CIMPHONI WHITE PAPER SERIES

# IT Infrastructure and Operations Still Matter

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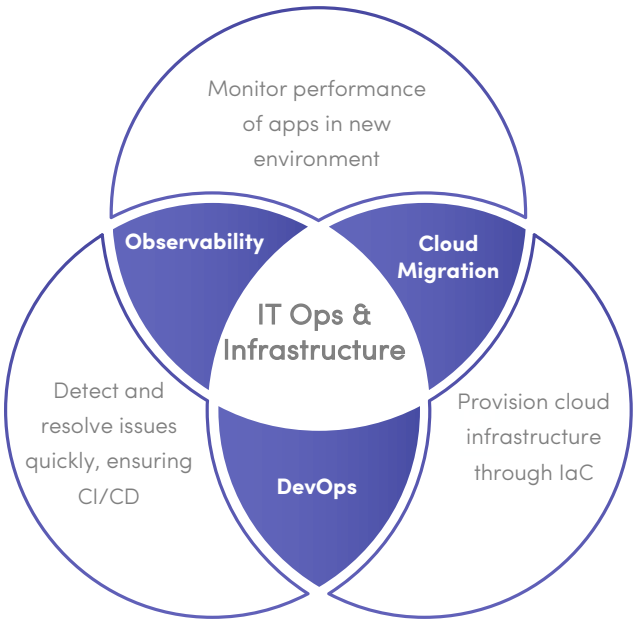
Nearly all emerging technologies – from Blockchain and Non-Fungible Tokens (NFTs) a few years ago and Industry Cloud platforms in the last couple of years to Generative AI most recently – have followed a normal lifecycle. This lifecycle usually starts with a unique technology innovation coming to market, then moves to inflated expectations as the promised value of the technology exceeds reality, followed by disappointment as expectations are dashed. It then moves into a period of awakening as a true understanding of the value becomes apparent. Finally, assuming a successful implementation, it delivers some measure of business value.

Generative AI is the latest iteration of technology following this familiar pattern. While there is good reason to believe in some of the hype surrounding Generative AI and how to capitalize on it to improve business performance, attention still needs to be given to managing and upgrading the underlying technical foundation that exists in most businesses today. Often unnoticed and under-valued, a solid technical foundation is a prerequisite to successfully deploying and realizing value from Generative AI and other emerging technologies. It is our contention then that **IT infrastructure and operations still matter**.

Therefore, establishing a solid technical foundation that supports both proven and emerging technologies should focus on the following requirements with ongoing investments to shore up any deficits:

- Responsiveness (meet performance objectives)
- Availability (accessible when needed)
- Scalability (grow with the needs of the business)
- Extensibility (incorporate new technical capabilities)
- Compliance (conform to government regulations and industry standards)
- Security (prevent unauthorized access to and strict control over data)
- Cost efficiency (minimize fixed costs, maximize variable costs)

While these requirements are not new to most seasoned IT professionals, the manner in which they are fulfilled is evolving. Specifically, there are three technical capabilities that IT infrastructure and operations teams should have in-place today that will support many of the requirements shown above. These capabilities are – **observability**, **DevOps** and **cloud migration/transformation**. Their relationship is shown in the graphic below. An overview of each of these is provided in the following pages.



## OBSERVABILITY OVERVIEW

Observability is a measure of how well the internal states of a system, in this case an information system, can be inferred from knowledge of its outputs. It is essential for understanding, diagnosing, and improving systems, particularly in complex environments like microservices architectures and distributed systems. The core elements of observability are shown in Figure 1 below.

### FIGURE 1 - CORE ELEMENTS OF OBSERVABILITY

1. **METRICS: Metrics are numerical values that describe the performance and behavior of a system over time. They provide a quantitative measure of various aspects of the system, such as CPU usage, memory consumption, request counts, error rates, and latency. Metrics are crucial for tracking the health and performance of applications and infrastructure.**
2. **LOGS: Logs are detailed, time-stamped records of events that occur within a system. They capture the actions and changes happening in the system, including error messages, user actions, and system behavior. Logs are invaluable for troubleshooting and understanding the sequence of events leading up to an issue.**
3. **TRACES: Traces capture the end-to-end flow of requests through a system, providing visibility into how requests traverse various services and components. They help identify performance bottlenecks, latency issues, and the root cause of errors by showing the path and duration of each request.**
4. **EVENTS: Events are significant occurrences or changes in state within a system. They can include alerts, configuration changes, and state transitions. Events provide context and insights into the reasons behind changes in metrics, logs, and traces.**
5. **DASHBOARDS: Dashboards are visual representations of metrics, logs, and traces. They provide a consolidated view of the system's health and performance, enabling teams to quickly identify and diagnose issues. Dashboards can be customized to display key performance indicators (KPIs) and other relevant data.**
6. **ALERTS: Alerts notify teams of potential issues or anomalies detected in the system based on predefined thresholds or patterns. Effective alerting helps in proactive incident management, allowing teams to address problems before they impact users.**
7. **CORRELATION AND CONTEXT: Observability involves correlating data from metrics, logs, and traces to provide a comprehensive understanding of the system's behavior. Contextual information, such as deployment changes, user actions, and environmental factors, is essential for accurately diagnosing issues and understanding their impact.**

By integrating these elements, observability provides a holistic view of the system's status, enabling teams to understand its internal state, detect and diagnose issues, and improve overall performance and reliability.

## DEVOPS OVERVIEW

DevOps is a set of practices that combines software development (Dev) and IT operations (Ops). It aims to signficantly shorten the development lifecycle and provide continuous delivery of code with high quality (low defect rates). The core elements of DevOps are shown in Figure 2 below.

### FIGURE 2 - CORE ELEMENTS OF DEVOPS

1. **COLLABORATION AND COMMUNICATION: DevOps emphasizes collaboration and communication between development and operations teams. This helps in breaking down silos and fostering a culture of shared responsibility and transparency.**
2. **CONTINUOUS INTEGRATION (CI): Continuous Integration involves merging all developers' working copies to a shared mainline several times a day. This practice helps in identifying integration bugs sooner, improving software quality, and reducing the time it takes to validate and release updates.**
3. **CONTINOUS DELIVERY (CD): Continuous Delivery is the practice of keeping the codebase in a deployable state. This means that code changes are automatically prepared for a release to production. With CD, developers can release code changes frequently and reliably.**
4. **INFRASTRUCTURE AS CODE (IaC): Infrastructure as Code involves managing and provisioning computing infrastructure through machine-readable scripts, rather than through physical hardware configuration or interactive configuration tools. This enables version control and automated testing.**
5. **AUTOMATED TESTING: Automated Testing ensures that code changes do not break existing functionality. Automated tests, particularly regression tests, are run frequently to provide feedback to developers and maintain a high level of code quality throughout the development process.**
6. **MONITORING AND LOGGING: Monitoring and Logging are crucial for gaining insights into the performance and behavior of applications in production. This helps in identifying issues proactively and improving the overall system reliability and performance.**
7. **SECURITY: Security practices, often referred to as DevSecOps, integrate security at every phase of the software development lifecycle. This includes automating security checks, conducting regular security assessments, and ensuring compliance with security standards.**
8. **VERSION CONTROL: Version Control is essential for managing changes to source code over time. Tools like Git allow teams to track revisions, collaborate on code, and maintain historical versions of their projects.**

These elements collectively help organizations to deliver software more efficiently, with higher quality and stability. By adopting DevOps practices, teams can respond faster to changes, reduce errors, and improve overall productivity and customer satisfaction.

## CLOUD MIGRATION AND TRANSFORMATION OVERVIEW

Cloud migration and transformation involves moving applications, data, and other computing elements from on-premises infrastructure to a cloud environment. This complex process requires careful planning and execution. Key considersations involved in cloud migration and transformation are shown in Figure 3 below.

### FIGURE 3 - KEY CONSIDERATIONS FOR CLOUD MIGRATION AND TRANSFORMATION

1. **ASSESSMENT AND PLANNING:**
   - Assessment - Evaluate the current IT landscape, including applications, data, and infrastructure. Identify dependencies, performance requirements, and potential migration challenges.
   - Planning - Develop a comprehensive migration strategy that includes timelines, resources, budget, and a roadmap for the migration process. Define the goals and objectives of the migration.

2. **COST-BENEFIT ANALYSIS:**
   - Analyze the costs associated with cloud migration versus the potential benefits, such as reduced IT expenses, scalability, and improved performance. Consider factors like licensing, training, and potential downtime during the migration process.

3. **CLOUD PROVIDER SELECTION:**
   - Choose the appropriate cloud service provider (CSP) based on factors such as pricing, service offerings, compliance requirements, performance, and support. Major CSPs include Google Cloud Platform (GCP), Amazon Web Services (AWS), Microsoft Azure, and IBM Cloud.

4. **SECURITY AND COMPLIANCE:**
   - Ensure that the migration plan addresses security and compliance requirements. This includes data encryption, identity and access management, and compliance with relevant regulations such as GDPR, HIPAA, and PCI-DSS.

5. **MIGRATION APPROACH AND OPTIONS:**
   - Rehosting ("Lift and Shift"): Moving applications and data to the cloud with minimal changes. This is often the quickest migration strategy.
   - Refactoring: Modifying applications to better suit the cloud environment. This can involve re-architecting or rewriting parts of the application.
   - Re-platforming: Making some optimizations to applications without changing the core architecture. This might involve changing the database or operating system.
   - Repurchasing: Moving to a different product, typically a SaaS platform, to replace the existing on-premises application.
   - Retiring: Decommissioning applications that are no longer needed.
   - Retaining: Keeping certain applications on-premises due to latency, regulatory, or other reasons.

**FIGURE 4 - KEY CONSIDERATIONS FOR CLOUD MIGRATION AND TRANSFORMATION**

6 **DATA MIGRATION:**
- Plan and execute the migration of data to the cloud. This involves data transfer methods, ensuring data integrity, and maintaining data security during the transfer process. Data migration tools and services from cloud providers can assist with this step.

7 **APPLICATION MIGRATION:**
- Move applications to the cloud, ensuring that they are configured correctly and optimized for the new environment. This step often requires testing and validation to ensure that applications perform as expected in the cloud.

8 **TESTING:**
- Thoroughly test all migrated applications and data to ensure they work correctly in the cloud environment. This includes performance testing, security testing, and functionality testing.

9 **PERFORMANCE OPTIMIZATION:**
- Optimize applications and infrastructure for the cloud environment. This might involve scaling resources, configuring auto-scaling, and optimizing costs by selecting appropriate cloud services and pricing models.

10 **TRAINING AND CHANGE MANAGEMENT:**
- Train IT staff and end-users on the new cloud environment. Implement change management practices to ensure a smooth transition and adoption of cloud services.

11 **MONITORING AND MAINTENANCE:**
- Set up monitoring and management tools to oversee the performance, security, and compliance of the cloud environment. Regular maintenance and updates are essential to keep the cloud infrastructure secure and efficient.

12 **DISASTER RECOVERY AND BACKUP:**
- Implement a robust disaster recovery and backup strategy to ensure data and application availability in case of failures or disasters.

13 **DOCUMENTATION AND SUPPORT:**
- Maintain thorough documentation of the migration process, configurations, and operational procedures. Ensure support structures are in place to address any issues that arise post-migration.

These considerations provide a framework for managing the complexity and risk associated with the migraiton of computing assets to the cloud and successfully delivering related business outcomes, many of which are captured in the requirements at the beginning of this white paper.

## WHY CIMPHONI?

Our IT consultants bring a unique combination of leadership and operating experience, both in business and IT, a track record of improving business performance through the use of information technology and a keen and practical understanding of various IT solutions and their applicability. Additionally, these consultants possess the leadership and people skills that motivate teams to successfully deliver projects. We differentiate ourselves from other consulting firms by excelling in the following areas:

### 1. We Listen

Before we can offer guidance, we seek to understand your business, the challenges you face and the goals you want to achieve. Working with your team, we develop a plan to achieve these goals that fit within the budget and time constraints established by the project's sponsor. Finally, we feel ownership for the project's outcome as much as you do.

### 2. Technical Competence


We have domain expertise in several of the leading tech platforms used for observability (Grafana, ELK stack, Dynatrace), DevOps (Azure, Dockers, Kubernetes) and cloud migration (AWS Migration, Google Cloud Migrate, Azure Migrate). We can also work with and improve your existing tech stack.

### 3. Time-to-Value

We partner with your IT team to identify and implement short-cycle improvements that deliver measurable business value. To do this we focus on the project's critical success factors while also providing constant and transparent communication to identify and resolve issues that could delay the project.

### 4. Project Cost

We leverage near shore (Argentina) and offshore (India) resources to keep project costs in line with your budget. Client engagements are led by 1-2 onshore senior consultants who have the requisite functional, technical, financial and people skills to successfully deliver the project.

### 5. Program Leadership

Our team consists of hands-on IT leaders that have led similar projects. We have the ability to work at multiple levels within your organization, from executives to engineers. We realize the hardest part of a project is often the "last mile" and we stay with your team through to a successful outcome.

With a team of former CIOs, CTOs and CDOs, we understand what it takes to successfully deliver projects over the line - seeing the big picture, but managing a thousand details.

## About Cimphoni

Cimphoni is built on the premise that technology, when properly applied and led, can deliver innovative solutions that transform businesses, enrich the products we use daily and improve the quality of our lives. The Cimphoni team is comprised of highly experienced technology and business leaders with a thirst for innovation and a passion for solving problems.

Founded in 2012, we serve customers throughout the United States from our offices in suburban Madison, WI and Las Vegas, NV.

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## Contact Us

**If you are ready to take the next step in upgrading your IT infrastructure and operations to create a solid technical foundation that supports emerging technologies, we would be happy to help. Contact us today for more information.**

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