Scope and Methodology

- Draup launched an in-depth study to analyze Digital trends in the Commercial Banking industry with a focus on studying job workflow and role transformation/progression of certain essential and specific job roles under the Commercial Banking value chain.

- The report initiates with a general overview of the impact of digitization on commercial banking through briefly & delves into:
  - Impact of Mobile/Online Interfaces (both on the consumer as well as bank employees)
  - Impact of Assisted Systems and Automation (mostly on bank employees)
  - Impact of In-Branch Digitization (both on the consumer as well as bank employee)
  - Impact on Treasury, Capital Markets & M&A, and Foreign Exchange Solutions (both on the consumer as well as bank employees)

- The report then focuses on studying the digital impact on specific Commercial Banking use-cases and Job Roles, through the following process:

  - Identification of Commercial Banking Value Chain: The value chain has been divided into 8 segments, covering 4 product/services segments: Lending/Financing, Treasury and International Services, Capital Markets, Mergers and Acquisitions and 4 horizontal functions: Sales, Client Management, Risk and Regulations/Compliance

  - Digital Use-Cases: We have identified key areas/use-cases under each of the Value Chain segments that are being highly impacted by digital technologies and mapped them under the respective segments. (Slide 10)

  - Mapping Job Role taxonomy to Value Chain: On the basis of identified use-cases, we have created a library of Job Roles mapped under each Value Chain segment which are being highly impacted by digital technologies. (Slide 11)

  - Mapping Digital Impact on Job Roles: In this step, we have segregated all the digitally impacted job roles as well as newly created job roles into 4 categories on the basis of the intensity and maturity of the impact:
    - Digital Natives (New age technology job roles such as Data Scientists, ML Engineers, RPA Developers and others)
    - Highly Automated (mostly back and mid-office operational job roles which are highly vulnerable to automation)
    - Digitally Disrupted (mostly Mid-Office job roles with considerable change in workflow due to AI and RPA based automation)
    - Digitally Influenced (Front and Mid-Office roles with digital impact limited to augmentation with new tools and no major change in workflow)

  - Deep Dive analysis of Key Roles:
    - Digital Native Roles: RPA Developers, Data/Big Data Analysts, Cloud Developers, AI/ML Engineers, API developers and Blockchain Developers
    - Digitally Influenced Roles: Commercial Loan Officers, Traders, Capital Markets and M&A Associates, FX Managers/Associates
    - Digitally Disrupted Roles: Trade Finance Analysts, Asset-Liability Valuation Analysts, AML Analysts
Executive Summary

There are broadly 5 segments within Commercial Banking which are getting highly impacted due to Digitization. Please see below key insights on respective Job Roles and Digital use-cases for each value segment.

**Commercial Lending/Financing**: Lending Operational processes such as Loan Underwriting, Agreements Review, Loan Servicing, Loan Administration/Monitoring, Loan Origination and others are getting automated through NLP and RPA based applications. This is impacting roles including Loan Underwriters, Loan Servicing Specialists, Loan Originators, and Legal roles. Other mid-office areas including Credit Risk analysis, Asset-Liabilities Valuation, Product Pricing, Defaults prediction and others are being disrupted due to the emergence of new AI/ML based tools, impacting roles such as Credit Analysts, Valuation and Pricing Specialists, Risk Analysts, Loan Officers, Relationship Managers among others.

**Treasury Services**: Banks and Fintech start-ups are providing AI/ML and RPA-based solutions for Business Cash Management including ML-based tools for cash-flow projections, Liquidity Forecasting, Automated accounts receivable/payable solutions, Trade Finance Automation and Open API & Smart Contracts based Real-time Payments processing and visibility. These applications are highly impacting job roles including Trade Finance Analysts, Treasury Managers, Treasury Operations & Sales, Account Managers among others.

**Capital Markets**: AI/ML-based debt/equity instrument pricing, pre-trade and post-trade analysis, news sentiment analysis, trading strategy creation, capital restructuring models and simulations, RPA-based order execution and management, deal/transaction due diligence, report reconciliation and development of online/mobile platforms for e-trading and analytical insights are disrupting the capital markets industry. Job roles being impacted include Traders, Capital Market Analysts/Associates, Capital Markets Operations Associates, Corporate Finance Associates among others.

**Mergers & Acquisitions**: Banks are using Data Science/Analytics and ML algorithms for M&A processes such as Target identification & due diligence, Deal Pricing, Deal room simulations, Divestiture/Merger Financials Processing, Post-Merger integration advisory, RPA-enabled Deal documentation and transaction execution among others, impacting job roles including M&A analysts, Corporate Finance associates, M&A Operations Associates, Capital Markets Associates and other similar roles.

**International Solutions & Payments**: International trade and payment service areas are being highly impacted due to Machine Learning, Smart Contracts and RPA technologies with use-cases including Integrated accounts payables applications, FX transaction management, FX risk hedging, real-time transaction monitoring, automated transaction processing, Interest Rate risk hedging and many others. Job roles being impacted include FX Associates/Managers, FX Operations Specialists among others.
This section provides:

- An overview of the digital transformation of banks across 3 areas - Mobile, Assisted systems & Automation and In-branch
- Deep Dives into:
  - Mobile/Online Banking transformation
  - Assisted Systems helping banks as well as clients through analytical tools
  - In-branch digitisation
  - Treasury Management solutions
  - Capital Markets & M&A Advisory
  - Foreign Exchange & International Solutions
Overview: The advent of Mobile/Online Banking, Assisted Systems (for Bank employees) and Digital Branch infrastructure have enhanced the digital experience among Commercial Banking clients as well as increased the banking operations efficiency at lowered costs.

Digitization of banks has resulted in reduced physical client-interactions due to the availability of Mobile/Online Platforms.

Banks are extensively using Analytical tools, to boost sales through personalised products and experiences, and automated processes to reduce operational costs.

Digitization of branches/offices have resulted in enhanced customer experience and increased efficiency through wearable technologies and biometric authentication.

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.
**Mobile/Online Banking**: Banks are using Online/Web Applications, Virtual Assistants, digital payment channels and biometric authorization technologies to digitally enhance the commercial banking experience.

### Banking Apps
- With an increase in **mobile-only banks**, clients can now **open accounts** through their **mobile** using an **app**.
- As these services are provided on mobiles, customers can complete transactions on the go and much faster.
- These apps give **real-time transaction updates** to clients and help them **track their account profile metrics** and loan re-payments scheduling.
- The apps also offer clients real-time insights and **tailored solutions** helping them manage money better.

### Corporate Payments
- Banks are **investing to innovate** within corporate payments landscape to enhance the **customer experience** for **digital transactions** by providing real-time services.
- There is a **movement** by several **banks** to **acquire** innovative payment companies to bring innovation in-house and leverage new **evolving technology**.

### Authorization
- **In-person KYC process** is prone to human error which can be eliminated through **biometric authorization**.
- **Biometric authorization** is the fastest and most accurate method of authorization.
- **Wearable devices** can now track a user’s unique **ECG pattern** to authorize withdrawals and payments.
- Other ways of biometric authorization include **Retinal Scans**.

### Virtual Assistants
- Customers can use **virtual assistants** to check their **balances**, **review transactions** and **make credit card payments via text**.
- **AI-based virtual assistants** with ML capability models are trained based on the **user behavior** and over time they provide **insights** like **payments initiation**, etc.

### Commerzbank
- **Commerzbank’s online multi-banking application** - Global Payment Plus, to help corporates manage all bank accounts from one application (Open Banking).

### DBS
- **DBS** has launched a **mobile payments solution** called IDEAL for corporates and small businesses that turns mobile devices into virtual **tokens of authorization**.
- **SWIFT’s Global Payments Innovation (GPI)** service is used by >10K banks for cross-border payments for its speed, transparency and **end-to-end tracking**.

### Wells Fargo
- **Wells Fargo** uses multifactor authentication which requires users to provide a combination of **biometric identifiers** to reduce the potential of fraud.
- **EyeVerify, Inc.** integrates Eyeprint ID™ into Comarch’s Smart Finance/Corporate Banking solutions to provide biometric login by eye vein pattern mapping.

### JP Morgan
- **JP Morgan** launched an **AI-powered virtual assistant** to help clients easily navigate through the bank’s online portal containing around 1,200 web pages.

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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.
Assisted Systems: Banks are extensively using AI-based analytical tools and automated processes to assist the Sales officers, RMs and Analysts in providing personalized experiences to the clients at lower operating costs.

**Tablets**
- Used by Bank Personnel to assist customers and provide relevant information.
- Helps to provide an interactive display for customers to view different products & services while acts as an Ease of pitching device for the branch personnel.
- Attractive hotspots in branches to easily assimilate the information.

**Wearables**
- Analytics performed by wearable glasses can help bank personnel to identify and tag objects in real-time like identifying counterfeit notes or fake checks.
- Wearables such as watches can also be used to send urgent notifications, alerting the bank personnel.
- Alerts are directly sent to the bank personnel's smartwatch whenever unusual activity is detected.

**Analytics**
- Commercial banks are leveraging technologies such as Machine Learning & data analytics to combat security issues.
- Predictive analytics helps to create new lending opportunities by accurately evaluating the creditworthiness of an institution requesting secured or unsecured loans.
- Analytics based risk models can handle billions of records and flag any anomalous activities in real time.
- To build accurate risk models to comply with banking regulatory requirements such as stress testing, Basel, & CCAR compliance.

**Automation**
- Banks are investing in automation to enhance operational productivity & customer experience.
- It reduces human intervention in manually intensive processes and improves the speed & accuracy of core business functions.

**Source:** DRAUP

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

• Citi Bank has launched its commercial banking application for tablets - CitiDirect BE Tablet to help treasury clients with transactions on the move

• HSBC Bank & Samsung Launch Wearable Technology in HSBC’s Flagship Branch in NY to enhance customer service & employee experience through better in-branch communications

• Banks such as ING & Santander are partnering with Kabbage, where Kabbage analyses large amounts of data from private and public sources to gauge the risk and creditworthiness of the business seeking the loan

• JP Morgan program – COIN (Contract Intelligence) leverages automation to interpret & review commercial loan agreement documents
Treasury Solutions: AI-based receivables/payables management, automated trade finance documentation, Virtual Commercial Cards and Self-learning ML systems are key digitization areas

Cash/Liquidity Management

- **Integrated Receivables**: AI, ML and OCR based straight-through reconciliation (STR) of receivables and payments matching
- **Account Payables**: Digitisation of paper accounts payable documents
- **Cash Management**: Real-time global cash position information and monitoring
- **Liquidity**: AI/ML algorithms-based cash flow forecasting
- **Expense Management**: OCR based receipt and document imaging to be stored and managed on mobile phones to help in reconciliation and billing

Trade Solutions

- **Digital and automated trade documentation**: Using rule-based AI systems to analyse documents, digitising and extracting the relevant data before feeding it into transaction processing systems.
- **Web platforms for real-time 24x7 monitoring and access to trade portfolio in multiple languages**
- **RPA-enabled Digital platforms for cross-asset class trade processing**

Payments/Commercial Cards

- **Mobile and digital payments for all kinds of businesses**
- **Virtual Commercial Cards** for account payables providing more days of the term over the traditional payment process
- **Contactless payment technology** on commercial/corporate cards for smaller purchases

Fraud/Risk Management

- **Supervised AI systems tested on billions of legitimate and fraudulent transaction examples**
- **Systems based on unsupervised ML models which use self-learning to discover previously unseen forms of fraud**
- **Machine Learning based client payment behaviour analysis for identification of potential anomalies**

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

Source: DRAUP
**Capital Markets and M&A: ML-based IPO simulation, OpenAPIs for solutions development, AI-based M&A advisory are transforming traditional Capital Markets**

### Trading/Investment Technologies

- Deep learning based **predictive pricing** and portfolio creation
- RPA based trade processing, execution & support functions
- **Supervised AI models for trading signal discovery**/identify best momentum signal
- Unsupervised AI models to identify drivers behind the market movement
- Data-driven investment recommendations from peer companies’ intention & news analysis

### Debt/Equity Market Solutions

- ML-based simulations of capital market scenarios such as IPOs, Share buybacks, capital restructurings among others
- Platforms and APIs enabling banks to create data-driven market solutions and to perform complex analysis, train ML models for all kinds of use cases (Ex: Black Knight’s Rapid Analytics Platform)
- Digital Platforms for real-time access to all aspects of a capital raising deal

### Pre-M&A Advisory

- **AI technology** to create **Deal Prediction** models that identify the most likely M&A or IPO targets, along with other **Crowdsourcing** techniques
- AI-powered **data capture and interrogation platforms** for the Presale Diligence process
- **Natural language processing** to analyze a multitude of contracts and other documentation in an automated way
- **Data Visualization** to reveal the factual information behind the numbers

### Post Merger Restructuring

- **Cloud, blockchain & smart contracts** make the transfer from one entity to another, straightforward thereby eliminating the need for **TSAs** (Transitional Service Agreements)
- **Cloud-based Enterprise Resource Planning systems** simplify the complex facet of integration with the merging of disparate enterprise software suites.

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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
**Foreign Exchange:** Use of new age FX Platforms with intuitive user-friendly dashboards, One-touch Login & Pre-trade execution analysis possibility have transformed the FX processes.

### Foreign Payment Platform
- Customizable dashboard to view and drill down on the post-trade reports
- Application-based service for use on mobile devices for quick, unplanned payments
- FX pricing fixed to the live spot rate & kept constant throughout, till the completion to hedge risk.
- ML Models for deep learning the frequent path taken by the customer to save time and repetition
- Highest possible level of security with several layers of 128-bit encryption

### Foreign Currency Hedging
- Use dynamic, programmable instructions to take certain actions in response to market variables such as time, price and volume.
- Customization of the parameters by importance level - liquidity constraints
- Choose from a fixed set of Aggressive - Risky and Passive - Risk-free algorithms to create own Hybrid algorithm
- Pre-trade execution analysis of the algorithm is available throughout the trade in Real-time

### Foreign Currency Accounts
- Highly advanced payer ID and virtual account offerings have enabled banks to now provide clients with customized ‘sub-ledger’ virtual accounts that are linked to a real-world physical account

### Trade Transactions
- Provide independent analysis of the quality and cost of algorithmic FX transactions
- Banks & FX trading houses should take help from a third-party firm to verify the quality of its electronic FX trades for gaining the trust of clients and industry
- Post-trade Transaction Cost Analysis, or TCA service

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

Note: The above insights are curated from news articles, journals and other similar sources

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**MIA** is the **AI voice assistant** of BBVA’s Turkish subsidiary, **Garanti** which deals with buying or selling of foreign currency or find out the exchange rates

**HSBC**
- HSBC’s Fee-based, hybrid algorithms can analyze data and forecast market moves using **predictive analytics** to minimize market impact

**JP Morgan**
- JP Morgan’s Face ID and Touch ID allows the user to access the Platform- Execute Mobile, without username or password
- Citi Bank’s Innovation Labs around the world, partner with FinTechs to accelerate innovation by providing their FX service through open APIs

**HSBC**
- JP Morgan- 1st bank to collaborate with 3rd party firm (BestX) to help clients verify its FX trades.
- Transaction Cost Analysis tools are available on HSBC’s e-FX trading platform **EVL**
- Blockchain enhances HSBC’s FX Everywhere Platform by process of creating agreed, immutable records in case of payment fails

Source: DRAUP
**In-Branch Digitization**: Digital Technologies have ushered a branch/office-space transformation wherein banks aim to operate with fewer physical client interactions, engaging self-service systems with minimal staffing.

### Challenges to existing branch models

- **High Costs**: about 50% of the banks’ operating costs attributed to the physical network and manpower
- **Poor Customer Experience**: old, under-occupied and poorly maintained branches

### Need for branch optimization

- 30% reduction in costs due to branch rationalization
- 60% of the US customers prefer online banking for traditional activities like bill payment, money transfer, monitoring account statements

### Need to retain bank branches

- 90% of consumers prefer face-to-face advice for complex products
- 60% of products are sold via branches
- 47% of US banking customers believe that a bank is not even legitimate unless it has branches

<table>
<thead>
<tr>
<th>Branch Model</th>
<th>Features</th>
<th>Level of Digitization</th>
<th>Level of Client Intimacy</th>
<th>Target Clientele</th>
</tr>
</thead>
</table>
| Cross Business Workflow | • Onboarding activity with client data saved on Banking Apps’ DB  
• Biometric Authorisations & Approvals  
• Automated Client Data aggregation | HIGH                  | LOW                      | • All First-time customers                                                      |
| Lounge/Cafe           | • Self-service model  
• Minimal staff to assist only on basic banking products  
• Relaxed atmosphere with complimentary services like TVs, iPads | LOW                   | HIGH                     | • Mid to High net-worth commercial banking customer who desires the proximity of a physical branch |
| Digital Cell          | • 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 |
| Account Branch        | • All aspects of self-serve/online banking and physical branch  
• Connected banking with enhanced customer experience  
• Bankers with Complex advisory capabilities | HIGH                  | HIGH                     | • Mid to High net-worth commercial banking customer who desires the proximity of a physical branch |

**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

**Source**: DRAUP
This section provides a detailed analysis of:

- **Major components of Commercial Banking Value Chain**
- **Digitally-impacted Commercial Banking processes/areas** and new use-cases throughout the value chain
- **Digitally-impacted Job roles** throughout the value chain
- **Job roles segregation on the basis of the intensity of digital impact:**
  - Digital Natives
  - Highly Automated
  - Digitally Disrupted
  - Digitally Influenced
**Digital transformation across Value Chain:** Banking operational processes including Underwriting, Loan Servicing, Cash Flow Management are being highly impacted by digital technologies whereas analytical & client-facing advisory processes are moderately impacted.

<table>
<thead>
<tr>
<th>VALUE CHAIN (1/2)</th>
<th>LENDING/FINANCING</th>
<th>SALES</th>
<th>TREASURY/INTERNATIONAL SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan Agreements Review</td>
<td>Asset Valuation</td>
<td>Personalised Sales Brochures &amp; Product Manuals</td>
<td>Liquidity Forecasting</td>
</tr>
<tr>
<td>Automated Business &amp; Personal Credit Rating</td>
<td>Loan Origination</td>
<td>Client Targeting</td>
<td>Real-time Payments Processing &amp; Visibility</td>
</tr>
<tr>
<td>Digital Underwriting Process</td>
<td>Economic Forecasting for Financial Projections</td>
<td>Customer Segmentation</td>
<td>FX Volatility and Exposure Analysis</td>
</tr>
<tr>
<td>Business Loan Administration</td>
<td>Defaults Prediction</td>
<td>Identity Verification/Profiling</td>
<td>Cloud-based Integrated Receivables</td>
</tr>
<tr>
<td>Loan Servicing</td>
<td>AI-enabled Financial Spreading</td>
<td>Client Retention</td>
<td>Trade Finance Automations</td>
</tr>
</tbody>
</table>

**DIGITAL USE CASES**

**VALUE CHAIN (2/2)**

<table>
<thead>
<tr>
<th>CAPITAL MARKETS</th>
<th>CLIENT MANAGEMENT/CRM</th>
<th>MERGERS &amp; ACQUISITIONS</th>
<th>RISK</th>
<th>LEGAL &amp; COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>News Sentiment Analysis</td>
<td>Self-Service Portals</td>
<td>Target Due Diligence</td>
<td>Transaction Breach Analysis</td>
<td>Loan Agreements Review</td>
</tr>
<tr>
<td>Equity/Debt Instrument Pricing</td>
<td>Tailored Solutions</td>
<td>Analytics-based Deal Pricing</td>
<td>Fraud Analysis</td>
<td>Deal Due Diligence</td>
</tr>
<tr>
<td>Deal Due Diligence</td>
<td>Automated Product Recommendations</td>
<td>Divestiture Financials Processing</td>
<td>Market &amp; Credit Risk</td>
<td>Sanctions Compliance Management</td>
</tr>
<tr>
<td>Virtual Deal Rooms</td>
<td>Real-time Deal Monitoring</td>
<td>Analytics-based Post-Merger Integration Insights</td>
<td></td>
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</tr>
</tbody>
</table>

**Note:** Analysis is based on the DRAUP’s proprietary engineering database and well as secondary research, updated in September, 2018.
**Commercial Banking Value Chain:** Back-Office & Mid-Office roles are being automated through RPA and AI-enablement whereas Front-Office (advisory) roles are being augmented with digital tools

<table>
<thead>
<tr>
<th>VALUE CHAIN (1/2)</th>
<th>LENDING/FINANCING</th>
<th>SALES</th>
<th>TREASURY/PAYMENT SERVICES</th>
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<tbody>
<tr>
<td><strong>DIGITALLY IMPACTED JOB ROLES</strong></td>
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</tr>
<tr>
<td>Loan Underwriter</td>
<td>Loan Administrators/Processors</td>
<td>Loan Officers</td>
<td>Treasury Modeller/Analysts</td>
<td>Investment Banking Associate</td>
<td>Market Risk Quant Research Associate</td>
<td>Loan Document Specialist</td>
</tr>
<tr>
<td>Credit Risk Analysts</td>
<td>Loan Verification Specialist</td>
<td>Sales Managers/Specialists</td>
<td>FX Product Manager</td>
<td>Quantitative Analytics Manager</td>
<td>Digital Fraud &amp; Security Manager</td>
<td>Due Diligence Investigator</td>
</tr>
<tr>
<td>Commercial Lending Specialists/Managers</td>
<td>Loan Servicing Managers/Analysts</td>
<td>Regional Sales Representatives</td>
<td>Payments Analyst</td>
<td>Technology Project Manager, M&amp;A</td>
<td>Open Banking/ PDS2 Channel Security Manager</td>
<td>Transaction Monitoring Quality Analyst</td>
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<tr>
<td>Unsecured Lending Analyst</td>
<td>Lending Strategy Analyst</td>
<td>Sales Analysts</td>
<td>FX Operations Associate</td>
<td>M&amp;A</td>
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<tr>
<td>Leveraged Loan Syndicate Analyst</td>
<td>Portfolio Manager</td>
<td>Branch Manager</td>
<td>FX Strategist</td>
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<tr>
<td><strong>VALUE CHAIN (2/2)</strong></td>
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<td>RISK</td>
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</tr>
<tr>
<td>Associate - Debt Capital Markets</td>
<td>CRM &amp; Analytics Manager</td>
<td>Investment Banking Associate</td>
<td>Market Risk Quant Research Associate</td>
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<tr>
<td>Equity Risk Manager</td>
<td>Relationship Managers</td>
<td>Quantitative Analytics Manager</td>
<td>Digital Fraud &amp; Security Manager</td>
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<tr>
<td>Analytics Manager - Debt Capital Markets</td>
<td>Strategic Planning Manager</td>
<td>Technology Project Manager, M&amp;A</td>
<td>Open Banking/ PDS2 Channel Security Manager</td>
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</tr>
<tr>
<td>Equity Research Associate</td>
<td>CRM capabilities expert</td>
<td>M&amp;A Specialists</td>
<td>Transaction Monitoring Quality Analyst</td>
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</tbody>
</table>

Note: Analysis is based on the DRAUP’s proprietary engineering database and well as secondary research, updated in September, 2018.
Digital Intensity: Job Roles across commercial banking value chain segregated into 4 categories on the basis of the intensity of digital impact and automation

<table>
<thead>
<tr>
<th>DIGITAL NATIVES</th>
<th>HIGHLY AUTOMATED</th>
<th>DIGITALLY DISRUPTED</th>
<th>DIGITALLY INFLUENCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>New technology job roles that have emerged in the Banking Industry due to digital transformation initiatives</td>
<td>Job roles with a high propensity for automation</td>
<td>Job roles with considerable changes in responsibilities due to digitisation</td>
<td>Job roles augmented by the development of technological tools such as AI/ML powered platforms</td>
</tr>
</tbody>
</table>

**JOB ROLES**

**DIGITAL NATIVES**
- Data/Decision Scientist
- Data Engineer/Architect
- Machine Learning/NLP Engineer
- UI/UX Developer
- Cloud Developer
- Big Data Analyst/Scientist
- Software Platforms Developer
- RPA Developer

These roles exist in Horizontally aligned as well as Vertically (BU-wise) aligned capacities.

**HIGHLY AUTOMATED**
- Accounting/Book-Keeping
- Payroll
- Data-entry Clerks
- Customer Service Representatives
- Loan Underwriters
- Loan Verification & Servicing Specialists

**DIGITALLY DISRUPTED**
- Trade Finance Analysts
- FX Operations Associate
- Loan Administrators
- M&A Operations
- Treasury & Payments Operations
- AML Operations
- Asset-Liability Valuation Analysts
- Pricing Specialists
- Payments Analysts

**DIGITALLY INFLUENCED**
- Relationship Managers
- Loan Officers
- Treasury Associates/Managers
- Branch Managers
- Product Managers
- Portfolio Managers
- Risk Analysts
- M&A Associates/Managers
- Traders

**NEW EXECUTIVE ROLES (Sample roles in peer companies)**
- Head of Digital Transformation/Digital Strategy – Global & Regional Heads
- Head of Innovation, Treasury Services – Global & Regional Heads
- Head of Digital Business & Commercial Banking – Global & Regional Heads
- Head of Digital Payments and Wallets – Global & Regional Heads
- Head of Customer Engagement & Innovation – Global & Regional Heads
- Head of Digital Product Management, Commercial Banking – Global & Regional Heads

Head of AI and ML Services
- Head of Data Science
- SVP, Data Analytics, Commercial Banking
- SVP, Head of Consumer and Commercial Modelling & Analytics
This section provides deep dive into:

- Commercial Banking application areas mapped across new technology roles
- Workloads and use-cases of 6 Digital Native job roles/technologies in Commercial Banking:
  - RPA
  - Data Analytics
  - Cloud
  - Artificial Intelligence/ML
  - Open API
  - Blockchain
Digital Natives: Banks are employing Data Analysts/Scientists, AI/ML Engineers and RPA developers to automate and develop new analytical tools and applications

<table>
<thead>
<tr>
<th>JOB ROLES</th>
<th>AREAS OF APPLICATION</th>
<th>Data/Big Data Analyst</th>
<th>ML Engineer</th>
<th>Platforms/API Developer</th>
<th>RPA Developer</th>
<th>NLP Engineer</th>
<th>Data Engineer/Architect</th>
<th>Cloud Developer</th>
<th>Applications Developer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade Finance Operations</td>
<td></td>
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<td>Loan Underwriting, Administration/Servicing</td>
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<td>Virtual Customer Assistance</td>
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<td>Tailored Products &amp; Recommendations</td>
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<td>Forecasting/Modelling</td>
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<td>Deals/Products Pricing</td>
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<td>Documents/Agreements Review &amp; Processing</td>
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<td>FX Execution/Confirmation</td>
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<td>Targets &amp; Deals Due Diligence</td>
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<td>Risk &amp; Fraud Analysis</td>
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<td>Real-time Payments</td>
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<td>Integrated Receivables</td>
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<td>Trade Processing</td>
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</table>

These roles work towards developing Data, Analytics, Modelling and Application Platforms and tools across the Commercial Banking Value Chain and Digital Use Cases
**Technologies:** RPA & Data Analytics have automated the redundant back-office workloads which allow the bank employees to focus on core finance activities

<table>
<thead>
<tr>
<th>Technologies</th>
<th>Roles</th>
<th>Key Activities and workloads</th>
<th>Key Use Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robotic Process Automation</td>
<td>RPA Developer</td>
<td>• Automate several commercial banking back-office processes based on the input from internal departments</td>
<td>• ANZ implemented RPA to fix time-consuming operational errors which occurred daily, they were able to reduce resources from 40 to 2.</td>
</tr>
<tr>
<td></td>
<td>RPA Tester</td>
<td>• Create Bots for the Automation process for Front Office and Back Office banking process areas involving web, Java, mainframe, and Windows-based applications</td>
<td>• BNY bots are being used to streamline the firm’s trade-settlement procedures. Tasks include clearing trades, resolving discrepancies done in ¼ of a second</td>
</tr>
<tr>
<td></td>
<td>Business Systems Analyst – RPA</td>
<td>• Perform stress tests for BOT scripts to prove scalability and stability of RPA code</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RPA Designer</td>
<td>• Assist automation projects to troubleshoot potential bottlenecks</td>
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<tr>
<td></td>
<td>Lifecycle &amp; Methodology Lead - RPA</td>
<td>• Identify and mitigate business risks associated with solution architecture</td>
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<tr>
<td></td>
<td>RPA COE Solution Consultant</td>
<td>• Develop Process Design Document (PDD) to capture end to end user keystrokes</td>
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<tr>
<td>Data Analytics</td>
<td>Strategic Analytics Associate</td>
<td>• Implement Cybersecurity and anti-fraud data analytics for digital authentication strategies</td>
<td>• Analytics based fraud analytics and behavioral pattern detection JP Morgan Chase</td>
</tr>
<tr>
<td></td>
<td>Advanced Financial Analytics Consultant</td>
<td>• Responsible for credit loss forecasting and portfolio risk management for Business Banking</td>
<td>• State Bank of India’s E-Smart SME is using data analytics gathered by e-commerce players to assess the creditworthiness of sellers</td>
</tr>
<tr>
<td></td>
<td>Compliance Officer - Data Analytics and Reporting</td>
<td>• Collect, review, interpret, and analyze data and/or documentation to ensure compliance with the department SLAs, policies, procedures and/or regulatory and risk requirements.</td>
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<tr>
<td></td>
<td>Risk &amp; Compliance Analytics Consultant</td>
<td>• Responsible for customer level data extraction and quantitative analysis focused on identifying growth opportunities</td>
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<tr>
<td></td>
<td>Client Intelligence Analytics Developer</td>
<td>• Develop analytics based products for internal usage regarding client intelligence, payments processing, trade analytics, credit risk analytics among others</td>
<td></td>
</tr>
</tbody>
</table>

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

Cloud & AI based roles are helping banks in developing analytical tools to enhance product development & advisory services across the value chain.

#### Technologies

- Cloud DevOps Engineer
- Product Manager, Hybrid Cloud
- Information Security Cloud Engineer
- Cloud Migration Lead
- Hybrid Cloud professional
- Cloud Solutions Architect

### Roles

<table>
<thead>
<tr>
<th>Roles</th>
<th>Key Activities and workloads</th>
</tr>
</thead>
</table>
| Cloud DevOps Engineer      | 1. Document and analyze customer requirements. Define future state vision for Cloud Services  
|                            | 2. Integrate internally developed components (API’s, web services, broker services, MQ and Data Power artefacts).                                                                                                       |
|                            | 3. Collaborate with Online Banking and Mobile development teams to deliver cloud-hosted solutions which meet the current and future standards and needs  
|                            | 4. Provide a cloud workflow orchestration services based on open source products (Orchestration As A Service )                                                                                                 |
|                            | 5. Incorporate multiple deployment models for infrastructure automation frameworks through Hybrid Cloud                                                                                                                  |

### Key Activities and workloads

- 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 modelling 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

### Key Use Cases

#### Santander’s Openbank

- Is using a hybrid model of the private and public cloud to improve the provisioning of resources for running its ML capabilities in real-time.

#### DBS

- Is collaborating with AWS to create a hybrid cloud environment which is optimized for rapid changes of capacity and functionality.

#### Citibank

- Is utilizing AI/ML to automate the cash application process of matching open invoices to payments received.

#### HSBC

- Is integrating AI & screen data for suspicious activities to help spot money laundering, fraud and terrorist activity.

#### JP Morgan

- Uses Natural Language Processing (NLP) to automatically interpret and review commercial-loan agreements.

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Note: Analysis is based on the DRAUP’s proprietary engineering database, updated in Dec 2018.
**Technologies:** Open API & Blockchain roles are redefining the payments/transactional workflow, banking applications development & security architecture of banking systems

<table>
<thead>
<tr>
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<th>Key Use Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open API</td>
<td>API Developer • Global Transaction Banking API analyst • Open Banking Commercialization manager • API Enabler- Open Banking • API Product Manager</td>
<td>• Create PISP (Payment Initiation Service Provider) solutions API for transaction banking • Asset Finance solutions by data flow through APIs for better decision making • Connection bank’s business lines and management with start-ups to develop concrete business solutions that will be mutually profitable • Manage the end to end IT delivery of the Open Banking solutions, through Agile at scale, continuous delivery, MicroServices &amp; API Architecture • Manage build of the Cloned Corporate bank, delivery &amp; implementation of core banking systems, integration of platforms, data, testing, deployments</td>
<td>- Citi Bank’s solution allows clients to integrate Citi’s APIs into their treasury processes to deliver payments in real time</td>
</tr>
<tr>
<td>Blockchain</td>
<td>Blockchain Developer • Blockchain and Distributed Ledger Strategist • Cyber Blockchain Specialist • Consultant, Blockchain Innovations • DLT Propositions manager</td>
<td>• Involved in the Systems Development Life Cycle (SDLC) phases like Design, Development and Testing • Develop applications using blockchain technology • Implement Equity Options Trading solution using blockchain as a proof of concept for decentralized distributed ledger technology • Build a payment system on the blockchain platform which can be used to send and receive payments by the participating banks in the network • Build a multi-bank Trade Finance platform help, digitize trade documents and automate processes • manage leading end-to-end development and delivery of “we.trade” – the world’s first live blockchain based open account trade platform</td>
<td>- Standard Chartered has an API portal for transaction banking, which enables 3rd party developers to optimize management of Working Capital, Account Balance among others</td>
</tr>
</tbody>
</table>

**Note:** Analysis is based on the DRAUP’s proprietary engineering database, updated in Dec 2018
This section provides deep dive into:

- Sample transformations of job workflow due to augmentation of digital tools and processes:
  - Commercial Loan Officers
  - Traders (Capital Markets)
  - Capital Markets/M&A Analysts
  - FX Associates
Impact of digitization in Commercial Loan Officers/Specialists: Digital loan applications and automated credit score generation ensure the eradication of paperwork and the KYC validation responsibilities of a Loan officer/Specialist

Lending: Workflow transformation

From Sales/Operational role
- Identify and meet potential clients.
- Receive documents and requirements from customer.
- Inspect, Validate, Review documents and calculate the credit score.
- Finalizes Loan amount based on credit score and repayability.

To Managerial Role
- Evaluate online application, digital documents and credit score from AI-based system.
- Allocate and Manage Field evaluators for collateral and document inspection.
- Evaluate loan amount, collateral and repayability based on Credit Score.
- Train Digital systems to decide on simpler loans.

Digital Transformation
- Digital Documents Upload and KYC
- Digital Lending
- Automated Client On-boarding and Profiling Procedures
- RPA-enabled Loan Underwriting and Approval
- Personalised Product Brochures and Recommendations
- AI/ML-based Due Diligence (Credit Risk, Collateral/Business Evaluation and other checks)
- AI/ML Platform for Client Targeting/Segmentation
- Loan Approval and Crediting
- Loan Underwriting
- Loan Officer checks eligibility
- Due-Diligence (Credit Score Check, Business History, Risk Appetite)
- Identify and meet requirements and recommend products
- Identify requirements and recommend products

Loan Officer: Job Role transformation
- Loan Officer
  - From Sales/Operational role
  - To Managerial Role

Digital Platforms
- AI and ML
- RPA

Note: Analysis is based on the DRAUP’s proprietary engineering database and talent module as well as skill analysis from job portals.
Impact of digitization in Trade Processing: Traders are using AI/ML tools to enhance their Trade analytical capabilities & risk management; also using RPA for Order execution and management.

Trade Processing: Workflow transformation

Traditional Trade Processing:
- Pre-trade Analysis
- Price and Transaction Modelling
- Manual trade positioning and executions
- Risk and Breach Monitoring

Digital Trade Processing:
- Automated analysis of trades using real-time updates
- AI/ML based Risk analysis and trade limit breaches monitoring
- RPA-based trade execution and order management
- AI/ML based Pricing Valuation/P&L

Trade Processing: Job Role transformation

From data-driven role:
- Communicate with broker-dealers to confirm trade details and resolve any trade issues
- Manage and trade for several funds
- Analyze investment opportunities, trading for cash-flow and reallocation purposes.
- Monitor performance, and collaborate with brokers to execute trades and develop new strategies

To insight-driven role:
- Use AI/ML models for Pre-trade and Post trade analytics.
- Provide intelligence and analytic support of trades and market fluctuations
- Use analytics tools to monitor transaction risk & trade limit breaches
- AI/ML-based pricing valuation and P&L Management
- RPA-based trade execution and Order Management

Note: Analysis is based on the DRAUP’s proprietary engineering database and talent module as well as skill analysis from job portals.
**Impact of digitization in Capital Markets – M&A Associates/Analysts:** AI-based virtual deal rooms, NLP-based News & market data analysis and RPA-enabled transaction execution are transforming Capital Markets and M&A deals Analysts into Advisory Managers

**Capital Markets Advisory/Executions: Workflow Transformation**

**Corporate Clients:**
- Understand Client requirement
- Client Due Diligence

**Generate Strategy Pitch Books:**
- Financial Modelling for different transaction scenarios

**Transaction Execution**
- Financial Sponsors/Target:
  - Identify Corporate Clients

**Target Due Diligence (M&A Cases)**
- Deal Structuring and Debt/Equity Instrument Pricing

**Digital Workflow**
- AI-generated Strategy Pitch Books: ML-based Transaction Scenarios
- Virtual Deal Rooms for Deal Structuring
- Analytics-based Debt/Equity Pricing
- RPA-enabled Deal Ops

**From analysis and modelling role**
- Gather information from clients and analyse financial information to determine strategies
- Manually create strategy pitch books
- Perform Deal structuring and pricing operations
- Lead operations team through the Deal/transaction execution process

**To Advisory/Client-faced role**
- Provide clients with customized, relevant transaction scenarios and deal models
- Provide clients with research about developments in the markets through apps and hybrid model
- Interact with clients throughout the deal executions process.
- Use online chats and video conferences to provide more content during client interactions

**Capital Markets Analyst: Job Role transformation**

**Benjamin B. Heinke**
**Debt Capital Markets Portfolio Associate**
- Total Years Of Experience: 5 Years
- Experience in Current Role: 1 Year
- Greater New York Area
- Bachelor’s Degree in International Business in EBS University, Germany

**Osman Nur**
**Analyst, Mergers & Acquisitions**
- Total Years Of Experience: 3 Years
- Experience in Current Role: 3 Years
- Greater New York City Area
- Bachelor’s degree in Commerce -Finance University of Virginia

**Digital Transformation**

**AI and ML**

**RPA**

**Note:** Analysis is based on the DRAUP’s proprietary engineering database and talent module as well as skill analysis from job portals.
Impact of digitization on FX Associates/Manager: AI-based Currency modelling & analysis; Smart Contract based payments validation/monitoring are key areas of transformations in FX Risk Management

Hasnain Raza
FX Corporate Risk Management
Total Years Of Experience: 17 Years
Experience in Current Role: 6 Years

- Bachelor in Financial Engineering & MIS
Binghamton University

FX & Interest Rate Derivatives Risk Management Professional at J.P. Morgan
- Provide FX risk management expertise to corporate treasury teams.
- Assist treasury teams with setting up the balance sheet/cash flow hedging programs along with the formulation of FX hedging policy.
- Provide customized FX hedging strategies, market analysis, relevant FAS133/ASC 815 accounting guidance, and seamless execution of derivative transactions.
- Educate clients on regulatory compliance requirements including ISDA, Dodd-Frank, and EMIR.

San Francisco, California

Brian Asman
Foreign Exchange (FX) Corporate Derivative Sales / Risk Management at J.P. Morgan
Total Years Of Experience: 6 Years
Experience in Current Role: 2 Year

- Bachelor in Engineering Management
US Military Academy

Greater New York City Area

FX Risk Manager: Role transformation

From data-based role
- Confirmation and settlement processing for all foreign exchange products
- Set-up cash flow hedging programs
- Follow Bank policies and procedures regarding Risk analysis of trades/wires
- Including OFAC and Dodd-Frank regulations
- Manual transaction approval and initiation
- Accounting, Financial Controls and Financial Reporting

To insight based role
- Real-time transaction monitoring through integrated APIs
- AI/ML-based FX transaction simulation and projections
- Carry out strategic hedging against FX, commodities on the basis of geopolitical instability, credit risk of customers.
- Establishing measurable treasury performance metrics at each tier of the treasury structure

Digital Transformation
- RPA
- Artificial Intelligence/Machine Learning

FX Specialist/Manager
- RPA-enabled transaction risk monitoring (Credit Limit checks)
- AI-generated Currency Cash Flow projections
- Pricing/Transaction Validation through Smart Contracts
- RPA-enabled transaction approval and initiation based on selected criteria
- FX Volatility Analysis using ML Simulations

Initiate transaction
- Transaction Settlement Lifecycle
- Internal approval processes
- Identify Exposures
- Risk Assessment

FX Transaction: Work Flow transformation

Note: Analysis is based on the DRAUP’s proprietary engineering database and talent module as well as skill analysis from job portals.
This section provides deep dive into:

- Sample transformations of job workflow due to digital disruption using RPA & AI-based automation:
  - Trade Finance Analysts
  - Asset/Liability Valuation Analysts
  - AML Analysts (Regulatory and Compliance)
Impact of digitization on Trade Finance Analysts/Associates: RPA and OCR based system has evolved the role of Trade Finance Officer from back-office data processing towards client-facing and advisory roles.

**Trade Finance Analyst: Workflow Transformation**

- Collect Trade Documents
- Review Trade Data
- Ensure Regulatory Compliance
- Bot Monitors for new documents
- Extract Data using OCR
- Automated document processing by AI/ML
- Document Processing (RPA integrated with Blockchain)
- Validate and Upload Documents
- Extract Data using OCR
- AI based compliance

**Trade Finance Analyst: Job Role transformation**

**From processing/operational role**
- Perform checks for both import & export L/C documents
- End to end processing of trade documents
- Checking of Documentary Letter of Credit
- Reviewing and analyzing documents discrepancies
- Communicate effectively with clients & stakeholders

**To Client-facing/Advisory role**
- Enable Blockchain for auto processing
- Liaise with clients for the advisory
- Operate dashboards to measure back-office process metrics
- Adoption of the latest SWIFT SR 18,19 standards to avoid a costly manual resolve
- Monitor Digital documentation exchange

**Lissette Vasquez**
Trade Finance Banking Analyst
Total Years Of Experience: 15 Years
Experience in Current Role: 8 Years

**Dominic Savio**
Guarantees and Trade Finance Officer
Total Years Of Experience: 17 Years
Experience in Current Role: 1.5 Years

**Guarantees and Trade Finance Officer at BNP Paribas**
- Manage Trade Finance Customer to deliver Trade Finance Products especially traditional Trade Finance products (LC & Guarantees/SBLC) and Supply chain including Receivable Financing.
- Communicating product information including product wise revenue to Business division and resolving customer queries on Trade Finance products

**Manager- Commercial & Trade Finance Services at Gulf Finance**
- Managed various trade operations processes: Letter of Credit, Guarantees, Bill Collections, Trade Finance and Supply chain solutions

**Note:** Analysis is based on the DRAUP’s proprietary engineering database and talent module as well as skill analysis from job portals.
**Impact of digitization on Assets-Liabilities Valuation Associates/Analysts:** Advanced Analytics and RPA are automating valuation and report generation processes

**From data evaluation and analysis role**
- Prepare daily reports relating to cash management and forecasting
- Generate Asset Valuation Reports
- Assist in the development of risk analytics models
- Prepare monthly treasury accounting entries and reconciliations, including securitization and derivative transactions

**AL Analyst**  
- Digital Transformation
  - RPA
- Advanced Analytics

**To Data Science based modelling and system development role**
- Utilize advanced analytics to assess Balance sheets
- Develop Asset Valuation Models
- Develop complex systems and programs that measure aggregate risk exposures
- Provide advisory on Asset-Liability Management using AI/ML models and simulations

**Assets-Liabilities Valuation Analyst: Workflow transformation**
- Collect client balance sheet details
- Valuate Client’s assets and liabilities
- Manually create client and regulatory reports offering solutions
- Measure liquidity or interest rate risk
- AI-based valuation of client’s assets and liabilities
- ML-based liquidity or interest rate risk modelling
- Automated report generation using templates and real time data

**Digital workflow**
- RPA bots to collect and integrate balance sheet info
- Asset Valuation Reports
- Risk Based Pricing Manager at SunTrust
  - Functions in an advisory role for model users, line of business (LOB) managers, and the strategic finance partners on the appropriate use of risk-adjusted profitability information.

**Brandon Knopp**  
- Asset Valuation & Analytics at BlackRock
  - Total Years Of Experience: 8 Years
  - Experience in Current Role: 2 Years
  - Bachelor’s degree in Economics at University of California

**Deana Mahan**  
- Interest Rate Risk Manager at SunTrust
  - Total Years Of Experience: 17 Years
  - Experience in Current Role: 6 Years
  - MBA at Auburn University

**Note:** Analysis is based on the DRAUP’s proprietary engineering database and talent module as well as skill analysis from job portals.
Impact of digitization in Regulatory & Compliance: Roles like AML analysts have evolved to be pure-play analysis and solution driven role post the transformational impact of RPA & AI in SAR/STR

SAR/STR Workflow transformation

Data collection to identify money laundering activities and transactions
Manually monitoring SAR/STR
Reporting STR/SAR

Digital Transformation

• Data collection to identify money laundering activities and transactions
• Manually monitoring the activities and transactions
• Discovering and standardizing SAR and STR
• Reporting suspicious activities and transactions due to inconsistency

To Analysis and advisory role

• Provide intelligence and analytic support to identify money laundering activities and transactions
• Reporting suspicious activities and transactions due to inconsistency
• Recommend solutions for AML based risk mitigation

AML Analyst: Job Role transformation

Lakshmee Bahadur
Customer Relationship Advocate
Total Years Of Experience: 32 Years
Experience in Current Role: 6 Years

Michael Evans
AML/KYC Analyst
Total Years Of Experience: 28 Years
Experience in Current Role: 4 Years

Note: Analysis is based on the DRAUP’s proprietary engineering database and talent module as well as skill analysis from job portals
This section provides a start-up dashboard covering Fintech companies developing digital solutions and channels for commercial banking use-cases.
# Emerging Fintech companies Dashboard

Fintech Start-ups are providing digital channels, automation platforms, payment services as well as Open APIs, digitally transforming banking value chain.

<table>
<thead>
<tr>
<th>Robotic Process Automation</th>
<th>Analytics</th>
<th>Cloud</th>
<th>Artificial Intelligence</th>
<th>Open API</th>
<th>Blockchain</th>
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</thead>
<tbody>
<tr>
<td>treasuryxpress</td>
<td>HEXANIKA</td>
<td>FINANCIALFORCE</td>
<td>BREX</td>
<td>TRUELAYER</td>
<td>Blockstream</td>
</tr>
<tr>
<td>Smart Scalable On-Demand</td>
<td>Solutions software that automates and consolidates regulatory compliance reporting and processes</td>
<td>Cloud-based applications company which offers ERP solution and offers accounting, billing, revenue recognition applications</td>
<td>Using AI &amp; ML, Brex is building B2B financial products like corporate credit card for tech Start-ups with much higher limits, automated expense management &amp; accounting systems</td>
<td>Provide APIs to develop financial applications in areas including real-time transactions, Online lending, Robo-advisory among others</td>
<td>Develop crypto-financial infrastructure on Bitcoin</td>
</tr>
<tr>
<td>Enterprise-level treasury solutions provider automating liquidity management, cash management, treasury operations, payments management and similar processes</td>
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<td>bitpay Developes Bitcore, an open-source platform for payments and wallets</td>
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<thead>
<tr>
<th>PAYMENTS</th>
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<tbody>
<tr>
<td>GOCARDLESS</td>
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<tr>
<td>It is an online direct debit provider to streamline and automate online Direct Debit payments</td>
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<table>
<thead>
<tr>
<th>PERSONALIZED PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WorkFusion</td>
</tr>
<tr>
<td>Automates complex processes with unstructured data such as AML, trade finance and claims handling using small training data sets</td>
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</tbody>
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<table>
<thead>
<tr>
<th>CAPITAL MARKETS</th>
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<tbody>
<tr>
<td>CAPITOLIS</td>
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<tr>
<td>Develop products for automation of FX novation workflow in both FX prime broking and bilateral trading</td>
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<thead>
<tr>
<th>ACCOUNT MANAGEMENT</th>
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<tr>
<td>ncina</td>
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<tr>
<td>Offers an end-to-end cloud-based platform for bank’s core and transactional systems such as customer onboarding and account opening</td>
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<thead>
<tr>
<th>LENDING</th>
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<tbody>
<tr>
<td>PLAIN</td>
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<tr>
<td>Provide lending of working capital such as loans and commercial cards to small &amp; medium businesses</td>
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<thead>
<tr>
<th>TRADE FINANCE / RISK MANAGEMENT</th>
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</thead>
<tbody>
<tr>
<td>Centrifuge</td>
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<tr>
<td>An open, decentralized operating system to connect the global financial supply chain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REGULATORY COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>プラシフィケーション</td>
</tr>
<tr>
<td>A client interaction solution leveraging real-time analytics engine to predict customer intent, helping to deliver personalized products</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BACK-OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>yayPay</td>
</tr>
<tr>
<td>Cloud-based accounts receivable solution that integrates with accounting, ERP, billing, and CRM applications to automate payment workflows</td>
</tr>
</tbody>
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<thead>
<tr>
<th>TREASURY</th>
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</thead>
<tbody>
<tr>
<td>AppZen</td>
</tr>
<tr>
<td>Developed an AI system to automate auditing process, read and audit expense reports, receipts, invoices and contracts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATA MANAGEMENT</th>
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<tbody>
<tr>
<td>tink</td>
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<tr>
<td>Provide APIs to develop banking applications in areas including Account Aggregation, Categorization &amp; Payments Management</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>IDENTITTY VERIFICATION</th>
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<tr>
<td>CAPITAL ONTAP</td>
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<tr>
<td>A technology platform that provides tools/APIs to BFSI companies enabling the development of digital financial solutions/applications for use cases such as Asset verification and reporting, real-time account balances among others</td>
</tr>
</tbody>
</table>

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