BC3402 Financial Services Process and Analytics

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1. Overview

The following report is prepared by AlgoTrader for NTUBank to assist the bank in the digital transformation of the Investment Banking Division. The objective of this report is to present our research, analysis, action plans and detailed descriptions of how we plan to integrate Algotrader proprietary software with NTUBank's existing banking and trading capabilities. In order to do so, a thorough preliminary assessment of NTUBank's current technological capabilities and competitive advantages were first carried out. AlgoTrader's solutions and its applicability to NTUBank are then further elaborated. Lastly, this report will appraise an estimated cost structure required by NTUBank for the implementation of AlgoTrader's solution.

2. Executive Summary

This report seeks to provide a comprehensive Investment Banking (Sales & Trading) management solution to NTUBank.

2.1. Situational Analysis & Key Issues

NTUBank has been a key player in the financial and banking industry in Singapore. In recent years, NTUBank has seen a slowdown in the growth of the Investment Banking Division (Science & Technology) because of its legacy system. There has been a lack of streamlining and end-end automation in the handling of the trade cycle in NTUBank. Amidst a time of rapid change and disruption, it's imperative that NTUBank continuously innovate to stay competitive.

Looking at the broader macroeconomic backdrop, more buy-side clients (i.e. hedge funds) have been turning into a more active, systematic and quant style of trading. In Europe and the United States, algorithmic trading solutions have been gaining greater prominence as more traders develop more sophisticated algorithms to source liquidity in a fragmented market. This trend will probably move to the Asia-Pacific region in years or months to come (Bloomberg Intelligence, 2021). As more funds become more comfortable with algorithm wheels, a toolkit that enables buy-side traders to more easily on-board, back-test their algorithms will provide a great-value add. Thus, NTUBank can consider providing an integrated development environment for traders to develop their strategic algorithms as an additional value-add.

Another opportunity that NTUBank can take advantage of is the growing institutional and retail appetite for digital assets, in particular cryptocurrency. A report by Eurex has shown that almost 40% of buy side institutions are interested

in becoming active and plan to invest in digital assets like cryptocurrency in the next 12 months (Eurex, 2022). The growing interest shown by institutional investors in crypto is not unusual as cryptocurrency will provide three key benefits to institutional portfolios: high potential returns, low correlation to other assets and liquidity (Mayhew, 2022). Prominent hedge fund leaders like billionaire investor Steven Cohen, who runs Point 72 Asset Management and Ray Dalio, founder of the world's largest hedge fund, Bridgewater Associates have published their support for bitcoin and other digital currencies (Semenova, 2021). With many funds looking to expand their exposure to cryptocurrency, it will be advantageous if NTUBank can catch the cryptocurrency wave.

2.2. Recommendations

AlgoTrader, an award-winning algorithm and order execution system can help NTUBank reach its full potential. We have proposed the following action plans to improve the current workflow and trading capabilities of NTUBank:

2.2.1. Wireswarm
A digital asset trading and connectivity for banks and brokers

2.2.2. OEM
Order and Execution Management System for systematic and discretionary buy-side institutions with managed connectivity to over 400 liquidity venues.

2.2.3. Quant
An end-end trading solution with automated trade signal generation and order execution

3. Situational Analysis

3.1. Introduction to NTUBank

NTUBank is a Singaporean commercial bank and financial service company headquartered at the Marina Bay Financial Centre in the Marina Bay district of Singapore. It is a universal bank with operations in consumer, corporate, institutional, and investment banking. Established in the late 2000s, NTUBank today is a full-service, full-integrated provider of corporate and investment banking, commercial banking, asset management and private banking. The company was established in the early 1900s where the corporate & Investment Bank segment is the largest source of income till today because of its long history in Singapore.

3.2. SWOT Analysis of NTUBank

Strengths	**Excellent Financial Position** NTUBank continues to enjoy significant growth and a robust balance sheet despite global uncertainty and turbulence. With strong financials, NTUBank's day-to-day operations are run with great stability, assuring its clients and investors. NTUBank's strong fundamentals have also allowed them the unmatched opportunity to invest and grow and the ability to continue to generate recurring earnings even in tough market conditions, i.e. strained US-China relations, COVID-19 pandemic and more recently the Russian, Ukrainian Crisis. With a strong free cash flow, NTU bank will have sufficient resources to upgrade and expand into new projects.
Weakness	**Backdated Legacy System in Investment Banking Division (S&T)** In more recent years, digital channels have become one of the primary ways to access the bank's offerings and digital products. Due to its long history, many of NTUBank's systems and processes are manual and backdated. Thus, in order to support these digital interactions, NTUBank has embarked on an ambitious journey to digitize the sales and trading value chain. However, there has been a sharp contrast between bold visions of the bank's management, and the immediate difficulties NTUBank faces in managing their digital initiatives. While an in-house system was developed 12 years ago to move the company towards electronic trading instead of phone trading, the migration to the poorly built, complex and fragmented system has been largely unsuccessful. Major asset classes, which could be easily electronized like futures and cash equities, continue to be done on the phone with heavy trader involvement. NTUBank only conducts agency trading through phone calls. The company's middle and back office process remains inefficient with low automation. NTUBank's bias towards liquid flow products, e.g. F. X, equities with significant scale means an "all-in" digitization strategy is needed. Taking into consideration the company's previous lackluster track-record at incubating and managing digital initiatives, having a

	third-party to manage its digital initiatives will be ideal. NTUBank should not attempt to maintain its status quo, as the value at stake from digitization is significant enough.
Threats	**Competitive Banking Landscape** The banking industry in Singapore faces intense competition with the entry of new digital players into the banking and finance sector. NTUBank can expect to face modest competition from the entrant of new digital banks. The Singapore government has granted full banking licenses to SingTel and Grab and Sea Limited. Digital Wholesale banking license has also been awarded to Ant Financial and Greenland Financial Holdings. This is amidst the competition by the major 3 local banks, DBS, UOB, OCBC and a plethora of international banks like Citigroup, Standard Chartered, etc. Many investment banks also provide a range of well developed trading execution platforms for its clients. For example, Goldman Sachs has the Marquee suite, Barclays has the BARX cross-asset electronic trading platform and Deutsche Bank has the AutoBahn platform to serve their institutional clients. NTUBank needs to upgrade its entire suite of products and trading platform to remain competitive and better serve her clients.
Opportunities	**Boom in the Cryptocurrency Landscape has accelerated demand for cryptocurrency offerings** Singapore's crypto friendly attitude and well-regulatory local crypto industry will offer a promising environment to facilitate growth in this area of fintech. There has been a robust demand from mainstream retail investors, corporate investors, accredited individuals and investment firms to invest in cryptocurrency (CNA, 2021). For example, many cryptocurrency platforms like Binance, Crypto.com and Coinbase have come to Singapore. Singapore's own local bank DBS, has launched the DBS digital exchange that enables institutional and accredited investors to tap into a fully integrated tokenization, trading and custody ecosystem for digital assets. Singapore has grand ambitions to become the global crypto hub (Chanyaporn, 2021). If NTUBank is able to introduce cryptocurrency services and a crypto trading desk. She will be

	able to catch the current crypto boom and will likely enjoy a first mover advantage in the space. **Revitalize Quant Strategies** Today many of the hedge funds are looking into systematic and quantitative trading and hope to move away from traditional trading means. This trend is not only for the major giants but also the smaller firms. Smaller hedge funds and family offices have also shown in interest in moving away from discretionary trading to a more algorithm based style. Some examples include Astignes Capital and Dymon Asia have all been working on ramping up on their systemic trading teams. NTUBank can leverage on new technologies such as those of AlgoTrader to allow her clients to create an integrated development environment to develop their strategic algorithms. This brings new opportunities for NTUBank to offer for buy-side clients to develop, backtest, and optimize systematic algorithms. Leveraging on opportunities in the quant and crypto space could allow NTUBank to build their own niche instead of competing directly with large investment banking giants like JPMorgan and Goldman Sachs.

In summary, in a rapidly evolving digital age, NTUBank needs to continue to be responsive and agile in the face of digital innovation and disruption. NTUBank should strive to work on its weaknesses and will find that an investment in end-to-end automation of the entire lifecycle of a trade a "no-regret" move that drives significant value. The small and nimble bank could quickly be the first mover in setting up a cryptocurrency trading desk and offer quant strategies that no other bank in Singapore currently do. Pivoting into offering an integrated development environment and quant trading as a service for the buy side can help NTUBank open up new sources of revenue.

4.   Recommendations

4.1.   Introduction of AlgoTrader

AlgoTrader is a global leader in institutional trading technology by orchestrating the entire digital asset trade lifecycle from pre-trade risk checks, to order generation, automated settlement and custody reconciliation. It also supports direct market access and full trade life cycle automation. AlgoTrader is based in Zurich, New York, and Singapore and is developed by trading system veterans

and crypto assets. We are trusted by the world's leading companies and banks such as Switzerland's InCore Bank, a Swiss-based B2B transaction bank.

AlgoTrader's unique strategic value proposition lies in its ability to not only benefit buy-side clients but can also be uniquely catered to banks and prime brokerages. This makes its technology more suitable for NTUBank than pure OEMS providers. With AlgoTrader expertise in providing customized and tailored solutions, NTUBank will be able to seamlessly integrate with AlgoTrader's end-to-end platform.

5. Wireswarm

Wireswarm is an institutional grade trading platform by AlgoTrader with low-touch direct market access and core banking integration. Wireswarm can be delivered either as a Software-as-a-Service (SaaS) or an on-premise tailored solution. Wireswarm can be used by both inhouse-traders and buy-side clients who wish to issue orders through NTUBank.

5.1. Trading Venues and Market Data Providers

Wireswarm provides connectivity to 400+ trading platforms through its multi-asset platform and single FIX connection, inclusive of both traditional Equity, FX, Fixed Income and Derivatives, and Crypto Spot, Options, Futures and Perpetual Swaps.

Traditional Assets	
Brokers	Interactive Brokers, Sino, LMAX, FXCM, Dukascopy
Data Vendors	Bloomberg, Reginitiv, QuantHouse, Quandl, Intrinio
Intermediaries	Bloomberg ESMS & Tradebook

| Crypto Assets	
Brokers	Bitpanda, Bitcoin Suisse, Crypto Finance
Data Vendors	CoinAPI.io, CoinMarketCap
Exchanges	FTX, Gemini, Coinbase, Kraken, Bitstamp, dYdX
OTC	BlockFills, B2C2

For clients keen on providing traditional asset trading services, clients have easy integrable access to Bloomberg EMSX and Bloomberg Tradebook which provides an external suite of services not limited to delta-neutral trade hedges, option risk management tools, DMA and algorithms for BTEC and key interest rates and bond futures with cross-market spread integration.

Algotrader has also recently established a partnership with dYdX, a leading Decentralised Exchange for crypto derivatives. This integration provides an additional liquidity venue for NTUBank's traders and buy-side clients. Traders also have access to cost-efficient leveraged trading instruments, with instant trade execution, on-chain settlement, zero gas costs and minimised trade fees.

5.2. Financial Use Cases

Trading as a service is a huge potential to improve scalability while minimising costs in sell-side flow businesses (McKinsey & Co., 2021). According to Figure 1, there is an exponential decrease in cost per trade as volume increases for banks which have structurally adapted itself to scale their trading volume capabilities.
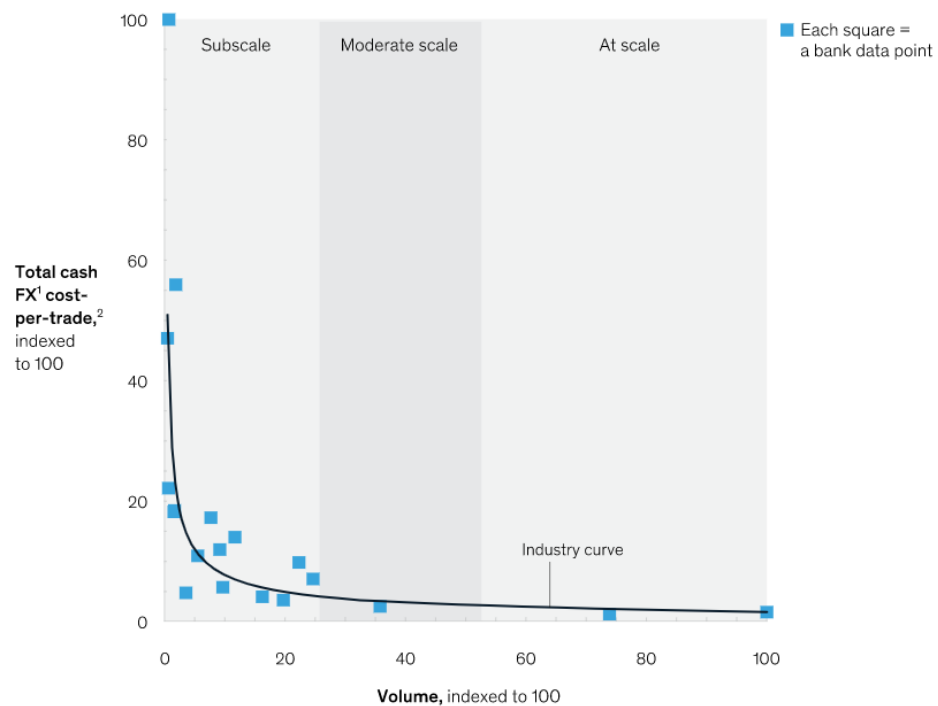
Figure 1: Cost per Trade for Representative Banks

Conventionally, two modes of trading are conducted by sell-side financial institutions:

5.2.1. Agency Trading

Agency trading is a popular method for executing orders on behalf of buy-side clients. This process comprises the entire trade cycle; Pre-Trade, Trade and Post-Trade processes. Algotrader offers a plug-and-play model with the bank's existing API to enable seamless integrations with custom settlement logics and custodian management. AlgoTrader provides multiple external venues of execution to ensure best execution with minimum delay, even in periods of peak volatility.

5.2.2. Principal Trading

AlgoTrader allows traders at NTUBank to internally net client orders and execute them against their own inventory. This helps to decrease overall trading costs by trading on aggregated client flow, allowing for more convenient ways to manage individual books, and also to neutralise greek exposures with automated hedging strategies.

5.3. Value Add to NTUBank (Wireswarm)

Since 2008, the revenue models have drastically changed with the collapse of Bear Stearns and Lehman over the financial crisis. The Sales and Trading (SnT) Division faced one of the largest changes, with the Volcker Rule (passed as part of Dodd-Frank) preventing banks from conducting their own proprietary trading.

The SnT business continues to face disruptions in the wake of latency-based technological advancements, where huge quantitative trading firms like Jane Street and Citadel have stepped into the competitive landscape, further eroding the profit margins of investment banks. (CBInsights, 2020) Investment Banks started to develop their own e-trading platforms like Marquee (Goldman Sachs), Autobahn (Deutsche Bank) and BARX (Barclays) to help scale their business by automating trade processes.

After communicating with the representatives from NTUBank's Global Markets Division, we have consolidated a few key points which Wireswarm can help address and add value.

5.3.1. Scalability

The global fixed income market represents roughly $130 trillion in debt outstanding, a notional amount which is impossible to be facilitated manually (Barclays, 2021). Wireswarm can help to automate the majority of trade orders for standardized products, enabling traders to focus their market making scope to high-ticket discretionary orders. This makes the business much easier to scale, where OEM Wireswarm can be repackaged as an NTUBank product as a service to offer buy-side clients.

5.3.2. Product Specialisation

Crypto Trading is a relatively new topic for the SnT business, with some investment banks building teams in their New York offices. With WireSwarm, NTUBank has the first-mover advantage in Singapore, enabling the company to establish a reputation as the go-to provider for competitive crypto quotes and execution.

5.3.3. Optimised Non-Flow Trading

Wireswarm can be customized to integrate with existing API's within NTUBank. For highly-complex and non-standardised products (For e.g. Mixture of Cross-Asset Exotic Options bundled with emerging market bonds), the valuation of the product can be computed in realtime by aggregating prices of the product's constituent on Wireswarm in real-time. Options and greek analytics can be generated on the fly, enabling traders to easily manage and hedge a book of complex products without having to compute them manually or having to vet the numbers through the risk department. As an illustration, you may refer to Figure 2 showcasing a similar application in Deutsche Bank's AutoBahn.

Prem Ccy	Total(USD):	USD
Status ⊞	OK	OK
Price (%EUR)	0.3180% /0.3570%	0.5120%/ 0.5310%
pips (USD) ⊞	42.90 /48.00	69.00 / 71.50
Premium ⊞	Rcv USD 4,288	Rcv 6,897 / Pay 7,153
Mid Premium	Rcv/Pay USD 4,545	Rcv/Pay 7,025 USD
Delta	-253,500	-496,678 EUR
Delta (%)	-26%	-50% EUR
Vega	-326	-1,514
Vega (EUR)	-242	-1,124
Gamma	-75,927	-402,427
BS Hedge to do ⊟	Buy 254,000 EUR	Buy 497,000 EUR
BS Fwd Hedge to do	Buy 254,000 EUR	Buy 497,000 EUR
	Hedge Type	Spot
	Hedge Rate	1.3467
	Traded Premium Type	Spot

Figure 2: AutoBahn Risk & Hedging Illustration

5.4. Future of Banking & Finance

In the past decade, Investment Banking has seen its profit centers' profit margins been eroded by technology and regulations across all core banking departments (CBInsights, 2020). Wireswarm elevates NTUBank as a forward-looking institution by transferring competencies in conventional banking and financial services surrounding traditional asset classes to provide a high quality of service

towards digital assets and decentralized finance. This also allows NTUBank to expand on the product offerings and caters to more tech-savvy clients or clients that are interested in diversifying into digital assets. Furthermore, Wireswarm makes the business scalable, while making core trading operations efficient, enabling NTUBank to focus on leveraging digital innovation to grow new income streams (e.g with a new crypto desk).

6. OEMS

Order, Execution, and Management System, OEMS, is a low-touch order, order management system (OMS) that allows clients to enter orders to a wide range of preferred liquidity venues, perform algorithm execution, configure order types and parameters, analyze and manage accounts and portfolios, review performance, draw insights, and also enforce pre-trade risk controls . It also allows a seamless integration with AT QUANT or any third-party signal generating service upstream via a proprietary FIX/Rest/Websockets connectivity.

6.1. OMS (Smart Order Routing)

OEM's Smart Order Routing allows the clients orders to be routed to a wide range of liquidity venues, such that it is executed in the venue that offers the best possible price. These venues include brokers, digital asset exchanges, intermediaries and over-the-counter (OTC) desks such as the following

Brokers	Dukascopy, Sino, Bitcoin Suisse
Exchanges (Digital Assets)	Bitstamp, Binance, Bitfinex
Intermediaries	Trading Technologies, Bloomberg Tradebook

6.2. Execution Algorithm

OEMS offers the following smart execution algorithms:

TWAP	Trades are executed evenly across a time period
VWAP	Trades are executed ratio of volume of dollar traded to the corresponding share volume over the trading horizon
POV	Limit on on trade size to achieve a target percentage of volume
Sniper	Execute trades equivalent to the lesser of available quantity at a price on the opposite side or better, or the remaining quantity to

	execute
Iceberg	Break up a large order into an order queue. Order is sent only when the previously sent order in the queue has been filled.
Trailing Limit	Stop orders at a percentage from the market price, executed when prices move in an unfavorable direction
Market Sweep	Trade orders are executed by taking all liquidity at the best price, then all liquidity at the next best price.

The client can split clients orders using the execution algorithms into smaller child orders which can then be directed to different liquidity venues. As NTU bank currently offers only TWAP and VWAP manual execution, we believe that having a multitude of algorithm options can provide clients with more options and controls to execute with a better level than the TWAP, VWAP benchmarks, reducing implementation shortfall.

This would be attractive to institutional clients who intend to make a large order and want to avoid disrupting the current trading prices or letting other participants know about their movements with a single, large order.

6.3. Order Parameterization

OEMS allows the clients to make configurations on their orders:

Parameter	Values
Order Type	Market, Limit, Stop, Stop Limit
Time-In-Force	Fill-Or-Kill, End-Of-Day, Good-Till-Date, Good-Till-Canceled, Immediate-Or-Cancel

6.4. Pre-trade Analytics

OEMS allows an admin to mandate rules along with internal risk and compliance checks by applying rule-based order management pre-trade checks to all orders before market submission.This includes credit risk compliance such as credit limit for each trading accounts, as well as market risk compliance such as the limit on the volume for a single equity. Compliance checks will help to ensure that trades adhere to regulations and prevent illegal trades.

6.5. Margin Trading

OEMS supports margin trading where NTUBank can loan funds to its clients to trade, allowing NTUBank to earn interest rates on those loans.

6.6. Off-Chain Trade Funding and Settlement for Digital Assets

OEMS can also significantly reduce counterparty risks for its clients in cryptocurrency trading. OEM supports Fireblocks, which is an off-chain service for cryptocurrencies that eliminates the need to make deposits around multiple exchanges (FireBlocks, 2018). Cryptocurrency exchanges require each participant to only trade from their own exchange custodian account. Trades are settled immediately on the exchange without counterparty risks. However, moving money in and out of the exchange deposits would incur a large amount of blockchain transaction fees. Hence, Fireblocks helps to eliminate these transaction fees by transacting between exchange custodian accounts off-chain. This also allows instant funding before making an order by reducing the need to place funds in different custodian accounts. This allows the client to settle and move assets off an exchange either on demand or at a pre-defined time period to balance between counterparty risk and blockchain transfer fees.

6.7. Value Add to NTUBank (OEMS)

6.7.1. Vertical Integration of Value Chain

Providing low-touch services like execution algorithms, order routing and pre-trade analytics can allow NTUBank to operate with a greater value, thus providing NTUBank with more avenues of income. Electronic trading will also allow NTUBank to be more competitive as the industry shifts towards automation of high-touch trading services since the 2008 financial crisis. This allows NTUBank to cater to the low-touch demands of buy side clients without expanding headcount.

6.7.2. Synergy with Existing Financial Services

OEMS could offer NTUBank a strategic gateway to build its credit business as it offers margin trading to its clients. Clients can borrow funds from NTUBank with an interest rate to perform trades, and NTUBank can assess and manage its risks correspondingly. NTUBank can also leverage the relationships with its clients through OEMS to promote its treasury services, which include global transactions and foreign currency conversion.

7. Quant

Algotrader provides an integrated development environment to develop strategic algorithms. The development environment has a well-designed system, efficient backtesting procedure, easy optimization and best execution.
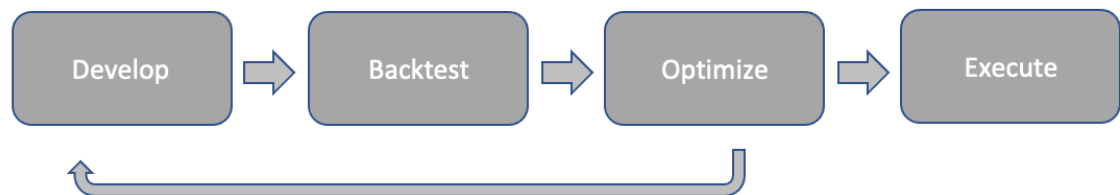
7.1. Strategic algorithms development

7.1.1. System design

Algotrader provides flexibility in development. Developers can write systematic strategies directly on AlgoTrader's integrated development environment using Python or Java, or integrate existing strategies into AlgoTrader API that allows the code to be written in any language. Data source can be easily integrated to algotrader as well, whether it is off-the-shelf live data, or your own data.

7.1.2. Backtesting method

The algotrader platform allows developers to use the same code for backtesting, paper trading and live trading. This reduces risk of errors and is more time efficient compared to traditional methods where backtesting code may be written in one language and a live trading system written in another language. After backtesting, a comprehensive backtesting report is generated that shows the performance of the strategy against historical or live market data, allowing for a more comprehensive analysis of the strategy's performance.

Figure 3: AlgoTrader BackTest report

7.1.3. Optimization

After running the backtests, algotrader can suggest the best parameter ranges that will generate the best returns for the strategy automatically.

7.1.4. Execution

Once the strategy is developed, algotrader enables easy live deployment of strategies to markets. With OEMS, algotrader ensures the best execution for the strategy across trading venues through smart order routing and a wide range of execution algorithms.

7.2. Quant use cases

7.2.1. Neutralize greek exposures in principal trading

Principal trading involves internally netting client orders and executing them against NTUBank's own inventory. NTUBank buys shares on the secondary market and holds them in their own account with the hope the prices will appreciate. Once it hits the desired price, brokers sell its inventory and make a profit. Quantitative researchers in NTUBank can use algoTrader AT QUANT platform to develop strategic algorithms to minimize the risks from principal trading by hedging off greek exposures.

7.2.2. Hedge off risk in OTC trading

In OTC trading, there is a lack of information about the company and they are commonly exchanged in thinly-traded markets. NTUBank can develop strategic algorithms to hedge off the risk involved in OTC trading by using derivatives, such as options.

7.2.3. Provide the service for buy side clients

We can repackage AT QUANT for buy-side clients, such as systematic hedge funds. They can leverage this development platform to develop strategic algorithms to capture profit opportunities. This allows for more persistent alpha. Unlike traditional quant investing, where signals generated are fixed and not responsive to changing market environments, machine learning systems analyse changes and adapt time frames of the measurements and price predictions, potentially enhancing alpha generation across different market environments.

7.3. Value add to NTUBank

7.3.1. New potential revenue stream

There is an increase in buy-side clients adopting systematic algorithms for trading. The number of hedge funds globally has increased to around 8,000 holding a total asset value of more than $4 trillion. ("Algorithmic Trading Hedge Funds", 2022) and top performing hedge funds are increasingly using strategic algorithms to trade the majority of their total value traded. This brings new opportunities for NTUBank to offer the Algotrader integrated platform for buy-side clients to develop, backtest, and optimize systematic algorithms.

7.3.2. Aid quant research effort by providing a convenient all-in-one platform to conduct research experiments

AI in the banking market to reach $64.03 Billion globally by 2030 at 32.6% compound annual growth rate. (Correa, 2021) Algotrader can better support research and development as it can improve the workflow of quant researchers as they are able to develop, backtest, and optimize the algorithms on the same platform. This eliminates the need to port from one codebase to another for developing and backtesting the codes.

7.3.3. Automated report generation for accurate reporting

A comprehensive report can be generated automatically, consolidating and documenting experiments or actual results accurately. This eliminates manual data processing steps that are time consuming and are exposed to the possibility of human error.

8. Cost structure

8.1. Fixed Costs

8.1.1. Integration Fee

NTUBank will incur a one-time integration fee as a team of AlgoTraders' engineers would integrate algoTrader into NTUBank's current system. AlgoTrader's engineering team consisting of a quantitative developer, quality assurance engineer, and devOps engineer will ensure the successful integration of AlgoTrader.

8.1.2. Equipment cost

Desktops or laptops are required to use AlgoTrader and the minimum requirement of the equipments are outlined as follows :

1. Dual Core Intel® Core™ i5 processor
2. 8GB of LPDDR4x RAM
3. 250gb HDD storage

8.2. Variable costs

8.2.1. AlgoTrader yearly license

AlgoTrader is available as a subscription-based license with yearly licensing terms. As such, companies need to pay a yearly fee to maintain the license to use AlgoTrader.

8.2.2. Server hosting cost

Amazon AWS can be used to host their productive AlgoTrader server. The recommended Amazon AWS instance is at least type type t2.xlarge, ideally instance type m5.2xlarge.

1. **T2.xlarge**

   T2.xlarge costs $0.1856 per hour, and this adds up to $1646.88 per year.

2. **M5.2xlarge**

   M5.2xlarge costs $0.384 per hour, and this adds up to $3363.84 per year.

8.2.3. NTUBank Engineer cost

To fully utilize AT Quant, NTUBank would need to hire quantitative strategists to develop strategic algorithms and quantitative developers to deploy the strategic algorithms to the live market.

9.   Roadmap

The product will be rolled out in 5 phases:
1.   Clarifying Objectives
2.   Product Development
3.   Alpha Testing
4.   Beta Release
5.   LTS

The core components of AlgoTrader (Wireswarm & OEMS) will be rolled out progressively to NTUBank traders until it attains production quality. Thereafter, supplemental features (Quant) will be developed and tested internally, before releasing the product to external clients. Our Engineering and Product Development will continue to work closely with NTUBank's Digital Technology Team to ensure continued support in updating and maintaining NTUBan'ls OEM AlgoTrader.

(1) Clarifying Objectives
We will collect, analyse and identify specific data to better inform stakeholders of costs and identify potential constraints

2022 Q3

(3) Alpha Testing
We will release the first version of the software to NTUBank Traders and simultaneously resolve bugs, while improving the product.

2023 Q2

(5) Long Term Support (LTS)
To adapt to the competitive landscape, we will continue to work closely with NTUBank for additional features and implementing feature updates

2022 Q2

2022 Q4

2025 Q2

(2) Product Development
We will identify and plan the necessary API endpoints for integration with NTUBank's existing infrastructure with AlgoTrader Wireswarm and OEMS

(4) Beta Release
We aim to release a production-level Wireswarm product with limited Quant access for selected NTUBank Clients. We will progressively suggest and build the necessary features to fully productionise Wireswarm, OEMS, and Quant
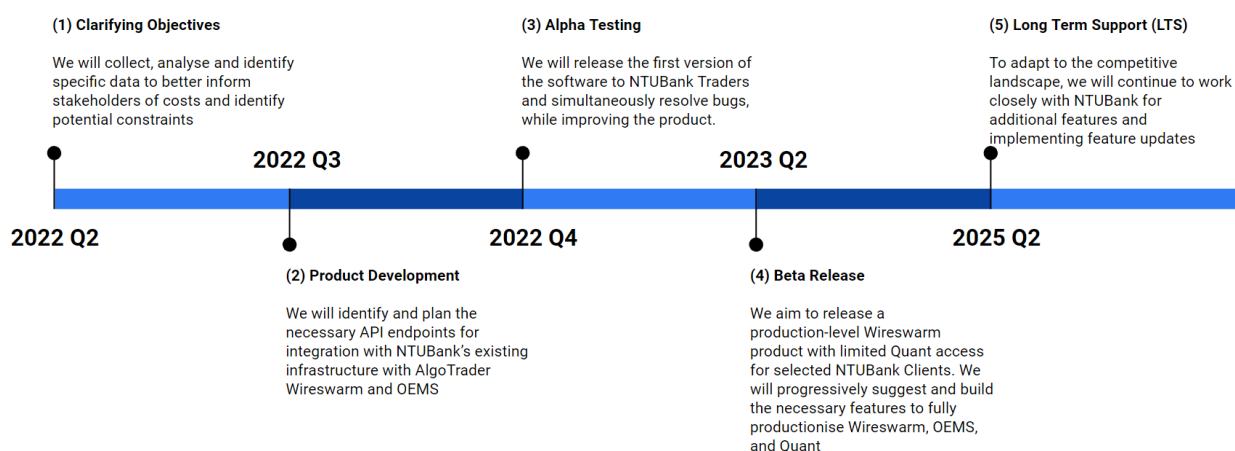
Figure 4: Implementation Roadmap

10.   Conclusion

Algotrader is the leading digital asset trading technology provider that can offer state-of-the-art and tailored solutions for NTUBank. As NTUBank is relatively young and nimble, she will pivot to a new system rather easily with low sunk cost involved.

By adopting AlgoTrader's solution, NTUBank will realise tangible benefits with cost savings from phone trades, remain competitive and increase its revenue growth. The three solutions proposed, Wireswarm, OEMS and Quant will be able to provide the much needed value-add that NTUBank is looking for. They will enable NTUBank to revamp its end-end trade automation, provide crypto services and an integrated environment for their clients and NTUBank Quantitative researchers to develop quantitative strategies.

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