Open Banking with AI

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Abstract

The convergence of Open Banking and Artificial Intelligence (AI) is re-inventing the global financial services domain, offering both opportunities and challenges. Open Banking has already disrupted conventional financial ecosystems by enabling secure, and standardized data sharing between banks and third-party providers via APIs. This shift has enabled new options for collaboration, better consumer experience, and higher financial inclusion. At the same time, AI—powered by large language models (LLMs) —has demonstrated massive potential by automating processes, personalizing services, and supporting regulatory compliance. Together, these innovations will be building a customer-centric financial ecosystem.

LLMs require access to vast and often sensitive datasets for optimal performance, yet the regulatory environment governing Open Banking emphasizes strict control, and limited data access. This underscores a challenge: how to realize the full benefits of AI without compromising data security and regulatory issues.

This paper addresses these gaps by introducing a structured framework by placing AI into Open Banking without allowing sensitive financial data to leave enterprise boundaries. The approach emphasizes data governance, the deployment of metadata-driven data catalogs, the data profiling and documentation, and the integration of AI models through API interactions.

Ultimately, this paper illustrates a balanced model for complementing Open Banking with AI: one that leverages capabilities of AI while safeguarding data integrity and data trust.

Key words*:* Open Banking, Artificial Intelligence, APIs, Data Governance, Large Language Models, Financial Services Innovation.

1. Introduction

Banks are financial institutions licensed to manage deposits, extend loans, and facilitate various financial transactions. They act as intermediaries between those who have money to save (depositors) and those who need to borrow money. Banks have been functioning and thriving because they're secured, managed, regulated and bound by law under government supervision. If the banks weren't regulated and endorsed by government and/or regulators, there would be no participants in the banking ecosystem. These banks weren't always ready to share the data with their competition or to third party providers. Traditionally, banks have kept customer financial data within their own closed ecosystems, hence limiting their customers' options for services, products, and insights into their financial lives.

With the advent of Open Banking and the evolution of the digital ecosystem, banks have evolved from a traditional money keeping business to an institution that helps participants achieve their financial goals. This digital evolution has also enabled satellite non-banking institutions to provide financial well being to the end consumer, empowering consumers with better financial acumen and personalized financial services.

Open banking mandates customers to share their financial information securely and electronically with other banks or other authorized financial organizations such as payment providers, lenders and insurance companies.

In this era, banking participants or consumers aren't comfortable sharing their data electronically as they still find it concerning with providing data access to the sensitive financial information. Open Banking could be as strong as its end consumer(s) want it to be, because at the fundamental core of this mandate is for the individual participants to grant third party providers access to their financial banking data. Participants fear potential data breaches, no clear accountability by the participating institutions, such as banks as data providers and third parties as data consumers. These third parties aren't necessary subject to the same governance and regulations that the banks are. Therefore, it raises some serious concerns about data storage, malicious access and transmission along with accountability.

On the other hand, the AI revolution is taking the market by a strom, and it has taken over many industries, not just finance, by automating tasks, enhancing productivity, and creating new interaction along with integration paradigms. These AI models generate human-like text, design, and even decision-making support, revolutionizing traditional workflows. These AI Models are generally referred to as "Large Language Models" (LLMs). For optimal functioning of these LLMs they need access to the data. Therefore, LLMs are best performant when executed within the cloud infra. That means they need uninterrupted access to data when executing.

The challenge arises when these two concepts - Open Banking and AI have to work together. For Open AI there is a mandate for controlled access to data, whereas for optimally executing a LLM there must be uninterrupted access to data. Therefore we need to find a better option for both of these concepts to co-exist as there is already a sense of trust deficit and clear accountability of data.

On top of it, moving data to third party providers to execute LLMs might even be seen as more challenging than beneficial for the banking institutions. A few of major banking corporations spending billions of dollars in their technology might be able to invest in the security or even executing LLMs in their ecosystem(s), but the small and medium sized banks won't be able to follow the suite. And with this the gap between our large financial institution and small/medium sized banks will widen.

The following sections provide a deeper overview of how these two concepts can co-exist and complement each other. Along with how AI can be augmented to better serve Open Banking.

2. Literature Review

Open Banking is an innovative model for the financial industry not only from a competition perspective but also from a customer engagement perspective. Banks will have to help their customers with superior and more agile offerings. Banks should enable their customers to manage their financial affairs, make better decisions. Digital disruption, FinTechs and regulatory compliance, such as Open Banking and Revised Payment Services Directive (PSD2) have accelerated the competition and forced banks to open up their systems [1].

On October 22, 2024, the Consumer Financial Protection Bureau (CFPB) issued a final rule (Rule) on personal financial data rights under Section 1033 of the Dodd-Frank Act [2]. The Rule apparently seeks to allow consumers to more easily switch financial institutions while maintaining their account history, facilitate comparison shopping by consumers, and better protect data privacy. It also helps resolve some aspects of long-running disputes between

banks and data aggregators over security and consumer permission protocols. The Rule mandates that depository institutions and other consumer financial services companies provide consumers and authorized third parties with free access to covered consumer personal financial data in a standardized electronic format.

Open Banking provides following benefits to the end consumers. Open Banking enables:

1. Transparency into the sharing of personal data

2. Personalized products and services for the end consumer

3. Ease and simplification of Peer to Peer and Peer to Institution payments

4. Enablement of one comprehensive financial ecosystem access

But, Open Banking does not establish an exclusive method for data sharing but instead establishes a framework for standard-setting organizations to align on technical standards [3]. Therefore, there is always a fear within banking institutions of leaking their data sets, which will not only penalize the banks but can also dent the bank's reputation.

Therefore, this Open Banking has to be dealt with carefully because financial institutions providing the data will end up getting an overhead cost of increased compliance stature that might be potentially passed to consumers. There could be revenue losses for third parties from data use restrictions, costs from screen scraping, and fraud risks with tokenized account numbers (TANs). Small or mid-sized banks even face the risk of existence.

AI in financial services removes complexities from operational tasks, reduces OPEX costs, and enhances customer experiences. It helps automate repetitive tasks such as data entry and compliance irregularities, improving efficiency and accuracy. Predictive analytics improves system assessments and enables bespoke product offerings.

Despite its potential, using AI in banking requires careful consideration of ethics and regulation. Balance technologies with fairness and accountability to prevent harm, according to Synechron[4]. AI models used for things like loan approvals or credit scores can learn biases from old data, which might unfairly affect certain groups. This could worsen existing inequalities. Additionally, banks must follow strict data protection laws to ensure customer information remains safe. AI must be used responsibly and ethically to build a more inclusive financial future [5].

Therefore a true benefit of AI can be leveraged by the financial institutions by ensuring the data is protected, doesn't leave the institution's own boundary yet can integrate with the wider AI ecosystem. This paper provides recommendations to evolve Open Banking APIs by powering it with AI without sharing institution's data beyond its boundary.

3. Research Gaps and Novelty aspect

There is still a gap in this specific area, it is around Performance Management of Open Banking APIs and TCO for running Open Banking with AI. Whenever there is an AI involvement in place, cost must be traded, because two capabilities have to coexist, which is not economical.

This communication focuses on leveraging AI without moving data elsewhere and delivering business value. And if a calibration is required during the transmission activity, it can be achieved via the approach mentioned above.

4. Open Banking APIs

4.1 Open Banking:

Pre Open Banking era, the users were individually connecting to every service app with no single point of data aggregation and understanding of one's financial well being. As much as users of financial ecosystems longed for the interconnectivity, there wasn't technology, and financial institution's will to federate their data to enable data

sharing.

With the advent of PSD2, Open Banking, CFPB mandates financial systems have started enabling the consumers data to be shared with partner ecosystems, upon consumer's consent. This is enabled via APIs for the data to be shared across the ecosystem. This is called the Open Banking API Model. API Model enables institutions to talk to each other on a secured channel and share just the contextualized information, turning the closed banking world into a modular, interoperable platform. This enabled transparency and financial evolution. These data exchange APIs are secure because they follow:

1.Consent Driven mechanism that authorized the financial institution to share the data only when the user explicitly provides the permission.

2.Strong Authentication: Mostly require two factor authentication.

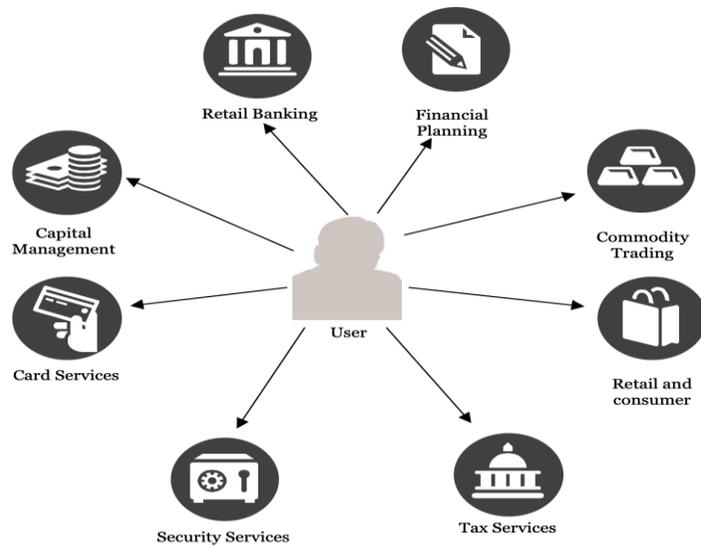3.Regulated Standards: Opening Banking/PSD2 have mandated APIs to follow strict rules for security.

Figure 1. Per Open Banking point to point integration
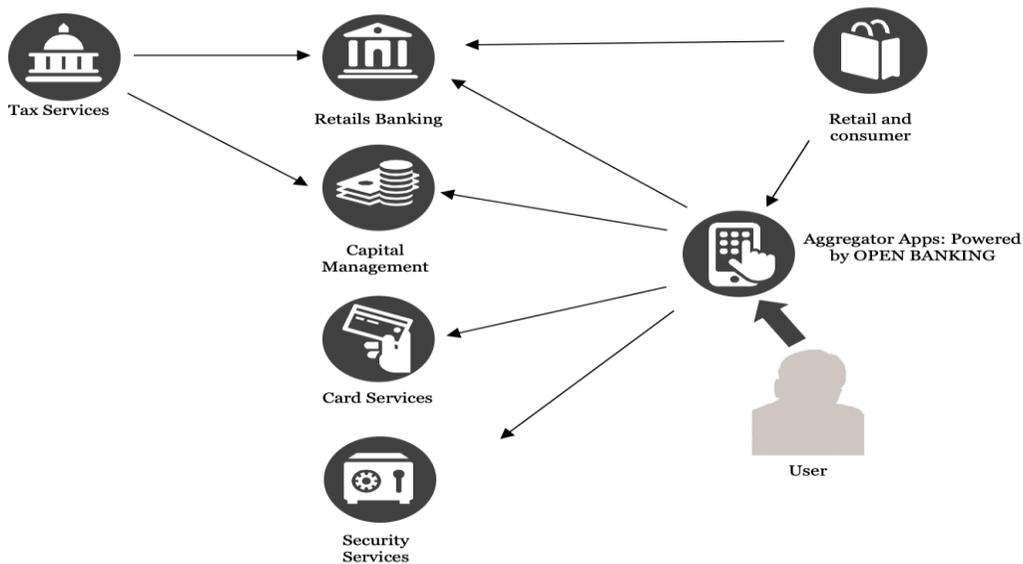

Figure 2. Post Open Banking Federated access to data with a third party provider App.

This newly formed ecosystem has empowered the participants to have ease of consolidation, and get personalized value from the chain drawn by the federated financial model.

4.2 AI in Banking:

Artificial Intelligence (AI) has fundamentally transformed financial markets, offering advanced analytical capabilities that enhance decision-making processes. AI-driven systems leverage machine learning, deep learning, and natural language processing to analyze vast datasets with unparalleled speed and accuracy. Financial institutions increasingly rely on AI for tasks such as fraud detection, trading automation, and credit risk assessment, improving efficiency while minimizing human error. The integration of AI enhances predictive modeling, allowing financial analysts to anticipate market fluctuations and optimize investment strategies [6]. This rise in adoption is also evident in the projected doubling of financial institutions' AI expenditure, expected to reach $97 billion by 2027 (Kearns, 2023). With an estimated compound annual growth rate (CAGR) of 29.6%, the financial sector is now the fastest-growing industry globally in terms of AI investment (La Croce, 2023). This exponential growth has prompted leading financial firms such as JPMorgan and Morgan Stanley Wealth Management to establish their AI infrastructures, recognizing the technology's transformative potential (Kearns, 2023) [7].

AI will provide competitive advantage to the institutions, by optimizing costs, innovate faster and offer improved personalized services. It'll be a key driver for innovation and growth in the financial sector, as it can assist in Regulatory Compliance, Risk Management, Operational Efficiency, last but not the least Customer Experiences.

But, the black-box nature of AI models raises concerns regarding transparency and accountability, necessitating the development of Explainable AI (XAI) frameworks.Therefore a true benefit of AI can be leveraged by the financial institutions by ensuring the data is protected, doesn't leave the institution's own boundary yet can integrate with the wider AI ecosystem.

4.3. AI Meets Open Banking:

There are several examples available wherein the Open Banking in collaboration with AI have completely transformed the financial ecosystem. One of such examples is Tink (Powered by VISA) - Tink has established itself as a leading open banking platform in Europe. The company provides a single API that enables access to aggregated financial data, payment initiation services, and personal finance management tools. This infrastructure allows banks, fintechs, and startups to develop data-driven financial services efficiently. Tink operates across two main areas of open banking: Account Information Services (AIS) and Payment Initiation Services (PIS). AIS involves reading and enriching financial data, while PIS focuses on initiating payments directly from consumers' bank accounts. This dual capability enables Tink to serve a diverse range of clients, from large banks to merchants and payment service providers. [8] [9]

It is now started leveraging AI to add more its already existing value by:

a.AI models categorize and enrich raw banking transactions (e.g., turning "AMZ*12345" into "Amazon purchase, Shopping").

b.Aggregates multiple accounts and uses machine learning to give spending and cashflow insights.

● Another example of how AI along with Open Banking is transforming the federated ecosystem:

Cleo [10] an AI Powered Chatbot connects to user accounts via Open Banking APIs, and provides live transaction and balance information. Enables gamification to engage users to participate in financial well being, in parallel enable individual users to reach their financial targets by providing real time suggestions. It achieves that by:

a. National Language Processing (NLP) to change with the users about their earnings and spending patterns

b. Leveraged trained LLMs to forecast spending vs earning vs savings vs investing plans and warn about overspending. These are all customized by the users. [11].

Third parties are able to reap the fruit of the AI when built upon Open Banking API, but the provider banks aren't able to reap major benefits in Open Banking powered by AI.

4.4. AI to provide Open Banking:

AI implementation is all about accuracy of the given LLM, the more trained an LLM is on the given set of data, the more accurate it is. A challenge in AI implementation always is about Data Privacy concerns, as managing sensitive financial data raises questions about security and compliance. Therefore, the data shouldn't leave the bank's ecosystem just to enable AI.

To overcome this problem this paper illustrates a pattern via which it'll be safer to provide AI solutions for Open Banking, with NO data leaving the Bank's ecosystem.
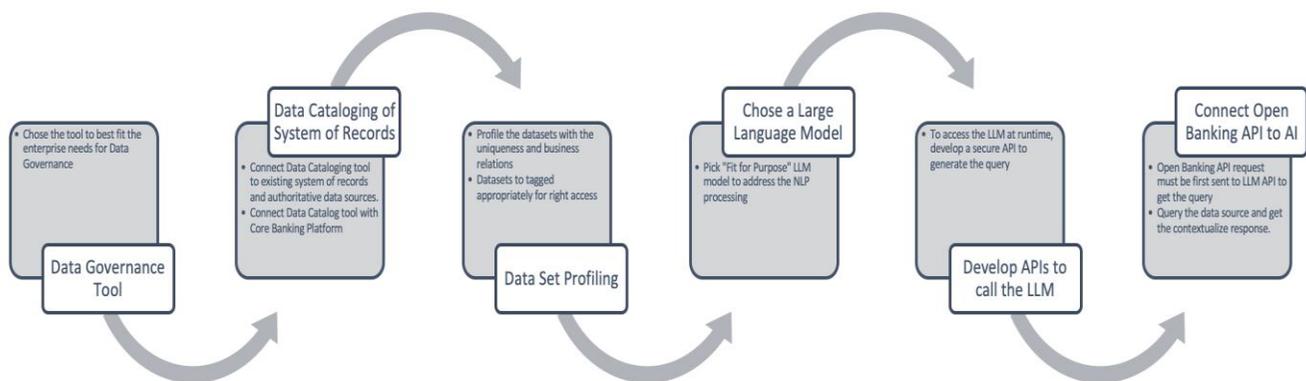
Steps to be followed:

Figure 3. Step by Step illustration of the work work to be completed

1. Introduce a Data Governance Tool into your ecosystem: Data Governance tool is critical for any enterprise to enable data democratization, build cross enterprise collaboration, protect and enhance data integrity and relevance, last but not the least help comply with data protection laws and regulations. [12]

2. Connect the Data Governance Tool to Core Banking Platform, and to other data sources, including but not limited to DataWareHouses, or Delta Lake or Transactional Data Stores: A data catalog centralizes metadata, making it easier for teams to find, understand, and trust data. This improves decision-making, ensures compliance, enhances collaboration, and boosts productivity by streamlining workflows and fostering a data-driven mindset. [13]

3. Profile Datasets for account related and transaction related data : Data profiles enabled through examination of all the datasets, ensuring quality, structure and relationships before it is leveraged in any business processes.

4. Explain and document each data element and fields along with its source of data : Each element and schema must be documented along with its context.

5. Train the best fit for purpose LLM on the data model, data extraction pattern and source of truth : Leveraging the step # 4, the LLM could be trained on the data profiles, its source of truth and type of data profiling. There is NO NEED TO TRAIN the model on the datasets.

6. Develop an API to call LLM with the API and the filter criteria, for example create a query to generate the account snapshot. : to make a call to the LLM in the real time there must be an API available, therefore an API to façade LLM must be developed.

7. During an Open Banking API Call – first make a call to the LLM APIs, get the query in response, and then make a call to the internal banking system to generate the data and share it with the consumer of Open Banking. : To ensure the least amount of engineering efforts required to enable Open Banking Federated APIs, LLM APIs must be called first, to get the query and source of truth details.

8. Consideration, that every SQL query in return must be validated. The delete statement must be validated.: Output of the LLM APIs must be validated before the query is blindly executed on the datasets, as the output query could be of destructive nature, therefore AI Governance is a critical piece of this transaction of Open Banking API that is powered by AI.
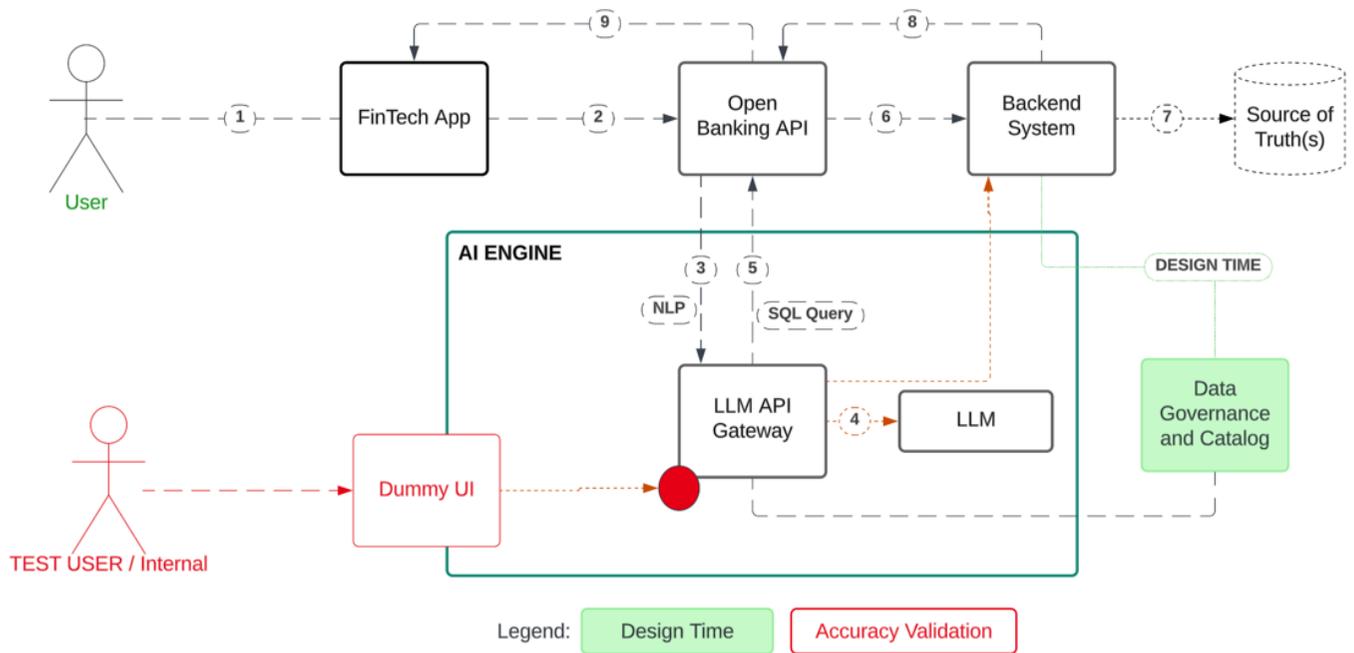
4.5. Run time execution order:

Figure 4. Open Banking APIs, working with AI

Steps to be followed:

1.A Fintech User logs in to an app.

2.FinTech App makes an Open Banking API call to the financial institution.

3.Open Banking API uses the API URI along with filters to make a call to the AI Engine.

4.AI engine responds back with the Name of the data store, fields to be queried, the query for a specific type of data source that could be indexed for better retrieval.

5.LLM API responds with: SQL Query with filters crafted for a given type to the data store, data store name in the enterprise.

6.Backend system will then take the data store name, query the vault to get the connection parameters from the configurations of Data Governance Tool.

7.Query the source of truth to get the data.

8.Share the final data with Open Banking API, where the response is validated against the API response schema

9.Open Banking then finally share the response back to the FinTech's app over the internet.

4.6. Tools recommended:

Colibra for Data Governance, Open AI LLM and API services.

5. Conclusion

The adoption of AI is not a choice anymore for the enterprises aiming for agility, and digital advancement and better client service. The AI powered Open Banking approach discussed in this paper offers a practical approach that allows the AI to be enabled for providing Open Banking without the data leaving the enterprise. It is a balancing act of risk acceptance, cost management, and business growth. By allowing systems to coexist, AI and Open Banking, the pattern allows enterprises to increase time to market for their Open Banking initiatives and control their datasets. Managed by strong governance, automation, and adequate design, AI in Open Banking will provide a framework for reducing risks for data leakage, enabling long-term value. As organizations continue to evolve, adopting this pattern can serve as a strategic enabler for sustainable AI adoption at scale.

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