

Group3 FT5001 Proposal

1. Introduction and Background

1.1 Background

The roots of the foreign exchange (FX) market trace back to its inception in Amsterdam nearly 500 years ago (Tradeciety, 2015). Over time, this market has undergone transformational changes, marked by significant milestones such as the implementation of the gold standard in 1875 and the establishment of the Bretton Woods system post-World War II (Federal Reserve History, 2013). As the years rolled on, the FX landscape transitioned into a free-floating system in 1973, with daily global turnover surging to an astonishing \$7.5 trillion by April 2022, outpacing daily global GDP by 30 times (Schrimpf & Sushko, 2019), all amidst a volatile market backdrop.

1.2 Digital Transformation of FX Market

The digital age has revolutionized FX trading. With the rise of the Internet, geographical barriers crumbled, and FX trading became accessible worldwide. Traditional banks initially held the reins, offering essential liquidity for exchanging and trading currencies. However, the landscape shifted as cloud computing emerged, streamlining transaction processing that used to be time-consuming. Big data technology and artificial intelligence (AI) have taken center stage in digital financial platforms. These advancements have empowered people with internet connections to engage in FX trading, enabling real-time analysis of vast data volumes and market trends, once a privilege reserved for institutional players.

1.3 Project Concept

Our vision is underpinned by cutting-edge technology. We use the power of big data to provide real-time exchange rates and historical data analysis, driving informed decision-making. AI-driven advisory algorithms generate personalized FX investment strategies, tailored to individual goals and risk appetites. Large Language Models enhance user experiences, providing a seamless interface for users to engage with the market. Innovation doesn't stop there. We integrate the Robot Automation Process (RPA) to automate the entire foreign exchange procedure. And, looking ahead, blockchain technology is on our radar, offering the potential to mitigate risks and expedite transactions, and also maintaining security and transparency.

2. Preliminary Problem and Market Analysis

2.1 Problem Statement

There are more than 15 FX brokers available in Singapore, the top 5 are IG, Saxo Bank, CMC Markets, City Index and Plus 500. Most of the existing platforms require a minimum deposit before trading, only the top 5 are regulated by MAS (Hatzakis, Bringans & Shadeck, 2023). Almost all existing platforms involve multiple financial markets, which may cause dirty read for those pure FX traders. In addition, these platforms predominantly focus on FX trading and investment for large financial entities but sideline the demands of individuals. Retail traders are one of the major participants in the FX market. Unlike the other participants such as banks and brokers, individuals face more uncertainty from information asymmetry. Even when the information is released publicly afterwards, many individuals need to dedicate themselves to their jobs during trading hours, which means they will probably miss the news that may affect the currency exchange rates. There are many challenges individual traders have to overcome to obtain the information they need to make most profitable trading decisions.

2.2 Our Solution

To better address the information asymmetry, we must look into its source. The traditional information asymmetry came from the nature and structure of the FX trading (Ranaldo & Somogyi, 2021). Nowadays, the application of automation technology to the trading and settlement has further exacerbated the information asymmetry risk, especially for individual traders. As such, our pioneering Robo-advisory platform redefines this scenario by offering a tailored suite of features designed with the everyday needs of individuals including travelers in mind. We proudly introduce a comprehensive solution that encompasses real-time exchange rates, historical data analysis, and advanced FX management capabilities. Firstly, users can subscribe to currencies that they are interested in trading, and then Robo-advisor will filter, identify and notify by pushing highly related news to them. The selection will be done by our AI model, predictions and suggestions will be given as well. Secondly, for users that are busy with work and cannot monitor the trend, we provide various preset order options over various periods of time. Users can customize multiple parameters to suit their personal needs, including price boundaries, trading frequency, etc. Users can choose

to trust our model and authorize to trade on behalf of them, or receive notification when the target price is almost reached and make decisions themselves.

2.3 Potential Risks

Apart from market related risks, the biggest risk of a trading platform is information leakage and runaway. The stakeholders may have concerns about losing money from fraud scams. To be a legal FX trading app, we will register at MAS for official regulation from the government. Meanwhile, we will apply the latest encryption technology to our app to ensure data security, making sure that any instruction can only be done by the user himself/herself, and build remote disaster recovery sites to prevent data loss. Moreover, our app will publish real-time risk alerts and tips on fraud identification.

3. Project Scope

We expect to approach our project goal from both conceptual and practical perspectives in parallel.

Regarding the conceptual part, we will conduct market analysis according to the designated research aspects distributed to each team member, including consumer behavior and demand, regulation environment, etc. Key issues such as demands of individuals and information asymmetry will be highlighted and addressed through innovative features demonstrated in our product and/or in the report. In the meantime, we expect to find out more unrevealed perspectives during the theoretical analysis. Currently our stakeholder focus is on the individual customers, but potential bank partners may also be considered thoroughly since they may take part in some of our FX procedures as well, for instance, sharing of real-time foreign currency exchange rates through APIs.

As for the scope of our practical achievements, we will demo a state-of-the-art FX application to illustrate our proposed FinTech innovations. The product delivery will be separated into two major targets, i.e., modeling and development.

Modeling is the foremost part of our product delivery as it provides a comprehensive overview and meaningful insights. The modeling is targeted at describing our ideal product, while our prototype will be implemented accordingly in a minimal way. First, a software architecture overview should be included, in which we will design a sophisticated and extensive framework to avoid delivering an unsustainable product. Based on this, we will also draw detailed UML diagrams to illustrate interactions between frontend and backend, as

well as to document system features and analyze user experience flow. ER diagrams that introduce database structure will also be provided to help grasp a better understanding of our features.

The software development is expected to present a full-stack application prototype with a focus on the frontend. The ultimate prototype should be able to demonstrate the workflow of our features and build a general product portrait to the audience during the project pitch.

Below illustrates the specification of our demo application. The overall goal of the below part is to deliver a proof-of-concept product for presentation. Some features may be subject to change in the final delivery, however, our functionalities will still focus on our valued stakeholders, i.e., the retail traders.

We expect the frontend can demonstrate following components:

1. Homepage. Users can peek at their profiles, wallet, leaderboard, and line chart of progress of their current goals. It also navigates users to different secondary pages.
2. Dashboard for historical data analysis and real-time exchange rates. It should be able to explain the logic flow of our progressive FX wallet. If a user has set up a fixed-term FX automation, historical data dashboard will show its real-time progress and robot operations by corresponding diagrams and metrics until the goal achieved. As for other needs such as market overview, a dynamic data table will be included to reflect current exchange rates. Source data may originate from sample dataset or public API.
3. Robo-advisor interaction page. It consists of a GPT-based consultant's chat room and an algorithm-based automated trading robot configuration panel. In the chat room, users can seek advice from the Robo-advisor while the advisor responds according to articles, news, and data retrieved from the backend; In the configuration panel, users may customize their own trading strategies by directly modifying the parameters such as bid price and expected withdraw time. The former component will be equipped with full features, while the latter component may use pseudo data without sophisticated machine learning algorithms for demonstration purposes.
4. Leaderboard. It should show user rankings according to metrics such as saved money per 100 SGD using their customized Robo-advisors compared to an instant cash exchange.

Backend and database should be capable of handling API requests from the frontend and return correct responses. The overall framework should present its interoperability and

extensibility. Ability to provide stable bidirectional connections is expected, in order to serve real-time messaging between users and Robo-advisors.

4. Proposed Methodology

In the process of developing the FX app, our team will adopt a comprehensive and structured methodology that aligns with the project's objectives, stakeholder engagement, risk mitigation, iterative development, and market analysis. This holistic approach comprises the following cohesive parts:

4.1 Agile methodology

Due to the compact timeframe, a fully featured product delivery may not be possible and loses its focus. To implement our state-of-the-art application, we believe Agile software development methodology is the best fit for this scenario. Specifically, we will implement the Scrum framework (Scrum.org, 2023) to facilitate iterative development and enhance flexibility. By dividing the project into sprints, we promote incremental progress and allow for frequent adjustments based on stakeholder feedback and changing requirements. From the perspective of programming, separation of concerns helps to accelerate the product deployment process. The backend and frontend of our application will be divided to facilitate concurrent development. Additionally, we will utilize popular frameworks such as Vue and Flask in a progressive manner in order to align with Agile methodology.

This approach ensures that the project remains adaptable, mitigates risks, and delivers tangible results at the end of each iteration.

4.2 Market Analysis and Stakeholder Engagement

4.2.1 Market Analysis

As an essential part of our methodology, We integrate Agile Market Research into the process of developing our app. This approach allows us to conduct in-depth market analysis concurrently with the development phase. By employing Agile principles in our research, we can gather consumer feedback quickly and iteratively, swiftly adapt to changing market dynamics and respond to emerging trends. This phase aims to delve deeper into the FX market, offering insights that will drive the app's development. We will conduct comprehensive research to understand market trends, user preferences, and pain points. This analysis will inform the decision-making process regarding feature validity and prioritization.

By leveraging data-driven insights, we ensure that the app remains aligned with evolving market dynamics.

4.2.2 Stakeholder Engagement

An integral aspect of our methodology is active stakeholder engagement. We employ Agile practices to foster continuous collaboration and feedback from key stakeholders. Effective communication channels are established to facilitate transparent interactions during sprint review and retrospectives. By incorporating stakeholder insights into the development process, we ensure that the app meets their expectations and addresses their needs. The iterative approach guarantees that the final product resonates with the intended audience and effectively addresses market needs.

4.3 Design and Architecture

In **Appendix A**, we designed the initial UML diagram for our development. We will follow the logic flow and evolve it during development according to the Agile principle.

4.4 User-Centric Design

Design and architecture will be guided by user-centric principles. We will create user personas and journey maps, leveraging insights from market analysis to design an intuitive and engaging user experience. The user interface will prioritize ease of use, ensuring that users can seamlessly navigate the app to achieve their currency exchange goals. Design decisions will be influenced by the app's target audience, their preferences, and industry best practices.

4.5 Robo-Advisory Algorithm Integration

Drawing upon insights from both market analysis and user requirements, we will integrate advanced trend prediction algorithms into the Robo-advisor module. Collaborating with data scientists, we will ensure the accuracy and reliability of these algorithms. The integration process will follow Agile principles, with regular feedback loops to refine and optimize algorithm performance based on real-world usage.

4.6 Progressive FX Wallet and Centralized Management

Design and architecture will encompass the development of the Progressive FX Wallet and Centralized Management Service. Insights gained from market analysis will inform user

interfaces that prioritize security, privacy, and user-friendly interaction. The architecture will ensure seamless integration of these modules into the overall app ecosystem, providing users with effective tools for managing their foreign currency transactions.

5. Initial Project Plan

Each team member will be distributed tasks according to personal skills and interest.

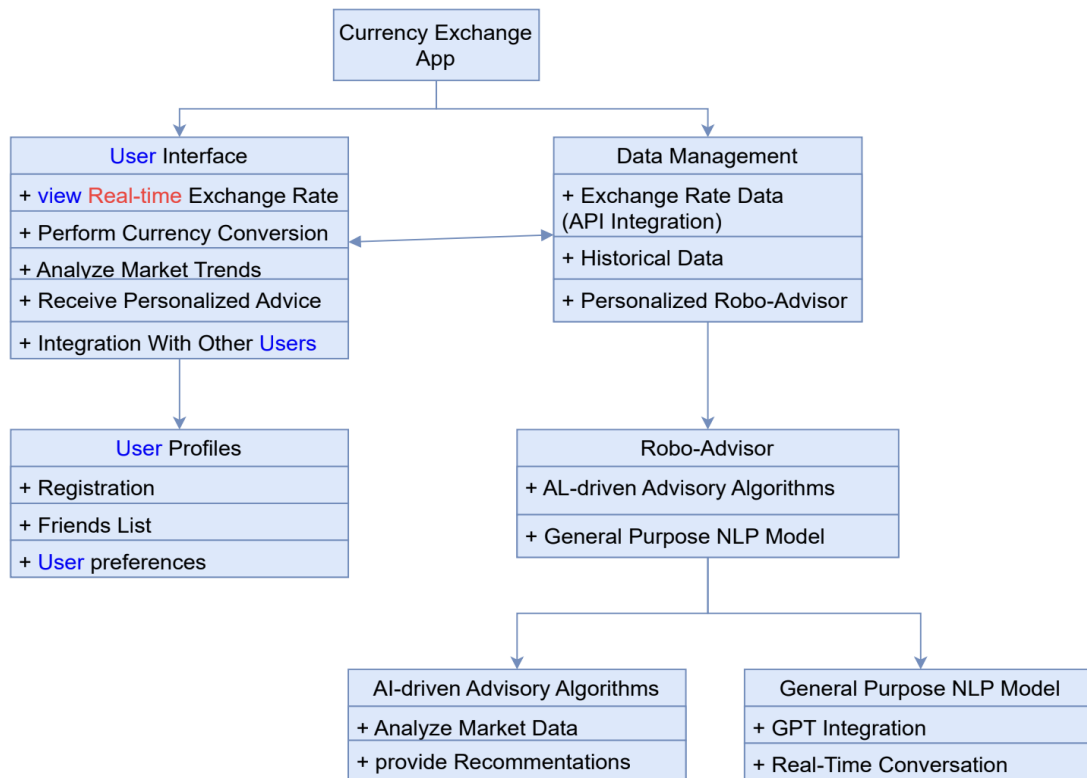
Generally, Huang and Xu will be responsible for the conceptual part while Liu and Geng will handle the practical targets. However, all members should accomplish their designated market analysis perspectives while fulfilling their own tasks.

In **Appendix B**, we provide a detailed timetable to illustrate the detailed plan and milestones the project is going to achieve.

Reference

1. Tradeciety. (2015, July 19). The History of Currency Trading and the FX Market.
2. Federal Reserve History. (2013). Creation of the Bretton Woods System.
3. Schrimpf, A., & Sushko, V. (2019). FX trade execution: Complex and highly fragmented. BIS Quarterly Review, December.
4. Hatzakis, S., Bringans, J., & Shadeck, J. (2023, July 18). 18 Best Forex Brokers Singapore for 2023. ForexBrokers.com. <https://www.forexbrokers.com/guides/singapore>
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6. Scrum.org. (2023). What is Scrum? Scrum.org. <https://www.scrum.org/resources/what-scrum-module>

Appendix A



Appendix B

We ek	Date	Conceptual	Practical
3	29 Aug	Preliminary market analysis	Construct framework skeleton
4	5 Sep	Product Modeling Diagrams Features Feasibility discussion	Frontend: Robo-advisor UI component Backend: Robo-advisor API setup
4	10 Sep	Complete Conceptual Analysis (ddl of Individual Report)	Frontend: Dashboard of FX rate collations Backend: Database configuration
5	14 Sep	Other features validity discussion	Frontend: Friends and Leaderboard Backend: Demo simulation for progressive FX trading automation
5	17 Sep	Materials for Project Pitch (Slides)	Frontend: UI perfection, debug and modification Backend: Backend perfection Materials for Project Pitch (Prototype)
6	24 Sep	Complete Project Report	N/A