



smart2V

Master Your Verification & Validation



## From Excel Chaos to Digital Excellence

Critical mistakes in Design Verification Planning — and how smart2V helps organizations regain control, transparency, and reliability in product development

AUTOMOTIVE TESTING EXPO 2026 · STUTTGART

*Dear Reader,*

Across industries, organizations developing technical products are experiencing a transformation of unprecedented scale. Trends such as electrification, automation, software-driven functionality, and increasingly stringent regulatory frameworks are fundamentally reshaping how products are designed, tested, and validated.

For those responsible for verification and validation (V&V), this shift is particularly challenging. The scope of testing is expanding rapidly — from traditional component and durability testing to advanced simulation, system integration, cybersecurity, and functional safety. At the same time, development cycles are accelerating, requirements are becoming more fragmented, and the pressure to demonstrate compliance with industry-specific standards and regulations continues to intensify.

Despite this growing complexity, many organizations still rely on outdated tools and fragmented processes. Design verification plans are often maintained in spreadsheets, status information is dispersed across emails and shared folders, and critical knowledge about test requirements remains largely undocumented — residing with a small number of experienced engineers who are increasingly difficult to replace.

This whitepaper highlights recurring pitfalls we observe in V&V organizations — issues that negatively impact efficiency, costs and overall product quality. For each, we provide practical recommendations based on our experience across a wide range of complex development programs.

We like to introduce smart2V, our digital platform for managing V&V activities to demonstrate how it helps organizations address these challenges. That said, the insights presented here are valuable independently of any specific solution.

We hope this paper provides useful perspectives. If you recognize these challenges in your own organization, we would welcome the opportunity to exchange ideas.

**Daniel Joest**

Product Manager smart2V · PEC project engineers & consultants GmbH  
+49 (1515) 806 4209 · daniel.joest@pec-group.com

# Verification & Validation Under Pressure

Why the management of V&V has become a strategic leadership challenge

The complexity of verification and validation has reached a tipping point. What was once a manageable set of physical tests has become a multi-dimensional challenge. Today's verification scope spans six distinct categories:



Each category involves different teams, methodologies, timelines, and often different external partners. Across all of them, three fundamental questions must be answered at all times:

- **Are we testing the right things?** — Completeness of the verification scope
- **Are responsibilities aligned?** — Between departments, OEMs, and suppliers
- **Are we testing at the right time?** — Resource availability, budget, and capacity

In practice, most organizations struggle to answer even one of these questions with confidence. The reasons are systemic — and they manifest as five recurring mistakes that we encounter across the automotive industry.

*The real question is not whether your V&V process works today. The question is whether it will still work when your product complexity doubles — and your development timeline halves.*

## “Our Excel-based DVP has worked for years — why change it now?”

The Design Verification Plan in Excel is perhaps the most ubiquitous tool in V&V. It is familiar, flexible, and requires no IT department to set up. For a single project with a small team, it works well enough. But for organizations managing multiple product lines, variants, and customer programs in parallel, the Excel DVP has become a liability.

The problems are well-known but persistently underestimated: Multiple versions of the same DVP circulate via email. Changes are not tracked or traceable. There is no audit trail showing who modified which test requirement and when. Formulas break. Files exceed size limits. And when the engineer who built the master template retires, the institutional knowledge encoded in that spreadsheet walks out the door.

Most critically, Excel-based DVPs create no **single source of truth**. When the OEM auditor asks for the current status of your verification plan, the answer requires manual compilation from multiple files — a process that introduces errors and delays at precisely the moment when accuracy matters most.

### What decision-makers should consider now:

The DVP is the backbone of your product validation. It must be auditable, version-controlled, and accessible in real time. **A centralized, workflow-driven platform** eliminates version conflicts, enforces approval processes, and provides a complete audit trail from requirement to test evidence.

**Our recommendation:** Evaluate whether your current DVP process can survive an unannounced IATF 16949 audit. If the answer requires more than five minutes of preparation, it is time for a digital alternative.

### Relevant Standards

**IATF 16949 §8.3.4.4** (Product Approval Process) requires documented verification plans with traceable evidence. **VDA 6.3** audits assess whether V&V processes are systematic and reproducible.

## “We know our project status — we have weekly meetings for that”

Weekly status meetings are a cornerstone of project management. But when they become the *primary* mechanism for understanding V&V progress, something has gone fundamentally wrong. In too many organizations, the V&V status is a narrative constructed from memory, email threads, and hastily assembled slide decks — not a data-driven reality check.

The consequences are predictable: Risks surface too late. Resource bottlenecks become visible only when deadlines are missed. Management receives polished summaries that obscure the actual state of testing. And when multiple projects compete for the same test bench capacity, there is no objective basis for prioritization.

Real transparency means that any stakeholder — from the test engineer to the V&V manager to the OEM customer — can see the current status of every test, every quality gate, and every open risk **at any time, without asking anyone**.

### What decision-makers should consider now:

Transparency is not achieved by adding more meetings or reporting layers. It is achieved by **making status information a byproduct of the work itself**. When engineers update test results in a centralized system, dashboards update automatically. When quality gates require digital sign-off, the approval status is always current.

**Our recommendation:** Count how many person-hours your organization spends each month compiling V&V status reports. That number represents pure waste — and it is entirely eliminable with the right system architecture.

*Master your verification and validation — smart2V enables you to be aware of the current project progress as well as all project risks at any time.*

— smart2V product vision

## “Our senior engineers know what needs to be tested — that's our quality assurance”

In many organizations, the V&V scope is defined by a handful of senior engineers who carry decades of product and testing expertise in their heads. They know which failure modes matter, which test standards apply, and the unwritten rules that make the difference between a successful and a failed validation campaign.

This is not a strength — it is a **single point of failure**. When these experts change roles, retire, or are unavailable during a critical project phase, the organization discovers that its test planning capability was never institutional. It was personal.

The problem is compounded in organizations that develop multiple product variants. Without a structured master DVP that codifies test requirements, acceptance criteria, and lessons learned, each new project starts from scratch — or worse, from an outdated copy of the last project's Excel file. Knowledge degradation is gradual and invisible until a critical test is missed.

### What decision-makers should consider now:

Expert knowledge must be **captured, structured, and made reusable**. A master V&V plan that serves as the institutional knowledge base — independent of any individual — is a strategic asset. When a new project begins, the project-specific DVP should be **derived from the master plan**, ensuring completeness while allowing project-specific adaptations.

**Our recommendation:** Ask yourself: If your three most experienced V&V engineers left tomorrow, could your organization still define a complete verification plan for your next product? If not, knowledge management is your most urgent priority.

## “Resource planning works project by project — we don't need a cross-project view”

Test benches are expensive. Skilled test engineers are scarce. Prototype parts have limited availability. In this resource-constrained environment, planning V&V resources project by project is a recipe for conflict, delays, and waste.

Without cross-project visibility, organizations cannot identify overlapping test requirements that could be consolidated. They cannot detect scheduling conflicts for shared test equipment until it is too late. They cannot compare planned versus actual test hours to improve future estimates. And they cannot make informed trade-off decisions when multiple projects compete for the same resources.

The result is a permanent state of firefighting: tests rescheduled at the last minute, quality gates delayed, development timelines slipping — not because of technical failures, but because of **coordination failures**.

### What decision-makers should consider now:

V&V resource planning must be **elevated from a project-level activity to a portfolio-level capability**. This requires a central system tracking all verification activities across projects, with visibility into planned vs. actual hours, test bench utilization, and upcoming capacity demands.

A RACI-based responsibility matrix — integrated directly into the verification plan — ensures every test has a clear owner and workload distribution is visible at a glance.

**Our recommendation:** Calculate the cost of your last three quality gate delays. In most cases, the root cause was a resource or coordination gap that was invisible until it became a crisis. Cross-project V&V planning eliminates these blind spots.

## Self-Check: Is Your V&V Process Future-Ready?

Many organizations have some form of V&V management in place — but not all are equipped to handle the growing complexity and regulatory scrutiny of modern automotive development. Use this self-check to assess your current maturity.

### How many of these statements apply to your organization?

- We have experienced at least one incident where a test was executed against an outdated DVP revision in the past 12 months.
- Compiling a complete V&V status report for management requires more than 2 hours of manual work.
- When a senior V&V engineer is unavailable, we struggle to define complete test requirements for new projects.
- Our quality gate approvals involve email sign-offs, printed documents, or manual checklists rather than a digital workflow.
- We cannot show end-to-end traceability from customer requirement to test evidence in a single system.
- Test bench scheduling conflicts between projects occur regularly and cause delays.
- Each new project's DVP is created by copying and modifying a previous project's Excel file.
- We cannot easily compare planned vs. actual V&V effort across our project portfolio.

**1–2 statements:** Room for improvement — targeted optimizations can strengthen your process.

**3–5 statements:** Significant risk exposure — structural gaps that will become more painful as complexity grows.

**6 or more:** Urgent action required — your organization is carrying avoidable risk in compliance, efficiency, and knowledge management.

### What to do next

Use this assessment as a starting point for a structured analysis. Identify gaps systematically — and address them with a combination of process improvement and digital tooling. **A purpose-built V&V management platform can close multiple gaps simultaneously**, because the root cause behind most of these symptoms is the same: fragmented, manual, and undocumented V&V processes.

# The Answer: smart2V

Your Digital V&V Management Platform



The five challenges described in this whitepaper share a common root cause: V&V processes that were designed for a simpler era and have not evolved with the complexity of modern automotive development. smart2V was built to address precisely this gap.

smart2V is a purpose-built digital platform for automotive verification and validation — designed to consolidate your entire V&V knowledge into a structured master plan and derive requirements-based project plans from it. Unlike generic PLM extensions, smart2V was built from the ground up for the specific challenges of automotive V&V, combining PEC's field-tested consulting methodology with a modern, web-based software platform.

### Master & Project DVPs

Maintain a master verification plan as your institutional knowledge base. Derive project-specific DVPs that inherit completeness while allowing targeted adaptations for variants.

### Workflow-Driven Quality Gates

Configurable approval workflows with digital sign-off and evaluation towards your requirements.

### Integrated Risk Management

Assess and track risks within the verification plan. Link probability/impact assessments to tests. Define mitigation measures and monitor effectiveness.

### Test Standard Library

Versioned test standards with full change history. Updated standards automatically flag affected verification activities across all active projects.

### Real-Time Dashboards

Track progress by verification category, department, sample phase, and component. No manual report compilation required.

### RACI Responsibility Matrix

Clear assignment of roles for every verification activity. Cross-project visibility into workload distribution and resource allocation.

### Integration & Reporting

REST API for PowerBI, ERP, and PLM integration. Reports include QG reports, runtime reports, failure/risk reports, and progress delta reports. Multi-language support (DE/EN).

Since 2008, PEC has stood for highly professional project management and engineering services — with a clear focus on complex project landscapes in safety-critical industries including automotive, aerospace, and defence. With an interdisciplinary team of over 200 experts, we support our clients from the early concept phase through to successful operational implementation across various projects.

What sets us apart: we embed within our clients' engineering teams — bringing not just capacity, but the structural clarity, cross-industry benchmarks, and methodological depth that internal teams rarely have time to develop on their own.

## smart2V: Where Methodology Meets Technology

smart2V is more than software. It is the distillation of PEC's V&V consulting expertise into a digital platform. When you adopt smart2V, you benefit not only from a powerful tool but from the methodology and best practices developed across hundreds of automotive V&V engagements. This combination of domain expertise and technology is our unique value proposition — something no generic software vendor can offer.

### Our clients value us for:

#### ... the external perspective with internal impact.

Our experts integrate seamlessly into your organization — while bringing fresh impulses, best practices, and benchmark knowledge from across the automotive industry.

#### ... the ability to transform complexity into manageability.

We create structure, clear role models, and consolidated V&V processes — so that you do not just execute your projects, but actively steer them.

#### Security & Hosting

smart2V is available as cloud-hosted SaaS or on-premise. All data processed and stored GDPR-compliant within European data centers.



*Dear Reader,*

We hope this whitepaper has given you a fresh perspective on V&V management — and perhaps you have recognized one or two challenges from your own organization.

If there is one takeaway, it is this: Fragmented, manual V&V processes do not just cause inefficiency — they create real risk for costs, quality, and time-to-market. The good news is that solutions exist. And many of them start not with a massive IT project, but with a shift in perspective.

### **Request Your Free DVP Maturity Assessment**

In a 30-minute session, we will analyze your current V&V process maturity and show you where smart2V can deliver the highest impact. No obligations — just an honest assessment by experienced V&V professionals.

**Visit us at Automotive Testing Expo 2026 in Stuttgart — Booth [1845]**

#### **Daniel Joest**

Product Manager smart2V

+49 (1515) 806 4209

daniel.joest@pec-group.com

#### **Nils Strathmann**

Business Development Manager smart2V

+49 (172) 3981196

nils.strathmann@pec-group.com

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