CASE STUDY: UOBAM'S T-SHAPED TEAM AT WORK

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Background

UOB Asset Management Ltd (UOBAM) is an Asian asset manager offering investment products in fixed income, equities, and multi-asset solutions that integrate traditional and alternative capabilities. The company was established as a wholly owned subsidiary of United Overseas Bank in 1986 and w as headquartered in Singapore. It has since expanded and now has a presence in many Asian countries.

UOBAM aims to provide top-class performance, customer service, and experience by embracing digital technology to transform the customer experience, operational processes, and business models. Through its network of offices, UOBAM offers global investment management expertise to institutions, corporations, and individuals through customized portfolio management services and unit trusts. As of 30 September 2020, UOBAM managed 60 unit trusts in Singapore. The company had US$27 billion in t otal assets under management (AUM) as of early May 2021.

Investment Philosophy

UOBAM believes in the use of a systematic portfolio construction process. By controlling risk, it can better deliver enhanced returns over the medium to long term. This philosophy serves as the backdrop for UOBAM's efforts at upgrading the digital technology available to its portfolio management teams.

The equities unit believes that with a rigorous and disciplined investment research process, it can identify high-performing businesses that enable it to deliver superior and consistent long-term performance. By combining this detailed research effort with a systematic model portfolio construction process, UOBAM believes it will be able to effectively derive sources of alpha to achieve outperformance over time.

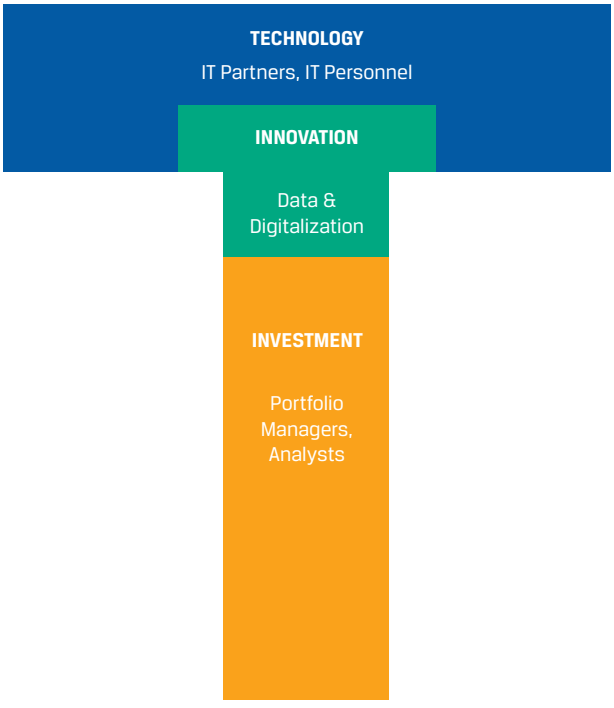
The fixed-income unit believes that consistent performance can be achieved through rigorous and independent fundamental research to uncover relative value opportunities. By adopting diversified investment strategies combined with active risk management, the team aims to generate sustainable total returns.

The multi-asset team makes recommendations on strategic asset allocation based on the firm's view on the economic outlook, and it implements the balanced mandates of retail and institutional clients.

Roles and Job Scope of the Team Working on AI/ML and Big Data

The T-shaped project team brings together three different business units and their expertise, as shown in **Figure 3**. The technology (Tech) function consists

FIGURE 3. T-SHAPED TEAM AT UOBAM



of IT partners, technology personnel, and technology tools. The innovation function is driven by the data and digitalization (DD) unit, which is responsible for bringing the right data and technology to the right people, at the right time, on the right platform. The investment function consists of the portfolio manager (PM) unit—including analysts from equity, fixed-income, and multi-asset units, as well as the newly formed environmental, social, and governance (ESG) unit.

The Investment Function

The UOBAM chief investment officer (CIO) leads the function in developing the firm's long-term investment strategy and in managing asset allocation with the objective to maximize the value of investments for its investors. He has oversight of the PM team, which includes the units managing equities, fixed income, and multi-asset investments and the newly formed ESG unit.

A key consideration that often comes to the CIO's mind is how emerging technologies can be adopted appropriately and be integrated within current investment management processes in a sustainable manner. This leads to the formation of the investment technology unit, with the responsibility to ensure that adoption of the technology achieves the desired outcomes.

The Innovation Function

Under the purview of the chief operating officer (COO) at UOB Asset Management, the DD unit serves as the innovation function in the T-shaped team setup. Its main responsibilities include the following:

1. Serve as a bridge between the Tech function and other business units (BUs), and ensure that the needs of the business are fulfilled.
2. Drive adoption of emerging technologies, such as AI/ML, across all BUs.
3. Ensure governance is in place and is adhering to policies on the usage of these technologies.

The DD unit, led by Chua EnHao, is the link that bridges the spheres of business and technology in an AI/ML project. The work of the DD unit begins by identifying challenges faced by other business units and assessing whether there is an opportunity for the challenge to be solved by the use of AI/ML. The DD team identifies challenges by sitting in meetings, through interdepartmental collaborations, and by other BUs approaching the DD team with their challenges.

The DD unit is also responsible for driving adoption of AI/ML at a project level (micro) and at the company/regional level (macro). This is done through changing the mindset and evangelizing and promoting the adoption of technology in the business units. The DD unit does this by conducting workshops, talks, and initiatives to increase awareness and by offering courses to up-skill the workforce, with the aim of driving technological adoption. More of this information is explained in the "Providing a Learning Environment in UOBAM" section of this case study.

The DD unit also plays the role of governance, where the unit ensures that the technology, the models created, and all data involved are used in an ethical manner via the data ethics validation procedure (DEVP). The DEVP sets out the processes and procedures to ensure that the development and use of artificial intelligence and data analytics (AIDA) technological solutions comply with the Fairness, Ethics, Accountability and Transparency (FEAT) principles set by the Monetary Authority of Singapore (MAS).

Members of the DD unit have knowledge in both areas of technology and finance and have become the channel that translates between hard code AI methodology within the technology domain and the business (i.e., UOBAM investment) domain.

For example, Ryan has extensive qualifications and experience. He is a CFA charterholder, has experience in finance as an equity and futures market maker, and holds a master's degree in information technology. This unique background provides him with an in-depth understanding and insight into the best possible solutions available for business problems in the financial realm. Another member is Kimberly Yeoh, who has a degree in economics and has prior working experience using AI in a technology company.

The DD unit's knowledge and experience assisted it in operationalizing business problems and matching those problems with the best available technological solutions. Apart from the business knowledge they bring to the project, the DD unit members also have networking, critical thinking, communication, and collaboration skills, among others. When assessing the right solution for the problems, the DD unit has to play the role of futurist in ensuring that the solutions proposed are forward looking and are future proof.

The DD unit's ability to be an effective bridge between the business and technological domain, be a driver of technological change, and be a governor of proper and ethical use of technology and data is what gives UOBAM a distinct competitive advantage.

The Technology Function

To accelerate adoption of emerging technologies, such as artificial intelligence and machine learning, UOBAM builds its capabilities on the following fronts:

1. Engaging fintech companies with proven solutions immediately catalyzed and transformed how UOBAM operates, creating better products and delighting its customers
2. Partnering closely with UOB Group Technology, UOBAM has been able to craft technology roadmaps, execute in an agile manner, and see results of quick wins and MVPs (minimum viable products).
3. Consulting services from the UOB Data Management Office speed up learning curves and help shape how UOBAM will need to establish its own capability.

Workflow in AI/ML Adoption and Implementation

UOBAM has put in place an AI/ML development life cycle, which defines the framework to develop AI/ML and advanced analytics solutions to enhance business. The four major phases of the life cycle, shown in **Figure 4**, describe the major activities and interactions between stakeholders (including business users) to develop practical AI/ML solutions and bring them to production.

Phase 1: Ideation

At the ideation phase, employees from business units identify processes within the business that can potentially be enhanced through the adoption of AI/ML solutions. Once these challenges are crystallized into problem statements, these are brought forward to an innovation working group, comprising DD staff and business representatives who have an in-depth understanding of both the business and the applications of technology. The group evaluates and prioritizes various problem statements based on the impact to the business and the feasibility of possible solutions. The group also serves to maximize intra-project collaboration and minimize duplication as various business units may submit overlapping problem statements.

Subsequently, when the project receives approval from the working group, the DD unit launches the project by conducting meetings with the relevant stakeholders to capture detailed business objectives and requirements.

To encourage and elicit ideas to use AI/ML solutions from staff, UOBAM's DD unit also conducts regular workshops that involve the heads and staff of various business units. These workshops serve as a platform for employees to share the challenges faced by their business units and to brainstorm possible solutions. Different business units often discover that they face similar challenges, which can then be fine-tuned and consolidated to find one comprehensive solution.

Phase 2: Model Development and Testing

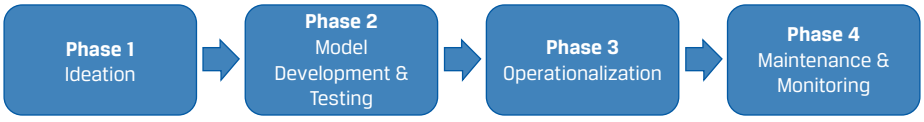
The approved projects then progress to Phase 2 for model development and testing. The first step is to ensure all requirements—including business objectives and functional and nonfunctional requirements—are properly captured. Resources, such as required data features, are also identified by the stakeholders and data scientists.

Subsequently, the data scientists begin the development of the AI/ML solution in an agile manner, delivering incremental features of the solution to the stakeholders for evaluation at the end of each sprint.

After the prototype solution is completed, the stakeholders of the project come together to determine whether the prototype solution can be piloted for wider testing. The pilot testing will enable stakeholders to validate whether the completed solution can meet the business needs or if it requires additional development.

Finally, when the proposed solution has been sufficiently tested and is able to meet all the business needs, the stakeholders can elect to move the solution to Phase 3 to operationalize it.

FIGURE 4. FOUR MAJOR PHASES OF AI/ML LIFE CYCLE



Phase 3: Operationalization

Before the solution is operationalized or deployed in a production environment, it has to be checked and validated by an independent internal team. Also, the model must adhere to the MAS FEAT principles. For example, the individuals or groups of individuals should not be systematically disadvantaged by the solution decisions unless the decisions can be justified.

In the last step before operationalization, stakeholders must present the solution before a management-led technology committee for approval. This ensures that the solution is aligned with the goals and philosophy of the business.

After final approval is obtained from the management-led technology committee, the Tech function will proceed to operationalize the solution and deploy it into the production environment for the business.

Phase 4: Maintenance and Monitoring

After the project is operationalized, the solution enters a maintenance and monitoring phase. The solution will be reviewed periodically by its users and stakeholders to ensure it remains relevant to the business.

The model also undergoes regular testing to ensure it is reliable. For example, if the solution includes a forecasting model, the model drift (the difference between the model forecast and the actual data) will be measured and reported.

In addition to tracking the solution performance, business users will also be required to incorporate such metrics as the cost-to-benefit ratio, productivity, and return on investment of the solution, where applicable. Solutions that do not meet business needs are either decommissioned or improved through a new AI/ML life cycle.

A Case within the Case: The Multi-Signal Predictive Analytics Project

In order to better understand how the T-shaped team has benefitted UOBAM, a case study of the T-shaped team at work is provided next.

Project Background

In 2019, the equities t eam, consisting of several portfolio managers and analysts, managed over 120 f unds, which required analysts to cover over 3,500 equities within the Asia-Pacific (APAC) region.

As UOBAM continued to expand its regional footprint within the ASEAN region, the portfolio of the team expanded faster than the size of the team. Analysts were also required to evaluate a large number of factors, and the team would have to rely on the experience and expertise of its portfolio managers. In order for UOBAM to maintain its standing as a regional asset manager with top-class performance, it would need to ensure that its investment team worked effectively to cover a larger portfolio and make more data-driven investment decisions.

With the advancement of AI/ML, the investment team decided to collaborate with the DD unit to harness the power of AI/ML to cover approximately 120 f actors and a larger portfolio of equities. After incorporating UOBAM's investment philosophy, the project team developed a model that aimed to predict equity performance and portfolio allocation.

The Process

The project followed UOBAM's best practice model, the AI/ML life cycle shown in Figure 4, which begins with ideation (Phase 1) b y the PM team through the digital pipeline. The PM team was searching for a more efficient way of analyzing the vast amount of equity stocks in the APAC region (as mentioned in the "Project Background" section of this case study). The PM team consulted with the DD unit to find the best technological solution that could assist the PM team in its business problem, and both teams concluded that applying an AI/ML solution would be the most effective approach.

The DD unit then assessed the viability of using AI/ML to solve the PM team's problem (Phase 2). After the teams assessed that there was a high probability of success in applying AI/ML to the problem, the functions conducted a more formal discussion to fine-tune the scope of the project. Subsequently, it was determined that the goal of this AI/ML project would be to harness the capabilities of AI/ML to create a portfolio of Asian (ex Japan, ex China) stocks that would be able to exceed the benchmark.

The PM unit set the business objective, while the DD team translated the objective into an actionable development workflow for the Tech team to work on. The project was presented to the technology committee, and the green light was given for development of a pilot. During the model development stage (Phase 2), the team faced several challenges (e.g., the model generated portfolios that exhibited high turnover rates, which would not be practicable for the business). This was where the DD unit was able

to step in to advise the Tech team on the tweaks that should be made to ensure the model was aligned with UOBAM's business goals and investment philosophy. The pilot went through several iterations before it could go into production to be operationalized (Phase 3) in the business.

This project served as an eye opener for the PM team as the model was able to uncover hidden gems that would usually fly under the radar. Subsequently, the PM team understood the added value of introducing AI/ML into its business model and took the initiative to up-skill in said areas. Quantitative success measures include increasing alpha and efficiency of the analysts working on the resultant portfolio. The knowledge and insights the PM team gained allowed it to better assess the merits of technology partners that UOBAM may engage.

At present, a majority of the investment team have taken courses on artificial intelligence for investment professionals and have learned Python through DataCamp. Some have also gone on to attain professional qualifications (e.g., a professional certificate in Python programming and machine learning from SMU Academy).

Engagement of Fintech Companies

The asset management industry in APAC will continue to grow rapidly and will provide asset managers with vast opportunities. To maximize these opportunities, asset managers will have to leverage technology, at speed and scale, to give themselves a competitive advantage.

UOBAM has recently partnered with Value3 Advisory, a fintech company that offers a capital market AI platform for independent, predictive, and automated credit ratings, research, and analytics (UOBAM 2019). Value3's platform, which uses a combination of AI, ML, and NLP (natural language processing), empowers investment and risk managers in financial institutions to make better decisions in portfolio selection, risk monitoring, benchmarking, and early warning indicators. The platform combines financial data with unstructured online digital footprints, news, events, trends, and patterns of the companies from diverse sources to transform data overload into actionable insights.

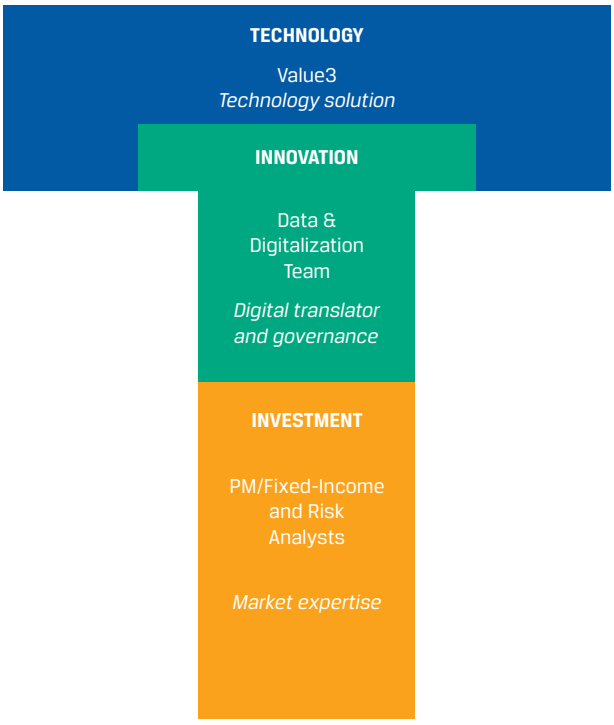
This strategic partnership serves as a win–win for both parties. In the development of the model, Value3 creates the prototype with its technological expertise and UOBAM refines the model with market intelligence gathered from its years of experience in asset management and bond valuation in the ASEAN region.

The UOBAM DD unit (i.e., innovation function) serves as the bridge between the domains of technology (Tech team) and investment (PM team), playing the role of digital translator to ensure that business needs are met in the model development. From a governance perspective, the DD team will ensure that the data are used responsibly and will work with Value3 to embed ESG considerations on the platform to facilitate responsible investing efforts. **Figure 5** depicts this model for a fixed-income ratings project with Value3 and UOBAM.

In "AI Pioneers in Investment Management" (CFA Institute 2019a), Larry Cao identified five major hurdles investment firms face in applying AI/ML and big data solutions: cost, talent, technology, vision, and time. UOBAM's collaboration with Value3 helps counter these challenges.

The cost of developing an integrated system—such as the one Value3 has—is generally regarded as a big-ticket item. UOBAM was fortunate to be able to tap a government grant provided by MAS in the adoption of the system. Talent is spread across the T-shaped team, with each domain providing input in its area of expertise. Technology is ever evolving, with new players entering the market providing niche solutions, and it is UOBAM's prerogative to be aware of these

FIGURE 5. T-SHAPED TEAM FOR THE FIXED-INCOME RATINGS PROJECT



niche solutions and evaluate whether they could provide value to the operationalization of the firm. UOBAM's evaluation requires forward-thinking vision to ensure that these niche solutions, if adopted, are viable to the firm's business needs, adaptable to future advances in technology, and, more important, in line with the mission, goals, and values of the firm. In this project, UOBAM has found that its time is predominantly spent on the refining of the model to suit business needs rather than in the development phase, which can be time consuming.

From a technological perspective, in UOBAM there has been a gradual shift from doing everything in-house to working with partners that are able to enhance and complement UOBAM's core business, which will provide the firm with a competitive edge in the future.

Providing a Learning Environment in UOBAM

UOBAM places a strong emphasis on employee learning and up-skilling of staff so that it can better meet the rigours and demands of an ever-evolving technological work landscape. UOBAM's digital strategy is based on the two pillars of people and technology. These two pillars form a symbiotic relationship in the firm's quest to be a digital-first enterprise.

This relationship is further illustrated in the four elements of digital transformation UOBAM has in place: solidify dataset, sharpen tool set, strengthen skill set, and shift mindset.

Solidify Dataset

Data are the fuel that provides a desired result. The quality and reliability of data will determine the accuracy of results in any model. Solidifying the dataset will include areas of data governance, strategy alignment, and data privacy and security.

Sharpen Tool Set

Technology tools greatly assist any AI/ML project, and the better the tool, the better the results. UOBAM has made improvements to its enterprise data architecture and governance (EDAG), which include a data lake and enterprise data warehouse (DLEDW) and a data discovery platform (DDT). The DDT was developed as a "sandbox" that allows businesses to perform data analysis and develop analytical prototypes. These are cyber-secured environments that enable pre-endorsed users (power users) to leverage on data from the data lake for analysis and generating insights.

Strengthen Skill Set

UOBAM realizes that to have a data-driven culture, employees will need data-related skills and knowledge. UOBAM has several training initiatives to ensure its employees have avenues to gain knowledge, which are illustrated next, in the fourth element of digital transformation.

Shift Mindset

The shifting of UOBAM's employees' mindsets is a critical component in the drive to be a digital-first company. The firm has initiated several programs to help its employees make that transition, including a series of training initiatives and resources for employees to tap into.

Training for the acquisition of various data-related skills can be found in UOBAM's in-house learning portal, iAMdigital. The portal has various classes on programming languages, such as R, Python, and SQL, as well as tutorials for AI and ML. Employees also are equipped with access to a DataCamp and LinkedIn Learning account, which offer courses at various proficiency levels so employees can improve their data and digital skills.

These training programs not only have facilitated the strengthening of UOBAM employees' skill sets but also more importantly have shifted the mindset of its staff in confidently adopting technology in their daily working lives.

Key Takeaways

Initiating change is never an easy process, and that process is exponentially harder with a large organization.

Leadership style within UOBAM has also evolved into a transformational style of leadership. There is a strong mandate from upper management to integrate technology in the work processes.

Management has also realized that while work processes can be automated, human intelligence is still needed to ask questions, identify problems, think of possible answers, and create solutions. Training is constantly being developed to ensure that staff are up to date with technological knowledge. UOBAM's

CEO, Thio Boon Kiat, has been a champion of the organization adopting and utilizing technology to bring better value to customers.

Technology is becoming more ubiquitous and will permeate almost every industry in the near future. This coming decade will see AI and ML play a significant and fundamental role in finance, particularly in areas of asset allocation, risk management, fraud prevention, and process automation, among others.

The COVID-19 pandemic has illustrated that no industry is safe from uncertainty. The pandemic saw multitudes of job losses, companies winding down, and many more facing financial crises. The normal we once knew was obliterated in a short period of time.

UOBAM recognizes the need to embrace technology and use it to assist employees in being more efficient in their job scope and better decision makers. The recent successes of the projects involving AI and ML serve as a testament to this notion. Being a company that is entrenched in technology will allow UOBAM to be agile and act swiftly to counter uncertainty in whatever form it may come.