Putting the 'O' in DevOps

Autonomous Operations for hybrid IT with Micro Focus® Operations Bridge.

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Operations Bridge must become the "O" in DevOps, anchoring Autonomous Operations and enabling I&O to participate on an equal footing in DevOps processes.

Executive Summary

Digital transformation is changing the face of IT. IT now needs to help the business move at the speed of the digitally driven market by supporting continuous innovation while simultaneously running its own core business; maintaining stability, performance, compliance, and security; and controlling costs. The technology backdrop is in almost constant flux: Cloud is mainstream, Internet-of-Things (IoT) devices are proliferating, containers are making fast inroads, and the mobility trend continues unabated.

At the same time, tasks that have traditionally been under the complete control of IT operations are now being performed by others. For example, monitoring is now often done by application developers as part of DevOps and infrastructure now is often in the cloud and autonomously provisioned by software. These rapid, concurrent changes present a unique set of challenges to infrastructure and operations (I&O) teams. This paper discusses these challenges, their impact, and how I&O can modernize the Operations Bridge to thrive and evolve into a stronger business partner.

A Brave New World

We are now in the midst of yet another technology-led disruption. With cloud now firmly in the mainstream, infrastructure is increasingly ubiquitous and "power" has shifted from IT-centric I&O teams to business-centric application teams. IT is effectively splintering into a bi-modal organization. On one side is the traditional mode focused on stability and continuous incremental improvements to business-as-usual processes. On the other side is DevOps, focused on agility, innovation, experimentation, and market disruption.

A collaborative and transparent relationship between these two modes is now the key to sustaining an adaptable enterprise, capable of thriving in this dynamically changing business environment. As companies are modernizing their systems of engagement with DevOps, they still need to deal with security, compliance, service levels, and user experience. To bring these two worlds together, an organization needs close collaboration between I&O, application teams, and the lines of business.

The Operations Bridge, a long-standing paragon of I&O, still plays a key role here. But to continue to deliver value, I&O must transform the Operations Bridge, making it capable of supporting both modes with continuous and Autonomous Operations. If I&O can't make this happen, application teams are ready to solve their own challenges, leading to two or more disparate IT management stacks with incompatible processes and a slew of custom integrations.

From this perspective, the Operations Bridge must become the "O" in DevOps, anchoring Autonomous Operations and enabling I&O to participate on an equal footing in DevOps processes.

Challenges and Impacts

Different but Same

The core mission of an Operations Bridge has not changed: It is still about empowering I&O to ensure services deliver the quality of experience consumers demand while minimizing the consequences of poor service performance and availability. Having said that, the way the Operations Bridge is implemented and how it functions needs to change. Firstly, while it is likely a traditional Operations Bridge solution will need to enhance or modernize its tooling, the better part of the effort lies in changing how the tooling is used. Secondly, there is now an opportunity for I&O to extend its value into the realm of business operations by collecting, monitoring, and reporting on business-related data (e.g., transactions, products, interactions).

The Need for Speed

We live in an interconnected, mobile, and social world of instant access. Customers and consumers are demanding better, faster, and more personal services, and the keys to success in this fast-paced digital business environment are agility and velocity. Against this backdrop, most implementations of an IT operations framework focus on controlling and governing the IT environment via process engineering, rather than driving business outcomes.

At the same time, most IT organizations have not invested sufficiently in automation, resulting in an operations framework that is process-heavy, brittle, and slow. One of the prime examples is monitoring deployment. Historically, the process most likely involved analysis of the application and infrastructure architecture and then manual configuration of monitoring tools accordingly, definition of policies, alerts, creation of reports, etc. This process is not only too slow for DevOps but is also only really suitable for deployments of entire systems, not incremental code changes and new microservices that are pivotal in DevOps, which requires a more agile approach. In its absence, application developers are resorting to deploying their own monitoring. While this may temporarily plug a gap, in the long run it can easily lead to chaotic operations as each team would deploy monitoring its own way with its own tools, causing duplications, redundancies, unnecessary costs, and ultimately lower quality of service.

We Are in Control

The traditional approach to monitoring used by most I&O organizations is predicated on certain assumptions:

- IT owns the environment and is therefore in full control over monitoring deployment and configuration
- IT controls provisioning and release and can therefore enable monitoring and deployment to happen concurrently
- Once provisioned, services are rarely de-provisioned or reconfigured, and monitoring continues in perpetuity

These assumptions no longer hold true. With the prevalent use of public cloud services, I&O does not own or control the entire environment. I&O also does not control provisioning—it is either application developers using self-service provisioning, or containers using infrastructure-as-code capabilities to

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automatically and dynamically provision infrastructure resources. What's more, cloud services and microservices can run anywhere and may live only for short periods of time, and monitoring needs to commence or end in concert.

People are going outside of I&O for their public cloud services

The Data Avalanche

In an environment where users on mobile devices are everywhere, applications in the cloud are everywhere, and microservices will come and go as needed, you now need to monitor everything, or at least monitor as much as you can.

Unlike a traditional IT environment, being able to figure out the root cause of a production issue is much harder in an environment with composite applications and dynamic infrastructure. The exact path a transaction takes, the location of users, and the application topology at a given point in time are no longer static. When you need to respond quickly to an unforeseen event, you need the data at your fingertips, which means you need to have either already collected it or be able to—in real time—interrogate the system (e.g., by increasing log levels or using dedicated APIs).

From Operational to Business Data

But monitoring isn't just about isolating and fixing outages anymore. As DevOps continues to gain prevalence, the traditional infrastructure management role of I&O will diminish, in essence heralding a shift from "plan, build, deliver" to "plan, broker, manage."

In such a model, data about infrastructure performance and availability becomes less useful, giving way to data about usage, cost, business value, transaction processing, and service levels. This means you would need to adapt data capture, processing, and presentation as well as the actual data you collect. You must

be ready to not only collect different data points, but to present data in totally different ways. For example, you might now need to collect transaction data to present a dollar value of business flowing through the system. This changes I&O from monitoring the health of the infrastructure to monitoring the health of the business and the value of the application.

Addressing the Challenge: Autonomous Operations

When you consider how increasingly autonomous developers are building increasingly autonomous applications running on top of increasingly autonomous infrastructure, it becomes clear that the path forward for I&O is Autonomous Operations. I&O requires an Operations Bridge that can sense the hybrid environment, analyze vast amounts of telemetry, and adapt to the situation as it arises. The degree to which these aspects can be automated will determine success.
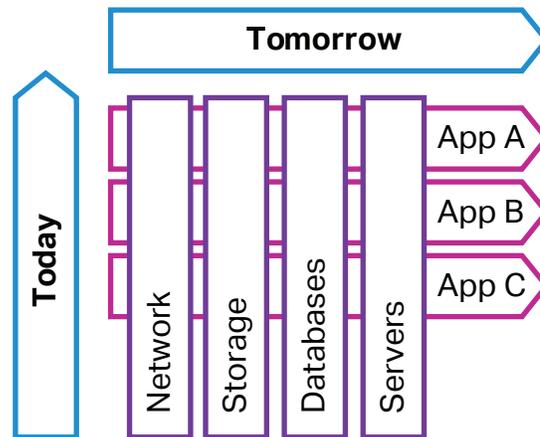
Autonomous Operations

I&O also needs a process framework that is flexible and adaptable. There are several intertwined capabilities needed to deliver on this vision. These capabilities rely on each other to bring about digital transformation of the operation bridge. This inter-relatedness makes it impractical for an I&O organization to adopt all capabilities, in full, at once across the entire landscape—because each I&O team would have a different adoption roadmap, different pain points, and different drivers. What's needed is an agile, iterative, incremental approach to implementation.

From Silos to Teams
As enterprises move through the digital transformation, they will need to evolve not only tooling and process but also organizational structure. DevOps was originally meant to encompass both developers and I&O professionals. However, developers jumped on the bandwagon early, while I&O regarded the whole endeavor with suspicion. This disconnect further entrenched the divide between these two teams. This divide is exacerbated by the differences in how each team is measured: While developers are measured by speed, I&O is traditionally measured by cost and stability.

To thrive in the digital age, organizations need to bridge these gaps by reorienting the organization from functional silos and technology domains into unified product/service/application teams that share key information previously confined to a single silo. In this new era, teams are aligned to the solutions they provide (e.g., Internet banking, customer service), leverage resources from across the organization (e.g., I&O, development, security, QA, UX), and share a common set of goals, centered on the outcomes, value, and the customer experience.

Figure 1. Moving from silos into application-oriented teams to better manage application delivery

Autonomous Operations: The Role of Automation

Success in the digital age depends on agility. Manual process execution—as is the case in most I&O processes, including monitoring—not only introduces delays and is antithetic to DevOps; it actually makes matters worse. DevOps relies on frequent, continuous execution: continuous integration and testing, continuous release and deployment, and continuous operations. When application releases occur every few months, the relevant processes execute a few times a year and—while slow—have limited detrimental effect. Using the same process in a DevOps context, with its frequent, continuous execution, this slowness is amplified and makes process execution simply impractical.

I&O must rethink how infrastructure is delivered and move toward fit-to-run infrastructure-as-code, and for an Operations Bridge to function effectively within this context of DevOps, it must be capable of Autonomous Operations. It is unrealistic to expect I&O to be able to afford the staff or the acquisition of skills to adopt Autonomous Operations with traditional tools and processes. Tooling must be extended with extreme automation capabilities, such as automated discovery and intelligence to profile and adapt monitoring continuously, automated analytics, machine learning, and touch-free monitoring deployment.

Success in automation is obviously tied to technology, but tools alone are no guarantee. Success in automation is also reliant on:

- **Organization.** An Autonomous Operations Bridge is more than just collecting IT operational data to support just I&O activities. You must have a good understanding of what data you need and for what purpose.

- **Standardization.** Based on the understanding developed regarding data consumption and provisioning, you can define a standard toolset and monitoring templates that you can use to drive automation.

- **Process design.** Automation must be built in. You should not expect to be able to just layer automation—plug-and-play style—over existing processes. Such processes need to be designed with automation in mind, and monitoring is no different.

Monitoring by Design: Enabling Developer Agility

The assumptions underpinning the existing approaches to monitoring are now being invalidated by DevOps. The velocity of traditional monitoring deployment cannot keep pace with the application release cadence. Consequently, application developers are taking matters into their own hands. This approach may work initially, but it is hard to scale as organizations mature and extend DevOps into more and more areas.

The way to deal with this new reality is to "shift left" and adopt a "monitoring by design" approach. In the past, monitoring was usually an after-the-fact activity driven by I&O and disconnected from application development. It usually took place toward the end of the release cycle. This approach will not work within a DevOps context.

"Shifting left" means starting to think about how and what to monitor early on. It means incorporating monitoring into application requirements and design, so that when you deploy, everything is already instrumented and in place to collect the data you need. Having unified solution teams is incredibly helpful as both I&O and developers can now more easily collaborate and cross-pollinate.

"Shifting left" is also about enabling developer agility and autonomy. Borrowing from approaches like "infrastructure as code," I&O should strive to provide "monitoring as code"—the ability for developers to programmatically build and deploy monitoring. By exposing APIs to your monitoring platform you can create a catalog from which developers can consume "monitoring as code." Developers simply "call" these APIs to manipulate the deployment and configuration of monitors at both deploy and run time. This delegation improves developer agility and autonomy as they don't need to rely on I&O to deploy monitors for them. It also helps I&O standardize (and hence automate) monitoring.

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Autonomous Operations and Collaboration

Monitoring as code makes the life of developers easier but it does not improve the application. Autonomous Operations facilitates the sharing of information from monitoring with the development and testing functions, helping to make the application better, for both current and future versions. This manifests itself in two scenarios:

- Application developers may not necessarily know how their application, and specifically their code, behaves in production. Problems, such as poor performance, can just as easily be related to deployment characteristics, poor integrations, resource allocations, and many other factors that are not code related. Gaining access to real-time dashboards can help teams see what's happening as it happens and provide vital insight.

- In production, issues often require the involvement and expertise of developers. Integrating bots with monitoring (and other) tools and adopting ChatOps can greatly facilitate rapid access to operational information, empower collaboration between team members, and accelerate incident resolution. Developers and operators can triage and resolve issues in live war rooms with automated command execution and traceability, which captures details that can be reused as best practices in the future.

Beyond issue resolution or code improvements, Autonomous Operations can lead to the production of more complete and accurate instrumentation, as developers are more involved in issues concerning their applications and how they are deployed, and operations gains better insight into what the instrumentation is capable of producing.

The Right Data for the Right Consumers

What data do you need, who will use it, and how? You will still need to collect the same monitoring data and log it or feed events into a console. You should also think about data that you had previously been able to collect even after the fact (such as topology) but now cannot (because you are not aware of services running or because some services will only run intermittently). You now also need to go beyond IT operational data and start collecting data related to transaction tracing, business process activity, capacity, usage, and service level agreements (SLAs). This data is particularly important for a number of reasons:

1. It gives you detailed insight into the execution flow of a digitized business process, which will come in handy during troubleshooting activities.

2. It provides an excellent opportunity to extend the value of the agile Operations Bridge beyond traditional break/fix activities and into the business operations realm.

3. It reduces the cost and complexity of collecting business activity data since the marginal cost of adding this capability to monitoring is lower than setting it up as a separate activity.

Once you have an understanding of what data you need, you can determine the best way to collect it. In almost all cases you will need to activate, or at least enable, data collection as soon as code is instantiated. This is where the "shift-left" is instrumental. Then you would need to define how you will provide the data and to whom.

Some data will be consumed by your customers as reports, some data will be fed into an analytics tool, and some into a business value dashboard.

Putting It Together: Real-Life Customer Stories

One of our customers, a financial markets clearinghouse, adopted a hybrid cloud strategy to deal with the variable workload requirements stemming from volatile transaction volumes. Their existing toolset was fractured: one toolset for cloud and one for everything else. They needed a single pane of glass with real-time insight into what is impacting the business, regardless of where resources are deployed, and the capability to integrate new technologies and deployment choices. Operations Bridge software provided them with a single extensible toolset they could use to monitor their expanding hybrid infrastructure, enabling them to effectively and efficiently govern service quality.

Another customer, a bank, was also going hybrid, deploying applications on premise as well as onto containers, running in an Amazon public cloud. They needed visibility into the health of key cloud-based services, and they turned to Operations Bridge software to expand their existing infrastructure management capabilities. They used the automated discovery and monitoring of both containers and the cloud infrastructure running them to not only conduct impact analysis and triage but also to forecast their public cloud usage and optimize their costs.

Algorithmic IT Operations Analytics

A current, state-of-the-art Operations Bridge collects thousands of data points each day. Using structures like service models to make sense of the volumes of data (e.g., for prioritizing and correlating events) is still very useful, but this approach relies on the environment being relatively static and the relationships between running software and the infrastructure that supports it being mostly predefined and well understood. But with microservices, loosely coupled composite applications, software-defined infrastructure, and containers, the environment is much more fluid, creating the need for algorithmic IT operations analytics, leveraging big data technologies.

More specifically, you need a platform that can:

- Collect, aggregate and store vast volumes of structured and unstructured data
- Use machine-learning, advanced analytics to identify patterns, relationships, and correlations that help you pinpoint issues
- Provide predictive analytics for baselining and anomaly detection to uncover trends before they become catastrophes
- Visualize information in useful ways to make it easy for operators to interact with the data

### Operations Through a Business Lens: Business Value Dashboard (BVD)

Business decision making has tended to follow periodical cycles (e.g., quarterly planning) and rely on point-in-time analysis using capabilities like business intelligence (BI). In this context, the value of the Operations Bridge remained squarely an I&O capability core mission—reduce the impact of outages and other issues.

Operations Bridge provided a financial markets clearinghouse with a single extensible toolset to monitor their hybrid infrastructure.

Today, DevOps allows business decision making to become near real time through continuous analysis of the digitized business process execution to understand the current "business health." Collecting the necessary data, at the speed at which it is needed, requires exactly the same techniques and tools already employed by an agile Operations Bridge to collect operational data. This puts the Operations Bridge in a great position to provide additional value above its core mission. You can now define and measure a manageable number of KPIs for which you will extract business data from the operational data that surrounds it, and package and deliver that data effectively to business decision makers.
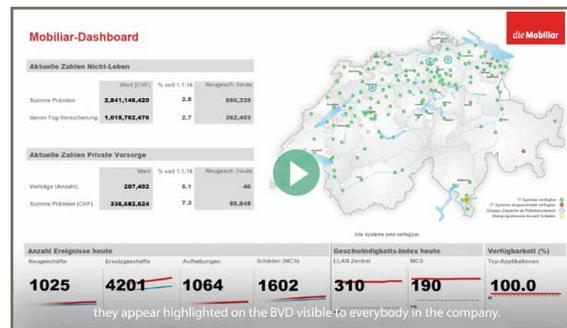
Business Value Dashboard for Die Mobiliar.
Die Mobiliar uses the Business Value Dashboard to show—in real time—values, aggregates, and trends for both key business (e.g., contract volume, contract value, claims volume) and IT (e.g., system availability, performance index, SLA) KPIs in a single pane of glass, resulting in increased transparency to the business and increased visibility of IT. Today the company's CEO uses this dashboard every day. He has now missioned I&O to also work directly with the business and extend this innovation to provide the board with actionable insight and enable it to make better decisions faster.

How We Can Help?

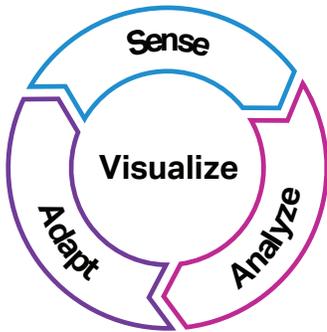### Autonomous Operations: Sense, Analyze, and Adapt
Our Operations Bridge software provides the big data, patented, analytics-driven capabilities you need to sense, analyze, and adapt Autonomous Operations across hybrid IT landscapes from traditional to hybrid cloud. It provides both high-level real-time visualization of business and IT parameters, as well as the needed views on operations to operators and subject matter experts, using powerful graphics and intelligent reporting. These capabilities transform IT into a value creator and strategic partner to the business.

Sense What's Happening
Automated discovery and monitoring reflect, almost immediately, deployment of new application and infrastructure instances, and it automatically activates the required monitoring, making your toolset smarter and faster and enabling your operators to focus on business priorities and innovation.

Analyze All Your Data

Our Operations Bridge software provides extensive predictive analytics capabilities for correlation of event streams over time and across dependencies. High-speed, high-volume data analysis; automated log, metric, and event analysis; plus anomaly detection work together to proactively alert operators to abnormal activity and uncover relevant insights from hundreds of millions of records to help your team better prioritize.

Simplified and accelerated automation and orchestration of complex and conditional remedial actions, notifications, and recovery procedures help you enable strong compliance, remove manual errors, and accelerate key operations processes.

Adapt to the Situation

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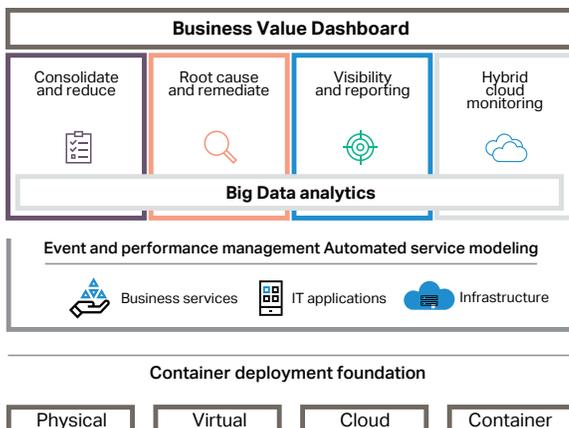
Sense, Analyze, and Adapt in Action: Four Key Use Cases

Figure 2. Business Value Dashboard

1. Consolidate and Reduce

Event and performance management is consolidated to a single pane of glass. Operations Bridge integrates with more than 110 existing tools and technologies, with no rip and replace.

2. Root cause and Remediate

Analytics-driven operational intelligence helps you predict issues before they happen, perform root-cause analysis, and remediate faster than ever before.

3. Visibility and Dashboards

Using a dynamically updated service model, Operations Bridge visualizes root cause to the operators and delivers powerful insights for performance driven business decisions by linking IT performance and business outcomes in real time.

4. Hybrid cloud Monitoring

Automated hybrid IT monitoring discovers and activates monitoring of cloud resources, with "what-if" modeling to increase resource usage.

Agile Operations Bridge Service

When you're ready to get started, our software services can help you implement the tooling and governance framework that enables you to consistently and successfully onboard applications onto Operations Bridge. We help you understand what information you need to collect, how to collect it, and how to best represent and deliver it to the stakeholders, whether these are people, processes, or tools.

We address all the elements covered in this paper: people and the organization, services and applications, data sources, the roles who consume it, auto deployment of monitoring, a monitoring catalog, and dashboards. We help you model and organize, standardize, and automate using Agile methods executed in sprints, delivering a minimum viable product, to help you keep improving IT in increments.

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