

MANIFESTO

THE INTELLIGENT TEST LAB

From Manual Coordination
to Intelligent Test Operations

“The next breakthrough in industrial testing will not come from automating individual test benches. It will come from intelligently orchestrating the entire testing operation.”



10 THESES • ONE VISION • THE FUTURE OF INDUSTRIAL TESTING

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THE POINT OF VIEW

A New Vision for Industrial Testing

For decades, engineering companies have invested heavily in sophisticated test benches, measurement systems, and laboratory automation. These investments have transformed the technical capabilities of industrial testing.

Yet a fundamental contradiction remains: While individual testing systems are often highly automated, the processes surrounding them still depend heavily on manual coordination.

Test requests must be prioritized. Resources must be allocated. Test specimens, equipment, and qualified personnel must be available at the right time. Approvals, dependencies, and unexpected changes must be managed across departments and locations.

In many organizations, these activities still rely on spreadsheets, emails, disconnected applications, and individual experience.

WE HAVE AUTOMATED THE EXECUTION OF TESTS. NOW WE MUST TRANSFORM THE WAY TESTING OPERATIONS ARE MANAGED.

This transformation is becoming increasingly important as engineering organizations face growing product complexity, shorter development cycles, increasing validation requirements, and pressure to use expensive testing infrastructure more efficiently.

Emerging technologies such as artificial intelligence, intelligent optimization, digital twins, and autonomous systems create opportunities to address these challenges. However, technology alone will not deliver the transformation.

The prerequisite is a connected operational environment in which test activities, resources, workflows, and information can be coordinated, monitored, and continuously improved.

We call this vision: “The Intelligent Test Lab”.

The following ten theses describe how we believe industrial testing must evolve.

01

The Test Lab Must Be Managed as One Connected System

A test laboratory is more than a collection of test benches. It is a complex network of resources, processes, people, and decisions.

Optimizing individual test systems is important, but it does not automatically optimize the overall testing operation.

A highly automated test bench creates little value when the required specimen is missing, equipment is unavailable, or the test cannot start as scheduled.

The Intelligent Test Lab treats the entire testing environment as an interconnected operational system.

The objective shifts from optimizing isolated resources to improving the performance of the complete testing organization.

02

Intelligent Orchestration Is the Next Evolution of Test Automation

Test automation improves how individual tests are performed. Test Lab Orchestration improves how the entire testing operation works.

Modern test laboratories depend on numerous interrelated activities. Test preparation, resource allocation, approvals, equipment availability, execution, and reporting must be coordinated.

These dependencies cannot be managed efficiently through isolated automation solutions alone.

Intelligent orchestration connects activities and resources within a common operational framework.

It enables organizations to respond more effectively to changing priorities, unexpected events, and evolving capacity requirements.

The future is not simply more automated testing equipment. It is more intelligently coordinated testing operations.

03

Test Capacity Must Be Aligned with Business Priorities

The goal is not to perform the maximum number of tests. It is to perform the right tests at the right time.

Testing capacity is limited and expensive. Different test requests compete for the same resources, while their importance for development projects may differ significantly.

Effective Test Lab Management must therefore consider more than equipment availability.

It must also reflect project priorities, development milestones, technical requirements, deadlines, and operational constraints.

The Intelligent Test Lab connects resource planning with the objectives of the engineering organization.

This transforms scheduling from an administrative task into a mechanism for making better business decisions.

04

Test Readiness Is as Important as Test Bench Availability

A reserved test bench does not mean a test is ready to start.

Successful test execution depends on the simultaneous availability of all required resources and the completion of necessary preparation activities.

Test specimens must be available and correctly configured. Equipment must be calibrated. Personnel must be qualified and assigned. Required approvals must be completed.

When these conditions are not met, expensive testing capacity may be wasted.

The Intelligent Test Lab makes these dependencies transparent and connects preparation activities with resource planning and execution.

Its objective is not simply to reserve capacity, but to ensure that planned tests can actually be performed.

05 Engineering Productivity Matters More Than Resource Utilization Alone

A fully booked test laboratory is not necessarily an efficient test laboratory.

High utilization can be valuable, but it may also create bottlenecks, reduce scheduling flexibility, and make it difficult to accommodate urgent requests.

Operational performance must therefore be evaluated more comprehensively.

Relevant indicators include test throughput, on-time delivery, productive operating time, avoidable downtime, coordination effort, and the reliability of testing processes.

The Intelligent Test Lab balances these objectives instead of maximizing individual indicators in isolation.

Ultimately, its purpose is to increase the engineering value delivered by the available testing infrastructure.

06 Intelligent Testing Requires Trusted Processes and Data

Reliable measurement data is essential. But understanding the context in which it was created is equally important.

A test result becomes more valuable when it can be connected to the original requirements, test configuration, assigned resources, execution conditions, and relevant process information.

This requires a closer integration of Test Lab Management and Test Data Management.

Structured operational information provides the context needed to find, interpret, compare, and reuse measurement results.

Open data models and standardized interfaces help make this information accessible across engineering tools and organizational boundaries.

The Intelligent Test Lab connects operational processes with the resulting engineering data, creating a stronger foundation for automated analysis, traceability, and future AI applications.

07

Artificial Intelligence Will Transform Test Planning and Decision-Making

AI cannot optimize testing operations it cannot understand.

Complex test planning involves numerous constraints, competing objectives, and changing conditions. Intelligent algorithms can help evaluate alternative schedules, identify bottlenecks, and optimize resource allocation.

In the future, AI agents may support more advanced scenarios: monitoring operational conditions, recognizing disruptions, proposing corrective actions, and coordinating selected activities across connected systems.

However, these capabilities require structured information, reliable process models, clearly defined rules, and appropriate human oversight.

The Intelligent Test Lab provides the operational foundation for introducing AI progressively and responsibly. The objective is not to remove engineers and planners from the process, but to augment their capabilities and help them make better decisions.

08

Open Architectures Will Accelerate Innovation

The Intelligent Test Lab cannot be built as another isolated software system.

Testing organizations already operate a wide range of specialized applications, including test bench automation, measurement systems, PLM, ERP, simulation, and data analysis tools.

Replacing these systems is neither necessary nor desirable in most situations.

The future belongs to open and interoperable architectures that connect existing capabilities while allowing new technologies to be introduced independently. Standardized interfaces, configurable workflows, and modular software components reduce unnecessary dependencies and protect existing investments.

This enables organizations to adopt new technologies without rebuilding their entire testing infrastructure.

Innovation should expand technological freedom, not create new vendor lock-in.

09

Continuous Improvement Must Become Part of Daily Test Operations

An intelligent test laboratory does not merely execute plans. It learns from operational experience.

Every test request, scheduling change, delay, equipment failure, and completed activity generates information about the performance of the testing organization.

When managed systematically, this information can reveal recurring bottlenecks, inefficient processes, and opportunities for improvement.

Operational KPIs, plan-versus-actual comparisons, and business intelligence provide the basis for data-driven performance management.

Over time, intelligent analytics can extend these capabilities by identifying patterns and supporting more proactive decisions.

The Intelligent Test Lab establishes a continuous improvement cycle in which operational experience contributes to better planning, higher reliability, and increased productivity.

10

The Intelligent Test Lab Is an Evolution, Not a Big-Bang Transformation

The journey toward intelligent testing operations can start today.

Organizations do not need to replace their existing infrastructure or launch a multi-year transformation program before realizing benefits.

A pragmatic approach begins with establishing transparency, structuring test requests, connecting resources, and improving planning processes.

From there, companies can progressively introduce standardized workflows, operational analytics, intelligent optimization, and AI-supported decision-making. Each step should deliver measurable value while creating the foundation for further innovation.

The Intelligent Test Lab is not a distant vision that depends on technologies that do not yet exist. Its essential foundations are already available.

The challenge is to connect them into a coherent operational architecture and develop them systematically.

FROM VISION TO REALITY

Building the Intelligent Test Lab

The transformation toward intelligent testing operations requires a fundamental change in perspective. Instead of asking only how individual test benches can become faster or more automated, organizations must ask how the entire testing process can become more efficient, transparent, adaptive, and intelligent.

This requires bringing together three complementary capabilities:

CONNECTED TEST OPERATIONS

Integrate test requests, resources, workflows, scheduling, and execution information.

INTEGRATED ENGINEERING DATA

Connect testing activities with measurement results and their technical context for analysis, reuse, and traceability.

INTELLIGENT DECISION SUPPORT

Use operational information, optimization algorithms, and increasingly AI to improve planning and operational decisions.

Together, these capabilities form the basis for a new generation of industrial testing environments. The potential benefits extend beyond the laboratory: faster engineering decisions, improved development predictability, better utilization of capital-intensive infrastructure, and greater organizational agility.

OUR COMMITMENT AT PEAK SOLUTION

At Peak Solution, we believe that the future of industrial testing lies in connecting processes, resources, and data through open, adaptable, and increasingly intelligent software platforms.

With Peak Test Management Suite (PeakTMS), we provide an established foundation for managing and orchestrating complex test operations. Complementary solutions such as Peak Test Data Manager (PeakTDM) help connect testing activities with the resulting engineering data and make that information accessible across different systems and analysis tools.

Together, these capabilities support an integrated approach to engineering operations and data management. Our ambition goes further: We envision testing environments in which intelligent software continuously supports engineers and test managers in coordinating resources, evaluating planning alternatives, responding to operational changes, and improving performance.

Achieving this vision requires more than technology. It requires collaboration between testing organizations, software providers, equipment manufacturers, standardization and research institutions, as well as industry partners. We are committed to contributing our experience, technologies, and ideas to this transformation.

A CALL TO ACTION

The future of industrial testing will be shaped not only by the capabilities of individual machines, but by the intelligence with which the entire testing operation is managed.

We invite engineering leaders, test laboratory managers, technology providers, and researchers to join the discussion:

- **How can we move beyond isolated automation?**
- **How can we connect testing processes and engineering data more effectively?**
- **How can we use artificial intelligence responsibly to make industrial testing more productive, reliable, and adaptive?**

We believe the time has come to establish a new vision for the industry.

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peak-solution.de/products/testlabmanagement.html