



Hewlett Packard
Enterprise

Business white paper

Gain actionable insights from your ALM data

HPE Predictive Analytics





Faster delivery—no compromise

You know the drill. In IT today, it's all about fast delivery of applications and updates—with no compromise in quality. Organizations demand that you release in hours and days, not weeks, months, or years.

Changing your software development process by adopting Agile delivery of quality applications and DevOps practices will help. But we believe that one of the best ways to achieve success in new projects is by using data science, specifically predictive analytics, for prescriptive guidance.

After all, the future is predictive: The strongest indicator of future behavior is past behavior. So why not closely analyze previous projects and apply precise insights to new initiatives? Organizations across many industries are starting to realize the value of applying analytics to business problems—tapping into a goldmine of dark data waiting to be explored.

About HPE Predictive Analytics

HPE Predictive Analytics is a new solution that helps reduce uncertainty and risk in software development projects. It improves your application delivery by providing actionable insights from analysis of your existing application lifecycle management (ALM) data.

HPE Predictive Analytics works with HPE ALM.NET (versions 12.0 and newer) and **HPE ALM Octane**. Its primary strength comes from applying several data science techniques to analyze and use your historical ALM project data. Techniques such as multivariate analysis, machine learning, recommender systems, anomaly detection, cluster analysis, and time series analysis combine to analyze historical data.

HPE Predictive Analytics algorithms learn and improve on predictions and recommendations over time, enhancing your ability to derive valuable insights. The result is that your planning, development, test, and operations teams can:

- Reduce the risk of failure when planning for new Agile projects
- Improve the level of code build quality in all releases to avoid rework
- Scale test management continuously and efficiently across geographically distributed teams

Questions you're probably asking

If your IT team is like most today, it's likely you face these questions:

- **Agile development:** If using Agile delivery, are quality assurance (QA) and development environments synchronized to the same build? Do we have clarity of roles and skill sets to help optimize Agile application delivery?
- **Resource allocation:** Are teams resourced appropriately? Are our planning estimates accurate? Do we have over- or under-capacity issues? How do we have governance when managing the use of distributed and disparate resource pools?
- **Quality management:** Do we have the right workflows in place to identify/resolve defects across a complex application portfolio? This is especially important for the quality and test management of interdependent systems within regulated, siloed enterprises.
- **Test automation:** How long will it take us to resolve defects? Are we testing the most critical parts of the application? Are we automating the right tests for continuous, and not slowing transformation to Agile delivery?
- **Management complexity:** Can we easily identify the root cause of build failures? Can we figure out who the right people are to fix an issue when something goes wrong? When different best-of-breed tools are in use, how do we manage for enterprise scale?

What HPE Predictive Analytics can do for you

When you look at the data and metadata associated with every requirement, user story, test, build, and defect across multiple projects, you quickly accumulate a significant amount of data that is ripe for analysis. By unlocking the insights hidden in your HPE ALM.NET or HPE ALM Octane projects, you can drastically improve the following processes:

- **Plan:** Accurate planning and estimates help set up Agile projects for success, by analyzing past performance data for better development timelines.
- **Develop:** Improve efficiency and accuracy while writing code, to identify problematic code and avoid rework by identifying existing code for reuse.
- **Test:** Accelerate for continuous testing, predicting defects and reducing time to fix with recommendations for reusing existing tests.
- **Operate:** Promote test efficiencies and collaboration across development, testing, and operations with enterprise scale, using actual production data to reduce risks and costs.

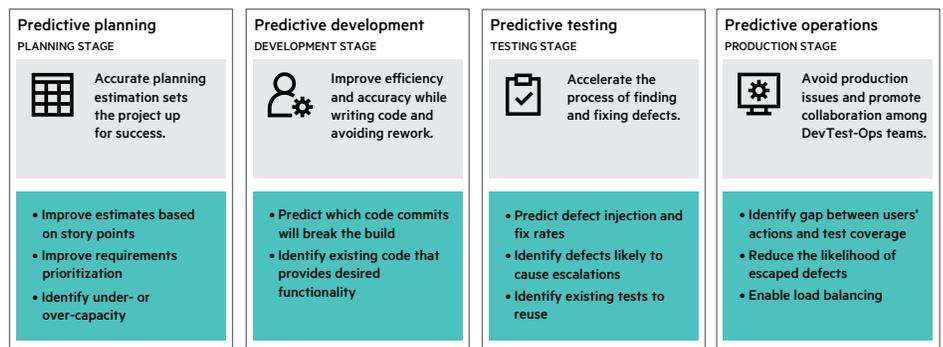


Figure 1: Overview of the HPE Predictive Analytics framework

HPE ALM Octane: at the core of HPE Predictive Analytics

HPE ALM Octane—a centralized ALM toolchain that is comprehensive and modular—is specifically designed for high-velocity Lean and Agile teams. HPE ALM Octane integrates with both HPE Agile Manager and the traditional HPE ALM.NET platform to allow teams to easily share assets and report across projects.

As the core platform supporting HPE Predictive Analytics, HPE ALM Octane delivers these key benefits for your IT team:

- **A responsive, streamlined user experience:** A targeted and simplified user flow and architecture use responsive design. HPE ALM Octane can be accessed through any HTML5-supported web browser or operating system, including many tablet devices.
- **Open, integrated, and extensible architecture:** With many out-of-the-box integrations, HPE ALM Octane boasts an extensive REST API, documented with Swagger, to allow users to work in the environment they're most comfortable in, without sacrificing collaboration, governance, and process guidance.
- **Easy integration with application delivery pipeline:** HPE ALM Octane platform easily integrates with the team's existing Jenkins/CI system for visibility into the release pipeline, as well as into source code control systems like Git, allowing for stronger collaboration and supporting a faster path from manual testing to test automation.
- **Unmatched enterprise scalability and support:** With scalability, enterprise credential support, cross-project sharing and visibility, and flexible methodology, IT teams can start small and know that as they grow the underlying technology is designed to support them along the way.

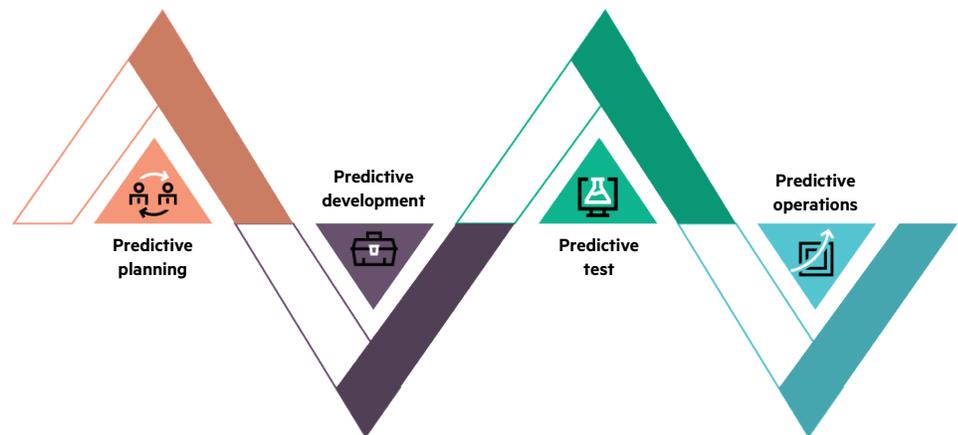


Figure 2: The four phases of HPE Predictive Analytics

Step 1: Predictive planning

With any Agile project, it's crucial to get initial estimates right because it sets the project up for success. If your timelines and investment estimates are incorrect, everything you do after that will be wrong, and you may be forced to make difficult decisions later to cut back on planned resources and features.

Much of software project planning today is based on heuristics and subjective experience rather than on actual data and analytics. So it's not surprising that a standard piece of advice when estimating development time is "take the developer estimate and triple it." But this is unrealistic.

By applying data science to testing and production, we have the opportunity to continuously improve the accuracy of planning estimates, by using a team's actual performance as the basis of a learning data set. We can make recommendations about estimates, offering prescriptive guidance as dates, resources, and/or business objectives change. This includes specific recommendations that depend on user-related data and how the algorithm is tuned.

The result is improved accuracy in development time and budget estimates, through automatically estimating and ranking recommendations with **Predictive planning**.

Example: Starting with user requirements, story points, and feature size estimates, HPE Predictive Analytics algorithms analyze a team's previous performance and identify potential problems, such as inaccurate estimates that will result in under- or over-capacity. Say that the team's initial estimate for a backlog item in sprint 1 is 15 story points, and the algorithm searches for actual duration data from similar backlog items in previous projects or releases. In so doing, the algorithm determines that a more accurate estimate would be 25 story points and recommends a more accurate estimation—to resize current estimates, but to also break the backlog item into smaller tasks.

Algorithms can identify over- and under-capacity issues and make recommendations for adjustment at the beginning of the sprint/project. This sets the team up for success: Rather than basing estimates on "gut feel" or industry averages, or tripling developers' estimates, algorithms can make more accurate predictions based on the team's actual performance.

Example: Let's say a backlog item was estimated at 15 story points, but analysis of similar backlog items in earlier projects showed that teams have been more productive than they anticipated, with the 15 story points an overestimation. HPE Predictive Analytics would then make a recommendation for resizing to 10 story points.



Figure 3: HPE Predictive Analytics helps you estimate projects more precisely, identifying over- and under-capacity issues.

Step 2: Predictive development

HPE Predictive Analytics improves efficiency and accuracy by helping your developers write efficient code, identify defects as quickly as possible, and avoid rework. From predicting code commits that will break the build even prior to code check-in, to proactively analyzing source code for defects or complexity, HPE Predictive Analytics offers suggestions and can identify existing code for reuse, based on the functionality you need.

Example: Consider a global industrial corporation with more than 200,00 employees in 150 countries. The company manufactures products that enhance energy and operational efficiencies in buildings and vehicles. By using HPE Predictive Analytics, the company was able to achieve greater success by establishing best practices that enable developers and project teams to improve application delivery processes. The results:

- Accelerated work on demand, enabling project teams to deliver more dependable, high-quality applications (code build). Streamlined defect tickets and conducted comprehensive testing of controls, defects and traceability of requirements, fostering greater efficiency.
- Opened up time for the IT department’s testing center of excellence (CoE) to be more proactive in providing advice to the business about testing tools and quality assurance functions as well as research and development expertise.

A primary benefit of HPE Predictive Analytics is traceability—from requirements and user stories to application modules, tests, defects, code commits, and builds. But when a build fails, development teams are faced with many questions—the most important being “Why did the build fail?” Options involve manually reviewing log files, many of which can be thousands of lines of code. With HPE Predictive Analytics algorithms, you can analyze metadata associated with each of these elements, to predict what is most likely to happen and offer recommendations. This is made possible through **build failure classification** and **log analytics**, which make it much easier to get code builds back to a good state.

HPE Predictive Analytics uses machine learning to determine if the build failure was caused by environmental issues or failed tests. After the cause has been narrowed down, the algorithm directs the user to the specific log lines that need to be reviewed, to drastically narrow down information that needs to be manually reviewed.

The algorithm also tracks for user feedback to improve the classification accuracy over time, and it can determine if similar failures have occurred on previous builds. Once similarities are identified, the algorithm ascertains who fixed the previous issues for **predictive collaboration**—enabling the knowledge expert(s) to recommend tactical actions for resolution, such as contacting the right team member.



Step 3: Predictive testing

HPE Predictive Analytics helps QA teams accelerate the process of quality application delivery through continuous testing. Algorithms help you identify the areas of an application with the most risk based on the analysis of code check-ins, changing requirements, test coverage, and feature usage. In addition, you can identify which tests may need attention because they have slowed down (taking longer to execute), are oscillating (pass/fail), are consistently failing, or haven't been run.

Example: Picture a leading information and technology-enabled health services business that delivers integrated solutions to modernize the healthcare system and improve overall population health. Managing quality and test management across such a complex portfolio in this regulated environment can be daunting. Using HPE Predictive Analytics to gain insights from project test data, the company was able to increase efficiency by adopting Agile across all new IT projects, while still maintaining a legacy Waterfall environment. The results:

- Real-time metrics can now be used for test requirements, execution, and defects across diverse, geographically distributed application teams. All teams view the same data instead of different spreadsheet versions. And by using data from HPE ALM in the Apache Hadoop platform, a data warehouse can be used by multiple systems for reporting.

Unfortunately, many QA teams spend the majority of their time conducting manual tests. HPE Predictive Analytics uses algorithms to help testers perform more efficiently. With root cause analysis, the solution fine-tunes QA resources by identifying which tests are failing in combination, and which are most likely to have the same root cause. It can determine if similar clusters of tests failed, how they were resolved, and who fixed them—greatly reducing the time it takes to fix underlying issues.

HPE Predictive Analytics also identifies which elements in an application have been covered by automated tests, frequency of use, and which elements have no test coverage. Algorithms couple test coverage mapping with production data to identify the most frequently used functionality. By overlaying usage by test coverage, the solution helps direct exploratory manual testing efforts to the highest priority areas of an application, for example, those with high usage and low automated testing coverage.

HPE Predictive Analytics offers smart recommendations on which tests need to be run based on code changes checked in. For example, rather than running a suite of 20,000 automated tests, it identifies the subset of tests that need to be executed based on code changes. The QA team may need to run only 500 tests to cover the latest commits. This helps you greatly reduce overhead and focus resources on the highest areas of risk.

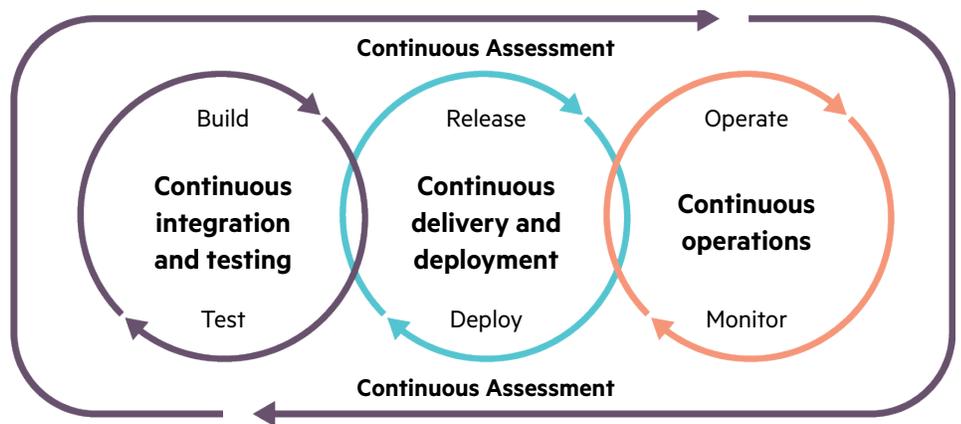


Figure 4: Stages of continuous assessment in HPE Predictive Analytics

Step 4: Predictive operations

As you track and report on capabilities across the project lifecycle, you can also promote test efficiency and collaboration across development, testing, and operations teams. This is done through actual production data that is routed into the machine learning and multivariate analysis of HPE Predictive Analytics.

Avoiding issues in production is one of your operations team's highest priorities. This team is responsible for keeping the production environment up and running and aims to avoid problems at all costs. HPE Predictive Analytics helps avoid issues in production in several ways, while working at enterprise scale:

- By analyzing test inefficiencies through predictive test production convergence, identifying what users are doing in production through actual usage data, workflows, frequencies, and so on. Algorithms identify the gaps between what users are doing and what tests are covering.
- In addition, HPE Predictive Analytics can analyze incidents in production (escaped defects) and identify the key causes of the defect and why they were not identified during testing. This insight is then used to make recommendations about which areas of an application are likely to have future escaped defects and how to resolve them before they cause issues in production.

Example: Imagine a leading financial services firm that provides credit decision-making solutions for approximately 500,000 direct and indirect customers, offering digital certifications for online transactions to be conducted legally and securely. If anyone wanted to see the impact changes made by continuous real-time application upgrades, it would take hours to find that information because it is not easily warehoused or retrievable. The system wasn't able to handle the company's need for data extraction, expansion, and reliability. Using HPE Predictive Analytics to gain insights from production data for test efficiencies, the firm can now define and build tests continuously, to deliver applications quickly and accurately at enterprise scale.

HPE Predictive Analytics provides detailed test reporting and heat maps that shorten the time needed to detect defects so that the firm can collaborate across teams and correct gaps in test coverage within six hours. By offering enterprise-grade Agile delivery that scales within DevOps practices, test results can now be easily stored, categorized, and assessed to facilitate test reuse.

How HPE Predictive Analytics extends the benefits of HPE ALM Octane

Unlike other tools that are piecemeal in nature, HPE Predictive Analytics extends the benefits of HPE ALM Octane. A case in point is the integration between HPE ALM Octane and HPE Project and Portfolio Management software (HPE PPM). You now have the unique ability to link project and portfolio planning data with ALM and develop algorithms that were not previously possible. This enables you to deliver actionable insights for initial planning with readjustment/prioritization across the Agile project lifecycle, while at the same time linking financial tracking data to estimates and actual performance.

HPE predictive algorithms include:

- **Predictive prioritization:** Analysis of production monitoring data is used to identify gaps in current functionality to make recommendations for closing these gaps. In addition, production usage analysis will help identify the most commonly used or popular functionality as well as the workflows.
- **Predictive re-prioritization:** Even with the best initial project estimation and prioritization, business needs can change. From new security threats to technology challenges, this can force a re-prioritization of planned work. Predictive re-prioritization helps users understand the possible tradeoffs through what-if analysis and recalculated project timelines.

Set your Agile projects up for success

Unlike other approaches, HPE Predictive Analytics uses algorithms uniquely developed by our data scientists that model on actual production data. This helps reduce defect backlogs and fine tune resource allocation for delivery at enterprise scale.

Take your first step to unlocking the value of **HPE Application Delivery Management**. Learn how you can enhance your application development lifecycle with **HPE ALM Octane**. Download the trial and learn to scale your Agile practices when you have tens (or hundreds) of software teams, as you have complete visibility across your Agile application lifecycle.

Next, **watch this video** and see what a difference continuous actionable insights can make as you plan-develop-test-operate across your teams. Then, visit us online to learn more.

Learn more at
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