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Business Driven QA Approach to IT projects in a Retail Industry

by

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Introduction

During the past few years, retailers have built sophisticated technology infrastructures and are pleased with the business advantages and increased efficiency these systems offer. However this has led to complex and expensive IT applications. These applications are time-consuming and costly to maintain and do not offer optimum business productivity and efficiency. Increasingly it is becoming a case of business supporting the technology, instead of technology support the business. However as a recent trend Business value of information technology (IT) has been getting tremendous attention. Renowned economist, Robert M. Solow, once remarked: "We see the computer age everywhere except in the productivity statistics." This statement widely known as the productivity paradox has been researched for potential reasons for the observed misalignment between information technologies and business. Retailers need to step back and look at what their existing technology is contributing to their business. This paper talks about one such approach and the enhanced role of QA in an IT enhancement project in a Retail industry.

The Current Scenario – An Analysis

In a typical IT project, even though teams ensure process adherence, the focus is more on a successful implementation and often little thought is given to assess the business efficiency, success and impact of the implementation.

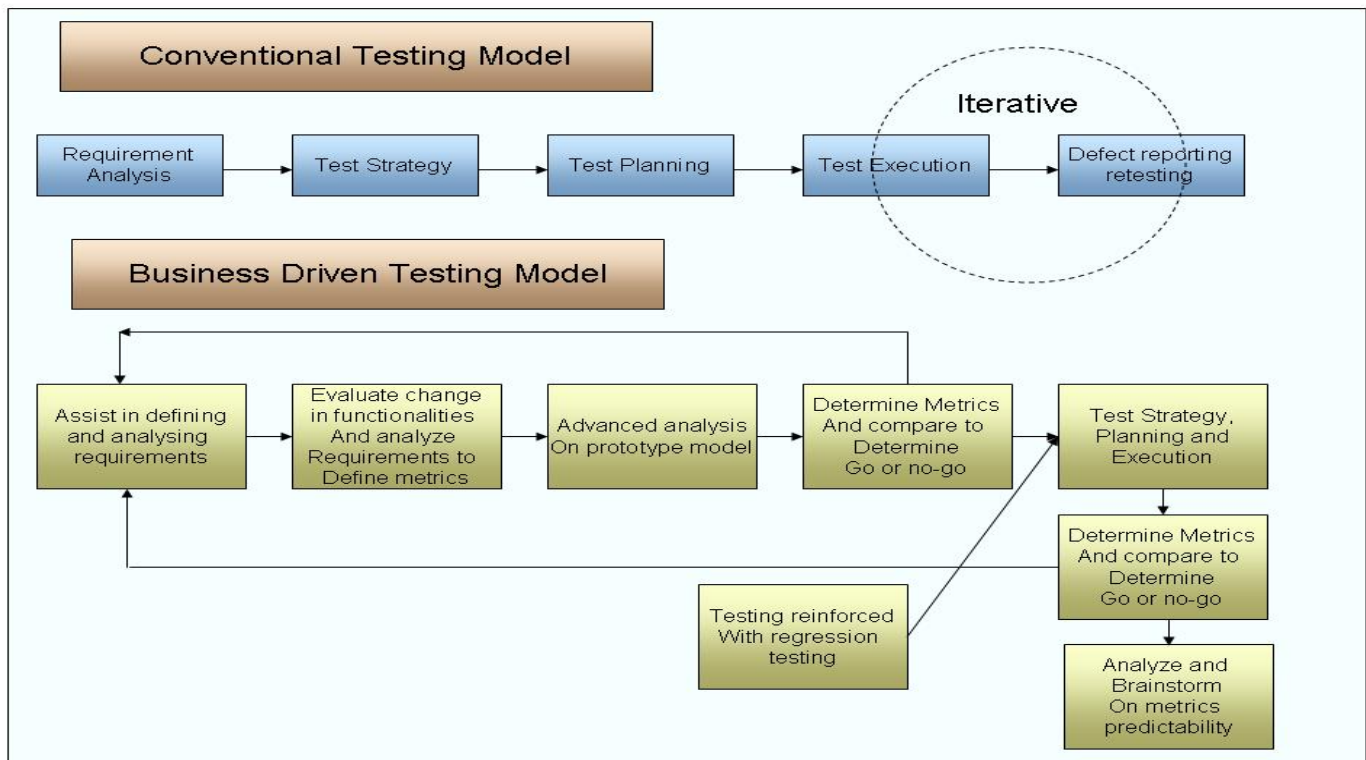
The teams tend to work in silos and the true objective of the initiative/project is lost in the quest for a successful implementation. Even though there are well defined software and testing processes such as requirement analysis, test artifact reviews, test strategy and various others the business impact on these phases are rarely assessed and incorporated. A mere one hour Business Requirements review or walk-through will not ensure 100% accuracy in understanding. In many cases, the IT department has traditionally been operating fairly autonomously without a lot of oversight and does not necessarily provide the return that the business side would like in terms of function and cost. It is a case of not looking at trees but the entire forest, in other words it is necessary to look for a complete overview and ensure that the IT functions are really aligned to what the business goals are. The testing processes and methodologies are absolutely vital, but a certain amount of business vision and flavor need to be added for every phase of the testing and development life cycle.

In the end it is necessary to ensure that every dollar invested in information technology, every resource allocated, and every application in development or production meets business goals.

Why this approach

- ❖ The traditional role of IT has changed and there is a paradigm shift where IT has gone from enabling the business to effectively becoming the business
- ❖ IT outcomes are no longer a litmus test for success, and Retail IT has started to take responsibility for fast, cost effective and reliable business results.
- ❖ The role of business applications has evolved to be instrumental in creating a sustainable competitive edge for the business
- ❖ In the current hypercompetitive and volatile market, Retailers need to effectively manage goals and risks while ensuring their software applications are aligned with business goals.
- ❖ Retailers recognize that applications are business driven. The quality, performance and integrity of the applications are reflected in its business value.
- ❖ The current testing models though being process oriented focus more on validation of the application functionality rather than focus on the business impact/effectiveness of the functionality.

Pictorial comparison of conventional and Business Driven Testing Model



Business Driven Testing Model

Unlike software offerings and methodologies that focus on internal IT processes, this method focuses on optimizing the strategic functions between technology and business. It allows technology executives to better manage a wide range of strategic IT functions that directly impact business results.

The following are the key steps that need to be followed to achieve optimized results in a retail industry

- ❖ Assist in pre-project planning from an end-user perspective in defining requirements and project frameworks
- ❖ Understanding retail/direct to customer business practices with emphasis on customer satisfaction as the final criteria for success.
 - Evaluate change in functionalities as it relates to the above-stated goals and measures
- ❖ Analyze requirements and determine metrics that would enable to measure the business value of the enhancement.
- ❖ Prepare a prototype and do advance analysis and predict the metrics defined to measure the business value. Compare this with the baseline numbers and determine a go or no – go.
 - Advanced analysis to recreate functionality, user or data related issues and assisting development team in creating acceptable solutions with minimal impact to existing business processes
- ❖ Test Strategizing, test planning and test execution by maintaining focus on business effectiveness of the functionality
 - Capture Metrics from test execution
 - The above is also reinforced with regression testing built on existing parameters held constant and observing the impact on throughput and performance by introducing the above mentioned changes.
- ❖ Compare the metrics that were identified after requirement analysis, metrics determined from the prototype testing and the actual metrics after implementation to determine a go or no-go.
- ❖ Analyze the comparisons and brain storm to identify if the predictions and actual metrics vary by more than 20% to improve the effectiveness of metrics predictability.

What we do differently.

The focus on this approach is to realign the IT efforts with the business goals. The impact of the business requirements/change has various significances in various phases of the software and testing life cycle. The impact on each of these phases is analyzed carefully and provisions made to measure these at the intermediate stages. This ensures early detection of any potential flaws and prevents loss due to faulty implementation. The business success criteria are applied to all phases of a project life cycle to ensure that every IT effort is towards achieving the business goal. In the end, what is important for retailers is to ensure that they build efficient applications that make the job for the application users and customers easier. After all lesser the wait at the checkout counter, happier the customer!

Software Life Cycle	Conventional Approach	Business Driven Approach	Key Difference
Requirement Analysis	The key activities performed are Requirements walkthrough and analysis. A traceability matrix is drawn to ensure coverage	The QA team assists in requirement definition and this helps in getting a clear idea of the business intent The QA team works with the business analysts to identify and quantify the impact of the business change to arrive at metrics that are necessary to align and track the IT processes against the business intent.	The focus is on understanding the business requirements and identifying the critical success factors. All the key stakeholders are aware of the business success factors and its impacts. Validation on the sanctity of the requirement is done at this stage to identify any potential failure scenarios
Development Life Cycle	The development team analyses the requirements to prepare a functional design document and develops the application followed by Unit test and handover to QA	The QA team assists the development team in analysis the business requirements and identify the impact areas from a functionality and performance perspective The QA team does an advance analysis to identify potential functionality, data or user related issues Prototype testing is done to validate basic functionality and apply business logic to ensure the logic is flawless and caters to the business requirement	The development is aware of the business impact and the design is based on meeting the business success criteria rather than building sophisticated applications and logic. The prototype test serves as an intermediate stage and ensures that the development team is on the right path.

Test Planning and Test Execution	The test plans are built based on requirements and functional design document.	Business Scenarios are identified to capture identified business metrics and multiple test cases are derived from these scenarios. The impact of the business change on the existing functionality is assessed and planned for.	Test plans are comprehensive and cover all business scenarios. Also various test methodology factors that affect the business criteria are also considered during planning and execution.
Reporting	Operational Reports are gathered and reported to the management	Operational reports are gathered and the impact on the business functionality is assessed. The reporting is done on the impact or improvements in the business functionality	Reports consist of business progress or achievements rather reporting mere operational numbers. The defects and test execution results are analyzed to report the actual business results.

Defining the Business Metrics that identify and quantify the business success factors

The impact and the critical success factors that affect the retail industry and its operations are studied and the analysis of yearly sales reports, customer demands and forecast data applied to derive at the business success factors and expectations from IT.

Identifying the business success factors and quantifying these into metrics that can be tracked through out the project life cycle is the most difficult challenge, but also vital. The success of the approach and the initiative depends on the accuracy of these metrics. Even though defining the business success criteria is considered as the toughest job in the industry, a fairly accurate assessment and quantification of the success criteria can be determined through the following.

1. Assess the requirements and identify the business success factors.
2. Analyze the business objective and validate the sanctity of the requirement
3. Analyze sales reports, forecast data and customer demands trends and apply the findings of the analysis to validate the requirements.
4. Interview business users and customers to understand the business expectancy and critical success factors
5. Identify the key business success factors
6. Arrive at metrics for the business success factors using the data from analysis.
7. Identify the current and desired application performance; Analyze the affect of the application performance on business metrics and draw metrics for both the performance factors.
8. Brainstorm with various stakeholders to baseline the metrics.

Analysis of Application Performance and its affect on business success factors

An efficient warehouse management system may not ensure 100% efficiency and accuracy in fulfilling orders. The reasons might be due to faulty logic or application or procedural overheads. Often retailers confuse application performance with business success. Optimum application performance is only to facilitate seamless working of applications for the end users. While application performance is one of the factors that affect the determination of metrics it is not the end result. The business metrics will vary for different application performances. For instance, a desired replenishment efficiency of 25% might be acceptable with the replenishment application performance factor at 38 locations per minute. However 25% might be too high if the same performance factor is 20. The business metrics should be defined and validated in accordance with the performance factors.

An example to illustrate our approach

The purpose of the IT enhancement was to increase the operational and logistical efficiency of ABC warehouse for an increased throughput with maximum customer satisfaction.

One such change was to change the strategy for wave planning and replenishment that would drive higher wave success rates and volumes through waves thereby improving sorter utilization capacity. The following illustrates the technique that was employed for an optimum implementation

Understanding the business need and impact for the change

- ❖ To Identify the process and constraints with the current wave planning strategy
 - No visibility to sorter/chute utilization rates (per wave).
 - Low utilization of chutes and success rates of waves due to order fallout.
 - Different pick types created upon distribution – CR, UP, CP.
 - Poor visibility to case replenishment picks done from reserve, thereby making reconciliation difficult.
- ❖ To Identify related areas of business process that have an impact on the throughput of wave planning
 - Routing of cartons to different zones based on free locations and not on NUMBER of free locations per zone.
 - Re-zoning operations in the active pick floor to stock cartons in different zones.

- No directed putaway into active locations

Evaluate change in functionalities as it relates to the stated goals and measures

- ❖ To understand the proposed strategy for Wave Planning and evaluate that with respect to business value addition.
- ❖ Proposed Strategy
 - Net demand calculated based on units in Active/returns location.
 - A replenishment created will be pulled from reserve to fulfill net demand
 - Plan orders based on criteria that will create UP and CP pick type orders.
 - Visibility to Chute Capacity and Pack Buffer Capacity will be provided.
- ❖ Business Value Addition
 - Minimal fallout of orders will occur.
 - Higher chute capacity and higher wave success rates.
 - Directed Putaway into active locations and faster reconciliation of CR's
 - Provide tools to check chute capacity to effectively plan waves.
 - Current parameters – Orders (15), Units (45) & Cubing (16500) @ 85% fill rate.

Pre-Project Planning and Project Framework

- ❖ Identify the Pros and Cons of the proposed strategy for Wave Planning and suggest improvements in case of high system impact with low throughput
- ❖ Identify the risks involved that have a high impact to the existing business process.
- ❖ Assist in preparing a high level implementation plan.
- ❖ Work with the Product Management team to define requirements, Analyze the requirements to prepare a requirements traceability matrix.
- ❖ Assist the Development team to define Functional Design document and plan for the functional test plan based on the above inputs.
- ❖ Plan for review the test plan with Product Management and Development teams to ensure that the test plan covers all business scenarios and evaluates the business value and impact.
- ❖ Use of test management tools such as HP Quality Center to facilitate test planning and execution; It also serves to create the dashboard and ensures requirement traceability and coverage.

Analyze requirements to determine metrics to measure business value

- ❖ Brain storm to determine the metrics that would measure the business value of the new wave planning and replenishment strategy
- ❖ The metrics that were identified were
 - Distribution Run times – 1.4 Minutes
 - Replenishment accuracy - 34%
 - Putaway to active floor throughput – 15000 containers (15.6%)

The metrics provided above were defined based upon;

- ❖ Business requirements and process changes suggested
- ❖ Forecasted sales value for peak '06 which were analyzed to obtain;
 - Size of waves (number of orders/wave)
 - Number of replenishments (daily) based on current active floor configuration

Prototype, advance analysis and prediction of the metrics

- ❖ A prototype code was developed and a test run was executed. A prototype model is provided to enable simple testing and metrics to be available immediately and give a framework for building more sophisticated tests or revise functionality.
- ❖ The results were analyzed to arrive at an approximation of the actual results. The results obtained were
 - Distribution Run times – 1.3 Minutes
 - Replenishment accuracy - 36%
 - Putaway to active floor throughput – 11500
- ❖ These were compared with the metrics defined earlier and a go – no go decision was made. It was inferred that the putaway logic had to be modified as there was a logistical flaw with containers being accumulated far from the active regions to be replenished. The team was able to save significant cost through this exercise and also prevent a faulty functionality being deployed to production. The approximate effort saved on this functionality was 37.3% of the total project effort.
- ❖ The prototype was modified to include the new logic and the new container numbers were found at 15200 (16%)

Creating acceptable solutions with minimal impact to existing business processes

- ❖ Analyze the proposed strategy by recreating the functionality to ensure minimal impact to the existing business processes
 - Replenishment pick density will be low with higher frequency of replenishments generated and low number of picks/tour.

- ❖ Identify any potential data or user related issues and work with the development team to provide acceptable solutions
 - Current parameters – Orders (15), Units (45) & Cubing (16500) @ 85% fill rate.
- ❖ Revisit the baselined strategy and check for
 - ROI
 - High Throughout
 - Minimal Business Process Impact
 - High Risk factors
 - Training/User Issues

Test Execution

We start our test execution phase with

- ❖ A complete understanding of the new Wave Planning functionality from business and application perspective.
- ❖ Identification of key functional changes and impact to the system
- ❖ Identification of user or data related issues
- ❖ Use of a Test Management tool to ensure requirements coverage and stream lined defect reporting
- ❖ A complete test plan signed off by product management, development and testing teams.
- ❖ A list of metrics to be captured
- ❖ The Industry standards testing methodologies and processes were used to conduct the test execution
- ❖ Test execution is reinforced with regression testing built on existing parameters held constant and observing the impact on throughput and performance.

Beyond Test Execution

- ❖ Compare the new performance and throughputs with existing data
 - Distribution run times: Before 8 Minutes After 1 Minute
 - 25% increased efficiency in replenishments
 - 17% increase in Putaway throughput

	Initial Metrics	Prototype Metrics	Final Metrics
Distribution Run Times	1.4	1.3	1
Replenishment Efficiency	34	36	35
Putaway throughput	15.6	16	17

Reporting

What do these numbers mean to the CIO of a retail giant? The numbers presented in the above table need to be quantified in terms of actual business gains and projected to the management. The benefit of doing such an exercise will make the decision of go or no-go easier.

The following was the sample report submitted for the above data

The Distribution Run time was reduced to 1 minute. This will allow the orders to be distributed on a wave quicker than before and 8 order waves can be planned in a day as compared to 4 waves. In short the number of orders that can be packed and shipped per day has increased by 100%
The replenishment efficiency has increased by 35%. This means that the capacity to fulfill CP orders has increased by 1000 orders per day.

The Putaway throughput has increased by 17%. This means that number of containers that can be putaway in a single shift has increased to 15800.

The above report loudly calls out the business benefits from the project. The management can review these results to determine the success of the project. Also individual teams can correlate this with the initial numbers to identify any deviation and identify the best practices.

Benefits

The following are the tangible benefits of this approach

- ❖ The success of the project is not tied to success of an IT project, but the business impact tracked through key business performance indicators.
- ❖ People who are most knowledgeable about the business process and the application functionality determine the effectiveness of an enhancement by relating it to business criticality and success
- ❖ It also allows the testing teams to start the test design much sooner thus accelerating time-to-deployment for high quality software.
- ❖ Testing is more effective as our approach greatly strengthens the test design process with innovative techniques such as prototype model testing
- ❖ This approach ensures the goals of the business and the needs of the customer are prioritized into requirements that remain persistent throughout the development process, from product planning to product deployment.
- ❖ Enable teams to share information and capabilities to improve operational efficiency and reliability of applications in production through better understanding of the business criticality and impact.

Potential solutions for problems during implementation

- ❖ Prediction of the actual results and quantifying requirements into business metrics requires high domain and retail business expertise.

Typically QA personnel with 4-5 years retail experience along with product managers should be able to assess requirements and predict business metrics

- ❖ Preparing a prototype model might affect the development effort and deviate from the project timelines.

The prototype should be planned such that the deviation from the actual development is minimal and the impact of the project timelines is low

- ❖ This might not be applicable to all Retail industry scenarios; if a company or individual is deep with process related problem, following such a model might deepen the problems.

An assessment on the feasibility of such a business process should be done prior to implementation.

Conclusion

For many companies “application delivery as usual” has actually become a competitive disadvantage and in some cases a business obstacle. As seen above, by focusing on the business process aspect, we are able to maximize efficiency and performance leading to a

satisfied customer. In conclusion, the move of IT from business support to a competitive advantage needs to be supported by a well-designed QA process.

Speaker profile**Name: Santosh Vithal Rao Atre****Education:** 2001: B.E. Instrumentation Technology**Software Testing Experience:** 4.5 Years

My association with Infosys Technologies Ltd is for the past 4.5 years when I joined as a software test engineer. During my tenure, I have worked with various domains such as ERP, CRM, Retail – WMS and banking. Working as a test engineer for a F&B client in US made me well versed with nuances of testing life cycle and standard testing processes. It was here that I was first exposed to retail domain; I was thoroughly fascinated by the experience and was eager to learn more.

Moving across different retail projects, gave me exposure to new technologies and business processes. The retail forums, magazines and trainings helped me understand the nuances of the retail industry and the project experience helped me identify this knowledge with business and marked trends. As a committed team member I put in extra effort to develop testing skills and apply the retail knowledge in my projects. These projects also gave me an opportunity to work on automation tools and frameworks apart from developing soft skills.

Having developed strong testing and retail domain expertise, I was promoted to the position of a Test Analyst in the company. Apart from managing and mentoring the team, managing client expectations for improved customer satisfaction. It was during this phase, I realized the importance of QA involvement in requirement definition and product design. My new roles as consultant QA lead for JP Morgan Chase and as test consultant for MetLife enhanced my testing process expertise.

For the past 2.5 years, apart from managing a testing team at onsite/offshore, I have also been responsible for developing best practices, providing solutions on testing proposals and mentoring the team. My aim is to constantly strive for excellence and look to add value to team, clients, company and myself through constant innovation and perseverance.