NEXUS
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AI-Fundamental ESG Scoring Platform:

Training a machine learning system to assist with ESG data analysis for 500 listed Chinese companies

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Executive Summary

BACKGROUND

Environmental, social, and governance ("ESG") investing in China is becoming increasingly popular among investors looking to align their investments with their values. Chinese companies are starting to take notice of this trend, with many taking steps to improve their ESG practices in order to attract more investment. Despite this, there are still challenges in assessing the ESG performance of Chinese companies, due to a lack of transparency and inconsistent reporting standards, especially in corporate governance, which is a critical aspect of investing in China. This is particularly true for institutional investors such as asset managers, pension funds and insurance companies, who are under pressure to invest in companies with strong governance practices to minimise risks and maximise returns.

As awareness and demand for ESG investing continues to grow in China, the use of artificial intelligence ("AI"), which includes machine learning ("ML") technologies, can help to collect, process, standardise and analyse large amounts of data from various sources, including company reports and news articles. This data can then be used to generate ESG scores and ratings for companies, which can provide investors with a more comprehensive view of a company's ESG performance.

Additionally, AI can help to identify and flag any potential red flags or areas of concern within a company's ESG practices, and help to monitor companies over time, tracking the progress of their ESG initiatives. Investors can thus make much more informed decisions when assessing the effectiveness of a company's ESG efforts.

In this whitepaper, Nexus FrontierTech ("Nexus") provides a deep dive into the business application and technical details of the award-winning ESG platform, ANAFES, developed as a Proof of Concept ("POC") in partnership with Chinese industry experts APS Asset Management ("APS"), focusing on companies in China, Hong Kong, Macau, Taiwan, and Singapore that issue equity and equity-related securities.

Readers will understand the business problems inherent with current ESG data systems, and gain insight into how AI-driven data analysis can be deployed as part of an investment process. Some interesting findings from Nexus' research into China's ESG space will also be presented.

As the paper will show, Nexus has successfully proven both the technological success and commercial viability of ANAFES for those that have a significant interest in China-listed companies. Moving forward, expansion of this platform would greatly benefit the asset management community, by accelerating the ease of adoption of ESG investing.

Data Challenges In Asset Management

PROBLEMS

Resource Limitations

No proper system to incorporate internal data from in-house analysts' investigative research and company engagements

Unable to map both external and internal data to in-house ESG investing frameworks

Market data may be missing or inaccurate, with a lack of local insights.

Asset managers face multiple data-related challenges in their efforts to implement sustainable investing. Many of these challenges have been well articulated and documented by industry experts and practitioners over the past few years, such as low data availability, poor data quality and lack of harmonised or interoperable ESG disclosure standards and frameworks.

For small to mid-sized asset managers ("SMAM"), i.e. those with around USD5-10 billion AUM or less, that look to incorporate ESG analysis with a more fundamentals-based investing approach, the problem is compounded by:

1. Resource limitations, given the significant time and effort required to manually harvest, organise, analyse and manage external ESG data (e.g. company disclosures, news, ratings reports). For example, it takes a trained analyst up to 40-60 minutes to manually find, extract and format ESG data from a single sustainability report, a process that is error-prone and highly unproductive. The time and effort increases significantly when dealing with reports in multiple languages. With the volume and scope of publicly available data set to increase exponentially, and fragmentation amongst data providers likely to persist, small and mid-sized asset managers will continue to struggle to keep up.

2. The lack of a system that incorporates internal data from in-house analysts' investigative research and company engagements (e.g. accounting forensics, company interviews, proprietary data) into assessments or frameworks.

[1] "Environmental, Social and Governance (ESG) Ratings and Data Products Providers". IOSCO CR02/21. (21 July 2021) https://www.iosco.org/library/pubdocs/pdf/IOSCOPD681.pdf

[2] "Incorporating ESG into China equities investing is no easy feat". AsianInvestor. (28 Oct 2021) https://www.asianinvestor.net/article/incorporating-esg-into-china-equities-investing-is-no-easy-feat
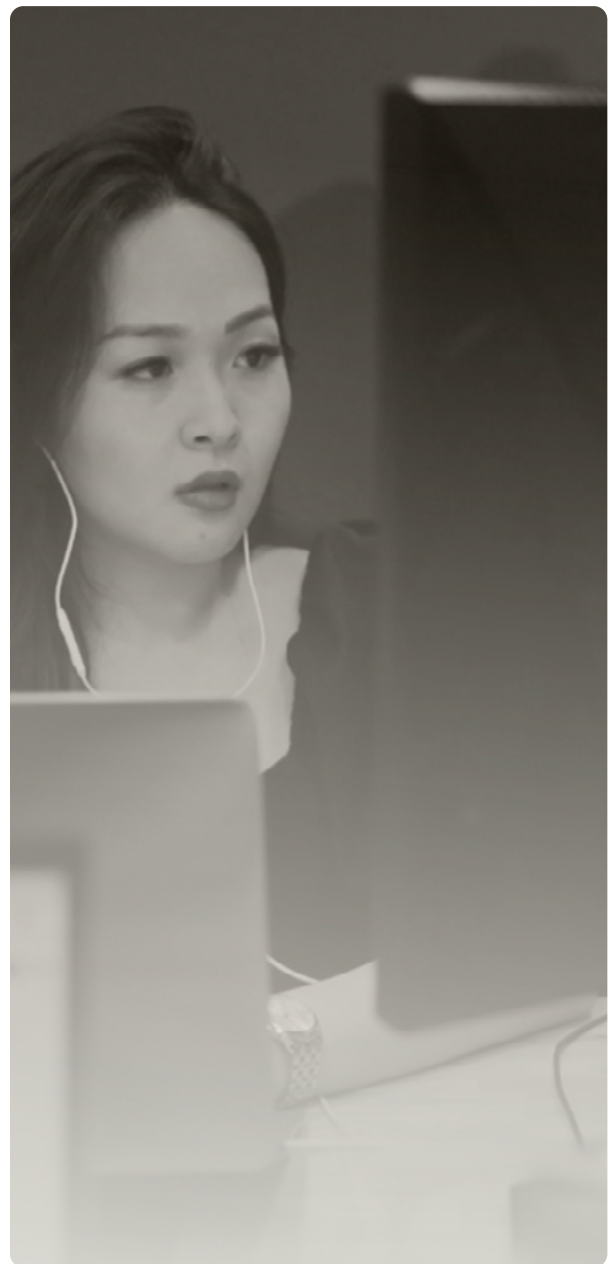
3. The need to systematically map both external and internal data to an asset managers' in-house ESG investing framework, which can vary significantly from one SMAM to another due to differences in portfolio focus as well as investing philosophies and methodologies. SMAMs then need to be able to easily compare and benchmark the data across different companies and portfolios in the context of its ESG investing framework. (This is, in fact, not unique to SMAMs: a July 2021 IOSCO study found that "almost all large asset managers are using or currently developing their own ESG ratings to supplement, or form part of their investment processes"[1].)

4. For SMAMs with a significant focus in geographies that are only now starting to place emphasis on ESG reporting such as China and Indochina, experts have also cautioned against reliance on "third-party ESG data providers, as some data may be missing or inaccurate due to lack of local insights or language skills". Instead, echoing point 3 above, SMAMs need to "do their own bottom-up approach", adopting a geography-specific mindset in ESG deployment and research and not simply adopt a "global" approach[2].

To address these challenges, market participants have started turning to the application of AI and ML techniques to improve their data harvesting and research. This area is still very nascent, with the same July 2021 IOSCO study noting that the "majority" of ESG ratings and data products providers, which are at the forefront of deploying these capabilities in ESG data ingestion, are still at the "prototyping and pilot stages".

[1] "Environmental, Social and Governance (ESG) Ratings and Data Products Providers". IOSCO CR02/21. (21 July 2021) https://www.iosco.org/library/pubdocs/pdf/IOSCOPD681.pdf

[2] "Incorporating ESG into China equities investing is no easy feat". AsianInvestor. (28 Oct 2021) https://www.asianinvestor.net/article/incorporating-esg-into-china-equities-investing-is-no-easy-feat

Understanding the ESG Landscape in China:

3 key observations that support the need for better ESG accountability and reporting

1. ESG reporting still new amid ongoing standardisation efforts

Chinese companies see the trend towards greater ESG disclosures, but few are acquainted with how exactly to go about doing it. Although China regulators and exchanges have stepped up efforts to provide guidance on disclosure standards, taking into account developments in other jurisdictions, the requirements remain largely fragmented across industries and government agencies, and much of reporting is still on a voluntary basis.

2. Growing quantity of ESG data from listed companies, but quality is an issue

Unsurprisingly, China faces an overall lack of structured, quality ESG data. Although reporting has increased amongst listed companies on the Shanghai and Shenzhen stock exchanges, investors have found much of the information disclosed irrelevant.[3]

Companies have not realised what ESG issues are more important to investors and what information they need to disclose to better reflect their ESG performance and plans. With more resources and spending power, large-cap companies have generally produced better quality data compared to small-sized companies.

3. Potential for exponential data growth as investors pile on pressure

Despite the slower start compared to other jurisdictions, Chinese asset managers are starting to ask practical questions on a number of ESG issues which Chinese companies are capable of answering, such as how much effort they have put into managing the environmental pollution. They are also raising their investee companies' awareness on ESG issues, and companies are responding positively to manage their environmental impact, take stewardship seriously, and include suggestions in their annual reports.

These would reinforce calls from international investors, who have had a longer history in ESG investing and have always had a keen interest to increase their exposure to China's economic growth.

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[3] "China moves to standardize fragmented ESG reporting landscape". Weforum. (2021) https://www3.weforum.org/docs/WEF_China_ESG_Champions_2021.pdf

A collaboration for a solution

by domain experts APS Asset Management and solution provider Nexus FrontierTech

1. **Augmenting knowledge with tech expertise**

2. **AI Implementation for integration into other platforms**

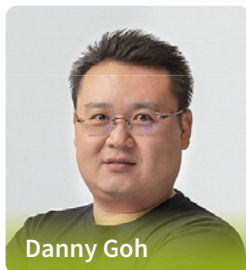3. **Scaling the solution for the asset management market**

ANAFES is a collaboration between Nexus and APS, a SMAM that was looking to implement ESG investing in a timely manner by proactively adopting technology.

APS aimed to efficiently gather, standardise and analyse external and internal ESG data to augment its fundamentals-based investing. Developing a POC of an integrated, scalable, cloud-based ESG platform would demonstrate the technical feasibility and potential business value of combining AI, ML and other technologies with APS' unique, fundamental-based Four Alpha-Hats® investing approach.

Conceptualised as a central portal, the platform would help standardise ESG integration within organisations by managing all ESG frameworks, data and news efficiently and accurately. Sustainability managers, portfolio managers, and analysts alike would be able to visualise, benchmark, and analyse company performance across industries and geographies to enable impact investing, via this ESG platform's dashboard.

"The solution will connect international ESG reporting standards, disclosure practices in developing countries like China, and investment management approaches in Singapore, adding to Singapore's growing pool of intellectual capital and capabilities as a global centre for Sustainable Finance."

"We are pleased to partner with Nexus in developing China's first real-time AI-Fundamental ESG system. We believe that it is a powerful system developed by combining Nexus AI expertise and APS' multi-decade experience in fundamental analysis of Chinese companies."

Danny Goh

**Founder & Chief Executive Officer
Nexus FrontierTech**

Wong Kok Hoi

**Founder & Chief Investment Officer
APS Asset Management**

Developing a solution:

AI-Powered ESG and Research SaaS Platform

OBJECTIVES

Based on feedback from APS and other SMAMs, investment analysts faced three key pain points with ESG data management, and resolving these formed the scope of this POC:

i. Demonstrate ability to develop AI and ML technologies to efficiently collect, process, standardise, and perform a range of different analyses on ESG data from sustainability reports, annual reports and news

ii. Demonstrate ability to integrate the data into APS' framework to generate ESG scores

iii. Showcase how asset managers can utilise such a system for ESG investing

SCOPE OF PROPOSED SOLUTION

To meet these objectives, the solution focused on the development of three sets of AI models (ESG Data Parser, News Monitoring, Investigative AI Models), including the sourcing and/or generation of annotated data to train the ML components required, as well as the integration of these AI models into a user web application to form a single solution.

The data in scope includes:

- Sustainability reports, annual reports, third party reports and news headlines and articles of 500 listed Chinese companies selected by APS

- 200 ESG data points from 46 factors across E, S and G categories mapped against Global Reporting Initiative (GRI) standards and APS' internal ESG framework

- Documents and data in English and Mandarin

SOLUTION DEVELOPMENT AND ACHIEVEMENTS

Nexus developed three sets of AI models to power a singular web application with a comprehensive dashboard. The development, challenges and achievements of these different technical components are described below.

ANAFES ESG Platform

AI MODEL SETS

1. **ESG Data Parser**
   - **Able to accurately extract and trace ESG data**
   - **Standardise and map data against user-defined ESG framework**
   - **Works with listed and private companies documents**

2. **News Monitoring**
   - **Aggregate news headlines from public sources and paid subscriptions**
   - **Classify, tag and organise news based on company and ESG factors**
   - **Perform sentiment analysis to detect controversial event signals**

3. **Investigative AI**
   - **Footnote analysis**
   - **Business Term analysis**
   - **Related Party analysis**

AI USER APPLICATION

Web Application and Dashboards
   - **Manage user-defined framework**
   - **Automate scoring and weight management**
   - **Rank and compare across sectors**

ESG Data Parser

ESG data analysis is currently extremely manual. AI automation is expected to save 40-50% of analysts' time at the start, increasing to 80% as the AI improves with more data.

Based on available research, while there have been some attempts to use AI automation and Natural Language Processing ("**NLP**") techniques in ESG data analysis, these efforts appear to be in the early stages of working towards a commercialised ESG data parsing service.

Nexus' ESG Data Parser, built for investment management purposes, provides ESG data traceability and integrity. By automating data collection, standardisation and analyses, human analysts are freed for more high-value added tasks such as analysis and making investment recommendations.

Whilst the experimental use of NLP in ESG is common, Nexus applied additional ML and computer vision techniques to extract not just textual information but spatial metadata. This means that more types of ESG data can be analysed. Extracted ESG data is also traceable to its location in the source document, allowing for easy verification (see **Figure 1**).

The main features of Nexus' ESG Data Parser are:

- Intelligent parsing and standardisation of ESG information from unstructured sources, such as sustainability reports, company annual reports, market reports and webpages.
- Supports English and Mandarin.
- Extracted ESG indicators are mapped to GRI Standards and interoperable with a user-defined ESG framework.
- Trained on a proprietary annotated ESG dataset of China ESG data.
- Integrated with proprietary data annotation and review system to guarantee data integrity and accuracy.

▼ *FIGURE 1*: **ESG DATA PARSER**

Source: Nexus FrontierTech

ANALYSIS OF ESG DATA STRUCTURES AND EXTRACTION CHALLENGES

Before explaining the technical components of the ESG Data Parser, it would be useful to present a brief survey of the ESG data structures and issues in analysing Chinese ESG Data.

Based on the dataset that Nexus worked with, ESG data is presented in 5 main forms: (i) Tables, (ii) Paragraphs, (iii) Charts, (iv) Graphics, and (v) Infographics. Unsurprisingly, most ESG data, particularly quantitative data, can be found in tables (**Figure 2**). A significant amount of data is also found as textual data in paragraphs.

As can be imagined, it is critical for any AI model to accurately detect and identify the data structures it is working with. The distribution of data structures also informs and guides Nexus' technical efforts in building the ESG Data Parser.

▼ *FIGURE 2*: DISTRIBUTION OF DATA STRUCTURE TYPES OF SELECTED QUANTITATIVE ESG METRICS.

GRI Factor	GRI Metric	Category	Distribution by Data Structure Type					Presence of multiple data points
		E-S-G?	Table	Para -graph	Chart	Graphic	Info -graphic	Disclosure-unit pairs
Emissions	Direct (Scope 1) greenhouse gas emissions	Environment	91%	4%	4%	2%	0%	1
Emissions	Energy indirect (Scope 2) greenhouse gas emissions	Environment	90%	3%	4%	3%	0%	1
Emissions	Greenhouse gas intensity (Greenhouse gas emissions/Sales)	Environment	77%	10%	7%	4%	2%	1
Energy	Breakdown of energy sources	Environment	91%	3%	3%	3%	0%	Multiple
Energy	Energy intensity (Energy consumed/Sales)	Environment	90%	6%	2%	2%	0%	1
Waste	% or amount of recyclable waste	Environment	66%	11%	0%	21%	2%	Multiple
Diversity and Equal Opportunity	Gender split of general workforce	Social	52%	9%	30%	6%	3%	2 or 4 (even number)
Training and Education	Average number of training hours per employee	Social	63%	22%	8%	3%	4%	1 or Multiple
Occupational Health and Safety	Total recordable fatality rate	Social	65%	25%	0%	7%	3%	1
Occupational Health and Safety	Total recordable incident/lost time rate	Social	69%	19%	2%	6%	3%	1

Source: Nexus FrontierTech, 2022

Apart from data structure, another challenge is the potential for multiple disclosures for each metric. For example, in reporting a breakdown of energy sources, companies can disclose multiple sources, which vary widely depending on industry and disclosure practices (also shown in **Figure 2**). This poses a serious problem for automation as well as standardising the disclosures for comparability and analysis. Aware of this issue, the ESG Data Parser was developed to detect single, double or multiple disclosures in order to handle and standardise them appropriately.

TECHNICAL COMPONENTS AND ACHIEVEMENTS OF NEXUS' ESG DATA PARSER

The ESG Data Parser has 5 main technical components. Components C to E perform similar extraction and standardisation functions, differing in the specific techniques applied based on the structure that the ESG data is presented in. Overall, technical performance of the ESG Data Parser was within expected levels.

a. Language detection

detects document language, accurately identifying English and Mandarin (traditional and simplified).

b. Pre-processing

extracts raw textual data from "unsearchable" (e.g. scanned, images) pages within a PDF. Pages with ESG data are detected and relevant Optical Character Recognition ("OCR") techniques are applied to extract textual content depending on whether the page is searchable or unsearchable.

c. Sentence Detection and Extraction

extracts ESG information from raw textual data, using NLP techniques to recognise paragraphs with ESG-related data. It then deconstructs them into sentence-level data, and extracts ESG disclosures and units using domain dictionaries. **This achieved recall accuracies of around 64%, which was lower than desired but functional.** Precision accuracy, which would be a challenge, and not the focus of improvement for Nexus' extraction approach, came in lower at around 60%, constrained by a limited domain dictionary.

d. Table Detection and Extraction

detects and classifies table elements and extracts ESG data from its cells, covering multiple table types, including tables with spanning cells in one row, multipage tables, multitable pages and custom textual indices. **This achieved accuracies of around 64-79% for table classification tasks, and recall accuracies of around 50% on extracting disclosure-unit pairs.** Certain classes of tables, however, remained challenging, e.g. tables with multi-index headers and spanning columns and rows.

e. Chart, Graphic and Infographic Detection and Extraction

detects the respective elements and extracts ESG data. Using charts as an example, the model detects the chart areas, extracts values, runs ML analysis to link values with chart regions, detects chart legends, and finally matches the extracted values with their labels. **This achieved chart detection accuracy of 80%, but disclosure-unit extraction was low at only 40%.**

f. Post-processing

cleans and maps the extracted ESG data in its disclosed format to the equivalent GRI and APS-proprietary ESG formats so that the standardised data can be analysed, compared and scored accordingly, to generate an ESG risk and opportunities assessment that reflects APS' investment approach.

With the development and integration of AI technology for the retrieval, extraction, standardisation and analysis of annual and ESG reports of corporations, Nexus was able to reduce the time taken to complete the whole ESG data analysis process by up to 80% (**Figure 3**).

This assumed a typical Maker-Checker-Approver operational setup to ensure that accurate, analysed and comparable data reaches the investment analyst for consumption. For a prototype solution producing a standardised and analysed set of historical ESG data for 500 Chinese-listed companies, the results were certainly promising and the AI system will only improve as more data becomes available.

ACCELERATING DATA EXTRACTION PROCESS USING AI ▼ FIGURE 3

Responsibilities of each actor in data extraction

Role of a Maker *(to be gradually replaced by AI)* is to search for and download reports from company websites and stock exchanges. Look through reports for ESG metrics, scroll PDF to identify and extract values from tables, paragraphs and charts, then input data on spreadsheets.

Role of a Checker is to "Eyeballing AR/SR" & read ESG metrics, scroll for ESG metric extraction and data extraction and check data on spreadsheets.

Role of an Approver is to do the final review to push out data for quantitative scoring according to APS framework and for analysts' usage

Source: Nexus FrontierTech

News Monitoring

Sustainability reporting, whilst useful in its level of detail and consistency, is typically lagged. This is where more timely data such as analysts' interviews, market reports, social media and news articles come in. For this project, Nexus focused on news monitoring as the starting point, before scaling the technology to capture all types of real time data.

The use case for news monitoring is straightforward. The existing process is that analysts would manually search for or click notification links to online news articles, read them, make notes on the side, take down the web link if the news is noteworthy, and share the news to relevant parties via email or other messaging platforms. Often, the analyses and reference data and web links are not stored or tagged systematically, which makes search, retrieval and consolidation later on time-consuming. The challenges apply generally to any research processes. As part of this POC, Nexus investigated the use of AI to automate some of these processes, to understand the potential benefits for ESG investment research.

TECHNICAL COMPONENTS AND ACHIEVEMENTS OF NEWS MONITORING

To analyse ESG news, Nexus utilised components of the ESG Data Parser since news articles have similar characteristics, such as unstructured, textual data in sustainability and annual reports, with similar challenges, design considerations and outcomes.

In addition to what has been covered in the previous section, the additional components and technical achievements specific to news monitoring are:

- **News acquisition**

  searches and aggregates news headlines of target companies from public sources and paid subscriptions that APS already has access to, within the limits of what each source makes available. News articles are in both Chinese and English.

- **Auto classification and tagging**

  of news based on company and whether they are linked to E, S and/or G factors in APS ESG framework. Classification accuracy is high for English (85%) but lower for Chinese (66%).

- **Sentiment Analysis**

  where sufficient news content is available, to detect controversial news by classifying them as positive/non-controversial or negative/controversial. We researched and tested several pre-trained NLP-based classifier models on both English and Chinese news, and utilised the ones with the highest accuracies (>80%).

To ensure user adoption and interaction with the AI system, Nexus extended the news monitoring system with a web browser plug-in (**Figure 4**). This browser plug-in is connected to ANAFES and allows analysts to see the suggested ESG classifications, tags and analysis of the news article they were reading. If an article has been wrongly tagged, the analyst could amend it on the spot, and the corrected data would not only be updated in ANAFES but also serve as feedback data for improving the news monitoring AI. Effectively, the web plug-in helps analysts teach the AI as they read.

▼ *FIGURE 4*: NEWS MONITORING WITH TEACH-AS-YOU-READ WEB BROWSER PLUG-IN

Source: Nexus FrontierTech

BENEFITS FOR INVESTMENT ANALYSTS

With the help of AI to filter through vast amounts of daily news, analysts become more productive and up-to-speed with the investment impact of real time developments.

In addition to time and effort savings, what is novel about this component is that analysts' interactions are used to teach the AI their point of view, resulting in more personalised ESG information curation and analysis.

Investigative AI

Nexus designed and developed 3 types of "Investigative AI" models in order to detect suspicious changes in reporting practices as well as potential related party interests that merit further investigation. These approaches are implemented using proprietary annotated data as well as proprietary knowledge and approaches from an investment management perspective to sieve out Governance-related red flags which can impact ESG scoring. Based on Nexus' research, these are not common features available on existing ESG platforms.

FIGURE 5: INVESTIGATIVE AI – FOOTNOTE ANALYSIS
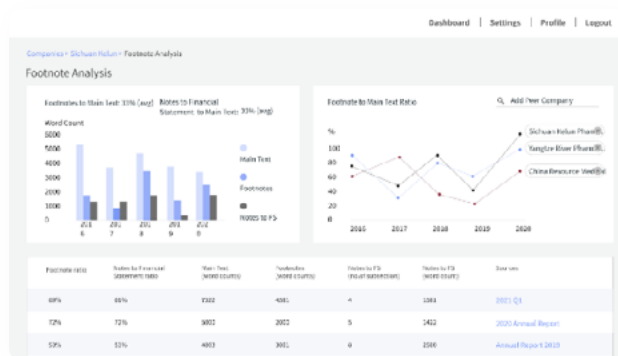
Source: Nexus FrontierTech

i. FOOTNOTE ANALYSIS

Footnote analysis is the use of word count, trend analysis and peer comparisons to detect unusual patterns in the use of footnotes in a company's financial reporting practices. Reporting irregularities (e.g. a sudden increase in the cashflow footnotes of a particular year) are flagged for analysts to investigate further. While the idea is quite simple, the effort is too great of an investment for any analyst to perform such systematic analysis by manually collecting this data. This is where AI automation thrives.

Nexus' footnote analysis model uses ML and statistical techniques to detect information signals in reporting of footnotes vs main text body of annual reports. The key challenge is to detect and classify footnotes accurately, since there is no standardised way to report a footnote.

Building off the base capabilities of the ESG Data Parser, Nexus developed a sentence detection and classification model that analyses the hierarchical structure of Chinese PDF financial statements and classifies whether a textual section is a footnote or not.

The initial results were promising, with an estimated footnote extraction model accuracy of more than 80%. Running this on a sample dataset of 13 Chinese companies with 5 years of historical data each (Figure 5), it took only minutes to generate the analysis, providing analysts with a feasible starting point to expand this type of thematic forensic study to generate new investment insights.

ii. BUSINESS TERM ANALYSIS

Business Term analysis helps investment analysts detect anomalies in reports by identifying and analysing key terms and phrases used in a company's financial reporting across time. This includes detecting unusual or unexpected changes in the use and definition of certain industry terms or key business metrics, such such as Gross Merchandise Value in the case of e-Commerce companies.

This model uses NLP-based search to extract user-defined business terms and definitions in a company's sustainability and annual reports over a period of time. The extracted terms and their definitions are highlighted and can be easily compared to flag any changes based on either word count or keyword addition/removal.

As the search task is relatively straightforward, Nexus was able to achieve over 92% accuracy for this process. More importantly, the output of the test run over a portfolio of 13 companies over a 5 year period helped analysts spot an instance of suspicious behaviour and open up a new case for deeper research. One area of improvement would be to combine this search technology with the results with other statistics, e.g. stock price trends, to provide quicker and more meaningful analysis.

iii. RELATED PARTY ANALYSIS

Related party analysis is a relatively common use case given that it has been one of the core corporate governance concerns for some time. There are free and paid services that provide this type of analysis in the Chinese market, but the processes, results and level of detail vary, depending on the sector.

Nexus' model made use of NLP techniques like Name Entity Recognition ("**NER**") and Question Answering ("**QA**") to extract data and create maps of family relations, career history, and company ownership of key company stakeholders and management as a starting point for further analyses (**Figure 6**).

▼ *FIGURE 6*: INVESTIGATIVE AI – RELATED PARTY ANALYSIS
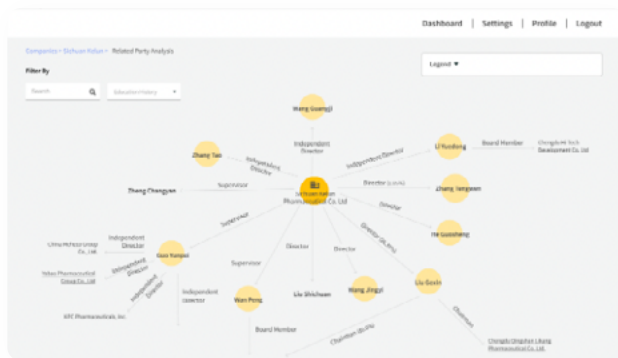
Source: Nexus FrontierTech

• **Family relations:**

detect, extract and classify familial relationships of board members disclosed in company and third party reports. NER, QA and long document transformer models were developed for detecting English and Mandarin entities. Additional datasets were investigated and annotated for accuracy evaluation and model refinement, including using more data sources like news articles. The model did not perform up to Nexus' accuracy standards (56%), with accuracy affected by complications with matching Mandarin and English names as well as noise around how family relationships are disclosed. Further improvements beyond the scope of this POC are required to bring it up to a usable level.

• **Career history:**

detect and extract the career history of board members disclosed in English company and third party reports. An English QA model was developed with surprisingly good initial results, with accuracy close to 100% but on a limited dataset.

• **Company ownership:**

detect and extract companies owned and ownership percentages using components of ESG Data Parser.

To conclude this section, Nexus has demonstrated the potential of using AI to conduct deeper investment analysis, opening up new lines of investigation in Governance-related issues that were previously impractical relying on manual effort. Notwithstanding this, Nexus notes that these Investigative AI features are still at an early stage; more user validation and improvement with more annotated and testing data are required.

The Nexus AI models are like a data engine working in the background to automate a wide range of workflows and analyses. To allow the analyst to visualise, manipulate and trace the data, ANAFES provides a front end web application with user dashboards for data visibility, impact analysis, and data source traceability. Users can also use the web application to customise their ESG framework, perform portfolio tasks and generate ESG scores.

Web Application and Dashboards

MANAGE USER-DEFINED FRAMEWORK

Asset managers can set up their own ESG framework within the system and have the existing ESG database mapped to their framework. The main user of this feature would be the owner of the ESG framework or policies.

- Seamlessly upload in-house ESG framework and factors via an excel template.
- Choose a leading global ESG standard such as GRI as a base for customisation.
- Choose preferred working language (English or Mandarin) and easily switch between the two with auto-translation functions.

▼ PLUG-AND-PLAY, USER-DEFINED FRAMEWORK
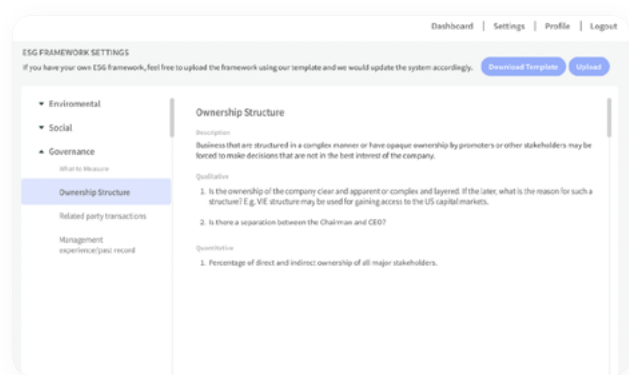
▼ SWITCH BETWEEN ENGLISH AND MANDARIN VIEWS WITH AUTO-TRANSLATION
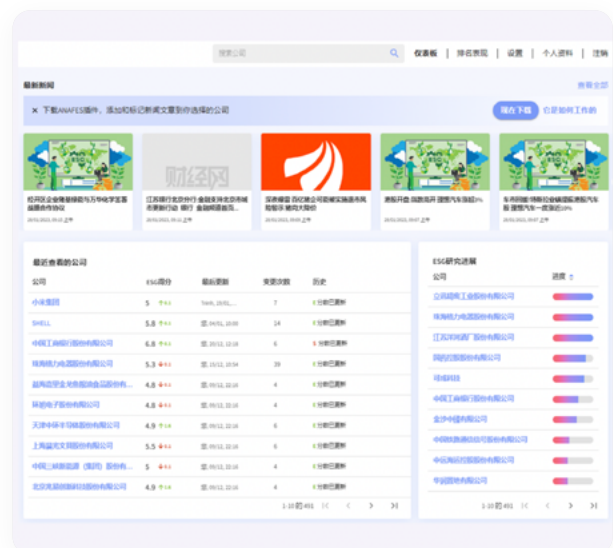
Source: Nexus FrontierTech

SCORING AND WEIGHT MANAGEMENT

After the ESG framework has been customised, asset managers can adjust and lock the scoring methodology and weightages to generate consistent, customised internal ESG scores.

- Adjust weightages of quantitative vs qualitative scores.
- Apply sector-based materiality weights.
- Audit trail for transparency and traceability.

For this POC, APS generated close to 100 ESG scores.

▼ **CUSTOM MATERIALITY WEIGHT ALLOCATION**

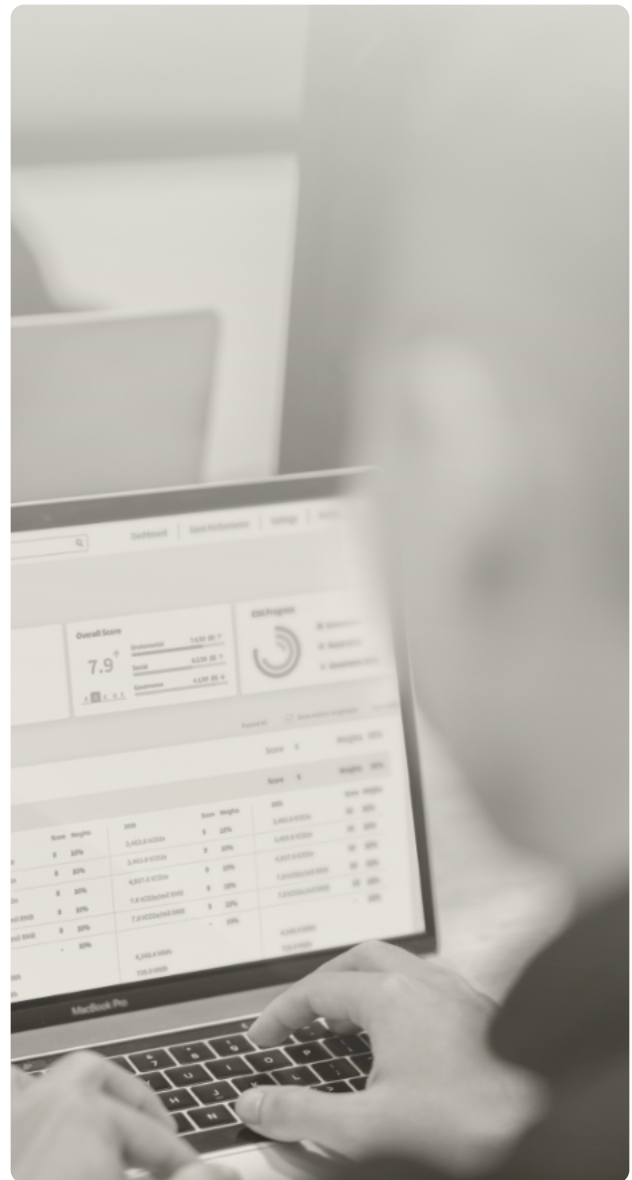▼ **AUTOMATED SCORING WITH TRACEABILITY**

Source: Nexus FrontierTech
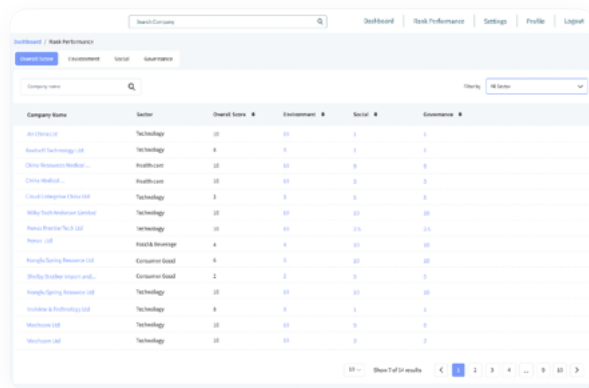
SECTOR RANKING AND COMPARISON

▼ ESG PERFORMANCE DASHBOARD
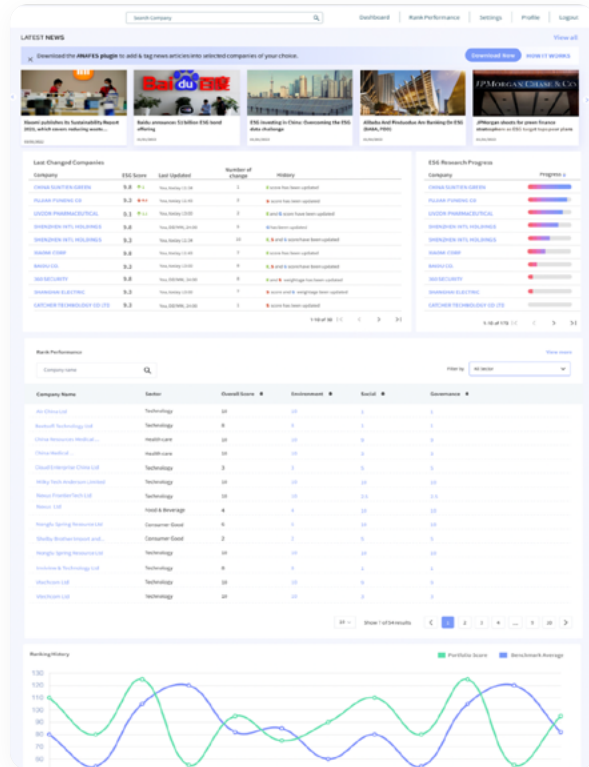
Asset managers can track and compare ESG scores and research progress of different portfolios and watchlists on the performance dashboard. Sector-based ranking tools help analysts to benchmark qualitative scores in a quicker way.

▼ SECTOR-BASED RANKING


Source: Nexus FrontierTech

Outcomes and Expected Benefits

PROJECT OUTCOMES AND ACHIEVEMENTS

The output of this POC project was a pilot solution that tracks a basket of close to 500 listed Chinese companies. Information capture was primarily from English and Mandarin sources, with the solution ready to translate both ways. Ingested external and internal ESG data was aggregated, scored and visualised according to APS' internal ESG framework for ease and consistency of analysis, with the level of data automation expected to increase over time.

Through this collaboration, Nexus and APS have:

a. Demonstrated the technical potential of using AI and ML to solve ESG data challenges. Even at such an early stage, ANAFES was able to reduce the end-to-end ESG data analysis time by up to 80%, and applied the process at scale to 500 Chinese listed companies.

b. Demonstrated the feasibility and early use cases of ESG data interoperability, by using global standards like GRI as a data backbone to map between fragmented, company-disclosed data and a proprietary, user-defined ESG framework.

c. Demonstrated the usability of such technologies through a web application. APS' investment team was able to use the system to generate close to 100 internal ESG scores, reducing reliance on external, uncontextualised ESG ratings.

d. Showcased the product potential of an integrated cloud-based platform solution, which can benefit the wider asset management community in Singapore and the region, starting with SMAMs that have a significant interest in China-listed companies.

e. Established a scalable ecosystem service. Built on a modular, API-ready infrastructure, there are opportunities to integrate with various data and service providers, serving as a data aggregator for asset management end users.
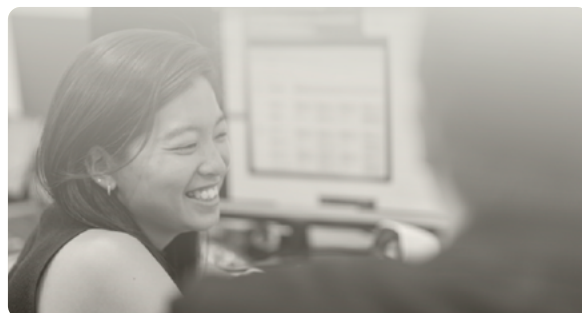
BENEFITS TO THE
ASSET MANAGEMENT COMMUNITY

Leveraging a platform like ANAFES, Nexus and APS believe asset managers can quickly realise several benefits:

a. **Accelerated implementation**
    of ESG investing in a scalable, customised and reliable way.

b. **Productivity improvements**
    of up to 50-70% through automating data, workflow and scoring, allowing analysts to concentrate on other high value tasks.

c. **Expanded ESG research capabilities**
    through broader coverage of companies and data sources, as well as integration of intelligent tools in ESG analysis.

d. **Stronger client engagement**
    through customised ESG reports and updates on portfolio companies.

e. Tangible demonstration of commitment as **international and sustainability signatories.**
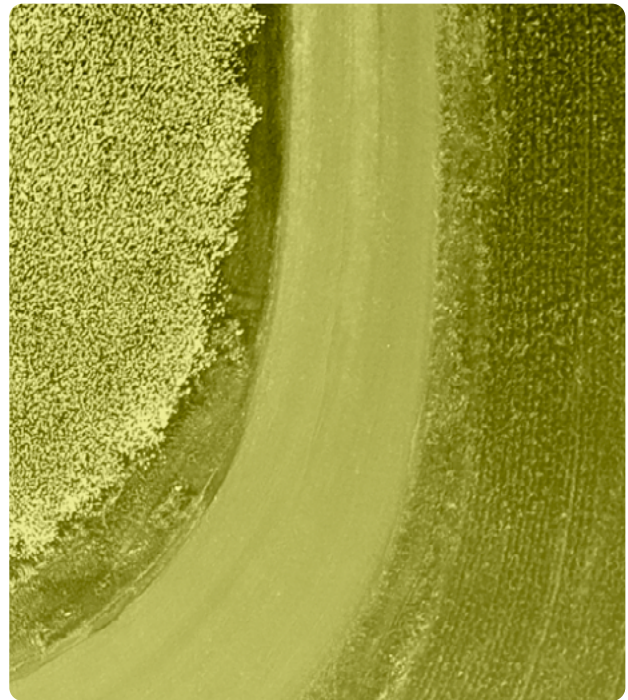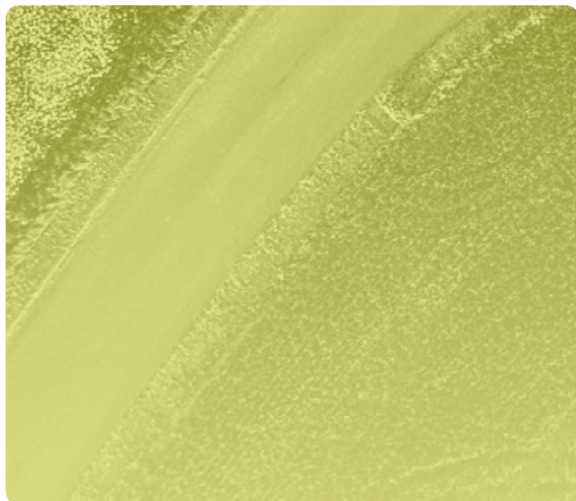
FUTURE PHASES

Nexus' next steps are to further improve the technical capabilities of the AI and ML system to reduce the end to end data analysis time by another 50% or more. This will allow us to increase the data coverage to the whole China-listed universe within a matter of months and set the solution up to scale to new markets and regions.

With the new 2021 GRI version taking effect in January 2023, Nexus would also look to make the necessary changes, having identified beforehand the areas that may be impacted. Finally, engagement with APS, the asset management industry, as well as other ecosystem partners and collaborators to continually identify and validate useful features will be important to enhance the commercial value of such a platform.

Concluding Notes

In this POC, Nexus developed a solution that integrated AI and ML technologies to solve ESG data challenges in an intelligent, interoperable and scalable way. Applying this solution to the Chinese market, the POC facilitated a unique collaboration and commercial innovation among investment managers, ESG experts and technology providers across Singapore and China.

Nexus and APS hope that the contributions in this project will add to Singapore's growing pool of intellectual capital and capabilities as a global centre for Sustainable Finance, and spur greater dialogue and collaborations on ESG data interoperability. One of the key practical aspects of the solution was indeed to demonstrate interoperability amongst ESG frameworks, starting with GRI, in the asset management space, which was successfully achieved.

From a productivity standpoint, the successful automation of various manually tedious research workflows is expected to increase the productivity of investment analysts by 50-70%, freeing up more time for them to concentrate on higher value tasks and functions, such as fundamental analysis. This would augment the capabilities of asset managers and researchers in the region.

Finally, learning from the partnership with APS, Nexus sees the potential to help a large number of small and mid-sized asset managers with limited resources accelerate the implementation of ESG investing via their own user-defined approach. Although the initial focus is on China, the ESG Platform's AI-native capabilities provide the potential to scale to other markets.

AUTHOR'S NOTE

Nexus FrontierTech (Nexus) recognises the increasingly critical importance of transparent, accurate and comparable environmental, social and governance (ESG) data and analytics for the financial industry. As the trusted and preferred partner in the transition to sustainable finance for several large banks, Nexus is committed to bringing SME Asset Managers affordable cleaned-data, analytics and research management solutions, which allow customers to use ESG data as the backbone of their investment processes and maximise their revenue growth opportunities by leveraging AI as their competitive edge.

The success of the ESG Platform was recognised at the Global Fintech Hackcelerator 2021. Nexus' submission of the ESG Platform solution was shortlisted as a Finalist in the Local Programme and scored above 60% by the experts judging panel, and received the prestigious Monetary Authority of Singapore grant.

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About Nexus FrontierTech

Nexus FrontierTech is a technology company that develops AI and digital transformation solutions for businesses, with a specialisation in finance. Our proprietary platform powers modular AI components that automate data-driven processes, extract valuable insights from unstructured data, and improve decision-making through predictive analytics.
We help organisations integrate AI into their operations, leverage data to drive business growth, and stay ahead in a rapidly changing digital landscape.