

Software Testing Profile of:

Infosys

1 Background

Infosys had in its fiscal year 2009 (ending March 31, 2009) revenues of \$4.7bn and an operating margin of 29.5%. FY 2010 Q1-Q3 revenues were \$3,508m.

The company had ~110,000 personnel at end December 2009.

Infosys' testing service practice, named Independent Validation Solutions (IVS), was created in 2001. The validation practice reports directly to the Board of Directors to ensure 'independence' in the reporting structure.

Infosys Validation Services has

- ❑ 7,600 career testers (as of end of March 2010)
- ❑ 180+ clients of which approximately 10 bringing \$10m or more a year in revenues

In addition, Infosys provides testing of technology products from vendors such as Microsoft or Cisco through its product engineering division unit, largely around software running on mobile devices.

Infosys achieved \$414m in revenue from software and product testing in FY 2009 of which:

- ❑ \$317m from Independent Testing
- ❑ \$47m from Independent Testing embedded as part of large ADM / SI contracts
- ❑ \$50m from product testing

In fiscal 2010, Infosys testing revenues reached \$448m of which \$307m from Independent software testing, \$91m from testing embedded as part of large ADM/SI contracts and \$50m from product testing.

2 Clients and Services Offerings

Infosys services two main client categories:

- ❑ Technology vendors (20% of revenues)
- ❑ Enterprise clients (80% of revenues).

2.1 Technology Vendors

This category comprises enterprise software and consumer software, media and entertainment products, storage products, computing and software platforms and communications equipment. Of these, ISVs represent the largest segment.

Infosys provides the following services to technology vendors:

- User acceptance services in form of business process validation
- Product testing: globalization and localization development and testing
- Compatibility and interoperability testing services.

2.2 Enterprise Clients

Infosys Validation Services has a wide testing service range, which includes:

- Validation services of custom applications: functional testing (user acceptance testing) in the form of business process validation, systems integration testing and offshore execution. Custom application validation and testing accounts for 55% of Infosys Validation Services' revenues for enterprise clients
- Specialty validation represents 40% of testing revenues. They include:
 - Performance engineering and testing
 - Packaged application testing (ERP testing) see section 5 *ERP Testing Offering In Focus*
 - Test automation for functional and performance testing
 - SOA testing
 - Regulatory compliance and testing
 - Data warehouse testing focuses on data quality for providing data analysis
 - Test data management provides data masking to data is to be tested in an offshore location. The data masking service allows to circumvent regulatory or privacy restrictions around location of data. It includes not only data masking but also data cleaning and replication. Examples of clients adopting this offering include banks engaged in M&A and merging their client data and information
 - Hosting of test environments
 - Security testing
- Consulting services (5% of testing revenues). In consulting, Infosys is focusing on quality assurance, program management and packaged applications (helping clients determine what potential problems can arise from the use of packaged applications and of related customization work).

For its enterprise clients, Infosys is able to provide user acceptance testing (UAT), working with the client, based on the combination of client involvement, from co-sourcing to Infosys owning the full responsibility of the UAT.

2.3 Engagement Forms

Infosys Validation Services provides testing services in several forms including T&M, fixed priced and increasingly SLA/unit of work/outcome based. NelsonHall estimates that 70% of the revenues in testing come from T&M-based contracts.

40% of the unit's revenue comes from large contracts with annual revenues of \$10m and above. Large contracts tend to rely on Testing Centers of Excellence i.e. dedicated centers to one client where Infosys Validation Services is taking overall responsibility for test planning, design and execution. Those contracts can be priced on SLAs/outcome or on T&M.

Infosys Validation Services' TCoE offering is available both as part of application management contracts and in particular for contracts with multiple releases a year as well as for major application implementations.

- For a bank: Infosys has worked with the client since 2004. Services provided initially started staff augmentation in majority and have evolved towards a majority of managed services, co-sourced work and anecdotally staff augmentation services.

Work scope began by testing of web and desktop applications. The service has expanded to include offerings such as testing of packaged applications (Microsoft CRM) and automation frameworks for trade processing applications. Since 2008, the company manages test environments, UAT and performance monitoring.

The contract at peak times involved 355 Infosys employees.

2.4 Offering Strategy

IVS has several initiatives in place. These include:

- ❑ Developing in a formal manner its domain expertise (vertical solutions)
- ❑ Investing in tools and accelerators to shorten test planning and execution (technology solutions)
- ❑ Developing methodologies and frameworks to help during the life cycle of the testing project (methodologies and frameworks).

In addition Infosys is progressing on offering pricing that is SLA- and outcome-based.

Vertical Solutions

Infosys Validation Services has developed industry-specific testing solutions for its five major sectors in which it operates. For all those verticals; Infosys Validation Services has built or is building business process-based testing packages comprising test cases and test scripts. These five key verticals are:

- ❑ Financial services: retail banking, commercial banking, wealth & asset management and brokerage
- ❑ Retail: point-of-sale, e-commerce applications, inventory management and Oracle Retail
- ❑ Insurance, healthcare & life science: healthcare claims, laboratory information management systems, life & pension claim management
- ❑ Communications, media & entertainment: wireless in the box, customer & billing, e-TOM L4 & L5 processes and telecom testing centers of excellence,
- ❑ Energy & utility services e.g. advanced metering infrastructure and trading.

Technology Solutions

Overall, the unit is focused on developing frameworks, tools and accelerators to automate various stages of test life cycle and to shorten testing planning and execution services. It is expanding its tool and accelerator focus from functional testing into specialized offerings using its own tools or those of third parties e.g. test automation, performance testing, security testing, master data management, data warehousing testing, SOA, usability testing, accessibility testing and hosted environment management.

Infosys Validation Services has developed a number of its own tools including:

- ❑ InFlux: a repository of prepackaged business models for the key verticals of the unit
- ❑ FTGEN: generates test cases based on requirements and specifications and performs change impact analysis on testing activities. The tool creates test cases that are sector-dependent
- ❑ Infosys Test Automation Accelerator (ITAA): complements the functionalities of testing tools in the market to perform functional testing by providing early automation. It provides pre-populated test suites.

Methodologies

Infosys has also a test life cycle automation framework that relies on several tools mentioned above and which also includes:

- ❑ Business process based testing
- ❑ Pre packaged testing suites

- ❑ Automatic test case generation
- ❑ Automated test script generation
- ❑ Integration with main testing tools, which allows to provide execution services.

In addition IVS has methodologies for new implementations/ transformation contracts and in particular around risk management and collaborative testing. These two methodologies are particularly used for complex, large contracts or/and for those involving TCoEs:

- ❑ Risk management frameworks are about conducting risk-based testing. The approach relies on estimating business impacts of changes induced by new application functionality
- ❑ Collaborative testing transition framework: is about test transition and change management.

Units of Work- and Outcome-Based Contracts

IVS is expanding its pricing mechanism to offer contracts priced on SLAs. Examples include those based on unit of works and on outcomes:

- ❑ Units of works include pricing based on the number of work units e.g. number of test cases or number of tables for data warehousing testing
- ❑ Outcome-based contracts are contracts based on SLAs that are
 - Productivity-based e.g. number of test cases designed or executed against time lines
 - Defect-related before they go or once they are in production phase.

3 Delivery

Infosys Independent Validation Solutions has a headcount of 7,600.

NelsonHall estimates that 75% of the unit's career testers are based out of India, spread across 8 delivery centers. Each of those 8 delivery centers is large enough to provide the full range of testing services from functional to automation testing and specialized offerings.

Infosys Validation Services is however expanding its delivery to nearshore zones. Examples include:

- ❑ Brno (the Czech Republic) nearshore activities for European client: Infosys has expanded the service activity of an existing center to include testing services. The primary purpose of the center is to handle different languages for services such as test planning, management and test design, together with India-based teams. The center does not focus on test execution services
- ❑ Shanghai (China) acts as both a nearshore and local center, servicing the operations of U.S. clients in China as well as local clients. The center potentially could service from a nearshore perspective Japanese clients. Services provided are execution services and language capabilities.
- ❑ Monterrey (Mexico) services clients in Central and South America as well as acts as nearshore center for clients located in the US and Canada.

4 Clients

IVS derives most revenues from a limited number of verticals. Key sectors include

- ❑ Financial services: 39% of total testing services revenue
- ❑ Communication, media & entertainment: 15%
- ❑ Insurance, healthcare and life science: 22% of revenue
- ❑ Retail: 13% of revenue.

Infosys' clients for testing services are predominantly located in North America (66% of revenues), in Europe (20%) and Rest of the World (14%).

5 ERP Testing Offering In Focus

In 2008 Infosys Validation Services launched an ERP Testing practice and offering to address growing needs by clients in testing ERP upgrades.

Applications covered by this service include SAP, Oracle applications, Siebel and PeopleSoft HCM. Of those offerings, the SAP testing offering one is currently the most in demand. This is due to the fact that SAP has a large client installed base.

Within ERPs, IVS is finding Oracle Apps and SAP have their own different challenges. Oracle has a series of different packages that have their own architecture, programming language and integration tools. Testing services therefore take into account this heterogeneity of applications by having more segmented offerings. In future, with its Fusion initiatives, Oracle will make its applications more consistent and therefore easier to test.

With its ERP Testing offering the unit is focused on testing implementation, upgrades and enhancements as part of systems integration and application management contracts.

Target clients are

- ❑ Primarily in the manufacturing and retail sectors
- ❑ To a lesser extent in the telecom, media & entertainment, energy & utilities, and pharmaceuticals.

Infosys Validation Services has ~600 personnel in its ERP testing practice, representing almost 10% of its career testers headcount and 10% of the unit's revenue.

Rationale for the Offering

The launch of the unit and offering was based on the premise that testing software packages implementation and upgrades such as those from SAP and Oracle require different testing skills and methodologies than those needed for testing custom-made applications:

- ❑ ERPs are updated frequently as part of ISV maintenance agreements
- ❑ ERP systems are integrated/interfaced with numerous applications. Because of their integration level, they draw on different databases and use different data that can be structured differently
- ❑ ERP applications, in spite of high level of customization, have a large number of standard business processes. This allows automation of business process-based testing.

Service Offering

Infosys Validation Services therefore provides services offerings to address ERP-related differences in nature:

- ❑ Consulting services on how to manage ERP updates and upgrades from a testing perspective. Services provided include process assessment, test management and tool recommendation
- ❑ Frequent updates: functional and regression testing that are heavily automated. IVS relies on pre-packaged business scenarios that lead into pre-packaged test cases
- ❑ business process testing across different module of the applications
- ❑ High integration level:
 - Integration testing for testing interfaces
 - Master data/data warehousing testing for handling and testing vast numbers of data and avoiding unnecessary data replication, cleaning of data and data creation
 - Performance testing for making sure systems can handle the high level of data and systems interfaces and integration. Infosys has developed a tool for predictive performance modeling; the solution aims at predicting workload for applications under test.
- ❑ Large scopes
 - Migration and implementation of a TCoE model.

Automation Activity

Infosys Validation Services is investing in testing automation and developing prepackaged test cases around core functionality and business processes. For instance, Infosys has developed prepackaged test cases for order-to-cash. The company says it has 650 pre-built transactions codes that can be executed across different automation tools

Restrictions will apply however: many clients still customize their business processes and the module screens. The level of reuse of test cases will therefore depend on how much customization has done the client in its system.

Engagement Forms

The nature of contracts influences the form of testing service delivered. As part of multi-year contracts, Infosys Validation Services is able to set up testing centers for excellence, often dedicated to one client.

Centers of excellences for packaged applications are used in the same manner as for custom applications: they are used to centralize and maintain knowledge of applications and build test cases and scripts that can be reused over the time of the contract from one update to another.

IVS is expanding the range of services provided by its ERP-centric centers of excellence into other specialties. Because ERP systems are highly integrated through middleware, ERP centers of excellence need to integrate further skills than pure ERP business process ones e.g. performance testing, integration testing.

Client Example

Infosys has helped deploying a SAP upgrade for a client in the oil & gas industry. The contract involves 21,000 main users located in 90 countries and 5,000 concurrent users. Infosys is involved in this contract as an implementation and testing vendor.

The contract involves the migration of SAP applications to a single SAP ECC 6.0 for the FI, CO, HCM, SCM and order fulfillment modules.

For this client, Infosys Validation Services has deployed 50 personnel and involved the creation of a TCoE dedicated to the client. Execution and automation were done offshore from a client-dedicated TCoE.

Services offered all testing services related to the SAP upgrade and included:

- ❑ Consultation for procuring and implementing infrastructure
- ❑ Configuration of testing software
- ❑ Development of scripts, automation, execution and maintenance of scripts
- ❑ Regression testing (1,900 scenarios) and functional testing (2,000 scenarios), System validation (4,400 scenarios and 6 datasets)
- ❑ Interface (350 scenarios) and security testing (6,000 transactions and 800 user IDs)
- ❑ Performance testing (onsite).
- ❑ Setting up of a testing center of excellence.

6 Perspective

Infosys Validation Services has an offering well focused on test execution as well as increasingly on software quality consulting. It has the following strengths:

- ❑ It has a large testing practice (in terms of size). Yet its client base is relatively focused on financial services, communication & media, insurance & healthcare and retail. This means that the company has developed a strong domain experience. This shows in the number of test packages verticalized by industry that the company is offering
- ❑ It services both enterprise clients and independent software vendors. Providing testing services to ISVs can be a sign of maturity of an offering: indeed ISVs have strong quality requirements for their software products because they are widely used
- ❑ It has gained a larger presence in specialized testing offerings e.g. performance testing, SOA, test data management and packaged applications
- ❑ Infosys' differentiation is evident with its testing offering around packaged applications e.g. SAP and Oracle.