# Leveraging Common Test Platforms Across The Product Lifecycle

Within any organization, different engineering groups involved in the product development life cycle must grapple with many similar questions regarding test and validation strategies:

- How do I validate that my product functions as intended at this phase?
- How do I implement testing early enough and fast enough?
- How do I control costs relating to testing and validation?
- How do I ensure problems are identified as early as possible?
- Is it possible to leverage what other departments have already done?

However, each group specializes in developing unique test approaches for their specific phase of the product development process. As a result, different needs arise when it comes to acquiring or developing solutions for their testing responsibilities. A test manager focuses on their department's unique project budget, timeline, and technical requirements of their phase of the product development life cycle. However, department managers are rarely tasked with the responsibility to consider how to optimize testing strategies across multiple areas. As a result, multiple unique and sometimes redundant solutions are designed at a higher overall cost to the company.
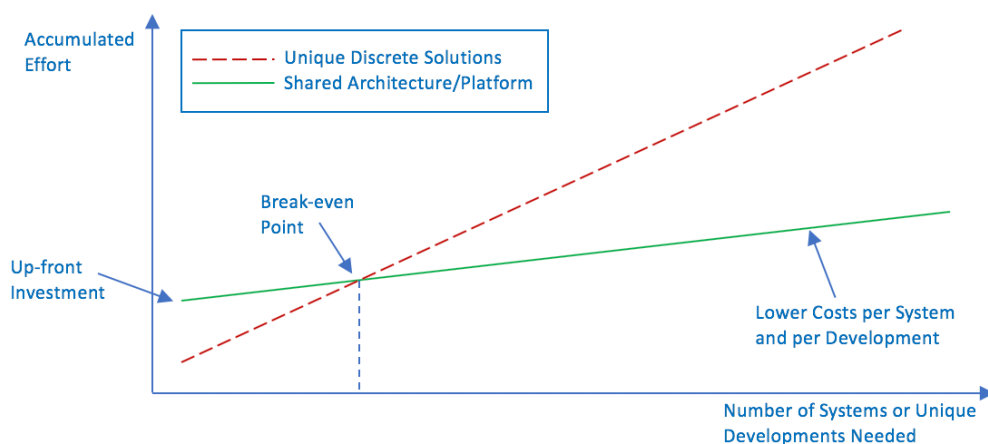
Every business becomes vulnerable when silos exist within the company, an all-too-common occurrence in multi-phased product development. All of the following testing phases serve essential and unique roles in ensuring quality assurance for your product. The testing needs of each are highly differentiated as a result. On the next page are the distinct aspects of each.
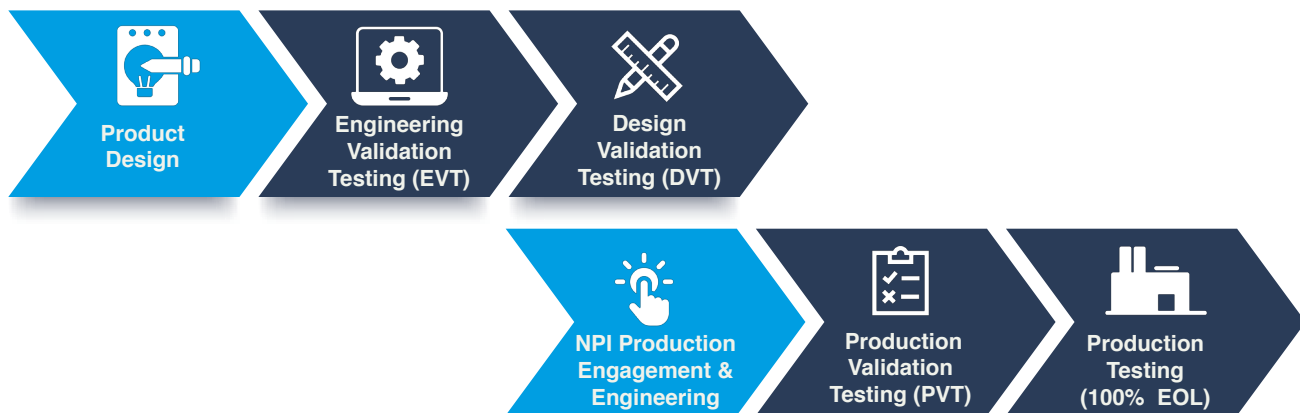
Navy Blue = Functional areas where testing is developed and utilized

Engineering Validation Testing (EVT)

In this stage, functional testing ensures a product is designed correctly and meets its functional intent. EVT helps prevent product design shortcomings and requirements misses from being passed into subsequent product development phases. If the initial product design is unable to meet the technical specification and produce expected results, changes must be made to the hardware and software designs before moving on the next phase of the process.

Design Validation Testing (DVT)

Once design's functional performance is validated, you must validate it further through regression testing, including environmental stresses. The DVT testing regimen simulates the actual Device Under Test (DUT) functional and physical operating environments and sometimes is applied to multiple DUTs simultaneously over long periods, regressively testing different scenarios and profiles. The goal is to determine how well your product performs over time and through various scenarios.

PVT Validation Testing (PVT)

Production (Validation) testing is utilized to confirm the end-product, or subassembly DUT, was assembled properly to verify the performance of the DUT as manufactured. PVT is employed primarily to verify the manufacturing process is correctly implemented, and the materials used (including lots/date codes variants) on each DUT have not inserted functional problems into the product. This is typically implemented on 100% of the production volume before shipping.

As a result, in these three distinct test phases, test departments may focus on their individual department project needs to create the optimal test solution for their phase only. While this can be an effective way to solve short-term solution needs, long-term savings and broader, company-wide efficiency are often risked in the process.

As companies grow, organizational complexity can also increase, and new test needs may arise. As a result, the ability to effectively scale testing and maintain consistency across the product development cycle becomes increasingly difficult. The following paragraphs include five key benefits of leveraging common platforms to increase standardization across your product development cycle to optimize effectiveness across functional boundaries.

1. Increase Efficiencies by Standardizing Your Test Approach Across the Development Cycle

The myriad different test solutions that are created by different organizations throughout the product development cycle are by default, extremely inefficient. There is an incredible amount of redundancy of effort from department to department, including selection of test equipment, creation of test approaches for new (and even previously implemented) functions, development of new software for testing, creation of test fixturing, analysis of product test requirements, lack of awareness of prior and subsequent phase testing strategies/coverage, etc. There is frequently also no mechanism to provide an effective feedback loop from advanced development groups, through product design, into manufacturing, and out to the field.

2. Optimize Test in the Product Development Live Cycle

The inefficiencies described above are often the result of a lack of a cohesive strategy and standardization on common architectural test approaches. By standardizing on common test hardware and software platforms, you can derive increasing degrees of efficiency across multiple organizations. When properly deployed and managed, organizations will begin to benefit from a design-once, and use-many approach. Additionally, this approach enables a higher degree of closed-loop feedback, coordinated strategy, increased test coverage, and elimination of redundant efforts, thus saving engineering effort and improving overall schedules.

3. Effectively Utilize Your Team(s)

The benefits of the above design-once-use-many approach extend to increased productivity.

Because you can to train your engineers on one system/platform, onboarding and ongoing learning is easier versus an organization that must train new, and current employees, on several custom solutions, while also spending valuable resources "inventing" multiple approaches to similar challenges. Additionally, teams that share common platforms are more nimble and flexible, allowing redeployment of resources as business needs change.

With the reuse of components across the company, your teams can deploy simultaneous, rapid updates on test systems and resolve issues that could impact the entire organization. This guarantees a faster product feedback loop.

4. Minimize Downstream Failures and Rework

With standardization of hardware and software, engineers can make quick and consistent updates to test systems as needed. These improvements are then deployed to each test site and across the development cycle, instead of servicing only one silo. With standardization, a closed loop is created so a downstream engineer can deliver information

---

Five Key Benefits Of Leveraging Common Platforms To Increase Standardization

1. Increase Testing Efficiencies Across the Product Development Cycle
2. Optimize Testing within the Product Development Cycle
3. Effectively Utilize Your Team(s)
4. Minimize Downstream Failures and Rework
5. Build-In Team Collaboration to Gain Consistency

and fixes, which are then incorporated upstream to prevent testing escapes in future product development. This reduces your product boneyard, and simultaneously minimizes the extremely high costs of downstream failures and rework.

5 Build-In Team Collaboration to Gain Consistency

In an organization that standardizes test solutions, engineers and test managers share best practices within the company and increase education. This improves training and reduces the time to educate new employees. It also allows you to move talent around your organization as needed. The increased flexibility allows your organization to be nimbler in deploying resources – focusing only on the parts of the development cycle that need it most at that time.

By leveraging the same technology and tools whenever possible, you have designed a process to deliver the most efficient and cost-effective solutions. Utilizing common equipment and software across different phases lowers the number of hours of engineering time and decreases the numbers of unique test components to stock and support. As a result, you will see greater consistency through test development.

The cumulative benefit of all the above features help drive a better, more collaborative culture in your organization and improves the bottom line by decreasing your time to market through every product lifecycle. Engineers will utilize a common vocabulary/vernacular and understand a common language and will be encouraged to share best practices to accelerate progress and development in the organization. As their time becomes more efficient, engineers will enjoy the ability to dive deeper into their own areas of technical expertise rather than reinventing previously implemented solutions. Your employees will be more engaged as a result and turnover will decrease. Standardization creates smarter, better businesses.

Obstacles to Implementation

Despite the easy-to-understand benefits of leveraging common platforms, the implementation of a holistic test strategy won't succeed without the right tactics to properly execute and get everyone moving in the same direction. The tendency for test managers to myopically focus on custom solutions for only their own department or project is one of the easiest ways organizations get knocked off this path to greater savings. Also, if your test managers are operating with autonomous budgets and have not been presented with the broader strategy, they will likely overlook the benefits of a standardized approach to the broader organization. Finally, if different test sites have historically operated independently, a top-down push may be required to ensure buy-in.

This is where alignment and participation from senior management and the finance organization is necessary. Your organization's strategy must extend to the development of a financial model that demonstrates the long-term savings and efficiencies created with this approach. Advocates of this approach will need to invest necessary time and resources to deliver a compelling business model including a demonstration of financial benefit, and C-level executives need to mandate its implementation including deadlines for completion, as well as metrics to track ongoing compliance. From an organizational standpoint, this approach won't be successful without participation at every level.

Buy-in of this strategy by test department managers is needed early, and business leaders/sponsors must require compliance to the objective of standardizing testing across the product life cycle, but must also provide the budget, resources, and time necessary to implement the strategy and plan.

Best Practices for Getting Started

Once you have attained executive and financial department buy-in and sponsorship, the hard, technical work of selecting appropriate hardware and software platforms begins. In order to effectively represent the needs of the entire organization, you will need to implement a cross-functional team that is well funded with both time and resources and given the charter to work across the organization to determine the appropriate strategy.

It will be this team's responsibility to find and select hardware and software based on the testing needs across the entire development cycle. The strategy needs to support and compliment the various specific needs of each department while also providing a common environment which allows the creation of testing solutions that can be shared up and downstream or across the organization. A cross-functional and representative team will help ease test managers' fears that their department will receive an inadequate system that compromises their test coverage and undercuts their ability to effective move products through their phase of the cycle.

A strategy and timeline must be set in place to ensure this transition occurs across each test silo and site location and the move to standardization is a seamless one. Finally, you must define ongoing metrics and key performance indicators (KPIs) and ensure they are tracked and built into key department and individual performance assessments to ensure compliance over time.

As demand for new technologies increases, your ability to make this move now will enhance your ability to increase your product time-to-market and earn much greater margins in the years to come.

For more than 50 years, Ball Systems has served companies that develop and manufacture critical components for the automotive, aerospace and defense, and consumer appliances industries. If you are ready to begin your journey towards standardizing test platforms across your corporation and would benefit from a partner who has been there before, please contact us today.

Contact Us

ballsystems
50 YEARS OF INNOVATION

16469 Southpark Drive, Westfield, IN 46074
Ph: +1 (317) 804-2330
ballsystems.com