



Cognitive Document Processing

Capgemini's new platform uses the latest artificial intelligence techniques and machine learning to reduce the time and effort required for document processing, with financial, strategic, and operational benefits for users. Costs could be reduced by 30% and the risk of regulatory non-compliance is also lessened.

Financial institutions (FIs) function in a heavily regulated environment; hence, every process requires substantial documentation. Though FIs have moved from physical to digital documents, they still rely heavily on manual processing, which consumes considerable effort and time. A Thomson Reuters study¹ revealed that the average number of employees working on know your customer (KYC) document processing increased by a factor of about 4.5 between 2016 and 2017.

At most banks, processing of documents such as cheques, along with claims processing and transaction processing, is outsourced to business process outsourcing providers (BPOs). The segment of BPOs, as classified by function, that serves financial institutions is referred to as the banking, financial services & insurance (BFSI) segment, and comprises roughly 17% of the global market for document outsourcing, estimated to be worth approximately \$32bn in 2017, according to the Thompson Reuters study, which also suggests BFSI could be one of the fastest-growing BPO areas overall. However, Capgemini experience suggests that even when outsourced, document processing often consumes a great deal of manual effort.

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¹ Thomson Reuters, KYC compliance: the rising challenge for financial institutions, 2018 <https://www.refinitiv.com/content/dam/gl/en/documents/reports/kyc-compliance-the-rising-challenge-for-financial-institutions-special-report.pdf>



Current process and pain points

Capgemini has therefore invested in researching the document processing area to find out how it can be made more efficient, whether it is carried out by FIs internally or by their BPO. Most of us are aware of the amount of paperwork, time, and effort that taking out a loan requires, so we will use it here as an example to show the possible improvements that we have identified.

Looking at pain points from the client side, it is striking that there are a lot of documents to provide. Corporate clients have associations with multiple FIs, and different banks may have different documentation requirements. As revealed by Thomson Reuters, a corporate client is contacted eight times on average during the process of onboarding, which takes 32 days on average. It can be frustrating for clients to comply with different requirements and wait for close to a month before FIs open their accounts.

Given that a bank's client base is expanding rapidly every day, it adds up to a lot of documentation to process. We are not just talking about extracting data, either – some documents, such as a partnership agreement or credit report, require the back office to read through them and make decisions. This manual process needs multiple verifications to eliminate biases and to ensure that the correct decisions are made and the required data extracted. Some of the steps have to be carried out by other departments or third parties.

There is no doubt it is a complicated, labor-intensive process, with scope for incomplete or false information, long lead times, inconsistency, errors, and other problems. The financial burden for FIs is considerable – Thomson Reuters estimate that the average bank will spend close to \$170m on document processing in 2018.

The advent of technologies like artificial intelligence (AI) and machine learning (ML) presents an opportunity to address most of the pain points. They can be utilized to assist FIs in the conversion of handwritten and typed text into fully digital documents using optical character recognition (OCR) and intelligent character recognition (ICR). After this step, the data is usually extracted in text form, from which the required entities are identified. The conversion of data into text form enables easy application of models that take advantage of artificial intelligence and machine learning.

Capgemini's Cognitive Document Processing

Capgemini has introduced its Cognitive Document Processing (CDP) platform to help clients benefit from this opportunity. CDP is an integrated platform that makes it easy to acquire, process, and act upon a range of structured and unstructured information. It accepts digitized or handwritten client documents as inputs, and uses cognitive automation technology to read and extract data. Executives can review the results of the automated processing and provide feedback. Our clients can also make use of the data in downstream business processes – for example, bank statement data could be used to build a better understanding of customers' spending patterns so that the bank can offer more customized products.

Adopting CDP can benefit financial institutions on three fronts: financial, strategic, and operational. An IDC study² found that digitally transforming document workflows could increase a company's revenue by 36% and decrease its costs by 30%.

Strategically, adopting CDP serves as a differentiator for FIs as it ensures faster and better business processes. The solution can be scaled across the organization, ensuring consistent service. From an operational point of view, CDP enables organizations to focus on core competencies by reducing the amount of labor and time required to process their large volumes of documents.

At an operational level, CDP can help FIs avoid potentially hefty fines for regulatory non-compliance. In February 2018, a US bank was fined \$613m for violation of the Bank Secrecy Act and for faulty anti-money laundering programs. An Indian bank, ICICI, has been fined close to \$8.5m for non-compliance.

The IDC study² identified the potential to decrease compliance risk by 23% by using this type of platform to eliminate errors such as misfiling and missing or invalid signatures.

² IDC, 2016, Business transformation through smarter document workflows, <https://acrobat.adobe.com/content/dam/doc-cloud/en/pdfs/idc-business-transformation-through-document-workflows-ie.pdf>

Use cases

We will now examine a couple of typical document processing challenges to see how CDP can help.

Mortgage processing

The usual processing steps are as follows:

1. Client starts the application process by uploading income and asset documentation online.
2. Lender sends the loan for processing.
3. Lender orders the client's credit score appraisal.
4. Underwriter reviews the file, credit, and property appraisals, and issues conditional approval.
5. Lender transfers the amount to the client.

Though the documents in the first step are structured, those required in subsequent steps are either semi-structured or unstructured: pay slips, investment disclosures, deeds of trust, mortgage notes, appointment letters, credit reports, property appraisals, etc. The client currently gives the FI hard copies of these documents, which are then scanned, uploaded, and processed manually.

CDP enables a solution where clients scan and upload the documents themselves, reducing the effort the FI has to expend on processing them and identifying discrepancies. CDP processes each document automatically, extracting the required data and contacting the relevant person if further processing is needed. The ML model's cumulative learning augments and prompts the ability of the model to process any new document type.

Incorporating CDP into the workflow enables organizations to eliminate much of the effort that is currently spent grappling with complicated paperwork, and to reduce the amount of manual decision-making required – thereby removing scope for errors and bias, and helping to ensure smooth, consistent service to clients. CDP increases accuracy and helps in early detection of anomalies.

Client onboarding

Client onboarding is a critical process for any organization as it defines the course of the future relationship with a corporate client. It starts with an onboarding request, where the FI asks the client to provide basic documentation. Due diligence then evaluates the client based on a few documents that indicate their financial soundness. Next, credit terms are set up: here, company financial statements are assessed. The next two steps, agreement management and party set-up on the system, require many different documents. Once again, some of these documents are unstructured, which means time-consuming manual processing.

This process takes a toll on organizations and their clients, and the amount of money, time, and labor spent increases with the volume of business and growing regulatory demands. CDP provides a solution that extracts relevant information from documents through an AI engine. The process reduces time, effort, and errors, improving satisfaction levels and enabling organizations to scale and automate in real time.



Handling different types of documents

CPD is designed to process documents and extract essential information from them with minimal human effort.

Documents can be categorized into three groups based on information entropy (a measure of uncertainty, as shown in the table below).

Document Type	Do we know WHAT the information is?	Do we know WHERE the information is?	Examples
Structured	Y	Y	W2 form, passport, state driver license, application forms
Semi-Structured	Y	N	Mobile bills, invoices, utility bills
Unstructured	N	N	Reference letters, address proof letters, experience letters, sales deeds

CDP enables us to acquire, process, and act on information from a huge range of printed, scanned, and handwritten documents. With structured documents, CDP can effectively and efficiently extract the required entities. Extracting useful data from unstructured documents is trickier because it requires advanced analytical techniques like natural language processing (NLP). By using NLP, we can add structure to unstructured content, which is useful in processing invoices, purchase orders, and application forms, for example.

Documents in the grey area between structured and unstructured belong to a third category, semi-structured. Here, we can use keyword searches and relative range lookups based on keywords.

For domain-specific requirements relating to structured or semi-structured documents, we have another option, custom entity extraction. Here we train the model with a considerable volume of domain-specific data, then test and retrain it until it is highly accurate. This trained and tested model can be invoked by domain-specific applications or analytics software.

The future of CDP

Currently, Capgemini is targeting CDP at financial services. However, the solution could in the future be extended to other industries such as healthcare. It could also be enhanced in order to eliminate the minimal manual labor that is still required after implementation of the current version.

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