CONTEXT-DRIVEN TESTING

A testing model for minimizing production defects in diverse software projects at companies to bring continuous improvement and value to their quality assurance testing

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experience partnership.

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OVERVIEW

Context-driven testing has been a practice for more than 15 years, but it's a concept that is still evolving in the healthcare technology marketplace. This method for testing software evaluates the ways in which a program will be used or is expected to be used by customers.

It acknowledges that projects evolve over time in unpredictable ways, and the people who use the applications are key to the context of any project. What works well for one person in a specific situation might not work as well for another person or situation. For example, when a nurse or a health coach schedules an appointment, he or she may complete this through an activity workflow or an assessment workflow. For those who tend to schedule appointments through an activity workflow, for instance, some might rely on a keyboard to complete this scheduling, while others might prefer to use a mouse.

Context-driven testing validates the behavior, perspective, acceptance and satisfaction levels of users and the way they are accessing the product or system—not just whether the particular feature performs as expected without glitches. It takes into consideration their preferences, needs, abilities and limitations. Through context-driven testing, organizations can:

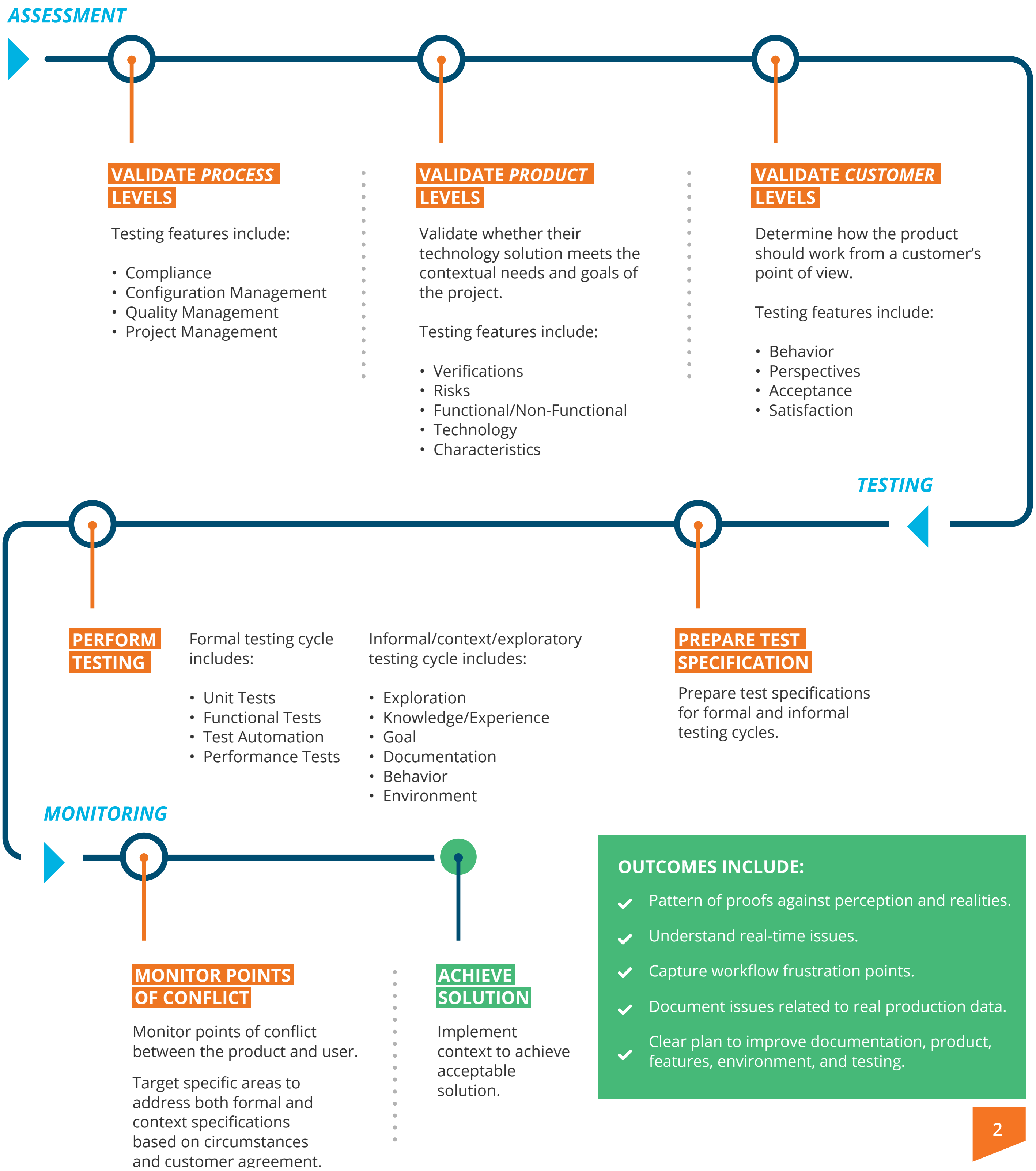
- Validate whether their technology solution meets the contextual needs and goals of the project.
- Determine how the product should work from a user's point of view.
- Reduce risks for user acceptance and increase adoption of the product.

With this type of testing, there is no single best practice that applies to all cases. Its value is contingent upon the amount of useful and timely information gathered during the testing process—and its success depends on whether the software solution resolves the problem or situation it is intended to address.

Context-driven testing is ideal for when quality assurance has reached a mature state, and when service-level agreements and metrics are under control and progressing in a positive direction. Contextual testing should not, however, replace other forms of testing. It should be integrated into the larger quality assurance process.

HOW CONTEXT-DRIVEN TESTING WORKS

Context-driven testing requires assessment, testing and monitoring of the product to validate whether its meeting the context of the project, determine user's acceptance and satisfaction, and lastly, help build confidence and increase adoption of the product.



ASSESSMENT

VALIDATE *PROCESS* LEVELS

Testing features include:

- Compliance
- Configuration Management
- Quality Management
- Project Management

VALIDATE *PRODUCT* LEVELS

Validate whether their technology solution meets the contextual needs and goals of the project.

Testing features include:

- Verifications
- Risks
- Functional/Non-Functional
- Technology
- Characteristics

VALIDATE *CUSTOMER* LEVELS

Determine how the product should work from a customer's point of view.

Testing features include:

- Behavior
- Perspectives
- Acceptance
- Satisfaction

TESTING

PREPARE TEST SPECIFICATION

Prepare test specifications for formal and informal testing cycles.

PERFORM TESTING

Formal testing cycle includes:

- Unit Tests
- Functional Tests
- Test Automation
- Performance Tests

Informal/context/exploratory testing cycle includes:

- Exploration
- Knowledge/Experience
- Goal
- Documentation
- Behavior
- Environment

MONITORING

MONITOR POINTS OF CONFLICT

Monitor points of conflict between the product and user.

Target specific areas to address both formal and context specifications based on circumstances and customer agreement.

ACHIEVE SOLUTION

Implement context to achieve acceptable solution.

OUTCOMES INCLUDE:

- ✓ Pattern of proofs against perception and realities.
- ✓ Understand real-time issues.
- ✓ Capture workflow frustration points.
- ✓ Document issues related to real production data.
- ✓ Clear plan to improve documentation, product, features, environment, and testing.

BENEFITS OF CONTEXT-DRIVEN TESTING

Context-driven testing, when performed alongside regular quality assurance activities for product releases, can help address issues reported by users before the software is rolled out to customers. These issues are often caused by:

- The usage patterns of customers, including physicians, nurses, members, care managers and care teams whose workflows vary on a day-to-day basis and from person to person. When adding medication details to a patient record, for instance, nurses must note the frequency of the medication given. Therefore, they may need a drop-down menu added to the record instead of a text box, so they can select the proper dosage and minimize manual errors that could harm patients.
- Real-time data used by customers that varies from data used during validations. For example, in a member portal, a unique ID may be generated to represent the condition of the member. In the quality assurance testing phase, the application may generate either a 10-digit number or a null value. In production, however, values with less than 10 digits may be generated, and if the application is not designed to handle this, it will cause an error.

By addressing these issues, context-driven testing can make products easier to use, optimize functionality for intended users and adapt the product to changing needs in the healthcare market.

Context-driven testing benefits healthcare providers and vendors developing technology solutions by helping them:

- Gain a better understanding of the perspective of users and the real-time issues they face.
- Address challenges that occur when using the technology or incorporating the application into a user's workflow.
- Document issues related to real-time production data.
- Develop a clear plan for improving product features, testing, documentation and the environment in which the technology is used.

BENEFITS OF CONTEXT-DRIVEN TESTING

Reduction in the issues reported to the production support team.

High customer satisfaction.

Realities vs. Perception.

Continuous product improvement and improved documentation.

Provide inputs to improve test scenarios and test data.

APPROACHES FOR CONTEXT-DRIVEN TESTING

Successfully conducting context-driven testing involves identifying the intended market and evaluating the environment in which people are likely to use the software product, such as nurses using mobile devices in the ER, or healthcare executives using smartphones to connect to their hospitals from anywhere around the world.

Contextual testing is possible with two approaches: a technology-based approach or a people-centric approach. The best approach to use depends on what the organization and its users will allow. If the customer allows the testing team to install an agent that captures actions performed by the user, a technical approach is suitable. Otherwise, a people-centric approach works best.

*APPROACH 1: **TECHNOLOGY BASED APPROACH***

DOMAIN EXPERTS AND TECHNICAL EXPERTS DEVELOP AND DEPLOY TESTING AGENT

Domain experts work with customers to define and determine the type of data collected and how often it is collected.

Testing agent includes a lightweight tool that's deployed on customer machines, which sends information back to a database.

TESTING AGENT COLLECTS USER ACTIONS AND CREATES TEST DATA

Collects information, specific to the application or URL, that illustrates data and product usage patterns.

ANALYTICS DASHBOARD PROVIDES PRODUCT USAGE PATTERNS

Provides analysis of product usage pattern to help businesses make decisions on new feature additions or product enhancements.

Domain experts can help analyze the usage pattern and real-time data, so the testing team can improve testing strategies.

APPROACH 2: ***PEOPLE-CENTRIC APPROACH***

DOMAIN EXPERTS INTERVIEW CUSTOMERS AND ANALYZE MARKET

Domain experts interview customers to gather input on their product experience.

Domain experts set up domain users team.

DOMAIN EXPERTS USE FEEDBACK TO CREATE TESTS

Domain experts use data from customers and the market to create tests and conduct exploratory tests.

DOMAIN EXPERTS PROVIDE FEEDBACK BASED ON TESTS

Based on the outcome of tests, domain experts provide feedback to the business team around the following parameters:

- Product enhancements
- New features
- Defects
- Documentation enhancements
- Behavior pattern of users

Domain experts provide testing team with:

- Production-like data
- New scenarios and test cases
- Test case enhancements

TEAM AND INTERVIEW SETUP FOR PEOPLE-CENTRIC APPROACH

SETUP DOMAIN USERS/EXPERT TEAM

Internal domain users and Subject Matter Experts (SME) teams consist of users with knowledge of the application, such as physicians, nurses or care team members. The team also includes domain users or SMEs not connected to the particular application to avoid influencing the business users.

Any SME involved in this process is trained on the application.

DOMAIN EXPERTS PERFORM OBSERVATION

Domain experts observe users and conduct 60 minutes of documentation that includes:

- Usage pattern of workflow and screen
- Test data captures input/output
- Frustration points
- Issues/errors

DOMAIN EXPERTS PERFORM QUESTIONING

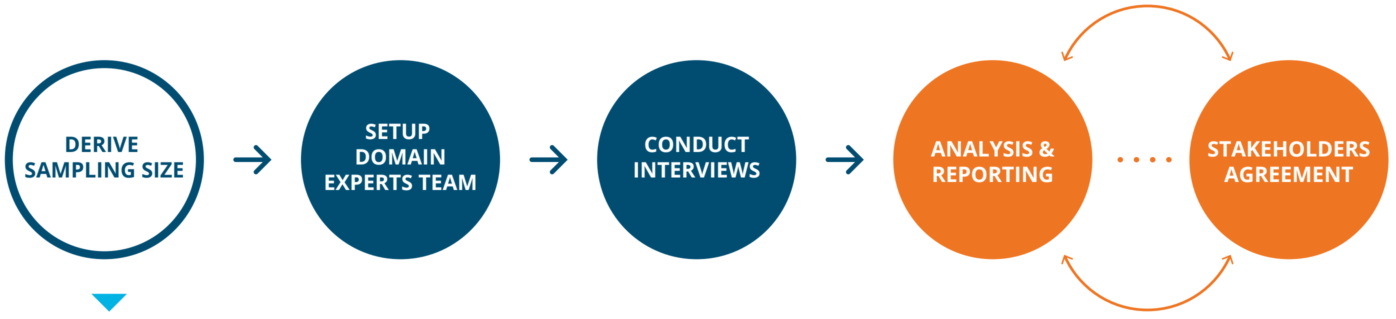
Domain experts questioning includes 30 minutes of documentation with objective questions based on observation and issues escalated.

CONSOLIDATE DOCUMENTATION

RECOMMENDATIONS FOR IMPLEMENTING THE PEOPLE-CENTRIC APPROACH

Implementation of the people-centric approach identifies the usage pattern and real-time data of the users.

PEOPLE-CENTRIC IMPLEMENTATION



DERIVE SAMPLING SIZE → SETUP DOMAIN EXPERTS TEAM → CONDUCT INTERVIEWS → ANALYSIS & REPORTING .... STAKEHOLDERS AGREEMENT

SAMPLING METHODOLOGY

The sampling size for context-driven testing has to be derived based on the stratification method. It needs to be derived for each of the roles of users across various applications.

Average relative sampling efficiency using the stratification method is 0.38.

Once the sampling size is derived, domain experts interview users from multiple clients for each application.

ANALYSIS, REPORTING AND STAKEHOLDER PRIORITIZATION

PRESENT DATA COLLECTED

Domain experts present the data collected through observation and interviews with internal stakeholders.

VALIDATE INFORMATION CAPTURED

The product owners and business analysis teams validate the information captured.

MEET TO DISCUSS FINDINGS

Stakeholders discuss and prioritize the findings, categorizing them based on:

- Product enhancements
- New features
- Defects
- Documentation enhancements
- Behavior patterns
- Test enhancements

Leaders of business analysis, development, quality assurance, release management and operations teams, along with product owners, should be part of the decision-making team.

PRIORITIZE TARGETS

Based on the categories, necessary actions will be initiated, and priorities and targets for implementation agreed upon.

CASE STUDY:
TOP 5 U.S. HEALTH INSURANCE PROVIDER

A diversified, leading U.S. health insurance provider, which began selling health insurance in the 19th century and today has 46 million members, is using emids for business analytics and quality assurance services. The company wanted to pursue context-driven testing to boost user satisfaction of its software product, minimize production defects and enhance the product by gaining a better understanding of the needs of users.

THE BUSINESS OPPORTUNITY

Context-driven testing was conducted for a module on a client-facing product. After the release of the module, users reported issues to the customer care team. These issues were caused by differences in the usage pattern of customers, including physicians, nurses, care managers, care teams and members, along with variances between real-time data used by customers and data used for validating the module.

THE SOLUTION

The customer did not want to install an agent on its systems, so emids helped the provider achieve contextual quality assurance through a people-centric approach. Experts from the internal development and quality assurance and business analysis teams formed the domain expert team. The team was trained not to influence customers based on their own experience with the product, but to observe and interview customers about their experience using it.

PROOF OF SUCCESS

Implementing the context-driven testing method helped the insurance provider identify two new defects in the product and discover five new areas for enhancements. The process helped maintain defect leakage—defects identified by the end user and overlooked during regular testing and beta testing cycles—to zero percent for this application. It also helped boost the confidence users had in the product, clarified their questions about it and improved customer satisfaction.

SUMMARY

No two software projects are alike—which means that different testing methods will be necessary for each project. Context-driven testing promotes the idea that human behavior and feedback should inform testing goals. Rather than following a test plan with specific lists of actions, testing teams are trusted to use their judgment and skill to determine how they need to test to meet the expectations of users. While this method may not address every problematic scenario, context-driven testing provides customers with insight they can apply to any context and helps them accurately assess how to address issues as they arise.

About the Author

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Mr. Prasad has 13-plus years of experience in software quality testing. He has successfully led large quality assurance programs for several clients and works with IT leaders at companies to bring continuous improvement and value to their quality assurance testing. His past experience includes working with First American and Genpact Headstrong.

About emids

emids is a premier provider of healthcare IT services and solutions. emids enables healthcare entities to achieve accessible, affordable and high-quality care by providing custom application and data solutions. Our clients experience true partnership with us as together we navigate the challenges of a rapidly changing healthcare industry.