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Beyond FRTB compliance, leveraging regulation to optimize market risk management

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In brief

- While FRTB regulations are not new, the upcoming implementation timelines are forcing institutions to finalize their compliance approach

- One of the primary challenges in implementing FRTB is managing and integrating vast amounts of data from multiple sources, including trading systems, risk management platforms and external data providers. Ensuring data quality, consistency and timeliness is critical for demonstrating the accuracy of risk calculations towards the liquidity of underlying risk factors

- Many banks have turned to external systems providers to complement their existing systems, streamlining the additional burden and exceeding the principles of the regulations, and unlocking considerable value and insight for the business they operate

Welcome to the third article in the Enterprise Resource Management thought leadership series. In the preceding articles with Kynec and SmartStream Technologies, we explored the areas of cross-desk optimizations and the liberation of data from existing multi-desk trading environments.

Financial markets continue to transform, driven by regulatory changes, technological advancements and the increasing complexity of global markets. One of the most significant regulatory developments in recent years is the Fundamental Review of the Trading Book (FRTB).

While set to be implemented by January 2025, many banks, ahead of the final implementation date, have for some time already, been deploying changes to support this regulation, identifying challenges and opportunities to optimize their existing solutions.

In this article, co-authored by David Cassonnet, Senior Vice President of ActiveViam, we explore the optimization opportunities of not just meeting the principles of this regulation but surpassing them with the support of third-party providers in the pursuit of achieving regulatory and operational excellence.

Understanding FRTB

What is FRTB?

FRTB is a comprehensive set of regulations introduced by the Basel Committee on Banking Supervision (BCBS) to overhaul market risk capital requirements. FRTB aims to address shortcomings in the existing framework and ensure that banks hold sufficient capital to withstand periods of market stress. The regulations introduce new methodologies for challenging and complementing existing market risk calculations, focusing on the sensitivity of analytics toward the liquidity of their underlying risk and other factors.

- **Historical context:** FRTB has been in development for several years; its initial proposal dates back to 2012. The original implementation date was set for 2018. However, due to the complexity and the significant overhaul required by financial institutions, the final implementation date has been postponed many times. Currently, the compliance deadline is January 2025

- **Early adoption and challenges:** Many banks have been working on FRTB compliance well ahead of the final deadline. Early adoption efforts have revealed several challenges, including the need for significant system upgrades, data integration and the development of robust risk models. Despite these challenges, early adopters have benefited from improved risk management practices and greater regulatory preparedness

- **Continuous improvement and updates:** Over the years, FRTB regulations have been refined and updated based on feedback from the industry and regulatory bodies. This iterative process has helped address some of the initial implementation challenges (e.g., slight differences in implementation from one jurisdiction to another) and has provided clearer guidelines for banks

Key components of FRTB

FRTB comprises several critical components that banks must address:

- **Revised standardized approach (SA):** A more granular approach to calculating market risk, requiring banks to classify risk exposures into predefined risk classes and apply standardized risk weights

- **Internal models approach (IMA):** Banks with robust risk management systems can use internal models to calculate market risk, subject to stringent validation and approval processes

- **Default risk charge (DRC):** A separate capital charge for default risk, reflecting the likelihood of counterparty defaults

- **Residual Risk Add-On (RRAO):** An additional capital charge for risks not captured by the SA or IMA

- **Liquidity horizons:** Differentiation of risk factors based on their liquidity, requiring banks to hold additional capital for less liquid positions

- **Non-modellable risk factors (NMRFs):** Risk factors that cannot be modeled reliably must be capitalized using a conservative approach

Importance of FRTB compliance

Compliance with FRTB is crucial for several reasons:

- **Regulatory requirement:** Non-compliance can result in significant penalties and restrictions on business activities

- **Risk management:** FRTB enhances the accuracy and sensitivity of risk measurement, helping banks better manage their market risk exposures

- **Competitive advantage:** Banks that successfully implement FRTB can leverage advanced risk management capabilities to gain a competitive edge in the market

Key challenges in implementing FRTB

Data management and integration

One of the primary challenges in implementing FRTB is managing and integrating vast amounts of data. Banks need to aggregate data from multiple sources, including trading systems, risk management platforms and external data providers. Ensuring data quality, consistency and timeliness is critical for accurate risk calculations.

Key data challenges:

- **Data quality:** Ensuring high data quality is fundamental to FRTB compliance. Banks must establish rigorous data governance frameworks to monitor and maintain data integrity. This includes implementing robust data validation processes, regular audits and error-correction mechanisms. High-quality data not only ensures compliance but also enhances the reliability of risk assessments

- **Data consistency:** Data consistency across various systems and departments is essential. Banks need to implement data standardization protocols to harmonize data from different sources. Consistent data allows for more accurate aggregation and comparison, facilitating better risk management and regulatory reporting

- **Data timeliness:** Timeliness of data is crucial for dynamic risk management. Banks must establish processes to ensure real-time data updates and availability. This involves integrating real-time data feeds, automating data collection and minimizing latency in data processing

Model validation and approval

For banks using the IMA, obtaining regulatory approval for models is a significant hurdle. The validation process involves rigorous testing, documentation and demonstration of the model's accuracy and robustness.
Banks must also establish governance frameworks to oversee model risk management.

Model validation process

The model validation process involves several key steps:

- **Model development:** Developing models that accurately reflect the bank's risk exposures and comply with regulatory requirements

- **Back testing:** Comparing model predictions with actual outcomes to assess accuracy and reliability

- **Sensitivity analysis:** Evaluating the model's sensitivity to changes in input variables and assumptions

- **Stress testing:** Assessing the model's performance under extreme but plausible market conditions

- **Documentation:** Maintaining comprehensive documentation of model development, testing and validation processes

Governance framework

Establishing a robust governance framework is essential for effective model risk management.
This includes:

- **Oversight committees:** Creating committees to oversee model development, validation and approval processes

- **Independent review:** Conducting independent reviews of models by internal audit teams or external consultants

- **Regular monitoring:** Implementing ongoing monitoring and validation processes to ensure models remain accurate and relevant over time

- **Simultaneous calculation and reporting:** Under multiple jurisdictions (with variants from the BCBS spec)

- **Banks implementing IMA:** Tracking the performance of individual desks and mitigating transitions of those desks from IMA to SA (and providing "What ifs" and scenario analytics around those events)

- **Understanding capital charges:** Not only computing the capital charges but understanding them and being able to explain movements from day-to-day and month-to-month.

System upgrades and scalability

FRTB requires significant upgrades to existing risk management systems. Banks need to invest in scalable infrastructure capable of handling complex calculations and large data volumes. This involves evaluating whether to build, buy or lease technology solutions and selecting appropriate vendors.

Infrastructure requirements

Banks must assess their infrastructure requirements to support FRTB compliance.
This includes:

- **Compute power:** Ensuring sufficient computational power to handle complex risk calculations and large datasets

- **Storage capacity:** Implementing scalable storage solutions to accommodate growing data volumes

- **Network bandwidth:** Ensuring high network bandwidth for real-time data transmission and processing

- **System resilience:** Building resilient systems with redundancy and failover mechanisms to ensure continuous operation during disruptions

Technology solutions

Evaluating and selecting technology solutions is a critical step in FRTB implementation. Banks can choose from various options, including:

- **In-house development:** Building custom solutions tailored to specific requirements

- **Vendor solutions:** Purchasing off-the-shelf solutions from vendors specializing in FRTB compliance

- **Cloud services:** Leveraging cloud-based services for scalable and flexible infrastructure

Resource allocation and expertise

Implementing FRTB demands substantial resources, including financial investments and skilled personnel. Banks must allocate resources effectively to ensure timely compliance while maintaining business continuity. Recruiting and retaining experts in risk management, data science and regulatory compliance is essential.

Financial investment

FRTB implementation requires significant financial investment. Banks must allocate budgets for:

- **Technology upgrades:** Investing in new systems, software and hardware

- **Personnel:** Hiring and training staff with expertise in risk management, data science and regulatory compliance

- **Consulting services:** Engaging external consultants for specialized expertise and guidance

Talent acquisition

Attracting and retaining skilled personnel is crucial for successful FRTB implementation. Banks should focus on:

- **Risk management experts:** Professionals with deep knowledge of market risk and regulatory requirements

- **Data scientists:** Experts in data analysis, modeling and management

- **IT specialists:** Technologists with experience in system integration, cloud computing and infrastructure management

Process improvements sought under FRTB

Further to the system, infrastructure and resources required to implement FRTB, key internal processes need to be equally under review as part of the principles of FRTB. These processes include:

Business process optimization

Effective FRTB implementation means optimizing various processes across the organization:

- **Position capture:** Enhancing the accuracy and timeliness of position capture processes to ensure reliable risk data, with automated improvements to data collection, validation, reconciliation and manual interventions

- **Sensitivity analysis:** Implementing robust sensitivity analysis frameworks to assess the impact of market movements on risk exposures with improvements to risk factor contribution and scenario impact decomposition

- **Stress testing:** Developing comprehensive stress-testing methods to evaluate the resilience of risk management systems with improvements to stress scenario calibration to historic and hypothetical events, impact of stress scenarios on capital adequacy and development of mitigation plans to these potential impacts

- **Capital allocation:** Optimizing capital allocation processes to ensure compliance with FRTB requirements while maximizing return on capital with improvements to risk-based capital allocation, dynamic reallocation of capital based on changing market conditions and capital allocation performance monitoring

System integration and build process optimization

Banks must carefully plan the integration and build phases of FRTB implementation:

- **Risk alerts:** Developing alert mechanisms to monitor and respond to risk events in real-time

- **Modular application architecture:** Designing scalable and flexible application architectures to support FRTB requirements with improvements to component modularity, data source interoperability and system resiliency

- **Improve vendor selection criteria:** Evaluating and selecting vendors based on their ability to deliver robust and compliant solutions, with those vendors exhibiting strengths in compliance, scalability and external integration capability

- **Improved system deployment processes:** Configuring systems to align with FRTB guidelines addressing improvements in go-live/ decommissioning planning, evidenced business procedure updates, stakeholder readiness planning, clear cutover scheduling and responsibilities and failsafe go-live backup procedures

- **Improved test-plan development and execution:** Implementing improved test strategies to include the evidenced scope of end-to-end test case creation, production replication environments, documented execution results, issue resolution and specific FRTB ES/IMA test comparison results

FRTB affects considerable systems and process in the current risk management IT sphere. The demand for change and increased processes, while remaining prudent for market stability, will continue to drive the need for banks to look externally for expertise and support.

Accelerating FRTB with third-party providers

The complexities of implementing isolated systems

As noted earlier, banks face many challenges in implementing a solution for FRTB. This includes, but is not limited to:

- Creating new infrastructure for running new models against current and new data feeds

- Integrating new feeds and dimensions of data to achieve new attribution and scenarios

- Identifying new pricing and analytic models and reconciliations

- Having access to new server capacity to achieve new and dynamic risk calculation loads

- Upgrading market risk analysis system to modern standards, deriving new insights and additional value

- Finding the right subject matter and IT expertise to manage both the change and new run responsibilities

- Evolving the deployment as regulators change the regulations

- Sourcing code visibility to provide vendor independence and transparency as well as visibility over the full implementation from sensitivity generation to the capital charge calculation

- Accessing historical data for trend analysis and comparison

Many banks have turned to external system providers who provide add-on and complementary systems frameworks to work with their existing solutions, providing external and integrable framework-based platforms to achieve the new FRTB requirements.

Leverage systems that have already addressed the complexity of the problem

By working with external providers, bank IT teams can focus on providing access to existing data and analytics, allowing the external system provider to address the change in dimensions, stress scenarios and reporting. Banks really should only purchase FRTB solutions from vendors who can demonstrate compliance with the ISDA unit tests.

With such systems deployed and/or cloud hosted, integration is dramatically improved without costly change programs to existing systems. In essence, these solutions become an add-on and extensible framework to bolster the existing risk management workflow, which is one of the contrasting principles with FRTB. Such solutions are often designed to run indifferently in any number of environments, and therefore offer great agility for organizations looking to migrate all or part of their architecture to the cloud. Usually integrated with all major cloud providers, external solutions enable banks to avoid being stuck on a single hardware platform and to look for the most competitive offer from cloud providers.

Speed up data consolidation using cloud-based integration

The result is fewer costly on-premises deployments and lower running costs overall. Cloud deployments facilitate data integration with banks, as an externally hosted solution with dynamic data configurations makes it easy for the business to work with existing production datasets without the need for complex IT data-system change projects. Further, by working with external system providers, advancements with cloud, data and AI features are more readily accessible and leveraged.

Exceed FRTB principles with Atoti

ActiveViam's flagship product, Atoti, is an advanced analytics platform designed for the complex, interactive analysis of large and fast-changing datasets. Atoti is flexible, purpose-built and scalable, solving tough business challenges for financial services organizations.

The key architectural features of Atoti:

Real-time data processing: Atoti processes data in real-time, enabling banks to perform dynamic queries and obtain immediate insights into their risk exposures

Scalability: The technology can handle large volumes of data, making it suitable for the extensive data requirements of FRTB

Flexibility: Atoti allows banks to integrate data from various sources and perform ad-hoc analysis, facilitating better decision-making and risk management

Reduced latency: By eliminating the need to re-run calculations for different queries, Atoti significantly reduces latency and improves operational efficiency

This technology is particularly valuable for FRTB compliance, where timely and accurate risk calculations are critical. Fed from existing systems and integrable with existing analytics, it's the ideal solution for adhering to the compare, contrast and stress calculation principles proposed by FRTB.

## Key functional features of Atoti supporting FRTB:

Easy, precise day-to-day variations comparison and explanation: Atoti calculates risk and PnL variations at any level of aggregation with a clear, precise view and enables users to drill down on any figure to understand why it changed. It's what risk managers will spend a lot of their time doing during the day

Dynamic risk aggregation: Atoti enables banks to aggregate risk data dynamically, providing a comprehensive view of total exposure. This capability is essential for meeting FRTB's stringent reporting requirements and ensuring that risk management systems can adapt to changing market conditions

Scenario analysis and stress testing: Banks can use Atoti to perform scenario analysis and stress testing, simulating various market conditions and assessing their impact on risk exposures. This helps banks identify vulnerabilities and develop strategies to mitigate potential losses

Optimization of risk calculations: Atoti optimizes risk calculations by leveraging in-memory processing and advanced algorithms. Banks can perform complex calculations more efficiently, reducing computational overhead and improving accuracy

Atoti dives deeper into key metrics to uncover new insights, accelerating and improving the quality of operational decision-making. The platform can be implemented on-premises or in the cloud. Atoti is flexible, scalable, capable of resolving the complete range of challenges for more or less any configuration
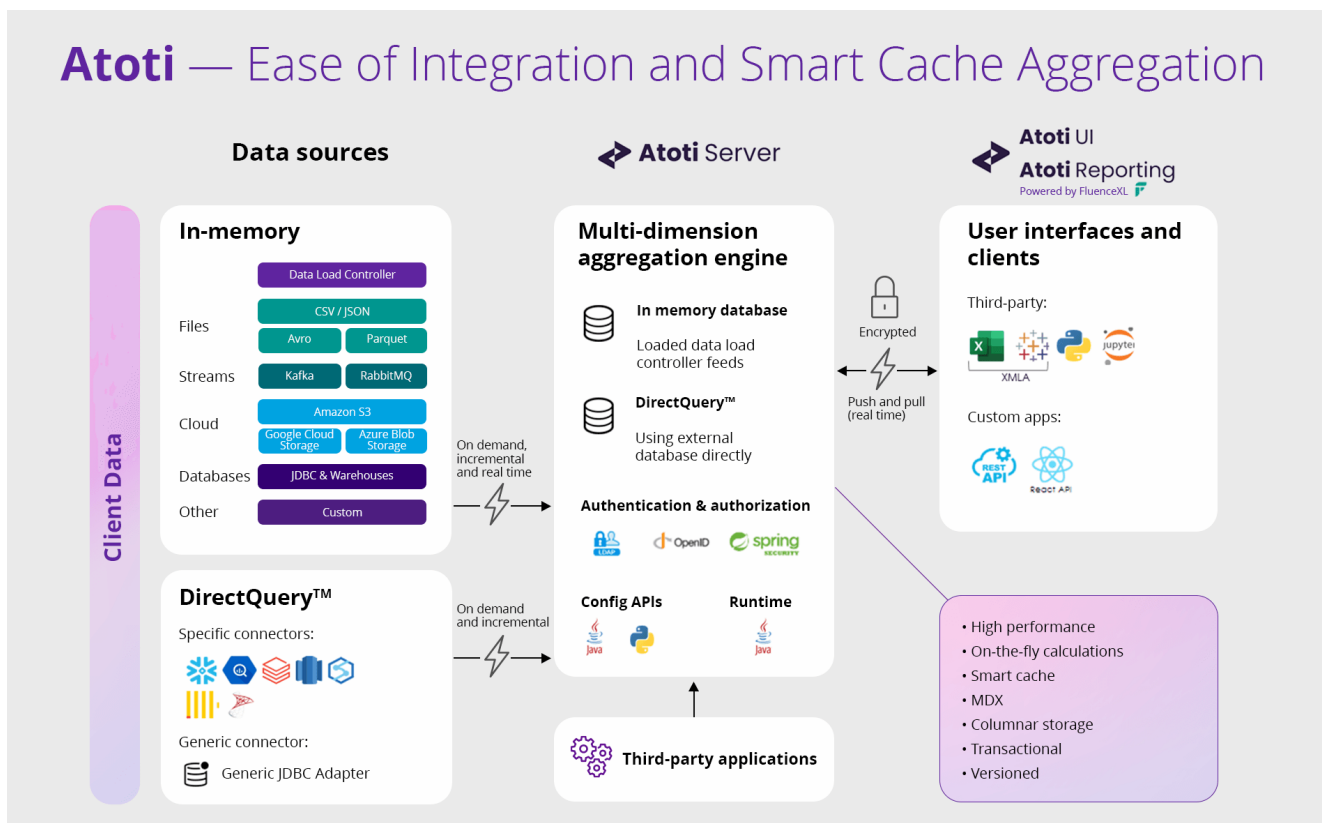
Source: Atoti

Beyond FRTB – unlocking great value and insight

Further to meeting the principles of FRTB, a flexible approach should provide additional business and optimization strengths that improve the return on investment of implementing a broad FRTB solution. FRTB compliance should not be seen as the goal, but as the new industry baseline and banks looking to get ahead must be able to go deeper and faster into their data to gain even better insights, with the help of their partner providers.

Business value generation

ActiveViam and their customers have implemented FRTB with a particular focus on the following key business outcomes beyond mere compliance:

- Optimization of the model-risk capital charge
- Opportunity for hedging and optimization
- "What-if" deal scenario analysis
- Simultaneous calculation and reporting under multiple jurisdictions (with variants from the BCBS spec)
- Tracking the performance of individual desks and mitigating transitions of those desks from IMA to SA (and analyzing "What ifs" and scenario analytics around those events)

They achieved this by focusing on workflow improvements that include:

- Enabling the transaction flow and analytics processing to be used as a trading decision-making tool
- Optimizing the performance scalability of increased number of features and scenarios between the standard approach and IMM
- Improving non-linearity analysis to identify contribution/attribution of risk sensitivity to trades, risk factors and other dynamic fields
- Re-using intermediate results already stored in memory, avoiding costly re-runs of full analytics for new pivots and reporting
- Performing dynamic capital charge attribution to desks, counterparty, assets, etc., ahead of hedging
- Provide tools and data to help the development and testing of new risk models
- AI-based query optimization for improved performance and flexibility
- Data pre-aggregation leading to improved performance and lower costs

The business benefits of this approach are numerous and include:

- FRTB implementation without the pain of implementing costly "What-if" tools
- Reduced infrastructure to support the calculation use cases required
- Improved operational TOM and audit trails as part of workflow improvement
- GenAI embraceable architecture with interpretive requests and data flows
- ML integration for optimization of disparate dataset integration and ingestion
- Centralized, streamlined limits management to improve efficiency
- Integration alternative without the need for an enterprise data replacement
- Dynamic "What-if?" tool that can query regardless of internal or standard models
- Support for multi-jurisdictional data analysis across models

- Audits for changes and sign-off on data and metrics
- Dynamic daily reporting versus monthly and quarterly

- A tool to flexibly engage with regulators

Driving key optimizations

Key optimization features of ActiveViam supporting FRTB include:

- **DirectQuery:** DirectQuery is a feature of Atoti that enables the query and analysis of data stored on third-party databases without loading or duplication. In the analytics dashboards, this "cold" data is merged seamlessly with the "hot" data stored in memory

- **Performance optimization:** Performance optimization is critical in the context of FRTB due to the extensive calculations required for portfolio simulation and risk assessment. ActiveViam enhances performance by leveraging in-memory computing, significantly reducing the time required for data processing and risk calculations compared to disk-based technologies. This allows banks to run more simulations and stress tests within shorter timeframes, providing quicker insights and enabling faster decision-making

- **Scope of calculations required for portfolio simulation:** FRTB mandates a comprehensive set of calculations for portfolio simulation, including sensitivity analysis, stress testing and risk aggregation. ActiveViam's ability to handle large volumes of data and perform complex calculations in real-time ensures banks meet these requirements efficiently. The technology supports both the standardized approach and internal models, providing flexibility and scalability for different business strategies

- **Attribution of results:** Attribution analysis is crucial for understanding the sources of risk and the impact of various factors on overall risk exposure. ActiveViam enables detailed attribution analysis by providing granular insights into trades, risk factors and sensitivities. This helps banks identify the root causes of risk, optimize hedging strategies and improve risk management practices

- **Determination of capital charge requirement:** FRTB requires banks to determine capital charges based on their risk exposures. Accurate and timely calculation of capital charges is essential to avoid over- or under-capitalization, both of which can have significant financial implications. ActiveViam facilitates accurate capital charge determination by providing robust risk calculation and attribution capabilities

Achieving strategic innovation with Atoti

Integration with AI and ML

AI and machine learning (ML) technologies offer significant potential for enhancing FRTB compliance and optimization. ActiveViam can integrate with AI and ML algorithms to improve data analysis, risk modeling and decision-making processes. This includes:

- **Predictive analytics:** Using AI and ML to predict market trends and assess the impact on risk exposures
- **Automated risk management:** Implementing AI-driven risk management tools to automate routine tasks and enhance accuracy
- **Advanced scenario analysis:** Leveraging ML algorithms to generate more accurate and comprehensive stress-test scenarios
- **Optimized aggregation:** Determination of the most commonly used aggregation calculation (versus pre-aggregation)

Cloud-based deployment

Cloud-based solutions offer scalability, flexibility and cost-efficiency, making them ideal for FRTB compliance. ActiveViam can be deployed on cloud platforms to leverage these benefits. This includes:

- **Scalable infrastructure:** Using cloud resources to handle large data volumes and complex calculation
- **Cost efficiency:** Reducing the need for on-premises infrastructure and associated maintenance costs
- **Flexibility:** Enabling banks to scale resources up or down based on demand

Enhanced data integration and management

Advanced data integration and management capabilities are crucial for FRTB compliance. ActiveViam supports seamless integration with various data sources and provides robust data management tools. This includes:

- **Real-time data feeds:** Integrating real-time data feeds to ensure timely updates and accurate risk calculations
- **Data quality management:** Implementing data validation and error-correction mechanisms to maintain high data quality
- **Comprehensive data governance:** Establishing data governance frameworks to ensure data consistency and reliability

Case study 1
Implementation of Atoti for FRTB compliance in a European regional bank

Background

A European regional bank that was already an Atoti client for VaR aggregation faced challenges in meeting FRTB compliance due to limitations in its existing risk management systems. The bank needed a solution that could handle large data volumes, perform real-time risk calculations and integrate data from multiple sources, under a single jurisdiction.

Solution

The bank implemented Atoti to enhance its risk management capabilities. The solution involved:

- **Data integration:** Integrating data from trading systems, risk management platforms and external data providers into Atoti

- **Real-time processing:** Leveraging Atoti's in-memory processing to perform dynamic risk calculations and scenario analysis

- **Scalability:** Ensuring the solution could scale to handle increasing data volumes and computational demands while maintaining high performance

- Enhanced front-end user interface for middle-office risk management

Results

The implementation of Atoti was delivered on time and under budget, and resulted in:

- **Improved compliance:** The bank met FRTB compliance requirements by performing accurate and timely risk calculations. The bank could also easily introduce tweaks to the FRTB rules required by the local regulator while the implementation was ongoing

- **Enhanced risk management:** Real-time processing and dynamic queries provided better insights into risk exposures at any level of granularity. The possibility to drill-down and analyze it in real-time on a large dataset boosted the impact of their decision making

- **Operational efficiency:** Reduced latency and computational overhead, eliminated multiple legacy manual processes and minimized the dependency on fragmented systems

- **User Interface:** Atoti UI introduced increased transparency, the ability to explain the daily measures to a broad range of end users across multiple entities, and the creation of reports for trading heads, accessible on-line

Case study 2
AWS-hosted Atoti FRTB solution in a tier-1 global bank

Background

A leading global bank faced challenges in optimizing its FRTB implementation due to the extensive calculations required and the need for real-time insights into risk exposures.

Solution

The bank evaluated and implemented Atoti to enhance its risk management capabilities. The solution included:

- **Performance optimization:** Leveraging in-memory computing to reduce calculation times and improve performance

- **Scope of calculations:** Supporting a wide range of calculations required for portfolio simulation and risk assessment

- **Attribution analysis:** Providing detailed insights into risk factors and sensitivities to optimize hedging strategies

- **Capital charge determination:** Facilitating the accurate and timely calculation of capital charges, and enabling advanced capital optimization to generate growth and profitability

- Support for multiple jurisdictions

Results

The implementation of Atoti was delivered on time and under budget, and resulted in:

- **Improved compliance:** The bank met FRTB compliance requirements with accurate and timely risk calculations providing full calculation transparency to answer any regulatory inquiry and investigation

- **Enhanced risk management:** flexible and agile "what-if analysis" to simulate instantly the effect of a trade or a set of trades on the bank's capital charge. Real-time processing and dynamic multi-dimensional queries to provide deeper insights into risk exposures

- **Operational efficiency:** Reduced latency and computational overhead; Atoti removed the limitations of "slow IT" and "shadow IT" created by multiple siloed and disjoint systems. Superior data governance workflow, enabling adjustments and sign-off process, facilitated the migration of the bank's risk architecture to the AWS Cloud. By migrating the Atoti FRTB platform to AWS, the bank has been able to achieve remarkable savings on compute costs without sacrificing performance and accuracy or impacting the user experience

The future with FRTB

The FRTB represents a significant regulatory challenge for banks, requiring comprehensive changes to risk management processes, systems and data integration. By leveraging advanced technologies such as ActiveViam's Atoti, banks can achieve real-time data processing, dynamic risk aggregation and efficient scenario analysis.

Optimizing FRTB implementation involves a holistic approach, encompassing process optimization, system integration and robust testing and deployment strategies.

DXC Luxoft, with its extensive expertise in capital markets technology and FRTB transformations, is well-positioned to assist banks in navigating the complexities of FRTB compliance. Our proven track record, combined with innovative solutions and deep industry knowledge, ensures that banks can meet regulatory requirements while enhancing their risk management capabilities. As the 2025 deadline approaches, proactive planning and strategic implementation will be key to achieving FRTB compliance and maintaining a competitive edge in the evolving financial landscape.

By focusing on the differentiating elements of solutions like Atoti and incorporating advanced optimization strategies, banks can not only meet regulatory requirements but also enhance their overall risk management practices. The future of FRTB lies in leveraging cutting-edge technologies to achieve greater efficiency, accuracy and agility in risk management.

Find out more

To learn more about how DXC Luxoft can help your bank navigated complex FRTB regulations, visit **https://www.luxoft.com/industries/capital-markets** or contact **financialservices@luxoft.com**

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David Cassonnet began his career as a trader assistant on the CAC Index option pit trading floor in Paris. He then joined Summit Systems where he held various roles across Europe and then in APAC as Head of Operations where he managed the tremendous growth of the business in the region. In 2010, David joined the founders of Summit in their new venture, Quartet Financial Systems, now known as ActiveViam, a pioneer in in-memory computing technology that provides advanced real-time analytical capabilities to large financial institutions. David spent two years setting up the company's business in APAC before moving back to Europe in 2014.

Today, as SVP for Business Development, David leads a team of software engineers, data scientists, and business analysts, helping financial organizations worldwide tackle complex data analytics challenges in their risk management and trading environments. David holds a master's degree in economics and finance from Paris Sorbonne University and currently resides in France.

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About Luxoft

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About ActiveViam

ActiveViam's mission is to meet the unique needs financial services organizations have for data analytics in ways no other provider can. Our robust platform, Atoti, empowers users to make better decisions, faster, with technology that is flexible, purpose-built and scalable. With the ability to analyze massive data sets in sub-seconds, ActiveViam's clients are well-prepared to navigate any challenge that comes their way.

www.activeviam.com

About Amazon Web Services

Since 2006, Amazon Web Services has been the world's most comprehensive and broadly adopted cloud. AWS has been continually expanding its services to support virtually any workload, and it now has more than 200 fully featured services for compute, storage, databases, networking, analytics, machine learning and artificial intelligence (AI), Internet of Things (IoT), mobile, security, hybrid, virtual and augmented reality (VR and AR), media, and application development, deployment, and management from 99 Availability Zones within 31 geographic regions, with announced plans for 15 more Availability Zones and five more AWS Regions in Canada, Israel, Malaysia, New Zealand, and Thailand. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—trust AWS to power their infrastructure, become more agile, and lower costs. To learn more about AWS, visit aws.amazon.com.

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