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DIGITAL REDEFINITION OF BANKING

December 2018

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AGENDA

01	Overview	
02	Digital Transformation of Traditional Banking Roles	
03	Digital Spend Analysis	
04	Digital Transformation in Banking – US Deep Dive	
04	Service Provider Opportunity Analysis	

This section provides an overview of :

- Digital transformation of banks across 3 areas- Mobile, Assisted systems and Inbranch.
- Digital redesign of bank branches
- Different systems/features equipped across each banking digitization area-Mobile, Assisted, In-branch

Overview: Digitization of traditional banking processes and transactions have forced banks to consolidate and redesign branches for advisory services

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Note: Analysis is based on the DRAUP's proprietary engineering database, updated in Dec 2018 Note: The above insights are curated from news articles, journals and other similar sources In-Branch Digitization: Digital Technologies usher branch transformation wherein banks operate with fewer branches and engage self-service systems with minimal staffing

Branch Model	Features	Level of Digitization	Level of Client Intimacy	Target Clientele	Challenges to existing branch
Digital Box Selling financial services on shelves without customization	 Retail-like displays Self service aisles Standardized products Minimal staffing & advisory services 	MODERATE	LOW	 First-time customers Customers with standard banking needs 	 High Costs: about 50% the banks' operating costs attributed to physical network and manpower Poor Customer Experience: old, under occupied and poorly maintained branches
Lounge/Cafe	 Self service model Minimal staff to assist only on basic banking products Relaxed atmosphere with complimentary services like TVs, iPads 	LOW	НІСН	 High income individuals 	 Need for branch optimization 30% reduction in costs due to branch rationalization
Digital Cell Evolved and immersive digital experience	 Advanced digital tools and technologies: video conferencing, robotic guides, online document sharing, digital signatures, card readers, etc. 	VERY HIGH	LOW	 Gen Y customers who are tech savvy and desire flexibility to transact anytime 	 60% US customers prefer online banking for traditional activities like bill payment, money transfer, monitoring account statements Need to retain bank branches
Flagship Branch	 All aspects of self-serve/online banking and physical branch Self-serve kiosks, ATMs, service staff with iPads Bankers with Complex advisory capabilities 	HIGH	HIGH	 Mid to High net-worth traditional banking customer who desires proximity of a physical branch 	 90% of consumers prefer face-to-face advice for complex products 60% products are sold via branches 47% of US banking customers believe that a bank is not even legitimate unless it has branches

Note: Analysis is based on the DRAUP's proprietary engineering database, updated in Dec 2018 Note: The above insights are curated from news articles, journals, white papers and other similar sources 4

Mobile/ Digital Devices: Mobile devices have transformed the customer banking experience and act as a rich banking data source to enhance the experience further

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Banking Apps	 With an increase in mobile-only banks, customers can now open accounts through their mobile using an app. Customers are given debit/ credit cards and can apply for cheque books. These apps give real time updates to customers and help them track their expenses and loan re-payments. Customers can even set up savings plans, budgets and money goals on the app Customers can automate bill payments using banking apps Apps also provide brokerage services to customers 	 As these services are provided on mobiles, customers can complete transactions on the go and much faster The apps also offer customers real-time and personalised advice/goals helping them manage money better. As a result, customers develop a stronger relationship with the bank.
P2P Payments	 As digital wallets are becoming increasingly popular and convenient, banks are now offering P2P payment services P2P services offered by many banks allow customers to transact with different people regardless of where they bank 	 Customers can now conveniently pay for products and services through their mobile phones instead of cash or card Money can also be transferred between accounts through these services within minutes or even seconds sometimes
Authorization	 Banks are looking at efficient and safer methods for authorization like biometrics Some wearable devices track user's ECG. Each person's ECG is unique which can now authorize ATM withdrawals and payments Other ways of biometric authorization include retinal fingerprint scans In-person KYC and passwords can be eliminated through biometric authorization 	 Biometric authorization is the fastest and most accurate method of authorization. Processes such as in-person KYC are necessary and expensive but not very efficient . It depends on the KYC officer who is conducting it. The process is prone to human error which can be eliminated through biometric authorization
Virtual Assistants	 Customers can use virtual assistants to check their balances, review transactions and make credit card payments via text They are also used to pay bills and manage finances Banks are increasingly partnering with existing platforms such as Facebook Messenger and Amazon's Alexa to provide customers with virtual assistants 	 AI enables access to massive amounts of data at high speeds allowing for digital conversations that unfold like human conversations providing customers with a personalised experience

Note: Analysis is based on the DRAUP's proprietary engineering database, updated in Dec 2018 Note: The above insights are curated from news articles, journals and other similar sources Assisted Systems: Banking staffs are trained with smart devices equipped with digital tools based on Analytics and AI to offer personalized advisory and product solutions

• Employees use tablets to assist customers and view customer information

- They are also used as a check-in device for customers
- Additionally, they act as interactive displays for customers to view different products and services offered by the bank. Branch personnel can assist the customer during this process and provide further information to make a sale then and there
- Tablets provide mobility to branch personnel and allow them to go to the customer
- They act as an interesting starting point to make a pitch to the customer making it easier for branch personnel to make a sale

Wearables

Tablets

- Wearable glasses can help bank personnel identify and tag objects in real-time like identifying counterfeit notes or fake checks through analytics performed by the glasses
- Wearables like watches can also be used for urgent notifications and to send alerts to bank staff. For example, beacons can send alerts directly to the bank personnel's smart watch
- Wearables provide on the go solutions for bank employees. They help focus attention on things that require immediate action
- They also act as a means to detect unusual activity and alert personnel directly

In-Branch: Branches aim to provide an experience that is both efficient and personalised for customers through technology systems

Drive-In ITMs	 These ATMs have adjustable screen to accommodate different vehicle size Optimized placement of keypad, card holder and cash dispenser according to vehicle size and Camera that provides panoramic view of what's going on around the car making it easy for customers to focus on their transaction Customers can make deposits, withdraw cash and have a video teller experience at these ITMs 	 This enhances safety and prevents problems such as ATM thefts as customers can complete transactions while they're still in their cars Increases convenience for the customer
Video Conferencing	 Customers can book an appointment slot through the banking app They can select the specialist they want to consult with They can then go to the bank to interact with the specialist or through their personal device anywhere 	 Customers can now have one on one conversations with specialists from remote locations They can consult experts from different locations not restricted to their own town, city or even country This gives customers the ability to make a more informed decision
Beacons	 Beacons that are placed at the branch entrance can be used for security as well as capturing customer data These beacons pick up information on the customers entering the branch and analyze their past transactions, account details, loans and any other activities with the bank Depending on their activities, branch personnel are notified in advance of problems or solutions the customers are searching for 	 Branch personnel will not have to spend time hunting for customer details and will be able to address issues immediately This systems will help provide customers with a personalized banking experience at the branch
Welcome Robots	 Robots greet customers and provide information on the products and services offered by the bank. They guide customers towards cash deposits, foreign exchange and loans They can also answer customer queries using voice recognition 	 Robots help eliminate the repetitive tasks for branch personnel. They assist the personnel so that they can devote attention on important and bigger tasks They also serve as an attraction for customers

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01	Overview	Analysis of :	
02	Digital Transformation of Traditional Banking Roles	 Job role disruption across b areas such as Lending, Final 	usiness ance and
03	Digital Spend Analysis	payments, CRM and Regula compliance > Impact of digitization on	 payments, CRM and Regulatory and compliance Impact of digitization on Teller Loan officer Accountant Compliance advisor/officer
04	Digital Transformation in Banking – US Deep Dive	 Feller Loan officer Accountant 	
04	Service Provider Opportunity Analysis	Compliance advisor/of	

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Impact on traditional banking roles: Digitization of banking operations have led to job role elimination, enhancement and consolidation. Disrupted employees are moving to new roles within the industry



Job Category	Impact of Digitization	Impact on workload
Customer Relationship Management	Mobile/internet/digital banking facilitates the debit/credit activities, account access, e-statements, Interactive teller machine and investment planning	Manual tasks involving customer onboarding account transactions, statement generation, account linking procedures have been eradicated
Lending	Customers can choose, Buy and Pay for loans based on automated systems and apps that conducts RPA based credit scoring through KYC documents and historic transactions	Eradication of manual verification and authentication of customer data and documents
Finance & Payments	Automated payments reduce the expenses and errors, improves productivity and cash management, and operational efficiencies with payment security and privacy	Automation of paperwork, funds transfer and basic customer support activities
Regulatory & Compliance	Banks can save project cycle time and cost and focus more on closure of MRAs and improve regulatory compliance and reporting accuracy	Manual efforts put on regulatory reporting, AML, KYC profiling and validation, and account closure processing will be automated

Job Progression of Bank Tellers: Digitization of transaction systems through ATMs/ITMs/Mobile apps have led to the disruption of Teller role

Job Progression of Bank Tellers

Increase cost savings for bank via effective risk

management, adherence to policy and regulatory

Provide expert advice and services to customers.

Help customers find solutions based on financial

compliance, and reduce fraud and customer claims

Traditional Role

Teller

- Process deposits, withdrawals and other banking transactions for a high volume of customers
- Sell or redeem savings bonds and other financial instruments
- Provide account services to customers by receiving deposits and loan payments, issuing savings and withdrawals
- Cater to customer calls in order to resolve issues
- Offer service by answering inbound calls, make outbound calls to customers and/or service providers, and respond to emails
- Data entry of customer and account information and transactions

Personal Banker	Branc
Provide customer service via operational	Lead group of team mem
excellence and accuracy, including opening and	customers, communities
maintenance of customer accounts	advise and recommendat

Post Digitization Role

- ch Manager bers to better serve
- and shareholders via financial advise and recommendation of products and services Motivate teams to perform better by providing
- excellent service and develop ongoing profitable client relationships
- Implement plans which promote customer engagement and drive results in sales, and customer satisfaction scores

Skills

needs

Banking software like Finacle, BaNCS, Flexcube, etc; Spreadsheet software (Excel)

Digital Ambassador

- Use digital channels and explain the benefits of using such channels like Mobile/Internet Banking
- Assist customers via registration process and ensure customers are well equipped to use the services in future
- Cross-selling digital channel products

Skills

Spreadsheet software, Digital marketing, Core Banking software

Job Progression of Loan Processing & Lending: RPA systems in lending is a key trigger for evolution of traditional lending roles such as Loan officer/ Project analyst

Job Progression of Loan Processing and Lending Roles

Traditional Role

Loan Officer

- Assess client needs, verify credit history, provide rate quotes and recommend appropriate alternatives
- Design loan packages to meet customer specific needs and serve as a PoC for customers throughout the loan process
- Generate reports to track compliance with financial reporting, loan covenants and delinquencies
- Assist in the booking and tracking of new business in both lending and investment

				Post	Digitiza	tion Role		
 Assistant Branch Manager Maintain staff educational training regarding corporate marketing campaigns Build relationships with small businesses and affluent clientele via presentations and networking Leverage reports to build a profitable business while minimizing loss 			 Enside area area isside area Anitic production interaction Wootano 	Busine sure operations properly docur ues alyze operations ocesses complyin ernal policies ork with teams a d the Risk team	ess Support Manage are represented and the rec mented and are aware of any s processes and design new in ng with regulatory requirem across Treasury Solutions Op	Pr Juirements y risks or robust ents and erations		
Skills Spreadsheet software (Excel), Digital Marketing		Skills	ECM/BPM/Data related technologies like IBM FILENET, DATACAP, etc; local AML & banking laws					
 Portfolio Manager Manage portfolio of loans and investments to ensure deadlines Assist Relationship Managers in the underwriting of new business such as risl ratings, DSC calculations, and due diligence Apply credit policy to ensure asset quality remains strong and limit risk 								
Skills Web Analytics, Competitive Core Banking Software			titive Ana	alysis, Data Ana	alysis using SQL/Excel,			

Project Analyst - Loan

- Manage internal or external loan projects
- Develop, document and maintain program/project schedules, resource plans and program/project budgets of loans
- Monitor the loan project from start to end
- Coordinate delivery of professional services to customers

Job Progression of Finance & Payment Roles: Digital recording systems, eSignatures and real-time balance sheet updates have evolved the accounting roles to advisory role

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Job Progression of Finance & Payment Roles

Traditional Role

Accountant

- Document financial transactions by entering account information
- Prepare balance sheet, profit and loss statement, and other reports
- Substantiate financial transactions by auditing documents
- Recommend financial actions by analyzing accounting options

Financial Advisor

- Perform financial modeling and valuation analysis leveraging diligence findings to develop additional modeling scenarios
- Analyze financial model output and client information to prioritize data and present conclusions for discussion purposes
- Participate in accounting, business and legal due diligence for both credit approval and underwriting approval processes
- Prepare detailed transaction marketing materials and management presentations

	Post Digitiza	ation R	Role
	Financial Controller		HM Underwriter II
Coordinate and direct the preparation of the budget and financial forecasts and report variances. Manage & comply with local, state, and federal government reporting requirements and tax filings. Develop and document business processes and accounting policies to maintain and strengthen internal controls.			Responsible for underwriting and decisions within delegated lending authority, within SLAs and neeting production and quality requirements Review tax returns or financials, propose loan structure, collateral and due diligence, make recommendations and approve new money requests within delegated lending authority
ls	CFA, CPA/CMA Certification; Spreadsheet software, GAAP	Skills	NAMU Certification, Excel, Six-sigma tools, Regulatory guidelines (FHA, FNMA, etc), Tax laws
	Financial (Consul	Iltant
	 Analyze the customers' invest and referral goals by develop experience 	stment n bing a pos	needs and achieve sales ositive customer

• Develop and expand customer relationships in order to contribute towards the branch success

Skills IFRS, MIS, SAS, CCAR, RRP, Series 7 and 65 certified

Note : DRAUP's proprietary talent module was used to analyse job roles by Industry and skill type

Job Progression of Regulatory & Compliance Roles: Risk analytics and AI/ML based systems have consolidated the documentation tasks of Risk analyst to analysis and solution driven role

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Compliance A

- Develop new process, in accuracy, and decrease of
- Monitor internal electro breaches in company and
- Assist managers and coll ٠ surveillance, research an
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- Monitor internal electro breaches in company and
- Assist managers and coll ٠ surveillance, research ar

Market Risk Analyst

- Research/Resolve issues related to first mortgage loans and/or home equity loans
- Review loan servicing documents. Ensure compliance with regulatory requirements. Customer service inquiries

Job Prog	sion of Regulatory & Compliance Roles
	Post Digitization Role
dvisor/Officer prove team's efficiency, ependency on outside vendors ic communications looking for industry policy agues with special projects, data mining prove team's efficiency, ependency on outside vendors ic communications looking for industry policy agues with special projects, data mining	 Risk Manager Develop and maintain end-to-end risk management program including development of design adequacy and control effectiveness Provide knowledge and expertise on compliance obligations, regulations and industry standards while adhering to the procedures and guidelines Establish and maintain an effective business relationship with business partners, key project stakeholders, Second Line of Defense and subject matter experts to advise and support the Business Control Officer (BCO) Skills CFA/ FRM/ NCFM Certification, CRISC, MIS, ITIL, FRM and PRM certified

Credit Risk Analyst

- Evaluate clients' credit data and financial statements
- Analyze client records and using the data to recommend payment plans
- Evaluating the financial status of clients by producing financial ratios through computer programs

SAS, SPSS, Python, SQL, C++, HTML, SAS70, Tableau, VBA, Planview Skills

Technologies: RPA & Analytics have automated the redundant workloads which allows the bank employees to focus on core finance activities

Technologies	Roles	Key Activities and workloads	Key Use Cases
Solution	 RPA Developer Business Systems Analyst – RPA RPA Designer Business Support Manager – Reporting & Analytics RPA COE Solution Consultant 	 Automate several banking processes based on the input from internal departments Create Bots for Automation process for Front Office and Back Office banking process areas involving web, Java, mainframe, and Windows-based applications Perform stress test for BOT scripts to prove scalability and stability of RPA code Assist automation projects to troubleshoot potential bottlenecks Identify and mitigate business risks associated with solution architecture Develop Process Design Document (PDD) to capture end to end user keystrokes 	 Automation of various processes including report generation, fraud detection, credit card processing, and customer onboarding. RPA automates the information transfer process collection during customer onboarding RPA automates the Loan Processing process and reduces the time of loan processing
Analytics	 Analysis & Reporting Specialist Business Analytics Manager Advanced Financial Analytics Consultant Digital Analytics Analyst Risk & Compliance Analytics Consultant 	 Analysis of projects relating to financial accounting procedures, methods or systems. Analyze financial results to ensure accuracy Assist Reporting and Analytics team with gathering data and creating reporting as needed Collect, review, interpret, and analyze data and/or documentation to ensure compliance with department SLAs, policies, procedures and/or regulatory and risk requirements. Responsible for customer level data extraction and quantitative analysis focused on identifying growth opportunities Preparing reconciliations and analyses to aid in the validation of capital calculations and reports 	 Products Cross-Selling by analyzing customer behavior, customer identification, and loan recoveries Using predictive analytics for user behavior analytics to find new business trends

Technologies: Cloud & AI based roles will help banks in automating data documentation workloads and personalised customer services

Technologies	Roles	Key Activities and workloads	Key Use Cases
Cloud	 Cloud Engineer (Enterprise Cloud Services) Cloud DevOps Engineer Information Security Cloud Engineer Cloud Migration Lead Solution Architect 	 Document and analyze customer requirements. Define future state vision for Cloud Services Integrate internally developed components (API's, web services, broker services, MQ and Data Power artifacts). Collaborate with Online Banking and Mobile development teams to deliver cloud-hosted solutions which meet the current and future standards and needs Work with Finance to determine the service costs and cost allocation methods for the cloud services. Work with Architects and Sourcing teams for the design of service elements 	 Hosting of Mobile and Web Applications, payment gateways and ERP & CRM by SaaS Helps in backing up the bank's critical data in case of cyber attack or disaster
Artificial Intelligence	 AI System Analyst AI Developer NLP Developer ML Engineer Conversational AI Engineer Data Scientist 	 Develop various statistical and ML techniques to develop segmentation, predictive models, experimental designs, and decision analyses Develop algorithms to optimize pricing, product offering, and distribution channel Transform data into impactful business insights, strategy recommendations and implementation plans to improve key performance metrics for the business Data analysis, data mining, and prepare modeling datasets from multiple data sources Build and manage chatbot and virtual assistant platforms to deliver conversational experiences for customers and team members across the bank 	 AI will result in higher sales, better customer relationships and more customized customer solutions Use AI technology to leveraging Cognitive Messaging virtual assistant to provide Financial Guidance to the customers

Technologies	Roles	Key Activities and workloads	Key Use Cases
Internet of Things	 IoT Solutions Architect Network Engineer Network Security Analyst Architect - Enterprise Payment Technology (IoT) 	 Design and develop end-to-end solutions Understand application, server, and network security and compliance requirements Design and configure Security Access policies, Identity Stores and Authorization Profiles for ACS and ISE Work on real-time Log analysis from different network security devices Build and manage real-time Kafka producer and consumer application Architect end-to-end solutions for bank customers using IoT Platforms and Services 	 Wearables allow balance check and transaction history Data collected by various sources such as banks and mobile apps allow tailored marketing and personalized solutions for customers
Blockchain	 Blockchain Developer Senior Security Data Analyst Cyber Blockchain Specialist Architect - Enterprise Payment Technology (Blockchain) 	 Involved in the Systems Development Life Cycle (SDLC) phases like Design, Development and Testing Develop applications using blockchain technology Create REST MicroServices APIs using SpringBoot Application. Use Docker containers to build and run all the microservices Implement Equity Options Trading solution using blockchain as a proof of concept for decentralized distributed ledger technology Build payment system on blockchain platform which can be used to Send and receive payments that are sent by the participating banks in the network 	 Blockchain allows real-time execution of payments and enables AML and fraud prevention Blockchain platform allows transactions without the need of paper

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01	Overview	Analysis of:
02	Digital Transformation of Traditional Banking Roles	Digital spend of Top 30 banks globally
03	Digital Spend Analysis	Digital centre and headcount analysis by Geography
04	Digital Transformation in Banking – US Deep Dive	
04	Service Provider Opportunity Analysis	

Consolidated Technology Spending: Digital spend in banking is highly consolidated among the top 30 banks with analytics, AI and RPA being top areas of investment





Note: Analysis is based on the DRAUP's proprietary engineering database, updated in Dec 2018

Consolidated global IT and Digital Footprint: ~79% of Digital workforce in Banking is consolidated in North America and Europe



- International banks have chosen US, UK and China as major hotspots for digital centres
- Most of the digital centres in banking are located in US which makes it a key decision making region
- Chinese Giants such as ICBC, Bank of China's digitization efforts have contributed to the growth of Asia-Pacific region

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01	Overview	
02	Digital Transformation of Traditional Banking Roles	
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04	Service Provider Opportunity Analysis	

Analysis of:

- Key US digital hotspots and headcount
- Digital maturity analysis of US banks
- Digital transformation deep-dive of top US banks
 - Bank of America
 - Citi Group
 - ➢ Wells Fargo
 - > JP Morgan Chase
 - > Capital One
- Partnerships and investments of emerging banking companies

Bank Hotspots in US: Increase in the number of digital use cases has led to the emergence of newer digital hotspots in the US



Note: Analysis is based on the DRAUP's proprietary engineering and talent database, updated in Dec 2018

Digital Maturity of US Banks: Digital leaders such as Bank of America, Wells Fargo, Citi have built capabilities and continues to close skill gaps across technologies to stay ahead in innovation

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Note: Analysis is based on the DRAUP's proprietary engineering database, updated in Dec 2018

Source : DRAUP

Bank of America: One of the few leading banks that is increasing the digital maturity in bank branches through interactive systems that need least human interaction





Note: Analysis is based on the DRAUP's proprietary engineering database, updated in November 2018

Bank of America: Digital centres deep-dive and Talent distribution



- Greater Chicago Area
- Greater Los Angeles Area
- Greater New York City Area
- Greater Philadelphia Area
- Jacksonville, Florida Area
- Phoenix, Arizona Area
- San Francisco Bay Area

Key Workloads

- Implementation, integration, deployment of ML and AI solutions
- Data Lake creation and cleansing to support Modelling, Analytics, Reporting and Regulatory needs
- Evangelize solutions leveraging big data technologies to ingest, process and analyze large, disparate data sets to meet/exceed business requirements.
- Identify areas of application for robotic process automation technology that supports the enterprise strategic vision and goals

Key Workloads

- · Provide analytical and digital transformation solutions to Bank of America team using high-end statistical techniques like Predictive Analytics, Decision Strategy, Decision Modeling and RPA
- · Development of high-end data reporting tools for better data visualization with interactive graphs and data cubes for detailed insights
- Technical Delivery of Optimized Automation Solutions to varied applications types - Web, Desktop, Windows, Middleware etc.

Kev Workloads

- Design, build and implementation of new systems to enhance Equity, FICC, Prime Broker, Stock Loan, Repo and Custody.
- Development, maintenance and production support of a complex suite of front office trading systems.
- Development and delivery of business transformation of organization models and technical architecture, focused on global financial markets and products, risk management and financial regulatory change

~31%

Digital talents involved in new-age solutions (RPA, Blockchain, IoT and Analytics/AI)



Digital Talent based out of **US** Centres

Citi Group : Citi is taking cues from its innovation labs across globe that is involved in developing cutting-edge solutions such as beacons



Citibank's Smart Branches

- The smart branches contain an interactive media wall displaying local weather, news and financial updates. There is also a touchscreen "Planning Table," a series of interactive "Work Benches" and a digital "Service Browser" where customers can browse Citi's products and service
- Branch staff members are provided iPads and direct visitors to a circular "workbench" in the middle of the space, where employees and visitors sit side by side and do transactions on desktop computers or mobile devices
- The branch has a luxury suite where customers of its Citigold service can drink a free cappuccino, use free office and conferencing space for personal or business meetings and meet with a Citi financial adviser
- Customers can also have a video call with a Citi specialist to offer assistance for bigger and more complicated investments

		Partnerships	Other Digital Initiatives
1,390	~3,530	 HighRadius: This partnership was to increase the efficiency and automation (through AI and ML) to match open invoices to payments 	Innovation labs: Citi's Global Innovation Labs promote rapid research, experimentation and prototyping of next-generation technology
		received for Citi's corporate clients or the Citi Smart Match service. Citi had also previously invested in HighRadius.	 solutions that will deliver value to clients Beacon Technology: Customers can enable Bluetooth technology on their personal devices to
31,502		 Cornell Tech: Citi is working closely with the students and faculty at Cornell on blockchain, ML, big data, biometric authentication and IoT 	receive cardless entry into ATM lobbies after operating hours. It also allows branch personnel to be notified on the customers entering and to
	~152,841	 through this partnership Nasdaq: Together, they announced a payment systems that uses DIT (Distributed Ledger) 	 devote personal attention. This has been adopted in their Manhattan, New York branches Voice-based biometrics solution: Helps identify
	analytics/ RPA/ IoT/ Blockchain	Technology) to record payments	customers on call within seconds

Note: Analysis is based on the DRAUP's proprietary engineering database, updated in November 2018

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Citi Group: Digital centres deep-dive and Talent distribution



Wells Fargo : Wells Fargo Lab is developing next-gen Fintech solutions integrating technologies like virtual reality, social media, biometrics, and GPS-based systems into customer service

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Note: Analysis is based on the DRAUP's proprietary engineering database, updated in November 2018

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Wells Fargo: Digital centres deep-dive and Talent distribution



- Charlotte, North Carolina Area
- Greater Chicago Area
- Greater Denver Area
- Greater Los Angeles Area
- Greater Minneapolis-St. Paul Area
- Greater New York City Area
- Greater St. Louis Area
- Greensboro/Winston-Salem, North Carolina
- Phoenix, Arizona Area
- San Antonio, Texas Area
- San Francisco Bay Area
- Columbus, Ohio Area
- Des Moines, Iowa Area

Key Workloads

- Design, develop and deploy bank's Voice biometrics applications.
- · Design and implement AI components of Wells Fargo current and future products.
- Design and build chatbots using latest deep learning and NLP techniques for various advisory solutions
- Transforming Digital Banking by creating a smart, secure, and connected user experience using mobility, cloud computing, data analytics, and security.

Kev Workloads

Hyderabad Area, India

- End to end delivery of Performance Testing efforts in the Area of Consumer Lending Technologies.
- Developing applications on Salesforce Lightning.
- Build processes that help deal with issues a customer may face in a bank. This includes extensive Apex programming along with building a clean UI using JavaScript and XML.
- Developing, reviewing, reporting on complex process maps and reverse engineering existing complex process maps to ensure all required data attributes are identified for new data models

15 Total Number of Digital Centres

~28%

Digital talents involved in new-age solutions (RPA, Blockchain, IoT and Analytics/AI)



Digital talents in Charlotte and San Francisco

JP Morgan Chase : Over the past three years, Chase has grown their active digital customer base by 10 million customers to 48 million total



Note: Analysis is based on the DRAUP's proprietary engineering database, updated in November 2018

JP Morgan Chase: Digital centres deep-dive and Talent distribution

Analytics/AI)

~40%

Digital talents in New

York, Columbus and

Dallas



· Columbus, Ohio Area

Key Workloads

- Development of automated solutions for Data Ingestion, Data Reconciliation, Data Enrichment, Fraud Detection, Fraud Prevention, etc.
- Creating automated application that is geared towards young adults, allowing them to open accounts, make deposits or send money to friends through the Zelle digital payments network.
- Design and build application for sourcing asset financial data from various sources and process it.

Key Workloads

- Developing and implementing key global capabilities in the area of Data Strategy & Analytics to drive "best-in-class" data science solutions
- Develop different analytics frameworks through database design, modeling and implementation.
- Development of enterprise applications and tools for loan processing, risk discovery, fraud management etc.

Key Workloads

- Build micro-services for JP Morgan Clearing Connector to facilitate Switzerland Clearing House transactions & other activities such as report generation using Java 8 & other tools.
- Network Expansion project to enable Foreign Currency Conversion for JP Morgan vendors using Java 8

Capital One : One of the few banks to integrate retail business models in bank branches by opening Capital-one cafes that offers banking solutions and services in a café ambience

Capital One Cafes

- These cafes function as co-working spaces to the public. Anyone, regardless of bank affiliation, can grab a cup of coffee, sit on a couch, and, if they want, get coached through their money problems by professionals - for free
- There are iPads throughout the café that invite customers to click through short finance lessons or take a quiz to test their money knowledge and no log-in or sign-up is required
- Small, closed nooks are also available for private conversations with a money coach. And there's a larger conference room which can be reserved online by local businesses and non-profits
- The café has interactive digital displays and video teller machines for ATMS
- The staff are called 'Digital Lifestyle Coaches' and help customers with online banking services
- Capital One has partnered with Peet's Coffee to provide beverages and snacks for purchase in each café.

— Digital Spend (2017)				
			Partnerships	Other Digital Initiatives
Job Openings ~2,198	~966 ~1,232		 Amazon Web Services: Cloud services PokitDok and Gem: Gem provides blockchain services while PokitDot provides an API platform. 	Capital One Labs: it builds fundamentally new products, consumer experiences, and engineering solutions that advance Capital One for example,
	0.000		These two companies will help Capital One build a new claims service that uses the digital ledger technology to track claims for medical clients and estimate patients' out-of-pocket health care costs	They launched a mobile card reader called Spark Pay that lets merchants accept payments on mobile devices . The engineers and developers at the bank work on emerging technologies
Talent Distribution ~45,574	~6,292	~39,302	 ClearGraph: Capital One build a mobile app that helps customers track transactions using NLP. The app, Intellix, was build with ClearGraph. Viewpost: offers a secure B2B network for 	 blockchain, AI & ML, IoT amongst others Capital One Growth Ventures: They provide assistance and funding to a select number of tech start ups. These start ups also serve as partners
*Technology includes traditional IT roles	■ Technology ■ Banking and new-age digital roles like AI/ Analytics/ RI	PA/ IoT/ Blockchain	invoicing, payments and real-time cash management for Capital One clients	and together they explore new initiatives and products that would benefit both companies

Note: Analysis is based on the DRAUP's proprietary engineering database, updated in November 2018

CapitalOne

~46.000

Global Headcount

~USD 27.23 Bn

Total Revenue (2017)

McLean, Virginia

Headquarters

'USD 3 Bn

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Capital One: Digital centres deep-dive and Talent distribution



- Nottingham, UK
 - Philippines

- Richmond, Virginia Area, United States (Innovation Lab)
- Washington D.C. Metro Area, United States (Innovation Lab)
- Dallas/Fort Worth Area, United States
- Greater New York City Area, United States (Innovation Lab)
- Greater Chicago Area, United States
- San Francisco Bay Area, United States (Innovation Lab)
- Greater Philadelphia Area, United States
- Greater Seattle Area, United States
- Toronto, Canada Area

Key Workloads

- Design and develop Capital one's conversation platform, Eno an automated program that can communicate with the bank's customers via text message to give them information on their accounts and help them make credit card payments from their smartphone.
- Data Engineering, Data Analytics and Insights around the Cloud and optimization and development of Blockchain solutions
- Develop, validate and deploy the credit risk, fraud, marketing, balance forecasting, and location analytics models.
- Build the COS Online Payment System for EASE. Account Managers
 and Authorized Users

Key Workloads

- Development of ML based solution for "Remarketing Opportunity & Persona Identification of AutoNavigator Visitors"
- Development of solutions to improve the car repossession rate, repossession turn around time and operational efficiency using the combination of AI, Chatbot, Automation and NLP.
- Implement a text analytics-based module to automatically read and analyze negative news about the customer for potential money laundering activities
- Implement a machine learning based model to identify data quality issues for the AML models

12 Total Number of Digital Centres

Digital Labs (Richmond, Washington D.C, New York City, San Francisco)

~50%

Digital talents in Richmond and Washington D.C **Startup investments**: Startups that develop end to end use case solutions in Analytics, AI, Cloud and Blockchain are prime targets of investments



	Robotic Process Automation	Analytics	Cloud	Artificial Intelligence	Internet of Things	Blockchain	Key Takeaway
Bank of America 🧇		Visible Alpha is a data analytics platform which compares forecast models Visible Alpha				r3 is a blockchain software firm with a open-source blockchain platform, Corda r3	Focused on Analytics and blockchain to enable personalised solutions to clients
citi	ScaleFactor automates complex accounting tasks and translates financial information into business insights ScaleFactor	Ayasdi solves the big data and data analytics problems and automates manual processes Ayasdi	Persado Marketing Language Cloud offers Al- generated language Persado	Selerity uses proprietary AI to deliver data solutions designed to automate workflows in finance Selerity	Tealium manages the customer data via web, mobile, offline, & IoT devices Tealium	Digital Asset uses blockchain technology and develops distributed ledger technology solutions for the financial industry Cobalt	Highly focused on Analytics, AI, blockchain and cloud to enable digital experience for customers
WELLS FARGO		Develops and delivers a data, intelligence, and collaboration platform. AltX	Canopy Tax is a cloud- based platform for tax and accounting Canopy Tax	H2O is an open source data science and machine learning platform H2O.ai		Axoni offers distributed-ledger technology for financial institutions and capital markets service providers Axoni	Focused on expanding AI and Analytics to offer consumers services according to their preferences
JPMorgan Chase & Co.	Bill.com automates end-to end processes of back- office operations Bill.com	Mosaic Smart Data, data analytics company, offers real-time intelligence on FICC data Mosaic	AppDirect offers and manages virtual stores where organizations can buy cloud- based software services AppDirect	Volley uses AI to help companies generate content automatically for employees Volley		Digital Asset uses blockchain technology and develops distributed ledger technology solutions for the financial industry Digital Asset	Highly focused on Analytics, Blockchain and Cloud
Capital One		Enigma is a Data-as-a- Service company which evaluates insurance risks and combats money laundering Enigma	Snowflake provides a data warehouse as a service designed for the cloud. Snowflake Computing	Uses machine Learning and software implementation to provide customized solutions Notch			Focused on cloud ,data analytics and Al

Banks Partnerships: Tech Giants are increasingly partnering with banks for data monetization and to develop fintech based solutions

D R A U P



Emerging Banking companies Dashboard: Fraud Detection, Account Management and Regulatory Compliance based solutions are key focus areas

D R A U P

	Robotic Process Automation		Analytics		Cloud		Artificial Intelligence		Internet of Things		Blockchain
IENT		ANCE			G FINANCIALFORCE	F	MindBridge		(K) Ring		Blockstream
ACCOUNT MANAGEN	Eliminates the manual tasks in back office and customer service operations like account opening/closing, payment processing & customer data updates	REGULATORY COMPLI	The software automates and consolidates regulatory compliance reporting and processes	TRANSACTIONAL	Cloud based applications company which offers ERP solution and offers accounting, billing, revenue recognition applications	RISK MANAGEMEN	Using AI & ML, Mindbridge AI Auditor platform detects the anomalous patterns and identifies risks	WEARABLES	Developed a contactless payment ring which has wallets and debit cards	TRANSACTIONAL	Developed crypto-financial infrastructure on Bitcoin bitpay Developed Bitcore, an open source platform for payments and wallets
NBOARDING	Enables customers to capture and upload key documents such as KYC KOFAX	LENDING	PEERIQ Analyze, access, & manage risk in the peer to peer lending sector and uses predictive analytics and	LENDING	MAMBU Enable banks to create, launch and service loan, lend and deposits products via its	AUDITING	Developed an Al to automate auditing process, read and audit expense			TRADING	Developed a trading and exchange platform based on blockchain technology
0	through by capturing and extracting data from documents and bills		offer investors actionable insights		cloud platform		reports, receipts, invoices and contracts	CONS	Developed Beacon Core and		
FRAUD	UiPath Identifies data patterns and tracks bank accounts and credit card activities in real- time via RPA	CREDIT SCORE	Introduced app for credit scoring and reporting which uses data points to offer personalized offers and real- time credit	ACCOUNT	Offers end-to-end cloud- based platform for bank's core and transactional systems such as customer onboarding and account opening	PERSONALIZED	Developed an AI & ML based platform which understands complex data & offers personalized answers to user	BEA	Beacon Standard based on cloud-based platform	WALLET	Xapo Developed a digital wallet and a bitcoin storage vault

Note: Analysis is based on the DRAUP's vendor ecosystem module, updated in July, 2018

AGENDA

01	Overview
02	Digital Transformation of Traditional Banking Roles
03	Digital Spend Analysis
04	Digital Transformation of US Banks
04	Service Provider Opportunity Analysis

Analysis of:

- Top SP revenues in BFSI outsourcing
- Outsourcing intensity across technologies and related service opportunities
- Opportunity propensity across 3 digitization areas in banking
- Service/Solution driven opportunity mapping
- Deep-dive of 3 solution opportunities and use cases

Service Providers: Technology Service Providers, with their expertise in banking technologies such as RPA and Analytics are emerging as robust partners for development



Note: Data curated by service provider financial reports published annually and updated in December 2018. Note: The above insights are curated from news articles, journals and other similar sources. Technology opportunities: Banks are scaling Mobility, analytics and RPA solutions across enterprise by partnering with niche service providers



Opportunity Propensity: Digital tools and dashboard solutions for bankers offer the vast addressable service opportunities for SPs

#	Service/ Solution Opportunity Areas	Mobile/Digital Devices	Assisted Systems	In-Branch
1	App Development (Web & Mobile)			
2	Big data/Analytics			
3	RPA/Development/Integration			
4	Artificial Intelligence/Machine Learning			
5	Blockchain Development			
6	Testing			
7	Datacentre Management			
8	System Integration			
9	Security			
10	UI/UX Design			

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Service/Solution driven opportunities: Analytics, RPA and App development are key solutions that banks scale and integrate across the enterprise to achieve high level of digitization



*Capability here has been generalized basis standard offerings of some of the Mid-Sized SPs in Banking space Note: Analysis is based on the DRAUP's proprietary engineering database, updated in Dec 2018 40

POWERE

Application Development: Application development opportunities are spread across core banking solutions such as payments, mobile banking, risk and wealth management



Key Engagement areas

Retail and Core Banking applications

- Wealth Management: Development of advisor desktop environment application for wealth management used by advisor and stakeholders of the company
- Risk Management: Development of Risk Application that comprise of key modules such as customer transaction details, credit and loan Information, User Authorization Process and Recovery process of Application
- Reporting: Development of Anti Money Laundering Reporting tool, which is a dynamic rules engine to identify and manage AML defects within customer profiles

Case Study



- Development of Trust Relationship Portal that manages the relationship details and Small Business Referral System which is used to create a Small business and Merchant real time Referrals
- Development & testing of Pricing App, an application developed for BoA's credit card division

accenture 🏽 🐨 Bankof America 🧼



- · Development of UI Based Web application which enables users to enquire about the Credit Card status details
- Development of deceased case notification app used to manage the accounts of a customer who is deceased
- Development of a middleware application which integrates between consumer and provider to communicate with one another by sending messages into request processor

Data Analytics: Collaborating with SPs having complete analytics workflow expertise to help banks in their digital journey (Majority focus on Data Sanitization & Data Lake Creation)

Wealth

Managers

Alerts

.

Stakeholders CRM Risk Loan Tellers Advisors Customers Analysts specialists Managers Insights AI/ML Dashboard Data **Analytics Applications Exploration Development** Data lake creation for Use-cases Behaviour **Risk Analytics** Transactions **Payments** analytics Recommendation Lifetime value Investment Predictive analytics engines prediction analytics

Workflow

Complete

fering

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	Data Processing								
Data sanitization and processing Data formats (Image, Text, Voice, Video, Transactions, Balance sheets etc.)					Open Sou ঞ্জীন্চতীতত্ব	rce Processing Spark	Fools Apache DRILL		
	Data CollectionDatabase likeCloudDataNoSQLStorageStreaming								
Data Sources									
Mo Dev	bile ⁄ices	ATMs	Social Media	Back-office Systems	Banks	Card Machines	Payment apps		

Key Engagement areas

- **Core Process automation** (Advice generations, customer analytics, product recommendations)
- **Risk Analytics** • (Credit/Operations/Market/ Liquidity/Regulatory)
- **Regulatory Analytics and** Reporting Case Study

- **Retail Banking & Cards** (Processing, Monitoring and customer support
- Lending (Verification, Score generation and payment time prediction)
- **Anti-money Laundering**

- Import data from RDBMS to HDFS and analyze data via spark in hive database
- · Work on FTL Graduation framework where raw data is processed to create datasets and upload the data onto hive tables and deploy in AWS environment

CapitalOne

 Analyze financial expenses data by moving core financial data into Hadoop lake/OLAP and towards cloud AWS



- · Analyze data in an application that helps in identification of potential fraud scenarios within the organization
- Create central data repository for customer complaints across consumer businesses then DB migration from oracle to HBase
- · Data Quality check in AML modules that checks duplicate, referential integrity, Null check, Data length check, Range Check, customization of checks

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Robotic Process Automation: Manual and redundant processes are being replaced by RPA which includes report generation, order processing, and data entry









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