



REGTECH FOR REGULATORS
ACCELERATOR

An API-based Prudential Reporting System for the Bangko Sentral ng Pilipinas (BSP) R²A Project Retrospective and Lessons Learned

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The RegTech for Regulators Accelerator (R²A)

The RegTech for Regulators Accelerator (R²A) partners with leading financial sector authorities to pioneer the next generation of tools and techniques for regulation, market supervision, and policy analysis. Accessing new datasets and analyzing available data more effectively allows financial authorities to establish a body of knowledge and evidence to drive smart policy reforms that promote financial inclusion and ensure financial stability, integrity, and consumer protection. R²A accelerates these advances by helping authorities re-imagine how they collect and manage data, and by prototyping new solutions that strengthen their capabilities. Through R²A, partner financial authorities seek to harness technology to improve the speed, quality, and comprehensiveness of information in support of targeted, risk-based decision-making.

Launched in October 2016, R²A has already partnered with the Bangko Sentral ng Pilipinas (BSP) and the Mexican Comisión Nacional Bancaria y de Valores (CNBV) to develop and test next-generation prototypes that can serve as examples for other supervisors and regulators. R²A also engages closely with technology innovators to create structured opportunities for them to propose solutions and collaborate with financial authorities in the design and testing of promising ideas.

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“The RegTech for Regulators Accelerator Project has truly connected us with the possibilities that technology can provide to enhance and further support our work in financial supervision.”

Foreword

Nearly two years into our partnership with the RegTech for Regulators Accelerator (R²A) Project, there is much progress to celebrate. We have successfully produced a prototype application programming interface (API) for prudential reporting, and increased our understanding of how technology can be harnessed by the Bangko Sentral ng Pilipinas (BSP) to achieve our institutional objectives. Our experience is presented in this case study.

This initiative comes at a time when banks and non-traditional financial institutions are deploying digital approaches to reach portions of the population that were previously excluded from the financial system. While this is a welcome development, the growth of digital financial services engenders a new host of challenges that traditional tools and processes are ill-suited to address. We are working to transform these emerging challenges into opportunities. We have established a fintech sub-sector within the BSP Financial Supervision Sector, a unit dedicated to conduct effective oversight of fintech and other innovative alternatives, to keep pace with consumers’ increasing adoption of digital financial services.

This case study reveals the vast potential of an API solution to improve the quality and timeliness of supervisory data that can input into the BSP regulatory and policymaking processes. We are eager to expand this prototype to all banks in the country. Beyond process improvements, this regtech initiative serves as a stepping stone towards greater use of technological solutions and transforming the way we work as regulators. We value our participation in the R²A Project. The vendor selected for our proof of concept was very responsive to our needs, agile, and capable of iterating systems until the prototype was able to address our objectives. Our experience showcases that technological applications are accessible, and are a necessity for financial supervisors in this era of digitalization.

*Nestor A. Espenilla Jr., Governor, Bangko Sentral ng Pilipinas
Manila, September 2018*

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Context: A Philippine banking sector in flux

The Philippine banking sector is undergoing a profound transformation, driven by rapid economic growth, financial innovation, and a concerted effort to strengthen the prudential regulatory framework and boost financial inclusion among the country's 105 million inhabitants. Growth in formal bank credit and deposits accelerated sharply during the decade (see Figure 1). Banks' geographic footprint has expanded rapidly, mainly on the back of greater branch penetration and the growth of microfinance and digitization.¹ Mobile money and banking have enabled established banks and new financial technology (fintech) companies to overcome longstanding physical and financial barriers to access. By the end of 2017, there were 587 licensed banks in the market, of which the vast majority (544) were classified as thrift, rural, or cooperative banks. Mobile banking services were offered by 23 banks, while 30 banks were licensed as electronic money issuers (EMIs).²

Measures of financial inclusion have also improved, albeit from a low base. According to the World Bank's Global Findex, the portion of the population aged 15 years of age and over with access to an individual or shared formal financial account grew from 27% in 2011 to 34% in 2014 and 35% in 2017.³ Nevertheless, this is still nearly half the average level for similar low- and middle-income countries. Rates for borrowing and savings through the formal banking system are similarly low (10% and 12% of respondents surveyed in 2017, respectively). Furthermore, the distribution of financial services outlets is heavily concentrated on the industrialized island of Luzon that is home to Manila, while around 37% of municipalities still lack a bank branch.⁴

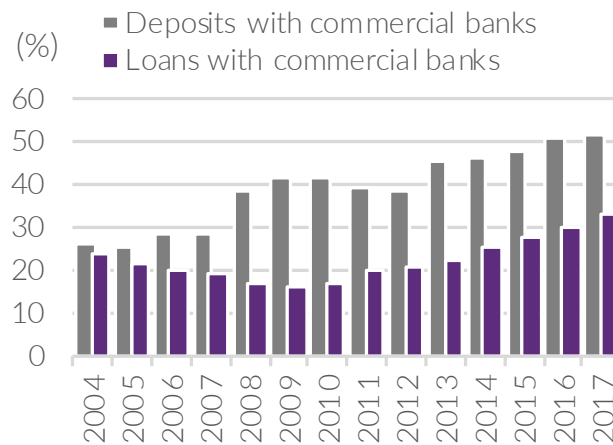
To narrow this gap, the Central Bank of the Philippines (Bangko Sentral ng Pilipinas, BSP) has prioritized regulatory policies aimed at promoting financial inclusion and consumer protection. Its efforts have placed the Philippines near the top of global rankings in terms of its overall regulatory and institutional environment for financial inclusion.⁵ More recently, the BSP shifted its focus to digital innovation, and to that end issued a number of measures aimed at increasing competition in digital financial services and removing barriers to access for low-income consumers. They include regulation approved in mid-2017 that allows banks to set up "branch-lite" units and cash agents, as well as lighter know-your-customer (KYC) and lower minimum balance requirements on basic deposit accounts.⁶ A new digital national identification system should further streamline KYC procedures for customer onboarding. Meanwhile, the approved product offerings of microfinance institutions (MFIs) have been expanded, while plans are underway for a regulatory "sandbox" to support the growth of fintech start-ups.⁷

BSP has made big strides in aligning its prudential banking regulation with international standards of risk-based supervision. In 2015, it began phasing in higher minimum-capital requirements for banks in line with the Basel III international capital-adequacy framework well ahead of the 2019 deadline set by the Basel Committee on Banking Supervision. To meet these enhanced reporting requirements, supervised financial service providers (FSPs) have had to pack ever more data into the financial reporting packages (FRPs) that they periodically submit to the BSP.⁸ Thrift, rural, and cooperative banks are subject to simplified reporting requirements, yet they too are likely to face tighter regulation going forward. As banks' product offerings and distribution networks expand, the volume of prudential reporting data that they will need to submit to BSP is likely to grow.



FIGURE 1. Account ownership

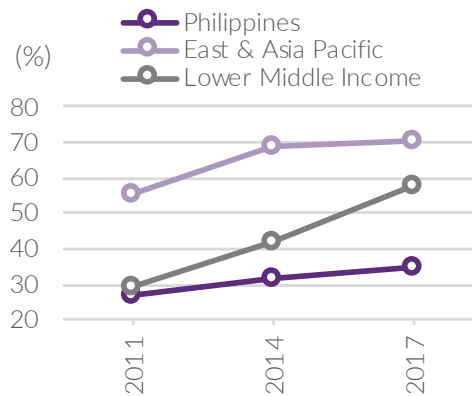
% of Gross Domestic Product (GDP)



Source: IMF Financial Access Survey

FIGURE 2. Loan & deposit penetration

% of respondents, 15+



Source: World Bank Findex

The inexorable rise of digital financial services in the context of significant catch-up growth potential and a supportive regulatory environment suggest that financial inclusion should continue to make gains in the Philippines. However, rapid change and digitization of the financial ecosystem also pose challenges for BSP. A proliferation of regulatory data from new products, platforms, and providers risks overwhelming the existing prudential reporting systems and threatens to impair prudential oversight. To meet this challenge, BSP is exploring several possible use cases of regulatory and supervisory technology (RegTech² and SupTech) to enhance compliance and oversight capacity.⁹ This case study showcases one application for prudential reporting that promises to harness the emerging abundance of data and unlock significant efficiency gains in the reporting process.

The challenge: Diagnosing the pain points of regulatory reporting

As the Philippine financial system grew in size and complexity, BSP's regulatory reporting systems evolved to form a core reporting package and several stand-alone reports. As new regulations were issued or existing ones were amended to align with global banking standards (i.e., Basel reforms), reporting requirements often had to be revised and templates had to be added or updated. Each financial institution had to interpret the new requirements, reconfigure their templates, and update their validation formulas and automation macros. By 2017, banks had to complete more than 240 reporting templates with more than 100,000 data points altogether.

This evolution embedded several inefficiencies into the regulatory reporting process. The reliance on Excel-based reporting templates had become increasingly cumbersome due to manual preparation and validation. While an automated validation process was in place, cross-validation consumed more and more time as the number of items for reconciliation grew with every new report. This process also required constant communication between personnel of the BSP and the reporting institution to clarify errors and omissions. Furthermore, validation results were reviewed manually or "eyeballed" by the BSP processor for accuracy. The cumulative effect of these pain points was more delays and rising compliance outlays.

Aside from penalties and reputational costs, the prior architecture entailed significant administrative overhead. Banks had to expend resources on compliance and information technology, in addition to the opportunity cost of diverting resources from revenue generating activities. For BSP, this meant that there was less budget for research and analysis. The Central Bank was also spending more on licensing fees and service agreements for various data management systems and analytical software packages.

Cyber risks were another concern. The use of email to send compliance reports (and follow-up communication to address inconsistencies and errors) was inherently insecure. The BSP's web portal offered a slightly safer mode of transmission, but it did not solve the issue of multiple reports that needed to be submitted individually.

The greatest shortcoming of the existing reporting system was the constraint it imposed on BSP's core tasks of safeguarding the stability and integrity of the Philippine financial system. Time and energy spent formatting, processing, and validating compliance reports detracted from their more pressing duties of analyzing and overseeing the financial ecosystem. The lag between data collection and operationalization undermined policy responsiveness and effectiveness. The fragmented data architecture, coupled with limits on the amount of data that could be mined, made it difficult to generate rich and timely insights. Worse, gaps in data coverage and analysis could hide potential sources and concentrations of risk in the banking sector, rendering supervision more reactive. These challenges would only intensify as the financial ecosystem became increasingly technology-based and data-driven.



Against this backdrop, the need for a new prudential reporting architecture was clear, compelling, and increasingly urgent. It went beyond improving data quality and relieving administrative pain points but became a matter of ensuring the continued smooth functioning of monetary policy and prudential supervision.

Box 1: Prudential Reporting Pain Points

Financial service providers' perspective:

- Manual population of Excel reporting templates
- High investment costs for reoprtng infrastructure
- Vulnerability to human errors
- Limitation of file sizes
- Insecure transmission via email
- Time-consuming cross-validation process

BSP's perspective:

- Extensive and time-consuming validation process
- Manual review of validation results
- Delays and late submissions
- Fragmented data warehousing
- Templates difficult to amend
- Vulnerability to human errors
- Limitations of file sizes
- High investment costs for technology infrastructure
- Insecure transmission via email

The R²A process: Seven steps to building a prototype

The R²A process describes the particular *modus operandi* employed by the R²A team together with its partners for the co-creation of RegTech²/SupTech solutions. It can be broken down into seven steps (see Figure 3). What follows is a short description of how the process was implemented in the Philippines.¹⁰

FIGURE 3. R²A's seven-step project roadmap



Source: R²A

Step 1 Inception: Building trust and securing commitment

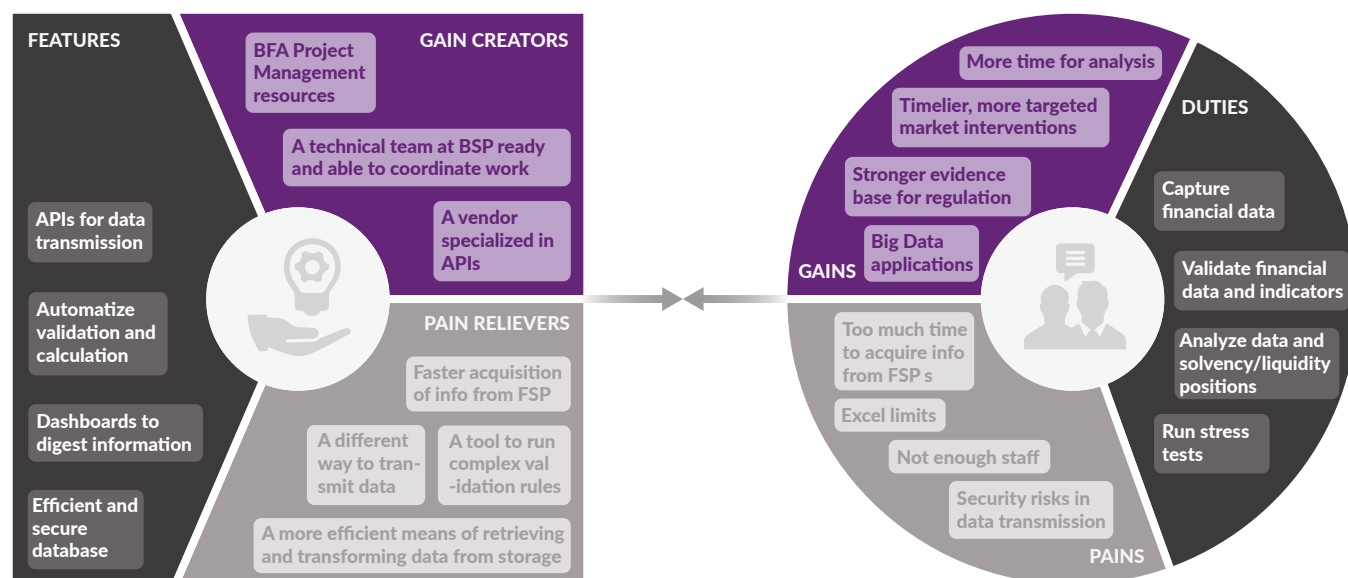
The first task of any prospective R²A engagement is to establish a sufficient degree of confidence that the financial authority is willing to test data-driven and technology-enabled approaches to regulation and supervision and able to carry the project through to completion. Since technological change often elicits skepticism and resistance within organizations, effective change management requires a culture of openness to experimentation, an alignment of vision among all project stakeholders, and high-level buy-in from top leadership. Fortunately, all of these ingredients were present when the BSP approached R²A in October of 2016 with an interest in exploring possible RegTech² and SupTech solutions to its supervisory challenges.

BSP has been a pioneer of leveraging digital innovation to advance financial inclusion. In 2001, it was the first central bank to allow a mobile network operator to provide mobile money services. It has made digital innovation a central plank of its financial inclusion strategy and launched numerous policy initiatives to that end.¹¹ The R²A project was closely aligned with this strategic vision, and accordingly it received strong backing from the top leadership. A letter of commitment from the then Governor of BSP, Amando M. Tetangco Jr, authorized his Deputy Governor (and since July 2017, Governor of BSP) Nestor A. Espenilla Jr. to allocate the necessary internal resources to make the project a priority. Such high-level buy-in was crucial to ensuring the success of the BSP API project.

Step 2 Use case: Value proposition analysis

The API-based prudential reporting system was one of several possible RegTech²/SupTech use cases under consideration by BSP and R²A at the outset of the engagement. Others included a consumer complaints chatbot and the use of geographic information systems (GIS) to improve disaster response. R²A organized a brainstorming session with its technologists, technical experts, and BSP stakeholders where the relative value of the prospective R²A projects were assessed according to their expected impact, technical and operational feasibility, and overall strategic fit. An analytical framework widely employed in technology consulting helped to articulate the value proposition of the solutions in terms of pain points and corresponding technological "pain relievers" (see Figure 4). On key criteria, the API prudential reporting system came out on top (as did the consumer complaints chatbot and management system, which was developed separately).¹² In particular, Deputy Governor Espenilla and his team decided to pursue the prudential reporting project because it addressed issues at the core of its supervision mandate and it would free up resources for other RegTech²/SupTech projects.

FIGURE 4. Value proposition analysis¹³



Source: R²A, Osterwalder et. al 2015

Step 3 Governance: Defining project parameters

BSP and R²A pledged to collaborate on designing, developing, and testing a prototype API prudential reporting solution over a twelve-month period. While a fully-fledged product was not in scope, the prototype would provide a basis for assessing the viability, scalability, and desirability of rolling out the solution to the wider market (see Step 7).

A project charter assigned roles and responsibilities to project stakeholders. R²A provided technical specialists to help guide design and development, a project manager to ensure effective implementation and facilitate coordination, and financing for the vendor selection process and award. BSP, for its part, designated an executive champion to act as the project sponsor, who would advise on the project's strategic direction and sign off on major milestones as needed. BSP would also assign a Project Lead to serve as the day-to-day activity manager and liaison with the R²A team and the vendor.

Step 4 Design: Proof of concept

During this step of the process, the R²A team conducted a “design sprint” with the aim of sketching a rough blueprint for subsequent development work.¹⁴ R²A's technologists and policy experts worked closely with the BSP to translate their needs and desires regarding data transmission, security, and visualization into concrete functional and technical specifications that are intelligible to technology vendors. The challenge was to craft a solution that would meet the BSP's rigorous reporting and security requirements, that could be managed and maintained by its staff, and that would be readily adopted and trusted by FSPs. Based on consultations with key BSP personnel as well as representatives from two FSPs — U.S.-based JP Morgan Chase (JPMC) and the local Bank of Philippines Islands (BPI) — a proof of concept (POC) was conceived using dummy data and mock visualizations. This served to determine the feasibility of the solution and resolve ambiguities before decisions would become hard to reverse. It also defined the solution's core functional and technical requirements, in particular:

- A single, standalone application that would expose an API for two test financial institutions to build against, in order to allow for the digital submission of financial figures for two pre-selected compliance reports.
- The ability to collate data and to run previously created validation formulas against all data submitted.
- Storage of all submitted data in a manner that allows extraction through pre-written SQL queries.
- At a minimum, industry-standard SSL/TLS security for all communications.
- Data storage in a single central location to allow visual reports such as graphs to be generated on the back end.

Step 5 Resourcing: Selecting a tech vendor

A crucial role played by the R²A team in the co-creation process involves pairing financial authorities with competent technology vendors capable of delivering a prototype to specification. A variety of matchmaking methods are available for this purpose, including competition prizes, “hackathons,” and tech sprints.¹⁵ For the BSP's API-based prudential reporting project, a request for Applications (RFA) was deemed appropriate given that API technology is mostly standardized. R²A arranged a global bidding round for a US\$100,000 grant award. This would cover all of the applicants expenses related to the development and testing work, including staff time, hardware, software, travel and all other project-related expenses.

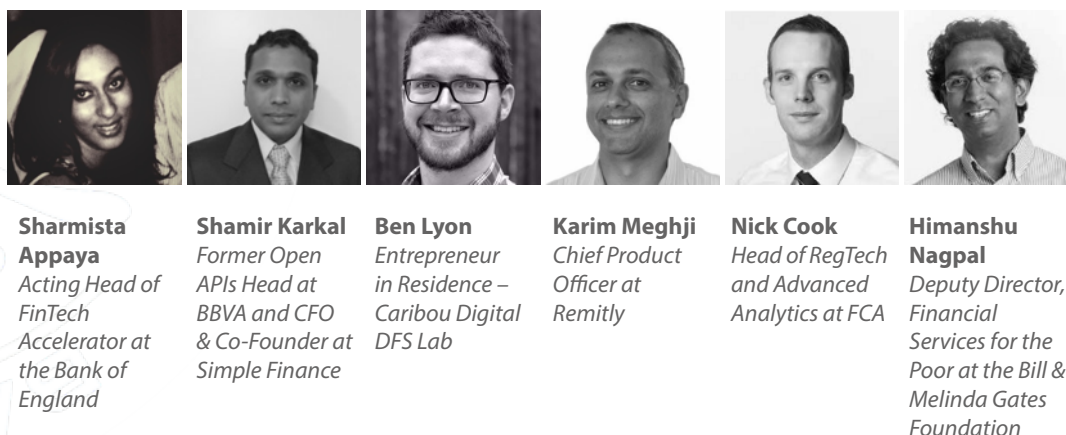
The RFA received 15 submissions from nine different countries (including five local vendors) over the course of one month. During the first round of screening, R²A's expert technologists evaluated applications according to six ranking criteria. The first three assessed the applicants in terms of their



(1) relevant experience in building large public-facing APIs, (2) technical and managerial expertise, and (3) adequacy of staff resources. The second part evaluated the proposals based on their (4) responsiveness to the requirements spelled out in the RFA, (5) the feasibility of the execution plan, and (6) innovativeness of their proposed RegTech solutions.

The top three firms in the ranking were shortlisted for the second round, where a panel of six independent reviewers (see Figure 5) would blindly review the applications and score them anew. A partnership between Compliant Risk Technology (CRT) & Pinecone of Croatia, ranked with the highest score, was selected and, after proper due diligence, awarded the contract.¹⁶

FIGURE 5. R²A's panel of judges



In order to facilitate contracting, R²A stood in as the intermediary counterparty to both BSP and the vendor. In other words, the vendor and the BSP contracted directly with R²A's fiscal sponsor (Rockefeller Philanthropic Advisors), rather than with one another. This effectively "de-risked" the engagement for both parties and enabled a speedier procurement process. During this contracting stage R²A also helped to settle critical legal questions regarding data sharing and storage as well as licensing of intellectual property.

Box 2: Vendor Snapshot—Compliant Risk Technologies (CRT) - Pinecone

Location: Croatia

Founded: 2014

Background: Compliant Risk Technology LLC and Pinecone Ltd. formed their partnership in late 2014 with a view to provide regulatory and risk management solutions for the financial sector.

Mission: To provide integral financial regulatory reporting solutions that facilitate the rapid generation and transmission of regulatory reports.

Technical and managerial expertise: CRT-Pinecone specializes in regulatory reporting solutions, tools, and technologies (mostly XBRL-based) for financial authorities (banking and insurance) and supervised entities.

Relevant experience: Projects with the Croatian Financial Supervisory Agency, Insurance Supervision Agency of Croatia, Croatian National Bank, and others.

Products: Market-proprietary XBRL-based business reporting applications, Integral Financial Supervisory System (IFSS) for central banks and supervisory agencies, and S2CT for EU Solvency II insurance regulatory reporting and data warehousing.

Staff resources: 10 employees



Step 6 Prototyping: Iterative testing and development

With a blueprint in hand and a development team at the ready, the actual work of building a prototype could begin. Using the technical and functional specifications elaborated by R²A and BSP in step 5, CRT-Pincone developed a rudimentary prototype API that could receive a small subset of the required data from the participating FSPs in a controlled environment. This allowed R²A and BSP to test the feasibility of the prototype, address any unforeseen issues early on, and better estimate the time and resources required to roll out the solution to all FSPs. JPMC and BPI volunteered mock data to live test the prototype and ensure that it could handle the delivery, receipt, validation, and storage of prudential data.

The final phase of prototyping involved sharpening the analytics, specifically the ability for BSP to extract and visualize information from the prudential database in statistics, reports, and dashboards. For the prototype, a web-based pivot table tool was developed that combines the user experience of a spreadsheet application with the computing power of a relational database. It also enables users to create custom charts and monitoring tools.

The prototype was delivered in July 2018.

Step 7 Production: Taking the product to market

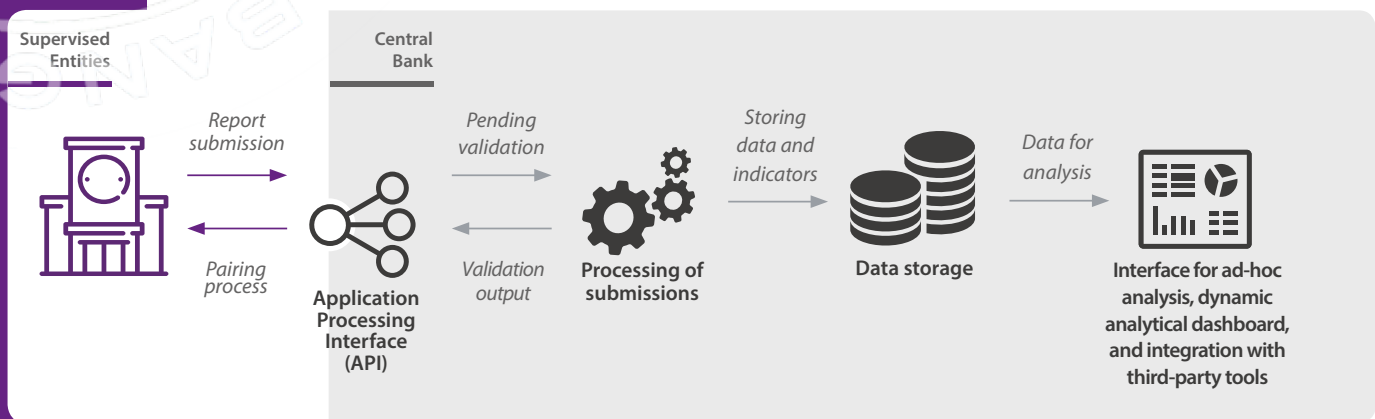
Once an R²A prototype has been developed to the satisfaction of all stakeholders, a decision is made between the vendor and the regulator on whether to launch the product full-scale. In the case of the Philippines, repeated testing with live data had clearly demonstrated the API solution's feasibility. Furthermore, an additional goal of any R²A project is capacity-building for the project partners so that they can learn to operate and maintain the product post-delivery, though a longer-term service agreement with the vendor might still be required in some instances. BSP staff worked closely with CRT and R²A on training on the inner workings of the API. With an in-house technical team and viable product, the BSP began working on scaling up the prototype for the entire market.



4 The solution: An API-based data architecture for prudential reporting

The prototype that emerged from R²A's design and development process represented a fundamental re-engineering of BSP's prudential reporting system. It consisted of a mix of relatively cost-effective, best-in-class technologies targeted at the various pain points of the existing reporting system. Together they formed a coherent, streamlined, and nimble architecture for the (1) transmission, (2) processing, (3) warehousing, and (4) analysis of banks' prudential reporting data. This section provides some color on each of these technical layers, and highlights the efficiency gains that are reaped by rationalizing and automating key aspects of the reporting process.

FIGURE 6. R²A/BSP new API-based data architecture for prudential reporting



Source: R²A, BSP

1 Application programming interface (API)

The API establishes a direct line of machine-to-machine transmission between the supervised banks' core banking system and BSP without human intervention. Rather than having supervised entities manually populate multiple spreadsheet-based report templates, raw data is extracted from their databases and converted into a single encrypted XML-based file. This is then "pushed" directly to BSP's processing queue, obviating the need for email or web data portals.

APIs have a number of advantages over the existing prudential reporting system. First, the volume (and hence granularity) of data that can be transferred is increased considerably. Not only can the XML format hold far more memory than Excel files, but also API transfers have fewer size limitations than email attachments. Second, this mode of transmission is inherently more secure than email as there is less room for human error (e.g., a file is accidentally sent to the wrong person or through a compromised email account). Furthermore, BSP's solution contains several industry-standard security protocols to encrypt and authenticate files. Third, sending raw data cuts the total number of data points that are submitted – in BSP's case, from ~107,000 to ~50,000 – since duplicate and calculated fields are eliminated. Likewise, transferring raw data rather than preformatted templates means that amendments to data requests can be accommodated relatively easily.

2 Processing engine

A new processing engine performs all data validation and formula calculation in one dedicated location based on rules defined in a dynamic business syntax. Validation tests are run near-instantaneously upon receipt of the file submission, with the reporting entity receiving an automated response (via API and message) detailing the test results and flagging any abnormal or missing values. Broken rules result in the report being rejected and sent back for review and resubmission. Once validation is passed, the data is run through the calculation engine where all the relevant prudential indicators and risk metrics such as capital adequacy ratios (CAR) are calculated.

With over 7,000 validation rules prescribed by BSP, having a single processing engine ensures that all tests and calculations are run uniformly, rather than on disparate spreadsheets whose formulas may be inconsistent, broken, or out of date. It also allows for more complex number crunching than might be possible in Excel. Automation significantly cuts down on processing time, especially for data-sets that were being validated through painstaking manual reconciliation. Excluding these, the average processing time fell from an average of 1800 seconds to around 10 seconds. Finally, a calculation engine with a user-friendly interface where indicators are defined or amended means that methodological changes – for instance, in the calculation of risk-weighted assets (RWAs) – are implemented relatively easily.

3 Database

After processing, the cleansed data is passed directly into a centralized, secure, access-controlled database for storage, without manual uploads as in the old system. This warehouse facilitates access to historical data and allows for more efficient database management. BSP will be able to extract data in different ranges using pre-scripted SQL queries and without requiring BSP's intervention.

4 Analytical tools

A centralized database also expands the array of analytical tools that can be applied, including dashboards and statistical software. The BSP prototype included a web-based pivot table tool as well as charts depicting key performance and risk indicators. More interactive visualizations and sophisticated Big Data applications such as predictive analytics and machine learning are also under consideration for future deployments.

FIGURE 7. Key performance metrics

Reporting	R ² A Prototype
29 reporting schemes (14 financial reports + 15 related reports)	1 unified scheme (in XSD format)
~243 reporting templates	~210 reporting templates
~107,000 data points	~50,000 data points (other data points are calculated in fields)
~7,000 validation rules (in several layers, some spot checked by humans)	~7,000 validation rules (single validation layer in dynamic business syntax)
Layered reporting packages (multiple submission of reporting package via email)	Single reporting package (automatic submission via API, no human intervention needed)
Processing time avg. > 1800 sec (excluding manual workarounds)	Processing time avg. ~10 sec (excluding manual workarounds)
Multiple processing and analytical layers (some manual)	Single processing and analytical layers (processing and validation layer)

Source: CRT, R²A

5 Conclusion

The Philippines stands at a critical juncture in the evolution of its financial sector. Digitization is driving rapid growth in financial services, spurred on by supportive regulation geared towards advancing financial inclusion. But a bigger and more digital financial ecosystem also presents challenges. Spreadsheet- and email-based prudential reporting systems are ill-prepared to process, validate, and analyze the surfeit of data being generated by digital products and platforms. Existing prudential data architecture already struggled to produce complete, timely, and consistent reports, and relied on the widespread use of manual workarounds.

To meet this challenge, BSP is proactively exploring RegTech² and SupTech solutions. Through its participation in the RegTech for Regulators Accelerators (R²A), BSP received a market-ready prototype capable of accommodating more granular data and more frequent submissions from supervised institutions via APIs. The prototype developed by BSP in collaboration with R²A has demonstrated the feasibility of a market-level API-based solution for prudential reporting, and validated many of its promised benefits. As testing showed, rationalization of the prudential data architecture and automation of reporting processes relieved many pain points of the existing system and unlocked significant efficiency gains for BSP and supervised entities. The API prototype could deliver a greater volume of data, at faster intervals (hourly even), and with fewer duplications, errors, and omissions.

These findings suggest that an eventual roll-out of this solution to the wider market could free up substantial time and resources from routine tasks that could be redirected to other goals. Timelier and richer data would enable supervisors and policymakers to sharpen their analytical tools and adopt new statistical techniques such as machine learning. Monetary policy, macroprudential oversight, and financial inclusion strategy would all stand to benefit.

The Philippine API project also served to validate R²A's model of collaborative co-creation through "lean" design and development. This iterative approach allowed the developers and project managers to spot potential problems early and make course corrections quickly. As a result, the prototype was delivered to the satisfaction of all stakeholders. Furthermore, the emphasis on knowledge sharing and capacity building ensured that the groundwork had been laid for the upcoming roll-out of a full-scale product to the wider market.

Endnotes

¹ Bangko Sentral ng Pilipinas, "[A Report on the Philippine Financial System](#)," Second Quarter 2017.

² Ibid.

³ See: <https://globalfindex.worldbank.org/>.

⁴ Jeanette Thomas, "Regulation Spurs Innovation in the Philippines," 5 November 2012, CGAP.

⁵ For instance, see: Robin J. Lewis, John D. Villaseñor, and Darrell M. West, "[The 2017 Brookings Financial and Digital Inclusion Project Report: Building a secure and inclusive global financial system](#)," Brookings Institute, August 2017. And: Economist Intelligence Unit, "[Global Microscope 2016: The Enabling Environment For Financial Inclusion](#)," 2016.

⁶ With cash agents, banks can tap third party agents as a cost-efficient delivery channel and leverage innovative digital solutions to onboard more clients.

⁷ See speech by Nestor A. Espenilla Jr., Governor of the Bangko Sentral ng Pilipinas, "[The Future is Now: Survive, Compete and Grow Amidst Radical Changes in Labor and Employment Policies](#)," 18 April 2018.

⁸ The FRP contains the balance sheet, income statements, and supporting schedules on a monthly and quarterly basis.

⁹ RegTech for Regulator, RegTech², is distinguished from RegTech for supervised entities. See: Simone di Castri, Matt Grasser, and Arend Kulenkampff, "[Financial Authorities in the Era of Data Abundance: RegTech for Regulators and SupTech Solutions](#)," RegTech for Regulators (R²A) white paper, August 2018.

¹⁰ For more information, see: Simone di Castri, Matt Grasser, and Arend Kulenkampff, "[The RegTech for Regulators Accelerator \(R²A\) Process: Giving Financial Authorities Superpowers](#)," RegTech for Regulators (R²A) paper, August 2018.

¹¹ For details on these policy initiatives, see: Bangko Sentral ng Pilipinas, "[Financial Inclusion Initiatives 2017](#)," January 2018.

¹² See: Simone di Castri, Arend Kulenkampff, and Matt Grasser, "[A chatbot application and complaints management system for the Bangko Sentral ng Pilipinas \(BSP\). R²A Project Retrospective and Lessons Learned](#)," RegTech for Regulators (R²A) case study, September 2018.

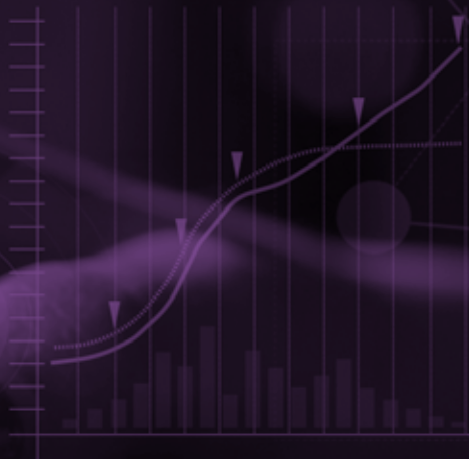
¹³ Alexander Osterwalder, Yves Pigneur, Gregory Bernarda, and Alan Smith, "Value Proposition Design: How to Create Products and Services Customer Want," John Wiley & Sons, January 26, 2015.

¹⁴ Design sprints are short (typically five days) but intense workshops aimed at answering critical questions through rapid prototyping and user testing.

¹⁵ For a survey of vendor selection models, see: "[The RegTech For Regulators \(R²A\) Process: Giving Financial Authorities Superpowers](#)," August 2018.

¹⁶ See: <https://www.crt.hr/>.

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