical operational timeline and helps in identifying the process's standard duration and variability without the anomalies of the pandemic's impact.

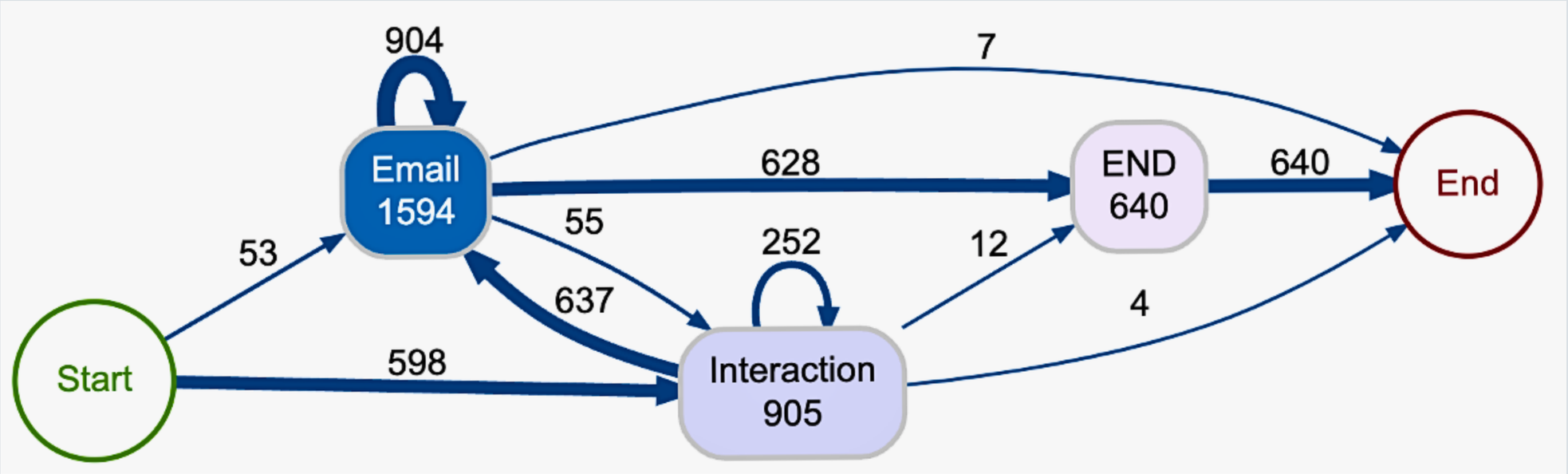

Table 3: Process map - filtered for week 11-17

Overview of Process Flow

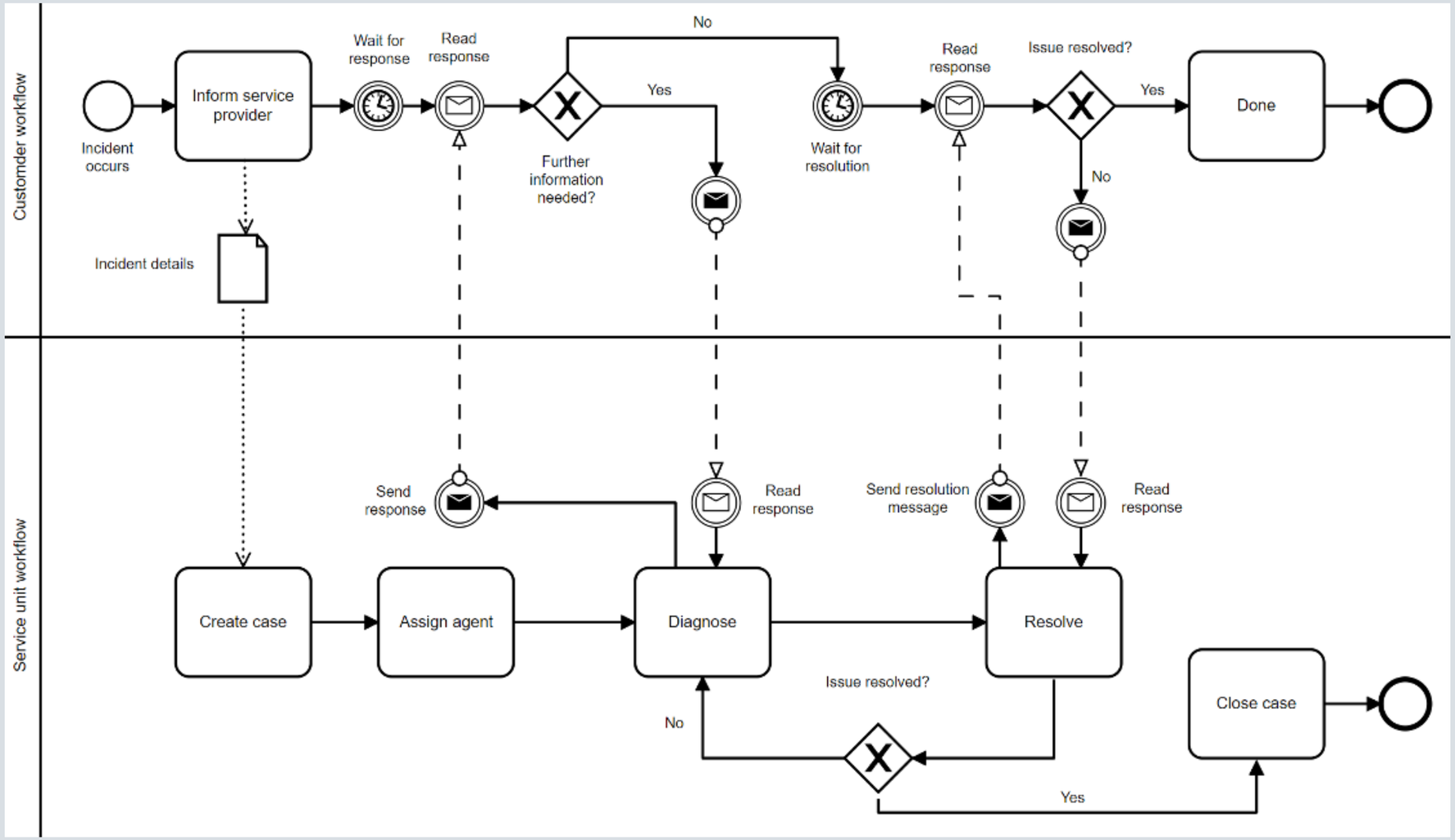

Table 4: NTP´s current BPMN

NTP's "As-Is" BPMN

This BPMN-model outlines the current customer service process for NTP. The process flow is divided into two main parts: the customer's actions, starting from the incident occurrence, and the service unit's response, beginning with case creation. It details the steps and decision points from reporting an incident to case closure.

Overview of Process Flow

NTP’s “As-Is” BPMN

In the “As-Is” BPMN model, the customer is an enterprise client of NTP, which represents a business-to-business (B2B) service model. The process initiates when an incident occurs, prompting the customer to report it through various channels provided by NTP.

Upon receiving the report, a service case is generated in NTP's system, Salesforce. The case is then queued until an available service agent is assigned. The critical interaction between the customer and the service unit begins here, where the agent must diagnose the issue, often requiring further clarification from the customer through additional communication loops.

The customer's and service agent's workflows intersect at various decision points, assessing if further information is needed or if the issue has been resolved. If the case requires more details, the agent must reengage with the customer, creating a feedback loop until sufficient information is provided to proceed.

When the agent has enough information, they attempt to resolve the case. The process is iterative, with potential back-and-forth communication until the issue's resolution is confirmed. Once resolved, the agent closes the case, completing the service cycle.

Notably, the BPMN model shows a streamlined interaction without direct involvement from other departments or third-party service providers, indicating a centralized customer service approach. The diagram does not elaborate on specific contingencies for rejected resolutions or escalations, which suggests areas for process improvement.

The model does not depict direct customer-agent communication outside the prescribed channels, implying that the service unit acts as a central point of contact. It reflects a structured approach to incident management, focusing on resolution efficiency within the specified service level agreement timeframe.

Activities and Events

This analysis provides insights into the average and maximum durations for key customer service activities at NTP, based on event log data analyzed in R

- **Email Correspondence**: With 1,594 events, email is the most common interaction, averaging 10.37 hours to resolve, though some cases require extensive communication (up to 558.2 hours).
- **Interactions:** Account for 905 events, where direct customer engagements take an average of 9.95 hours, highlighting the variable nature of queries and problem-solving sessions.
- **Case Closure (END):** Indicates 640 completed service requests, with an efficient average resolution time of 8.75 hours, but with some cases taking up to 48.5 hours, suggesting occasional delays.

Activity	Events	Average Duration	Max. Duration
Email	1 594	10.37	558.2
Interactions	905	9.95	118.13
END	640	8.75	48.5

Table 5: Overview of activities, events and time used

Activity Time

We conducted a box plot analysis to evaluate the processing times for key customer service activities. This visualization shows the distribution of individual instances of each activity and the total completion time in hours.

- **Email**: This activity shows the highest variation in processing time, reflecting the indirect nature of email communication, which can lead to delays before an agent sees and responds to an email.
- **Interaction**: Generally has a shorter processing time compared to email, suggesting more efficient resolution when agents are in direct contact with clients.
- **Business Hours Impact:** We assume that the service unit operates predominantly between 9 AM to 5 PM. Processing times for activities, especially email, can extend beyond typical resolution times due to this operational schedule.

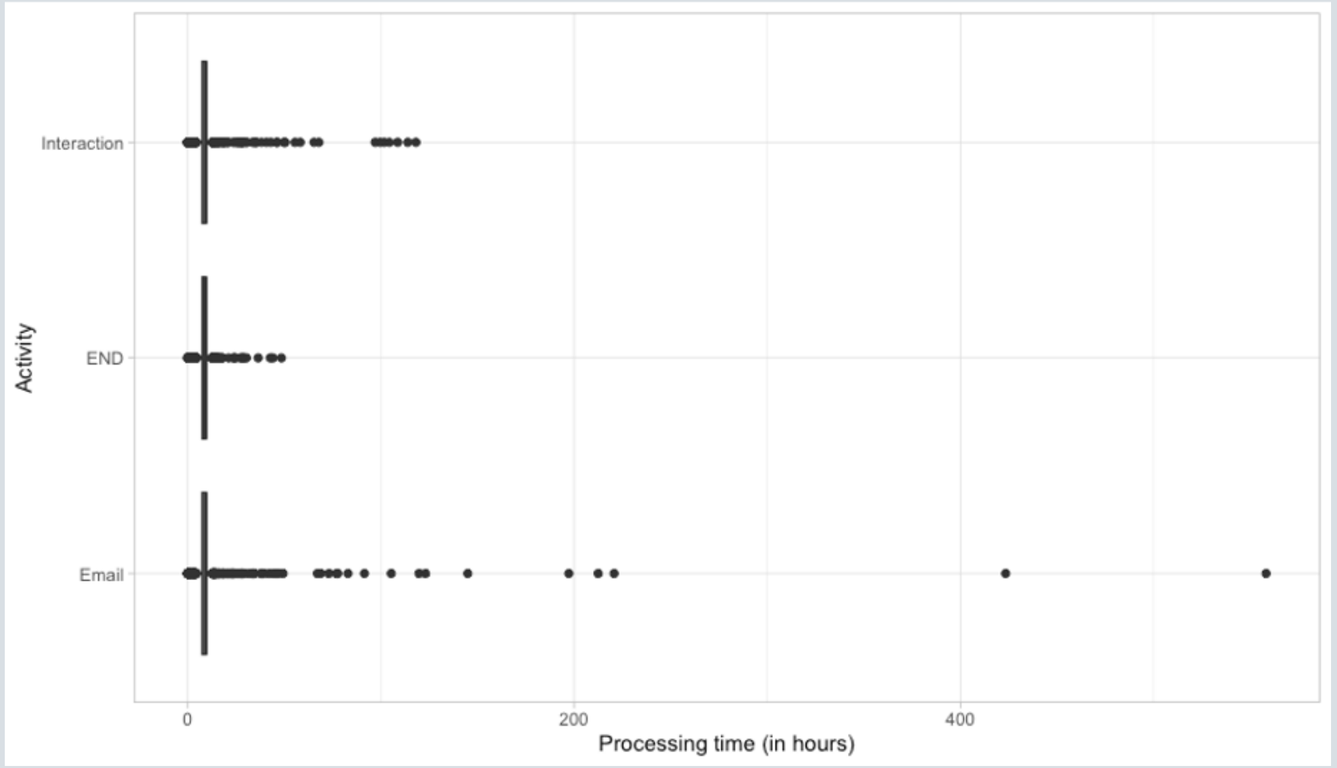

Table 6: Boxplot of activity time

Variant Analysis

Distribution of Process Variants

This cumulative distribution plot showcase the variability in the customer service process. By analyzing the event log in R, we have identified a total of 67 distinct process variants.

The majority of these variants are infrequent, indicating a high degree of variability in customer service interactions.

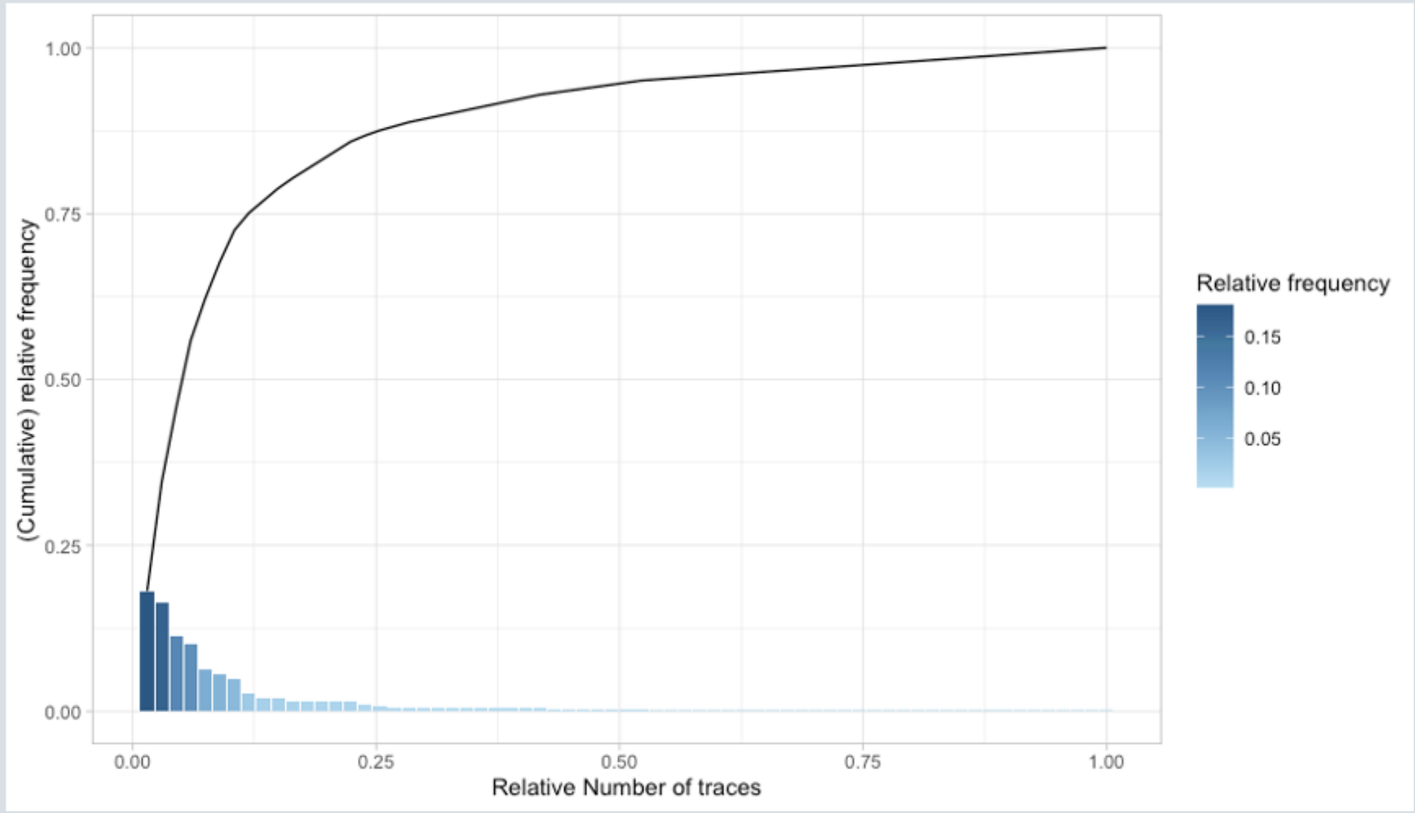

Table 7: Cumulative distribution plot

Variant Analysis

Trace Frequency

This trace frequency analysis reveals the predominant pathways through which NTP manages customer cases. The displayed traces account for 60% of the most common sequences observed in the process logs.

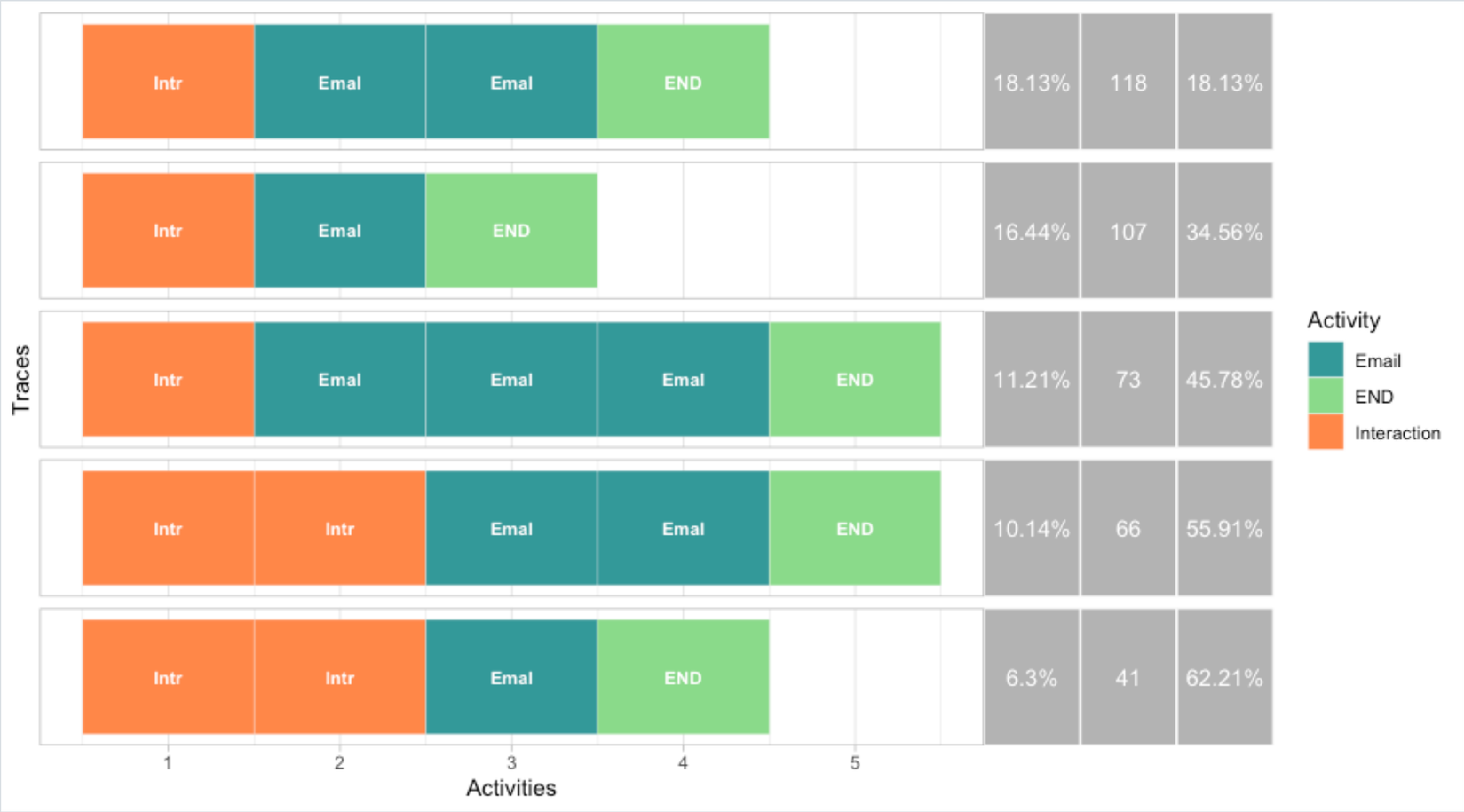

Table 8: Trace frequency of activities

Variant Analysis

#1: Interaction → Email → Email → END

Characterized by a sequence beginning with direct customer interaction and followed by two emails before case closure, this trace dominates with 118 cases (18.13% of total). It implies that initial interactions typically require further email follow-ups, with an average duration of 58.48 hours from start to finish.

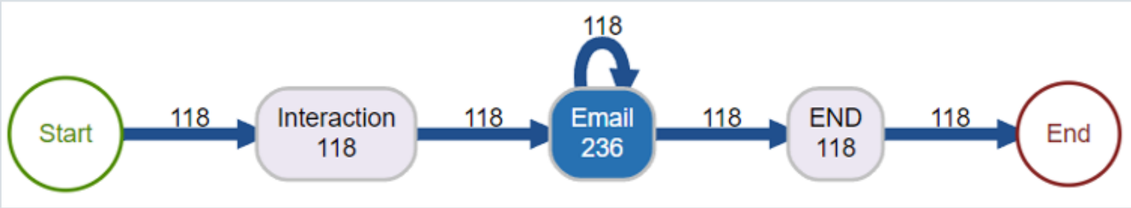

Table 9: Process flow #1

#2: Interaction → Email → END

Accounting for 107 cases (16.44% of total), this trace suggests a more streamlined process: an initial interaction followed by a single email leads to case closure. Despite being referred to as the "Happy Path" due to its straightforward nature, it averages a slightly longer duration of 61.52 hours, which could be attributed to more complex issues resolved within this path.

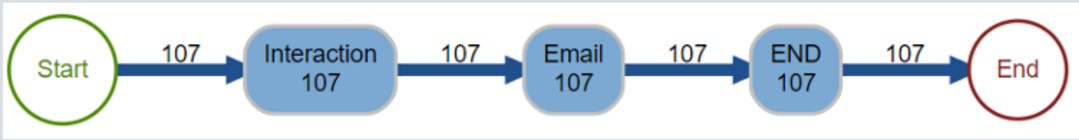

Table 10: Process flow #2 - happy path

Variant Analysis

#3: Interaction → Email → Email → Email → END

This variant, present in 73 cases (11.21%), typically involves extensive email correspondence post-initial interaction, suggesting the need for detailed clarification or resolution of complex issues. It has an average throughput time of 76.48 hours. The repeated email exchanges likely indicate a bottleneck, highlighting an area for process improvement.

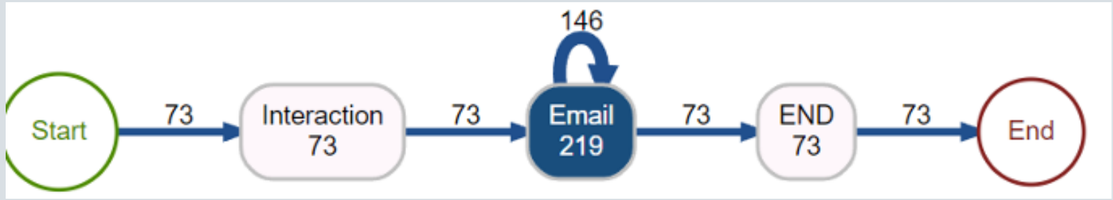

Table 11: Process flow #3

#4: Interaction → Interaction → Email → Email → END

Occurring in 66 cases (10.14%), this trace pattern indicates cases that require multiple interactions before proceeding to email, reflecting more complex customer inquiries or issues. This variant's average throughput time is 94.17 hours, pointing to a 'double loopback' as a potential efficiency barrier in the process.

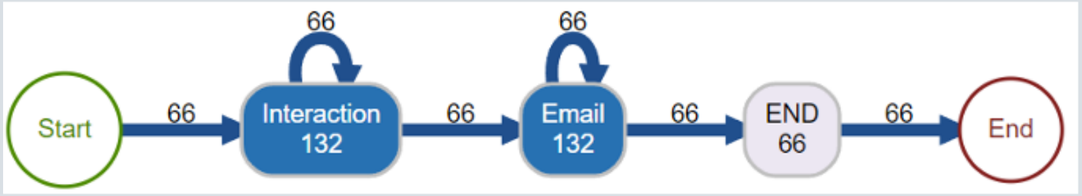

Table 12: Process flow #4

Throughput Time for Cases

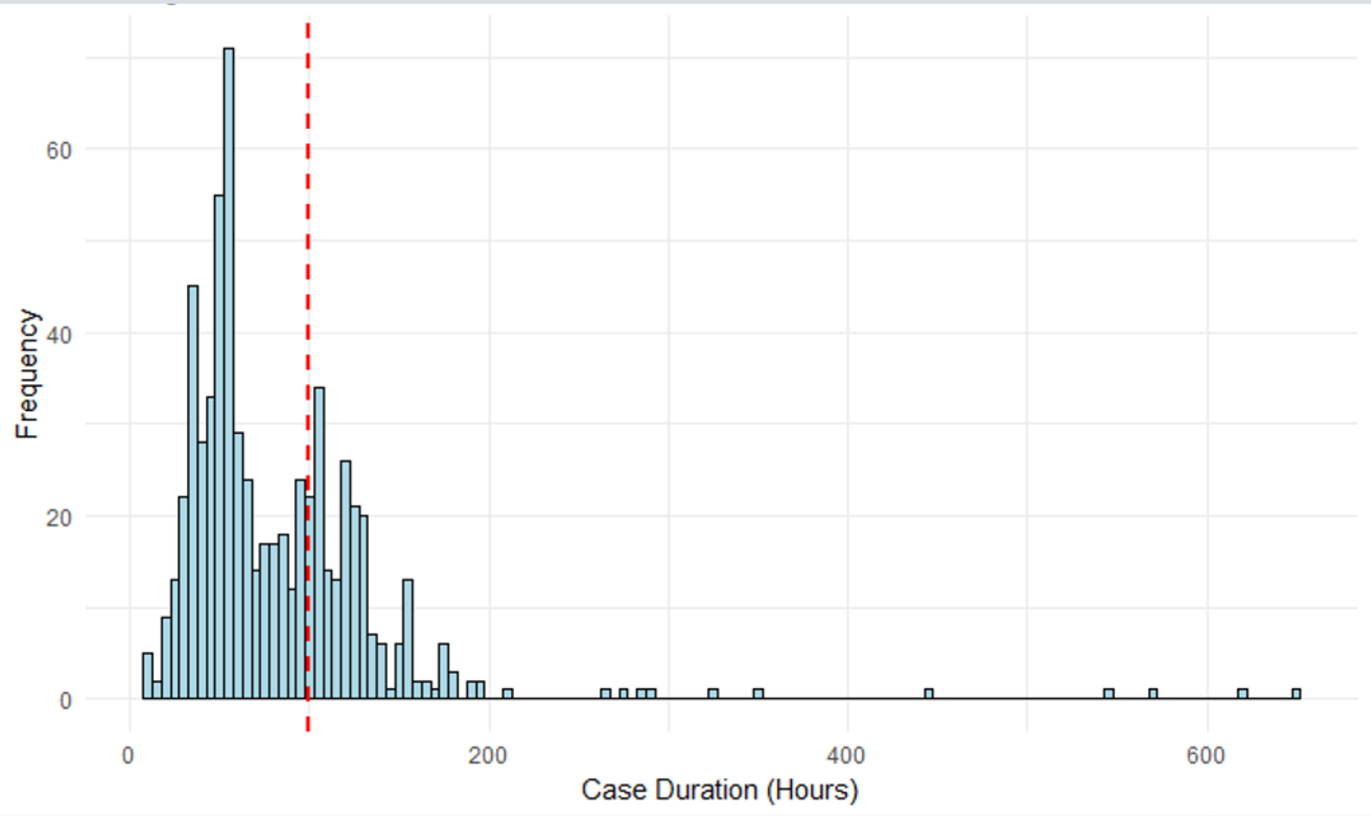

Table 13: Histogram of case durations

NTP has established a service level goal of 100 hours. Currently, 198 out of 640 cases exceed this benchmark, with 30.9% of cases surpassing the standard threshold. This significantly exceeds the 90% which is standard for process performance.

(Dumas et. al., 2018, p.482)

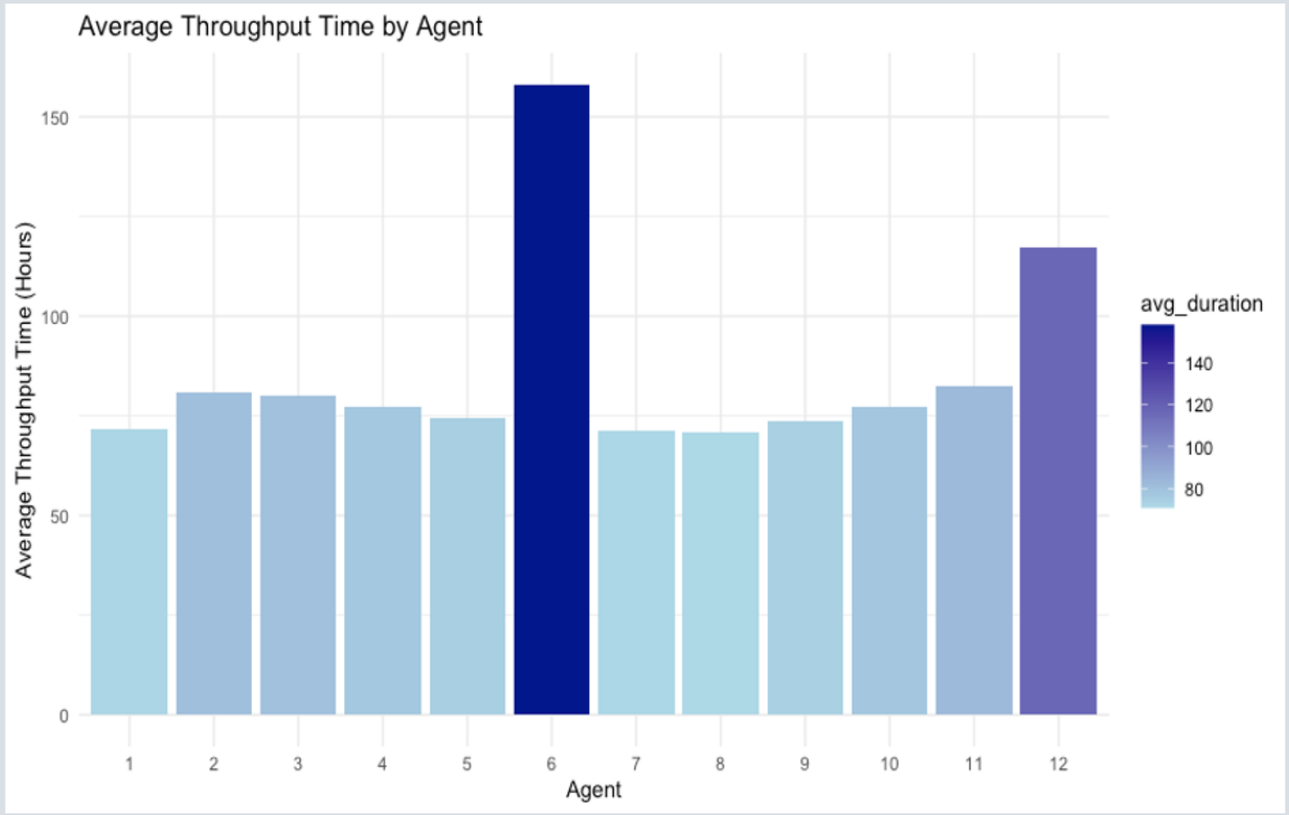

Table 14: Barchart of average throughput time by agent

Average Throughput Time by Agent

Consistent Performance:

Most agents demonstrate consistent performance, with their average throughput time clustered within a similar range.

Notable outliers:

Agent 6 stands out as a significant outlier, indicating a substantially higher average throughput time compared to others. Agent 12 is also an outlier, though to a lesser extent, with a slightly elevated average throughput time.

Agent Involvement

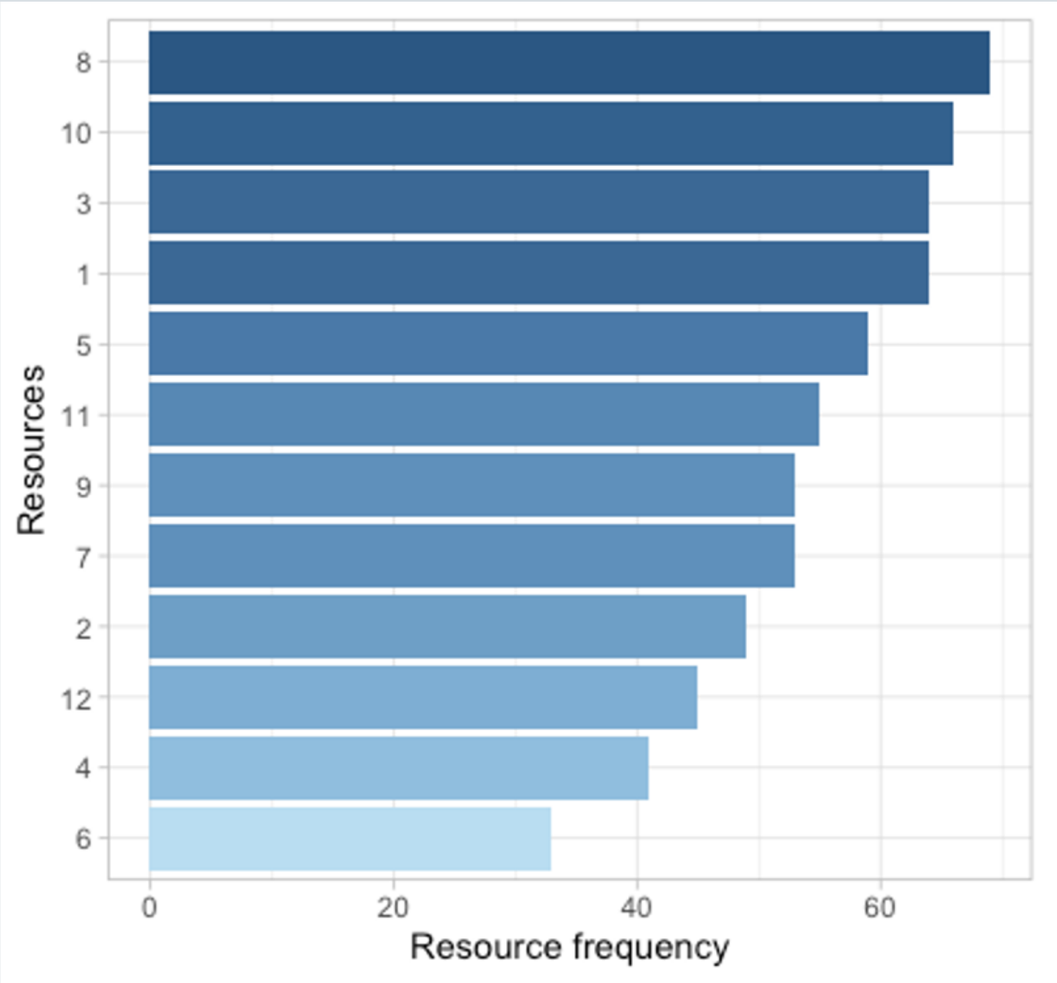

Table 15: Barchart of agents (resources) and total cases

Agent Involvement: Each bar represents an agent, and its length signifies their involvement in cases, from most to least.

Distribution of Workload: Its a generally balanced workload distribution among agents, though some variation exists. Agents 8 and 10 handle the most cases, indicating potential efficiency, while agent 4 and 6 are less involved, suggesting underutilization.

Potential for Optimization: The agents with high involvement, such as 8 and 10, highlights areas for efficiency improvement or better workload distribution. Conversely, agent 4 and 6 might signal opportunities for increased engagement or enhanced contribution.

Agent Capacity Planning: This data is crucial for agent capacity planning, ensuring optimal workload allocation across agents, thereby enhancing overall efficiency and avoiding overburdening of individual agents.

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Agent	Absolute
8	309
10	301
3	298
1	289
5	273
11	271
12	255
7	245
9	244
2	236
6	219
4	199

Table 16: Absolute frequency for each agent

Agent Frequency

Agents: Numerical IDs (1-12) denotes agents handling customer service events.

Workload Insight: Agent 8 tops the chart with 309 events; Agent 4 shows lower engagement with 199 events.

Key Contributors: With Agents 8, 10 and 3 leading in activity, there’s potential indicators of workload imbalance or differential case management efficiency.

Agent Workload

Agent	Total cases	Avg. Throughput time
1	64	71,56
2	49	80,68
3	64	79,86
4	41	77,25
5	59	74,48
6	33	158,15
7	53	71,23
8	69	70,78
9	53	73,72
10	66	77,32
11	55	82,63
12	45	117,19

Table 17: Workload among agents

Agent Workload: Agents 8 and 10 handles the most cases with 69 and 66 cases, respectively, while Agent 6 handles the least with 33 cases.

Throughput Time: Agent 6 has the longest average throughput time at 158 hours, while Agent 8 having the lowest at 70.7 hours.

Performance Variation: The wide variation in completion time may indicate differences in case complexity, agent efficiency, or a combination of factors.

Potential Inefficiencies: Agents 6 and 12 stand out with considerably higher average throughput times, which might indicate inefficiencies or more complex cases that require further investigation.

Workload and Service Level

Cases Over 100h

Agent	Total cases	Avg. Throughput time
1	15	126,34
2	17	115,05
3	23	128,49
4	11	130,18
5	16	130,40
6	16	260,97
7	11	124,68
8	19	122,36
9	13	124,79
10	23	122,93
11	15	152,05
12	19	188,43

Table 18: workload among agents, over 100 h

Cases Under 100h

Agent	Total cases	Avg. Throughput time
1	49	54,79
2	32	61,43
3	41	52,58
4	30	57,85
5	43	53,67
6	17	61,37
7	42	57,23
8	50	51,18
9	40	57,12
10	43	52,93
11	40	56,60
12	26	65,13

Table 19: workload among agents, under 100h

All Cases

Agent	Total cases	Avg. Throughput time
1	64	71,56
2	49	80,68
3	64	79,86
4	41	77,25
5	59	74,48
6	33	158,15
7	53	71,23
8	69	70,78
9	53	73,72
10	66	77,32
11	55	82,63
12	45	117,19

Table 20: workload among agents, overall

Cases exceeding NTP's 100-hour service level could result in increased costs and reduced customer satisfaction. Efficient workload management is essential to uphold service standards and contain expenses.

Cases per Topic by Agent

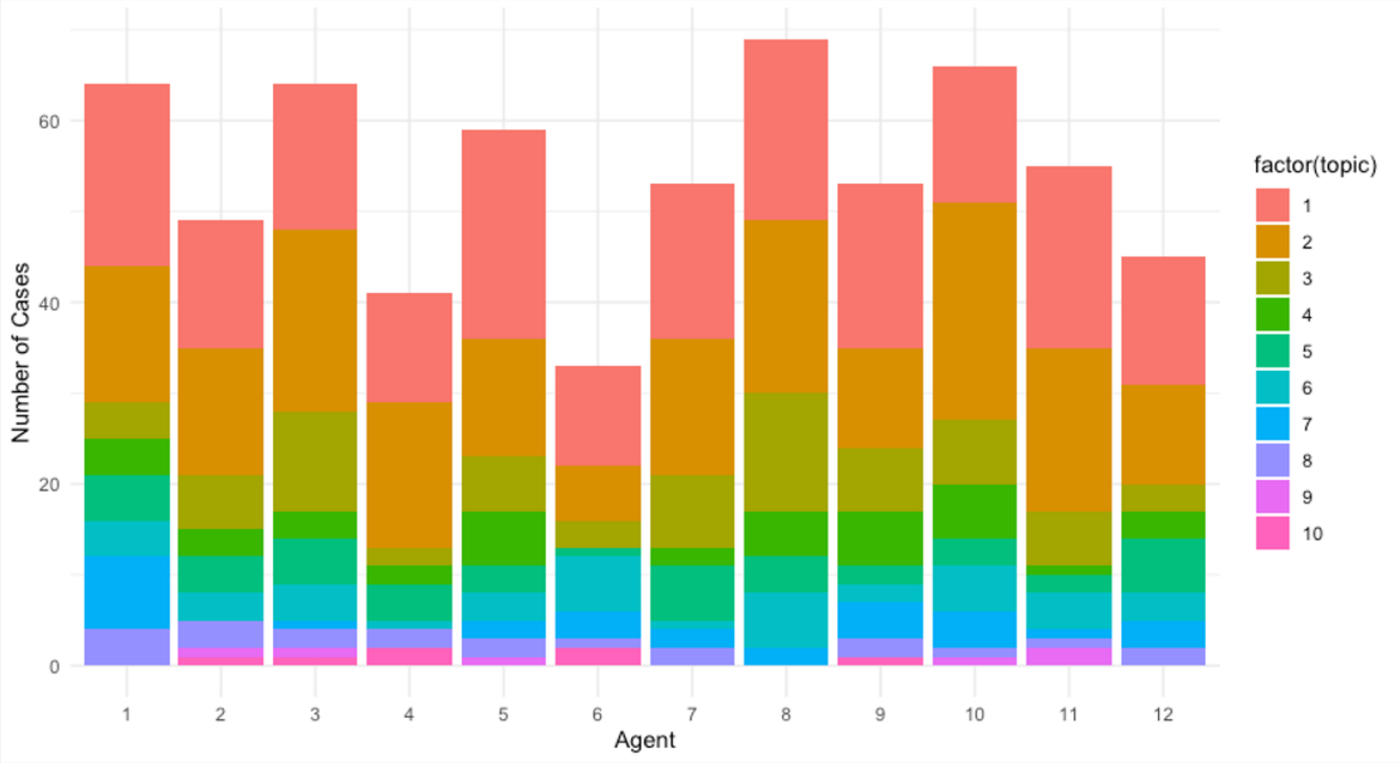


Table 21: numb. of cases per topic, per agent

- This chart illustrates the distribution of cases and topics among agents
- Topic 1 and 2 are the most commonly handled, while 9 and 10 have lower agent involvement
- Unfortunately, the dataset does not provide insight into the reasons behind these patterns, and the details on the topics are unavailable

Case Duration by Topic

Topic	Average duration (hours)
1	84,82
2	81,15
3	69,51
4	86,40
5	60,66
6	89,56
7	70,50
8	115,36
9	172,21
10	167,88

Table 22: Average duration on each case

- **Duration Variation Across Topic:** We observe significant differences in average resolution times among case topics, suggesting varying complexities and resource demands.
- **Duration Extremes:** Topics 9 and 10 exhibit the longest average durations at 172.21 and 167.88 hours, respectively, hinting at more complex issues that require extended attention. Conversely, topic 7 shows the shortest average duration of 70.50 hours, suggesting more straightforward or efficiently managed cases.
- **Complexity and Efficiency:** The protracted durations for topics 9 and 10 may reflect the intricate nature of these cases, potential procedural inefficiencies, or a shortfall in specialized expertise.

Performance Insight of Agent 6

An in-depth analysis of agent 6's performance unveils critical insights. Despite solving fewer cases, there's a notable extension in resolution time, suggesting inefficiencies in case management.

- **Cases Resolved**: Agent 6 manages fewer cases, with a longer resolution time indicating inefficiencies.
- **Case Engagement:** Avoids cases 4 and 9, with high handling times for cases 8 (447 hours) and 10 (371 hours).
- **Efficiency Variance:** Efficiently handles case 3 (65.56 hours), suggesting a proficiency in certain case types.
- **Communication:** High volume of emails suggests potential for communication improvement or need for additional email training.
- **Workload:** Closed 32 cases; the highest case duration was 558.2 hours via email, much above the average, with a preference for simpler cases, mainly topic 1.

Topic (type of case)	Average dur.time	Count
1	170,70	11
2	137,29	6
3	65,56	3
5	25,57	1
6	110,63	6
7	147,13	3
8	447,50	1
10	371,28	2
Total	**1 475,64**	**33**

Table 23:Average duration time by case, agent 6

Activity	Numb. of cases	Max dur.time (hours)
End	32	44,08
Email	123	558,20
Interaction (call or chat)	64	118,13

Table 24: Overview of max duration time in each activity, agent 6

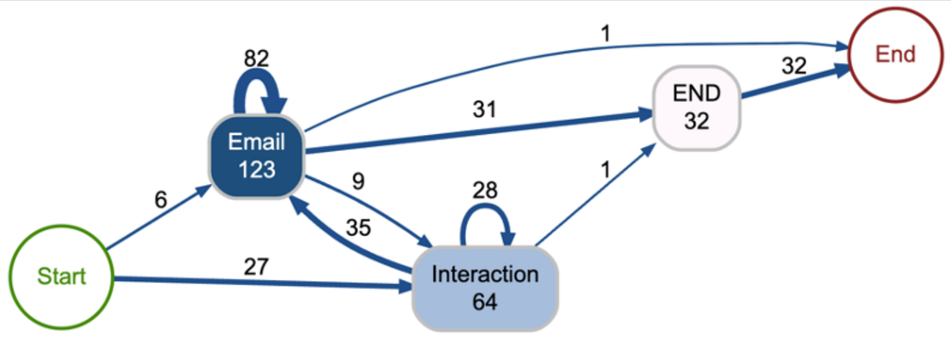


Table 25: Process map, agent 6

Performance Insight of Agent 12

Further scrutiny of Agent 12's performance reveals a lower resolution count and a notable variance in case handling times, pointing to possible operational inefficiencies or a focus on more complex cases.

- **Case Resolution:** Lower completion count; notable time variance suggests possible focus on complex cases.
- **Case Selection:** Handles cases 1-8, possibly indicating specialization or avoidance of certain types.
- **Resolution Efficiency:** More efficient across most topics, but topic 8 (249.12 hours) suggests specific challenges.
- **Communication Load:** High email (128 instances, max 212.45 hours) and interaction (83 instances, max 113.93 hours) activity points to communication improvement opportunities.
- **Case Focus:** Prefers cases in topics 1 and 2 (14 and 11 cases), indicating a tendency towards time-intensive cases.

Topic (type of case	Average dur.time	Count
1	163,31	14
2	75,05	11
3	70,22	3
4	110,58	3
5	72,94	6
6	108,71	3
7	119,04	3
8	249,12	2
Total	**968,97**	**45**

Table 23:Average duration time by case, agent 12

Activity	Numb. of cases	Max dur.time (hours)
End	44	48,50
Email	128	212,45
Interaction (call or chat)	83	113,93

Table 24: Overview of max duration time in each activity, agent 12

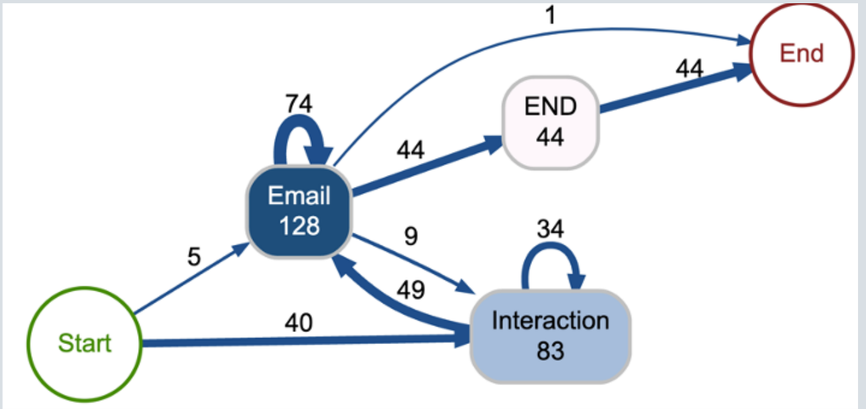


Table 25: Process map, agent 12

Process Control

Outliers Identification:
Among all cases reviewed, 17 are outside control limits, marking them as outliers that deviate from the usual pattern in case resolution times.

Pattern Disruptions:
The control chart reveals 62 runs breaching expected patterns, suggesting recurring deviations which may signal underlying process inefficiencies or the need for procedural adjustments.

Control Limits:
Control limits are set at three standard deviations from the mean case resolution time, defining normal operational boundaries. Cases falling beyond these limits warrant further investigation as exceptions.

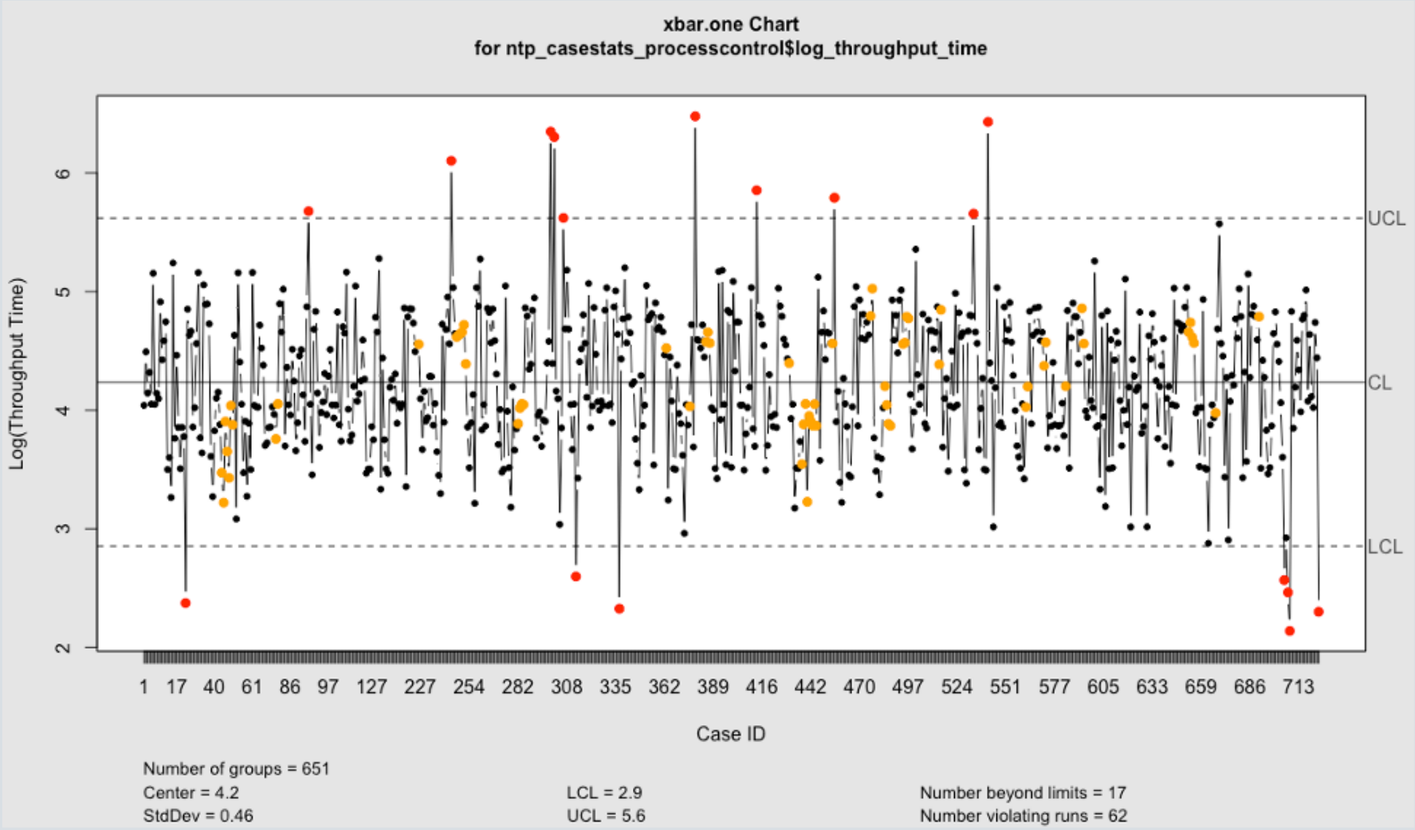


Table 26: Process control chart

Service Level and Process Capability

Average Resolution Time:
The average time to resolve a customer issue corresponds to 4.2 on the graph, which is a standardized metric for internal analysis.

Resolution Time Variability:
While the spread of resolution times shows some consistency, there is noticeable variability, with certain cases being resolved significantly faster or slower than the median.

Service Level Objective:
The organization aims to resolve issues within 100 hours, depicted by the upper control limit (UCL) at 4.6 on the graph.

Service Level Performance:
Analysis indicates that approximately 21% of cases exceed the 100-hour service level objective, signaling a need for process improvement to meet this target more consistently.

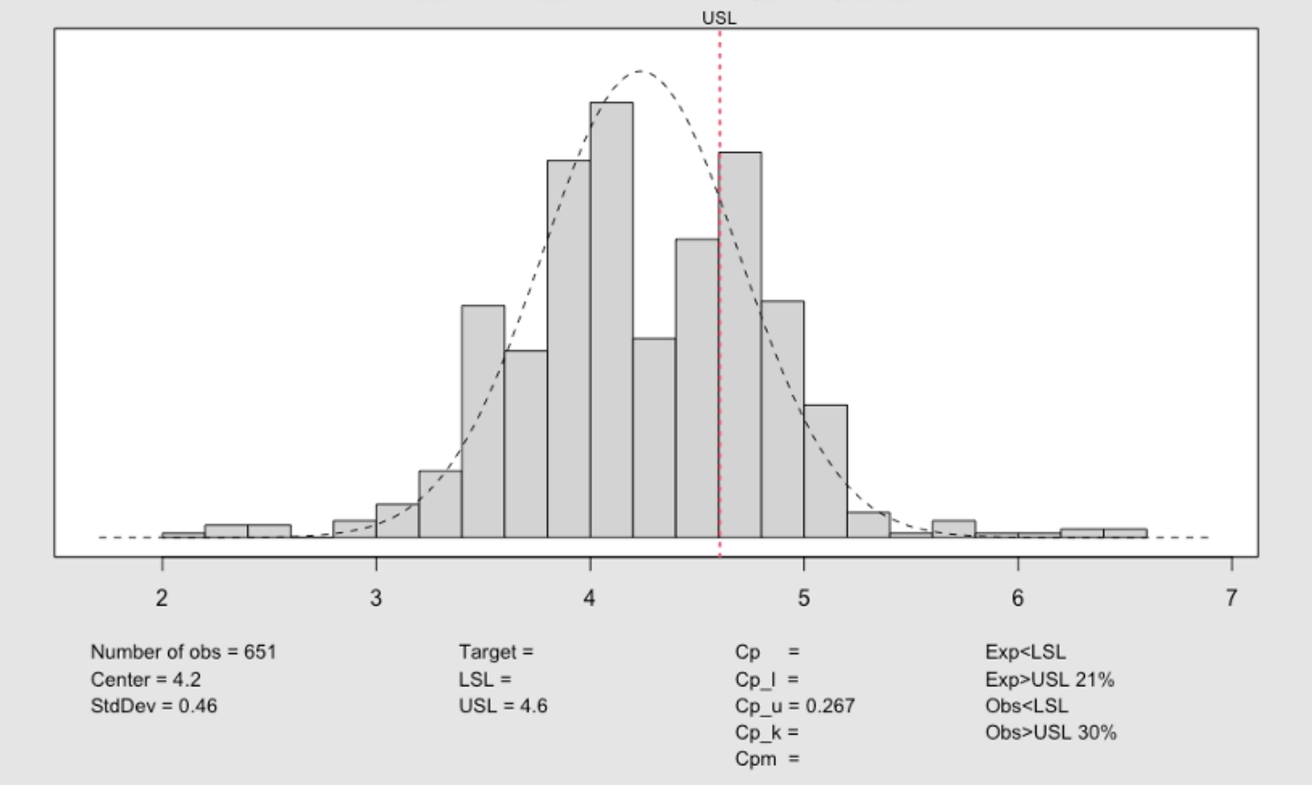
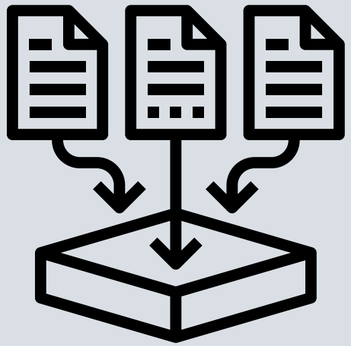


Table 26: Process capability analysis, throughput time

Bottlenecks

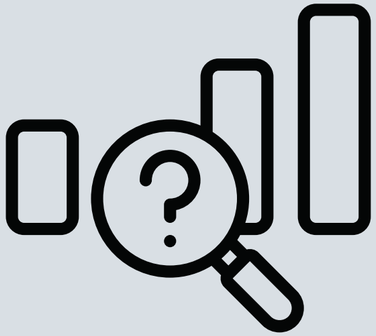
"Bottlenecks slow down the process or the cost of process execution is too high”
(Dumas et al., 2018, p. 297)

Resource Efficiency



Data

Case Complexity



Time Gaps

Bottlenecks

Resource Efficiency: Maximizing resource efficiency is vital for process effectiveness, affecting cost savings and customer satisfaction. A deep dive into resource usage is crucial for enhancing operational workflows

Data: High-quality data is the cornerstone of problem identification and resolution within business processes. Incomplete or inaccurate data can obscure issues, making it difficult to address root causes and implement effective solutions. In this case, the data we have is reliable, but it lacks information on the certain bottlenecks. We are not able to detect the root cause in some of the processes with long throughput time.

Case Topics with High Complexity: Cases demanding more time and expertise for resolution introduce longer wait times, potentially slowing down the entire service process. Additionally, there may be a tendency among some agents to select cases based on the simplicity of the topics. As a result, these agents tend to resolve a greater number of cases in less time. It is more likely for the more experienced agents to handle the cases that are perceived as more complex and challenging. Such behavior results in an uneven distribution of workload, which contributes to a bottleneck in the process.

Time Gaps Between Activities: Significant time lapses between activities have been pinpointed as potential bottlenecks. These may occur as wait times before an agent takes up a case or as delays between the completion of one task and the initiation of the next. These time gaps can impact the process flow and efficiency, affecting both agent performance and customer experience.

Key Insights

Data & Case Statistics

- Data influences by the pandemic may not fully represent typical operations at NTP.
- Data generalization and anonymization practices, while safeguarding privacy, constrain the depth of the analysis.
- Limited timestamp precision for key activities hinders accurate analysis of case handling and resolution timelines.

Case Handling Efficiency

- The frequency of event loopbacks signals potential inefficiencies, indicating the need for process streamlining and standardization.
- Nearly a third of cases (30.9%) fail to meet the 100-hour service level target, highlighting a critical area for service improvement.

Resource Utilization

- Notable differences in agent workloads and case handling time have been observed
- Agents 6 and 12 exhibit longer handling times per case, with Agent 6 completing the fewest cases overall.

PROCESS IMPROVEMENT

- Recommended System Changes
- Process Redesign Recommendations
- BPMN Model of the Recommended New Process Flow

Process Improvement

Incorporating AI for Issue Identification: Our strategy utilizes AI to classify issues quickly and accurately, guiding customers to suitable agents or autonomously handling straightforward cases, thus allowing agents to focus on more complex challenges and fostering skill development.

Mandatory Document Submission: We aim to implement a mandatory document submission step to ensure all critical information is available at the start, reducing follow-up interactions and expediting the resolution process with a clear, user-friendly interface.

Targeted Agent training & Specialization: Specialized training will be introduced for agents, enhancing their expertise in handling complex case topics and ensuring a more balanced workload distribution.

Predictive Workload Distribution: AI-driven systems will predict case volume and complexity, allowing the even distribution of cases and optimization of agent workloads to maintain service quality.

Process Mining for Continuous Improvement: Regular process mining will provide insights into performance, supported by a continuous improvement team dedicated to implementing data-driven changes.

Combined Impact of Improvements: These suggestions are orchestrated to significantly increase the process's efficiency. Both the AI-technology and agents are empowered with the necessary details to begin resolution immediately, fostering an environment of continuous improvement and customer satisfaction.

Process Improvement

Recommended Changes

In line with our Process Improvement strategy, we propose strategic enhancements to NTP's Salesforce CRM system to further elevate the customer service capabilities. This initiative focuses on:

- Integrating AI for precise issue identification and efficient routing
- Implementing a mandatory document submission step for comprehensive initial case information
- Specializing agent training to handle complex inquiries more effectively
- Utilizing predictive workload distribution to optimize agent efficiency
- Employ process mining to continuously refine service processes

Recommended Changes

AI Integration and Document Management

Building on our strategy to elevate customer service, we focus on integrating Salesforce Einstein's AI technology into NTP's service processes. This integration will harness predictive analytics, machine learning, and natural language processing to optimize service delivery and information accuracy.

Einstein AI for Issue Classification and Routing:

- Utilizes data from user actions to provide predictive analytics and machine learning, enhancing case classification and routing, and improving issue resolution
- Includes Einstein Discovery, Prediction Builder, and Next Best Action tools to derive customer insights, predict customer behaviors, and recommend proactive steps for service agents.

Mandatory Document Submission Streamlining:

- Salesforce can be optimized to support the mandatory document submission process, ensuring critical case information is collected at the outset
- Leverages Einstein Language capabilities to analyze customer communications, detecting sentiment and intent in multiple languages, ensuring accurate understanding of customer needs
- Einstein Bots can be employed to guide customers through the document submission process, answering common queries and improving overall efficiency

Recommended Changes

Specialized Training and Predictive Workload Management

This phase of the strategy involves targeted initiatives to upgrade the agents' expertise and leverage AI for efficient case distribution, ensuring a balanced and effective approach to customer service.

Targeted Agent Training & Specialization:

- Implementing specialized training programs to develop agents' skills in handling complex cases, aiming at enhancing service quality and agent confidence in addressing intricate customer issues.

Predictive Workload Distribution:

- Utilizing AI algorithms to analyze and predict case volume and complexity, enabling the even distribution of cases among agents, optimizing workload management, preventing burnout, and ensuring a consistent level of service across all customer interactions

Data-Driven Process Optimization

Process Mining for Continuous Improvement:

- Implementing regular process mining to identify inefficiencies and optimize customer service workflows.
- Insights gained will guide a dedicated team in making data-driven improvements, ensuring our processes are both efficient and adaptable to changing customer needs.

Process Redesign Recommendations

Our redesign recommendations are informed by a comprehensive approach that includes Salesforce Einstein AI's insights, process management enhancements, and targeted agent development. These recommendations synergize advanced AI integration, meticulous document management, specialized agent training, and predictive workload strategies. Together, they form a robust framework aimed at optimizing every touchpoint of the service workflow, from case intake to resolution.

- **Enhanced Initial Contact:** Integrate an AI-driven interface for immediate, accurate incident logging and preliminary case creation.
- **Smart Case Assignment:** Utilize AI to match cases with agents based on expertise, availability, and workload for improved efficiency.
- **Dynamic Case Processing:** Establish pathways within Salesforce for direct resolution of simple cases and escalation protocols for complex issues.
- **Proactive Communication:** Implement automated, real-time updates on case status, leveraging Salesforce capabilities to keep customers informed.
- **Efficient Resolution and Feedback:** Automate resolution confirmations and feedback collecting, ensuring continuous service quality improvement.

BPMN Model for Recommendations

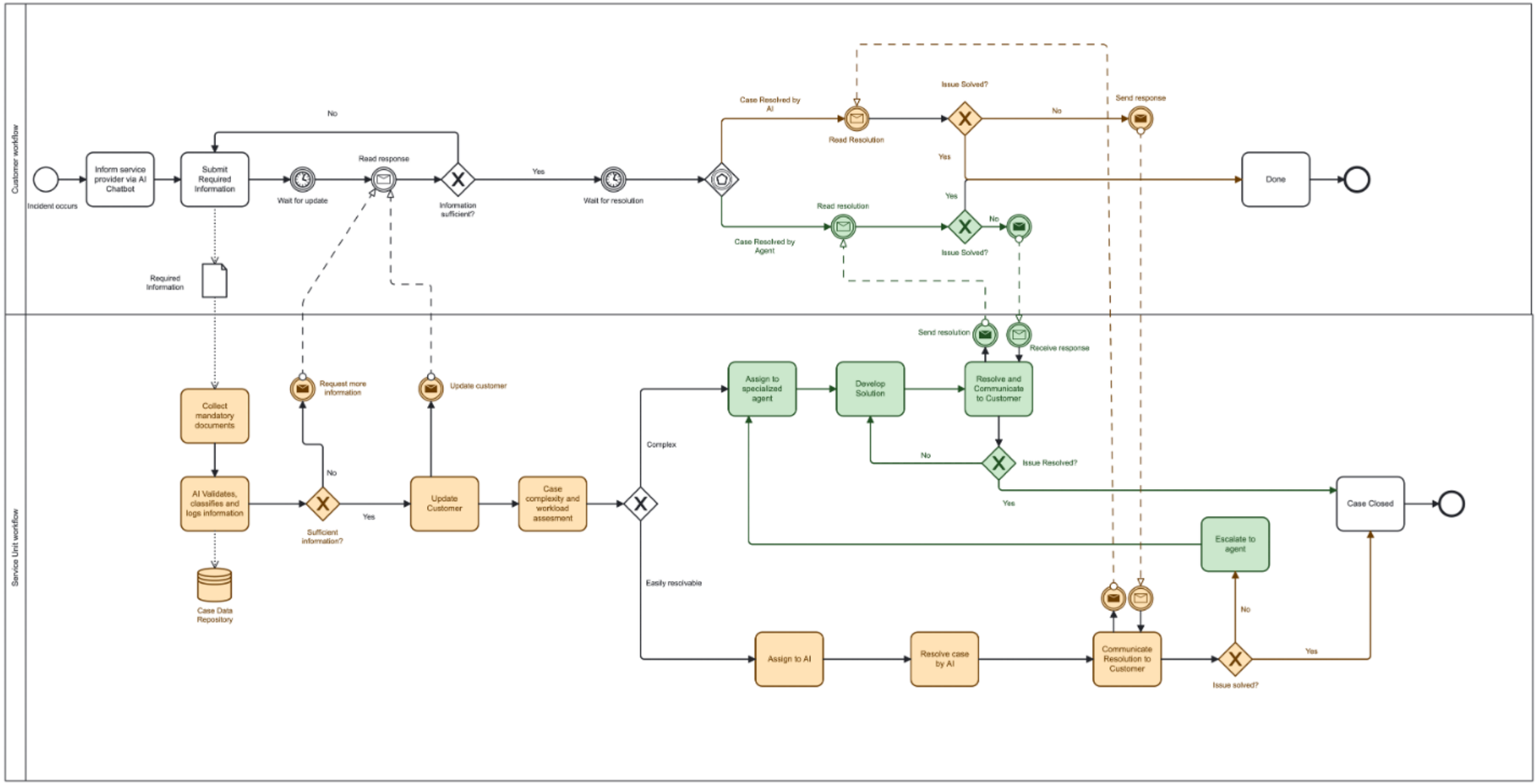


Table 27: Recommended BPMN model

BPMN Model for Recommendations

Incident Reporting through AI

The process is initiated when an incident occurs, and the enterprise customer reports it via an AI Chatbot. This entry point allows for an immediate and interactive response.

AI-Driven Case Handling

Upon submission, the AI system validates and classifies the incident in detail before logging them into Salesforce. This step reduces the initial assessment time and enhances accuracy of issue identification and routing.

Mandatory Document Collection

A new mandatory step requires the submission of all relevant documents at the outset. This ensures that all relevant information is available at the start, minimizing the need for additional clarification and reduces iterative communication loops.

Case Complexity Assessment

The AI evaluates the complexity of the case and decides on the best course of action. Simple cases may be resolved by AI, demonstrating an adaptive resolution pathway, while complex cases are assigned to specialized agents.

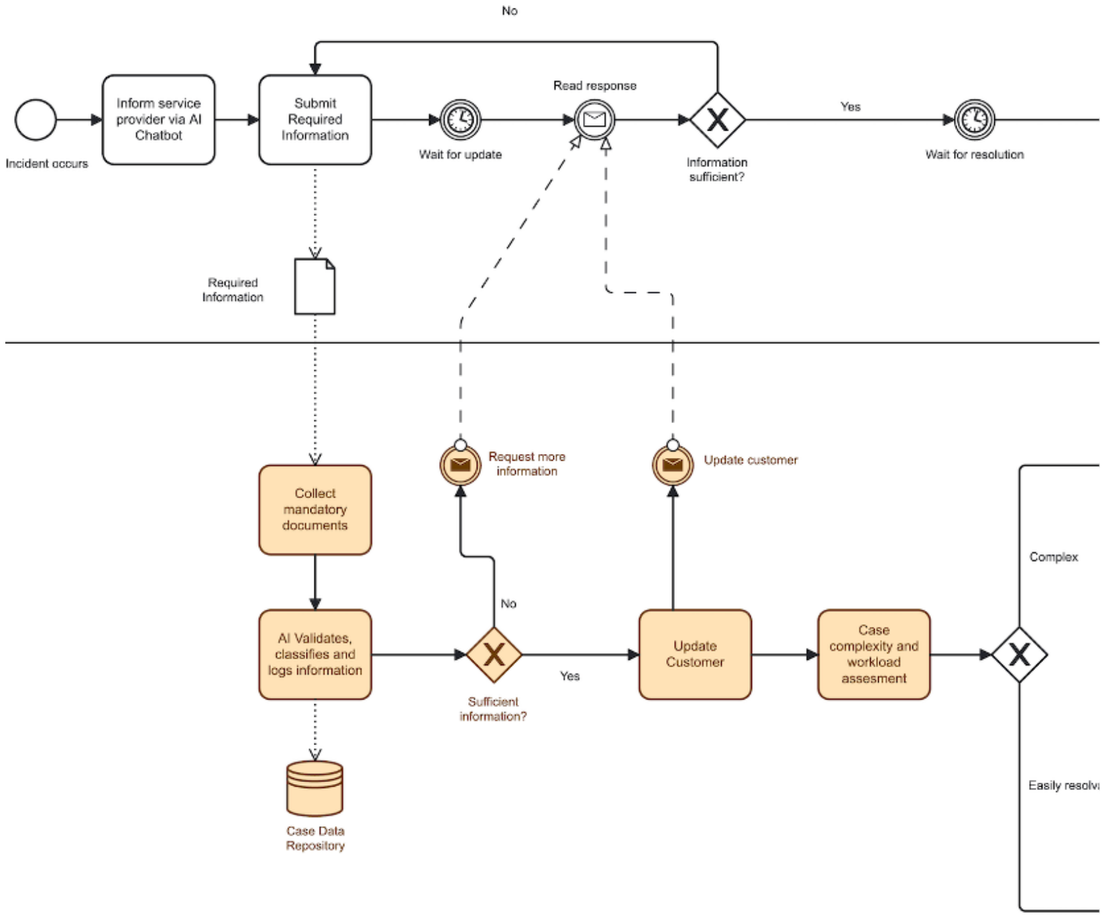


Table 28: Snippet of Recommended BPMN Model

BPMN Model for Recommendations

Specialized Agent Engagement

For complex cases, the designated agents engage in developing a solution, drawing on their training and expertise.

Efficient Resolution

The model emphasizes efficient communication with the customer. If a case is straightforward, AI resolves promptly, but if the issue is beyond the scope of AI, the case is directly escalated to an agent.

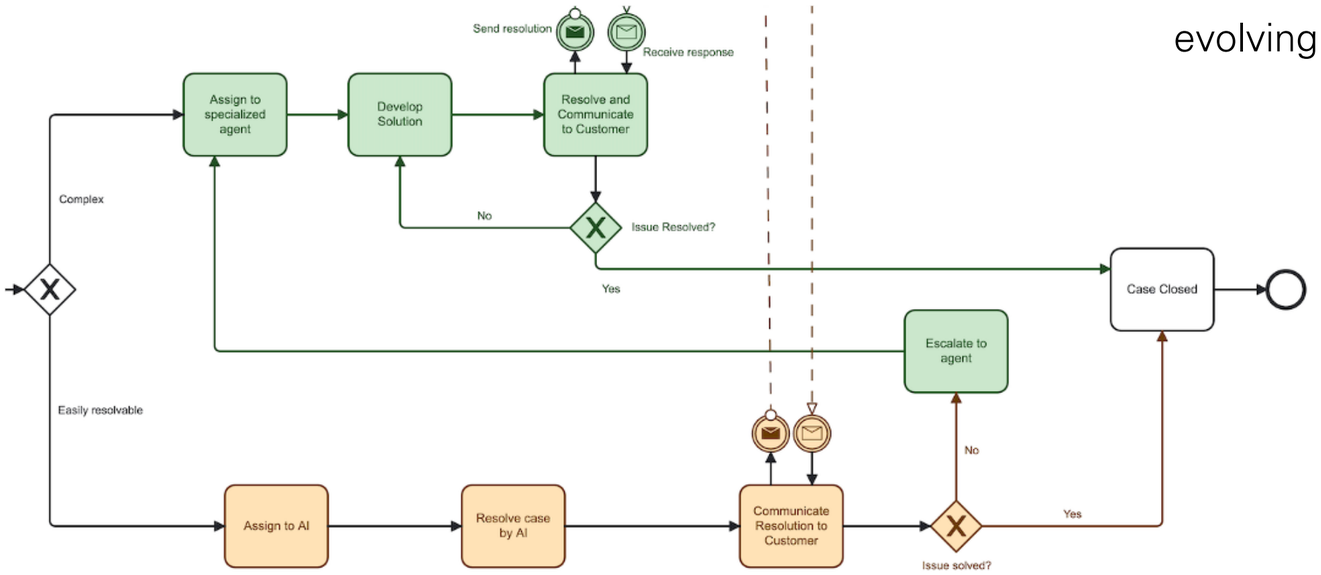


Table 29: Snippet of Recommended BPMN Model

Streamlined Case Closure

Once the issue is resolved, the case is closed in the system.

Continuous Process Improvement

Not explicitly depicted in the BPMN-model, inherent int the system is the continuous capture of case data. This is crucial for ongoing process mining and iterative enhancements, ensuring the service process is constantly evolving and improving.

RECOMMENDED SOLUTIONS

- Problems and Solutions
- Strategic Recommendations and ROI
- Recommended Approach

Recommendation

Data & Case Statistics

Problem

- Generalization and anonymization of data limit in-depth analysis.
- Limited timestamp precision for key activities hinders accurate analysis of case handling and resolution timelines

Solution

- Implementing regular process mining to identify inefficiencies and optimize customer service workflows.
- Insights gained will guide a dedicated team in making data-driven improvements, ensuring our processes are both efficient and adaptable to changing customer needs.

***Expected Impact**: Enhanced efficiency and adaptability of customer service processes.*

Recommendation

Case Handling Efficiency

Problem

- High frequency of event loopbacks suggests need for process streamlining and standardization
- Nearly a third of cases (30.9%) exceeds the 100-hour service level target, highlighting a critical area for service improvement

Solution

- Gather data from user actions to provide predictive analytics and machine learning, enhancing case classification and routing, and improving issue resolution
- Utilize Salesforce Einstein AI to streamline case prioritization and routing, directly targeting and reducing the exceeding of service level.

Expected Impact: *Improved case resolution times and adherence to service level agreements.*

Recommendation

Resource Inefficiency

Problem

- Notable differences in agent workloads and case handling time could lead to inconsistent service quality
- Agents 6 and 12 exhibit longer handling times per case, with Agent 6 completing the fewest cases overall.

Solution

- Provide specialized training to improve handling of complex cases.
- Utilizing AI for predictive workload distribution among agents.

Expected Impact: *More balanced workloads, enhanced service quality, and reduced agent burnout.*

Strategic Recommendations and ROI

Strategic Recommendations

Data-Driven Optimization:

- Advance NTP's process mining to unveil and refine inefficiencies, propelling the customer service process into a state of continual enhancement and ensuring agility in meeting evolving customer demands.

Intelligent Case Management:

- Capitalize on Salesforce’s AI capabilities to improve case handling. Through predictive analytics and smart routing, aim to boost resolution efficiency and meet the service level targets.

Agent Performance Enhancement:

- Invest in specialized development programs to elevate agent proficiency, especially for those handling complex cases, and deploy AI to equitably manage workloads, fostering a high-performing, balanced service team.

Precision in Data Capture:

- Restructure the data capture approach to secure more accurate and comprehensive activity records, laying a solid foundation for precise analysis and informed decision-making in case management.

Return on Investment

Cost Efficiency Through Optimization:

- Process mining aims to reduce wasteful practices, potentially leading to lower operational costs and a more efficient allocation of resources.

Investment in AI Technology:

- Initial investment in Salesforce AI is anticipated to yield long-term savings through improved efficiency and customer retention.

Training and Development ROI:

- Investing in agent training may have upfront costs but is expected to enhance efficiency and reduce long-term operational expenses due to better case handling.

Data System Upgrade Cost-Benefit:

- Upgrading data systems requires capital but is projected to result in substantial savings from improved decision-making and reduced errors.

Recommended Approach

Given the need for flexibility, continuous improvement, and collaboration across departments and stakeholders, an Agile methodology seems to be the most suitable for implementing the recommended changes.

Agile can accommodate the evolving nature of AI and data analytics, allowing NTP to adjust its strategies in response to real-time insights and feedback, which is essential for the dynamic field of AI-driven customer service processes.

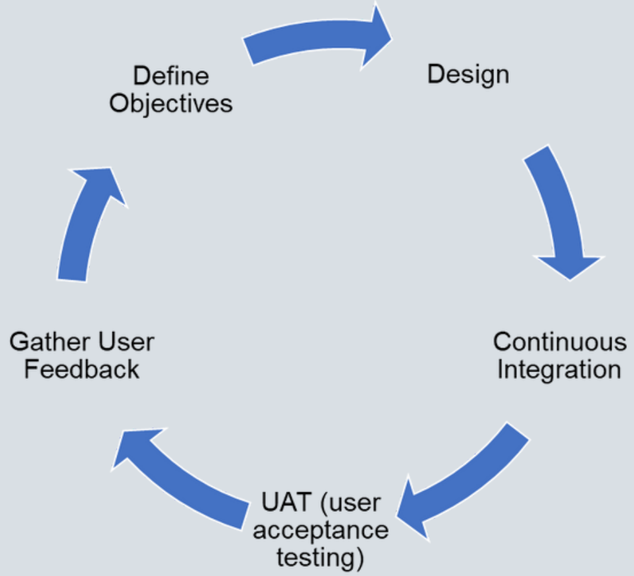


Table 30: Agile Wheel

DEVELOPMENT & IMPLEMENTATION

- Project Objectives
- Planning, Timeline, Gantt Chart
- Project Governance and Resource Requirements
- Customer Involvement and Employee Involvement
- Expected “Quick Wins”, Medium-Term and Long-Term Performance
- Monitoring and Follow-up
- Project Risks, Mitigation and Contingency Plans

Project Objectives

What?

We aim to deploy cutting-edge technology to uplift the customer experience while simultaneously improving the work-life balance and efficiency of the employees.

Why?

As NTP seeks to improve its customer service processes, the infusion of new technology is projected to facilitate smoother information exchange and notably enhance throughput times.

How?

The integration of AI into existing workflows is set to streamline communication, tailor customer interactions, and drastically reduce response times, thus bolstering service effectiveness and resource efficiency.

Project Planning

Task that needs to be done before committing to the project

Finance

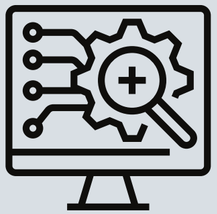
- Develop a budget plan.
- Obtain cost estimates for technology implementation.

Legal

- Undertake a thorough review of legal and compliance aspects tied to AI adoption.
- Prepare and review contractual agreements with partners and providers.

Technology

- Conduct a technical feasibility study to identify integration challenges.
- Plan for seamless data migration and ensure system interoperability.
- Set up stringent data privacy and security protocols.
- Craft a specialized training curriculum for IT staff on AI operations.



Human Resources

- Assess staff implications and strategize for training or reassignment as needed.
- Develop an upskilling program for customer service teams to complement AI technology.

Management

- Create an elaborate project timeline detailing milestones and deliverables.
- Delegate roles and define responsibilities within project teams.
- Formulate a change management approach for smooth transitions.
- Design a communication strategy to maintain stakeholder engagement.
- Ensure business continuity plans are in place during system overhaul.

Project Timeline

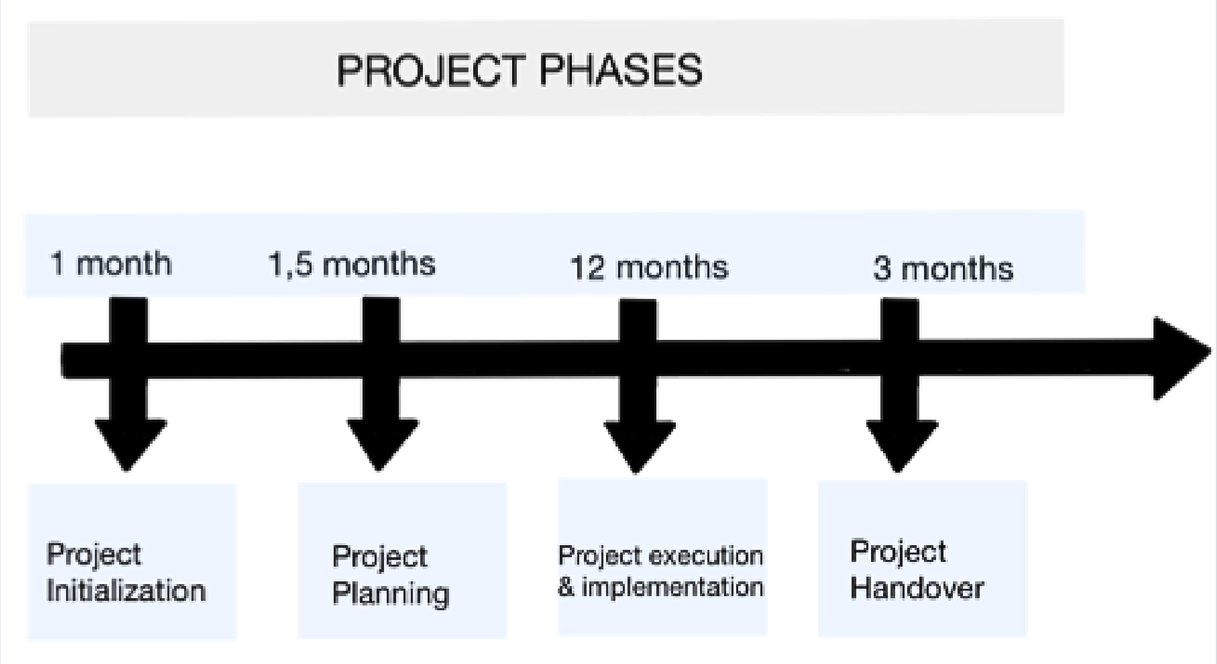


Table 31: Project Timeline

Project Initialization:
Formalize the project's concept, secure approvals, and launch the initiative, setting the foundation with a clear mission and objectives.

Project Planning:
Detail all project elements, including schedules, resource allocation, and budgeting, ensuring readiness for execution.

Project Execution and Implementation:
This phase involves the active realization of project plans, overseeing the deployment of technology, process restructuring, and monitoring of progress against the project timeline.

Project Handover:
Finalize the project with a structured handover to the operational teams. This includes training, documentation delivery, and transitioning of full control to ensure sustainable project outcomes.

(Vargas, R. V., 2007, p.5)
(Wiegers, K., 2007, p. 10)
(Jeston & Nelis, 2008, p. 217)

Gantt Chart

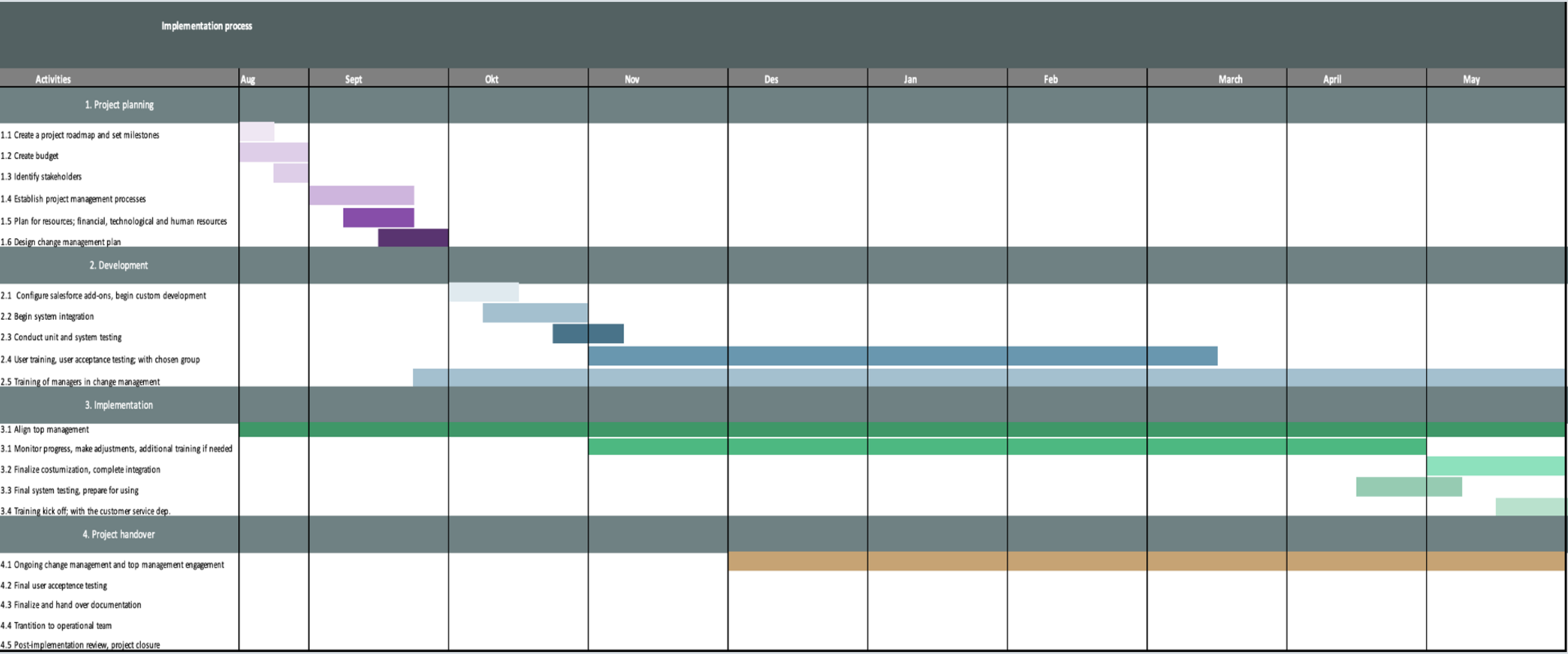


Table 32: Gantt Chart

Gantt Chart

- The Gantt chart strategically concentrates on the critical implementation and development phases over an 8-month period, intentionally omitting the initial project setup and final handover to maintain focus on core development activities.
- Project initiation is scheduled one month before formal planning begins. This phase is dedicated to defining project goals, finalizing the scope, and mobilizing our project team, ensuring everyone is aligned and understands their responsibilities.
- Details regarding the handover phase are not depicted on the chart but are planned for execution during the autumn months, marking the transition from project completion to operational status.

Project Governance

To effectively steer the BPM initiative, we're proposing a comprehensive governance framework. This framework forms the operational backbone, aligning each phase with strategic objectives and ensuring accountability across the board.

BPM Decision Making:
Pinpoint critical decision-makers at each project stage, design a decision-making matrix mapping decisions to roles, and set clear timelines and escalation paths for decision-making bottlenecks.

BPM Roles and Responsibilities:
Establish a RACI matrix (Responsible, Accountable, Consulted, and Informed) to define team roles and prevent task overlaps, ensuring accountability and clear delineation of responsibilities.

Process Performance Measurement System:
Determine the metrics for BPM success, establish KPI targets, and assign metric ownership to enable focused monitoring and reporting

BPM Standards, Conventions, and Guidelines:
Enforce the Seven Process Modeling Guidelines (7PMG) to assure clarity and uniformity across all BPM models, incorporating a standardized vocabulary and constraining model complexity.

BPM Quality Controls:
Align quality control with the 7PMG, streamline model elements and pathways to ease comprehension and minimize errors, and conduct regular reviews to maintain adherence to these standards.

(Dumas et. al., 2018, p. 192)
(Dumas et. al., 2018, p. 484)

Resource Requirements

Executive steering Team	Implementation Partner Department Head Senior Executives	Provide overall direction to the development of BPM program
Project Management Team	BPM Program manager Project manager IT lead	Develop and execute project plans, Monitor project progress and make decision.
Core team	Process Analyst Quality Assurance Team Administrative Support	Implement BPM methods and tools, Define and enforce standards and guidelines.

(Dumas et al., 2018, p. 484)

Customer Involvement & Employee Involvement

To harness the full potential of BPM at NTP, fostering a culture steeped in process-centric thinking is essential. We've identified five core capabilities that will arm the team with the knowledge and tools needed for active engagement and triumphant BPM endeavors.

Process knowledge:
NTP must ensure that every employee understands the role they play within the organization's BPM ecosystem. This involves regular educational sessions to map individual contributions to the overall success of process optimization.

BPM knowledge:
It is crucial that all NTP team members involved in BPM have a solid foundation in BPM principles. This extends beyond theoretical knowledge to practical, hands-on experience with BPM tools and methodologies relevant to their roles.

Process collaboration and communication:
NTP will prioritize the establishment of robust channels for cross-functional communication and collaboration on BPM projects. This will be supported by a communication plan that promotes transparency and regular updates on BPM initiatives.

BPM and process training:
NTP will invest in comprehensive BPM training programs. These will include a mix of on-site workshops and e-learning modules focused on the application of BPM in our specific context, reinforcing our commitment to continuous process improvement.

Propensity to lead BPM:
Leadership at NTP will demonstrate a strong propensity to guide and support BPM projects. This involves visible commitment from top management to champion BPM practices and lead by example in embracing process changes.

(Dumas et. al., 2018, p. 486 – 488)

Quick Wins

AI-Enhanced Efficiency and Document Control

Salesforce Einstein Integration

Implementing AI-driven case routing, classification and guide document submission can be done relatively quickly, offering immediate customer service improvements and cost savings.

- Improved accuracy in case classification
- Faster case routing leads to quicker resolutions
- Reduced waiting times for customers
- Cost savings through enhanced efficiency

Mandatory Document Submission Optimization

Optimization of document submission processes within Salesforce can yield immediate efficiency gains by ensuring completeness and accuracy from the start.

- Immediate improvements in document processing
- Reduced errors and incomplete submissions
- Faster case initiation and progression

Medium-Term

Specialized Training and Data-Driven Interactions

Specialized Agent Training

Developing and implementing a training program will take some time, but within medium-term frame, it can significantly enhance the capabilities of customer service agents.

- Agents better equipped to handle complex inquiries
- Higher quality of customer service interactions
- Increased customer satisfaction and retention

Bots for Personalized Interaction

As bots collect and analyze interaction data, they can progressively offer more personalized service, which would fit into a medium-term strategy.

- More targeted and relevant customer communication
- Continual learning from interactions to improve service
- Enhanced customer engagement through personalization

Long-Term

Specialized Training and Data-Driven Interactions

Predictive Workload Distribution
Implementing a system for predictive workload distribution is complex and relies on a robust dataset, positioning it as a strategic long-term initiative due to its dependency on the maturation of medium-term gains.

- More balanced case distribution among agents
- Proactive management of high-complexity cases
- Improved agent performance

Strategic Organizational Integration
Involves aligning technology and processes with the broader objectives of the organization, which requires ongoing evaluation and alignment.

- Customer service fully aligned with organizational goals
- Long-term business objectives supported by service enhancements
- Enhanced synergy across departments and functions

Process Mining for Optimization
Regular process mining and the continuous refinement of customer service workflows are long-term commitments that will evolve as more data is collected and analyzed.

- Ongoing identification and elimination of process bottlenecks
- Continuous adaption to changing customer needs
- Sustained improvements in operational efficiency

Monitoring and Follow-Up

With the implementation of the new AI system, continuous monitoring and refinement of the process are essential. It's common knowledge that no project launch is impeccable, and it remains uncertain whether the AI will expedite the process. To verify its impact, NTP should conduct a thorough comparison of the throughput times pre- and post-AI implementation.

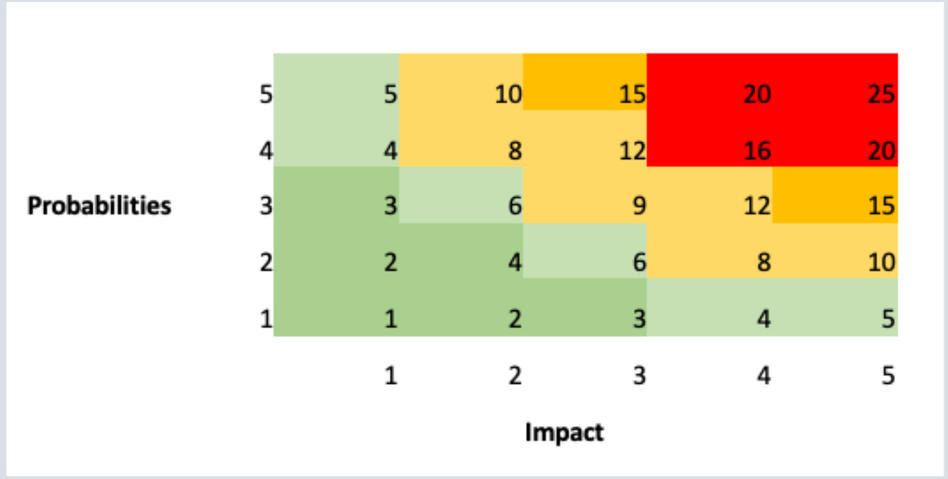
Process mining, which involves analyzing business processes based on event logs recorded during their execution becomes a powerful tool in this context. With the new system in place, process mining can yield more accurate data, making it substantially simpler to pinpoint and address any process inefficiencies.

"Measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it."
H. James Harrington (1929–)

(Dumas et. al., 2018, p.413 - 419)

Project Risks

Problems	Probablitiy	Impact	Risk Level
Technical Compatibility	3	4	12
Data Security and Privacy	2	5	10
Implementation Costs	3	4	12
User Adoption	4	3	12
System Dependency	2	4	8
Data Quality	3	5	15
Change Management	3	3	9
Training and Expertise	3	3	9
Performance Expectations	2	4	8
Scalability and Future Development	2	4	8
Ethical Concerns	2	4	8
Service Disruption	3	4	12
Long-term Maintenance Costs	3	3	9



For more insight into some of these risk levels, please see Appendix 2

Project Risks

- **Technical Compatibility:** Risk that AI may not fully integrate with current IT infrastructure.
- **Data Security and Privacy:** Risks related to handling sensitive data and compliance with GDPR and other privacy laws.
- **Implementation Costs:** Unexpected expenses due to integration complexity or additional customization requirements.
- **User Adoption:** Risk of employees not embracing or resisting the new AI technology.
- **System Dependency:** Over-reliance on AI can create vulnerability if the system encounters issues.
- **Data Quality:** Incorrect or inadequate data quality could result in poor decision-making by AI.
- **Change Management:** Resistance to change can impede effective implementation and optimization of processes.
- **Training and Expertise:** Risk of insufficient training and support for employees using the new system.
- **Performance Expectations:** AI may not meet expected improvements in efficiency or customer satisfaction.
- **Scalability and Future Development:** The system may not be scalable enough for future needs or integrate new AI advancements.
- **Ethical Concerns:** Risks of bias in AI algorithms that could lead to unethical treatment of customers or employees.
- **Service Disruption:** Potential for operational disruptions during the transition to the new system.
- **Long-term Maintenance Costs:** Risks that maintaining and updating the AI system could be expensive over time.

Risks, Mitigation and Contingency

Technical and Data Management Risks

Technical Compatibility

- **Risk**: AI may not fully integrate with current IT infrastructure.
- **Mitigation**: Conduct compatibility assessments and pilot testing.
- **Contingency**: Explore alternative solutions or necessary system upgrades.

Data Security and Privacy

- **Risk**: Potential breaches and non-compliance with GDPR and privacy laws.
- **Mitigation**: Implement robust security measures and regular compliance checks.
- **Contingency**: Establish rapid response protocols for data breaches.

Data Quality

- **Risk**: Inaccurate AI decision-making due to poor data quality.
- **Mitigation**: Regular data audits and cleansing procedures.
- **Contingency**: Manual verification processes for critical data-driven decisions.

Operational and Adoption Risks

User Adoption

- **Risk**: Employee resistance to new AI technology.
- **Mitigation**: Comprehensive training and change management strategies.
- **Contingency**: Additional support and feedback mechanisms to address concerns.

System Dependency

- **Risk**: Over-reliance on AI creating operational vulnerability.
- **Mitigation**: Develop backup and manual processes.
- **Contingency**: Emergency protocols for system downtime or failures.

Service Disruption

- **Risk**: Interruptions during AI integration.
- **Mitigation**: Phased rollout with continuous monitoring.
- **Contingency**: Ready fallback procedures for immediate manual operations.

Risks, Mitigation and Contingency

Financial and Regulatory Risks

Implementation Costs

- **Risk**: Excessive costs due to integration complexity.
- **Mitigation**: Careful budget planning and cost-benefit analysis.
- **Contingency**: Scope adjustment and prioritization of essential features.

Long-term Maintenance Costs

- **Risk**: High ongoing costs for AI system maintenance.
- **Mitigation**: Choose scalable and maintenance-efficient solutions.
- **Contingency**: Budget revisions and seeking cost-effective maintenance options.

Performance and Ethical Risks

Performance Expectations

- **Risk**: AI not meeting intended improvements in service.
- **Mitigation**: Ongoing performance evaluation and adjustments.
- **Contingency**: Iterative development and potential AI system enhancements.

Scalability and Future Development

- **Risk**: AI system not scalable for future expansions.
- **Mitigation**: Select flexible and upgradable AI solutions.
- **Contingency**: Future-proofing through modular design and technology partnerships.

Ethical Concerns

- **Risk**: Biased AI algorithms leading to unethical outcomes.
- **Mitigation**: Conduct bias audits and ensure ethical algorithm design.
- **Contingency**: Regular algorithm updates and ethical reviews.

Thank you for your attention!

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Appendix 1

R Coding Process

1. Library Inclusion:
For comprehensive data analysis, the following libraries were included:
bupaR, edeaR, processmapR: These libraries are crucial for process mining and understanding workflows within the telecom's customer service process.
dplyr, tidyverse: Utilized for data manipulation and preparation, ensuring the data is in the right format for analysis.
qcc, scales, bupaverse: These libraries aid in quality control and visualization, providing a deeper insight into the service process.

2. Data Setup and Preparation:
The raw data from "INN354 2023H Case project - Raw data.csv" was imported and prepared for analysis.
New indexes and timestamps were created to facilitate a comprehensive understanding of each case and event within the telecom's customer service process.

3. Creation of Activity and Event Logs:
The data was transformed into activity and event logs using activitylog() and eventlog() functions. This conversion is key to applying process mining techniques.

4. Case Statistics Aggregation:
Aggregated data at the case level using group_by_case() and summarize(). This step is essential to understand the overarching trends and patterns in the customer service process.

5. Data Filtering:
Specific weeks were filtered to focus on a particular timeframe, providing a more targeted analysis of the service process.

6. Summary and Visualization of Data:
Conducted summarization of activities to get insights into the frequency and duration of different customer service activities.
Generated process maps to visually represent the workflow in the customer service process.
Explored resource frequency, workload distribution, and case durations to gain insights into operational efficiency and resource allocation.

7. Agent-specific Analysis:
Conducted a detailed analysis for specific agents (e.g., Agent 6 and Agent 12), examining their individual workflows, activities, and case complexities.

8. Process Chart and Control
Focused on throughput time as a crucial KPI, using qcc for quality control charting to monitor and analyze variations in throughput times.

Appendix 2

AI and Risk

The risk matrix presented in our report illustrates a predominance of moderate (yellow) risk levels with no low (green) risk levels. This distribution reflects a cautious approach, recognizing the substantial uncertainties and challenges inherent in integrating Salesforce AI into NTP's systems. The absence of green risk levels is a result of several factors:

1.Common Pitfalls in AI Customer Service: It's widely accepted that AI integration in customer service carries risks. Companies are advised to proceed with caution, ensuring any new technology implemented can be effectively managed and integrated. (Clark-Simpson, 2023)

2. Technical Compatibility and System Dependency: Salesforce acknowledges the limitations of new technologies, including AI, which can introduce accuracy issues, potential biases, and inequalities, as well as security and content sourcing concerns. This supports our classification of these risks at a moderate level, as they directly impact the integration's technical feasibility and reliance on the AI system.
(Loeb, 2023)

3. Risk and Returns Management: Many organizations lack the structured approach necessary to balance the risks and rewards of intelligent automation. Aspects like implementation, system management, risk, and resilience management are often handled separately, which can lead to fragmented risk mitigation strategies (Berruti et al., 2021)

4. User adoptation: "Organisations also need to consider that different cohorts in the workplace and community have different understandings and views about AI, with younger people, the university educated, and managers more aware, knowledgeable about and accepting of AI. In contrast, other cohorts are likely to need more reassurance and evidence of the trustworthiness of these technologies. As such, a one-size-fits-all approach is unlikely to work." (Gillespie et al., 2023)

5. System dependency: "... Although those incidents are extreme cases, experts said AI will erode other key skills that enterprises might want to preserve in their human workforce." (Pratt, 2023)

6. Performance Expectations: "Explainability is also crucial to building trust. Customers, regulators, and the public at large all need to feel confident that the AI models rendering consequential decisions are doing so in an accurate and fair way. Likewise, even the most cutting-edge AI systems will gather dust if intended users don't understand the basis for the recommendations being supplied."(Grennan et al., 2022)