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The Agile Metrics Puzzle: Solving It with Framework Guidance

[1] Madhumitha Sampath,[2] Archana Madhavan, [3] Padma Priya
[1]Senior Consultant, India, email.mitha@gmail.com, +919686031655
[2]Consultant, India, archana.madhavan01@gmail.com ,+918095046308
[3]Founder, Agile Bodhi, India, padma@agilebodhi.com, +919994894112

ABSTRACT

Despite the adoption of over 90% of agile in the IT industry, measuring its progress and success remains an unanswered question. Agile is widely followed across organizations, but how to select the metrics for the team/org remains a discussion topic. Selecting appropriate Agile metrics is crucial for optimizing team and organizational performance, as a one-size-fits-all approach is ineffective. But there are scenarios, where organizations use incorrect metrics and data points for measuring project progress irrespective of the agile framework they follow.

This paper explores the importance of tailored metrics in Agile methodologies and offers guidance on choosing metrics based on key performance indicators (KPIs). By aligning metrics with specific goals and contexts, teams can achieve more meaningful and actionable insights.

Keywords—*Agile, Scrum, Kanban, metrics, KPI*

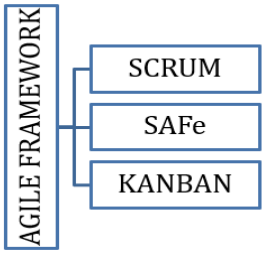
I. INTRODUCTION

Agile is a new software development approach that uses incremental and iterative design, development, and delivery. Agile tries to eliminate the flaws of software project execution using earlier approaches like the Waterfall, V Model, and Spiral model, etc., Agile consists of a framework and processes that adhere to the iterative mode of software development. Agile provides the values to be followed and the framework provides how to implement the values and principles into practice. Unfortunately, when Agile is implemented in organizations and teams the cultural events are implemented without realizing the fundamental values. According to Tim Guay “A dogmatic approach to Agile, such as prescriptively adhering to the Scrum Guide, is not Agile and is a serious antipattern”[1].

II. FRAMEWORKS CONSIDERED

Agile frameworks are structured methodologies designed to implement the Agile principles of flexibility, collaboration, and continuous improvement. These frameworks provide specific practices and guidelines to help teams deliver high-quality products in iterative cycles.

Though many Agile frameworks are available, we are considering the three major used frameworks.



- **Scrum** - Scrum is a framework for project management that emphasizes teamwork, accountability, and iterative progress toward a well-defined goal.
- **SAFe** - SAFe (Scaled Agile Framework) is a comprehensive framework for scaling Agile practices at the enterprise scale.
- **Kanban** - Kanban is an agile management method built on a philosophy of continuous work.

III.AGILE KEY PERFORMANCE INDICATORS(KPIs)

KPIs (Key Performance Indicators) are essential metrics for assessing a team's performance and ensuring they are aligned with their project objectives. As software development teams increasingly adopt Agile methodologies like Scrum, monitoring progress and performance has become crucial. KPIs offer a way to measure and analyze performance, enabling teams to enhance their processes and achieve their goals

In Agile, Key Performance Indicators are used to measure the performance and progress of a team. Agile KPIs are essential for organizations that use agile methodologies to measure their success. There are many ways in which Agile KPI metrics can benefit a team.

- ***Progress tracking***
- ***Decision making***
- ***Insight creation***

Below are standard agile KPIs widely used across organizations.

- **Velocity**: Measures the amount of work a team completes during a sprint, typically in story points or hours.
- **Burndown Chart**: Tracks the remaining work in the sprint backlog over the sprint duration.
- **Defect Density:** The number of defects per unit of work completed within a sprint.
- **Release Burndown**: Tracks progress towards a release goal by measuring the remaining work against the planned work.
- **EPIC Burndown**: Tracks the progress of an EPIC goal by measuring the remaining work
- **Customer Satisfaction (CSAT):** Customer feedback on the delivered product or feature quality
- **Burnup Chart:** Visualizes the amount of work completed against the total work planned.
- **Cycle Time**: The total time taken to complete a task from the moment work starts to its completion.
- **Lead Time**: The time from task creation to task completion.
- **Throughput**: The number of tasks completed within a specific period.
- **Work In Progress (WIP):** The number of tasks being actively worked on at any given time.
- **Control Chart**: Visualizes the state of tasks (e.g., in progress, completed) over time to identify bottlenecks.
- **Blocked Tasks**: The number of tasks that are blocked and the reasons for the blocks.
- **Code Churn**: The amount of code changed over a given period, indicating stability and quality.
- **Net Promotor Score:** The standard measurement for gauging customer loyalty and satisfaction
- **Defect Escape Rate:** The Escape Rate measures the number of defects that make it to production despite testing and quality assurance efforts
- **Code Stability:** Code stability tracks the number of risky changes made to code that could potentially harm the program.
- **Code Coverage:** Code coverage measures the percentage of source code properly reviewed by testing processes.
- **Failed Deployment:** Sometimes referred to as the mean time to failure, this metric determines how often deployments prompt outages or other issues.
- **Change Failure Rate:** The percentage of deployments and changes that cause a failure in production or after release

Along with the KPIs listed above organizations use few data metrics to measure the progress of an agile team. These data metrics enhance the predictability and aid in measuring team progress

Story comments frequency	Sprint Planned Story points vs Actual Story points	Stories spilled over from previous sprints
Issues blocked	Overloaded team members	Overloaded sprints
Underutilized team members	Underutilized sprints	Age in each stage of the issue workflow
Missing estimations	Missing description/acceptance criteria	Missing mandatory fields
Stories without assignees	Stories without Parent	Sprint closed before the due date
Sprint closed after the due date	Estimation changes	Bugs leaked to production
Regression bugs found	Missing test reports	Missing test cases
PR status	Unreleased items	Bug severity
High-priority issues picked late	Idle Issues	

IV. RESEARCH APPROACH

A survey was conducted to assess the current state of Agile metrics adoption within organizations by focusing on the three primary frameworks: Scrum, Kanban, and SAFe. The primary objective was to understand the theoretical metrics (*Metrics that get aligned to selected agile framework core principles*) aligned with these frameworks, the metrics currently being used within organizations (*Organization metrics*), and the potential for incorporating additional data points to enhance metric effectiveness.

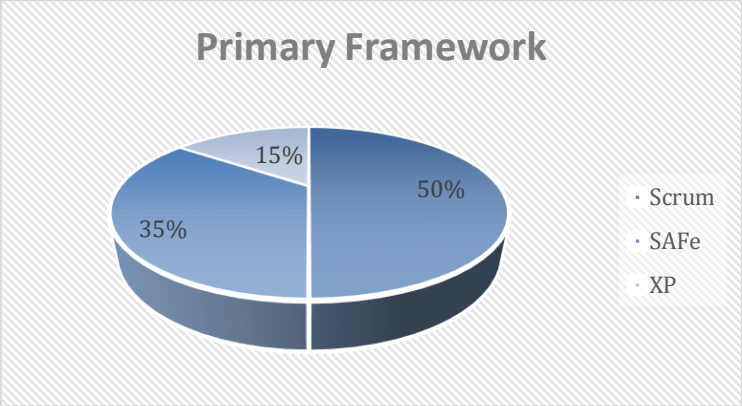
Research Methodology

A structured survey was distributed to Agile practitioners, project managers, and IT professionals. The survey consisted of below questions,

- Which framework are you using in your team/ organization? (if working on multiple frameworks most used)
- What KPIs from the list are theoretically relevant for the selected framework?
- What KPIs from the list are currently following in your org/team as part of the selected framework?
- What are the desirable data points you will consider useful for the selected framework to enhance your agile delivery tracking?
- As part of agile delivery and tracking will you be considering above listed data points along with KPIs?

V. RESEARCH FINDINGS: INSIGHTS ON SCRUM, SAFe, AND KANBAN FRAMEWORKS

Primary Framework



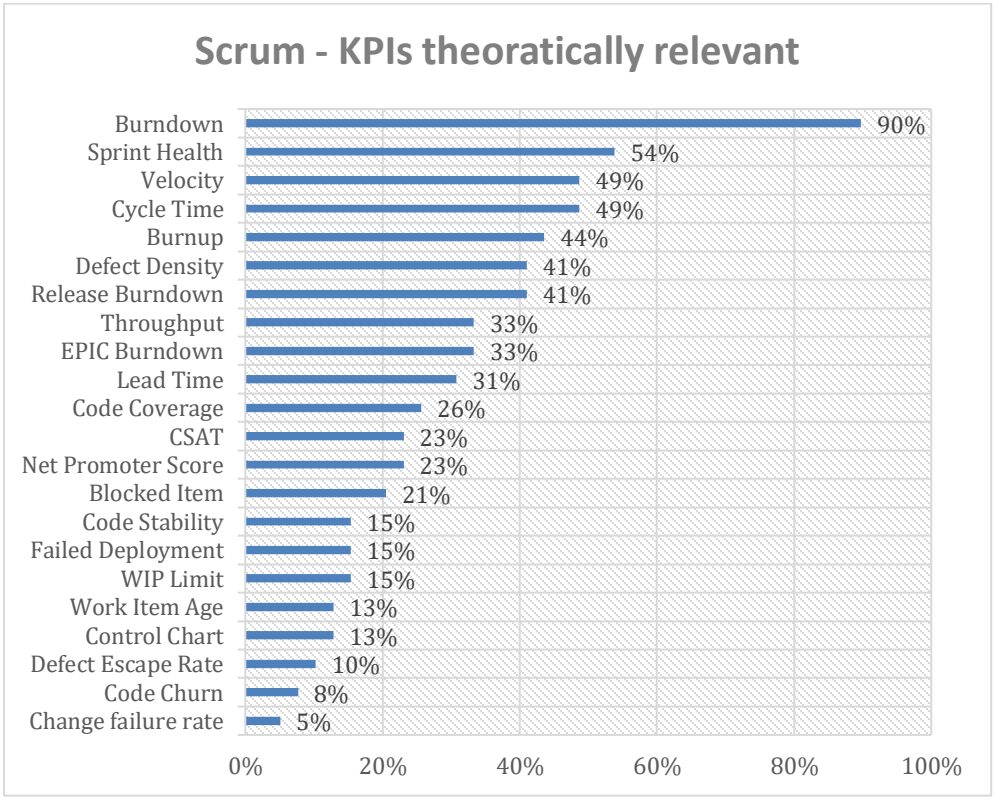
- **50%** of respondents reported using Scrum as their primary Agile framework
- **35%** of respondents reported using SAFe as their primary Agile framework
- **15%** of respondents reported using Kanban as their primary Agile framework

Scrum is the most widely used Agile framework among the surveyed practitioners, with a significant 50% adopting it. This prevalence underscores Scrum's effectiveness in delivering value iteratively and incrementally.

SAFe follows, with a notable 35% adoption rate, reflecting its importance in scaling Agile practices across larger organizations. Kanban constitutes 15% of the responses, indicating its suitability for specific project types or organizational contexts where a focus on workflow visualization and continuous delivery is crucial

V(A). SCRUM FINDINGS

Theoretically Relevant Metrics



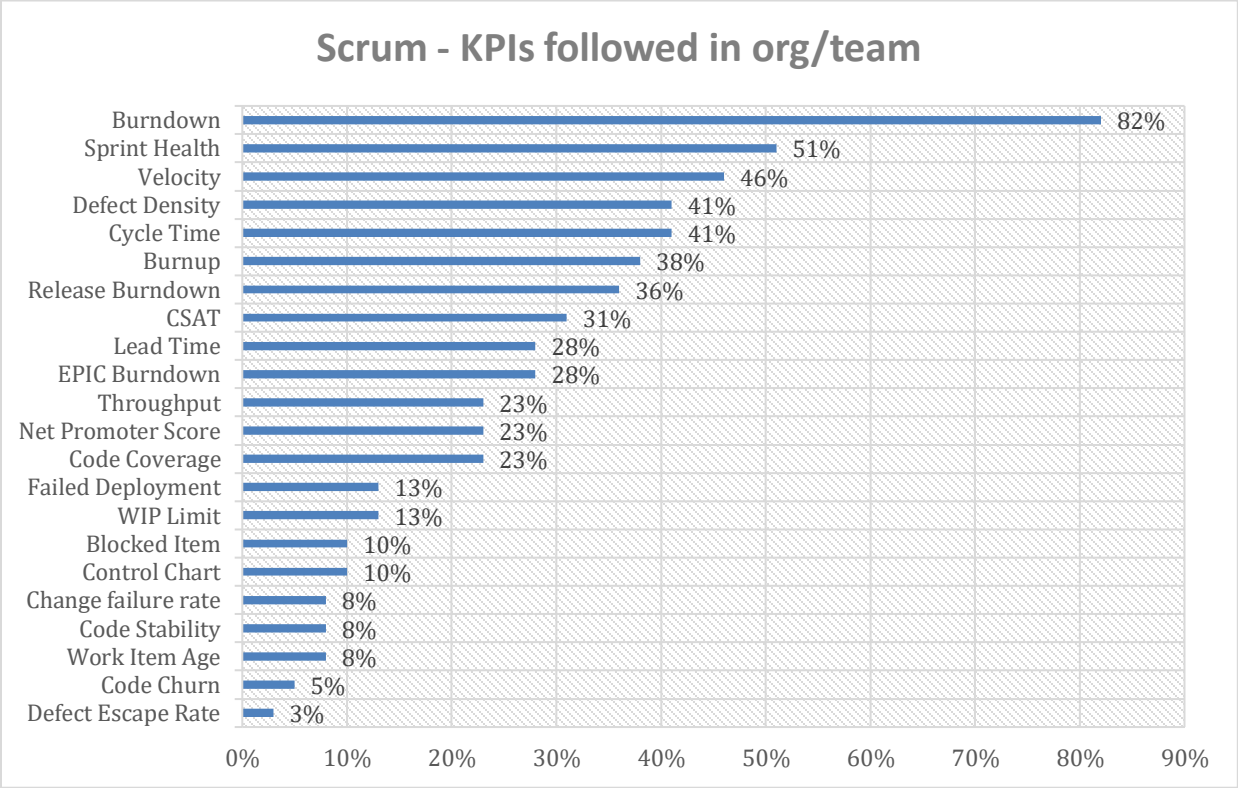
The top 5 metrics identified from the survey - Burndown, Sprint Health, Cycle Time, Velocity, and Burnup - are indeed core to the Scrum framework. They provide valuable insights into a team's performance, progress, and efficiency.

- ***Progress and predictability:*** *Burndown, Velocity*
- ***Team performance and morale:*** *Sprint Health*
- ***Process efficiency:*** *Cycle Time*
- ***Product delivery:*** *Burnup*

Based on the survey results, Agile practitioners prioritize the metrics based on:

- ***Traditional Scrum Metrics***
- ***Quality and Efficiency***
- ***Customer Focus***
- ***DevOps Integration***

Organization Metric



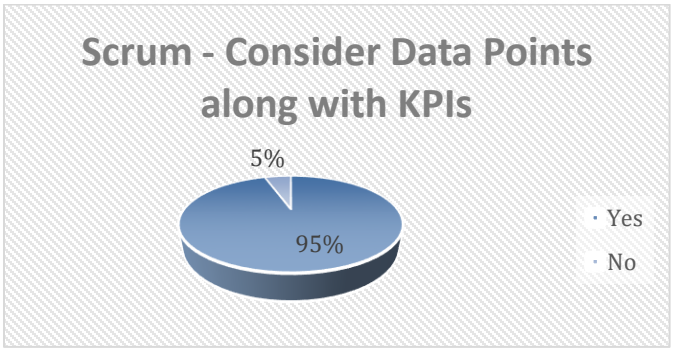
The top 5 metrics identified by the survey - Burndown, Sprint Health, Velocity, Defect Density, and Cycle Time - provide a strong foundation for evaluating Scrum team performance.

- ***Progress and predictability:*** *Burndown, Velocity*
- ***Team performance and morale:*** *Sprint Health*
- ***Product quality:*** *Defect Density*
- ***Process efficiency:*** *Cycle Time*

Based on the survey results, Agile practitioners prioritize the metrics based on:

- ***Traditional Scrum metrics***
- ***Customer-centric metrics***
- ***Quality-focused metrics***
- ***Process efficiency metrics***
- ***Deployment and stability metrics***

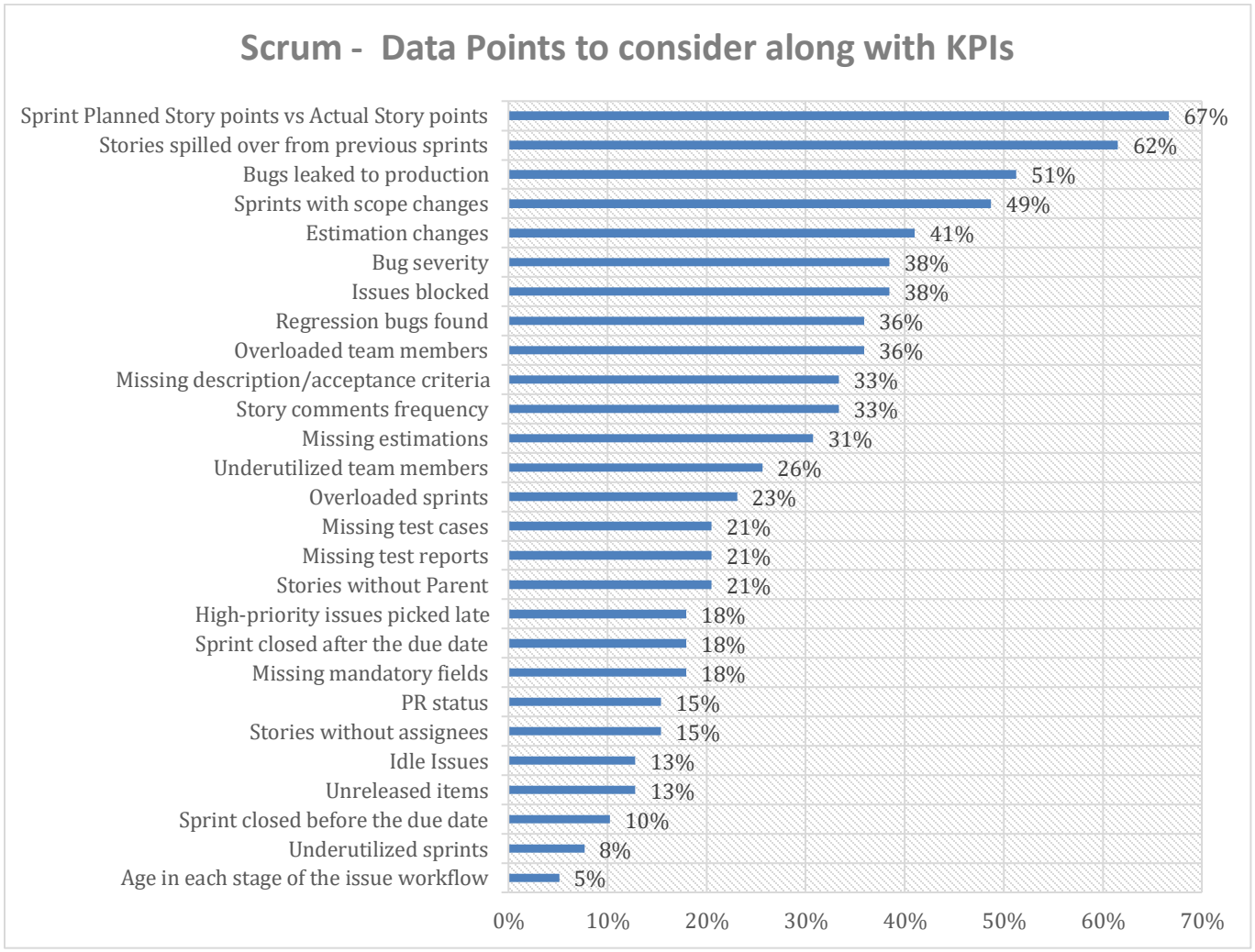
Additional data points



- **95%** of respondents reported that they will be considering additional data points along with metrics they follow
- **5%** of respondents reported that they won't be considering additional data points along with metrics they follow

The need to consider additional metrics is likely driven by increasing project complexity, faster time-to-market, and higher-quality software delivery.

Note: Collecting additional data points requires expertise and some manual effort in using the tools, but this is only an initial, one-time effort



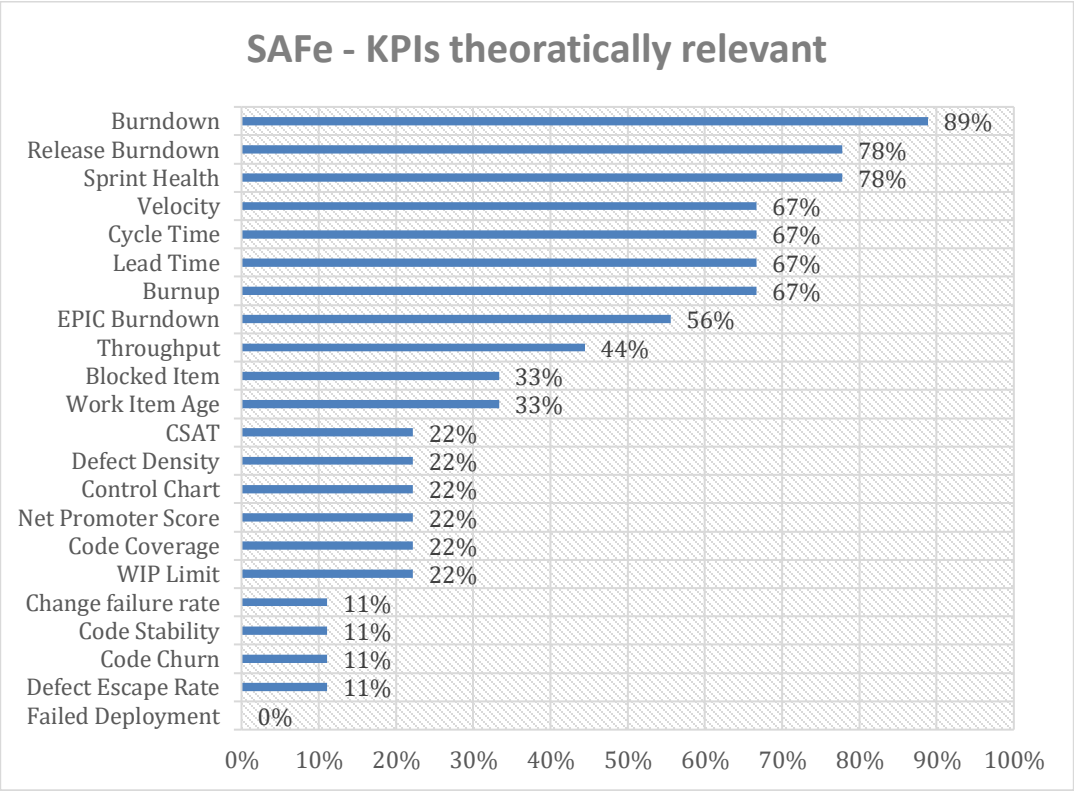
The top 3 data points identified by the survey - Sprint Planned Story Points vs Actual Story Points, Stories Spilled Over from Previous Sprints, and Bugs leaked to production - provide a strong assurance of Scrum team planning accuracy.

Based on the survey results, Agile practitioners prioritize the data points based on:

- ***Planning accuracy***
- ***Product Quality***
- ***Workload distribution***
- ***Process efficiency***

V(B). SAFe FINDINGS

Theoretically Relevant Metrics



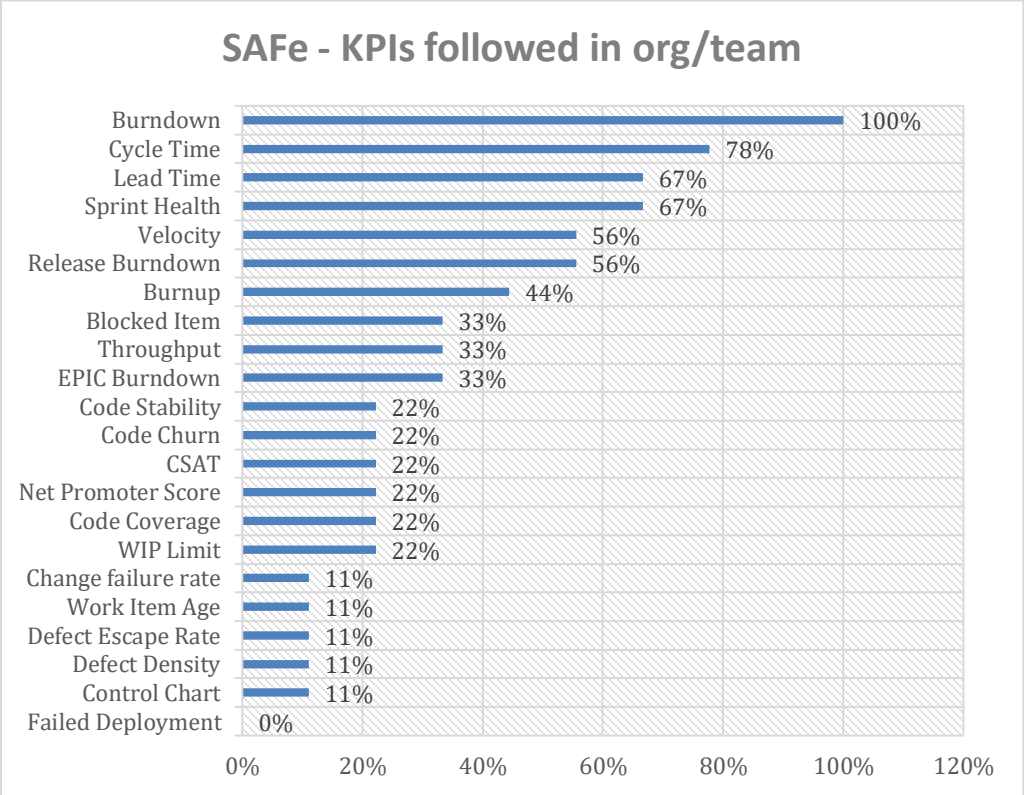
The top 5 metrics identified by the survey – Burndown, Release Burndown, Sprint Health, Velocity, and Cycle Time - provide a comprehensive view of project health and progress, helping teams stay aligned with their objectives while maintaining transparency and accountability.

- ***Progress and predictability:*** *Burndown, Release Burndown, Velocity*
- ***Team performance and morale:*** *Sprint Health*
- ***Process efficiency:*** *Cycle Time*

Based on the survey results, Agile practitioners prioritize the metrics based on:

- ***Traditional SAFe Metrics***
- ***Customer Focus***
- ***Quality and Efficiency***
- ***Limited DevOps Integration***

Organization Metrics



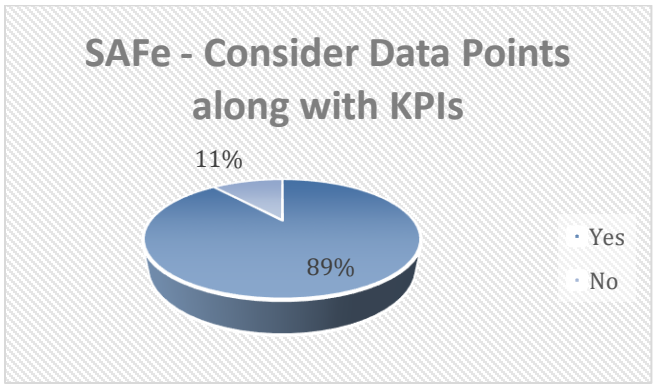
The top 5 metrics identified by the survey – Burndown, Lead Time, Cycle Time, Sprint Health, and Velocity - provide a comprehensive view of program predictability and progress of deliverables, helping teams stay aligned with their objectives while maintaining transparency and accountability.

- ***Predictability:*** *Burndown, Velocity*
- ***Team performance and morale:*** *Sprint Health*
- ***Process efficiency:*** *Cycle Time, Lead Time*

Based on the survey results, Agile practitioners prioritize the metrics based on:

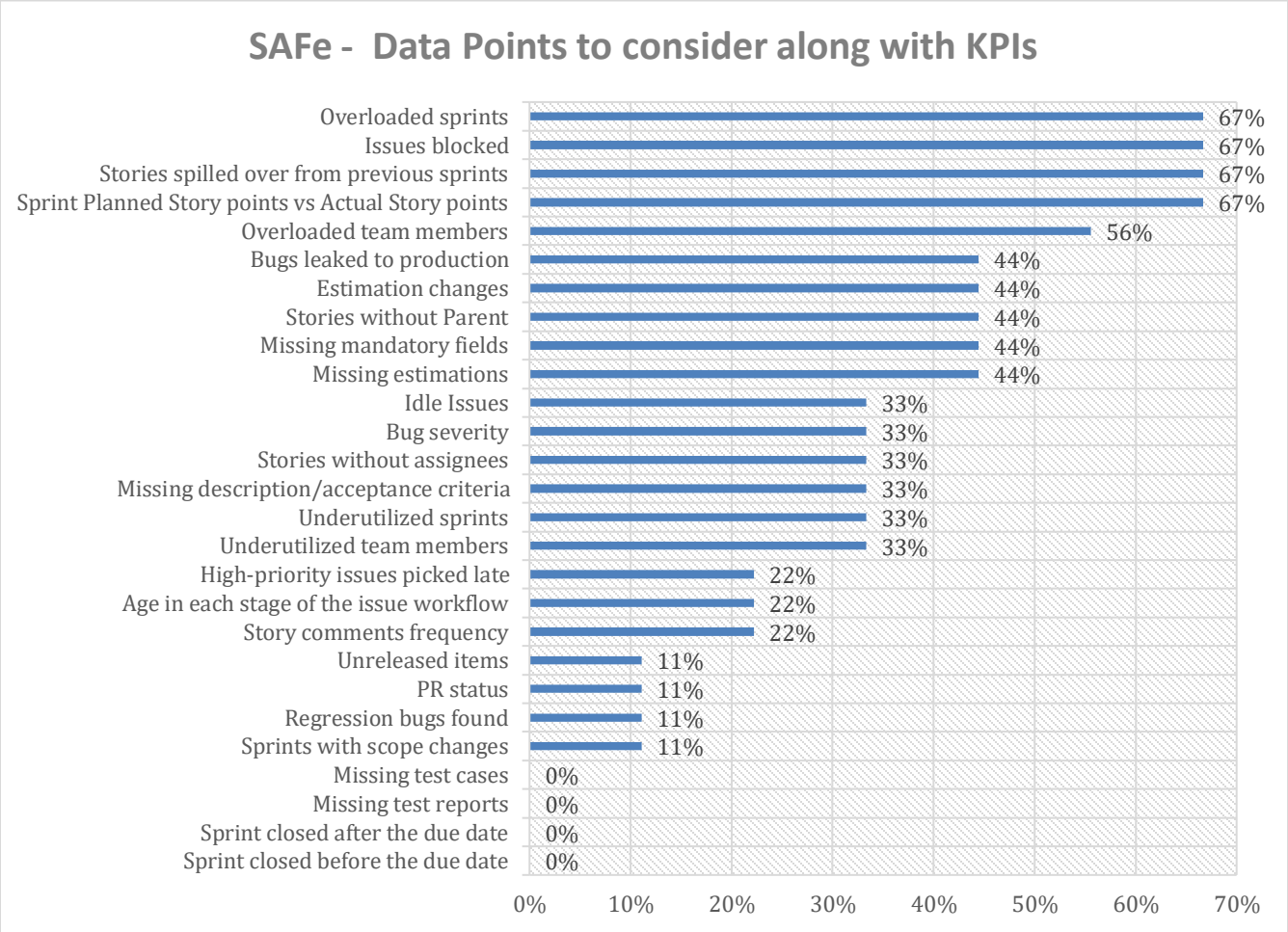
- ***Focus on customer satisfaction and team productivity***
- ***Development efficiency and code quality***
- ***Lack of emphasis on quality and deployment stability***

Additional data points



- **89%** of respondents reported that they will be considering additional data points along with metrics they follow
- **11%** of respondents reported that they won't be considering additional data points along with metrics they follow

Most Agile practitioners are eager to integrate additional data points with SAFe metrics, aiming for a more comprehensive view of project performance. This reflects a push for deeper insights and data-driven decision-making.
Note: Collecting additional data points requires expertise and some manual effort in using the tools, but this is only an initial, one-time effort

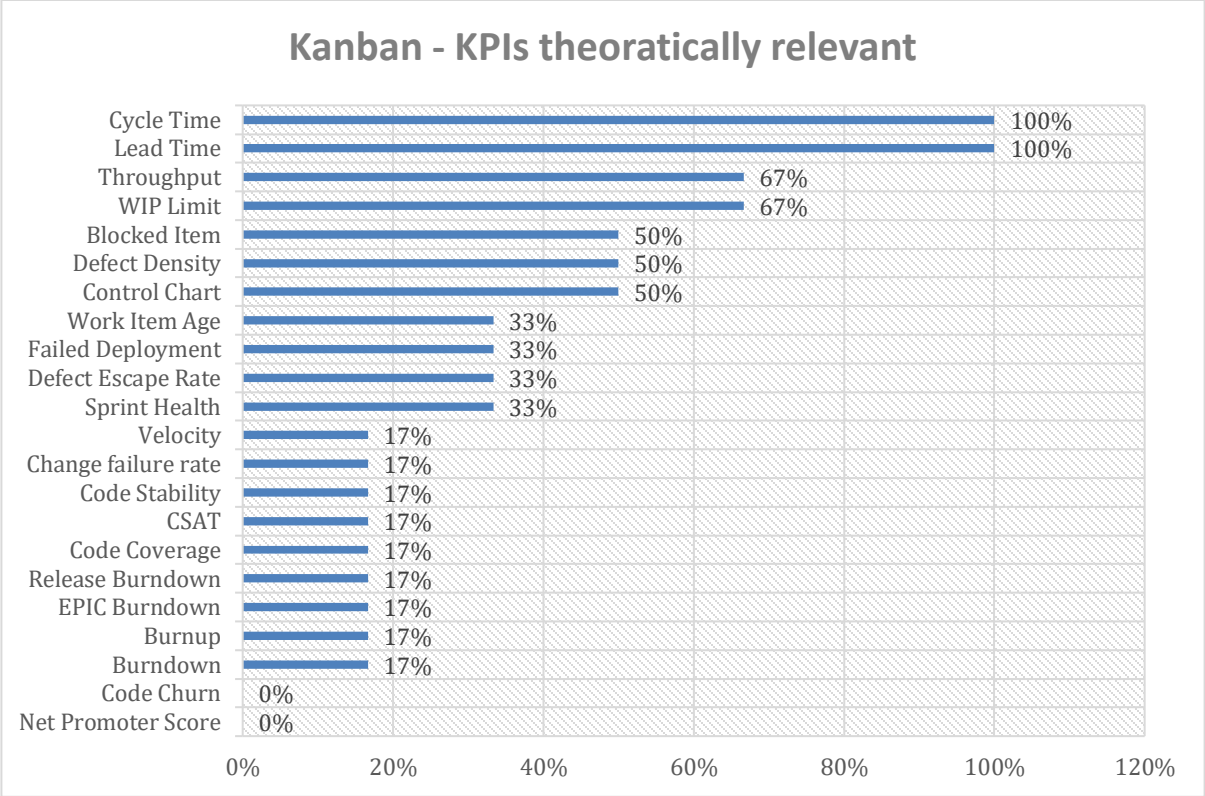


The top 3 data points identified by the survey Overloaded Sprints, Issues blocked Stories Spilled Over from Previous Sprints - point toward the need for additional data points for effective planning
Based on the outcome of the survey the agile practitioners prioritize data points based on,

- ***Planning accuracy***
- ***Workload distribution***
- ***Process efficiency***

V(C). KANBAN FINDINGS

Theoretically Relevant Metrics



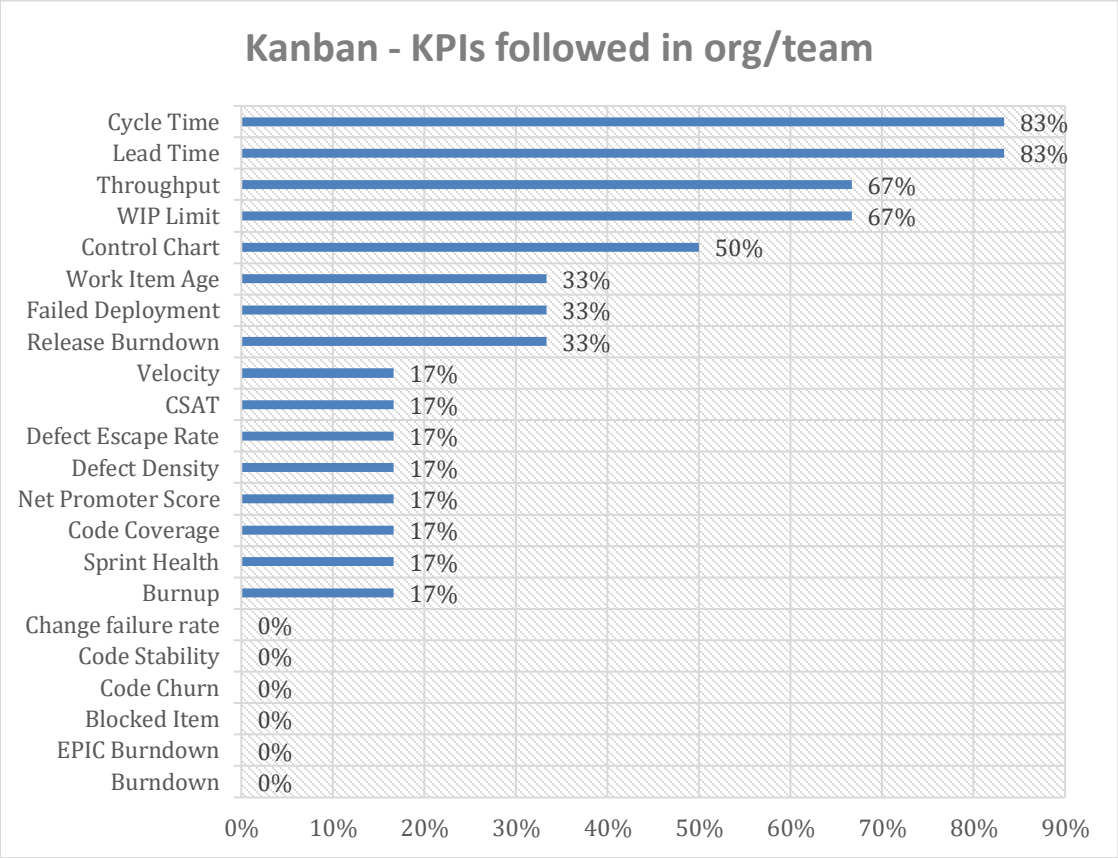
The top 5 metrics identified by the survey – Cycle Time, Lead Time, Throughput, WIP Limit, and Blocked Item - highlight crucial aspects of flow management in this system.

- ***Flow Efficiency:*** Cycle Time, Lead Time, WIP Limit, Blocked Item
- ***Product delivery:*** *Throughput*

Based on the outcome of the survey the Agile Practitioners prioritize metrics based on,

- ***Flow Efficiency***
- ***Planning***
- ***Customer Satisfaction and delivery***
- ***Lesser DevOps intervention***

Organization Metrics



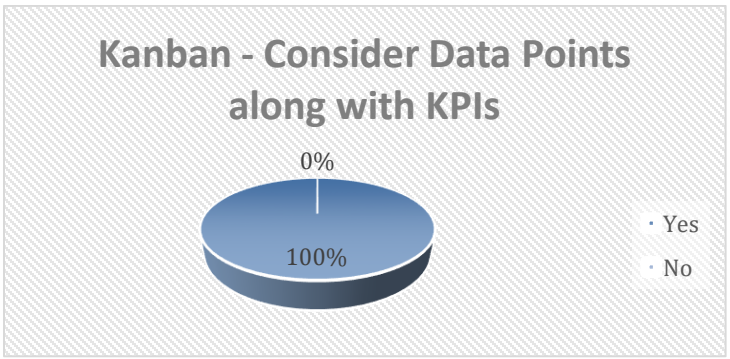
The top 5 metrics identified by the survey – Cycle Time, Lead Time, Throughput, WIP Limit, and Control Chart- highlight crucial aspects of flow management in this system.

- ***Flow Efficiency****: Cycle Time, Lead Time, WIP Limit, Blocked Item*
- ***Process efficiency****: Control Chart*

Based on the outcome of the survey the agile practitioners prioritize metrics based on,

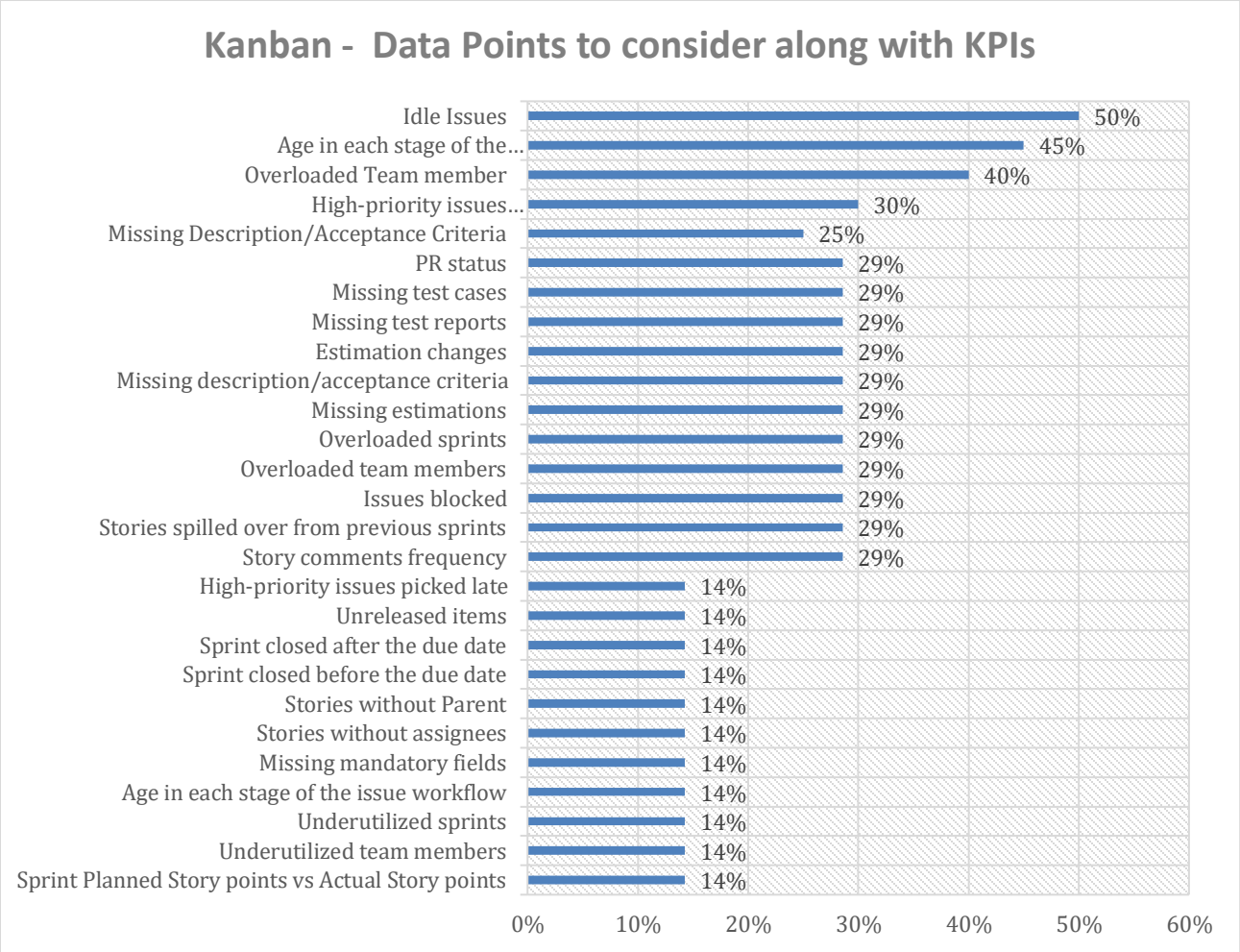
- ***Flow Efficiency***
- ***Planning***
- ***Customer Satisfaction***
- ***Lesser DevOps intervention and delivery***

Additional data points



The survey revealed that 100% of Agile practitioners expressed the need for additional data points within the Kanban framework. This unanimous feedback highlights the practitioners' desire for more comprehensive metrics to better monitor and optimize their processes, ensuring continuous improvement and more effective workflow management.

Note: Collecting additional data points requires expertise and some manual effort in using the tools, but this is only an initial, one-time effort



The top 3 data points identified by the survey - Idle Issue, Age in each stage of the workflow and Overloaded team member - highlight crucial aspects of Process flow and delivery

- ***Process and delivery***

Based on the outcome of the survey the agile practitioners prioritize data points based on,

- ***Flow Efficiency***
- ***Process Efficiency***
- ***Workflow Efficiency***

VI.OPPORTUNITIES IN METRIC USAGE AND IMPROVEMENT

There was a discrepancy between theoretical understanding and practical implementation. While most organizations were aware of relevant metrics, actual usage varied significantly. Many teams struggled with data collection and analysis, leading to inconsistent metric reporting. Some organizations relied heavily on a limited set of metrics, hindering comprehensive performance evaluation. Respondents expressed interest in incorporating additional data points to enrich their metric suite:

- **Quality metrics:** Defect rates, code coverage, and test case effectiveness were often mentioned.
- **Business value metrics:** Customer satisfaction, return on investment (ROI), and time-to-market were considered essential.

- **People metrics:** Employee engagement, burnout levels, and team collaboration were highlighted as potential areas for improvement

VII.RECOMMENDATIONS

- Provide comprehensive **training** on **metric selection**, **calculation**, and **interpretation**.
- Establish **standardized reporting** and **visualization practices**.
- Invest in **data analytics tools** to support **metric analysis**.
- Encourage a culture of **data-driven decision-making**.
- Conduct regular **metric reviews** and **adjustments**, incorporating insights from **intra-organizational surveys**.

VIII.FURTHER SCOPE FOR ANALYSIS

The manipulation of Agile KPIs is a major concern across organizations. Ensuring the accuracy of KPIs and data points has further scope for analysis. During the initial analysis, we identified the following ideas,

- Assign Accountability for Data Points Based on Roles
- Introducing Additional Custom Fields based on data points and KPIs selected by the team for monitoring
- Restrict Issue Type Creation Based on User Roles
- Mandate Essential Fields for Issue Creation and Issue Closure
- Implement Automated Checks
- Periodic Audits and Reviews

These ideas will be further analyzed in future papers.

IX.CONCLUSION

In conclusion, while organizations widely acknowledge the significance of metrics in Agile adoption, there remains a discernible gap between their theoretical understanding and practical implementation. This disconnect hampers the full realization of Agile's potential benefits. To bridge this gap, it is imperative that organizations not only prioritize the collection, analysis, and visualization of data but also expand the range of metrics they utilize.

While implementing a broader range of metrics can be challenging, the benefits are significant. For example, improved metrics can lead to higher customer satisfaction, increased efficiency, and reduced costs. Incorporating a broader spectrum of metrics, including those focused on quality, business value, and people-centric measures, will enable organizations to gain a more comprehensive and nuanced understanding of their performance. By doing so, they can enhance the effectiveness of their Agile frameworks, ultimately leading to more informed decision-making and improved outcomes across all levels of the organization. To overcome potential challenges, companies should invest in training their employees, use appropriate tools, and create a culture that values data-driven decision-making.

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