GREENPOINT SUMMIT: RFR TEST STRATEGY & IMPLEMENTATION

SUMMIT TRICKS AND TRAPS

SERIES - 1 / ARTICLE - 3

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Why Test RFRs?

LIBOR (London Interbank Offered Rate) was the key benchmark interest rate used by global lending institutions for decades. However, its role in the 2008 financial crisis led to its sunset. The fall and replacement of LIBOR has made the migration to an invulnerable system imperative in financial institutions across the world. Indeed, the publication of 24 of the 35 LIBOR settings was halted on 22nd January, 2022. As LIBOR is phased out, RFR, or Risk-free Rates, are robust alternatives for your institution. Unlike LIBOR, RFRs are backward-looking and do not include a premium for longer-term funding.

It is important to factor in the impact and risks associated with implementing RFRs. GreenPoint's Summit teams work closely with clients to ensure a seamless migration from LIBOR to RFRs. Our RFRs testing methodologies are designed to effectively implement RFRs while pre-empting and mitigating the pitfalls and risks associated with this complex transition. In this article, we delineate how we successfully implemented RFRs at a client institution using our testing strategy to minimize disruption, error, and risk.

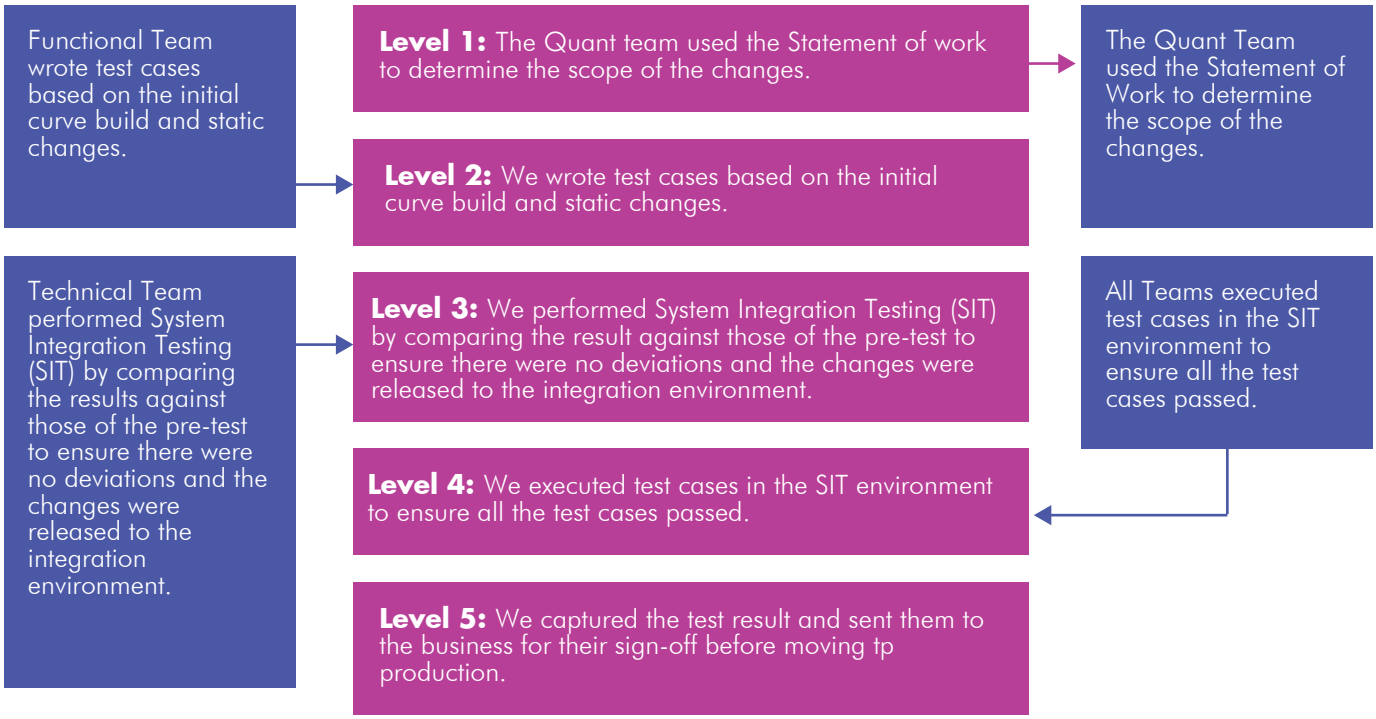
Our Testing Strategy

Our methodology studied Risk-Free Rate (RFR)/Overnight Swap Index (OIS) curves to perform impact analyses on trade/portfolio valuation and accounting. The strategy tested these curves to mitigate the impact of material changes in the variables on downstream feeds or accounting. As a result, we closely determined the maintenance of all variables within the required thresholds and captured any associated financial risks with the implementation.

Our Testing Approach

To ensure this risk mitigation and a comprehensive understanding of any impact, our testing approach was defined at five different levels.

Diagram 1: Our five-level Testing Approach



Our Testing Objectives

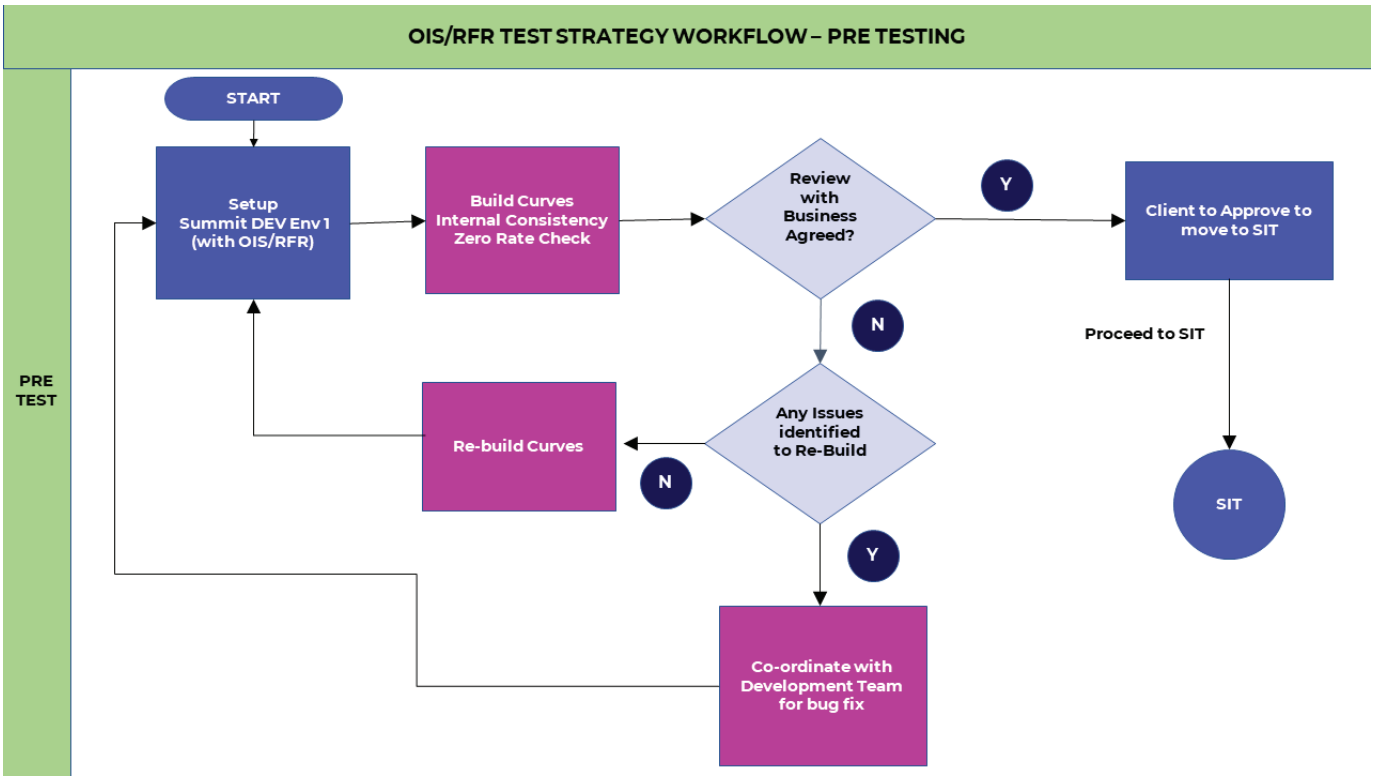
- During the build phase, our objective was to validate the RFR/OIS functionality while preserving System Integration Testing and User Acceptance Testing timelines.
- Our quant team oversaw the curve build and the unit testing of the RFR/OIS setup, including curve build changes.
- We performed functional tests to ensure the delivered RFR/OIS functionalities corresponded to those defined in the scope.
- Avoiding impact on the client's business processes during the RFR/OIS implementation was our top priority. Testing was performed incrementally on the existing build to optimize the scope coverage and lower the number of potential defects when entering the SIT/UAT environments. Any potential changes and impacts, including batch processes, were immediately relayed to the client.

The Pre-Testing Phase

- Our first-level testing validated the (i) Initial Build, (ii) Internal Consistency, and (iii) Zero Rate to ensure that either a) the zero rate was unaffected, or b) the change was within the permissible threshold outlined in the scope.
- Due to its impact on trade booking, this phase also included the validation of the Mark to Market (MTM) impact to ensure the pre-implementation and post-implementation values were within the specified thresholds.
- If the difference was above the thresholds, we rebuilt the curves to accommodate the differences.

The sequence of our pre-testing phase is depicted below:

Diagram 2: RFR/OIS Test Strategy Pre-Testing Workflow



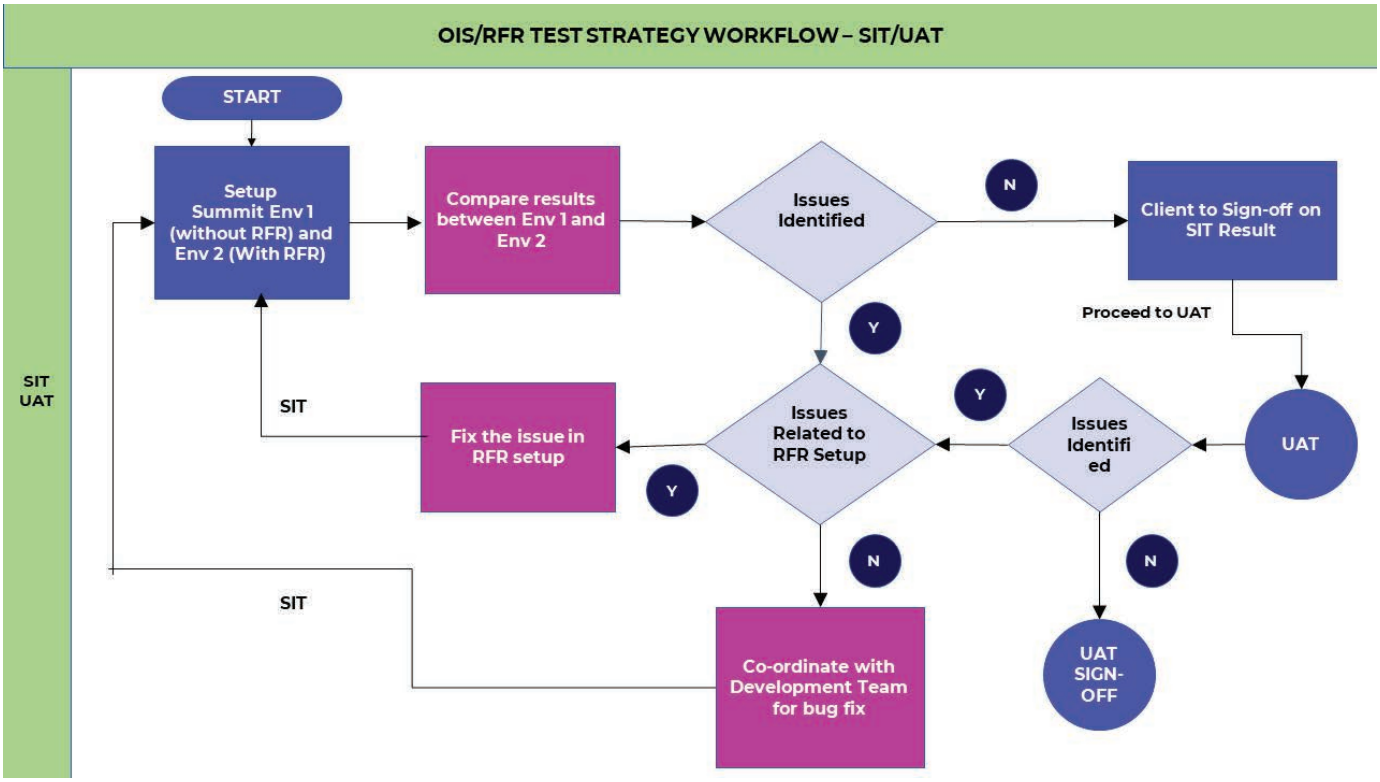
Regression Testing

We performed regression testing to ensure that existing infrastructure and systems at the client institution continued to perform seamlessly after the transition.

- We consolidated the changes and automated their release into the environment for end-to-end testing. This helped us verify that the curve internal consistency and the MTM difference are the same as determined during the pre-test.
- We then performed downstream system tests. To ensure their prominent impact on feeds and downstream systems, we tested changes in the curve construction and static changes related to the RFR requirements respectively.
- The key test involved comparing the MTM value with the counterparty MTM value to verify that it was matched within the threshold.
- Under this phase, all test cases prepared during the pre-test phase were tested again to ensure that they passed before the production phase.
- All the test results captured during this phase, including the MTM value comparisons were then submitted to the client for their final sign-off.

The workflow of our regression-testing phase is as follows:

Diagram 3



The Regression Testing Environment

We set up two different environments to highlight the differences between an RFR and non-RFR implementation. This also allowed us to easily investigate (i) regression issues and (ii) valuation differences due to the RFR/OIS setup.

Function	Environment 1 With RFR Config	Environment 2 Without RFR Config	Difference
As of Date	Day 0	Day 0	Environment 1 and Environment 2

Table 1: RFR and Non-RFR Testing Environments

Our Roles and Responsibilities

The roles and responsibilities of GreenPoint's project team, our client, and Finastra product team are outlined below:

	Implementation	Client	Product
Test Planning	✓		
Test Reports	✓		
Defect Management	✓		
Refresh Test Environments		✓	
Defect Fixes Related to 6.0			✓
RFR/OIS Configuration	✓		
Smoke/Unit Testing	✓		
Integration Testing Execution	✓		
UAT Execution		✓	
Change Control Management	✓		
Re-testing	✓		
Test Results & Reports	✓		
Test Results & Reports Review	✓	✓	
Test Reports Sign-off		✓	

Table 2: Roles and Responsibilities

Testing Environments

We used a number of environments to perform all tests related to the RFR/OIS implementation:

- Environment 1: Functional Setup and Unit Testing
- Environment 2: Integration Testing
- Comparison Testing: Production-like Setup (Environment 1) vs. Integration Testing (Environment 2)
- Client Environment 3: User Acceptance Testing
- Parallel Testing, as applicable

Defect Management

Our defect management system allowed quick and effective responses to any issues that arose during the testing process.

- Identified issues were raised as tickets on the product defect ticketing portal.
- Thereafter, the product team took the responsibility for the raised ticket and provided a solution.
- After receiving the solution, the project development team implemented it.
- The functional team re-tested for the defect to ensure it was fixed.

GreenPoint> Summit

ABOUT GREENPOINT SUMMIT

- GreenPoint Summit is a comprehensive platform encompassing new implementations, version and module upgrades, product and application development, test automation, cloud migration, and system maintenance
- Our quantitative services and platforms include Libor Replacement Simulation Tool (LRST), curve creation, recreation and management, model validation and documentation, and creation of challenger models for regulatory compliance.
- Our summit professionals also provide data porting, migration and management as well as cloud services.
- Over the last year we have completed several projects including full system upgrades, Libor/RFR migration, replacement of valuation frameworks, and custom code creation and testing for large global banks and insurers.

GreenPoint> Financial

ABOUT GREENPOINT FINANCIAL

- GreenPoint Financial is a division of GreenPoint Global, which provides software-enabled services, content, process and technology services, to financial institutions and related industry segments.
- GreenPoint is partnering with Finastra across multiple technology and services platforms.
- Founded in 2006, GreenPoint has grown to over 500 employees with a global footprint. Our production and management teams are in the US, India, and Israel with access to subject matter experts.
- GreenPoint has a stable client base that ranges from small and medium-sized organizations to Fortune 1000 companies worldwide. We serve our clients through our deep resource pool of subject matter experts and process specialists across several domains.
- As an ISO certified company by TÜV Nord, GreenPoint rigorously complies with ISO 9001:2015, ISO 27001:2013, and ISO 27701:2019 standards.

Sanjay Sharma, PhD

FOUNDER AND CHAIRMAN

Sanjay provides strategic and tactical guidance to GreenPoint senior management and serves as client ombudsman. His career in the financial services industry spans three decades during which he has held investment banking and C-level risk management positions at Royal Bank of Canada (RBC) Goldman Sachs, Merrill Lynch, Citigroup, Moody's, and Natixis. Sanjay is the author of "Risk Transparency" (Risk Books, 2013), Data Privacy and GDPR Handbook (Wiley, 2019), and co-author of "The Fundamental Review of Trading Book (or FRTB) - Impact and Implementation" (Risk Books, 2018).

Sanjay was the Founding Director of the RBC/Hass Fellowship Program at the University of California at Berkeley and has served as an advisor and a member of the Board of Directors of UPS Capital (a Division of UPS). He has also served on the Global Board of Directors for Professional Risk International Association (PRMIA).

Sanjay holds a PhD in Finance and International Business from New York University and an MBA from the Wharton School of Business and has undergraduate degrees in Physics and Marine Engineering. As well as being a regular speaker at conferences, Sanjay actively teaches postgraduate level courses in business and quantitative finance at EDHEC (NICE, France), Fordham, and Columbia Universities.

Maraimani Chakkaravarthy

DELIVERY HEAD - GREENPOINT SUMMIT

Maraimani Chakkaravarthy is Delivery Head for Summit Practice at GreenPoint Global. Marai is responsible for the delivery of our current and forthcoming projects and collaborates with our existing delivery teams in the US and India. He is initially tasked to grow our Summit team globally with talented, energetic, and experienced professionals.

Marai has over 25 years of experience in enterprise financial technology and software – most recently as Asst. Vice President at Deutsche Bank in Singapore where he oversaw Summit across six instances and 16 countries in APAC. He led a team of 40 professionals including offshore teams and was instrumental in creating frameworks to manage multiple clearing markets including Singapore, Hong Kong, Korea, Japan, and China. During his tenure at Deutsche Bank, he also oversaw several Summit upgrades and created test automation frameworks. He led the development of an APAC-wide P&L consolidation automation for Deutsche Bank that combined data feeds from Summit, Spider, Kondor, and other systems. Before joining Deutsche Bank, Marai was at HCL Technologies in Singapore for eight years as Summit Project Manager.

Marai holds a B.Sc. in Physics from the University of Madras, a Diploma in Computer Science, and several other certifications, including Oracle and Project Management. Marai is an avid farmer and is passionate about bringing technology applications to farmers in rural India.

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