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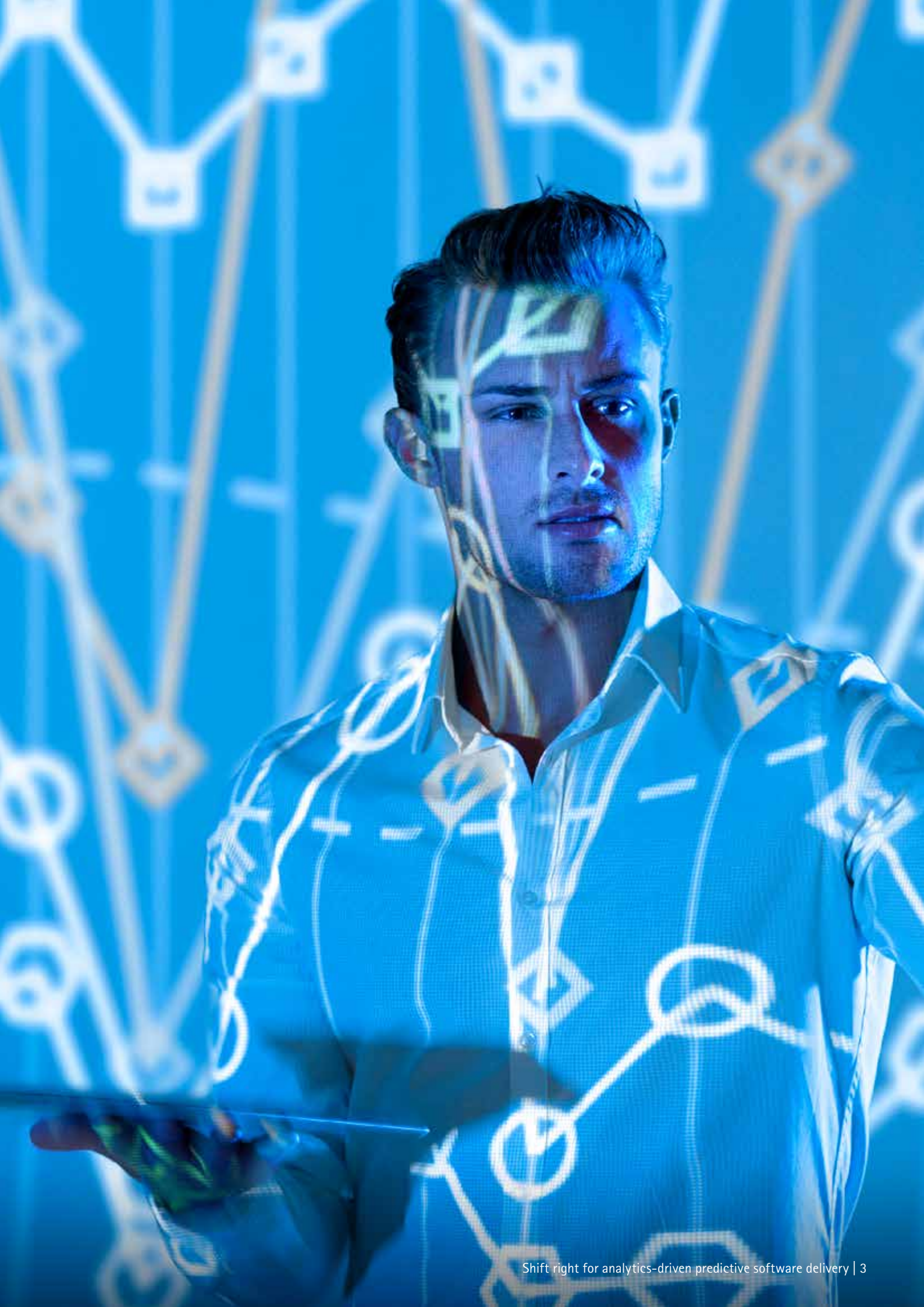
Hewlett Packard Enterprise

SHIFT RIGHT FOR ANALYTICS-DRIVEN PREDICTIVE SOFTWARE DELIVERY

STAYING AHEAD IN TODAY'S FAST-MOVING WORLD DEMANDS EFFICIENT SOFTWARE DELIVERY TEAMS. WITH TIME BEING THE MOST EXPENSIVE AND VALUABLE RESOURCE A COMPANY HAS, ENTERPRISES TODAY FACE INCREASING PRESSURE TO BUILD SOFTWARE QUICKLY AND WITHOUT SACRIFICING QUALITY.

Delivery is not about speed and quality alone. For optimal results today, frequent software delivery should be shaped by constant user involvement and the utilization of in-depth analysis of in-production application data such as performance, user interaction data, customer feedback, resource usage and other operational metrics. The ability to effectively analyze this data and act on the results is transforming software delivery into a complete package that enables better quality, higher productivity and an improved customer experience.

In this paper, we'll dive into the concept of software delivery based on predictive analytics, and discuss how you can use it to provide strategic differentiation for your enterprise, while enabling the innovation that today's IT leaders need in order to navigate their path to success.



DATA ANALYSIS AS A CATALYST FOR CHANGE

As Marc Andreessen so famously once said, 'software is eating the world'. Today's organizations' core processes and systems are based on software, and the majority of companies today—whether they know it or not—are actually software companies. The companies that will get ahead are the ones that are the most innovative with their software. This can be seen today with companies that are entirely software-based, such as Uber and AirBnB, who both disrupted their traditional marketplaces without any physical assets—Uber as a taxi service that owns no taxis, and AirBnB as an accommodations company that owns no hotels.

As software drives the change, delivery is critical, with IT changing the way business works. With analytics especially, the synergy between IT and business is greater than ever before. In the past a company had a specific business model and IT had to devise a solution to implement that model. What is happening today is that technology and especially intelligent applications powered by innovations in predictive analytics, machine learning and AI are driving a substantial change in the business model itself. A high delivery velocity is essential to get innovation to the market as quickly and efficiently as possible. Software engineering is changing from being a highly-structured and inflexible activity to becoming more agile and adaptive.

A NEW WORLD OF SOFTWARE DELIVERY

IT organizations face a challenge with the amount of time it takes to implement these types of changes. They often lack the tools needed to get proper visibility into what's happening to their software-delivered innovations, or are simply unable to forecast the emergent bottlenecks in software and delivery pipelines. When you know which of your product's features are most frequently used you can harness that knowledge to make sure that you prioritize your development and quality assurance (QA) effort on these features.

USING PREDICTIVE ANALYTICS TO IMPROVE QUALITY

Predictive analytics uses statistical algorithms to identify patterns in the data that you have, and attempts to accurately forecast how the environment will behave in the future. To truly benefit from your application and investment in software, you need to understand how to make better decisions to improve outcomes. Predictive analytics gives you meaningful insight into your software development and delivery processes, and tells you how far off you are from reaching goals such as on-time delivery, what the risks of upcoming releases are, or even the actions you should take to reach your targets.

Predictive analytics is complementary to DevOps; it gives you the ability to leverage your knowledge and transparency, react to it quickly, and reduce the chance of failure. The catalyst of this change can be seen in every industry; the same principles that are used by insurance companies to predict losses, for example, can be applied to application development to deliver software faster, and with higher quality.

TECHNICAL DEBT, AND THE DEPLOYMENT BOUNDARY

High development velocity could lead to IT organizations accepting technical debt as an accepted fact of delivery. Technical debt means temporarily compromising the evolutionary state of your software architecture or development objectives. This could mean, for example, compromising on automated tests, which can lead to more costly manual testing or other issues down the line. With the high velocity of software development in a release you can 'repay' any technical debt that was accrued by analyzing technical deficiencies in the development cycle. You can then prioritize and send the critical ones to development and QA for continued evolution and innovation.

Organizations today must counter the effects of technical debt and focus on both sides of what's known as the 'deployment boundary'. To the left of this boundary is an agile-based focus on testing, increasing quality, release criteria, etc.; and to the right of the boundary is the production environment and deployment infrastructure. For example, when developing your performance test plans and scripts, you can use the data gathered by your production logging and monitoring tools and scripts to learn the real-world performance characteristics and expectations, and set new performance goals against these. This enables you to create tests that evaluate software against real life scenarios that are performed by your users, and save a great deal of effort in building tests by eliminating guesswork.

There is great value in the data that exists to the left of the boundary; however the right side of the boundary has tremendous value as well—such as how your users are using your product, the positive or negative feedback they have based on usage, or what additional features or enhancements they request. Collecting and analyzing this important production data to the right of the boundary can help create higher quality releases, and prioritize the repayment of technical debt you have accrued.

HOW TO ARRIVE AT PREDICTIVE DELIVERY

So how exactly do you arrive at predictive delivery, which is essentially the application of predictive analytics to the software delivery lifecycle? And what does it take to get there?

Combining the rich and heterogeneous data available in post-release production environments as a 'first class construct' with the software development data is a critical component of a high velocity predictive software delivery.

DEFINING AND CAPTURING YOUR DATA

An 'outcome-based approach' means that before you change something, you need to know the final outcome that you want to achieve. For example, to determine how a mobile app's features evolve, it is necessary to understand what features your customers are using the most by capturing data such as user flows and clicks. This type of information can help you determine the data you want to collect, and then from there better understand what type of analysis you want to do.

Capturing your existing data involves knowing what data you need to use to feed the predictive analytics algorithms, and defining the data sources you want to use to make better and more informative decisions. Data reliability—the ability to know which data is relevant and which data is misleading—is another important part of arriving at predictive delivery. The data from your testing framework and continuous integration tools, for example, is extraordinarily valuable and has an abundance of hidden information.

DATA PREPROCESSING

Data will come from many sources, and in different shapes and sizes. In the data discovery process, before running your queries, data preprocessing is an important phase. Two of the steps concerns the normalization and standardization of the data. Data should be collected into a single repository, and then normalized and standardized in order to correlate metrics from different systems across the IT organization. This data needs to eventually be used to comply with the requirements of any predictive analytics solution that your organization uses.

UTILIZING TOOLS AND STATISTICS

An application's business leader needs to be able to understand the performance of their current initiatives and make investment decisions. They can do this by looking at a dashboard tool or statistics that can help them clearly interpret relevant data, such as what is trending to deliver in 10 days. Running 'what-if' simulations can help as well; for instance, what happens if I add five more people to my development team, or how might a new feature lead to extended application usage? Running these types of scenarios through a simulator can help you better understand its effect on future events and outcomes.

ACQUIRING THE NEEDED SKILLS

Data scientists are needed to help you deliver better and more effectively. Utilizing the knowledge of your data scientists and developing their skills is a crucial way of arriving at predictive delivery. With businesses looking for ways to gain more value from their data and organize the unstructured data that can't be effectively analyzed with traditional databases or tools, data scientists are a critical resource for any organization today. With predictive delivery in particular, this includes their ability to process and run a qualitative analysis on your past data in order to help you interpret your results, rather than just relying on a flat quantitative or binary, 'green' or 'red' result.

A WORLD OF PROBABILITY

Finally, enterprise IT leaders need to recognize and embrace the fact that this is a world that is not black or white. There are different levels and shades of gray—it's a world of probability with no perfect certainty or absolute answers. This is an iterative learning process that requires moving quickly, while at the same time understanding that it's only really possible to know the likelihood of what may or may not happen.

TWO PERSPECTIVES, ONE PATH TO SUCCESS

Through Accenture's 'shift right' model and HPE's predictive delivery model, two industry giants are welcoming and embracing the rising trend in predictive analytics.

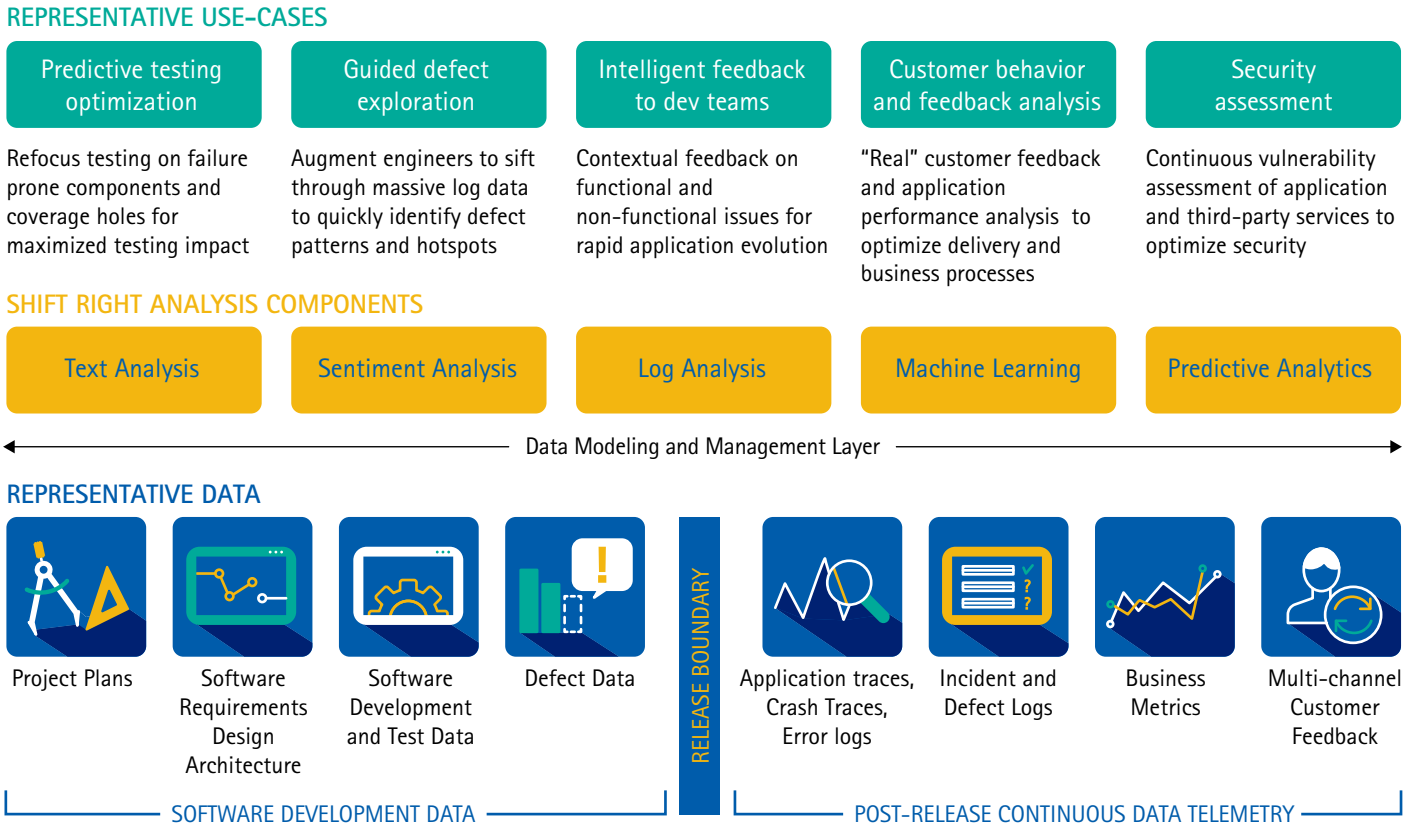
THE ACCENTURE PERSPECTIVE: SHIFT RIGHT FOR PREDICTIVE DELIVERY

While shifting left focuses on analyzing software development early, shifting right is about leveraging big data analysis to harness predictive delivery. Shift right is an analytics-driven approach to leveraging software development and post-release data for continually assessing the functional and non-functional qualities of "software under use" (software being used by customers). This adoption is critical in today's outcome-oriented economy, as taking proactive actions to enhance application quality and business performance is more important than ever before.

Adoption of a shift right approach provides continuous feedback to development teams for optimizing ongoing delivery. The shift right approach uses several artificial intelligence (AI) and statistical techniques running on a coherent data model of the rich and heterogeneous software development and post-release data. The techniques power several role-specific insights such as predicting the emerging hotspots in the software and proactively guiding testing teams to focus their testing efforts on these hotspots. Further, the shift right approach facilitates correlation of software-performance data with business metrics. In retail for example, analysis of real user monitoring data helps correlate latencies across enterprise IT to the end user with customer conversion rates which is a key business metric for retail.

The shift right approach is illustrated in detail in the image on the following page. Here you can see the different data points (software development and post-release), and how they feed the shift right approach through various logging and analysis systems.

The shift right model for predictive delivery



Accenture's view on shift right for predictive delivery is to balance the high velocity of a feature release by looking at the post-release data in order to assess the technical debt. By 'shifting right', you can not only look at software development data from your delivery pipelines, but at post-release data as well to see what technical debt has been injected into production. This requires working through a great deal of post-deployment data and information generated by users and production systems.

The need for the type of analysis described above was demonstrated in a recent pilot study with a large retail e-commerce enterprise, where Accenture analyzed the feedback of some of the retailer's mobile e-commerce apps. The enterprise IT was surprised to see that they were not aware of many functional issues that their customers were consistently providing feedback on, related to multiple releases of their iOS and Android retail apps. The critical user feedback and corresponding data they received enabled them to adjust their product backlog to address these issues, and deliver an enhanced user experience to their customers.

In another pilot study at a large European telecommunications company, intelligent automation opportunities were identified in the defect resolution process. Applying AI and analytics techniques on post-release defect data and software development data showed a 10-15 percent savings in time required for defect exploration, defect resolution and regression testing. Some of the shift right use cases are illustrated in detail in the image on the next page.

CONTINUAL UI ENHANCEMENTS
User behavior analysis, Path traversal analysis, Bounty programs, UI test automation

IDENTIFY FUNCTIONAL BUGS IN APPS
App-store rating analysis, Sentiment analysis, Natural language processing

SECURITY VULNERABILITY ANALYSIS
Crowd-sourced bug bounty programs, Static / dynamic code analysis, Behavior analysis, Log inspection, Data classification based privacy controls

APPLICATION PERFORMANCE MONITORING
Instrumentation, Secure logging Analytics, Visualization

APPLICATIONS FEATURE REQUESTS AND ENHANCEMENTS
App-store feedback analysis, User behavior analysis, Path traversal analysis

DYNAMIC TEST PLAN OPTIMIZATION
Path traversal analysis, Regression analysis, Hotspot identification

BUSINESS PROCESS OPTIMIZATION
Business KPI Analysis, Process-model based analysis, Application performance correlation and visualization

APPLICATION SERVICES OPTIMIZATION
Log analytics, Event correlation, Data mining, Invariant analysis, Visualization

THE HPE PERSPECTIVE: LEVERAGING PREDICTIVE DELIVERY

The advent of big data and ability to process data at high speeds makes predictive analytics an increasingly important part of our lives. Businesses apply predictive techniques every day—whether to manage supply chains, ensure customer retention, influence marketing behavior or calculate credit risk. These techniques can be applied to the software development lifecycle as well.

The predictive delivery concept

Predictive delivery is the application of predictive analytics to the software delivery lifecycle to help guide and streamline the software development lifecycle. For years, developers have been generating data as they plan, build, test, and deploy software, whether as part of an agile development environment or a traditional waterfall organization. Until recently, that data sat idle, and was frequently discarded.

Today, developers are in a position to ask some very interesting questions about their data, such as:

- Will my team be able to meet all of our commitments?
- Are we wasting time testing scenarios that aren't used?
- Are we prioritizing our development effectively?

Through predictive delivery, analysis can be applied at each stage of a delivery pipeline to understand what is likely to happen given a specific scenario. Ultimately the actual outcomes are combined to refine the algorithms, improving accuracy and insight into your development process.

For example, by applying predictive analytics to backlog planning, you can develop estimates that are more accurate. By combining the data for multiple teams, you can build an accurate plan of the backlog for your release and set more realistic delivery goals. Predictive techniques applied during development allow more efficient and faster throughput, while increasing the quality of the output. And with regards to operations, you can ask questions such as what the most likely usage scenario is for a feature, or whether you are investing the right amount of effort in certain functionality.

The insights that predictive analytics can derive from your development pipeline will reduce waste and increase the velocity and quality of your software, saving time and resources while benefiting users. At HPE, we are building the solutions and platforms that will power predictive delivery to enable teams to deliver better, faster and lower cost solutions.

While the predictive ALM software from Hewlett Packard Enterprise unlocks the insights hidden in previous projects, the specialized algorithms help mine existing data to accelerate development, improve quality, and mitigate risk. The Defect Convergence algorithm uses machine learning regression techniques to predict defect convergence based on historical data. This feature is a key component of our predictive delivery capabilities and will be made available for our HPE ALM and HPE QC customers.

PREDICTIVE CAPABILITIES TODAY ARE TRANSFORMING SOFTWARE DELIVERY IN THE SAME WAY GPS ONCE TRANSFORMED NAVIGATIONAL CAPABILITIES.

Leaders must show fast-paced innovation to keep up with their competition, and predictive analytics gives IT executives more transparency into their organizations, with the ability to gain deep visibility into the past and present state of their applications, and provide comprehensive strategic insights for the future.

The new era of delivery is one that's fueled by insight and data, and not just on gut instinct. With the dawn of predictive delivery, you can apply science, statistics and vast amounts of data at your fingertips to know where you've been, where you are, and—most importantly—take control of where you're going.

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To learn more about how predictive analytics can boost quality and agility of your testing and software delivery contact Leroy Jackson.

ABOUT ACCENTURE

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