



Product Verification and Validation Services

Transforming from Product Quality to Product Integrity



20 years of independent product V&V experience with over 10,000 product variants verified, and thought leadership through the scaled Product and Engineering Services portfolio



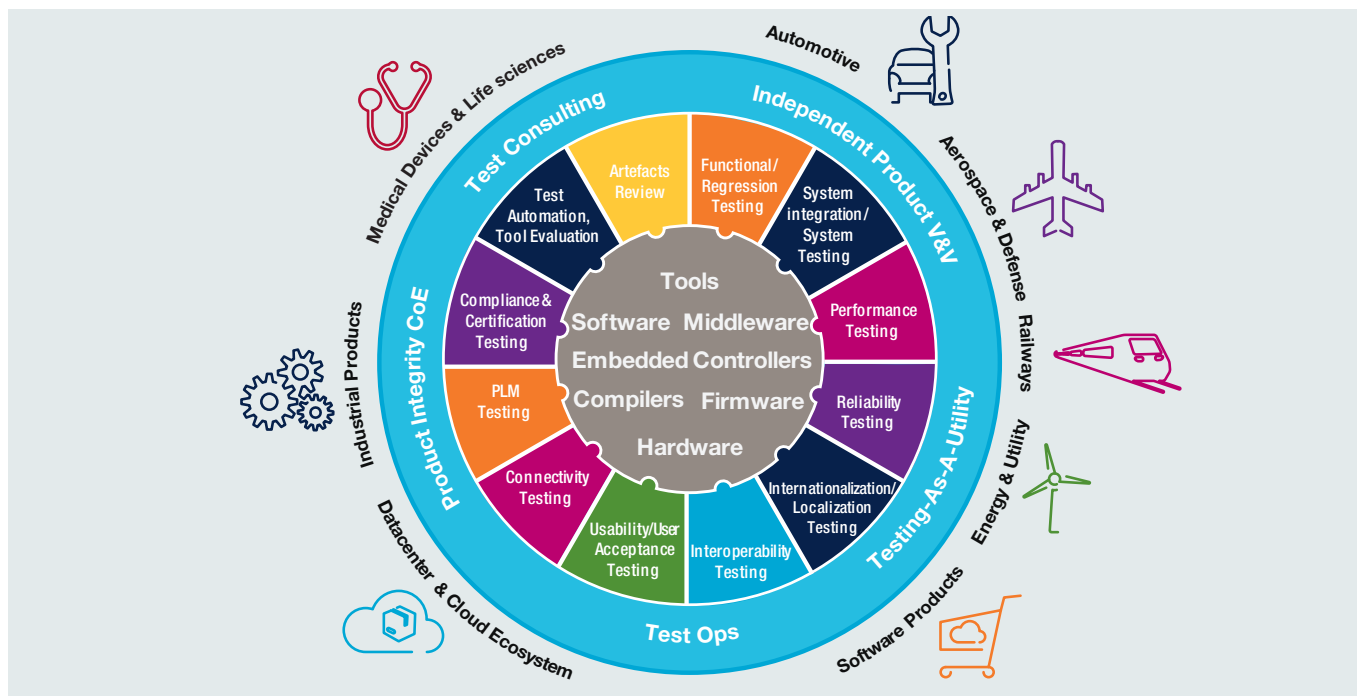
Product engineering organizations face new challenges every day with verification and validation of products. These challenges are amplified by technology convergence, increasing product complexity, security requirements, stringent regulatory compliance, and very high quality expectations on first launch of a product. Product companies aspiring to stay ahead of the competition are always striving to strike a balance between Cost of quality, Time- to-market and actual product Quality (CTQ).

The increasing end user expectations, on parameters such as performance, safety, reliability, durability and usability, are forcing a paradigm shift in the verification and validation strategy, from mere quality to overall product integrity.

Product Verification and Validation (V&V) Offerings

Our V&V strategy is driven by an objective of first-time-right delivery with a continuous focus on all aspects of product integrity, enabled by automation at all possible levels - mechanical, electrical, hardware, firmware, software and external interfaces.

We engage early in the product development lifecycle, from the requirements definition phase so that the design intent is retained during formal test execution. We work with the customer's product team right through the process for regulatory approvals and certifications.



Product Verification & Validation Services Spectrum

The Capgemini Advantage

- Mature Product V&V methodologies and robust metrics program
- ISO 13485, ASPICE level 3 certified
- Complex test labs and calibration services
- Ready assets for engineering domains
- Global network of partners
- Global presence and Rightshore® delivery model
- Flexible business models, outcome based Product V&V
- Industry leader in complementary software testing

Our Best Practices

- Processes and assets aligned to industry standards
- Shift Left and Shift Right
- Test design techniques to elevate testing efficiency
- Integrated tool chain across system engineering, development and V&V teams
- Automation effectiveness through COTs and home grown tools
- Optimized test environment management

Our Differentiated Services

• V&V Consulting

We help in improving and optimizing V&V effectiveness using our proven methodologies and context specific best practices

- Verification and Validation process consultancy complying with industry best practices.
- Engage through the product lifecycle from assessment to solution, to achieve product integrity.

• Testing-As-A-Utility (TAAU)

Our Testing-As-A-Utility Services are provisioned through customer centric RightShore® test labs and provide significant cost benefits

- Test-Automation-As-A-Utility
- Test-Platform-As-A-Utility
- Test-Labs-As-A-Utility

• Product Integrity

We help taking the organizations beyond quality to gain end-user loyalty and trust

- Providing 360° view of product quality based on development and operational quality criteria
- Benchmarking the products with respect to industry standards
- Design, establish and run a Product Integrity Center of Excellence

• TestOps

TestOps framework helps in defining context specific V&V strategy through analytics on continuous integration and continuous deployment feedback data in DevOps environment

- Automated feedback from operations and development to improve test process effectiveness
- Shift-left and shift-right via service virtualization, product life cycle orchestration and dashboard

Domain Specific Product V&V

Medical

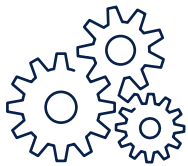


- Customers include 6 out of Top 10 Medical Device manufacturers
- Verification for 25+ product categories such as pacemakers/ ICDs, imaging equipment, ventilators, blood aphaeresis systems, glucose monitoring systems.
- ISO 13485 certified, harmonized with ISO 14971
- Supported 200+ regulatory submissions across geographies
- CAPA, xGMP, Pharmacovigilance Audits, Medical Writing

Success Stories

- Independent system V&V of pacemaker and Implantable Cardioverter Defibrillator (ICD) programmer for a leading class III medical device manufacturer. Achieved 95% Test Automation and 80% reduction in cycle time over a period of 3 years.
- Product verification for next generation blood aphaeresis system for a leading blood management company in North America. Effective V&V helped to achieve the goal of higher platelet yield in the stipulated time.

Industrial Products



- Verification of 200+ products in Industrial Automation, Building Automation, Transport, Energy & Utilities
- Complex Test Labs for moving systems, HVAC components, control systems components
- In-house Environmental Test Chamber
- CE, UL, ATEX, SIL, C-Tick, GOST certification support

Success Stories

- Controller system testing for an industrial automation major. Cycle time reduced from 7.5 person months to 1 day using test automation.
- Complete hardware design verification using LabVIEW based Automated Test Fixture for a leading HVAC manufacturer

Datacenter and Cloud



- Complete ownership of V&V for leading vendors in Storage, Server, Network Management, Hyper Converged SDDC, Cloud, Big Data and Flash products
- Test automation ownership for 20+ product lines
- Focus on scalability, reliability, performance, stress testing, security and customer scenario testing
- Certification, Reference Architecture, Best Practices and Compliance for VMware, Microsoft and Citrix platforms
- Over USD 8 Mn invested in labs; managed test labs for leading storage, server and virtualization vendors

Success Stories

- QA ownership for over 13 years for a leading IP SAN storage product from North America. Offshore lab setup having 300+ storage arrays and 100+ servers.
- QA ownership of Object Storage Platform for a leading storage and server technologies provider enabled the customer to plug a strategic gap in its product portfolio and save on fees for third party object storage products.



Automotive

- Participation in 100+ production programs
- Deep expertise in V&V of vehicle infotainment, cluster systems, body electronics and active safety ECUs
- Member of USTAG committee, played key role in the preparation of ISO 26262 FDIS
- Member of AUTOSAR and GENIVI consortiums
- ASPICE Process Capability Maturity Level 3 Certified
- V&V methodology following ASPICE and ISO26262 standards
- Complex and configurable test benches for HIL validation

Success Stories

- 13+ years of engagement with a North American automotive Tier-1 supplier for testing of various instrument panel clusters and infotainment systems
- 10+ years of engagement with a North American OEM for testing of body control modules, instrument panel clusters, powertrain and active safety

Solutions, Platforms & Accelerators

1	HTAP: Hybrid Test Automation Platform	<ul style="list-style-type: none"> • Unified test infrastructure for all GUI and HMI test automation needs • Supports multiple form factors and operating systems: Web, Mobile, Desktop, Native apps and HMI
2	HMIviz: Vision Based HMI Automation	<ul style="list-style-type: none"> • Camera and OCR based solution • Easy to integrate with HIL test benches • Supports more than 27 Global Languages: Asian, European, North American, Arabic
3	Medical Image Verification Platform	<ul style="list-style-type: none"> • Automates manual visual verification of Images in medical imaging modalities such as CT, MRI • Supports 2D, 3D, animated controls, moving waveforms
4	Command Line & API Test Automation Framework	<ul style="list-style-type: none"> • Automated testing of API and CLI interfaces for device drivers, communication protocols, SDKs for desktop/ embedded/ enterprise systems
5	Message Bus Test Automation Framework	<ul style="list-style-type: none"> • Automate the functional testing of applications developed on IOT middleware/ message bus
6	Image Verification - Pattern Matching Utility	<ul style="list-style-type: none"> • Automated verification of static, moving, animated and 3D images • Proprietary algorithms and techniques of pattern matching
7	AUTOGENIE – Script-less Test Automation Framework	<ul style="list-style-type: none"> • Selenium based Web Test Automation without programming
8	PLM Test Automation Framework	<ul style="list-style-type: none"> • Automated testing of PLM business scenarios across multiple PLM tools

To know more:

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Visit: www.capgemini.com/P&ES