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Redefining Speed and Stability: A Meta Analysis of CI/CD Performance through DORA Metrics

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ABSTRACT: Continuous Integration and Delivery (CI/CD) has transformed modern software development, enabling faster, more reliable delivery cycles. This article investigates the impact of CI/CD on software delivery speed and stability through a meta analytical review of benchmark studies and industry metrics, with a focus on the DORA framework's Four Key Metrics: Deployment Frequency, Lead Time for Changes, Change Failure Rate (CFR), and Mean Time to Recovery (MTTR). Utilizing data from DORA, CircleCI, GitLab, and other industry reports, the study applies systematic methods to compare elite and non elite performance bands. Results indicate that mature CI/CD implementation significantly enhances deployment frequency and reduces lead times, while simultaneously improving system stability through lower CFR and faster recovery times. Elite performers exemplify how frequent, stable deployments can be achieved through automation, observability, and standardized tooling. Industry-wide evidence indicates that these principles are broadly applicable across various organizational contexts. Discussion highlights existing barriers to CI/CD adoption, including legacy infrastructure, cultural inertia, and toolchain fragmentation. To address these, the article emphasizes the role of GitOps and platform engineering in streamlining CI/CD operations. Emerging trends such as AI integration, Software Bill of Materials (SBOM), and advanced observability are also identified as future enablers of delivery excellence. In conclusion, CI/CD maturity is strongly correlated with elite performance in software delivery. DORA metrics offer a reliable framework for assessment and continuous improvement. Organizations seeking to scale their DevOps effectiveness must align their practices with these benchmarks while leveraging emerging tools and cultural strategies to sustain delivery excellence.

Keywords: CI/CD, DevOps, DORA Metrics, Software Delivery, Deployment Frequency, MTTR, Change Failure Rate, GitOps, Platform Engineering.

INTRODUCTION

The advent of DevOps has marked a fundamental transformation in software engineering, integrating development and operations into a unified workflow. At the heart of this

transformation lies the practice of Continuous Integration (CI) and Continuous Delivery (CD), which are designed to automate the integration, testing, and deployment of software. Emerging in the early 2000s, CI addressed the limitations of the waterfall model by enabling frequent code integrations, reducing risks of integration failures, and supporting faster, more agile development cycles.

As CI matured, it evolved into CD, extending integration to include automated delivery and deployment into production. This evolution enabled rapid, consistent updates and directly supported agile methodologies by shortening development cycles (Ali, 2023). This transformation was underpinned by cultural changes within organizations that encouraged collaboration across functional boundaries, further bolstered by automation technologies that streamlined the entire software lifecycle (Erdenebat et al., 2023).

The expansion of cloud computing further enhanced the CI/CD paradigm, enabling organizations to implement scalable and resilient pipelines. Cloud based infrastructures allowed teams to deploy and test applications at scale, providing a flexible environment to meet the growing complexity of software projects. These advancements underscored a growing recognition of the role that CI/CD plays in ensuring rapid and reliable software delivery, ultimately reshaping organizational workflows (Lwakatare et al., 2019; Rajasinghe, 2021).

Alongside the practical evolution of CI/CD, efforts to measure and evaluate software delivery performance have also matured. The DevOps Research and Assessment (DORA) group introduced a data driven framework based on four key metrics: Deployment Frequency (DF), Lead Time for Changes, Change Failure Rate (CFR), and Mean Time to Restore (MTTR). These metrics provide a standardized and widely adopted method to evaluate software delivery effectiveness and reliability (Senapathi et al., 2018; Vieira et al., 2025).

Deployment frequency reflects the agility of teams in delivering value, while lead time assesses the efficiency of code changes reaching production. CFR quantifies the proportion of changes causing production incidents, and MTTR indicates how quickly teams recover from failures. Collectively, these metrics capture the essential attributes of high performing teams: speed, quality, and resilience.

Research consistently indicates that speed and stability are not conflicting goals. Studies show that elite software delivery teams can achieve high deployment frequencies and short lead times while maintaining low CFRs and MTTRs. This suggests a reinforcing relationship: mature CI/CD practices enhance both velocity and system reliability ((Erich et al., 2017; Luo et al., 2022). DORA's findings further validate that well implemented CI/CD pipelines contribute to organizational agility without sacrificing operational stability (Θεοδωρόπουλος et al., 2023).

The advantages of CI/CD, however, are not without challenges. Cultural resistance to DevOps transformation, complexity in toolchain integration, and security concerns remain persistent hurdles. Organizations often grapple with legacy practices and fragmented systems, leading to inefficiencies and inconsistent outcomes (Donca et al., 2022; Fantom et al., 2023). Security, in particular, is a growing concern. As software is delivered more rapidly, the potential for

unaddressed vulnerabilities increases prompting the need for integrated DevSecOps approaches that embed security into the CI/CD lifecycle (Gallaba, 2019).

Despite these challenges, industries across sectors have adopted CI/CD practices to meet unique regulatory, technical, and market demands. Highly regulated industries such as finance and healthcare emphasize secure and compliant CI/CD pipelines, while tech driven companies like Amazon and Netflix leverage CI/CD for rapid innovation (Erdenebat et al., 2023). Across industries, organizations report benefits such as faster time to market, improved reliability, and lower failure rates (Zampetti et al., 2020).

One of the emerging pillars in this ecosystem is platform engineering. This discipline provides standardized environments that abstract operational complexity, allowing developers to focus on value creation. Platform engineering supports rapid provisioning, testing, and deployment, aligning with CI/CD principles and enabling efficient collaboration between development and operations (Alvin & Aji, 2023). As teams increasingly adopt microservices and cloud native architectures, platform engineering plays a pivotal role in managing complexity, ensuring observability, and maintaining continuous delivery pipelines (Pereira et al., 2025).

In summary, CI/CD has evolved into a cornerstone of modern software delivery, offering mechanisms for speed, stability, and quality. DORA metrics provide a robust framework for measuring and guiding performance, revealing that elite teams can achieve simultaneous improvements across these dimensions. While challenges remain, successful implementations across diverse sectors affirm the transformative potential of CI/CD. As the practice continues to evolve, platform engineering will play a crucial role in sustaining and scaling delivery excellence.

METHOD

This study employed a meta analytical research approach to examine how Continuous Integration and Delivery (CI/CD) practices impact software delivery speed and stability, focusing on performance as measured by DORA's Four Key Metrics. The methodology was guided by the principles of systematic review and empirical data synthesis from diverse sources, including industry reports and peer reviewed publications.

The research framework was designed to evaluate performance outcomes against the DORA defined elite thresholds: frequent deployments, short lead times, low change failure rates (CFR), and rapid mean time to restore (MTTR). These indicators serve as the basis for assessing CI/CD maturity and effectiveness across organizations.

Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta Analyses) guidelines, the study was initiated with the formulation of a focused research question: "Do organizations implementing mature CI/CD practices achieve both higher deployment velocity and operational stability as measured by DORA metrics?"

A comprehensive literature search was conducted using IEEE Xplore, ACM Digital Library, Scopus, and Google Scholar to collect relevant studies. Additionally, official industry reports from DevOps Research and Assessment (DORA), CircleCI, GitLab, and Atlassian were included, selected for their broad adoption and empirical rigor as benchmark data sources.

These criteria were chosen to ensure the inclusion of empirically validated studies with measurable outcomes, while excluding sources that lacked methodological transparency.

Inclusion criteria:

- Empirical research or industry studies addressing CI/CD performance
- Reports or articles measuring DORA metrics explicitly
- High quality peer reviewed or widely cited sources

Exclusion criteria:

- Editorials, opinion pieces, or non data driven discussions
- Studies lacking defined measurement criteria

Key metrics including deployment frequency, lead time for changes, CFR, and MTTR were extracted from each selected source. A standardized data extraction form ensured consistency across studies. For each metric, median values and performance thresholds were coded, and effect sizes were noted where applicable (Sobhani et al., 2022).

Quantitative synthesis involved aggregating data from selected studies and benchmarking them against elite DORA performance bands. Multivariate statistical techniques were employed to examine relationships between metrics and identify patterns. Heterogeneity among datasets was assessed to determine consistency and generalizability (Fernandes et al., 2023).

DORA classifies performance into elite, high, medium, and low tiers based on aggregated survey results and statistical modeling. These bands were validated by triangulating results from multiple datasets, including survey responses and performance case studies (Vieira et al., 2025). Comparisons were made between organizations exhibiting elite traits (e.g., Amazon, Netflix) and those with lower maturity levels.

The methodology included integration of benchmark data from:

- DORA 2024/2025 State of DevOps Report
- CircleCI 2024 Software Delivery Report
- GitLab 2024 Global DevSecOps Survey
- These reports offered real time metrics from thousands of software teams and enabled a cross sectional view of CI/CD performance.

Limitations include variability in reporting standards across sources, and the inherent bias in self reported survey data. To address this, a sensitivity analysis was conducted by excluding outlier datasets and re evaluating results for robustness. Meta analysis tools such as RevMan and CMA

were conceptually referenced for effect size estimation and heterogeneity assessment (Scharfen & Memmert, 2019).

In conclusion, this chapter establishes a rigorous methodology grounded in systematic review and validated benchmarking practices. It provides a replicable approach for assessing CI/CD maturity and performance based on DORA metrics.

RESULT AND DISCUSSION

This chapter presents the empirical findings derived from benchmark data and literature synthesis, focusing on DORA's Four Key Metrics: Deployment Frequency, Lead Time for Changes, Change Failure Rate (CFR), and Mean Time to Recovery (MTTR). It is organized into three sub sections corresponding to the speed and stability dimensions and their correlation.

Deployment Frequency & Lead Time

Table 1. Deployment Frequency and Lead Time Benchmarks

Indicator	**Elite Teams**	**Non Elite Teams**
Deployment Frequency	Many times/day	Weekly to monthly
Lead Time for Changes	< 1 day	1 week to >1 month
Automation Level	High (Full CI/CD)	Low to Moderate

Deployment Frequency in Elite Teams

Top performing software teams, as defined by DORA, demonstrate deployment frequencies ranging from multiple times daily to several times weekly. Tech leaders like Amazon and Netflix deploy hundreds of times daily, enabled by mature CI/CD pipelines (Kumar et al., 2023).

Lead Time Correlation

Shorter lead times are highly correlated with higher deployment frequency. Elite teams maintain lead times under one day, enabled by automated testing, continuous feedback, and efficient CI/CD pipelines (Luo et al., 2022).

Role of Automation

Automation enables frequent integrations, faster testing, and deployment readiness. CI/CD workflows with integrated QA and observability drastically shorten release cycles (Lwakatare et al., 2019).

Table 2. Throughput Variation by Industry

Industry Sector	Typical Throughput	Key Constraints
E commerce/Tech	Many deploys/day	Market pressure, innovation cycles
Finance/Healthcare	Weekly–Monthly	Regulatory compliance
Manufacturing/Legacy	Monthly–Quarterly	Infrastructure complexity

Change Failure Rate & MTTR

Table 3. CFR and MTTR Benchmarks Across Teams

Metric	Elite Teams	High Performance
Change Failure Rate (CFR)	0–5%	6–15%
Mean Time to Recover	< 1 hour	< 1 day
Tool Support	Full rollback & monitoring	Partial integration

Measurement Techniques

CFR and MTTR are tracked using CI/CD logs and incident management tools. These metrics help teams quantify reliability and resilience (Alamin, 2025; Erich et al., 2017).

Platform Influence

CI/CD platforms like GitLab and Azure DevOps lower MTTR via integration with observability tools.

Best Practices

- Automated testing
- Blameless postmortems
- Continuous monitoring

Speed–Stability Correlation

Table 4. Speed and Stability Traits of Elite Teams

Attribute	Elite Performers	Non Elite Performers
Deployment Frequency	Many/day	Weekly–Monthly
Change Failure Rate	0–5%	>15%
Developer Satisfaction	High	Moderate to Low
Real World Example	Amazon, Netflix	Legacy Enterprises

Empirical Validation

Studies confirm a strong speed stability synergy in elite teams. Organizations like Amazon and Netflix demonstrate that frequent releases do not compromise system integrity (Krey, 2022).

Developer Satisfaction

Higher DORA metric scores correlate with better morale, team engagement, and productivity.

Impact of Speed Without Stability

Rapid but unstable deployments degrade quality and increase technical debt, leading to burnout and customer dissatisfaction (Erich et al., 2017).

The findings of this study reaffirm that mature CI/CD practices not only enhance deployment speed but also improve software stability challenging the traditional belief that these qualities are mutually exclusive. However, the pathway to achieving elite performance is nuanced, shaped by systemic limitations, fragmented toolchains, evolving engineering roles, and emerging technologies.

A critical challenge in many organizations lies in the integration of CI/CD practices within existing legacy environments. Traditional industries such as finance, healthcare, and manufacturing often struggle with rigid architectures and outdated technologies, impeding the adoption of continuous delivery methodologies (Mokkapati et al., 2023). These challenges are compounded by organizational inertia and resistance to cultural change, particularly in large enterprises where divisions and departments operate at varying levels of technological maturity.

Knowledge gaps also hinder CI/CD effectiveness. Teams without adequate training or familiarity with CI/CD tooling may fail to fully realize its benefits, such as reduced lead times and improved CFRs (Miriyala et al., 2025). This lack of expertise affects both implementation quality and long term sustainability, highlighting the need for structured enablement and capacity building initiatives.

Toolchain fragmentation further exacerbates CI/CD inefficiencies. For example, organizations often combine different testing, deployment, and monitoring solutions, which results in inconsistencies, communication gaps, and increased manual overhead that slow feedback loops (Dhaliwal, 2022). This fragmentation undermines pipeline automation and introduces variability in performance outcomes, particularly in tracking DORA metrics (Ramadugu, 2024). In contrast, integrated toolchains or unified platforms allow for cohesive observability, streamlined workflows, and more reliable performance measurements.

To address these gaps, GitOps and platform engineering have emerged as strategic enablers. GitOps leverages Git repositories as the single source of truth, facilitating declarative infrastructure and consistent deployment states (Ochuba et al., 2023). This model enhances transparency, version control, and cross functional collaboration. Platform engineering builds on this by abstracting infrastructure complexity, providing standardized environments, and reducing cognitive overhead for developers (Modalavalasa, 2021). Together, these practices not only address fragmentation but also bolster CI/CD maturity and team productivity.

Looking ahead, several trends are expected to shape the next phase of CI/CD evolution. Artificial intelligence (AI) is poised to automate complex pipeline tasks, such as predictive incident detection, test suite generation, and anomaly resolution. For instance, early implementations in large-scale organizations have demonstrated how AI can proactively reduce failure rates and

accelerate recovery times (Diwan, 2025). AI driven insights will enable proactive maintenance and real time adaptation of CI/CD pipelines.

Simultaneously, the adoption of Software Bill of Materials (SBOM) is gaining traction, providing transparency and traceability across software components. SBOMs strengthen software supply chain security, a crucial aspect of modern DevSecOps practices (Chinnam & Karanam, 2023). Observability is also becoming integral to CI/CD success. Enhanced observability, powered by machine learning, allows teams to monitor, diagnose, and remediate issues in real time, fostering reliability and operational excellence (Singh, 2025).

In conclusion, while CI/CD maturity offers measurable advantages across DORA metrics, its widespread adoption requires overcoming entrenched cultural, technical, and educational barriers. Future developments anchored in AI, GitOps, SBOM, and platform engineering will define the next frontier of software delivery performance.

CONCLUSION

This study demonstrates that mature CI/CD adoption significantly enhances both speed and stability in software delivery, as reflected in DORA's Four Key Metrics. By synthesizing empirical research and industry benchmarks, the findings confirm that elite teams achieve rapid deployment, reduced lead times, lower failure rates, and faster recovery times disproving the notion of a trade-off between velocity and reliability. These improvements are enabled by automation, streamlined pipelines, and integrated monitoring that collectively strengthen organizational agility.

At the same time, the results highlight persistent barriers such as legacy systems, cultural resistance, and fragmented toolchains that limit wider adoption. Overcoming these challenges requires strategic investment in skills, organizational alignment, and platform standardization. Emerging enablers GitOps, platform engineering, AI-driven pipeline optimization, SBOM integration, and advanced observability provide practical pathways to elevate CI/CD maturity. For organizations seeking sustained delivery excellence, aligning practices with DORA metrics while embracing these innovations will be essential to remain competitive in an increasingly complex software landscape.

REFERENCE

Alamin, Z. (2025). Evolving DevOps Practices in Modern Software Engineering: Trends, Challenges, and Impacts on Quality and Delivery Performance. Journix: J. Inform. Comput., 1(1), 21–29. https://doi.org/10.63866/journix.v1i1.4

Ali, J. M. (2023). DevOps and Continuous Integration/Continuous Deployment (CI/CD) Automation. Aei, 4(1), 38–42. https://doi.org/10.54254/2977-3903/4/2023031

Alvin, M., & Aji, R. F. (2023). DevOps Implementation With Enterprise on-Premise Infrastructure. Jurnal Media Informatika Budidarma, 7(1), 331. https://doi.org/10.30865/mib.v7i1.5500

Chinnam, S. K., & Karanam, R. (2023). Federated DevOps: A Privacy-Enhanced Model for CI/CD Pipelines in Multi-Tenant Cloud Environments. International Journal of Scientific Research in Computer Science Engineering and Information Technology, 465–474. https://doi.org/10.32628/cseit23112547

Dhaliwal, A. S. (2022). Artificial Intelligence in Managing Artifacts and Binaries in CI/CD. Design of Single Chip Microcomputer Control System for Stepping Motor, 1(1), 1–3. https://doi.org/10.47363/jaicc/2022(1)340

Diwan, P. D. (2025). Mastering Cloud Platform Engineering With Key Modern Concepts. Global Journal of Engineering and Technology Advances, 23(1), 058–068. https://doi.org/10.30574/gjeta.2025.23.1.0105

Donca, I.-C., Stan, O., Misaroş, M., Gota, D.-I., & Miclea, L. (2022). Method for Continuous Integration and Deployment Using a Pipeline Generator for Agile Software Projects. Sensors, 22(12), 4637. https://doi.org/10.3390/s22124637

Erdenebat, B., Bud, B., Batsuren, T., & Kozsik, T. (2023). Multi-Project Multi-Environment Approach—An Enhancement to Existing DevOps and Continuous Integration and Continuous Deployment Tools. Computers, 12(12), 254. https://doi.org/10.3390/computers12120254

Erich, F., Amrit, C., & Daneva, M. (2017). A Qualitative Study of DevOps Usage in Practice. Journal of Software Evolution and Process, 29(6). https://doi.org/10.1002/smr.1885

Fantom, W., Davies, E., Rotsos, C., Veitch, P., Cassidy, S., & Race, N. (2023). NES: Towards Lifecycle Automation for Emulation-Based Experimentation. https://doi.org/10.1109/noms56928.2023.10154268

Fernandes, A., Afonso, J., Noronha, F., Mezêncio, B., Vilas-Boas, J. P., & Fernandes, R. J. (2023). Intracycle Velocity Variation in Swimming: A Systematic Scoping Review. Bioengineering, 10(3), 308. https://doi.org/10.3390/bioengineering10030308

Gallaba, K. (2019). Improving the Robustness and Efficiency of Continuous Integration and Deployment. https://doi.org/10.1109/icsme.2019.00099

Krey, M. (2022). DevOps Adoption: Challenges &Amp; Barriers. https://doi.org/10.24251/hicss.2022.877

Kumar, A., Nadeem, M., & Shameem, M. (2023). Multicriteria Decision-making–based Framework for Implementing DevOps Practices: A Fuzzy Best–worst Approach. Journal of Software Evolution and Process, 36(6). https://doi.org/10.1002/smr.2631

Luo, W., Tian, Z., Zhong, S., Lyu, Q., & Deng, M. (2022). Global Evolution of Research on Sustainable Finance From 2000 to 2021: A Bibliometric Analysis on WoS Database. Sustainability, 14(15), 9435. https://doi.org/10.3390/su14159435

Lwakatare, L. E., Kilamo, T., Karvonen, T., Sauvola, T., Heikkilä, V., Itkonen, J., Kuvaja, P., Mikkonen, T., Oivo, M., & Lassenius, C. (2019). DevOps in Practice: A Multiple Case Study of Five Companies. Information and Software Technology, 114, 217–230. https://doi.org/10.1016/j.infsof.2019.06.010

Miriyala, N. S., Bandaru, B. K., Mittal, P., Macha, K. B., Venkat, R. S., & Rai, A. (2025). Impact of Cloud-Native CI/CD Pipelines on Deployment Efficiency in Enterprise Software. International Journal of Computational and Experimental Science and Engineering, 11(2). https://doi.org/10.22399/ijcesen.2384

Modalavalasa, G. (2021). The Role of DevOps in Streamlining Software Delivery: Key Practices for Seamless CI/CD. International Journal of Advanced Research in Science Communication and Technology, 258–267. https://doi.org/10.48175/ijarsct-8978c

Mokkapati, C., Jain, S. K., & Pandian, P. K. G. (2023). Implementing CI/CD in Retail Enterprises: Leadership Insights for Managing Multi-Billion Dollar Projects. Innovative Research Thoughts, 9(1), 391–405. https://doi.org/10.36676/irt.v9.i1.1458

Ochuba, N. A., Kisina, D., Adanigbo, O. S., Uzoka, A., Akpe, O. E., & Gbenle, T. P. (2023). Systematic Review of Infrastructure as Code (IaC) and GitOps for Cloud Automation and Governance. International Journal of Multidisciplinary Research and Growth Evaluation, 4(2), 664–670. https://doi.org/10.54660/.ijmrge.2023.3.2.664-670

Pereira, I. M., Carneiro, T., & Figueiredo, E. (2025). Manipulating a CI/CD Pipeline in an IoT Embedded Project: A Quasi-Experiment. Journal of Software Evolution and Process, 37(4). https://doi.org/10.1002/smr.70022

Rajasinghe, M. (2021). Adoption Challenges of CI/CD Methodology in Software Development Teams. https://doi.org/10.36227/techrxiv.16681957.v1

Ramadugu, G. (2024). Leveraging AI for Continuous Integration and Delivery Enhancing Developer Productivity in Smart Education and Sustainable Learning. 287–300. https://doi.org/10.4018/979-8-3693-7723-9.ch017

Scharfen, H., & Memmert, D. (2019). Measurement of Cognitive Functions in Experts and Elite Athletes: A Meta-analytic Review. Applied Cognitive Psychology, 33(5), 843–860. https://doi.org/10.1002/acp.3526

Senapathi, M., Buchan, J., & Osman, H. (2018). DevOps Capabilities, Practices, and Challenges. 57–67. https://doi.org/10.1145/3210459.3210465

Singh, C. (2025). The Role of RPA in Transforming DevOps: Driving CI/CD Efficiency and Beyond. Interantional Journal of Scientific Research in Engineering and Management, 09(01), 1–6. https://doi.org/10.55041/ijsrem8160

Sobhani, V., Rostamizadeh, M., Hosseini, S. M., Hashemi, S. E., Refoyo, I., & Mon-López, D. (2022). Anthropometric, Physiological, and Psychological Variables That Determine the Elite Pistol Performance of Women. International Journal of Environmental Research and Public Health, 19(3), 1102. https://doi.org/10.3390/ijerph19031102

Thatikonda, V. (2023). Beyond the Buzz: A Journey Through CI/CD Principles and Best Practices. European Journal of Theoretical and Applied Sciences, 1(5), 334–340. https://doi.org/10.59324/ejtas.2023.1(5).24

Vieira, M., Vieira, M. A., Galvão, G., Louro, P., Fantoni, A., Vieira, P., & Véstias, M. (2025). Enhancing Airport Traffic Flow: Intelligent System Based on VLC, Rerouting Techniques, and Adaptive Reward Learning. Sensors, 25(9), 2842. https://doi.org/10.3390/s25092842

Zampetti, F., Vassallo, C., Panichella, S., Canfora, G., Gall, H., & Penta, M. D. (2020). An Empirical Characterization of Bad Practices in Continuous Integration. Empirical Software Engineering, 25(2), 1095–1135. https://doi.org/10.1007/s10664-019-09785-8

Θεοδωρόπουλος, Θ., Rosa, L., Benzaid, C., Gray, P., Marin, E., Makris, A., Cordeiro, L., Diego, F., Сорокин, П., Girolamo, M. D., Barone, P., Taleb, T., & Tserpes, K. (2023). Security in Cloud-Native Services: A Survey. Journal of Cybersecurity and Privacy, 3(4), 758–793. https://doi.org/10.3390/jcp3040034