Introduction

Digital transformation enables gains in capabilities, customer reach, flexibility, and agility as it allows businesses to take advantage of the latest digital technologies for application and service delivery. But, with digital transformation comes increased complexity and disintermediation between the business and its end customer as back-end infrastructure moves to the cloud and beyond the enterprise’s control and visibility.

This reality places more importance on monitoring the end-user experience of digital services. It’s not surprising then that a recent Gartner survey of enterprise IT leaders concluded that End-user Experience Monitoring (EUDEM) was the most critical dimension of application performance management (APM). [Gartner, Survey Analysis: End-User Experience Monitoring Is the Critical Dimension for Enterprise APM Consumers, C. Haight, 20 September 2016].

But End-user Experience Monitoring (EUDEM) itself is evolving beyond monitoring customer or end-user interactions with discrete applications and websites. Whereas traditional web monitoring looked only at availability – whether a site was up or down – or page load and response times over http, today’s end-user experience monitoring must consider everything that can impact the delivery of websites and applications. This includes network service levels, Internet infrastructure such as domain name services, content delivery networks and load balancers, and services provided by API integrations or third-party social media, advertising, and personalization services that call on web hosts from outside the organization.

Gartner calls this broader technology, Digital Experience Monitoring (DEM). [Gartner, Innovation Insight for Digital Experience Monitoring, W. Cappelli, 14 October 2016]. Today’s digital experience is more dependent than ever before on services that are outside the enterprise’s control. IT and DevOps leaders need to gain visibility into these services to meet customer demands for faster, more reliable web applications and services, and ultimately fulfill business objectives.

In this report, we’ll take an in-depth look at DEM and explore how Catchpoint can help you to meet the growing demands of this technology.
Gartner defines DEM as an “availability and performance monitoring discipline that is implemented through the application of visualization, analytic, and machine-learning functionality into a combination of datasets ingested from two or more of the following sources.” [Gartner, Innovation Insight for Digital Experience Monitoring, W. Cappelli, 14 October 2016].

- Lightweight instrumentation of devices and endpoints
- JavaScript injected web pages, network-extracted packets and flows
- Synthetic transaction executions
- APIs and social media feeds

Today, 5% of all large enterprises use at least two of these DEM tools, usually as part of an APM suite, according to Gartner. But Gartner expects that by 2019, that number will rise to 30%. Not only that, but enterprises will decouple DEM from APM, combine these DEM data sources and store the data in a large nonrelational data store with machine-assisted analytics capability. Gartner expects that within five years, many enterprises will be buying and implementing a pre-integrated, three-layer platform (whether on-premises or cloud-based).

Gartner recommends a three-layer data architecture to support such a DEM system. This would include ingestion of data from multiple sources and a nonrelational database management system that can scale to handle the large amount of data these
“In its recent report, ‘Innovation Insight for Digital Experience Monitoring,’ Gartner issued some cautionary advice: IT leaders that do not invest in ‘DEM’ run the risk of becoming increasingly irrelevant as their skills and tooling fail to keep up with exponentially growing operational complexity and increasing demand for proactive, personal, and dynamic services.”

multiple data sources would generate. Finally, enterprises need advanced visualization and analysis capabilities to make sense of that data.

Other key findings in the Gartner report are that enterprises need to combine DEM data sources for optimal results and that DEM should ideally track a user’s interactions across the enterprise’s application and service portfolio, rather than be tightly coupled to single applications as APM is today. With the proliferation of mobile devices like smartphones and tablets, user interactions with an enterprise’s application and service portfolio happen almost continuously across multiple touchpoints. A DEM strategy should reflect this.

Using a single technology for data ingestion that’s focused largely on observation, with some data aggregation (think basic web monitoring over http or single-application APM) is an “inadequate” approach today, according to Gartner. Gartner cites four factors for this:

- Digital interactions between customers or end users and an enterprise’s applications or services occur continuously and those applications and services change in real time.
- The user population for most enterprises is expanding beyond internal users and external customers to include short-term partners, suppliers, and observers.
- Users are engaging with an enterprise’s applications and services while simultaneously interacting with social media communities.
- Users are not just human but, increasingly, machines in the wake of the emergence of the Internet of Things.
Using Synthetic Monitoring and Real User Measurement on the Same Platform

Two of the most-common techniques for monitoring digital experience are synthetic, or active monitoring, and real user measurement (RUM), or passive monitoring. Synthetic monitoring can spot performance problems, including outages, before your users are impacted, tell you which users in which geographies will be impacted and help you to respond faster to minimize disruption to your business.

But how do you know how your typical user interacts with your site? What are the most visited pages, the steps taken to complete a transaction? This is where RUM comes in. It tells you how users navigate your site or application, which can help you to fine-tune your synthetic tests as well as fix specific problems with design, navigation or functionality that automated testing might not catch for continuous improvement of digital service delivery.

A classic use case for RUM is shopping cart abandonment. Ecommerce vendors would be lost without gaining insights into what’s making real users abandon purchases, whether that’s shipping charges, failed coupon codes, a performance issue late in the buying process, or saving products via mobile app or browser to buy later from the desktop site.

Correlating synthetic metrics with RUM data generates even more powerful insights. This can show how users are potentially affected by detected performance issues or whether users dropping off, such as with shopping cart abandonment, has more to do with a design flaw or a coupon code that’s not working. When it comes to digital experience monitoring, this really isn’t an either/or question. Synthetic monitoring and RUM are better together, on the same platform.

Catchpoint Synthetic Monitoring doesn’t just return performance metrics, it provides detailed information on what’s causing application performance to degrade from all layers of your service. This can be a problem with one of the web hosts supporting the application, third-party services for advertising, personalization, or social media, API calls between applications, or the Internet infrastructure supporting the applications, including domain name servers (DNS), content delivery networks (CDN), Internet service providers and cloud service providers. By testing constantly using synthetic monitoring you can pinpoint performance issues before your users are impacted, from anywhere around the world, using Catchpoint’s network of nearly 600 Internet backbone, mobile, and last mile nodes, or internally, behind the firewall, using on-premise nodes.

Catchpoint RUM takes it from there, allowing you to verify performance impacts on real users, analyze user engagement and site performance and correlate revenue and business metrics to end-user experience. Catchpoint RUM data is used to optimize synthetic strategies, supporting continuous improvement of service delivery. Catchpoint Synthetic Monitoring and RUM are one platform, with monitoring data correlated and viewed in the same portal.

The combination of synthetic monitoring and RUM gets you the minimum two DEM data sources that Gartner recommends. Catchpoint Synthetic Monitoring adds data from APIs and other third-party sources, which we will cover in the next section.
As we mentioned above, Gartner expects DEM to be increasingly decoupled from APM, eventually standing on its own. Our focus is on helping our customers to achieve their business objectives using DEM technologies.

**Monitoring Third-Party Service Providers and APIs**

As we mentioned in Section 3, Catchpoint Synthetic Monitoring isn’t just limited to availability or web response times. We have 16 different test types for synthetic, covering applications, infrastructure, and network. One of these test types is our API test, which ensures that API calls between web applications and third-party web services and applications are performing properly. This includes data generated by the GET and POST RESTful API commands.

Our real browser monitor can monitor all web hosts and zones that support the delivery of an application. This includes third-party content such as advertising, social media, and personalization services.

The days of web applications being served from a single server are long gone. It takes a complex network of web hosts and services to deliver the rich, interactive experiences that today’s web users have come to expect. And they expect them to be delivered in just a few seconds, regardless of the devices they’re using.

When you rely on a third party for content and service delivery, as virtually all major digital applications do today, you need to be able to hold that third party accountable to contracted service levels in their service level agreements. With its ability to break down performance data across every step of the service delivery process, Catchpoint enables you to enforce these SLAs.

**Turning DEM Performance Data into Fast Business Insights**

All data collected by Catchpoint is processed, stored, and analyzed in real time, in Catchpoint’s proprietary Orchestra NoSQL in-memory database, which delivers data instantly to users, handles large data sets better, and does not require a full-time database administrator. Catchpoint customers can analyze their granular, object-level data, in addition to aggregate data.

Catchpoint Orchestra also supports longer data retention times than competitive products, allowing for more extensive time-series analysis of long-term performance patterns. Raw, object-level data is kept for up to 5 years. Raw test-level data is kept for up to 3 years for historical comparative analysis. Record-level data is kept for up to 100 days. Catchpoint’s built-in analytics leverage advanced statistics that turn detailed raw data into actionable insight for efficient triaging and performance optimization. With raw object-level data’s ability to power real-time exploration to uncover patterns or to slice and dice up to 50 reports across a wide array of pre-defined and custom metrics, you can inspect every detail of each test and preempt any performance degradation.
Data is accessed via a variety of dashboards, some user-defined, some pre-built, that can be shared with core development and operations engineers as well as executives and network operations center engineers. These dashboards include flexible multi-dimensional analysis, historical comparisons for baselining and benchmarking, statistical analysis and charting.

Catchpoint customers gain the ability to present customized data to different stakeholders, giving them the insights needed to make strategic decisions.

Customer Use Cases

7digital monitors APIs, ISPs and CDNs

7digital is a B2B digital music platform that serves as a resource for anyone who wants to run a music service, such as a streaming radio or high-quality music download service. It provides a catalog of up to 53 million songs plus the technology to deliver the music to its customers. The UK-based company has customers in more than 40 countries around the world. Given its global audience, the company needs to maintain a reliable service that’s available and fast, 24/7, 365 days a year. It uses Catchpoint Synthetic Monitoring to ensure this reliability.

7digital processes tens of millions of API requests every day for customers throughout the world. With a strong presence in North America and Europe, it’s moving into developing markets in Asia, the Middle East and Africa. Catchpoint’s nodes in every major city around the world give 7digital the global coverage it needs to monitor its service wherever its end users are.

As a true digital business, 7digital is heavily dependent on data that can change millisecond by millisecond. This data, on how 7digital’s platform is performing, is vital for improving 7digital’s services and selling those services to customers. The speed at which the company can collect and analyze that data ends up being a major differentiator between 7digital and its competitors. Catchpoint’s data management capabilities help the company to make that difference.

One critical metric that 7digital needs to measure is reducing the Time To First Byte (TTFB) latency for songs that aren’t in the cache. 7digital needs to make sure that their customers’ music starts as quickly as possible. 7digital also needs to ensure the ISPs are connecting in the right way and that their CDN provider Fastly is performing at optimum levels. Fastly allows objects to be streamed back to the user immediately from origin while the entire object is fetched in full. This means that 7digital customers who request a song that’s not in the cache will begin hearing music as soon as they push play.

7digital can change its platform up to 10 times a day and see how any deployment affects performance and ensure any change moves the needle in the right direction. This means closely monitoring page load times and knowing immediately if any customers run into any issues trying to interact with their site.

Catchpoint has proven to be the perfect complement for the internal monitoring tools that 7digital relies on. The website team can correlate the Catchpoint results with the internal results for a 360-degree view of their application performance. This comprehensive visibility is particularly helpful during critical new music album release periods when the website is extremely busy on a worldwide scale.
Dreamlines gets faster page load times around the world

Dreamlines is the leading international online portal for cruise holidays. With its headquarters in Hamburg, Germany, Dreamlines employs more than 350 people in France, Italy, Brazil, Russia, the Netherlands, and Australia. Dreamlines’ portfolio consists of over 30,000 cruises operated by more than 100 cruise lines.

Dreamlines has multiple websites that are localized for the individual country, so the German website is different from the Brazilian website and so on. Each of these websites needs to be up and running optimally for that specific country. Each site is customized for its local audience, so Dreamlines needed a solution with a global node based system that monitors the different websites from the locally relevant nodes, to provide accurate performance metrics by geography. It chose Catchpoint for its more than 550 global monitoring nodes.

Catchpoint also proves helpful when reviewing application performance history. Dreamlines conducts in-depth performance reviews after busy time periods, such as peak holiday seasons, and having historical monitoring allows the company to see what was going on that impacted website performance. That performance includes third-party content delivery partners that Dreamlines needs to hold to service level agreements.

Thanks to Catchpoint’s customizable analytical capabilities and innovative alerting systems, Dreamlines has been able to achieve a 40% improvement in page load times and deliver consistent availability.

Honeywell monitors performance wherever its employees go

Honeywell is a very large, multinational manufacturing company with businesses in many industries including life sciences, energy, chemical engineering, oil and gas, and aerospace. The company has more than 150,000 employees spread around the globe plus contractors and sub-contractors. With global IT infrastructure to support these employees including applications, databases, servers, and network infrastructure, the company made monitoring of customer, or end-user experience its No. 1 priority.

After using Catchpoint Synthetic Monitoring to solve web performance issues in China, the company deployed OnPrem Agent in its remote locations to monitor application performance for its employees. OnPrem Agent allowed Honeywell to see how applications performed in different regions of the world at different times of day. For example, it was able to see how performance of ERP applications in EMEA held up as US east coast users came online.

But Honeywell then went one step further, and in the process, proved that OnPrem Agent can go wherever you need it. It deployed OnPrem Agent on its fleet of corporate jets to help solve performance issues with its in-flight Internet services.

With OnPrem Agent installed on planes and at satellite communications ground stations, Honeywell was able to quickly determine that its slow in-flight Internet was caused by oversaturated satellite spotbeam services at peak travel times. The service provider was providing the contracted level of service, but Honeywell found that that level of service didn’t meet its needs. The
company needed to subscribe to a better quality of service during peak usage times.

Honeywell solved its in-flight Internet service issues and proved that OnPrem Agent can go wherever you need it to go, wherever there’s network connectivity, and give you precision performance metrics on customer experience from those locations.

**Qualtrics gains a global perspective of customer experience**

Qualtrics provides market insights to customers in different verticals including education and large enterprises. It needs to know that those services are performing well. It uses Catchpoint Synthetic Monitoring to ensure that its services are working at optimal levels for its customers.

Catchpoint enables Qualtrics to quickly respond to any detected performance issues, speeding time to discovery and resolution. Prior to using Catchpoint, time to discovery of a problem took up to 2 hours. With Catchpoint, Qualtrics is able to resolve performance issues in less than 5 minutes. This is made even easier by Catchpoint’s automated alerting, which allows Qualtrics to troubleshoot performance issues without even logging into the Catchpoint portal.

Catchpoint also gives Qualtrics an understanding of customer experience across the globe. The company has been able to take advantage of Catchpoint’s global node network to drive latency down and page performance up in every region of the world. Competitors that it had evaluated lacked coverage in Europe and Asia. With Catchpoint, Qualtrics can see performance by country, city, and Internet service providers.

**Verizon Digital Media Services gets in front of problems**

Verizon Digital Media Services provides a next-generation digital content platform, streaming 150m hours of video every month and powering 7% of the Internet. The websites and digital media it hosts have to be fast and accessible through multiple devices, in any location, with no loss in quality. Verizon Digital Media Services include video content management, web acceleration, and commerce acceleration.

The company needed to proactively monitor its platform and services from around the globe to ensure high performance and validate the service level agreements it signs with its customers. At the end of the day, it needs to provide its clients with the ability to deliver high-quality digital experiences.

Verizon uses a combination of Catchpoint Synthetic Monitoring and RUM to monitor web performance, including FTP and HTTP requests, APIs and multi-step transactions. It particularly likes being able to slice and dice data any way it needs to to identify performance issues faster.

With Catchpoint, Verizon reports it can identify problems 4X faster and pre-empt 99% of performance issues. It has also reduced false alerts by 90%, something of paramount importance considering the vast global infrastructure network this Verizon group must manage.
Conclusion

We know Gartner research and Catchpoint customer use cases show that end-user experience monitoring has evolved into digital experience monitoring that moves beyond simple http testing to take a holistic view into everything that affects the end-user experience. This includes first- and third-party web hosts, network connections, Internet infrastructure such as DNS and CDNs, APIs, and more.

Modern online applications depend on multiple infrastructure layers and services, both internal and external to an organization. Enterprises need visibility into these infrastructure layers and services and need to be able to see how they affect end-user experience. They need to be able to hold these service providers to their service level agreements. By constantly monitoring end-user experience in this way, enterprises can respond to performance issues before end-user experience is impacted, keeping customers happy and coming back for more, and protecting their brand.

Digital business means global business and enterprises need to monitor customer experience wherever their customers are. Catchpoint’s global node network gives them coverage that no other vendor in this space can match.

Gartner expects DEM to stand on its own, decoupled from APM. At Catchpoint, our focus is on the digital experience and supporting our customers to deliver high-performing, reliable services to their customers and end users. We help our customers to be successful in DEM.

With its mix of synthetic monitoring and RUM on the same platform, Catchpoint can provide actionable intelligence on the digital experience of all your online systems, both inside and outside the firewall. These analytics can be correlated with alerts from your other monitoring systems to close the performance management loop and ensure amazing digital experiences for all of your customers.

Source: Catchpoint
Digital experience monitoring technologies enable I&O leaders to observe and analyze the interactions between digital agents, both as individuals and communities, and applications, services or digital business processes.

Key Findings

- Classical end user experience monitoring (EUEM) technologies that focus on availability, response time and transaction completion rates at the interface between a single user and an application execution instance are proving insufficient in assessing how users regard application or service quality.

- Strategic investments in digital experience monitoring (DEM) platforms are required in order for I&O to support digital business initiatives.

- To date, the majority of I&O’s investments in DEM technologies have been tactical and/or isolated in nature, focused on single applications and, hence, limiting their potential.

- Most I&O teams do not yet have the skills or experience needed to work effectively with DEM platforms.

Recommendations

- Exploit a combination of data sources to build models describing the interaction of digital agents with your enterprise’s application and service portfolio.
Utilize traditional, single-application-associated EUEM results primarily as input for managing the entirety of an agent’s digital experience.

Monitor the impact of social sentiment on how individual users perceive the quality of an application’s performance.

Don’t be humanist! Recognize, monitor and manage the experience of machine agents as well as that of human agents.

**Strategic Planning Assumption**

By 2020, 30% of global enterprises will have strategically implemented DEM technologies or services, up from fewer than 5% today.

**Analysis**

EUEM technology and services have traditionally focused on capturing metrics at the interface between either an internal end user or an external customer and a single application. Typically, a single technology for data ingestion has been deployed and the emphasis of the technology’s functionality has been on observation and, at best, some data aggregation. Four factors are rendering this model increasingly inadequate (see Figure 1).

These four drivers, taken together, require EUEM technology and services to decouple from the role as supporting one dimension of application performance monitoring and evolve into DEM, as defined below.

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**Figure 1. Four DEM Drivers**

End users or customers no longer digitally interact with enterprises at discrete moments via single, relatively static applications or services. Instead, their digital interactions now occur continuously. The boundaries between applications are blurring, and applications and services change their functional capabilities in what, from the user’s perspective, amounts to real time.

As business digitalizes, the population of agents that interact with an enterprise expands to include not only internal users and external customers, but also long-term and short-term partners, suppliers and observers (including competitors) who are not conducting digital business with the enterprise, but the quality of whose interactions can shape the overall perception of the enterprise.

Digital agents increasingly engage with applications and services while linked to and simultaneously interacting with a social-media-enabled community. Those interactions can influence, even determine, the digital agent’s judgment of application or service quality.

The agents engaging applications and services can no longer be assumed to be human, and also should include machines. In the wake of the emergence of the Internet of Things (IoT), there will be many situations in which human agent engagement with a given application or service will be the exception, not the rule.

*Source: Gartner (October 2016)*
**Definition**

Digital experience monitoring (DEM) is an availability and performance monitoring discipline that is implemented through the application of visualization, analytic and machine-learning functionality into a combination of datasets ingested from two or more of the following sources:

- Lightweight instrumentation of devices and endpoints
- JavaScript injected web pages, network-extracted packets and flows
- Synthetic transaction executions
- APIs and social media feeds

The datasets are then observed and analyzed with the goal of optimizing the holistic operational experience and behavior of a digital agent, human or machine, with the application and service portfolio of enterprise. Since digital agents frequently interact with applications and services as participants in a larger community of digital agents, this discipline also seeks to observe, model and manage the behavior of digital agent communities as they collectively engage with enterprise application and service portfolios.

**Description**

Technologies or services supporting DEM will have a three-layer architecture. On the first level, one will find various data ingestion mechanisms from a variety of sources (see Note 1). On the second level, one will find a nonrelational database management system capable of storing text and metrics, typically a key-wide column structure and accessible via a map-reduce algorithm. On the third level, one will find three flavors of machine-assisted analytic functionality: complex dataset visualization; automated pattern discovery and anomaly detection; and automated causal path discovery and predictive analysis. As used today, this three-layer architecture, although capable of standing alone, will often be used in conjunction with an APM and algorithmic IT operations product suite.

**Benefits and Uses**

By combining multiple methods of ingestion, a nonrelational data management capability and machine-assisted analytics, DEM technologies and services can help enterprises obtain an understanding of the quality of that continuous digital experience as well as determine the causes of or anticipate incidents rendering that experience suboptimal. Furthermore, this same combination of technologies will make it easier to understand how social-media-communicated sentiments impact how an individual interprets experience quality. Finally, as robots or purely digital agents come to make up a larger and larger percentage of users accessing an enterprise application or participating in a digital business process, the three-layered DEM architecture will make it easier to detect and optimally manage their presence and participation.

**Adoption Rate**

As business processes digitalize, applications are becoming increasingly central to business revenue generation and operational maintenance. At the same time, application architectures are evolving to become more modular, distributed and dynamic with the consequence that when users, whether internal or
external to the enterprise, interact with that enterprise via a digital process, they are no longer aware of the boundaries between applications. Instead, they will regard their interactions as parts of a continuous digital experience of that enterprise.

At present, approximately 5% of all large enterprises are using two or more of the four data sources noted above, usually in conjunction with other components of an APM suite. Over the next three years, Gartner expects 30% of large enterprises to decouple these digital experience data ingestion mechanisms from their tight association with APM, combine them and associate them with a large nonrelational data store and machine-assisted analytics capability. Initially, these components will largely be assembled in-house, but within five years, many enterprises will be buying and implementing a preintegrated three-layer platform (whether on-premises or cloud-based).

**Risks**

The primary risk associated with investment in DEM mirrors that of most transformational efforts – an overemphasis on the technological component with insufficient focus on the changes in skills, roles, metrics and process required to get value from the technology.

Secondarily, platform investments are uniquely susceptible to both the effects of scope creep and “big bang” implementations that, at best, fail to meet unrealistic expectations and, at worst, negatively impact current operations.

Alternatively, I&O leaders that do not invest in DEM run the risk of becoming increasingly irrelevant as their skills and tooling fail to keep up with exponentially growing operational complexity and increasing demand for proactive, personal and dynamic services. This growing irrelevance will continue to affect I&O leaders’ ability to compete for funding for current operational needs as well as funds spent on technology resources outside of the IT budget.

**Recommendations**

■ Use a combination of at least two DEM data sources to observe and construct models describing the interaction of digital agents with your enterprise’s application and service portfolio:

■ Traditionally, the various end-user experience data ingestion mechanisms have been deployed separately from one another and sometimes heated arguments have been had as to which mechanism is the most optimal. The truth is that each ingestion mechanism has something to contribute to the observation and understanding of how users, customers and others interact with an enterprise application portfolio. Learn how to use multiple data ingestion mechanisms simultaneously and how to synthesize them into single, consistent model of digital experience.

■ Develop metrics and manage the overall quality of an agent’s multiple interactions with the enterprise across its application
and service portfolio. Traditional, single-application-associated EUEM should continue but should utilize the results primarily as input to understand and manage the entirety of an agent’s digital experience.

Instead of focusing on individual applications, learn how to combine data from a user’s interactions across multiple applications. As application architectures evolve, it will become increasingly difficult to associate user interactions with any single application and it is already the case that users, particularly external customers, find it difficult to determine the boundaries that separate enterprise applications or services.

Monitor the impact of social sentiment on individual agents’ perceptions of quality, and develop metrics that reflect the quality of experience had by the community of agents as a collective whole.

Users increasingly interact with applications, services or digital processes while simultaneously communicating with other users as part of a social-media-enabled community. Not only are experiences shared in real time across such communities and, through that sharing, shape the perceptions of individual community members, but such communities can exhibit emergent properties that are not easily derivable from the aggregation of observations of individuals. At one level, observe and analyze the community interacting with the application portfolio as an integrated whole, paying particular attention to how a performance incident that directly impacts the experience of few members of the community is communicated to the rest of the community.

**Representative Providers**

- AppDynamics
- BMC
- CA Technologies
- Catchpoint Systems
- Dynatrace
- Hewlett Packard Enterprise
- IBM
- Lakeside Software
- New Relic
- Nexthink
- Riverbed
- Soasta

**Evidence**

Additional data for this research was drawn from approximately 200 client inquiries on end-user experience monitoring issues taken over the past six months.
Note 1

Data Ingestion Mechanisms

At present, the four most widely used data ingestion mechanisms are:

- Web-page-injected snippets – JavaScript code acting as mini-agents that capture and send data from an endpoint once a web page has been rendered
- Packet capture appliances – Both custom hardware and software based that capture packets from the network and interpret protocol information
- OS-resident agents that capture and send data directly from the endpoint or device
- The results of running synthetically constructed scripts against applications, services or digital business processes

Increasingly, however, social-media-based information (including sentiment data), collective intelligence benchmarking (CIB) and API data feeds are being added to the DEM ingestion level.

Source: Gartner Research, G00316678, Will Cappelli, 14 October 2016
About Catchpoint

Catchpoint is a leading digital performance intelligence company that provides unparalleled insight into your customer-critical services to help you consistently deliver amazing digital experiences. Catchpoint is the only performance monitoring platform that provides integrated synthetic and real user monitoring, comprehensive test types, real-time analytics, and a diverse node network to help you continuously preempt performance issues and optimize service delivery. More than 400 customers in over 30 countries trust Catchpoint to strengthen their brands and grow their businesses. To request a free trial, visit www.catchpoint.com/freetrial.

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