

CASE STUDY

CORE BANKING TRANSFORMATION AT THE RESERVE BANK OF INDIA

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CASE STUDY AT A GLANCE

| | |
|-----------------------|--|
| FINANCIAL INSTITUTION | Reserve Bank of India (RBI) |
| INITIATIVE | Transformation of Central Banking operations using Intellect Quantum Central Banking Solution |
| SYNOPSIS | <p>Central banks are facing increasing pressures as custodians of financial health of their countries. Central banks play a multitude of roles such as banker to banks, bankers to government, government debt manager, currency manager, and supervisor/regulator. With a large development agenda and a move to digital, complexities have grown. Modernization of the central bank is a starting point to modernizing the economy.</p> <p>The Reserve Bank of India decided to transform its core banking platform, and after a thorough evaluation process chose Intellect's Quantum Central Banking Solution (QCBS). The solution was chosen on the strength of its design architecture, allowing the bank to reduce complexity from 14 different applications. The migration has enabled India's central bank to consolidate and optimize a large portion of its operating environment. The government also leveraged the new Intellect platform to launch large-scale innovative initiatives like a national government payments gateway for implementing digital financial inclusion and a new goods and services tax (GST) at the national level.</p> |
| TIMELINES | <ul style="list-style-type: none"> • 2011–12: Implemented core banking system Quantum, which includes comprehensive banking services, government services, Enterprise General Ledger, Banking services portal, currency in circulation management, market operations, public debt management, depository for bonds and bills, etc. • 2013–2014: Went live with treasury, check truncation system, budget management, central government surplus auto investment, provision tracking, etc. • 2015–17: Went live with e-payments, e-receipts, national payments and receipt systems, payment gateway, national tax aggregation, etc. |
| KEY BENEFITS | <ul style="list-style-type: none"> • Significant systems and business processes rationalization. • Real-time balance sheet generation and seamless tracking up to transaction level. • Eliminated reconciliation for more than 30,000 transactions across 29 different regional offices. • Automated real-time view of government department balances. • Government overhaul of the tax system and the launch of a new and improved government payments gateway to support ambitious financial inclusion initiatives |
| KEY VENDORS | Intellect's Quantum Central Banking Solution |

CELENT PERSPECTIVE

- **Systems rationalization:** Celent was impressed with the efficiency gains RBI was able to achieve by migrating platforms. Intraday liquidity was downsized from three systems to one. More than 30,000 daily transactions have moved to automated reconciliation in real time, saving time and resources. The public debt floatation and market/liquidity operations were downsized from five systems to one. The annual financial statement used to take the bank 10 days; now it is automated and done online in minutes. From a pure efficiency standpoint, the move to Quantum Core Banking from Intellect was a huge enabler for the business, and allowed RBI to shift workload from manual and labor-intense functions to more high-value work.
- **Meeting central banking functional requirements:** Intellect was able to create a core platform in Quantum that meets 90% of the functional requirements of central banks globally. Intellect brought in many core business components for banking services from its existing platforms covering retail and corporate banking. The future of core banking will require extreme flexibility to meet the requirements of each implementation. With central banks, Intellect is almost guaranteed a unique implementation. Celent found the flexibility of the system to meet the multitude of needs from central banks around the world a compelling example of core transformation.
- **Opportunity to migrate:** RBI underwent a core migration to address challenges relatable to not only central banks, but many banks in general. The lack of real-time processing resulted in inefficiency and increased cost. Lack of integration between systems resulted in poor visibility into data and operations. RBI identified an increasing patchwork of manual workaround to deal with legacy technology debt and complexity, ultimately deciding on migration. Celent found the reasons for transformation a useful example, largely because the problems are nearly ubiquitous in the industry.
- **Government tax and payment overhauls:** In 2017, India underwent a historic tax overhaul, implementing the Goods and Services Tax (GST) through the Goods and Services Tax Network (GSTN). The government consolidated disparate tax policies and launched a portal through which payees could submit online. The architecture of Quantum allowed RBI to transform the system by leveraging Intellect's development capabilities. It launched the network in less than three months from inception. Without Quantum, the project would have needed to be built upon a legacy infrastructure, introducing significant risks, cost, complexity, and implementation time.

DETAILED DESCRIPTION

Introduction

The Reserve Bank of India (RBI) is a central banking institution which controls the monetary policy of India. In addition to executing monetary policy, the RBI is a key player in the financial services ecosystem. It keeps foreign exchange reserves, facilitates interbank lending, and regulates the banking industry. It also manages public debt, collections, and payments to the federal government, 29 state governments, and 7 union territories. The RBI started in 1935 and was nationalized in 1949.

Table 1: Reserve Bank of India Snapshot

| RESERVE BANK OF INDIA | |
|-----------------------|---|
| YEAR FOUNDED | 1935 |
| KEY POINTS | <ul style="list-style-type: none">Provides financial backbone for world’s seventh largest economy and the largest democracy.Manages public debt, collections, and payments to the federal government, 29 state governments, and union territories.4,138 currency chests.3,967 small coins deposits.187+ banks with 126,000+ branches. |
| GEOGRAPHICAL PRESENCE | 26 regional offices 1,100 clearing houses |
| EMPLOYEES | 17,334 |

Source: Reserve Bank of India

Implementing a core banking system can be a complicated task at even the smallest institution. Banking’s inherent complexity and the multitude of technological interdependencies introduce substantial risk of something going wrong. The common metaphor for undergoing a core banking transformation is changing the engine of a 747 while it’s in flight. It’s no surprise that the industry sees so few migrations annually. Even less frequent are sweeping technology transformations at large central banks, where “change the bank” risks and the complexity of legacy architecture can pose significant challenges.

The Reserve Bank of India, however, saw an opportunity to move towards a modern core banking platform to streamline workflows, reduce overall operating costs, and increase agility. The bank also wanted to provide the technological backbone for a range of initiatives to transform India’s central banking operations.

As a bank, its IT operations were becoming increasingly complex. Manual workarounds were common, and the complexity of decades of ancillary integrations was becoming a liability. Not only was the old system risky, but it was expensive. RBI had a vision for a number of larger digitization initiatives to transform the country; changing core systems was critical to the success of its larger strategic goals.

In 2011, RBI decided to implement the Intellect Quantum Central Banking Solution (QCBS), progressively modernizing one of the largest central banks serving the largest democracy in the

world. With Quantum, RBI was able to integrate three distinct financial worlds: the government, financial institutions, and the public, leveraging system architecture designed for speed and streamlined workflows.

Since the launch of Quantum, RBI has completely transformed foundational elements of its operations by leveraging the platform’s capabilities. In 2016, the bank launched a new payments gateway for direct outbound government payments as well as the infrastructure for a completely streamlined and modernized goods and services tax structure across regional offices.

The core migration of RBI to Quantum from Intellect is not just the story of bank moving towards more modern technology — it’s a lesson for how transformation has acted as an enabler for larger nationwide change.

Anatomy of a Typical Core Banking System

Simply put, a core banking system (CBS) for commercial banks represents the “system of record” supporting the bank’s “core” business. The CBS is responsible for tracking the current balance of each customer account and ensuring that transactions like deposits, payments, transfers, and interest are applied to the account on a daily basis.

A traditional core banking system typically includes four primary modules that handle the deposit-taking and recordkeeping: customer information file, deposits, loans, and general ledger. While some of these foundational subsystems may come from different vendor products, typically a bank will deploy all four from the same platform. Platforms also often include modules for functions like payments, channels, corporate banking, regulatory reporting, and many more.

Figure 1: Main Subsystems of a Core Platform

| | |
|---|--|
| <div><div>Customer Information File</div><ul style="list-style-type: none">• Holds customer legal addresses and other information• Tracks accounts held by a single customer• Handles household (related accounts) data• Provide basic customer profitability data</div> | |
| <div><div>Deposits</div><ul style="list-style-type: none">• Post deposits and withdrawals• Calculate and record interest• Manage and accrue fees• Output account data (statement preparation)• Handle stop payments/holds• Impose overdraft limits</div> | <div><div>Loans</div><ul style="list-style-type: none">• Post advances and payments• Manage interest rates• Calculate and accrue interest and payment due• Track late payments• Handle pay-offs and escrow</div> |
| <div><div>General Ledger</div><ul style="list-style-type: none">• Maintains bank’s chart of accounts• Maintains bank’s fixed assets and payables• Generates financial reports</div> | |

Source: Celent

Core banking vendors usually offer their core platform along with a series of separate secondary modules bundled together to allow for a flexible deployment, depending on the needs of the institution.

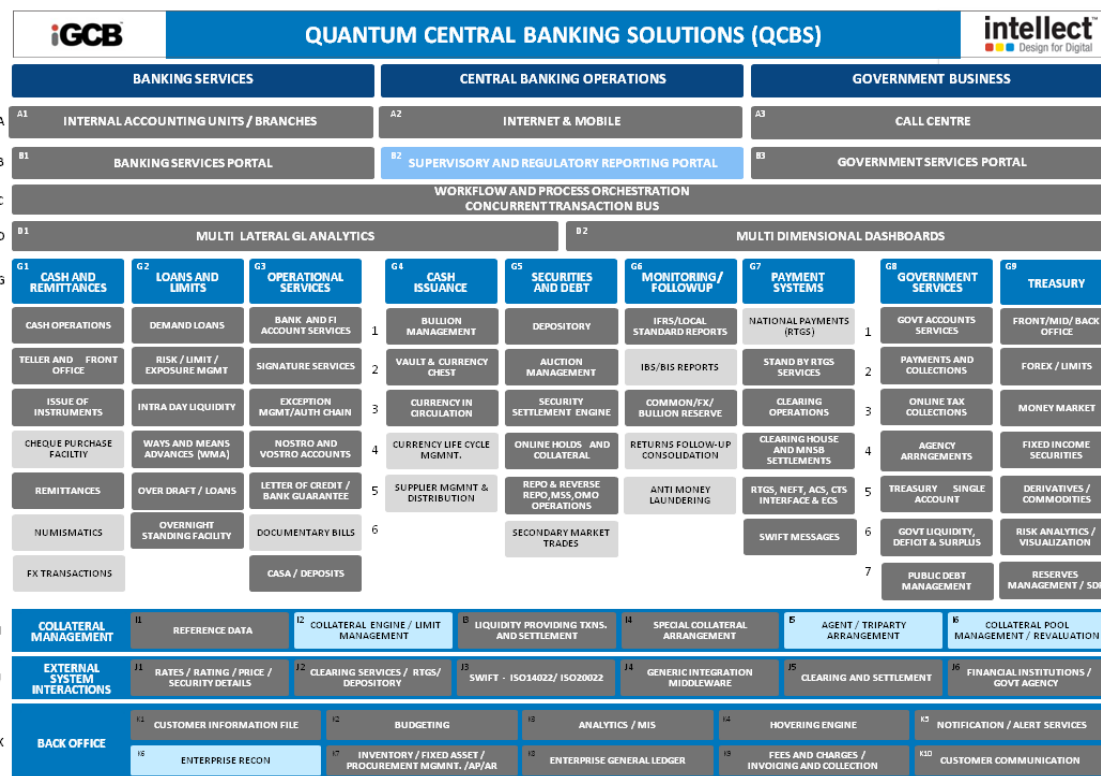
Anatomy of a Central Bank Core Platform

Core banking systems covering retail and wholesale banking are comparable to those covering the needs of a central bank in the areas covering customer information file, deposits, loans, and general ledger. However, the broader functional coverage of central banks (like currency in circulation management, advanced collateral management, government services, and specific monetary policies) can not be fit into a typical commercial banking core banking solution. Also, the inherent operational complexities, scalability, and stability requirements are similar. Other foundational technology elements like application and data integration, modern architecture, real-time transactions, and flexibility are still just as relevant. A vendor with a flexible and modular retail/commercial banking system could assemble a packaged software solution to meet many of the needs of a central bank.

As the primary agency for employing monetary policy and the essential banker to all other banks and government departments, however, central banks require unique applications and can present challenges to vendors looking to serve the space. Special components are required to fill the gaps for functionality such as currency lifecycle management, government accounts services, agency arrangements, government liquidity, and public debt management, among others.

Figure 2, provided by Intellect, looks at the landscape of banking modules covering the needs of a central bank. Modules listed in dark grey were implemented by Intellect for RBI.

Figure 2: Core Banking Modules



Business components implemented in RBI

Source: Intellect Design Arena Ltd. © 2017

Central banks in large countries tend to handle more transactions at peak times than the average bank within that country. There are also far-reaching systemic risk issues that need to be addressed with a central bank core. The impact of an attack on a central bank can be

disastrous, leading to intraday liquidity going dark and settlements being stalled. Strong IT security is paramount. Overall, these systems need to be robust enough to scale and provide IT protection. Modern core products are under pressure to balance these requirements with agility and flexibility of digitization objectives. It's not an easy task.

RBI's Decision to Migrate

For many institutions, migration is out of the question, and they continue to pile on more technology debt as they employ a patchwork of workarounds and fixes, kicking the can down the road for future CIOs.

RBI made a concerted decision to undergo migration because it saw the complexity of the legacy system becoming increasingly burdensome. It wanted to confront a number of challenges with the existing architecture, specifically around integration and visibility.

Integration

- The legacy systems were operating in isolation or with partial integration and required a lot of manual intervention and reconciliation.
- Difficult, slow, costly, and risky manual processes and reconciliations led to additional cost and staff.
- Liquidity systems for real-time settlements were not fully integrated with cash, depository, and collateral systems.

Visibility

- Oversight systems could not see enterprise-wide credit, reporting, and positions of financial institutions.
- Central bankers lacked an integrated view of banking and government services for efficient government funding and loans.

The Reserve Bank of India had a desired outcome in mind. It wanted a system which could:

- Seamlessly integrate operations with real-time accounting.
- Leverage a real-time general ledger with no manual reconciliation.
- Integrate dashboards for tracking and monitoring.
- Introduce flexibility into the system to launch new policies faster.
- Streamline business processes across different departments to eliminate much of the duplicate processing.

RBI saw a system that was increasingly becoming a liability and a drag on operations. One of its long-term strategic objectives was to assist in the digitization of the country through new payments networks and tax structures. The initiative involved not only the gains in efficiency through system rationalization, but also the flexibility to create initiatives. RBI needed a trusted partner.

Choosing Quantum CBS from Intellect

Intellect has more than 25 years of experience in core banking technology, with product suites that cover the vast majority of systems for retail and commercial banking. In 2009, it started putting together the pieces that would become the Quantum core banking solution.

The developers began breaking down the needs of central banks into a series of different components. Across its other core banking platforms for retail, Intellect had already taken a heavily modular and services-based approach that allowed it to break down platforms into their

constituent parts. This approach makes implementation much more flexible, enabling a piecemeal approach to transformation rather than a complete rip and replace. Intellect can tailor the platform to different countries. Intellect built out components for Quantum which cover an estimated 90% of the needs of most central bank systems globally. The rest would be customized.

Its design supports five foundational operational and relational roles of a central bank under a single application umbrella:

- Banker to government.
- Banker to bank.
- Government debt manager.
- Currency management.
- Monetary policy implementation.

Functionally, the Quantum CBS brought some major advantages over RBI's legacy platform.

Integration

- Parallel processing of bulk and real-time transactions to address RBI's unique transaction mix.
- Automation to improve liquidity and linkages to financial infrastructure like RTGS, CSD, ACH, and SWIFT.
- Integrated multidimensional dashboards for quick decision-making and active real-time balance sheets.
- Integrated funds and security settlement under a single application umbrella.
- Online posting of the general ledger for real-time MIS reporting.

Visibility

- Modular components for operations to enhance flexibility and scalability.
- Absence of manual calculations of balances or limits or use of shadows.
- Rules and parameters for limits and collateral, credit policy, schedules, and priorities for contingent events.
- N-tier architecture.

The platform is built around Intellect's "anything can change" principle, which reduces the amount of hardcoding done within the system, removing a manual bottleneck. It is designed so that anything can change any time without impacting the base code, largely enabled through heavy parameterization. Figure 3 goes into more detail about the platform's primary differentiators.

Figure 3: Ten Differentiators of Quantum

| | | | | |
|---|--|--|---|---|
| 1 | 2 | 3 | 4 | 5 |
| | | | | |
| TIME TO MARKET | TIME TO DIAGNOSE | TIME TO MONITOR | TIME TO CONSOLIDATE | TIME TO COLLABORATE |
| Rapid policy implementation | Zero recon and online real-time balance sheet | Real-time one click dashboards and risk analytics | National level balance consolidation and treasury single account (TSA) | State-of-the-art online portal |
| <ul style="list-style-type: none"> • 2,000+ configurable attributes for business users • Business users can manage policy implementation by themselves • Built around "Anything can change anytime" principle | <ul style="list-style-type: none"> • Available at central bank and branch/unit levels • Seamless navigation from GL to transaction (G2T) • User configurable financial reporting tool | <ul style="list-style-type: none"> • 360 degree view • 15+ dimensions and 7+ levels of drill down • Risk analytics with 50+ dimensions • Pattern identification for intraday liquidity • Proactive alerts and notifications | <ul style="list-style-type: none"> • Removes money fragmentation • Seamless merger/de-merger for government entities • Online balance slicing across multiple dimensions | <ul style="list-style-type: none"> • 50+ business services for banks and government entities • Advanced service and workflow management including self administration |
| Document number | | | | |
| 6 | 7 | 8 | 9 | 10 |
| | | | | |
| TIME TO AUCTION/SERVICE | TIME TO CIRCULATE MONEY | TIME TO PLEDGE/RELEASE | TIME TO PROCESS | TIME TO ADOPT |
| Auction management and depository | Currency life cycle management | Real-time collateral and liquidity management | 24x7-Reliable and secure operation | Implementation certainty |
| <ul style="list-style-type: none"> • Integrated public debt (Bond/Bills) auction management including underwriting • Depository with complete life cycle support for securities up to redemption • Support for legacy physical bonds | <ul style="list-style-type: none"> • Includes placing indent for printing, receipt, distribution and destruction • Automated asset balancing • Online currency management portal | <ul style="list-style-type: none"> • Support for complex monetary policies and intraday liquidity • Fully automated pledging/releasing of securities from any depository • Multiple collateral pools • 25+ eligibility rules • 15+ types of haircuts • 9+ concentration limits | <ul style="list-style-type: none"> • 99.99% uptime • EOD Time <15 mins • Certified for very high scalability of 100 million transactions a day with 12,000 users • Fully compliant with PKI security framework | <ul style="list-style-type: none"> • Agile delivery model • Best-practices from multiple central bank implementations across geographies • Dedicated central banking centre of excellence with certified experts • Reduced learning curve for users |

Source: Intellect Design Arena Ltd. © 2017

For a more detailed overview, please refer to the Appendix at the end of this report.

The Transformation of a Central Bank

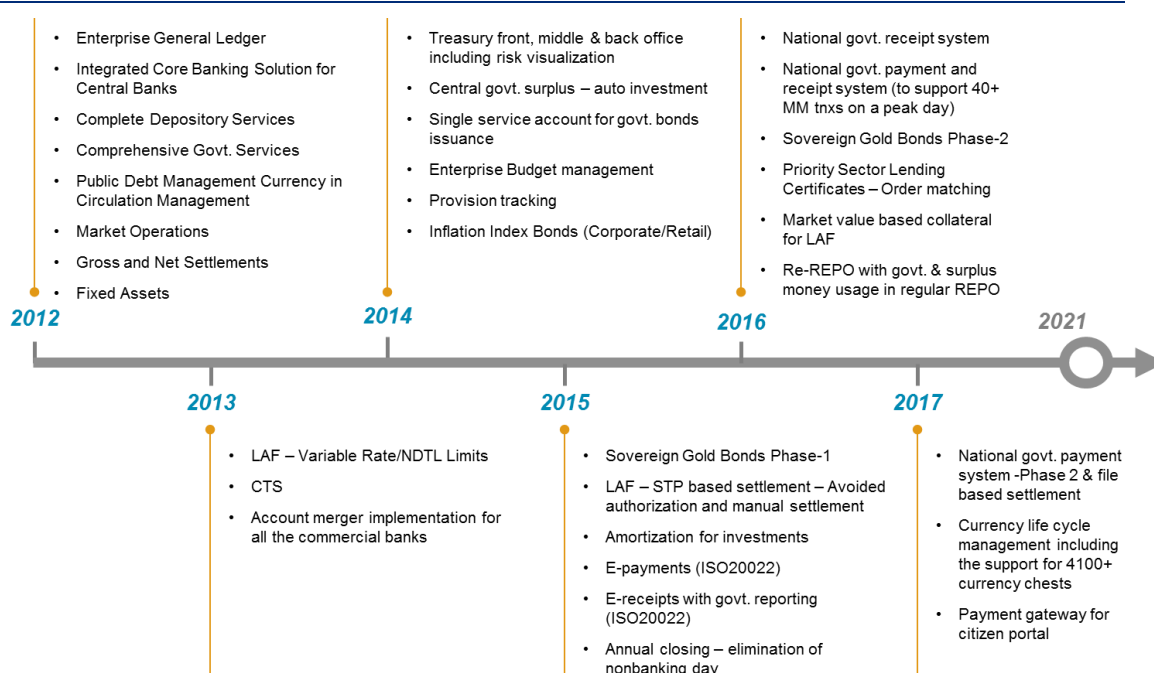
Core transformations are by nature difficult and complex. The size and scope of moving RBI onto the Quantum platform required an extremely structured approach. The transformation touched almost all of the critical aspects of the central bank, so the risk needed to be carefully managed; failure would have been catastrophic.

Intellect was not only implementing the Quantum central banking solution but was also responsible for the setup of the hardware/network, operating system, database, application servers, storage and replication infrastructure in primary data center, near disaster recovery (DR), and far DR, along with setting up of IT help desk and call center.

The implementation involved all regional offices across India supporting 29 different state governments and central ministries. It was done in three main phases; first rolling out the general ledger, then moving onto government services, and then budget management.

The project began in April 2011, with the launch of the enterprise general ledger in June of that year and the pilot launch in September. Figure 4 looks at the implementation timeline in more detail.

Figure 4: Progressive Transformation Journey in RBI

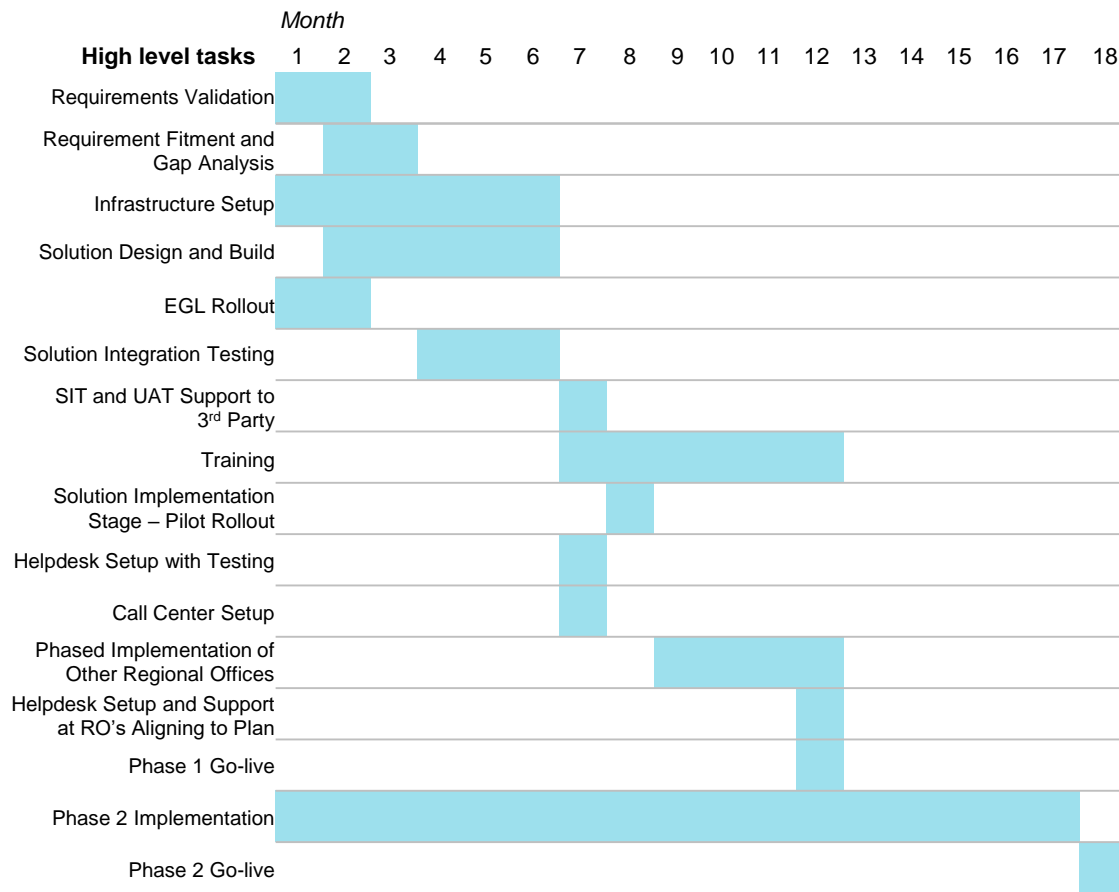


Source: Intellect

The initial rollout of the platform took **18 months** from start in April 2011. The integration included the following implementations (run in parallel):

- Enterprise general ledger: **6 weeks**.
- Banking and government services pilot: **6 months**.
- National rollout of banking and government services: **12 months**.
- Complex depository, monetary policy operations, and other modules: **6 months**.

Figure 5: Progressive Transformation Timeline



After the successful completion of the original scope in 18 months, the other key features have been added as part of the progressive transformation, as indicated in Figure 5, as the nation is on a fast pace digital transformation.[

The core components were delivered on time in the first year, but other modules were gradually phased in so that Intellect could properly test and deploy new systems without any serious issues. There were many platforms that ran in parallel. For example, debt management, depository budget management, and others ran together over an 18-month period to properly mitigate any risks. Modules for components like currency lifecycle management and certain others are still running legacy but are undergoing transformation in 2017.

Figure 6: The Functional Scope of Sub-Modules for Phase 1 & 2

| Phase-1 | Phase-2 |
|--|--|
| <ul style="list-style-type: none"> • Enterprise general ledger • User Access Management • Alerts and Notifications • Loans and advances • Currency in circulation management • Wide range of government services • Government Payments • Intraday liquidity • Authorisation and Workflow • Branch inventory • Vault and Teller management • Foreign borrowing management • Cheque book management • Demand drafts/pay orders • ECS clearing • Inward clearing • Outward clearing • Demand drafts management for government • Deposits • Electronic funds transfer eg. RTGS, NEFT • Stand-by RTGS • End of day/start of day • Bullion management • Letter of Credit - Export Credit Refinance • Limits management • Online tax collections • Standing instructions • Banking services portal • Advanced signatory services | <ul style="list-style-type: none"> • Primary Auction management • Market Operations management • Collateral management • Public debt office (managing public borrowings of governments) • Government investment management • Fixed assets management • Budget management • Supplementary module • Automated surplus and deficit management • Treasury single account • Business rule driven fund sweeping into government accounts • Physical bonds management • Inter government transactions • Depository/instrument life cycle management for bonds and bills • Public fund management eg. Pensions, Savings schemes etc. • Agency banking management • Multilateral Net Settlements |

Source: Intellect

Intellect's migration approach for RBI leveraged design thinking to customize Quantum to specific local requirements. Design thinking is becoming a popular way for vendors and advisory groups to guide clients through application development. It improves visibility into potential issues by focusing on a solution rather than a potential problem. The process allows the designers to think about ways to achieve the proposed end state of the client, mapping the viability and feasibility of project to the overall business strategy. The design approach of the platform enabled the transformation to be iterative, allowing the bank to more effectively map the functional requirements.

The project also involved RBI moving to a model of near and far disaster recovery. The scope included setup and maintenance of the entire data center, utilizing primary, near, and far DR. This involved the physical servers, storage, application serves, web server, operating system, infrastructure monitoring, and IT help desk, all implemented and run by Intellect.

Intellect used a combination of onsite and offsite development to achieve the end state. A team of close to 150 people from RBI and Intellect were involved in the delivery. More than 14 departments from RBI assisted in the implementation, with a core team of experts led by the Chief General Manager, General Manager, and two Assistant General Managers.

Functional and technical implementation partners include HP for services, storage, and EMS Server; Oracle for database solutions; and BK Systems for IVR. RBI also bought a support license from Redhat.

RBI engaged KPMG for gap analysis, RFP support, and project management support; Digital Age for penetration testing.

Problem Resolution

There will always be challenges during a core migration. The ways in which a vendor manages those challenges directly impact the success of a project. Table 2 examines some of the main challenges and their resolution.

Table 2: Problem Resolution During Implementation/Migration

| CHALLENGE | RESOLUTION |
|--|---|
| Long time taken for key decisions impacting the project timeline | A core team of five strong subject matter experts and IT experts from RBI were asked to coordinate between the business users and Intellect and make key decisions without waiting for the steering committee or executives. |
| Resistance from users who were using legacy systems and manual processes for many years. Fear of moving out of comfort zone. | <p>Vision-setting sessions where major stakeholders could ensure alignment of a single goal across departments and executives.</p> <p>Continuous roadshows, workshops, and focused training involving key users/change agents from various departments and regional offices to progressively update the business benefits and innovative design features in the new system and to seek their insights.</p> <p>Intellect team conducted many joint design workshops to discuss the key features and to seek the user feedback upfront. This was a critical success factor.</p> <p>Towards the launch of the new system, the team conducted focused and simplified training to various user groups.</p> |
| Phased rollout of the platform and additional complexity to modules, with numerous temporary interfaces and touch points operating in both new and legacy systems | Introduction of throw-away interfaces and special accounting treatments for cross-department and branch transactions and to ensure smooth transition from legacy systems to new integrated solution seamlessly. |
| Data migration and addressing duplicate data across various departments running in siloed architectures | Senior subject matter experts handled data reconciliation and analysis and identified complex data issues across the affected systems. |
| Business parameters and new business processes reengineered to reflect the new integrated environment, moving away from legacy workflows | Progressive design of business parameters and workflow, involving experts from all departments as well as major stakeholders. They also conducted multiple rounds of end state visualization to seek feedback and align the key people. |
| Major scope changes in the later part of the implementation | Besides the initial BPD prepared by KPMG in consultation with RBI, Intellect subject matter experts had detailed discussions with the business team and came out with a refined set of business processes / blueprint for the entire transformation which includes recommendations considering the long-term vision, flexibility in the design to adapt the potential changes during the course, and hooks for progressive |

transformation. This has hugely avoided the major changes to the blueprint during the course of the project.

Impact to external systems within RBI and ministries due to the reorganization of general ledgers accounts and transaction account numbers

Introduction of features like Old-To-New account number mapping where both the legacy and new account numbers are supported in all the transactions, reports, and queries. This has reduced the operational impact and external system impact to a large extent.

Source: Intellect and RBI

PROJECT RESULTS

A core migration, while difficult, can utterly transform an enterprise. Everything touches the core, so the benefits are far reaching. The Reserve Bank of India was able to move away from a highly manual system hampered by decades of custom development, adopting a completely real-time, highly automated, and extremely flexible platform, integrating deposit and central banking operations under a single application umbrella and optimizing the bank's operations. It's had an impact on implementation of monetary policy and other significant nationwide payment and tax initiatives.

From a high-level institutional perspective, Quantum achieved:

- Improved control, reporting, and risk management across all central bank operations.
- Optimized and transparent transactional services for financial institutions and government clients.
- Increased savings in operational costs through proven process automation, reporting, and MIS.
- Elimination of reconciliation burdens for single-view general ledger and MIS through tight integration
- Reduced total cost of ownership through standardized and configurable parameters and workflow.

The migration impacted almost all parts of the organization, and through the significant gains in efficiency, the bank was able to really transform the business. Overall, there were significant tangible benefits from the migration (see Table 3).

Table 3: Measurable Benefits

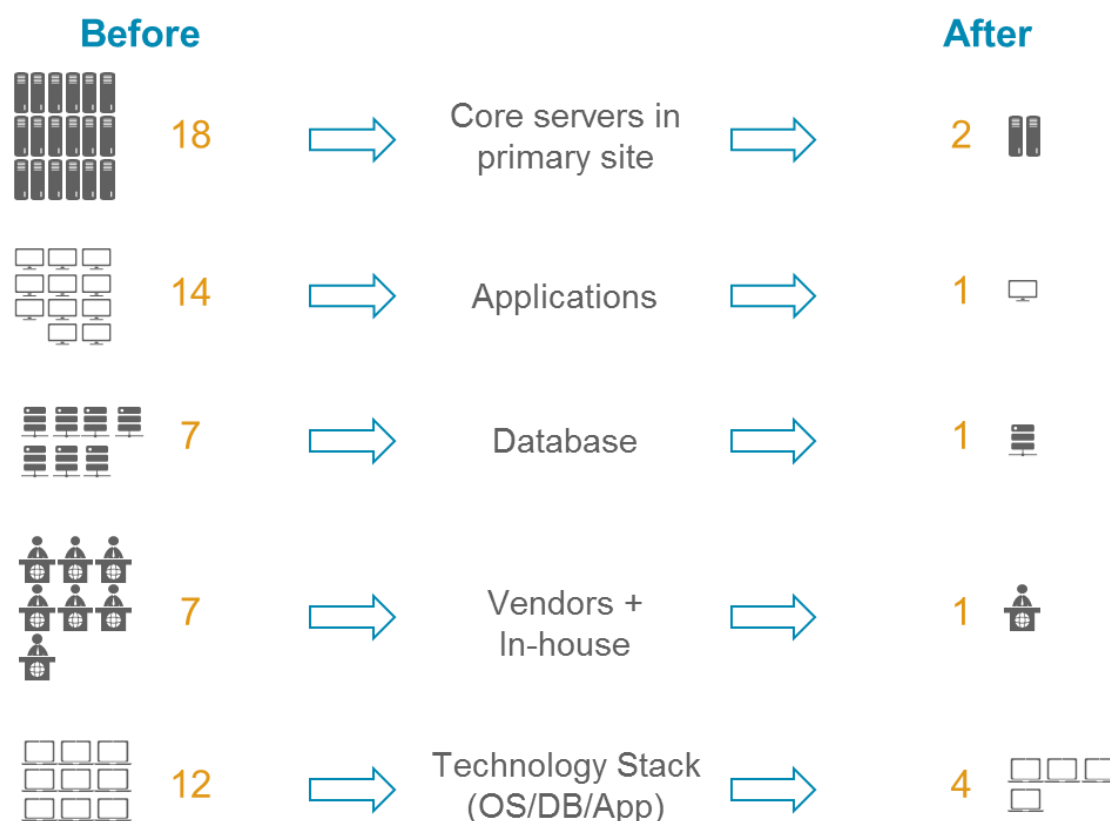
| CATEGORY | RESULTS |
|---|--|
| Public debt floatation and market/liquidity operations settlement | From five systems to one (QCBS); fully automated; over 95% operational risk reduction. |
| The entire intraday liquidity process | From three systems to one (QCBS); fully automated; supported with robust in-built depository in QCBS. |
| Weekly statement affairs to parliament | Reduction from three days to real-time and complete elimination of huge reconciliation effort — a 100% improvement. |
| Annual financial statement | Reduction from 10 days to online (two minutes) and complete elimination of reconciliation effort — 99.99% improvement. |

| | |
|--|---|
| Reconciliation | Elimination of reconciliation for 30,000+ transactions among 29 regional offices with operating cost reduction. |
| Single fund account for 200+ commercial bank balances spread across India | From thousands of accounts maintained in 29+ offices to one back office treasury. |
| Real-time view of entire government position | Fully automated real-time view of all the government department balances; automatic surplus and deficit management; no manual work for consolidation. |
| From 6+ complex systems and many manual processes to single intellect QCBS | Real-time information availability to the senior management team for making effective decisions. |
| The dedicated section for Interoffice and interdepartment transaction reconciliation was taken out | From 40,000+ outstanding transactions at peak to zero. |
| Duplicate voucher posting | Reduction from more than nine applications to one. |

Source: Intellect and RBI

The move towards a modern core system made an impact on system rationalization. Figure 7 details a few of the results.

Figure 7: System Rationalization



Source: Intellect and RBI

Core migrations are never easy, and Intellect was able to move one of the largest central banks in the world onto a new core banking system through a methodical and phased implementation.

The benefits from such a large shift in the tech environment speak for themselves, and it has enabled the bank to achieve a number of larger aspirations.

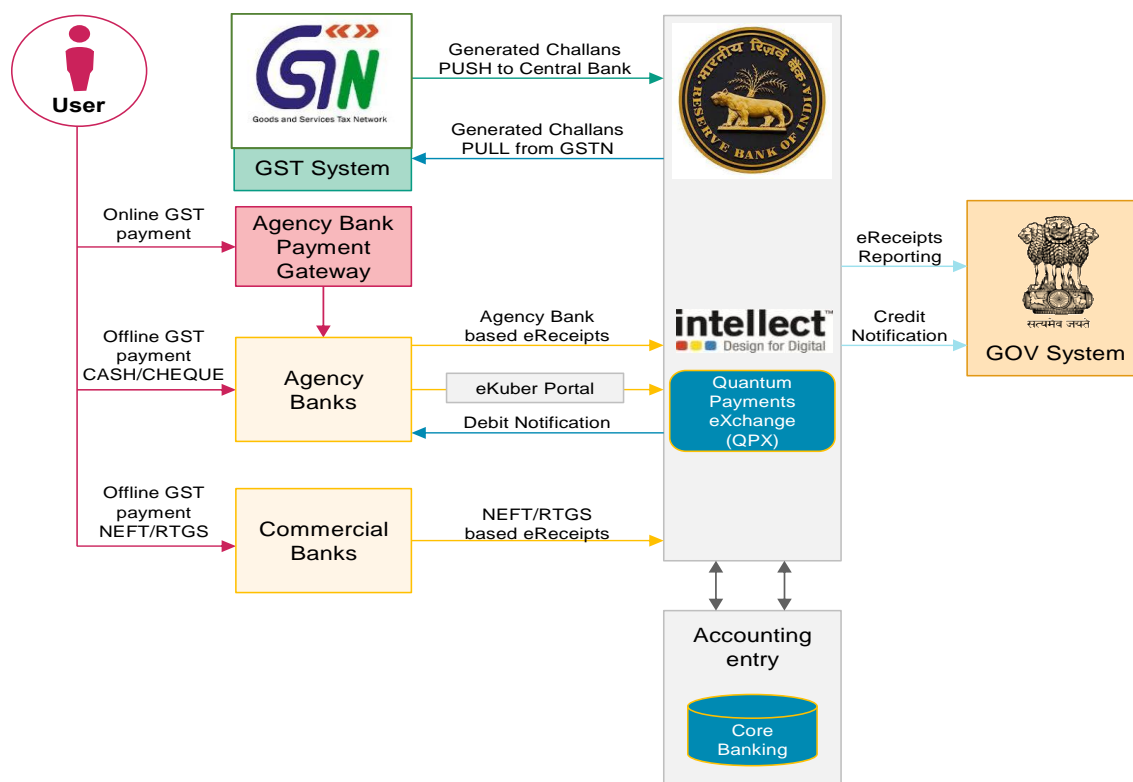
Leveraging Quantum for Larger Achievements

India has undertaken a number of financial initiatives, and RBI has played a key role in guiding the country through some significant and truly innovative projects. Quantum's capabilities have made that task substantially easier and less risky.

In 2017, India underwent a historic tax overhaul, implementing the Goods and Services Tax (GST) through the Goods and Services Tax Network (GSTN). GST is essentially a VAT or consumption tax levied through businesses. Before GST, each region in India had its own distinct tax structure, with different standards that made tax collection difficult. Taxes were also often calculated through middlemen or accountants, opening the door to fraud. With GST, the government of India and RBI have been able to create a much stronger, more transparent, and reliable system.

The tax overhaul and launch of GST and GSTN relied heavily on the use of technology, namely the new Quantum core banking system. Intellect enabled the rollout of the GSTN through robust frameworks for portals. The GSTN portal will act as the gateway to connect the government to taxpayers, allowing consumers to register businesses, pay taxes, and upload invoices directly online. Figure 8 explains the process in more detail.

Figure 8: GST Process



Source: Celent

The government and RBI also completely transformed outbound payments by creating the National Government and Payments Gateway (QPX) from Intellect. QPX is a payments scheme for direct payments of benefits, government subsidies, staff salaries, and other schemes like disaster relief. This system allows the government to send direct real-time payments to the bank accounts of the beneficiaries. It was launched in 2017 across all government entities and

regional offices. While the system is processing over 3 million transactions a day on its launch, it is expected to process more than 30 million transactions per day, and the benchmarking was done accordingly.

One of the major benefits has been RBI's ability to bring in the unbanked population. Supporting bank accounts for beneficiaries promotes financial inclusion across a large population of unbanked consumers. The use of identification and accounts also inhibits corruption, and all outbound payments are tracked and recorded through the system.

Lessons Learned

When it comes to adoption of technology, central banks are not thought of as progressive. RBI, however, shows what can be accomplished through core migration at a large central institution. There are also relevant lessons for all institutions. RBI had many of the same requirements around automation, scalability, stability, cost reduction, and flexibility as many of the largest banks globally. A few key takeaways for other institutions follow/

- **Go slow.** Project management in core banking transformation matters. This cannot be understated. RBI had multiple modules being implemented over a number of years, many running in tandem to make sure risks were mitigated and to allow for proper testing. A failed migration can be the death of an institution (or a CIO's job) — it's important to take time, even if that means higher cost.
- **Be realistic.** Banks need to be realistic about the reality of a core transformation. It's not going to be easy. It's important to keep an adaptive mindset when understating a large transformation initiative, because it's likely that objectives will need to adapt to the situation.
- **Plan for organizational change.** Modernizing technology is a cultural shift. First, internal personnel might not have a complete and clear view of the end goal. This may lead to concerns about their own importance or value. Second, back office staff are accustomed to legacy workflows. The change to modernize a platform will undoubtedly inject process change. For example, RBI was able to completely remove manual requirements around transaction processing across departments, batch processing, reporting, and a number of other areas. Banks need to communicate that there will be a learning curve as well as a shift towards more value-added work by existing staff through executive-level vision-setting by deputy governors and department heads at various points during the course of the project.
- **Plan for challenges.** It's never a matter of if a challenge will arise, but when. Intellect and RBI worked together to make sure there were proper mitigation plans in place to handle any unexpected occurrences during rollout. Institutions need to make sure they have a partner that will work with them to put out fires instead of conventional vendor management approach. An open mind to working with the vendor as a team and an increased level of trust building were tremendously helpful in completing this large transformation on time in full.
- **Involve the entire organization.** Similar to the importance of cultural change, there needs to be critical stakeholder representation from up and down the organization. Front-line employees all the way up to the C-suite need to be involved in the project plan. RBI involved central executives as well as officers at regional offices to review overall system changes and implications in order to maximize their ability to plan for the future state.
- **Adapt agile delivery model after a comprehensive requirement validation phase.** The comprehensive requirement validation in large transformational initiatives would help in optimizing the business processes up front and also help foreseeing possible deadlocks/challenges during the implementation. This helps in designing the solution for such challenges from a global perspective. Once the requirements are discussed with the key officers, front line staff, and department heads, progressive delivery and validation up front would greatly reduce the project risk as the learnings are progressively adopted during the course of the entire project.

The migration of RBI from a legacy core platform to Quantum from Intellect is a success, and provides a view of what technology modernization looks like at a macro level. The modernization of RBI's core system goes beyond a single market, use case, or segment. It is about the modernization of an entire country and the technology therein. By summoning institutional will and taking a long-term perspective, RBI has positioned itself to fulfill its missions safely and efficiently for years to come.

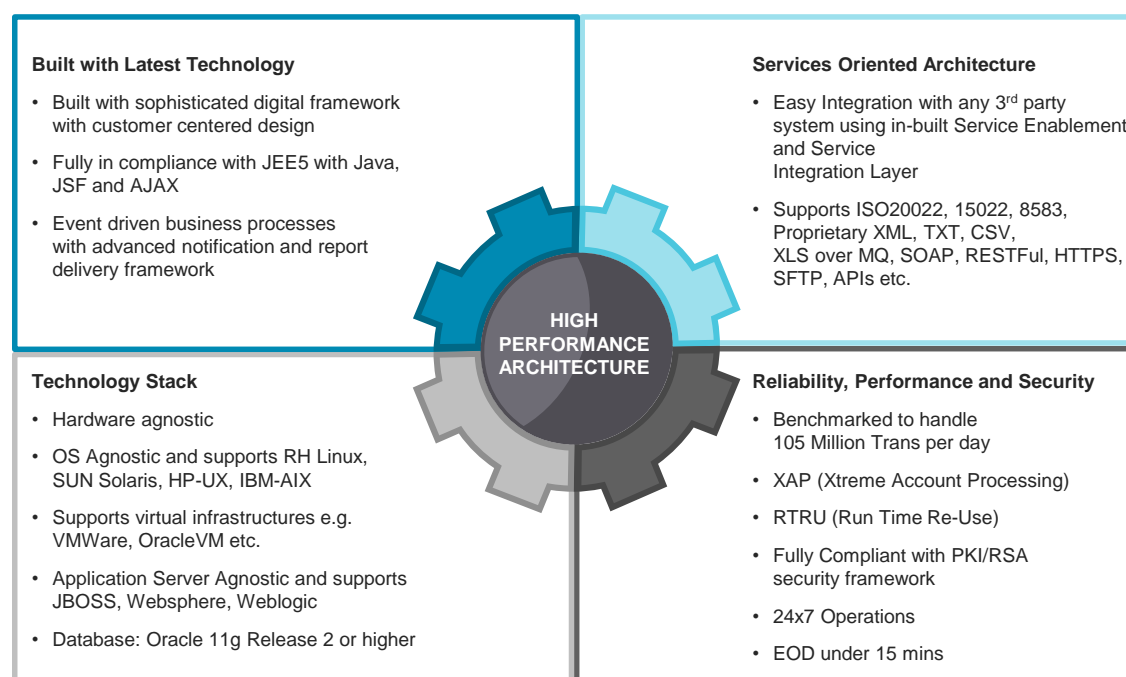
APPENDIX: DETAILED QUANTUM PROFILE

Intellect Quantum is designed specifically for central banks. The platform is built for the unique needs of central institutions, looking at reduced complexity, real-time decision-making or risk management, high configurability, and robust scalability. The integrated suite of products is focused on tackling the challenges of these institutions.

Quantum includes Currency Management, Public Debt & Depository Management, Enterprise General Ledger & Collateral Management.

Quantum Central Banking Solution has successfully modernized central banks such as the Reserve Bank of India, Central Bank of Sweden (Sveriges Riksbank), National Bank of Ethiopia, Central Bank of Lesotho, and Central Bank of Seychelles. Implementation in other central banks like Central Bank of Armenia and Bank Indonesia (Central Bank of Indonesia) is in progress. The solution also has become a systemically critical national backbone for India because it is supporting the national tax aggregation and dissemination and dispute resolution for GST (Goods and Services Tax). It has also become the government payment gateway for implementing a wide range of direct benefit government schemes and subsidies as part of the financial inclusion initiative.

Figure 9: Quantum Central Banking Solutions — Technical Architecture



Source: Intellect

The primary benefits of the system are bucketed below into four main categories in Table 4.

Table 4: Enterprise Architecture Efficiencies

| ADVANTAGE | COMPONENTS |
|--------------------------------|--|
| Real-time | <ul style="list-style-type: none"> With core accounting capabilities, fixed assets accounting, account payable and receivable, budget and control, public debt and public deposit maintenance. |
| Integration and simplification | <ul style="list-style-type: none"> One Integrated system handling cash and securities settlements simultaneously. One integrated system that supports government, commercial banks and public. Rationalization and unique identification of internal departments / government departments / member banks / agencies. Simplified customer structure on front end portal as well as back office. Simplifying or reducing complexity of central bank operations. |
| Flexibility and scale | <ul style="list-style-type: none"> Local and global hierarchy. N-tier support for general ledger, budget heads, and government department structure. Covering organization, customer hierarchy, general ledger, limits, accounts, budgets, central bank hierarchy, balance sheet hierarchy and reports. Ability to partition — for reorganization and consolidation of constituents, internal departments, and user groups. Transition support with Old-to-New accounts processing. Transition management — new branches/offices can absorb transaction postings from offices supported by legacy system. Transition for customer re-org; state split. Unique concept of UDCH for user-definable customer hierarchy supporting advanced requirements like Treasury Single Account for managing real-time government account balances. Consolidation of accounts during or post transition; example: SBI accounts from 500 to 2 (removal of money fragmentation). Department merger during transition. Example: Government Department and Bank debt merged to become one integrated department. |
| Other | <ul style="list-style-type: none"> Customer portal — self-managed workflow with real-time transaction capabilities. |

Source: Intellect

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