A Broadcom Company
technologies

White Paper

DX Application Performance Management

Connecting App Performance with Business Impact

Introducing Business Payload Analyzer—a new approach for insights into business and customer experience.

Executive Summary

In today's digitally-driven world, ensuring a positive customer experience is essential to success. As many organizations undergo digital transformation initiatives, the ability to understand how customer experience impacts the business has become increasingly important. Operations and business teams need a unified view of the health and performance of business critical applications in order to establish a common understanding of how certain performance issues might impact the bottom line.

While traditional end-user monitoring and Application Performance Management (APM) solutions are able to provide some of this data, today's current methods for collecting customer experience data still present many challenges:

- Development-driven tagging and match-based definitions requires deep application knowledge and can be hard to maintain.
- Network taps are not able to handle high volumes of traffic.
- Cloud applications can be very complex and create blind-spots in understanding user experience.

Due to these limitations, the majority of organizations are still struggling to gain insight and prioritize problems based on impacts to business goals and to the overall customer experience—in fact, 53% of companies state their current tools do not provide the metrics they require.[1] A new approach is needed to simplify the collection of key business metrics.

As a result, our DX Application Performance Management (DX APM) solution now has a new capability called Business Payload Analyzer (BPA). BPA uses data science and natural language processing techniques to reduce the maintenance and deployment challenges of current end-user monitoring tools. BPA is designed for application owners who want greater visibility into how the end-user experience and business key performance indicators (KPIs) align with application performance. Application owners need this visibility to help prioritize issues based on user experience and improve the overall digital experience.

In this white paper, we will explain the technology behind BPA and how it can be used to enable you to gain deeper insights into the business impact of customer experience.

1. Improving User Experience and the Bottom Line, Dimensional Research, January 2019

Terminology

To understand how DX APM performs business context correlation, we must begin with an understanding of the following standardized terms:

- **Business Transaction/Page**

  A single webpage, mobile screen, or end user step that is identified by a human-readable name, that causes work (Frontend Transaction) to be performed on the application backend being monitored (for example, login, display balance, or enter shipping information).
- **Business Process/Activity**

  A series of sequenced business transactions typically identified by their business value which are tracked together as a complete unit of work that has business value for the end user (for example, checkout, place an order, and so on).
- **User Session**

  All the business transactions and business processes performed by a user in a period of time which typically expires either when the user closes the application or browser, or is inactive for a specified period of time.
- **Frontend Transaction**

  The actual URL processing code (work) in the application backend monitored by the APM solution.
- **Middleware Transaction**

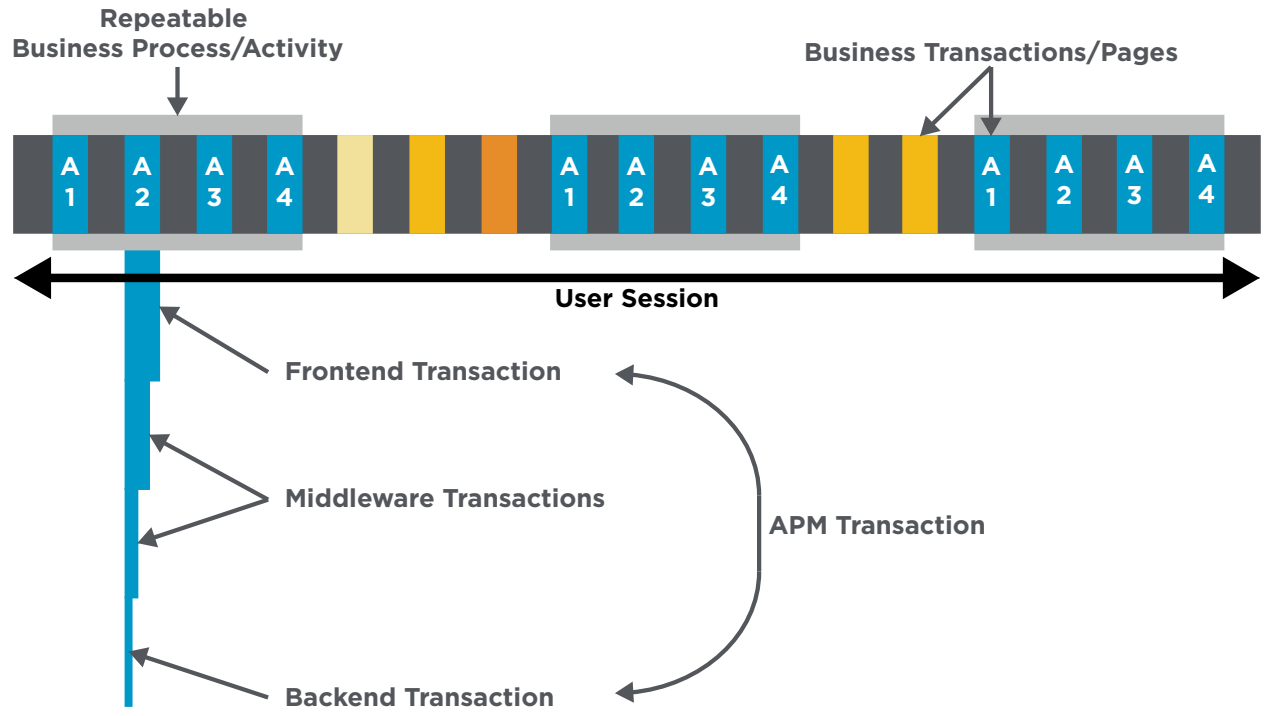
  The business logic code that connects a frontend transaction to the backend transactions.
- **Backend Transaction**

  The outbound calls to external resources such as databases, mainframes, or other systems.
- **APM Transaction**

  All the code executed on the backend systems monitored by the APM agent.

The following figure shows where the terms apply to the business process.

Figure 1: Business Process Terminology

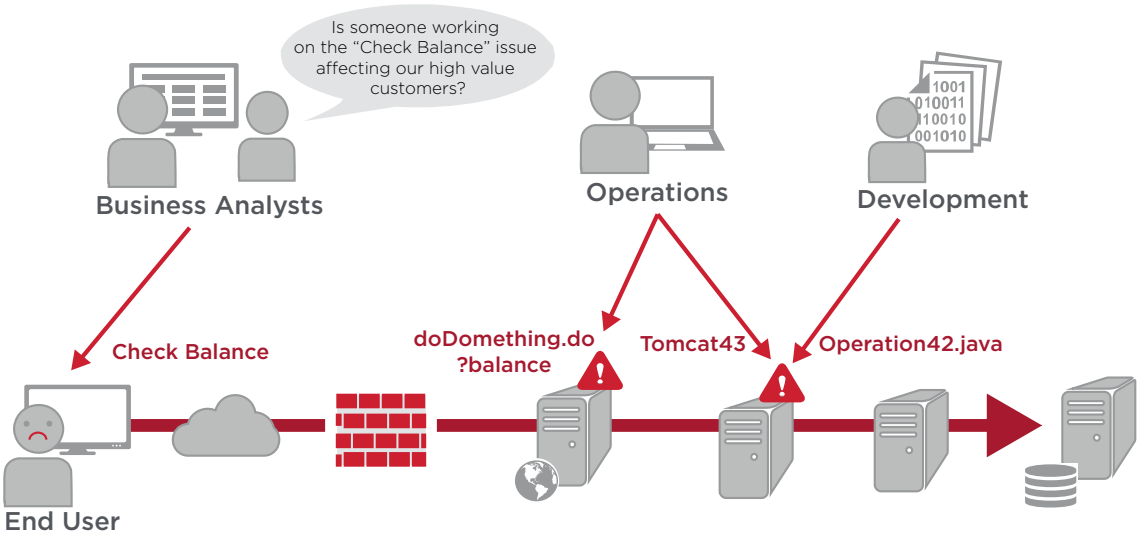


Importance of Connecting Performance Metrics with Business Impact

Establishing a common business context between the application developers, operations teams, and business group is essential to the success of today's complex applications.

One of the main challenges in monitoring an application is understanding how interactions performed by users correlates to tasks performed on the application backend. Without this understanding, the operations and development teams might only be able to refer to the tasks a user is performing by the webpage address, machine names, or source code files. This information might be meaningless to other stakeholders who are trying to understand the business impact and priority of an application issue.

Figure 2: Analyzing a Transaction Today



Once the business context is established, the subject matter experts and the stakeholders can understand the impact of an issue at any point in the application's transactional flow. They can ensure that the application is delivering value to the end user and business.

Operations can also now make prioritization decisions based on customer and business impact—not by the "squeaky wheel" approach of addressing the issue that has the most monitoring alarms active.

How It's Done Today

DX APM has multiple technologies that can be used to identify, name, and correlate business transactions and business processes to the backend work performed by application servers and downstream resources. The following examples describe how this correlation can be achieved today:

- **SDK/JavaScript** – The application developers programmatically "tag" human readable context into each webpage or screen along with defining rules to track those screens into a complex multi-step business process.
- **Agent Recording** – The APM Java agents are placed into a recording mode which allows them to capture the sequence of URLs and any HTML form, JSON and XML data passed from the client or server involved in a business process. The user can then manually edit the captured data to provide human-readable names to represent the URLs and Web pages.
- **Manual pattern definition** – APM provides a facility where URLs and webpage naming patterns combined with pattern matching of HTML form, JSON or XML data passed from the client or server can be defined. These pattern definitions are then assigned human-readable names and manually organized into business processes.

While the previous techniques can successfully establish the business context of a business transaction, many abandon them due to the ongoing maintenance cost and revert to using the webpage address as their business transaction name. This reversion causes stakeholders to no longer share a common business context for the end user's value to the application's business success.

BPA is a New Approach

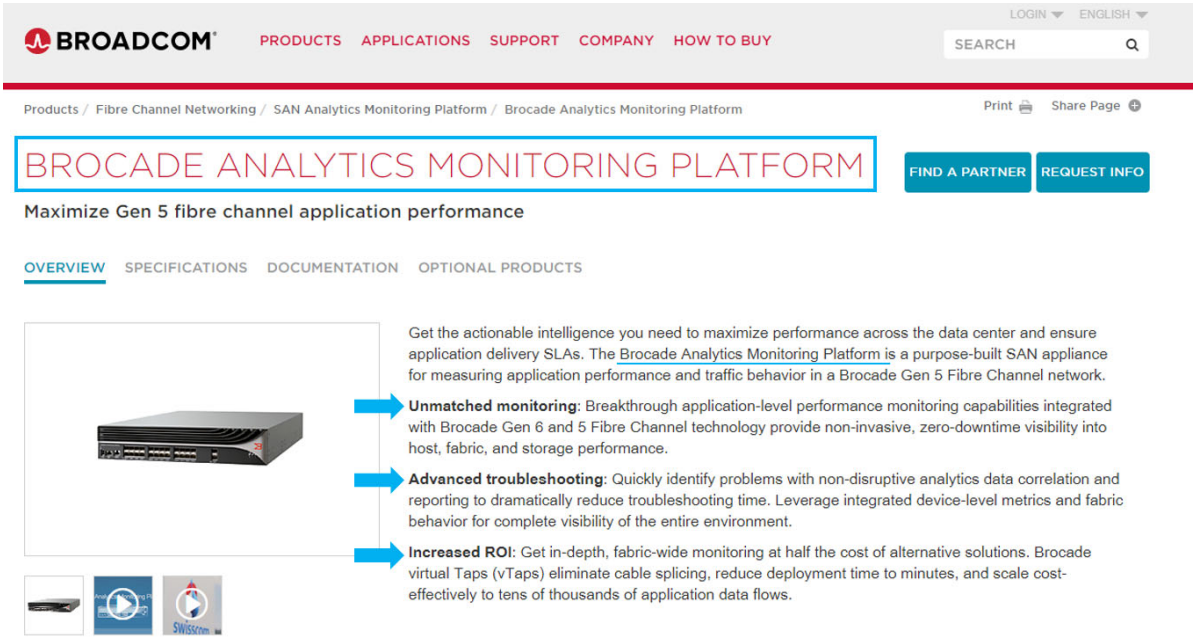
To solve the challenge of establishing a common user or business context, CA Technologies, A Broadcom Company has developed a capability called BPA. BPA uses patent-pending machine learning techniques and non-pervasive collection to extract user relevant information and business KPIs. BPA then maps this information to the application transactions—providing greater visibility into the user experiences that drive the digital business.

Let's see how this is done.

Analyze the Payload

BPA reviews and analyzes the payloads of conversations between the client and the application backend for structure. It uses a form of natural language processing and machine learning—similar to the way Amazon Alexa or Microsoft Cortana analyzes sentence structure. This analysis allows BPA to create rules about application Web pages, screens, or Web service calls. It then extracts key information to identify and order those Web pages, screens, or Web service calls into named business transactions and business processes. Over time, BPA evolves its understanding of an application as the application changes. The following figure shows an example webpage that was analyzed by BPA.

Figure 3: Example Webpage



The analysis included a sample of product pages viewed by users. BPA processed the data to generate a set of capture rules to create a business transaction name. In this example, BROCADE ANALYTICS MONITORING PLATFORM was used as the business transaction name. BPA has also identified a few other key phrases or words in the payload to capture as tags or attributes used for filtering in the APM Team Center application map or used to define Business KPIs.

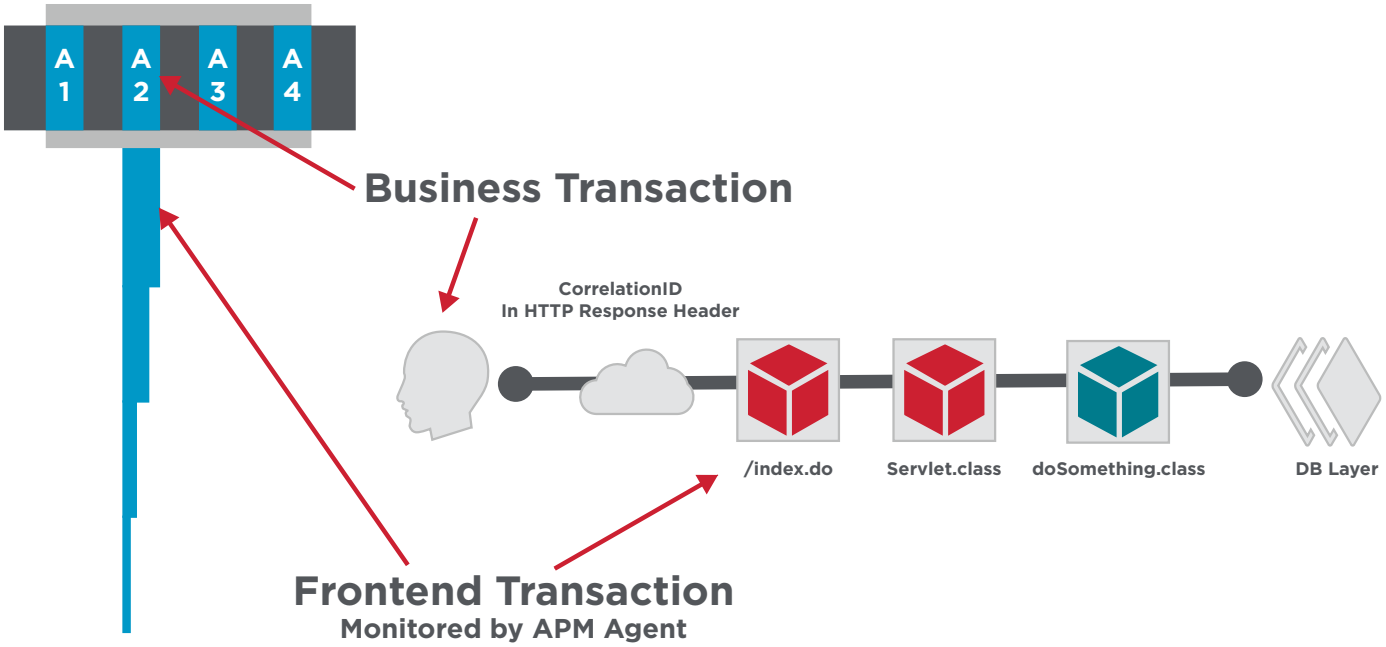
Identify and Sequence Repeating Business Processes in the Application

The next step in the process is to identify the patterns of repeating business transactions repetitively performed by the set of users accessing the application, and then group those transactions into business processes. To do this, BPA automatically captures the user session identifiers that the application passes between the client and backend servers. BPA uses the identifier to link and tag the data it captures from one page to the next. This data can then be displayed in a funnel format to highlight user paths and drop-offs.

Connect Business Transactions and Business Processes to the Application Backend

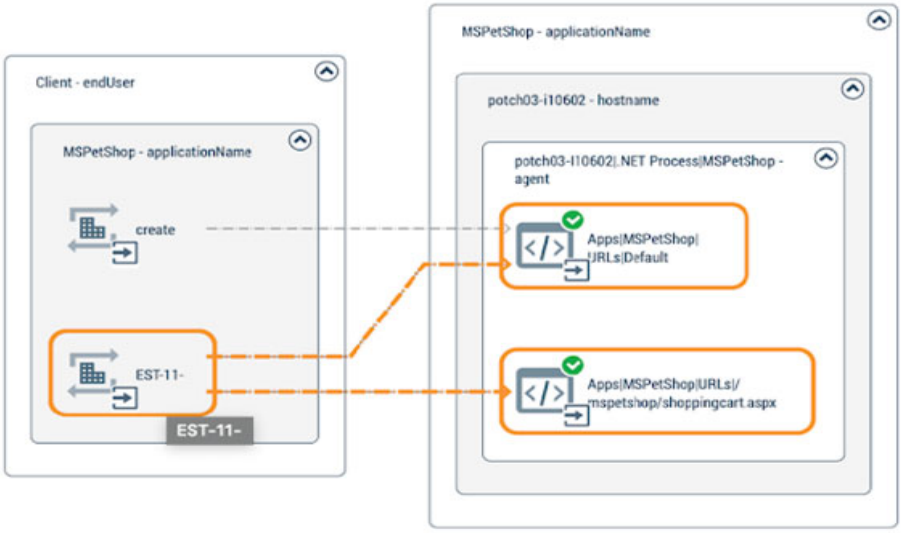
Finally, BPA connects the business transaction to the application backend by capturing the link that was triggered by the end user and monitored as an APM transaction. This link is a randomly generated CorrelationID inserted in the HTTP headers by the APM Agent that is monitoring the frontend transactions. This CorrelationID is then used by APM to link the captured name for the Business Transaction and the APM Application Map flow of a transaction through the infrastructure and back to the end user. The following figure shows the business transaction flow.

Figure 4: Business Transaction



Once the entire flow of the Business Transaction from the end user to the backend transactions is understood, DX APM displays this entire path in the DX APM Team Center topology map. See an example map in the following figure.

Figure 5: DX APM Team Center Topology Map



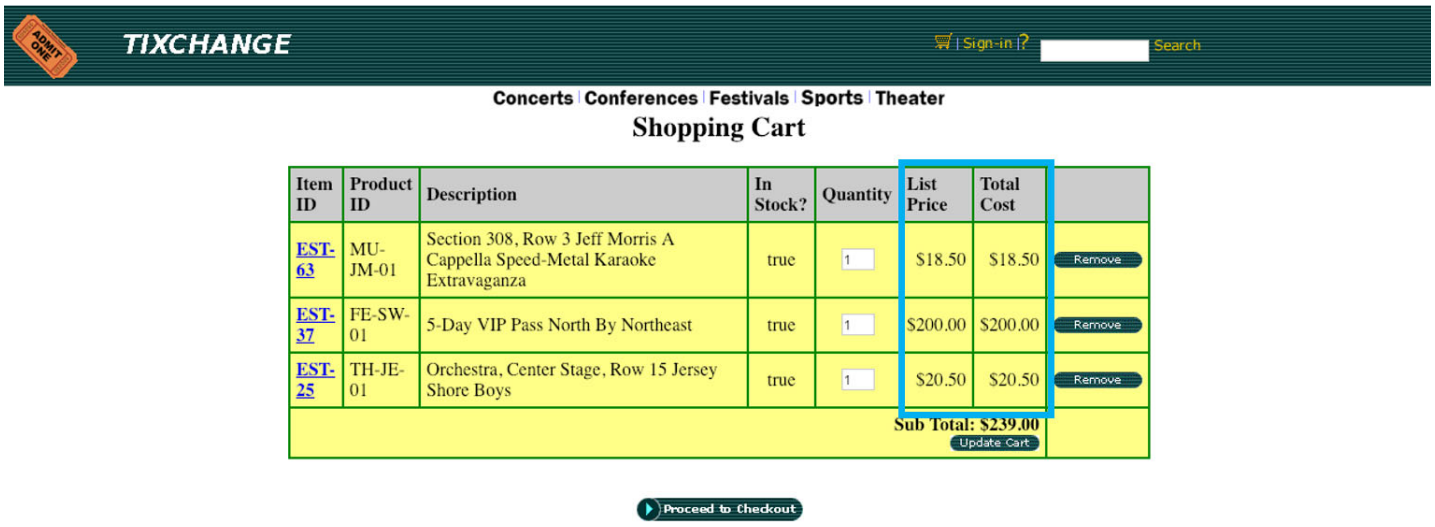
Using BPA to Gain Deeper Insights into the Business Impact of Customer Experience

There are multiple ways that BPA can be used to help provide business context:

- **Automatic Transaction Naming** – With BPA enabled, any detected business transactions will automatically be displayed as end-user elements in the application map in DX APM team center along with the named business transaction. This allows application owners to quickly understand business context directly in DX APM, rather than having to rely on multiple tools.
- **Define, Track, and Trend Business KPIs** – Application owners might want to track and trend certain KPIs that align to the business goals of an application. For example, an application owner might track a shopping cart value for an e-commerce application or the most popular product being viewed by the users. BPA provides the ability to define Business KPIs and trend them over time by extracting values from payload conversations without any modification to the base application code or developer knowledge needed.

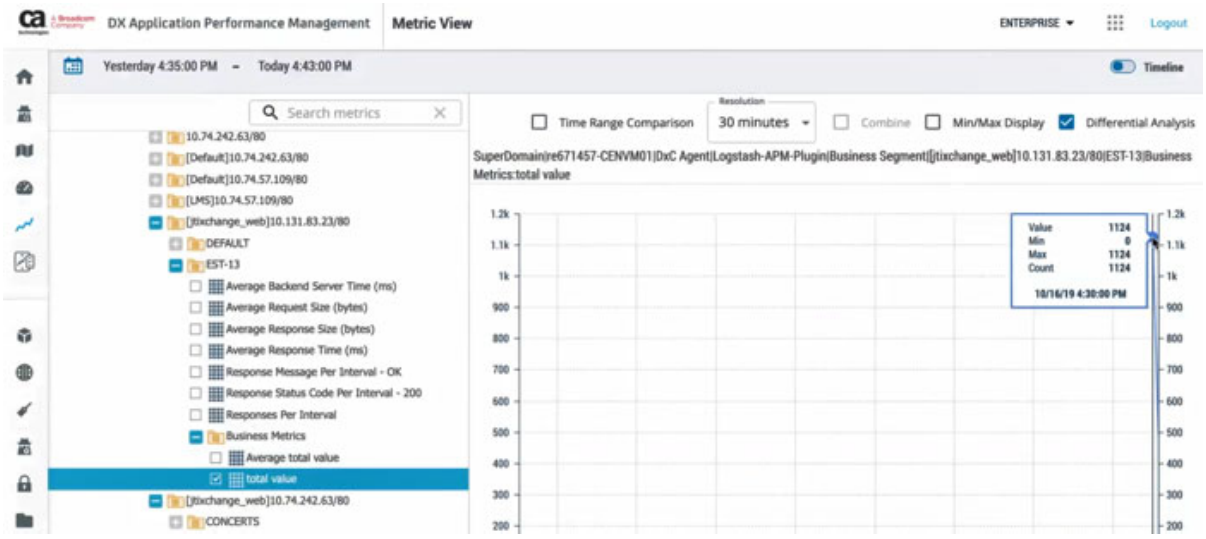
  The following figure shows an example where BPA is tracking shopping cart values.

Figure 6: Capture Shopping Cart Values



To determine the value, BPA learns from a sample set of users interacting with similar product pages (see Figure 2). Some keywords or values should be captured on any business transaction in the application where it is presented to the user. If the captured value is numeric (see Figure 6), the user can simply tell BPA to trend this value over time as a Business KPI. The following figure shows an example Business KPI graph.

Figure 7: Trended Business KPIs



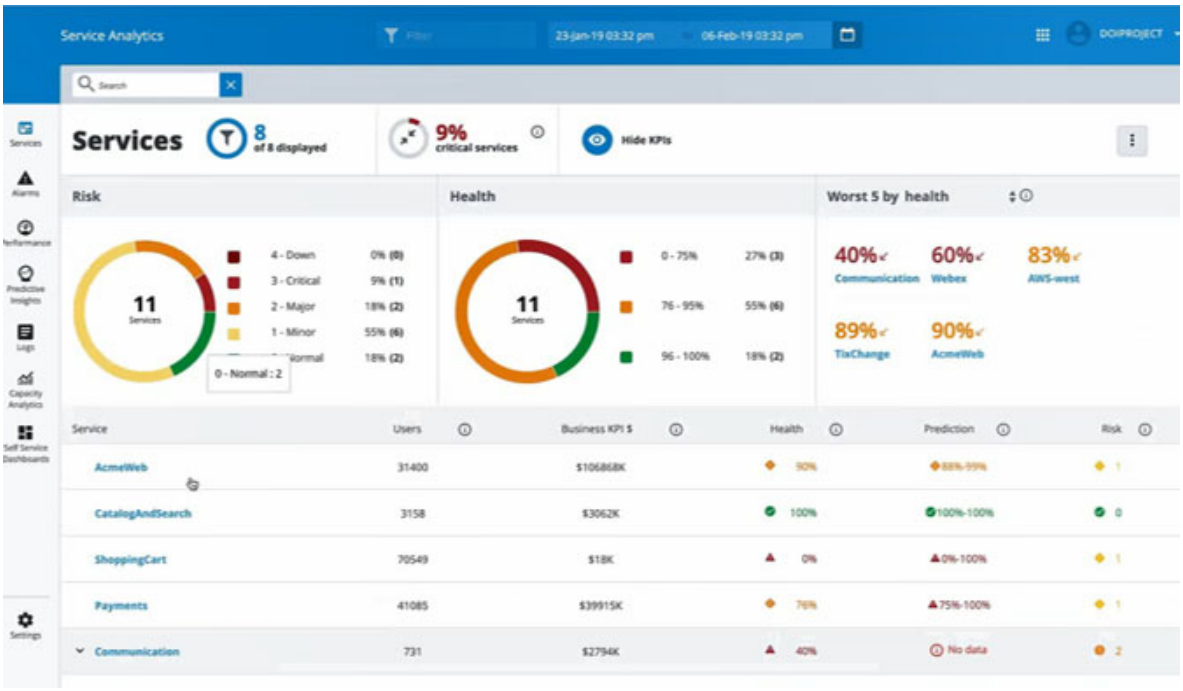
Alarms for Business KPIs are triggered using our single and multi-variant anomaly detection. Application owners might want to create custom self-service reports, or organize components in the DX APM Team Center application topology based on keywords extracted by BPA.

Business-Driven Service Analytics

BPA also feeds data into our DX Operational Intelligence solution to provide app owners with a single dashboard view of services and the impact on customer experience.

The following figure shows the Service Analytics dashboard.

Figure 8: Service Analytics Dashboard



By leveraging the Service Analytics dashboard, IT can prioritize alarms and outages by revenue or number of users affected. This prioritization allows IT to speed root cause analysis, and ensure that the most business critical applications are up and running.

Conclusion

BPA has been designed to help remediate the challenges and limitations of today's traditional methods for collecting user experience data. With BPA, application owners will have a much deeper understanding of how end user experience and business KPIs align with application performance. This will help application owners prioritize issues based on user experience and improve the digital experience.

To learn more about BPA, please consult the documentation.