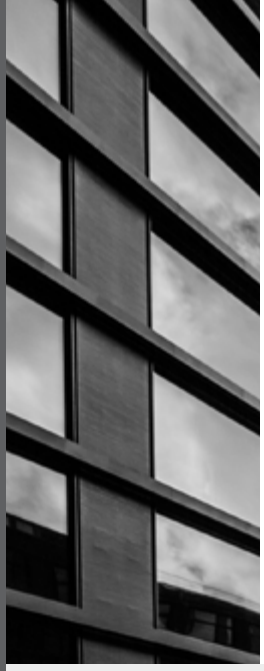


BIAN
Banking Industry
Architecture Network

Building the future of banking services

Introduction
Steven Van Wyk

Executive Vice President, Head of Technology and Operations, PNC Financial Services Group and Chairman of the BIAN board.

The pace of change in financial services has never been greater. Emerging technologies are opening doors for banks to deliver differentiated and truly futuristic services. However, this future will remain a pipedream if the industry fails to rethink business approaches.

At BIAN, we believe that the banking industry wastes over a billion dollars each year due to the complexity of core technologies and timeworn integration approaches. This has become one of the primary reason banks are not getting the anticipated benefits from digital transformation projects. The industry must rid itself of its anchors – the proprietary core banking solution that will soon become tomorrow's legacy technologies – if it is to evolve.

We need to stop trying to predict the future but as an industry start taking responsibility to define a much more efficient and effective approach. This is where BIAN comes in. It has worked for over a decade to create an open framework that allows banks to migrate from outdated systems to a fully digital model underpinned by industry standards. The model virtually eliminates integration costs and levels the services playing field for banks, giving them a way to rapidly deploy interchangeable micro services from any recognised developers, based on requirements from the customer and business.

PNC Financial, where I head up technology and operations, is well aware of the drive towards digital banking. Today over 60% of its customers rely on non-branch channels - a clear signal that a digital strategy is required to keep pace with their demands. The organisation has been a BIAN member since its inception, precisely because it has provided the foundation to support our digital future.

Speaking as Chairman of the BIAN Board and Head of Technology at PNC Financial, I'm excited to continue welcoming new members to our growing global network. The organisation is uniquely placed to offer partners, competitors and customers an opportunity to play an active role shaping the future of banking.

We want to provide the world with the best banking service oriented architecture.

Facing the future:
The challenge

For banks:

The financial services industry is more competitive than ever before – new entrants and advancements in consumer technology are boosting customer expectations for streamlined, instant services, delivered through frictionless technology platforms. Meanwhile, many banks are still battling with expensive, archaic, legacy technology, developed in a pre-internet era and struggling to keep up with the pace of innovation as a result.

For FinTech providers:

FinTech enterprises are built on flexible cloud-based architectures, and as such, are in many cases leading the charge of banking digitisation. But without access to core infrastructure, it's often impossible to operate directly without the support of an existing bank's IT network.

The industry is now opening up to enable and encourage collaboration between banks and FinTech providers, particularly through the integration of banking APIs and the adoption of cloud. But all the while there is a lack of standardisation across APIs, collaboration is limited.

For technology software vendors and service providers:

Despite the level of expertise and innovation offered up by technology developers and providers, a disproportionate amount of a bank's IT budget is still spent on the sheer cost of IT integration. Gartner predicts that this will soon surpass 50% of a bank's budget for new large systems.

Without this resource burden, banks would have the scope to realise the full potential of the solutions that they invest in and implement. Technology vendors and service providers need to help reduce the cost of integration and align banks to a longer-term technology roadmap and vision.

The solution

Work together to future-proof the financial services industry

The banking industry has changed almost beyond recognition in recent years, but the digital transformation that we have experienced so far is just a fraction of the shift that is to come. At BIAN we fundamentally believe that by collaborating effectively across the global financial services field – from established banks and FinTech providers, to technology vendors and consultants, we can navigate this period of change together. Through industry collaboration, we can embrace the digitisation of banking for what it is: an exciting opportunity to introduce genuine change to the industry and open the door to new business models, rather than an unconquerable challenge that threatens the future of financial services.

Building the model

Members combine their industry expertise to define a usable banking technology framework that standardises and simplifies core banking architecture across the entire financial services ecosystem. Based on service-oriented architecture principles, the comprehensive model is being adopted by banks across the globe, as a means to streamline convoluted enterprise architecture.
(See page 23 for the model in full, or page 11 and following, for examples of the BIAN model in practice)

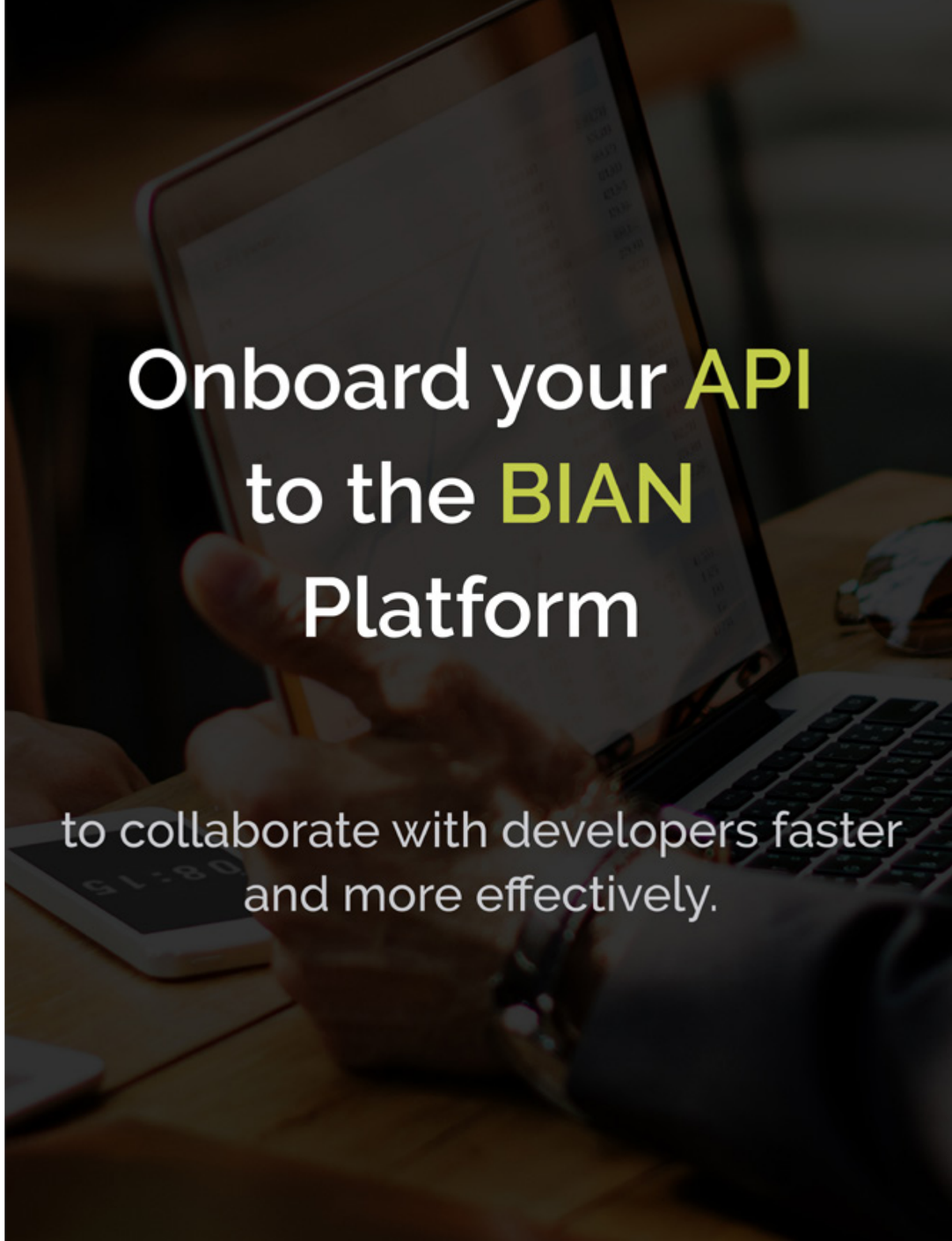
Who are the BIAN members?

An ecosystem committed to knowledge sharing:

BIAN is made up of the world's leading corporations from all areas of the financial industry. It is the support of these industry front-runners and the knowledge and passion of individual experts within those enterprises that drives the ecosystem forward. To be a member of BIAN is to put a stake in the ground as an industry leader and make a commitment to shaping the future of the financial services industry.

Today we have over 70 members including:

ABN·AMRO
JPMorganChase
Credit Suisse
citi
DISCOVER
SAP
Nordea
Infosys
EVRY
IBM



Our vision:

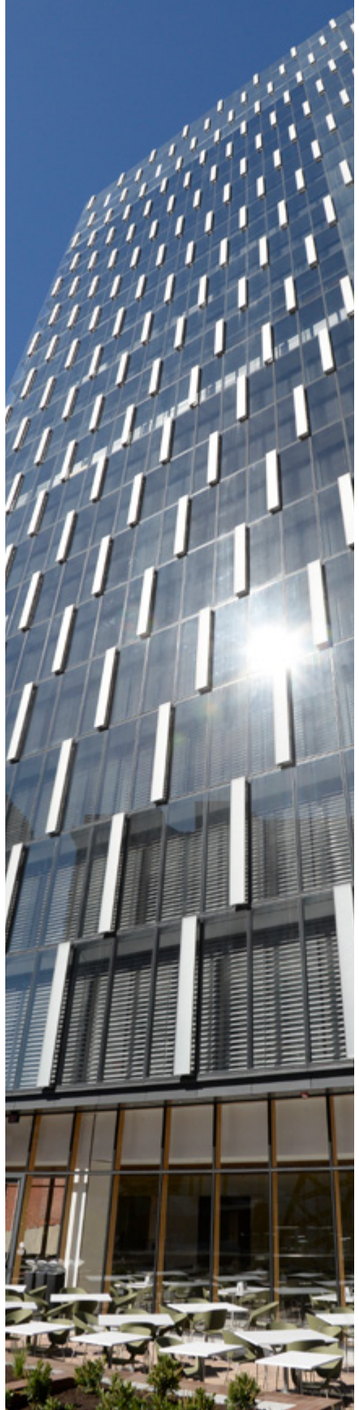
We want to be the banking tec hnology standard.

Using the model:
BIAN in practice

PNC

Steven Van Wyk, Executive Vice President, Head of Technology and Operations, PNC Financial Services Group explains the benefits of aligning the bank's enterprise architecture to the BIAN model.

The BIAN model fits perfectly in line with how we view enterprise architecture (EA) at PNC. One of the first steps we took as an organisation was to bring a business perspective to enterprise architecture. To us, technology is not just a collection of servers and software, but rather a set of technical solutions that are aligned to specific business capabilities and functions.



1) Adding the business view

To begin, we looked at every application that existed in our portfolio and mapped it to the aligned BIAN service domains (specific business functions) in our EA management tool.

This gave us a clear view of systems that were providing similar or overlapping capabilities, which could be optimised, while also creating a consistent and replicable way to evaluate proposed new solutions for our application portfolio.

2) Creating a bank on a page

This allowed us to create a business driven "bank on a page" heat map, using BIAN's M4 model on pages 25-26 , to show what areas were suffering from obsolescence and compliance issues. As we move forward, we can align our risk and project portfolio views to the same bank on a page overview.

Using BIAN's framework, we can move our core platforms into a componentised framework, which allows us to manage our transformation in logical steps that are aligned with the overall business strategy.

3) Positioning for disruptive industry change

Defining our technology into capabilities in this way also sets us up for future innovation. The proliferation of FinTech is setting new expectations with new business models that sometimes compete directly with banks. We are evolving our core banking capabilities into a componentised framework that will allow us to embrace evolving business expectations and customer demands. The search for innovation partnerships becomes easier when you are no longer tied to the past era's monolithic application approaches. We are exploring open banking APIs, for example, in a collaborative project with BIAN and Carnegie Mellon University. By aligning to the BIAN framework we are assured that our enterprise architecture can continuously adapt to new market and technology demands.

By aligning to the BIAN framework we are assured that our enterprise architecture can continuously adapt to new market and technology demands.

Using the model:
BIAN in practice

Cognizant

Cognizant Technology Solutions, led by Sanghosh Bhalla, Niloy Sengupta and Akshaya Bhargava from the firm's Banking and Financial Services Consulting practice, recently helped a top three North American bank, adopt BIAN and optimize their enterprise portfolio of applications that support business functions across all of its business units.

This "universal bank" is a market leader in the US in several market segments including retail and commercial banking, lending and mortgages, wealth management and capital markets, and over several decades have amassed an enormous portfolio of ~6000 applications. It commissioned an enterprise-wide Application Portfolio Rationalization program to support some strategic business drivers such as reduction of TCO of apps by eliminating redundancies, increased governance and controls, ensure standardization for better risk and regulatory compliance, simplification and application modernization including increased cloud adoption, enabling additional growth of business opportunities and improving user-experience. The program had a target to reduce the application portfolio size by at least 15% within three years.

Cognizant joined the program and drove the adoption of BIAN 5.0 Service Landscape as the framework to compare apps based on the functional overlaps. BIAN proved useful to the program objectives in the following ways:

1) Provided the enterprise view of business capabilities:

The bank needed a framework that could provide a single unified view of its business capabilities at a high level. While it had several capability models at the line of business levels, they were inadequate to provide the enterprise view that was critical for this program.

2) Developed Capability based Overlap Analytics:

Each application was mapped to BIAN Service Domains and then clustered based on overlaps. Subsequently, the application health & wellness metrics, were applied to individual clusters, and each app was scored based on those metrics. The applications that scored low in the wellness tests became candidates for retirement in that cluster. Subsequently, the program team started discussions with the business and technology leaders to decommission those apps. BIAN based overlap analytics was critical in these negotiations to educate the stakeholders that such decommissioning would not hinder their day-to-day business operations, as they had alternatives.

3) Sustained an Optimal portfolio of applications:

Beyond rationalizing the existing portfolio, it was essential to ensure that the proliferation of applications with overlapping capabilities does not happen in the future. Therefore two new checkpoints, based on BIAN based capability analytics, were implemented in the New Application Development process. The first is during the Concept Review stage during Ideation, before funding approvals. This checkpoint ensures that the bank will not fund any new apps that have a potential to overlap with those that are already deployed and will not be retired in the near-term. The second checkpoint is during the New Application Onboarding stage, where the Enterprise Architects will review and validate that a new app that is being built or bought does not have any capability overlaps with any existing apps in production.

4) Established Portfolio Health KPIs:

We drove the creation of several application health & wellness metrics to score apps. These metrics looked into the fitment of applications to current and future business strategy; the criticality of the apps to business functions; the degree of alignment of apps to enterprise technology standards; the degree of aging; the degree of compliance of apps to risk and regulatory compliance parameters and the total cost of ownership.

5) Adoption of BIAN as the Enterprise Business Capability Model:

Increased participation from client's Architect community in BIAN Working Groups and set the stage for Domain Driven Design and Microservices architecture leading to agile and component-driven enterprise architecture.

Using the model:
BIAN in practice

Aleksandar Milosevic, Chief Software Architect at banking software provider Asseco SEE explains the business benefits of working with BIAN to define standardised APIs.

Using standard interfaces to consolidate and modernise portfolio

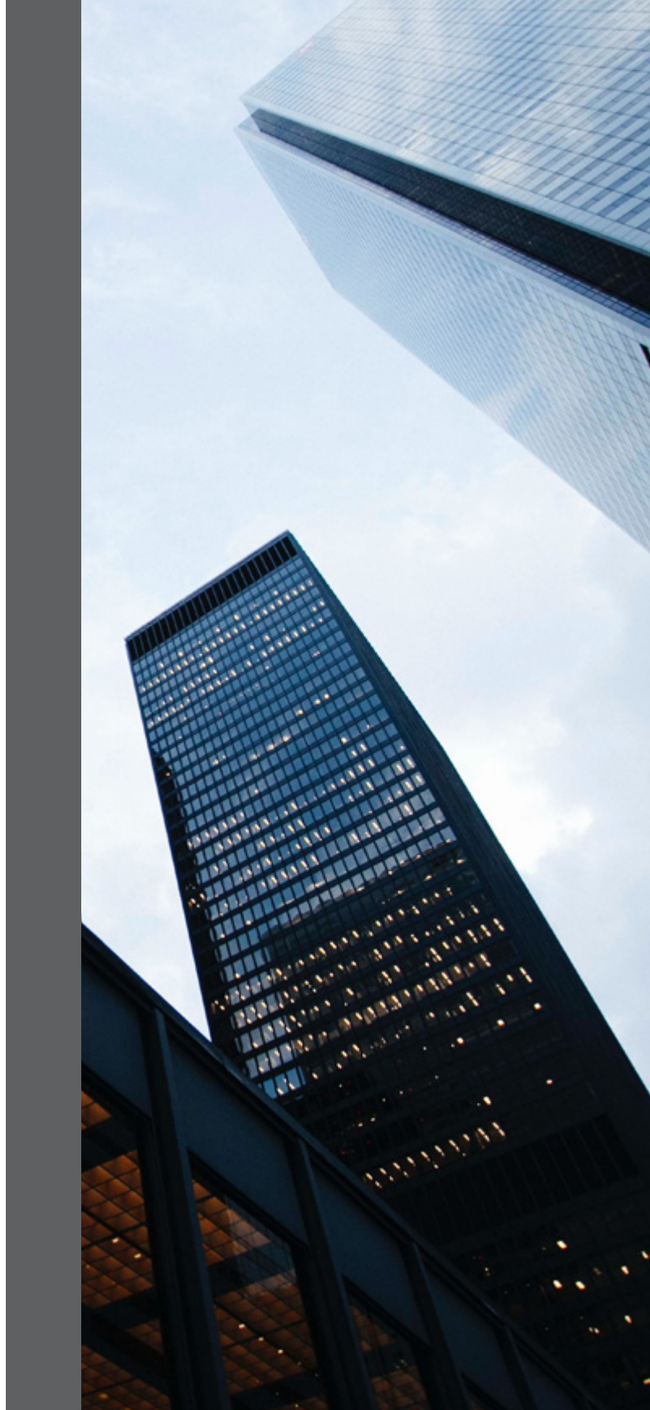
As a vendor that grew through acquisitions, we inherited a rich collection of applications that have their application specific interfaces. Applications that had similar scope ended up having their specific interfaces for essentially the same responsibilities. One of our strategic goals was to cut integration time and cost and over time achieve plug-and-play interoperability between different applications in our portfolio. Another goal was to hide any application or platform specifics behind the interfaces so we can gradually modernise individual applications without disturbing the others. Last but not least, our goal was to enable easier consumption of our interfaces from customers and partners. As we were already using BIAN as a map for application portfolio tracking and optimisation we decided to go a step further with BIAN – to define standard A2A interfaces aligned with BIAN and retire legacy application specific interfaces.

Asseco Reference REST APIs

We formed working groups from domain experts and gave them the charter to standardise REST APIs for Asseco SEE banking applications. One of the biggest challenges when defining a large set of consistent APIs is the alignment of their responsibilities and boundaries. Through our experience with BIAN we learned that we could utilise the landscape for functional decomposition of APIs in which each service domain becomes a candidate boundary for an API definition. Having clear rules for establishing service domains reduced the risk of unclear boundaries and increased the productivity of our working groups.

30 APIs and counting

Since the beginning of 2016, our working groups were able to define 30 APIs and our many product teams implemented those APIs as both consumers and providers. Working on standard APIs had an integral impact on our development organisation and helped broaden the perspectives outside organisational and application siloes. With three banks already using REST APIs and many more in the pipeline, APIs and their alignment with BIAN is a hot topic in almost any discussion that we have with banks today.



How to get involved

Networking and knowledge sharing opportunities include:

Global and local events	Featuring world leading banking and technology speakers. Or work with us to host your own event and grow your network
Collaborative Working Groups	Designed to collaboratively build the core banking model of the future
Hands-on projects	Engage with partner projects, such as Carnegie Mellon University's work on open APIs
Accredited courses	Become a BIAN-certified architect
Case Studies	Learn how others are putting the BIAN model into practice and share your experiences
How-to guides and webinars	Benefit from ongoing education and knowledge sharing
Collaborative media opportunities	Raise your company's profile as a leading innovator in the industry

> "Being a BIAN member brings unrivalled networking opportunities – from meet and greets at BIAN events, to working directly as part of a cross-industry working group to thrash out an industry challenge or opportunity. Most recently I've discovered huge value in working with the wider BIAN network to understand how the industry is preparing for things such as open APIs and blockchain technology."

Coen de Bruijn,
Head of Business Architecture, ABN AMRO

Interested in joining the BIAN network, but want to see more first?

Non-members are encouraged to attend our events and webinars completely free of charge. See full details of our latest engagements on our website **https://bian.org/.**

What our members say

"TCS has always been committed to adopting standards and influencing them where possible. We believe BIAN offers the potential for further standardisation and gives banks the tools to rationalise and simplify their businesses. We see BIAN as a vehicle to contribute to help deliver these open business standards in a collaborative manner, for the benefit of all financial institutions."

R. Vivekanand
Vice President & Global Head – Product Delivery
TCS Financial Solutions

"BIAN's collaboration with industry groups such as Object Management Group (OMG) and SWIFT demonstrates its commitment to making its banking models more valuable to its members. Through the BIAN community, IBM will continue working to address the requirements of financial institutions through solutions based on open standards."

Chae An
Vice President and CTO Financial Services Solutions
IBM

"As a founding and active member of BIAN, Microsoft is enabling global collaboration with key thought-leaders in the banking and IT communities around the establishment of technology standards and SOA best practices. In doing so, BIAN will be instrumental in laying the groundwork for the banking industry services in the new economy."

David Vander
WW Industry Lead, Microsoft Services
Microsoft

"Based on our 'IT-strategy 2020' plan, KfW has decided to significantly redesign part of our current IT landscape. As part of this transition process the clear focus is on standardisation. Using the BIAN community and materials we strongly believe that BIAN will help us meet our IT objectives. What's more, as one of the largest development banks worldwide we hope our membership will attract other development banks to join BIAN and help promote standardisation across our market."

Michael Strauss
Head of IT Strategy and Architecture
KfW Bankengruppe

"We view standardisation across the industry – amongst both financial institutions and vendors – as the key to realising the promise of SOA and simplifying the integration effort of major projects. We are impressed with BIAN's existing membership and are delighted to be part of this visionary organisation. We hope this forum will provide real business value in the years ahead."

Ian Guy Gillard
Executive Vice President,
Bangkok Bank

"The implementation of an enterprise architecture, enriched by internal and external communities, is one of the projects Société Générale is currently investing in. We are convinced that the nature of the common work and shared information about the architecture vision will speed up our current tasks on the same topics, and continue to support our customer-oriented spirit."

Alain Benoist
Global head of transformation, processes and information systems
Société Générale

The Service Landscape

The BIAN model is based on a service-oriented architecture that defines the standard business capabilities that make up a bank – such as payments, loan offerings or trading facilities. These are defined by Service Domains. By identifying the information dependencies (known as Service Operations) between these standard business capabilities, BIAN is building a simplified, yet comprehensive solution to overcome legacy banking technology issues.

How to join

The BIAN membership is open to all parties in the financial services industry who are willing to collaborate and share knowledge to move the whole industry forwards.

Visit **https://bian.org/membership/join-us/** or email your application to **info@bian.org**

The Service Landscape in detail

Reference Data

Reference Data
Party Data Mngmt.
Customer Profile

External Agency
Information Provider Admin
Syndicate Mngmt.
Interbank Relationship Mngmt.
Correspondent Bank Relationship Mngmt.
Correspondent Bank Data Mngmt.
Sub Custodian Agreement
Product Service Agency
Product Broker Agreement
Contractor/Supplier Agreement

Market Data
Information Provider Operation
Market Information Mngmt.
Financial Market Analysis
Financial Market Research
Quant Model
Market Data Switch Admin
Market Data Switch Ops
Financial Instr. Ref Data Mngmt.
Counterparty Administration
Public Reference Data Mngmt.
Location Data Mngmt.

Product Management
Product Design
Product Deployment
Product Training
Product Quality Assurance
Discount Pricing
Product Directory
Special Pricing Conditions

Sales & Service

Channel Specific
Branch Location Mngmt.
Contact Centre Mngmt.
Branch Network Mngmt.
E-Branch Mngmt.
Adv. Voice Services Mngmt.
ATM Network Mngmt.
Contact Centre Operations
Branch Location Operations
E-Branch Operations
Adv. Voice Services Operat.
ATM Network Operations
Branch Currency Mngmt.
Branch Currency Distribution
Prod. Inventory Item Mngmt.
Prod. Inventory Distribution

Cross Channel
Party Authentication
Transaction Authorization
Point of Service
Servicing Event History
Servicing Activity Analysis
Contact Routing
Contact Dialogue
Interactive Help
Contact Handler
Customer Workbench

Marketing
Business Development
Brand Mngmt.
Advertising
Promotional Events
Prospect Campaign Mngmt.
Prospect Campaign Design
Customer Campaign Mngmt.
Customer Campaign Design
Customer Surveys

Sales
Prospect Campaign Execution
Prospect Mngmt.
Lead/Opportunity Mngmt.
Customer Campaign Execution
Customer Offer
Sales Planning
Underwriting
Commission Agreement
Commissions
Product Matching
Product Expert Sales Support
Product Sales Support
Sales Product

Customer Mngmt.
Customer Relationship Mngmt.
Customer Prod./Service Eligibility
Customer Agreement
Sales Product Agreement
Customer Access Entitlement
Customer Behavioural Insights
Customer Credit Rating
Account Recovery
Customer Event History
Customer Reference Data Mgmt.
Customer Precedents
Customer Proposition

Servicing
Servicing Issue
Customer Case Mngmt.
Case Root Cause Analysis
Customer Case
Card Case
Customer Order
Payment Order

Operations & Execution

Product Specific Fulfilment

Loans & Deposits
Loan
Leasing
Current Account
Deposit Account
Corporate Current Account
Consumer Loan
Corporate Loan
Corporate Lease
Merchandising Loan
Mortgage
Fiduciary Agreement
Savings Account

Cards
Credit/Charge Card
Card Authorization
Card Capture
Card Billing & Payments
Merchant Relations

Customer Services
Corporate Trust Services
Remittance
Currency Exchange
Bank Drafts & Trvl. Checks
Brokered Product
Consumer Investments
Customer Tax Handling
Consumer Advisory Services
Trust Services
Service Product

Investment Mngmt.
Investm. Portfolio Planning
Investm. Portfolio Analysis
Investm. Portfolio Mngmt.
eTrading Workbench

Wholesale Trading
Trading Book Oversight
Trading Models
Dealer Workbench
Quote Mngmt.
Suitability Checking
Credit Risk Operations
Market Making
ECM / DCM
Program Trading
Traded Position Mngmt.
Market Order
Market Order Execution

Market Operations
Mutual Fund Admin.
Hedge Fund Admin.
Unit Trust Admin.
Trade Confirmation Matching
Order Allocation
Settlement Obligation Mngmt.
Securities Dlvry & Receipt Mngmt.
Securities Fails Processing
Trade/Price Reporting.
Custody Administration
Corporate Events
Financial Instrument Valuation

Trade Banking
Letter of Credit
Bank Guarantee
Trade Finance
Credit Mngmt.
Credit Facility
Project Finance
Limit & Exposure Mngmt.
Syndicated Loan
Cash Mngmt. & Account Services
Direct Debit Mandate
Direct Debit
Cheque Lock Box
Factoring

Corp. Financing & Advisory Services
Corporate Finance
M&A Advisory
Corp. Tax Advisory
Public Offering
Private Placement

Cross Product Operations

Payments
Payments Execution
Financial Message Analysis
Financial Gateway
Correspondent Bank
Cheque Processing
Central Cash Handling
ACH Fulfilment

Collateral Administration
Payments Execution
Financial Message Analysis
Financial Gateway
Correspondent Bank
Cheque Processing
Central Cash Handling
ACH Fulfilment

Account Mngmt.
Position Keeping
Reward Points Account
Accounts Receivable
Account Reconciliation
Counterparty Risk
Position Mngmt.
Fraud Detection
Transaction Engine
Product Combination
Customer Position

Operational Services
Issued Device Admin
Issued Device Tracking
Disbursement
Open Item Mngmt.
Leasing Item Administration
Dunning
Customer Billing
Rewards Points Awards & Red.
Channel Activity Analysis
Channel Activity History

Risk & Compliance

Bank Portfolio & Treasury
Corporate Treasury Analysis
Corporate Treasury
Asset Securitization
Asset & Liability Mngmt.
Bank Portfolio Analysis
Bank Portfolio Administration
Stock Lending/Repos

Models
Market Risk Models
Financial Inst. Valuation Models
Gap Analysis
Credit Risk Models
Liquidity Risk Models
Economic Capital
Business Risk Models
Customer Behaviour Models
Fraud Models
Credit/Margin Management
Production Risk Models
Operational Risk Models
Contribution Models

Business Analysis
Segment Direction
Product Portfolio
Customer Portfolio
Branch Portfolio
Channel Portfolio
Competitor Analysis
Market Research
Market Analysis
Contribution Analysis

Regulations & Compliance
Guideline Compliance
Regulatory Compliance
Compliance Reporting
Regulatory Reporting
Fraud/AML Resolution
Financial Accounting

Business Support

IT Mngmt.
IT Systems Direction
IT Stds & Guidelines
Systems Administration
Development Environment
System Development
Production Release
System Deployment
Systems Operations
Platform Operations
Systems Help Desk
Systems Assurance
Internal Network Operation

Non IT & HR Enterprise Services
Legal Compliance
Internal Audit
Security Advisory
Security Assurance
Approved Supplier Directory
Procurement
Company Billing & Payments
Fixed Asset Register

Buildings, Equipment and Facilities
Property Portfolio
Site Operations
Site Administration
Equipment Administration
Equipment Maintenance
Utilities Administration
Building Maintenance

Business Command & Control
Organization Direction
Business Unit Financial Analysis
Business Unit Financial Operations
Business Unit Accounting
Business Unit Direction
Business Unit Management

Finance
Financial Statements
Financial Control
Financial Compliance
Enterprise Tax Administration

Human Resource Mngmt.
Human Resources Direction
Employee Assignment
Employee Data Management
Employee/Contractor Contract
Employee Certification
Employee Evaluation
Employee Payroll and Incentives
Travel and Expenses
Employee Access
Employee Benefits
Workforce Training
Recruitment

Knowledge & IP Mngmt.
Mngmt. Manual
Intellectual Property Portfolio
Knowledge Exchange

Corporate Relations
Corporate Communications
Corporate Alliance/Stakeholder
Corporate Relationship
Regulatory and Legal Authority
Investor Relations

Business Direction
Corporate Strategy
Corporate Policies
Product & Services Direction
Business Architecture
Continuity Planning

Document Mngmt. & Archive
Document Services
Archive Services
Correspondence

The M4 Model, the Bank on a page

For the creation of the enterprise blueprint, a different layout of the Service Landscape has been developed. This layout better reflects some of the typical structure and flows/connections in a bank and, consequently, is a better format for assembling the blueprint. It does not change the nature or content of the Service Domains themselves, it is simply an arrangement of the Service Domains.

This alternative layout is called the 'value chain' view as it includes structures that align loosely to the value chain in service delivery.

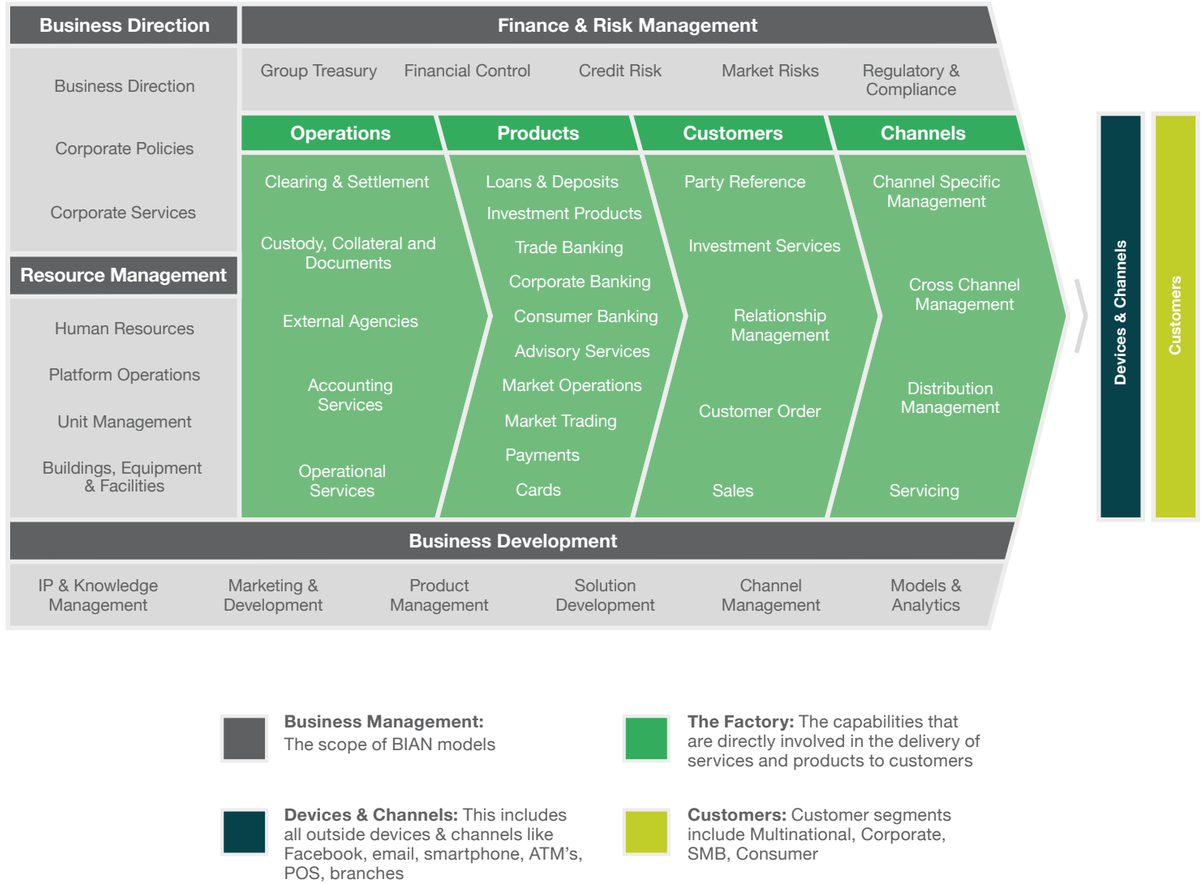
The M4Bank is a worked example where the BIAN designs have been used to define a representative organization 'blueprint'. The M4Bank blueprint is assembled using BIAN Service Domains and represents a generic financial services value chain. It has four 'dimensions of complexity' (hence the name):

1. Multiple products - the enterprise supports a range of products and services.

2. Multiple channels - products and services are accessed through many channels and devices.

3. Multiple lines of business - the enterprise spans business segments/markets.

4. Multiple levels of management - the enterprise has global, regional and local management levels.



Business Management: The scope of BIAN models

The Factory: The capabilities that are directly involved in the delivery of services and products to customers

Devices & Channels: This includes all outside devices & channels like Facebook, email, smartphone, ATM's, POS, branches

Customers: Customer segments include Multinational, Corporate, SMB, Consumer

A closing statement from BIAN's Executive Director – Hans Tesselaar

It's time for financial services providers to stop firefighting external challenges and technology developments and start taking control of their own destiny.

That doesn't mean taking on the full burden of core banking transformation as an individual enterprise, assuming it as a competition point – but instead working together with the wider industry to build a standardised model. From there, financial enterprises will be empowered to compete in the areas that matter – namely, the service and products they offer to customers.

I've been in the financial services industry for over 30 years and am excited to see that the smartest players in the business are more open to collaboration than ever before. By working together, we can realise the limitless opportunities emerging in our sector.

I look forward to hearing from you.

https://bian.org