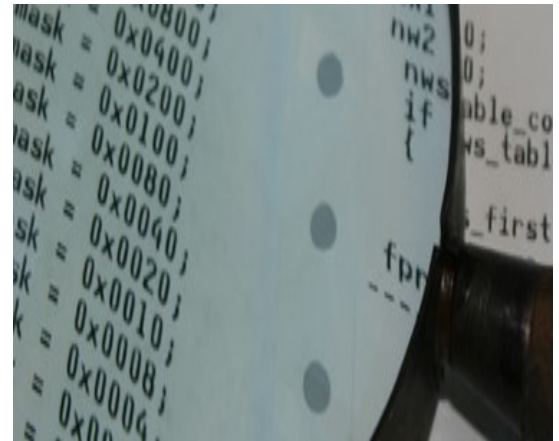


An essential part of any software development project is a comprehensive testing process. Including independent verification and validation (V&V) in the early phases of development allows for earlier identification and resolution of defects, significantly reducing development costs and speeding up implementation. Identifying and resolving latent defects also helps lower ongoing maintenance costs once the software is in use.

Software testing can be time-consuming and, if done in-house, can distract from core competencies and waste resources. It is estimated that one third to one half of computer hardware in some large companies is used for software development, testing, and staging. When not in use, this hardware sits idle.

GB Tech saves our clients time and money by performing early detection of software errors, reducing costly rework, shortening the development schedule, and freeing up hardware and personnel resources.



GB Tech provides an efficient, consistent and repeatable verification and validation (V&V) process that identifies defects early in software development; saving our customers time and money.



GB Tech's expertise provides the client the right tools and level of support based on criticality – resulting in efficient, effective coverage.

GB Tech:

- ISO 9001:2008 certified
- Projects performed at Capability Maturity Model Integration (CMMI) Levels 3-5
- Methodology follows IEEE 1012-2004 quality standard, tailored to specific project needs
- Traditional unit integration qualification testing, planning and documentation... PLUS dynamic code coverage and failure modes and effects tests required by software with higher integrity levels
- Full Static Analysis capability - tool supported code scrutiny identifies issues early when repairs can be made at most cost effective phase of project
- Metrics provided throughout development cycle allow better management of the project
- Professional staff whose core competency is software V&V

GB Tech uses automated tools as a force multiplier in performing effective, efficient code analysis.

Examples include:

- LDRA testbed®
- PC lint
- FxCOP
- PMD
- Resource Standard Metrics (RSM)

Tested and Proven

GB Tech's expertise in software test and quality assurance has been honed by 25 years of mission-critical projects for NASA, Department of Defense, and Homeland Security clients.

GB Tech ASSESS™ Process:

ASSESS™ is GB Tech's scalable testing solution. It offers a consistent, repeatable process that is compliant with CMMI Standards. A hybrid method for code analysis is embedded in ASSESS™. It is designed to mesh with project schedules and provide timely inputs to mitigate risk sooner in the cycle.

V&V Scope Determination

- Software development projects vary widely in their need for a particular level of V&V, from simple review of artifacts, to support of requirements development, to full independent testing, verification and validation.
- GB Tech reviews the project plans and documentation to determine the scope of the V&V project.

Criticality Analysis/Risk Assessment

- If the customer does not know the Software Integrity Level (SIL) of the project, GB Tech can assist.
- GB Tech's Critical Analysis/Risk Assessment model gathers customer criticality and risk data, and determines the recommended SIL. The SIL drives requirements, design approaches, test types and degree of overall effort needed.

Software Verification and Validation Plan (SVVP)

- GB Tech prepares a SVVP tailored to meet the project's needs based on degree of software criticality.
- A low criticality level project may not need dynamic code coverage testing, while a high SIL project may require 100% code coverage and Failure Modes and Effects Testing.
- Our SVVP methodology is based on IEEE 1012-2014 and describes in detail the testing tasks to be done and at what level.

GB Tech's Critical Analysis and Risk Assessment model is used to identify and customize the recommended Software Integrity Level and testing requirements, ensuring testing meets needs of our customers.



Scaling with Precision

Cost of Locating and Correcting Errors

Relative Cost	Errors Made During	Cost Multiplier	Errors Found During	Relative Cost
0.1 x	Requirements	2700	Beta Test	270 x
0.15 x	Definition	600	System Test	90 x
0.3 x	Decomposition	100	Integration Test	30 x
1.0 x	Build	1	Unit Test	1.0 x

Reworking software is far cheaper earlier in the life cycle. Finding and fixing software problems after delivery is often 100 times more expensive than when done during the requirements and design phase.

Tool Support

- The rule set and analysis tools needed for test support are configured and assembled.
- GB Tech utilizes a suite of automated analysis tools combined with professional expertise to provide a window into system, architecture, data, and logic issues.

Test Project Implementation

- The traceability matrix established from concept of operations and high level requirements is used as a measure of progress at each phase.
- Issues identified by analysis are verified, metric calculations acquired, and results presented to client throughout the development cycle.
- Visibility and presentation of code issues to the client at most cost effective lifecycle step for repair.

Metrics

- Examples provided include code metrics which measure standard conformance and code structure maintainability, and
- Project metrics measure fault diversity and phase containment



GB Tech has is a leading provider of managed IT, software testing and logistics services for solutions that demand mission-critical precision and scalability. Serving the aerospace, healthcare, homeland security and energy industries, GB Tech delivers scalable solutions that help companies, technology partners and government agencies quickly identify and effectively respond to rapid change in today's most dynamic markets.

Founded in 1985, GB Tech provides the highest degree of proficiency and on-demand scalability to help clients lower costs, streamline operations and ultimately improve productivity. Moreover, GB Tech helps mitigate risk by delivering application assurance in mission-critical systems and operations for some of the world's most dynamic companies.

**Aerospace • Healthcare
Energy • Homeland Security**

GB Tech, Inc.
2200 Space Park Drive
Suite 400
Houston, TX 77058
Ph: (281) 333-3703
Fax: (281) 333-3745
inquiry@gbtech.net