# The Case for Converged Application & Infrastructure Performance Monitoring

Why Today's Digital Business Services Ecosystem Needs a Converged Monitoring Strategy

White Paper by **Larry Dragich**

eG

Total Performance Visibility

Evolution of APM

Application performance monitoring (APM) is one of the most popular and in-demand technologies in enterprise IT. APM has evolved from being a standalone technology used just by application teams to being an integral technology for many different stakeholders in organizations. IT Operations, Development, and DevOps teams are finding new uses for APM and how it can benefit them. Ironically, APM is also finding its way into the C-suite, providing business-level reporting and trending metrics.
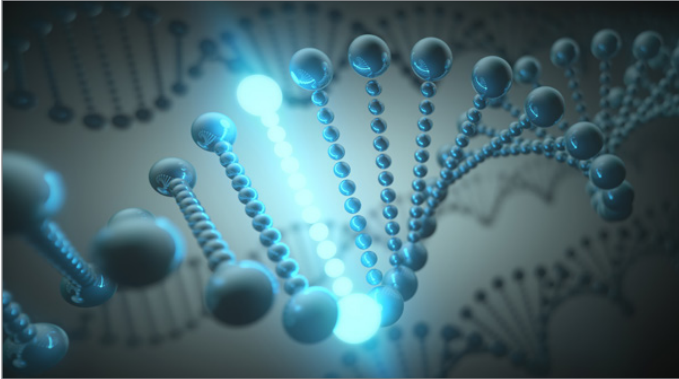
If you were looking for an APM solution 10+ years ago, the challenge was a formidable one. Real user monitoring (RUM) was very high level, instrumenting the application meant to ARM it, and transaction tagging and tracing was a pipe dream. Using agents for monitoring brought concerns of overhead and complexity. There were fierce debates on the risks and rewards of agent vs. agentless monitoring. Most IT shops would implement network monitoring (i.e. wire data analytics) to gain insight into the application behavior and build a baseline that captured a normal workload. The need quickly evolved for synthetic transactions to provide application health checks and visibility during off-peak hours when transaction volumes were low.

Today's APM has come a long way since then and has advanced to a level where deployment is easy. In fact, APM has become table stakes for any successful digital transformation initiative. The success of application performance not only relies on the application being available, but also highly responsive. Measuring user experience during application access on digital touchpoints has become a necessity for application managers, given today's digital economy where speed and responsiveness rule the roost. While APM tools have started focusing on digital experience monitoring, one of the paramount use cases in today's digital world is application code-level

visibility through distributed transaction profiling across cloud-native environments with containerized and dynamic application architectures.

The Need for Digital Intelligence

Today, IT leaders need to understand and make decisions on what is happening within the ecosystem they support. Digital intelligence is the ability to perceive information, (i.e. from monitoring tools) and retain it as knowledge (aka. Big Data) to be applied towards adaptive behaviors (i.e. machine learning and/or AI) within the environment (e.g. prod, dev, etc.).

Communicating in terms of the end-user experience provides a focal point that allows IT to make a connection to the business and speak to them in a language they can appreciate. It doesn't matter if every system dashboard is green: if the end user has a perception that the application is slow, then it is slow. The end user only sees the application as a sequence of transactions he/she performs. When the transactions work as expected and are fast and responsive, the user experience is considered satisfactory. According to IDG's 2018 State of Digital Business Transformation study, 62% of organizations said delivering an excellent customer experience as measured by customer satisfaction scores defines success of a digital-first business.

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This is why tracking business transactions are so important to gain digital intelligence. When you know what is critical to the end users and can track it at transaction level, you gain quick insight into what may be

causing their dissatisfaction. This allows for faster mean-time-to-repair (MTTR) and consequently helps build trust with your business constituents.

The basis for a converged application and infrastructure monitoring solution starts with digital intelligence, but it goes further to establish context with the performance of the infrastructure supporting the application. According to a Forrester survey, 98% of business technology decision-makers said user experience problems rely on several parts of the IT infrastructure. A combined view in a dashboard that answers specific performance questions about availability, user response times and business transactions is the need of the hour. This includes being able to track the subtleties across the application environment in context of the infrastructure dependencies.

Zeroing In On The Cause of Application Performance Issues: A Real-World Scenario

A few years ago, we were expanding a critical business application over a much larger demographic and things were on track. We had a basic graph with two data elements across one dimension of time, making it easy to compare the current end-user experience to its normal baseline. This is an effective way to communicate the real-time performance back to the developers and IT leadership.

During the new release, as the application usage increased with user load, we noticed that application response time rose well above the normal baseline. There was also a direct correlation to page aborts indicating user frustration. Then the system reached the point of critical mass and started presenting HTTP 500 errors.

Based on a simple performance breakdown showing server time over its threshold and network time within baseline, the developers were directly engaged, and the network team was on standby. Given this starting point, the development team began troubleshooting the performance discrepancy early on and before mid-day they had identified the root cause and added a new index to one of the very large data sets that was being called frequently.

Monitoring Has Traditionally Been Silo-based. But It Doesn't Have To Be So!

Because IT teams are by nature siloed in operations and ownership of processes and tools, each team ends up having their own monitoring solution. For example, the infrastructure team is mainly focused on system availability and uses one set of tools to monitor the virtual hosts and another set to track the virtual machines (VMs). The network team also has multiple tools to track different aspects of network availability, usage and performance. The database team has multiple different toolsets – one for each type of database server they need to support. Out of pure necessity, the monitoring tool sprawl continues.
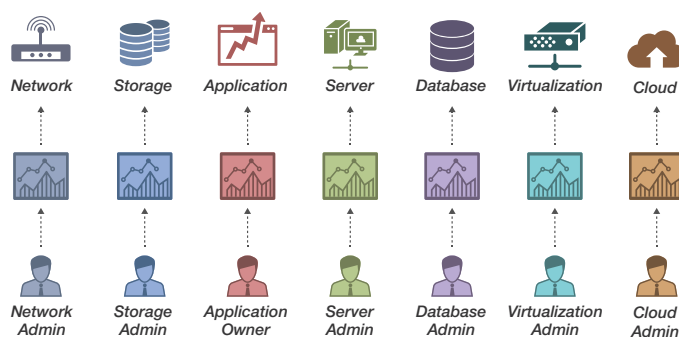

Figure 1: IT monitoring tool sprawl in organizations

The App Dev teams have completely different needs. They want to know how the application is performing before they release it to production. This is where code-level monitoring is typically introduced. However, code-level monitoring in production is a tricky business because IT Ops does not want to introduce any instability into the environment. So, when the question comes up about end-user experience, the IT Ops and App Dev teams try to infer how they

think things are going but they can never quite be sure. This is where the need for a converged application and infrastructure performance monitoring tool arises.

The Challenges of a Siloed Monitoring Strategy

If you only have monitoring in place to see the health of each infrastructure component, your vision becomes myopic and tracking the user experience will be difficult. If you are only monitoring the availability statistics for the application, you'll miss the user experience. Consider the typical monitoring solutions for the routers, servers, database, storage, etc. These are all critical elements that need attention but when something goes wrong, looking through the lens of each silo will make ascertaining the problem difficult.

An industry survey by Opsview found that over 35% of IT pros feel that because they have too many tools and dashboards, they are slower at responding to critical issues and identifying the root cause.

Troubleshooting Becomes Complex Without Context Between Components: A Real-World Scenario

Just the other day, we experienced a production issue on a fully instrumented critical business application. The issue first appeared nebulous (not an uncommon occurrence!). During peak volume time, the Service Desk was taking calls from users across locations stating that they couldn't login. However, if users were already on the system, everything was working well. Even when the users logged out, they could still login again and continue working. All other monitors were showing normalcy across each of the silos:

- Network monitoring (i.e. wire data analytics) showed that the transaction volume and performance was normal

- Deep-dive Java monitoring agents showed the same

- There were no glaring HTTP 500 errors

- The backend database was fine running within its baseline

- Infrastructure monitoring was green in all tiers and resource consumption was within baseline

- Then, a synthetic monitor popped an alert on two externally facing applications.

Once we were all assembled on a conference call, the network team investigated and found that our Internet provider's DNS resolution was not working properly. So, any machine that needed name resolution that wasn't already cached for the day, couldn't get a login page. It was only when all the silos were brought together could we truly figure out the problem. This obviously take precious time and much effort.

Enterprise IT Needs a Single Source of Truth

There are many tools out there today that will collect and display the end-user-experience, but which one is the single source of truth? Or better yet, which tool has been accepted by the business and IT leadership as the single source of truth?

Identifying an application that has gone catatonic is one thing but assessing the insidious slow performance of a complex multi-tiered application and fixing it, can be very time consuming and costly. This is especially true if you don't know what normal looks like and don't have a single source of truth to compare it to.

Troubleshooting a performance problem in the application delivery chain is like trying to solve a 1,000-piece jigsaw puzzle without having any picture to reference. You start by finding the four corners and then put together the edge pieces. This would be akin to looking at the infrastructure silos and how they are put together, to build some frame of reference. However, once you get into the middle, it's infinitely more difficult to solve.

Consider application code-level monitoring and how the transactions traverse the infrastructure. If you don't have a picture to reference, it will take some time to figure out the issue. Each part of the application delivery chain is like a separate piece of the puzzle and having a clear a picture in how its put together is advantageous to solving any performance problem. This necessitates a combined, correlated and contextual view of the application (code, SQL, logs, etc.) and the supporting infrastructure (network, server, storage, virtualization, cloud, etc.).

Why Should You Choose a Converged Application and Infrastructure Monitoring Strategy?

Using disparate monitoring tools to aggregate application and infrastructure metrics and getting a correlated end-to-end view can be difficult. Collecting the alerts and events from multiple tool sets creates a lot of noise for the support staff who then need to make decisions and create some type of repeatable processes for their teams to follow.

Organizations need a monitoring solution that will collect, assimilate, and correlate all the events in the application and infrastructure environment, and allow for easy troubleshooting. Understanding the dependencies between the application and underlying infrastructure is imperative for root cause diagnosis. Pinpointing code-level issues using business transaction tracing is one thing; but fault domain isolation when an application slowdown occurs can simplify troubleshooting for IT teams.

IT's Biggest Challenge: Root Cause Diagnosis

- Is slow network connectivity affecting application access by end-users?

- Is a memory leak in the application server affecting code processing?

- Is the virtualized/containerized server facing any capacity issues that are choking application performance?

- Is a storage hotspot on the SAN array hosting the database slowing down query execution?

A converged application and infrastructure monitoring solution provides unified visibility of the entire application

stack – from user experience, business transactions, application code, all the way to the supporting infrastructure tiers.
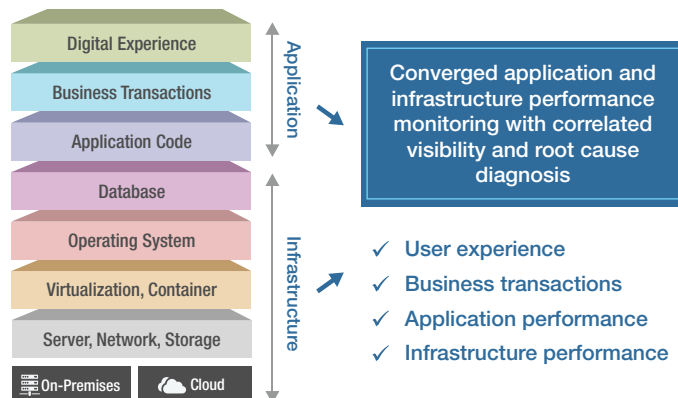

Figure 2: Converged application and infrastructure monitoring providing full stack visibility

Then, as a next step, work with IT Operations and begin to automate the incident flow by tying this into your current ITSM and service support platform (e.g. ServiceNow, Remedy, etc.). The solution should be easy enough for the frontline support teams to use (i.e. service desk) and dynamic enough for the Tier 2 support teams to use and get value out of it quickly when troubleshooting. Since events can crop up anywhere in the application delivery chain having more of an app-centric view of the infrastructure is extremely helpful for problem triage.

What are the Challenges in Enterprise Adoption?

The challenge for most organizations is that everybody has an opinion about what application monitoring should be and how it should work but most don't have a clear monitoring strategy defined. Developers typically focus on code-level diagnostics; to an IT admin, server-level monitoring of the application infrastructure is assumed sufficient, and network teams may just be using traffic flows and wire data to track application behavior. It is essential for all stakeholders to understand the need for a converged application and infrastructure monitoring strategy and understand its benefits (see Figure 3 below) to each stakeholder well in advance.

Since the IT processes are just as critical as the technology itself, it's imperative to have a strategy and to communicate it frequently. Getting the buy-in from senior leadership on a defined enterprise monitoring strategy is key. This helps
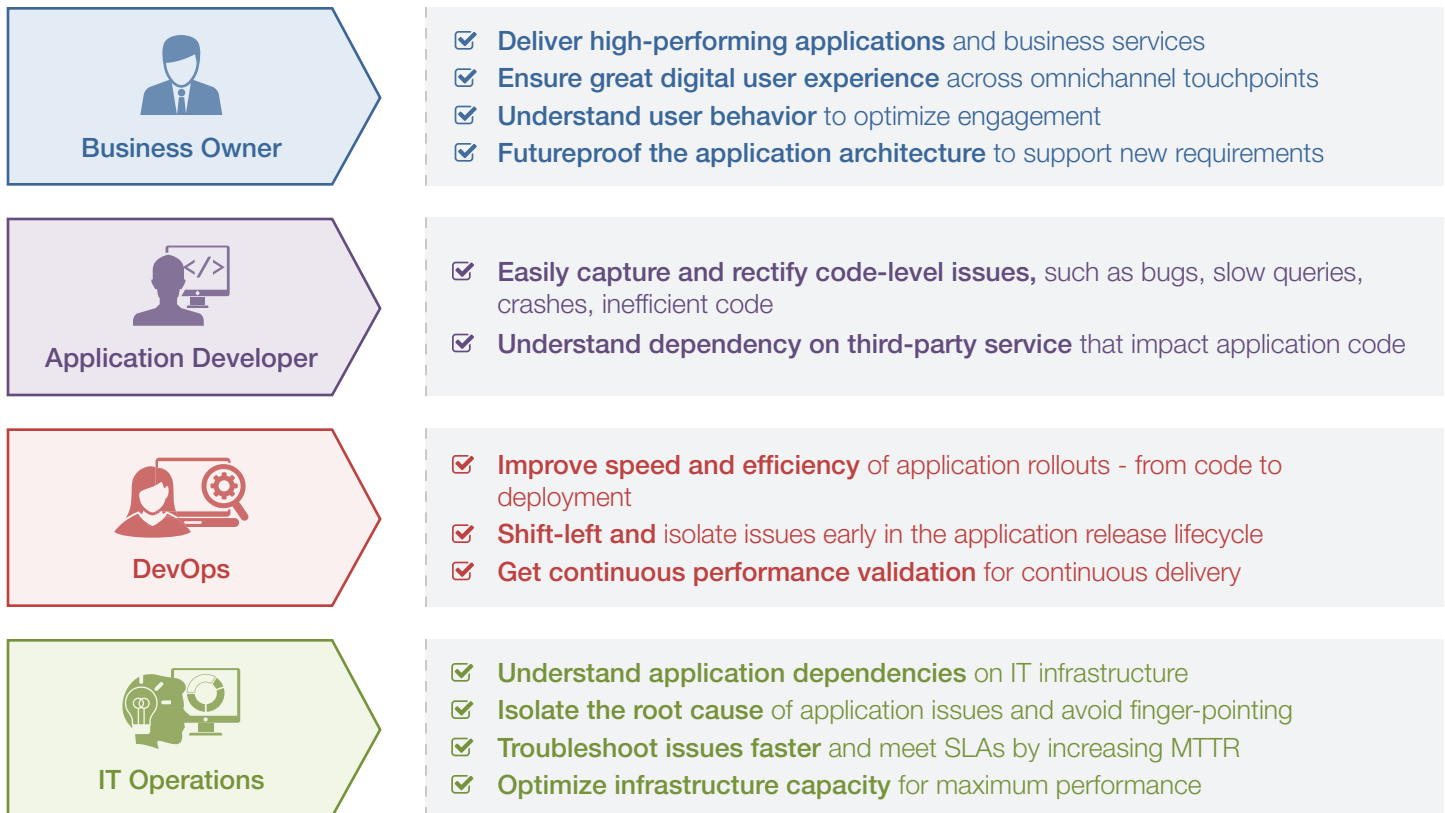
Business Owner
- ☑ **Deliver high-performing applications** and business services
- ☑ **Ensure great digital user experience** across omnichannel touchpoints
- ☑ **Understand user behavior** to optimize engagement
- ☑ **Futureproof the application architecture** to support new requirements

Application Developer
- ☑ **Easily capture and rectify code-level issues,** such as bugs, slow queries, crashes, inefficient code
- ☑ **Understand dependency on third-party service** that impact application code

DevOps
- ☑ **Improve speed and efficiency** of application rollouts - from code to deployment
- ☑ **Shift-left and** isolate issues early in the application release lifecycle
- ☑ **Get continuous performance validation** for continuous delivery

IT Operations
- ☑ **Understand application dependencies** on IT infrastructure
- ☑ **Isolate the root cause** of application issues and avoid finger-pointing
- ☑ **Troubleshoot issues faster** and meet SLAs by increasing MTTR
- ☑ **Optimize infrastructure capacity** for maximum performance

Figure 3: Benefits of using converged application and infrastructure monitor for different stakeholders

with adoption for everyday use of the tool and helps with how the solution will be acquired and managed.

The new solution may be targeted to replace another monitoring tool that's already in use but will not replace all of the other monitoring tools from each silo. This is because most of the tools in each silo are for provisioning and administering the infrastructure components and monitoring is typically their secondary purpose. When done correctly, with the right tool selection and process development, a converged application and infrastructure performance monitoring solution can become the conduit between supporting the Business, the Development teams, and IT Operations.

How Does an Organization Justify a Move to Converged Application and Infrastructure Monitoring?

If an event occurs in the infrastructure and no one sees it, believes it, or takes action on it the value of your enterprise monitoring solutions can be severely diminished, and you run the risk of owning "shelfware". Predominantly, monitoring is still being treated as a nice-to-have, and, in larger organizations, it hasn't become part of their strategic business plans. When there is a void of a strategic business plan, one-off solutions will appear to fill in the gaps.

Review the monitoring tools used in your organization across all silos and see whether there are any overlaps and redundant functionality that you are paying for. Then, decide whether you are able to correlate the metrics across different datasets and how much effort is needed to manually complete it.

Estimate the amount of time taken for troubleshooting the root cause of performance issues and set that as a benchmark to improve on with automated converged application and infrastructure monitoring. These will help justify the need to adopt a converged monitoring strategy.

Once a converged monitoring solution is in place, you will have the ability to reduce the mean-time-to-know and mean-time-to-repair significantly. Then, once you have matured the solution you can move to a predictive model preventing issues from occurring with the right reporting algorithms. The ability to do capacity planning with infrastructure resources by using trending reports is another element to help justify the benefits of the solution.

Consider that the correlation of events and the amalgamation of metrics not only help with troubleshooting but when presented with the right amount of detail, they bring value to the business by way of real-time reporting and trending. And it's the way the business interprets the accuracy of those metrics that determines your success in building trust with them.

One helpful way to build trust and get buy-in is to have the basic questions ready to answer when a performance issue comes up and needs resolution. Consider having the answers ready to these simple questions:

- What did the application performance look like yesterday?
- What was the application performance like 7 days ago or last week (i.e. Monday vs Monday 7 days ago)?
- What is the average application performance (i.e. 30 - day rolling average)?

If you can't answer these simple questions quickly, from an IT executive perspective, they won't have much faith

that the solution will provide the necessary value for them and their business partners. Think of these questions as a barrier to entry for building trust with IT Leadership and to be widely accepted as the single source of truth for performance and availability.

We are only limited by our beliefs and the perceptions we have of what is real and what brings us value. End users of our critical business systems are no different, and with the convergence of technology finding its way to their own personal devices, meeting the expectations of a quality customer experience for everyone is much more difficult. The use of a converged application and infrastructure performance monitoring solution can provide the necessary insight to improve the end-user experience and become the conduit between supporting the Business, the Development teams, and IT Operations.

How eG Innovations Can Help

eG Innovations offers an industry-leading converged application and infrastructure performance monitoring solution, **eG Enterprise**, that provides your single source of truth across applications code, business transactions, and IT infrastructure components. From the data center to the cloud, monitor all your business-critical applications and infrastructure from one console. Leverage the embedded analytics and built-in correlative intelligence to automatically isolate the real root cause of application performance slowdowns.

Key Features of eG Enterprise

- Proactively detect user experience issues before your customers are impacted
- Trace business transactions and isolate the cause of application slowness
- Get code-level visibility to identify inefficient application code, long-running database queries, or slow third-party calls
- Automatically map application dependencies within the infrastructure to pinpoint the root cause of the problem
- Get actionable insights in your fingertips to troubleshoot application performance meltdowns
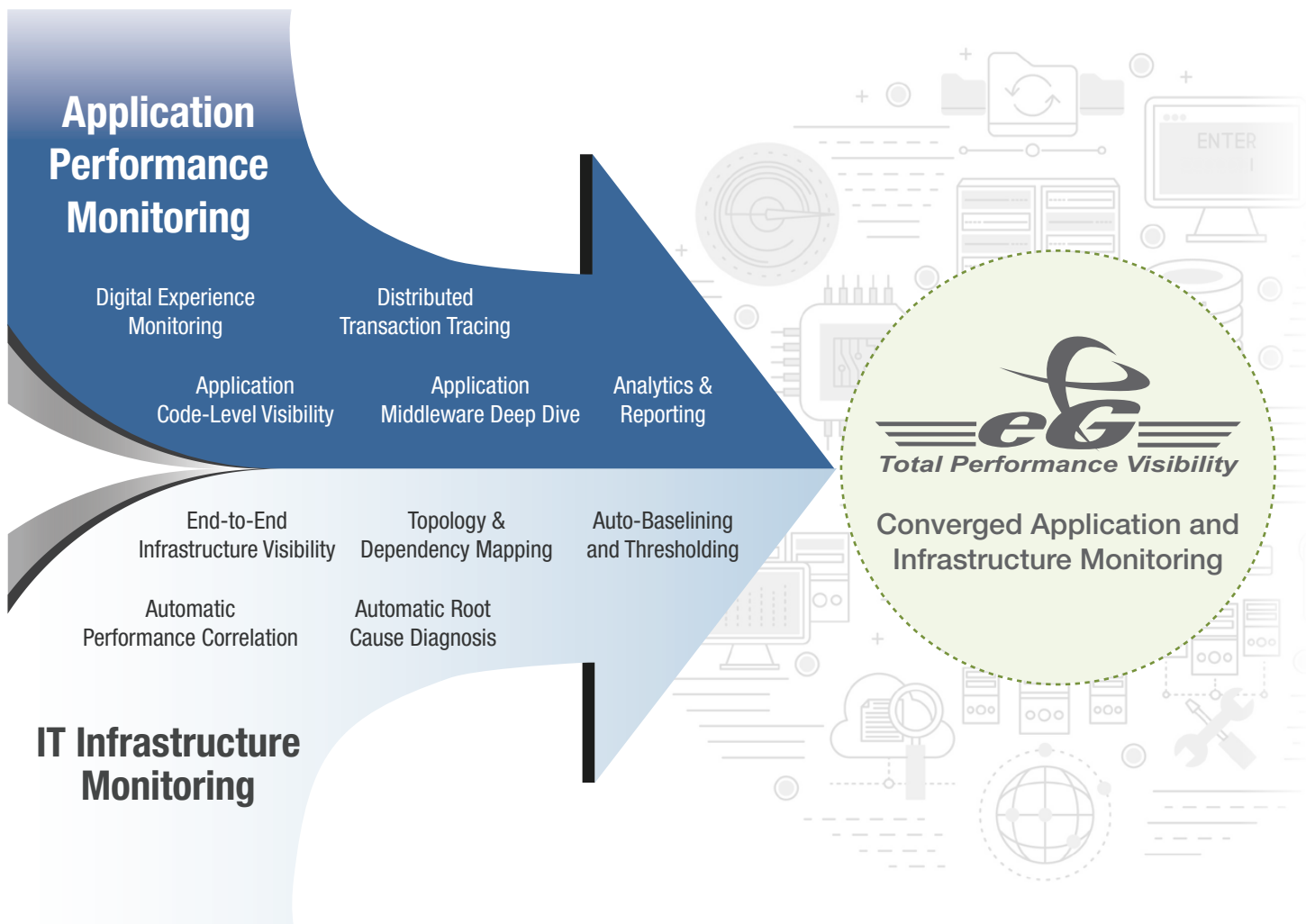
Figure 4: Converged application and infrastructure performance monitoring using eG Enterprise

By considering all application-to-application mappings, application-to-VM relationships, and application-to-network dependencies, eG Enterprise differentiates the root cause of a problem from its effects. In single click, IT administrators to drill down into any application or infrastructure tier to monitor availability, health, performance and usage metrics. Using intuitive dashboards, performance metrics are visually mapped to a hierarchical layer model which is custom-built for each tier. Alerts are correlated across the layers, so administrators can easily pinpoint which layer is causing a problem. eG Enterprises uses built-in machine learning capabilities to auto-baseline performance metrics, so that any deviations from the norm are promptly notified. Out-of-the-box reports and analytics help with trending, forecasting and capacity planning, delivering insights for infrastructure right-sizing and optimization.

Try a full-featured free trial of eG Enterprise today! Learn more at www.eginnovations.com/APM.

About the Author

Larry Dragich is actively involved with industry leaders, sharing knowledge of Application Performance Management (APM) strategies and approaches for implementation. He has been working in the Enterprise Monitoring space since 2006 where he consults on best practices for process development, automation, and tool adoption. Larry is also a regular blogger for APMdigest.

Next Steps

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FREE TRIAL
15-days of free monitoring and diagnosis, in your own infrastructure. Try it and learn exactly how eG Enterprise helps you ensure a great end-user experience and improve IT operations.

About eG Innovations

eG Innovations provides the world's leading enterprise-class performance management solution that enables organizations to reliably deliver mission-critical business services across complex cloud, virtual, and physical IT environments. Where traditional monitoring tools often fail to provide insight into the performance drivers of business services and user experience, eG Innovations provides total performance visibility across every layer and every tier of the IT infrastructure that supports the business service chain. From desktops to applications, from servers to network and storage, eG Innovations helps companies proactively discover, instantly diagnose, and rapidly resolve even the most challenging performance and user experience issues.

eG Innovations' award-winning solutions are trusted by the world's most demanding companies to ensure end user productivity, deliver return on transformational IT investments, and keep business services up and running. Customers include 20th Century Fox, Allscripts, Anthem Blue Cross and Blue Shield, Aviva, AXA, Biogen, Cox Communications, Denver Health, eBay, JP Morgan Chase, PayPal, Southern California Edison, Samsung, and many more.

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