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Evaluation of Glance Software, a Web-based Screen Share Remote Access Tool: A Usability Metrics and Process Sigma Case Study

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Abstract

This study is a usability measurement of a new technology of web-based remote desktop tools when upgrading and switching from a traditional app that requires installations such as Zoom and Microsoft Teams, which many organizations and users have become accustomed to the interfaces. Microsoft Teams and Zoom have a global presence and are commonly known by organizations worldwide. However, web-based remote desktop tools such as Glance software can leverage modern security protocols and encryption standards to ensure secure remote connections. It is crucial for IT companies dealing with sensitive data and compliance requirements; thus, switching and upgrading to this new technology is critical. System Usability Scale (SUS), which provides a standardized measure of perceived Usability, will be used primarily in this study to provide valuable insights into the user's perception of system usability, allowing organizations to make informed decisions for enhancing user experience. Integrating Usability measurement and Process Sigma helps ensure process improvements enhance efficiency and align with user needs and expectations. Results from Standardized Usability Metrics of Glance show that the quality level for Task Completion is 96%, Error Rates of 4%, Task Times of 1.7795 in minutes, and User Satisfaction is 92% with an overall sigma level (z-score) of 3.3276, this is 0.9280 higher than the combined usability average of Microsoft Teams and Zoom applications. By integrating usability considerations, organizations can strike a balance between operational efficiency (as emphasized by Six Sigma) and user satisfaction, leading to a more holistic approach to process improvement, which in this case is switching and upgrading an IT company to a Web-based Screen Share Remote Access Tool from traditional desktop support applications.

Keywords
Glance, Usability Metrics, Process Sigma, SUM, Z-score

1. Introduction
As technology evolves, so do the needs of IT companies. Web-based tools may leverage the latest advancements, such as improved performance, enhanced user interfaces, and better user experiences, contributing to the decision to switch from traditional apps. IT companies are increasingly upgrading and switching to web-based remote desktop tools over conventional communication and collaboration platforms like Zoom and Microsoft Teams for their external clients for several reasons. These traditional apps usually require participants to install software on their devices. Web-based tools eliminate this requirement, reducing user friction and making initiating remote sessions or collaborations easier. Web-based remote desktop tools can provide the necessary features for IT support teams to connect to users' machines and resolve issues efficiently. A case study of a software company that typically uses Microsoft Teams and Zoom for remote sessions with their clients implements a significant shift of switching to Glance Software as part of process improvement and providing a more efficient, effective, and secured client support experience will be the basis for this study.

Glance Networks currently holds a relatively small market share of approximately 0.1% in the Remote Access category. However, when examining the customer base of Glance Networks in terms of industries, it becomes evident that the two most significant segments are computer software, accounting for 23% of their customers, and Information Technology and Services, which represents 19% of their overall clients. Out of the total customer base utilizing Glance Networks, 37% comprises small-scale organizations with revenue less than $50 million. Additionally, a noteworthy 15% represents medium-sized businesses, while a considerable 24% constitutes large enterprises. Usability with Six Sigma principles involves applying data-driven approaches to measure and improve Usability systematically. Six Sigma, as a methodology for process improvement and reduction of defects, can be extended to include usability metrics, aligning the objectives of enhancing user experience with the broader operational efficiency goals.

1.1 Quantitative Model of Usability

This involves the use of measurable metrics and data to assess the Usability of a system or product. Various quantitative models and metrics represent Usability numerically, allowing for objective evaluations and comparisons. One commonly used quantitative model is the System Usability Scale (SUS), a widely adopted questionnaire for assessing perceived Usability. According to Sauro, J. & Kindlund E. (2005), four metrics can represent high-level Usability models - task completion, error counts, task times, and satisfaction scores.

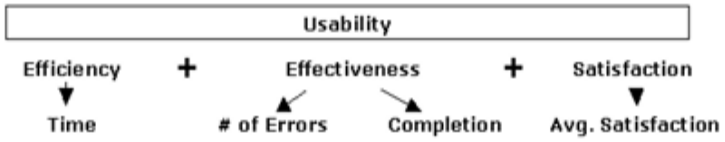

Figure 1. Quantitative Model of Usability by Sauro, J. & Kindlund E. (2005)

1.2 Process Sigma Measurement

Process Sigma is a statistical measure that quantifies the capability of a process to meet customer specifications and expectations. It is often denoted as "σ" and represents the standard deviation of a process. Organizations often set improvement targets based on achieving a higher Sigma level. The higher the Sigma level, the better the process performance.

- 6 Sigma: 99.99966% of the products or services meet specifications.
- 5 Sigma: 99.977% meet specifications.
- 4 Sigma: 99.379% meet specifications.

This research encourages continuous improvement efforts to increase the Sigma level and reduce defects. Organizations strive towards higher Sigma levels to enhance product or service quality.

1.3 Integration of Usability Metrics and Process Sigma

Usability and Process Sigma are two distinct disciplines. However, they can intersect in specific contexts, particularly in industries or organizations prioritizing process improvement and user experience. Combining usability considerations with Six Sigma methodologies helps ensure that process improvements enhance efficiency and align with user needs and expectations. Six Sigma's focus on reducing defects aligns with usability goals of minimizing user errors and improving overall satisfaction. Usability testing and feedback can help identify and rectify usability defects. Usability is often associated with a design-centered approach, emphasizing user-centered design principles to create products that meet the needs and expectations of the end-users.

2. Related Works:

Integrating usability metrics, particularly the System Usability Scale (SUS) and Process Sigma, in the context of web-based remote access tools is a vital area of research within the IT industry. This review explores existing studies, methodologies, and practical examples that shed light on the benefits, challenges, and outcomes of merging usability assessments with the structured framework of Process Sigma in evaluating and improving web-based remote access tools.

2.1 Usability Metrics:

Web-based remote access tools are pivotal in facilitating collaboration and remote work in the IT industry. Evaluating these tools' Usability involves metrics such as SUS scores, task completion times, error rates, and user satisfaction.

Studies of (Generosi et al. 2022) emphasize the importance of understanding user interactions and feedback when assessing the Usability of web-based remote access tools. At the same time, Usability metrics play a crucial role in evaluating the effectiveness, efficiency, and satisfaction of users interacting with a system. The System Usability Scale (SUS), developed by (Jeff Sauro and James Lewis 2016), stands out as a widely adopted quantitative tool for measuring perceived Usability. Studies such as (Polancos 2019) have successfully employed SUS to assess user satisfaction and identify areas for improvement in various digital products such as Enterprise Resource Planning System (ERP). Usability is a multi-faceted concept, and its evaluation often involves a combination of various metrics to provide a comprehensive understanding of the user experience.

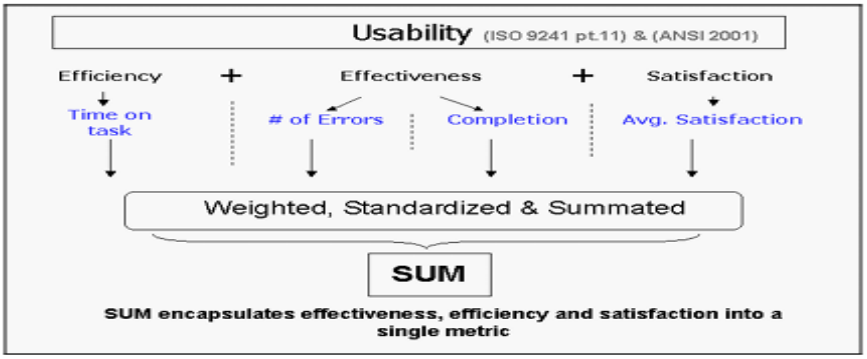

Figure 2. Summative model of usability or SUM Model by Sauro, J. & Kindlund E. (2005)

2.2 Process Sigma in Usability Improvement:

Process Sigma principles, rooted in Six Sigma methodologies, provide a systematic approach to identifying and eliminating process defects. Extending these principles to Usability in web-based remote access tools involves treating usability issues as defects and quantifying them using metrics like DPMO. (De Leon et al. 2020) demonstrate the application of Six Sigma to usability improvement, showcasing measurable enhancements considering design factors for web design development. Below are the integration examples:

2.2.1 User Experience Study on Touchscreen Technology: A Case Study on Automated Payment Machines

(Polancos et al., 2020) conducted a case study on the user interface design of an Automated Payment Machine (APM). The study integrated SUS scores with Process Sigma to quantify and address usability defects. Table 1 presents vital usability metrics and Sigma levels before and after implementing iterative design changes.

Table 1. User Experience Study on Touchscreen Technology

Component	Before Intervention	After Intervention
SUS Score	0.79	0.96
Quality Level	0.79	0.93
Process Sigma	3.0716 = 3.1	3.4119 = 3.4

2.2.2 The Interactional Effects of Page Layout, User Workload, and Lists in Improving the Single Usability Metric

In a longitudinal study by (De Leon et al., 2020), the integration of usability metrics and Process Sigma was applied to an online web platform. The research demonstrated a correlation between increased SUS scores and reduced reported errors over multiple iterations. Table 2 shows the trend of Usability metrics, Sigma factor, and process values from the study.

Table 2. Completion Rate, Error Rate, and Time per task

Metric	Before Intervention	After Intervention
Completion	0.73	0.95
Errors	0.91	0.99
Satisfaction	0.18	0.99
Times	0.75	0.99
SUM	0.4345	2.2978
Process Sigma	1.9345	3.7978

The literature reviewed highlights the significance of integrating usability metrics, especially SUS, with Process Sigma in evaluating and improving web-based related applications in the IT industry. Real-world examples demonstrate how this integration can lead to measurable enhancements in Usability, task efficiency, and defect reduction. As organizations increasingly recognize the critical role of user experience in remote collaboration, integrating usability metrics with Process Sigma emerges as a strategic approach to delivering high-quality, user-friendly web-based remote access tools.

3. Conceptual Framework

Integrating standard usability metrics with process sigma (z-score), a statistical measure often used in Six Sigma methodologies, involves aligning usability evaluation with a standardized statistical measure. Below is a conceptual framework for combining standard usability metrics with z-scores and Process Sigma for a comprehensive approach to usability assessment and improvement:

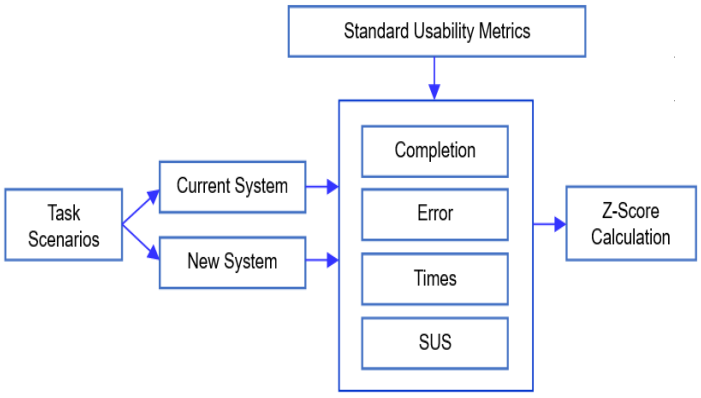

Figure 3. Conceptual Framework: Integrated Usability Metrics with Process Sigma

4. Methodology

This study investigates and analyzes the integration of usability metrics, specifically the System Usability Scale (SUS) and Process Sigma methodologies, in upgrading a traditional remote desktop tool to a web-based remote access solution. The research focuses on evaluating the perceived Usability of the upgraded tool, identifying usability defects, and applying Process Sigma principles to enhance overall user experience and process efficiency.

4.1 Research Design and Case Selection

The study adopts a mixed-methods approach, combining qualitative and quantitative research methodologies. A single-case study design focuses on a specific organization undergoing the transition. In addition, the case study was conducted within a medium-sized IT company currently utilizing a traditional remote desktop tool. And The organization's willingness to transition to a web-based remote access solution and participate in the study.

4.2 Data Collection Methods and Participants

Administer SUS surveys before and after the transition to measure perceived usability. Then, design realistic task scenarios representing everyday use cases and measure completion times. Collect qualitative feedback through interviews, focus group discussions, and open-ended survey questions. The user participants include IT support

Engineers who were directly impacted by the transition, including those regularly using the remote desktop tool, and stakeholders such as IT administrators, decision-makers, and other relevant managers involved in the upgrade process.

4.3 Data Analysis: For Usability metrics and quantitative analysis, the study utilizes statistical methods to analyze SUS scores, task completion times, and other quantitative usability metrics. A defect analysis was performed for Process Sigma to analyze DPMO calculations and identify areas with higher defect rates. And to correlate usability defects with specific usability metrics to understand root causes.

4.4 Limitations and Timeline: The study utilizes a Single-Case Design, in which the findings will be specific to the chosen organization, limiting generalizability. Usability metrics may be influenced by subjective perceptions, and biases in feedback may exist. The Data Collection is from May to December 2023, while data Analysis and Iterative Changes are from October to December 2023.

5. Case Study:

ABC IT Solutions, a leading software support IT company, has upgraded its remote desktop tool to a web-based remote access solution to enhance user flexibility, collaboration, client security, and overall system usability. The company aims to integrate usability metrics, specifically the System Usability Scale (SUS), and apply Process Sigma methodologies to ensure a data-driven and user-centric approach to the upgrade. ABC IT Solutions relies on traditional remote desktop tools such as Microsoft Teams and Zoom for its internal and client-facing operations. Recognizing the need for increased accessibility, a more user-friendly interface, and a secured web application, the decision was made to transition to a web-based remote access solution. The upgrade is expected to improve Usability, reduce errors, and enhance overall user satisfaction. The transition was implemented in the last quarter of the year (September–December 2023).

5.1 Usability Metrics of the Current System

The user satisfaction attribute is measured based on the comfortability and acceptability of use by using Software Usability Test (SUS) questionnaire as per Arthana et al. (2019). These consist of a 10-item questionnaire with a 5-point Likert scale for responses ranging from "Strongly Disagree" to "Strongly Agree." To calculate the SUS score, the study uses the following formula: $((\Sigma_{i=1}^{n}(Score_i))/n \; x \; 2.5$

Below is a sample SUS questionnaire tailored to evaluate the Usability of Microsoft Teams and Zoom as desktop remote access tools. Participants should respond to each statement based on their experience with the respective tool.

Table 3. System Usability Scale (SUS) Questionnaire

Please provide your level of agreement with the following statements regarding the Usability of Microsoft Teams or Zoom as a desktop remote access tool.
(5) - Strongly Disagree; (4) - Disagree; (3) - Neutral; (2) - Agree; (1) -Strongly Agree
I want to use Microsoft Teams/Zoom frequently.
I found Microsoft Teams/Zoom unnecessarily complex.
I thought Microsoft Teams/Zoom was easy to use.
I think that I would need the support of a technical person to be able to use Microsoft Teams/Zoom.
I found the various functions in Microsoft Teams/Zoom were well integrated.
I thought there was too much inconsistency in Microsoft Teams/Zoom.
I imagine most people would quickly learn to use Microsoft Teams/Zoom.
I found Microsoft Teams/Zoom very cumbersome to use.
I felt very confident using Microsoft Teams/Zoom.
Before I could get going with Microsoft Teams/Zoom, I needed to learn many things.

System Usability Scale (SUS) score for the current screenshare software system would be approximately 70%. The table below shows the overall SUS score that was surveyed from 26 participants.

Table 4. SUS Score of the Current System

Participant	Survey Questions										SUS Score
	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	
1	2	3	3	4	3	3	3	2	2	2	6.75
2	2	3	2	3	3	2	4	3	2	2	6.50
3	3	3	3	3	3	3	3	3	3	3	7.50
4	3	3	2	2	3	2	4	3	4	2	7.00
5	3	4	2	2	3	2	2	2	4	3	6.75
6	3	4	3	4	3	1	3	1	2	3	6.75
7	3	2	3	4	3	3	3	3	3	2	7.25
8	2	2	2	3	3	1	3	3	3	2	6.00
9	2	2	4	4	3	2	4	3	3	1	7.00
10	2	3	4	4	3	2	3	3	3	3	7.50
11	3	3	4	2	2	2	3	3	3	3	7.00
12	3	3	3	3	3	2	3	3	1	3	6.75
13	3	3	4	3	3	2	3	3	2	3	7.25
14	4	3	2	3	3	2	3	3	2	3	7.00
15	4	4	2	3	3	1	3	3	4	3	7.50
16	4	2	3	4	3	3	3	4	3	3	8.00
17	2	2	3	2	3	3	4	2	3	3	6.75
18	3	2	3	2	3	1	3	3	3	3	6.50
19	3	2	4	3	2	1	3	2	3	3	6.50
20	3	2	2	3	2	2	3	3	3	3	6.50
21	3	4	2	3	4	3	3	3	3	2	7.50
22	3	4	4	3	4	2	3	3	3	3	8.00
23	2	4	4	2	3	1	4	1	3	3	6.75
24	3	3	3	4	3	2	3	3	3	1	7.00
25	3	3	3	4	3	2	3	3	3	1	7.00
26	3	3	3	4	3	2	3	3	3	1	7.00
											AVE: 7.3

When evaluating the Usability of Software based on metrics such as completeness, satisfaction, time, and errors, the results provide valuable insights into the overall user experience. The data was interpreted based on the evaluation results for each task scenario (see Table 5) and to evaluate the Usability of Microsoft Teams and Zoom for remote technical support and issue resolution.

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Table 5. Task Usability Scenarios (Microsoft Teams and Zoom)

Process	Task	Microsoft Teams	Zoom
Download / Install / Login	Task 1	Visit the official Microsoft Teams website: https://www.microsoft.com/en-us/microsoft-teams/download-app.	Download it from the Zoom website (https://zoom.us/download)
	Task 2	Open the downloaded installer.	Open the downloaded installer.
	Task 3	Follow the installation wizard to complete the installation process.	Follow the installation wizard to complete the installation process.
	Task 4	If you already have a Microsoft account, sign in using your credentials. If you don't have an account, click "Sign up for free" to create a new one.	Open the Zoom app and either sign into your Zoom account or create a new one if you don't have an account.
Schedule / Start / Joining a Meeting	Task 5	To schedule a new meeting, click the "Calendar" tab and then "New Meeting."	Click on the "Schedule a New Meeting" option.
	Task 6	Click on the "Meet Now" button to start an instant meeting or select a scheduled meeting to join.	Fill in the meeting details, such as the date, time, and other settings.
	Task 7	If prompted, choose your audio and video settings and then copy the meeting link to start.	Once the meeting is scheduled, click the "Start" button to begin immediately or copy the meeting link to start later.
	Task 8	Share the meeting link with your client through email or another communication method.	Share the meeting link with your client through email or another communication method.

Share Your Screen	Task 9	Once in the meeting, look for the toolbar at the bottom.	Click on "Join with Computer Audio" to enable audio.
	Task 10	Click on the "Share" button (usually represented by a screen icon).	Your client will now enter the Zoom meeting and can see and hear you.
	Task 11	Choose between sharing your entire desktop or a specific application/window.	You can request remote control permissions if you need control over their screen.
End the meeting / remote session.	Task 12	Click the "Stop Sharing" button to stop sharing your screen.	When the session is complete, click the "End Meeting" button.

Table 6. Evaluation Result of the Current System (Task 1-6)

R	*Task 1*			*Task 2*			*Task 3*			*Task 4*			*Task 5*			*Task 6*		
	n	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*
1	1	1	1	1	4	6	1	6	8	1	4	5	1	2	4	1	6	6
2	1	1	1	1	6	2	1	8	6	1	5	6	1	4	5	1	6	4
4	1	1	2	1	2	5	1	6	5	1	6	5	1	5	1	1	4	6
5	1	2	2	1	5	5	1	5	5	1	5	5	1	1	1	1	6	6
6	1	2	2	1	6	6	0	4	0	1	2	2	1	5	5	1	4	4
6	1	1	1	1	5	5	1	6	6	1	5	5	1	6	6	1	5	5
7	1	1	1	1	6	6	1	6	6	1	5	5	1	4	4	1	7	7
8	1	2	2	1	2	2	1	6	6	1	6	6	1	2	2	1	6	6
9	1	1	1	1	5	5	0	6	0	1	4	4	1	2	2	1	8	8
10	1	1	1	1	2	2	1	6	6	1	5	5	1	4	4	1	6	6
11	1	1	1	1	4	4	1	8	6	1	6	5	1	2	4	1	6	4
12	1	1	1	1	4	6	1	6	0	1	5	2	1	4	5	1	4	6
14	1	1	1	1	6	2	0	5	4	1	2	5	1	5	1	1	6	4
15	1	1	1	1	2	2	1	4	4	1	5	5	1	1	1	1	4	4
16	1	1	1	1	5	5	1	6	6	1	5	5	1	5	5	1	5	5
16	1	2	2	1	6	6	1	6	6	1	6	6	1	6	6	1	7	7
17	1	2	2	1	5	5	1	6	6	1	6	6	1	4	4	1	6	6
18	1	1	1	1	6	6	1	6	6	1	7	7	1	2	2	1	8	8
19	1	1	1	1	2	2	1	7	7	1	2	2	1	2	2	1	6	6
20	1	1	1	1	5	5	1	5	5	1	5	5	1	4	4	1	6	6
21	1	1	1	1	2	4	0	5	4	1	5	2	1	2	6	1	4	6
22	1	1	1	1	4	2	1	4	5	1	2	4	1	6	6	1	6	4
24	1	1	1	1	2	6	1	5	5	1	4	4	1	6	4	1	4	5
25	1	1	1	1	6	6	1	5	5	1	4	4	1	4	4	1	5	5
26	1	2	2	1	6	6	1	5	5	1	6	6	1	2	2	1	7	7
Total	**10**	**1.25**	**1.29**	**10**	**4.33**	**4.38**	**8.33**	**5.67**	**4.75**	**10**	**4.71**	**4.63**	**10**	**3.67**	**3.58**	**10**	**5.67**	**5.63**

Table 7. Evaluation Result of the Current System (Task 7-12)

R	*Task 7*	*Task 8*	*Task 9*	*Task 10*	*Task 11*	*Task 12*

	n	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*
1	1	2	2	1	6	6	1	6	7	1	4	2	1	5	0	1	1	2
2	1	2	4	1	6	7	1	7	0	1	2	6	0	6	6	1	2	1
4	1	4	1	1	7	8	0	7	9	1	6	5	1	6	2	1	1	1
5	1	1	1	1	8	8	1	9	9	1	5	5	1	2	2	1	1	1
6	1	2	2	1	6	6	1	8	8	1	1	1	0	4	0	1	2	2
6	1	2	2	1	9	9	1	2	2	1	2	2	1	6	6	1	2	2
7	1	6	6	1	6	6	0	6	0	1	2	2	1	6	6	1	1	1
8	1	5	5	1	8	8	1	6	6	1	5	5	0	4	0	1	2	2
9	1	4	4	1	5	5	1	8	8	1	6	6	1	6	6	1	1	1
10	1	2	2	1	4	4	1	6	6	1	4	4	1	5	5	1	1	1
11	1	2	4	1	6	6	1	7	0	1	2	6	1	6	0	1	2	2
12	1	4	1	1	6	6	0	7	9	1	6	5	0	6	2	1	2	2
14	1	1	2	1	6	7	1	9	8	1	5	1	1	2	4	1	2	2
15	1	2	2	1	7	7	1	8	8	1	1	1	1	4	4	1	2	2
16	1	2	2	1	8	8	1	2	2	1	2	2	1	6	6	1	1	1
16	1	6	6	1	6	6	1	6	6	1	2	2	0	6	0	1	4	4
17	1	5	5	1	9	9	0	6	0	1	5	5	1	4	4	1	2	2
18	1	4	4	1	6	6	1	8	8	1	6	6	1	6	6	1	2	2
19	1	1	1	1	8	8	1	6	6	1	6	6	0	5	0	1	1	1
20	1	4	4	1	5	5	1	6	6	1	2	2	1	6	6	1	1	1
21	1	4	4	1	4	6	1	6	7	1	5	4	1	6	2	1	2	2
22	1	4	2	1	6	2	1	7	0	1	4	5	1	2	4	1	2	1
24	1	2	4	1	2	6	0	9	6	1	5	4	1	4	6	1	1	2
25	1	4	4	1	6	6	1	6	6	1	4	4	1	6	6	1	2	2
26	1	5	5	1	2	2	1	7	7	1	2	2	0	6	0	1	1	1
Total	**10**	**3.25**	**3.21**	**10**	**6.08**	**6.29**	**7.92**	**6.63**	**5.29**	**10**	**3.75**	**3.79**	**7.08**	**5**	**3.46**	**10**	**1.67**	**1.63**

(R=Respondent, n=Completeness of Task, t=Time, taken)

Based on the evaluation result from Table 6, 9 tasks out of 12 were completed by the 26 Respondents (NR), resulting in a 76% completion rate, 7.6% Error rate, and 98.625 minutes for the overall effectiveness of the current system. While Table 8 shows the computed Process sigma (Z-score) using the formula:

$$Z - score = (x - \mu)/\sigma$$

Table 8. Average Effectiveness of the Current System

Task	NR	NC	Effectiveness
1	26	10	100
2	26	10	0
4	26	0	100
5	26	10	100
6	26	10	100
6	26	10	100
7	26	10	100
8	26	10	100
9	26	0	0
10	26	10	100
11	26	0	100
12	26	10	0
Completion Rate			**76%**
Error Rate			**7.60%**
Times in Minutes			**98.625**

Table 9. Process Sigma of the Current System

Metrics	x	μ	σ	z-score
Completion	3.9931	4	1.5005	-0.0046
Errors	9.4444	5	1.0410	4.2693
Satisfaction	7.3233	8	0.4889	-1.3840
Times	4.3056	5	1.4435	-0.4811
			2.3996	**2.3996**

Table 8 shows the Process Sigma of the Current System. x represents the individual data points, μ represents the average time to complete the task or mean, and the σ represents the standard deviation. A z-score of 0.8388 suggests that the data point is close to the mean. Approximately 68% of the data in a regular distribution fall within one standard

deviation of the mean; however, further improvement is necessary, and the company may use this information to identify areas for improvement in the application's Usability, potentially aiming to reduce task completion times.

Microsoft Teams and Zoom are widespread communication and collaboration platforms. While they generally work well for screen sharing, the participants reported some common issues during the test for task scenario activity. Here are three problems that were encountered from both platforms:

- Using an outdated Microsoft Teams and Zoom version for both Host and Users may result in bugs or performance issues. This requires keeping Teams and Zoom updated to the latest version to benefit from bug fixes and performance improvements.
- Due to security measures, firewall or antivirus software block screen sharing features. This requires the company security team to re-configure their firewall or antivirus settings to allow Microsoft Teams and Zoom to access the necessary features.
- Since the screen sharing requires installation, the Graphics hardware acceleration may cause problems during screen sharing. The security team must turn off hardware acceleration in the Teams settings and see if the issue persists.

5.2 Usability Metrics of the New System

The same metrics will help us gauge users' effectiveness, efficiency, and satisfaction when interacting with the upgraded system. By assessing these metrics, we can identify areas of improvement, ensure user satisfaction, and ultimately deliver a remote desktop application that meets the evolving needs of our users. Table 10 shows the Task Usability Scenarios of the new Software; from 10, the steps have been stripped down to 6 as the downloading and installing of the Software is no longer required.

Table 10. Task Usability Scenarios (Glance)

	For the Host (Initiating the Session):	For the Client (Joining the Session):
Task 1	Go to the official Glance website.	The client should visit the official Glance website.
Task 2	Log in with your existing Glance account or create a new account.	Look for an option to join a session or enter a session code.
Task 3	Look for an option to start or initiate a new screen-sharing session. Enter the session code provided by the host and follow any prompts.	The client typically needs to grant permission for you to view and control their screen. This step ensures privacy and security.
Task 4	Glance usually generates a unique session code for each new session. Note or copy this code.	The client may be prompted to grant permission for the screen-sharing session.
Task 5	Communicate the session code to your client through a secure channel like email, chat, or phone.	Once permission is granted, the client can view the host's screen and collaborate as needed.
Task 6	When the session is complete, end the session from your end	Disconnects the screen-sharing session.

One of the critical features of Glance is that it offers Real-time Collaboration, such as shared document editing, collaborative drawing, or simultaneous screen sharing without installing any executable files. For security enhancement, both the host and the user can choose if they want to use a remote control. Select View Only to view without a remote control or View and Control to use a remote control. After you start a session, the Session Info box appears with directions on how to invite guests to the session.

The same formula is used to measure the System Usability Scale (SUS) in evaluating the Usability of the new system. These also consist of a 10-item questionnaire with a 5-point Likert scale for responses ranging from "Strongly Disagree" to "Strongly Agree." Table 11 shows the overall SUS score results, which are higher than the score from the current system.

Table 11. SUS Score of the Current System

Participant	**Survey Questions**	**SUS**

	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	Score
1	4	4	5	4	4	2	4	4	4	4	8.06
2	2	4	2	4	4	2	5	4	2	2	10.40
4	4	4	4	4	4	4	4	4	4	4	10.40
5	4	4	2	2	4	2	5	4	5	2	8.84
6	4	5	2	2	4	2	2	2	5	4	8.32
6	4	5	4	5	4	1	4	1	2	4	8.84
7	4	2	4	5	4	4	4	4	4	2	9.62
8	2	2	2	4	4	1	4	4	4	2	7.54
9	2	2	5	5	4	2	5	4	4	1	8.84
10	2	4	5	5	4	2	4	4	4	4	9.10
11	4	4	5	2	2	2	4	4	4	4	9.10
12	4	4	4	4	4	2	4	4	1	4	9.62
14	4	4	5	4	4	2	4	4	2	4	9.62
15	5	4	2	4	4	2	4	4	2	4	9.10
16	5	5	2	4	4	1	4	4	5	4	9.88
16	5	2	4	5	4	4	4	5	4	4	10.66
17	2	2	4	2	4	4	5	2	4	4	8.58
18	4	2	4	2	4	1	4	4	4	4	8.58
19	4	2	5	4	2	1	4	2	4	4	8.32
20	4	2	2	4	2	2	4	4	4	4	9.88
21	4	5	2	4	5	4	4	4	4	2	10.66
22	4	5	5	4	5	2	4	4	4	4	8.58
24	2	5	5	2	4	1	5	1	4	4	8.58
25	4	4	4	5	4	2	4	4	4	1	9.36
26	2	4	4	5	4	4	4	2	2	2	8.58
											AVE: 9.2

Table 12 below shows the evaluation results of the new system, which is the deployment of Glance as a new remote screen-sharing system for the company's client support workflow. Then Table 13 gives the results of 96% completion rate, 4% Error rate, and 9.7460 minutes for the overall effectiveness of the current system. Table 14 shows the computed Process sigma (Z-score) using the same formula.

Table 12. Evaluation Result of the New System (Task 1-6)

R	*Task 1*			*Task 2*			*Task 3*			*Task 4*			*Task 5*			*Task 6*		
	n	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*	*n*	*t*	*n*t*
1	1	0.5	1	1	2	3	1	3	5	1	1	2	1	1	2	1	0.75	0.75
2	1	1	1	1	3	0	1	5	3	1	2	3	1	2	3	1	1	1
4	1	1	0.75	0	1	3	1	3	2	1	3	2	1	3	0	1	0.5	0.5
5	1	0.75	0.75	1	3	3	1	2	2	1	2	2	0	1	0	1	1	1
6	1	0.6	0.6	1	3	3	0	1	0	1	0.75	0.75	1	3	3	1	0.4	0.4
6	1	1	1	1	3	3	1	3	3	1	2	2	1	4	4	1	0	0
7	1	1	1	1	4	4	1	3	3	1	2	2	1	2	2	1	2	2
8	1	0.75	0.75	1	1	1	1	3	3	1	3	3	1	0	0	1	1	1
9	1	1	1	1	3	3	0	3	0	1	1	1	1	0	0	1	3	3
10	1	1	1	0	1	0	1	3	3	1	2	2	1	2	2	1	1	1
11	1	1	1	1	2	2	1	5	3	1	3	2	1	0	2	1	1	1
12	1	1	1	1	2	2	1	3	0	1	2	0.5	1	2	3	1	0.5	0.5
14	1	1	1	1	2	1	0	2	1	1	0.5	2	1	3	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	0.5	0.5
16	1	1	1	1	3	3	1	3	3	1	2	2	1	3	3	1	0.75	0.75
16	1	0.5	0.5	1	4	4	1	3	3	1	3	3	1	4	4	1	2	2
17	1	0.75	0.75	1	3	3	1	3	3	1	3	3	1	2	2	1	1	1
18	1	1	1	0	3	0	1	3	3	1	4	4	1	0	0	1	3	3
19	1	1	1	1	1	1	1	4	4	1	0.5	0.5	0	0	0	1	1	1
20	1	1	1	1	3	3	1	2	2	1	2	2	1	2	2	1	1	1
21	1	1	1	1	1	2	0	2	1	1	2	0.75	1	0	4	1	0.5	0.5

22	1	1	1	1	2	1	1	1	2	1	0.75	1	1	4	4	1	1	1
24	1	1	1	1	1	3	1	2	2	1	1	1	1	4	2	1	0.75	0.75
25	1	1	1	1	3	3	1	2	2	1	1	1	1	2	2	1	0.5	0.5
26	1	1	1	1	2	2	1	2	2	1	3	3	1	0	0	1	1	1
Total	**10**	**0.93**	**0.92**	**8.8**	**2.28**	**2.16**	**8.4**	**2.68**	**2.24**	**10**	**1.94**	**1.9**	**9.2**	**1.8**	**1.84**	**10**	**1.05**	**1.05**

Table 13. Average Effectiveness of the New System

Task	NR	NC	Effectiveness
1	26	10	100
2	26	10	88
4	26	10	100
5	26	10	92.00
6	26	10	100
Completion Rate			**96%**
Error Rate			**4.0%**

Table 14. Process Sigma of the New System

Metrics	x	μ	σ	z-score
Completion	1.6844	1.5	0.5650	0.3265
Errors	9.4	5	0.7043	6.2476
Satisfaction	9.2083	8	0.8300	1.4559
Times	1.7795	5	0.6849	-4.7024
			SUM	**3.3276**

5. Results and Discussion

The new Glance system significantly improved effectiveness metrics compared to traditional Remote Desktop applications such as Microsoft Teams and Zoom. Key indicators, including user satisfaction, errors, and task completion rates, consistently showed superior performance with the Glance system as a web-based screen-sharing application in assisting clients with technical support. Quantitative data from Table 14 revealed that tasks performed using the Glance system were completed 1.7795 mins faster on average compared to Microsoft Teams and Zoom, typically 98.625 mins to complete. Users reported a more seamless and responsive experience, attributing this to the enhanced effectiveness of the Glance system. Table 11 reveals an average of 9.2 of the overall SUS score compared to 7.3 from the old system. Error rates in task execution were markedly lower with the Glance system than traditional tools. From the 7.6 average, error rates from the old system were lessened to 4% when the Glance was used. Users experienced fewer interruptions, glitches, and unexpected behaviors, contributing to a more reliable and error-free remote collaboration environment.

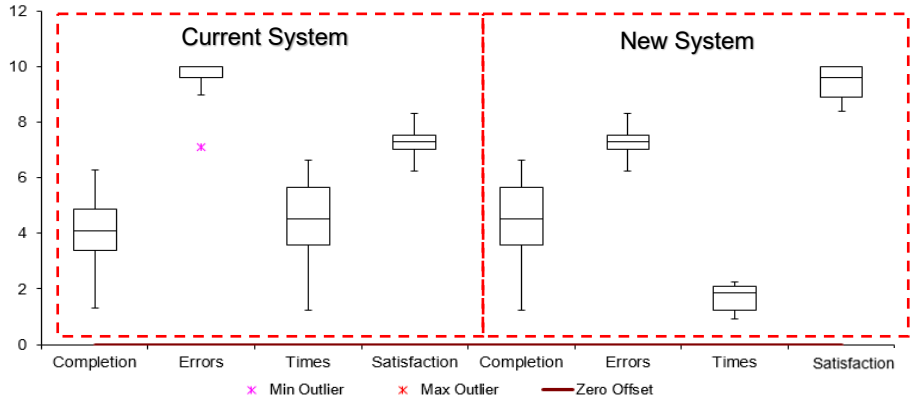

Figure 4. Box Plot (Current VS New System)

The box plot results from Figure 4 showcase the performance metrics of a new system vs the current system. As shown in the completion rate, the box has shifted upwards, indicating that the new system has, on average, higher completion rates than the previous/current one. This is a positive outcome, suggesting improved efficiency and user task success. The box is lower for Error rates, which implies that the new system has lower error rates, reflecting a more user-friendly interface or improved functionality. Reduced errors contribute to a smoother user experience and increased productivity. Lastly, the satisfaction rates box plot reveals the distribution of user satisfaction scores with the new

system. A higher box suggests that many users rated the system positively, indicating a higher level of user contentment.

Table 15. Data Analysis (Current VS New System)

	Current System				New System			
Labels	Completion	Errors	Times	SUS	Completion	Errors	Times	SUS
Min	1.2916	7.0833	1.25	6.24	1.25	6.24	0.9208	8.4
Q_1	3.3958	9.5833	3.5625	7.02	3.5625	7.02	1.2445	8.9
Median	4.0833	10	4.5208	7.28	4.5208	7.28	1.87	9.6
Q_3	4.8854	10	5.6666	7.54	5.6666	7.54	2.095	10
Max	6.2916	10	6.625	8.32	6.625	8.32	2.24	10
IQR	1.4895	0.4166	2.1041	0.52	2.1041	0.52	0.8505	1.1

6. Conclusion

Usability improvements in the Glance system stemmed from a more intuitive user interface, simplified navigation, and thoughtful design choices. Users found adapting to the Glance system easier, increasing satisfaction and productivity. Compared to the traditional Remote Desktop tools, Glance's user-centric design contributed to a positive user experience, minimizing the learning curve and allowing users to focus on their tasks rather than grappling with the complexities of the interface. Moreover, analyzing box plot data for completion, error, and satisfaction rates provides a comprehensive understanding of the new system's performance. Higher completion rates, user satisfaction, and lower error rates suggest that the new system delivers positive outcomes. It's essential to continue monitoring these metrics over time to ensure the sustained success of the implemented changes.

These findings have practical implications for organizations seeking effective remote collaboration tools. The Glance system not only outperforms competitors in terms of Usability but also has the potential to enhance overall productivity and user satisfaction in remote work scenarios. As businesses continue to adapt to remote work environments, the usability advantages offered by the Glance system position it as an asset in facilitating seamless and user-friendly collaboration. Considering these results, it is recommended that organizations consider the Glance system as a preferred choice for remote desktop screen sharing, taking advantage of its superior usability features to enhance communication and collaboration among team members. The insights gained from this case study underscore the importance of prioritizing Usability in selecting collaboration tools, ultimately contributing to the overall success of remote work initiatives.

References:

Arthana K. R., Pradnyana, M. A., G Dantes R., Usability testing on website wadaya based on ISO 9241-11, 2019, Journal of Physics: Conference Series, DOI 10.1088/1742-6596/1165/1/012012

De leon, G., Gratuito, J. and Polancos R., The Interactional Effects of Page Layout, User Workload, and Lists in Improving the Single Usability Metric, Proceedings of the 10th Annual International Conference on Industrial Engineering and Operations Management, Dubai, United Arab Emirates, March 10, 2020, https://doi.org/10.46254/AN10.20200065.

Enlyft, Companies using Glance Networks https://enlyft.com/tech/products/glance-networks

Generosi, A.; Villafan, J.Y.; Giraldi, L.; Ceccacci, S.; Mengoni, M. A Test Management System to Support Remote Usability Assessment of Web Applications. Information 2022, 13, 505. https://doi.org/10.3390/info13100505

Polancos, R., A Usability Study of an Enterprise Resource Planning System: A Case Study on SAP Business One. Advances in Intelligent Systems and Computing, 824, 1203-1223, 2019. . https://doi.org/10.1007/978-3-319-96071-5_121

Polancos R, Ruiz J. M. B. and E. A. I. Subang, "User Experience Study on Touchscreen Technology: A Case Study on Automated Payment Machines," 2020 IEEE 7th International Conference on Industrial Engineering and Applications (ICIEA), Bangkok, Thailand, 2020, pp. 710-714, doi: 10.1109/ICIEA49774.2020.9101977

Sauro J, Lewis J, Quantifying the User Experience (Second Edition), Morgan Kaufmann, 2016, Pages 345-350, ISBN 9780128023082, https://doi.org/10.1016/B978-0-12-802308-2.00021-7.

Sauro, J. & Kindlund E. (2005) "Using a Single Usability Metric (SUM) to Compare the Usability of Competing Products" in Proceeding of the Human Computer Interaction International Conference (HCII 2005), Las Vegas, USA

Sauro J., Kindlund E., Making Sense of Usability Metrics:Usability and Six Sigma, UPA Conference 2005