

2016 MAS-ABS FINANCIAL WORLD

API CONFERENCE
POST-EVENT E-BOOK

THE FIRST CONFERENCE
BY A CENTRAL BANK TO
CATALYSE API ADOPTION
IN THE FINANCIAL SECTOR

Understanding APIs

The API
Journey

Challenges
to Adopting APIs

The **Future**
of APIs

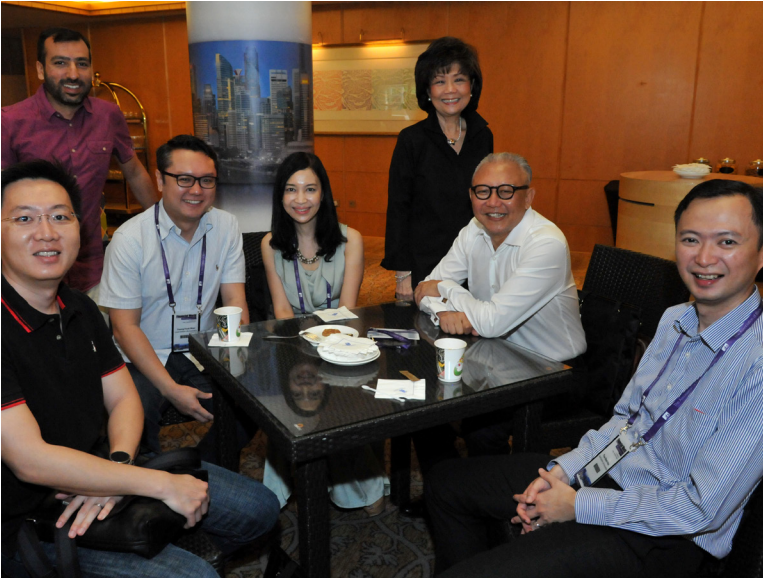


Monetary Authority
of Singapore



The Association of Banks
in Singapore

// EVENT PHOTOS



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APPLICATION PROGRAMMING INTERFACES AS THE FOUNDATION OF A SMART FINANCIAL CENTRE

KEYNOTE SPEECH



Mr Sopnendu Mohanty, CFTO, MAS.

The proliferation of Application Programming Interfaces (APIs) in the financial sector will facilitate Singapore's evolution into a smart financial centre.

We live in an era where technological innovation is no longer a choice. Businesses have to adapt quickly to rapid changes in consumer expectations. As an example, consumers increasingly prefer to use self-service kiosks, ATMs, and mobile banking services, compared to over-the-counter banking services, giving rise to a "self-service" culture. Are we ready to embrace these changes?

To this end, it is necessary for firms to look at how they can effectively meet existing customer and business expectations. If we want to realise our vision of becoming a smart financial centre, the key enablers of innovation - rapid experimentation, active collaboration, and a conducive ecosystem must be present. The Monetary Authority of Singapore (MAS) is of the view that the proliferation of Application Programming Interfaces (APIs) in the financial sector will facilitate Singapore's transformation into a smart financial centre.

While the use of APIs is not new in some sectors, its adoption in the financial sector is still fairly limited. Traditional financial

KEYNOTE SPEECH

institutions such as banks run the risk of being displaced by FinTech firms poised to “eat their lunch” by being better able to meet consumer demand. Banks can avert the risk of disintermediation by allowing these firms to “share their meal” through APIs, where the appropriate data exchanges take place seamlessly and efficiently to enrich their financial services, thereby generating greater value for both sides.

Fundamentally, the core advantage of an ecosystem built around APIs is the ease of collaboration and co-creation between industry players, which engenders new ideas and innovative solutions. By adopting open APIs, traditional financial institutions can more readily experiment, collaborate and leverage on innovative solutions and business models that other participants in the financial ecosystem have developed.

Singapore is not alone in its API journey. Globally, a number of countries such as the United States, the United Kingdom and Japan are exploring the opportunities of APIs as well.

MAS’ conviction to encourage innovation through APIs is clear. This API Conference marks the beginning of our API journey towards greater partnerships between financial institutions and FinTech firms, as we forge forward to establish Singapore as a smart financial centre where innovation is pervasive and technology is widely used.

SOPNENDU MOHANTY
CHIEF FINTECH OFFICER
MONETARY AUTHORITY OF SINGAPORE

CONFERENCE INTRODUCTION



Panellists at the API Conference.

A global first by a central bank, the Financial World: API Conference 2016 was a resounding success. Organised by MAS and the Association of Banks in Singapore (ABS) from 29 to 30 March 2016, the conference was held in Singapore and served to catalyse FinTech experimentation and innovation by encouraging the adoption of APIs in the Singapore financial sector. More than 140 key decision makers across business, operations, technology, compliance and information security joined the conference to hear from a distinguished line-up of speakers from around the world.

Speakers from the Bank of New York Mellon (BNY Mellon), IBM, MasterCard, Mesisit, OANDA, PwC, Singapore Exchange, Thomson Reuters and Visa shared on a wide range of topics which included their corporate API strategies, experiences with API implementation, the future of APIs, and insights on information security and data governance in relation to API adoption.

A panel of experts comprising BNY Mellon, Citibank, DBS Bank, Mesisit, PwC, Thomson Reuters, Tigerspike and Visa discussed opportunities for financial institutions to adopt API architectures.

Speakers from the Bank of New York Mellon, IBM, MasterCard, Mesisit, OANDA, PwC, Singapore Exchange, Thomson Reuters and Visa shared on a wide range of topics

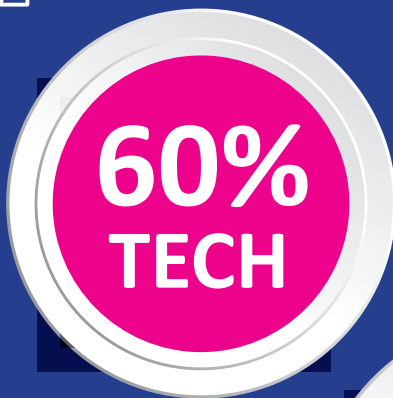
MAS and ABS believe that APIs can create significant opportunities for financial institutions and enhance their strategic competitiveness in the global financial arena.

E-BOOK

This e-book crystallises the insights shared at the API Conference to engender collective learning by the industry.

It is presented in four sections, namely **Understanding APIs**, which describes the impetus for implementing APIs; **The API Journey**, which looks at the strategies for adopting APIs; **Challenges to adopting APIs**, which highlights the potential difficulties that firms may encounter when implementing APIs; and **the Future of APIs**, which provides a view of how APIs will transform the financial industry. At the end of each section is a compilation of responses to questions raised by attendees, which speakers took the time to respond to post-conference.

THE FIRST CONFERENCE BY A CENTRAL BANK TO CATALYSE API ADOPTION IN THE FINANCIAL SECTOR



OPENING REMARKS BY THE ASSOCIATION OF BANKS IN SINGAPORE



Mrs Ong-Ang Ai Boon, Director, ABS.

Digital technology is fast changing the way in which enhanced and new financial services can be delivered to customers by leveraging external parties' applications, software and solutions.

Welcome to the Financial World: API Conference 2016. We are pleased to collaborate with MAS in organising this 2-day event which promises to be an interesting and exciting event.

We have more than 140 key decision-makers and innovators across the financial services industry participating in this conference. We would like to mention our appreciation to PwC, MasterCard and VISA for their financial support of this event.

Over the next 2 days, we will hear from an impressive line-up of speakers, both local as well as global industry players, who have good knowledge and insight into Fintech trends.

Digital technology is fast changing the way in which enhanced and new financial services can be delivered to customers by leveraging external parties' applications, software and solutions. It is also enabling agile FinTech start-ups to bypass geographic and regulatory boundaries to offer new ways of doing payments, peer-to-peer lending and crowdfunding.

Around the world, banks recognise that digital technology is disintermediating more traditional and regulated financial services

OPENING REMARKS BY THE ASSOCIATION OF BANKS IN SINGAPORE

and disrupting their business. Nevertheless, we also recognise the opportunities available to banks, and as we cannot beat them, we will join them. This conference is thus a major step in bringing all players in the financial ecosystem together – financial institutions, FinTech companies, service providers and regulators – so that everyone can learn from each other about how to rapidly and securely make banking services available through APIs. This will arrive soon. Customers and companies in Singapore will have more Fintech financial-related services and will find these services more convenient.

We believe that this conference is the start of an important journey to foster awareness. The range of speakers, with their knowledge and experience, and the richness of the views that will be shared, will enable financial institutions on the API journey to take note of the API lifecycle, to suss out relevant learning points, and to apply these points.

This is also a journey that takes time. We are embarking on this digital journey with banks to enable them to meet customers' changing demands and work with start-ups. Banks will need to progressively calibrate their speed on this journey, even those with established labs. Banks need to meticulously and carefully plan how APIs can be integrated with legacy systems, to build up skills sets and tools, and to enable the required shift in traditional banking and business mind-sets.

ABS is confident that, by embracing the FinTech revolution, its member banks will be left stronger and more prepared to adapt to a brave new world of apps and social media.

**MRS ONG-ANG AI BOON
DIRECTOR
THE ASSOCIATION OF BANKS IN
SINGAPORE**

OUR API JOURNEY: A GUIDE FOR FINANCIAL INSTITUTIONS

Understanding APIs



Mr Kevin Fedigan,
Chief Information Officer, BNY Mellon.

BNY MELLON

We believe that APIs can unleash the potential of the vast amount of data that financial institutions, banks and governments sit on. For instance, we have 40 petabytes of data, which we work on putting to good use for our 220 million investors through the use of APIs, to make it more efficient and effective to investors to manage their portfolios. APIs also provide an additional source of value creation for us.

MAS

APIs have evolved. In the early days, the Emulator High-Level Language API (EHLLAPI) was used to allow PCs to communicate with mainframe applications. Today, APIs connect many devices together over the internet, across public to private networks. Yet their value proposition remains the same – APIs bring value to consumers and businesses.

We believe that APIs reduce financial institutions' time to market, lower the cost of implementing projects and reduce the cost of maintenance as changes in business strategy can be more easily effected via APIs rather than making extensive changes across many different applications.



Understanding APIs



Mr Ben Gilbey, Senior Business Leader, MasterCard.

MASTERCARD

We understand that API developers are looking for more than the development of payment services. Developers are also looking to conduct P2P transfers, to identify fraudulent parties, and to implement tokenisation. Currently, we have 27 APIs, which cover all aspects of our services, such as payments, data services and security. We anticipate that we will have 10 more APIs coming up in the next 12 months. Many of our APIs are free for developers, as they bring more transactions into our network, and thus we are able to build a business model around these increased transaction fees.



Mr Tanmai Sharma, Founder, Mesitis.

MESITIS

We believe there needs to be a centralised data warehouse for all banks, to give clients a complete birds' eye picture of their finances. APIs are the solution which will enable the creation of this data warehouse, and lead to better customer service.

Many banks store data within separate silos. We believe internal APIs can enable banks to fully utilise data across these silos. APIs also provide additional value to banks' customers. While most people associate technology with consumer banking and mobile banking, we think that private banking, traditionally reliant on the personal touch, can leverage technology to make improvements.



Understanding APIs

OANDA

As a FX (Foreign Exchange) and CFD (Contracts for Difference) firm, we understand there is a need to implement APIs to boost internal efficiency. APIs give power users more flexibility and allow a firm to expand its platform for growth opportunities. Having internal APIs forces a firm to have clean and consistent documents, for instance. APIs also give our core customer segment - intermediate traders - more flexibility, by allowing them to create integrated or custom strategies.

For trading firms, the question is, why not open up your APIs to such independent traders and let them implement algorithms for their trading? By allowing partners to build new products in niche segments, this allows for some gaps to be filled - a win-win situation for everyone. Like Singapore Exchange (SGX), we understand that financial firms can't build everything themselves, and we found that one way is to make money from transactions that go through our APIs. This results in both our customers and partners being satisfied.

PwC

APIs are now a means of increasing business efficiency which will dominate in the years ahead. As such, we encourage financial institutions to

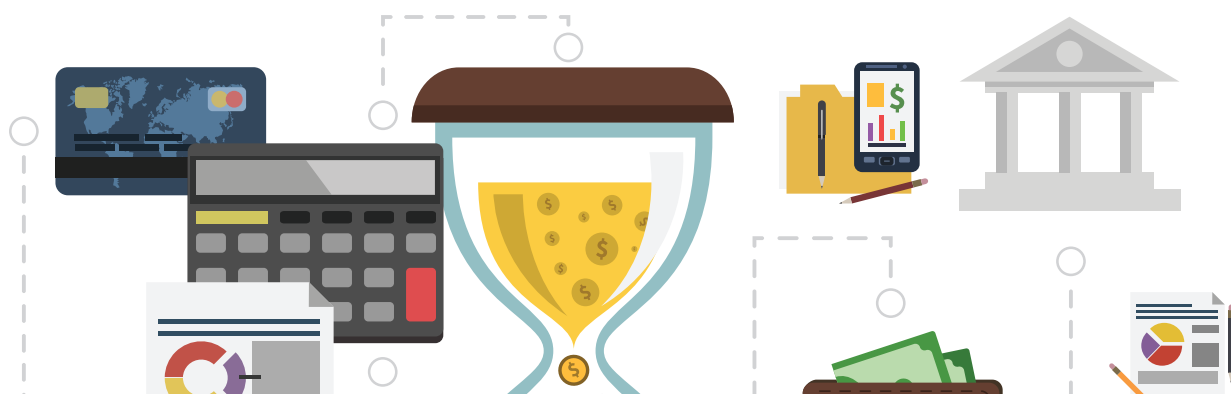
view APIs not just through the perspective of IT or systems architecture, but through a business perspective.

Changes to relevant processes and governance must accompany the implementation of APIs. Financial institutions should maintain a register of the number and type of APIs they have, such as what services these APIs provide, and their business capabilities.

We believe the first step in this journey is for financial institutions to understand their data on a deeper level. Most of the risks and concerns that financial institutions have about sharing their data with external parties can be mitigated if they know and understand their data, and build their data architectures accordingly.

VISA

APIs are the unsung heroes of the digital economy. We think that banks and FinTech companies must consider evolving models of collaboration, and APIs will facilitate integration and the co-creation of solutions for the end consumer. For every service that a FinTech company offers or develops today, there is an API that can help them deploy this service in the market more rapidly.



IN CONVERSATION

? What would be the first and necessary stepping stone for an organisation embarking on the API journey?

Information architecture is the main area of work. In order to be successful with the API journey, organisations must have a good way to segregate critical and non-critical data, and must have good data governance processes in place. Once these are in place, the exposure of these data through APIs is relatively straightforward.

PwC

? What are the use cases where financial services firms have used Thomson Reuters' APIs?

Broadly speaking, financial services firms use Thomson Reuters' APIs to provide real-time pricing, reference data, analytics, and historical data to end-user display applications running on desktops, in browsers, or on mobile devices. Thomson Reuters' APIs are also used for front, middle and back office applications involved in pre-trade, trade, and post-trade processes.

Thomson Reuters



The API Journey

We have dedicated technical product managers who oversee our APIs' entire life cycles.

BNY MELLON

Our foray into APIs came in 2012, when our bank started its own private cloud environment for developers to share their internal developments. These 2,600 apps within the private cloud developed into an app store ecosystem when we realised that third parties could make use of them to solve business problems.

To enable this, we launched our NEXEN ecosystem, which makes it easy for developers to publish their APIs and for consumers to purchase them. Users can also subscribe to various APIs, and in addition, the store also reroutes APIs to the right servers.

By opening up our APIs to FinTech firms, we have formed symbiotic relationships where we provide customers to FinTech firms, and in turn, these firms provide services that are in line with our portfolio.

The success of our APIs also comes from treating our APIs as a product. We have dedicated technical product managers who oversee our APIs' entire life cycles. Having standard protocols is essential if a company is to monetise their APIs. In addition, governance is critical in ensuring a consistent developer experience, which has to start early, such as through naming conventions, consistent documentation, and by ensuring consistency across all APIs.



In photo (L to R): **Mr Michael Gardner**, Head of Innovation Center, Silicon Valley; **Mr Kevin Fedigan**, Chief Information Officer; **Mr Hans Brown**, Head of Client Technology Solutions, Asia Pacific, BNY Mellon.

The API Journey

IBM

Our API journey started with one API. Now, we have more than fifty APIs, classified into four categories. Firstly, our data insight APIs crawl a constantly updating pipeline of news, enrich it with natural language processing, and store it for single-query consumption. Secondly, our speech APIs transcribe voice to text or text to voice, leveraging intelligence concerning the relevant grammar and context to generate a more accurate transcription.

Thirdly, our visual recognition APIs crunch unstructured data, and automatically extract and tag images to understand a picture's content and context. This is especially helpful for the large amounts of data produced by social media, photos, and videos. Our language APIs also walk users through step-by-step processes in natural, conversational language. Use cases include decision support and transaction handling.

Our advice on API implementation is to begin from a firm's technology foundations. A firm could choose a technology platform of its choice and examine who offers APIs for this platform. It can then look at its business processes, such as retail banking or loan underwriting, and think about how to apply these APIs. One last aspect is to look at the firms' business as a service - be it analytics, social or digital services.

MAS

Our larger role in the API ecosystem is not as a data service provider, but rather, we can be perceived as maintaining a database from which firms can draw relevant data through APIs. For us, there is a low cost in converting existing processes to API-enabled formats so that firms can access and creatively make use of data to provide value and benefit to their customers.

On a government-to-consumer level, we publish various data on the MAS website. This data is currently published in HTML, Excel or PDF formats. For example, primary dealers and MEPS+ (MAS Electronic Payment System) participants use SGS (Singapore Government Securities) data published on the MAS website. The public can also use the Register of Representatives to find out if they are dealing with a legitimate financial advisor that is selling financial products. One future possibility is for us to API-enable the MAS website. This will allow current users of this data and potentially new users to access this data seamlessly.

On a business-to-business level, we operate MASNET, a communications hub which facilitates the submission of MAS returns, as well as data exchange between organisations consisting of financial institutions, SGX and government agencies. Data is exchanged via batch processing of files. We envision that MASNET will move away from batch processing towards APIs. This will speed up the processing of transactions and improve efficiency, benefiting businesses and consumers in the long term.

The API Journey



Mr Lawrence Ang, Executive Director, MAS.

We envision that we could work with the industry to co-develop a set of APIs to facilitate transactions and the exchange of data with the industry more seamlessly.

For example, today, when a car owner purchases car insurance, insurance companies send this information to the Land Transport Authority (LTA) through MASNET, to enable the owner to renew their road tax at LTA. While MASNET currently helps to shorten backend processing times, data exchange is still not quite seamless, resulting in situations where a car owner is unable to renew their road tax despite their purchase of car insurance. With APIs, transaction verification can be greatly improved through near real-time data access.

On a government-to-business level, financial institutions interact with us in several ways. They conduct transactional exchanges with us, e.g. manual submission of online application forms to us; and they submit returns to us, e.g. MAS 610 returns. As submissions are currently done manually and at pre-defined frequencies, we may need more timely information from financial institutions, e.g. during a financial crisis. Using APIs, we can more efficiently validate current data against trending or historical data. We envision that we could work with the industry to co-develop a set of APIs to facilitate transactions and the exchange of data with the industry more seamlessly.

MASTERCARD

Our API philosophy is to enable the creation of one killer app to rule them all. This single app can be fully powered by APIs. The services we have deployed through APIs include payment options like MasterPass, data services like location and place tracking, and MasterCard Match for security. Offering these solutions to developers through APIs means that we can work together with them so that both parties benefit from being able to reach more customers and from providing better services. Over the past five to six years, we have had close to 9,000 developers working with us, and this is a major part of our business with annual growth.

MESITIS

One aspect of our business provides High Net Worth Individuals

The API Journey

(HWNIs) with an overview of their financial assets, across financial institutions and asset classes. Our Canopy engine extracts data from the bank statements in PDF format (Portable document format) that customers provide, parses it according to legal requirements, and gives the customer a consolidated view of their assets. This data is then used to create APIs.

We believe this aspect of the new economy presents a challenge for banks. Financial institutions can either keep all their data, updating it only once a month for customers, or they can choose to work with FinTech companies like us to provide live data to customers.

If they work with us, customers will see all their transactions with the bank reflected instantly, while transactions with competing banks will only be updated once a month. When financial institutions provide live data to customers, we believe customers are more likely to move to these financial institutions.

OANDA

We embarked on creating our own ecosystem for APIs with the aim of growing our platform and opportunities for expansion. We started aggregating data from liquidity providers, and allowing people to execute transactions on our platform. We also deployed proprietary products for customers to see their transactions on the Internet, mobile phones and desktops.

Part of our goal was to extend our core engine through open APIs, and slowly move our entire proprietary platform on top of these open APIs. In the process, we could begin to learn about the issues involved in this endeavour. As we progressed on our API journey, we invested a lot in our mobile applications and identified partners who could fill the gaps on our roadmap.

For instance, we wanted partners to build on our trading APIs which are based on our aggregated data. Just like SGX, we were clear that we didn't have the time or resources to build what we desired on our own. We recommend that vendors out there should consider targeting customers like ourselves, which have relatively fewer resources to custom-build our own API-enabled IT architectures.

We also recommend that it is important to know how to measure the success of one's APIs. We knew that more sophisticated traders would drive more volume through the APIs, and we worked on monitoring the traction of new products from this data. We used these to upsell and cross-sell products to customers.

Our advice is to adopt the Apple way – to set an API experience for partner developers. Set clear expectations, maintain or create industry standards, and allow for easy migration or upgrade paths, while not breaking things along the way.

We knew that more sophisticated traders would drive more volume through the APIs, and we worked on monitoring the traction of new products from this data.

The API Journey



Mr Ong Whee Teck, Partner, PwC.

We think one great way to get started with APIs is to constrain them to a business problem and to open the problem up to the wider FinTech community for ideas on how to solve it, such as through a hackathon.

When financial institutions open up their APIs, they should understand that people building products on their platform are doing it in their own interests. Before the products are launched, financial institutions should make developers register and have a process for evaluating these developers, as financial institutions don't want to be dealing with anybody who's fraudulent. These processes are about protecting critical systems and data.

PwC

We think one great way to get started with APIs is to constrain them to a business problem and to open the problem up to the wider FinTech community for ideas on how to solve it, such as through a hackathon. Banks should also create clear, visible measurements for APIs, perhaps with a scorecard put up on a wall for the teams to see their progress and move together towards the same goals.

SGX

Our API journey began in the early 2000's, driven by the contemporary electronic transformation of the capital markets. In co-operation with the industry, we led a Straight-Through-Processing (STP) initiative to lower operating costs, reduce settlement risk and in turn provide a more liquid and efficient financial market.

Once we understood the need for APIs, we progressively moved from terminal-based technology to standards-based APIs. This move helped us tap into the international market and create a vibrant 3rd party ecosystem, fostering innovation and new functionality for our clients.

As an organisation progressively implements APIs, its transactional and risk profile changes, even when operating over private networks. Our advice is that it's important to monitor behaviour and where necessary adapt your business to address these trends and emerging risks.

One such benefit is that APIs allow us to make changes to back-end



The API Journey

One such benefit is that APIs allow us to make changes to back-end technology architecture largely without affecting front-end users.



Mr Niguel Brooks, Senior Vice President, SGX.

technology architecture largely without affecting front-end users. Thus, even if we needed to change our platform, our clients would still plug their applications into the same APIs. This also serves as a form of risk mitigation to prevent an organisation from being locked to a single vendor or to facilitate a major platform upgrade.

When our journey began, securities trading was wholly traded using basic terminals. Our first API strategy was based on our core trading system, which gives both proprietary and standard FIX API access to trading participants. We were trying to address the challenges of technology innovation, globalisation and increased competition, which was fuelled by factors such as falling telecommunications costs and changes to the regulatory landscape that led to more competition.

We upgraded our various platforms to support APIs, but this came with its own issues, as many customers were not able to leverage our APIs on day one. We had to release GUIs (Graphical User Interfaces) to supplement our APIs and provide a bridge to manage the transition. We also aspire to be a platform-oriented company by enhancing our systems and in tandem we introduced the new electronic trading protocols ITCH and OUCH to address the demands and sophistication of the market.

Now, we are in the middle of developing a strong financial community, which has offered opportunities for expansion outside our current business model. Our ecosystem of financial institutions, for instance, can raise opportunities such as, “Do we build a financial services cloud, just like what NASDAQ has done?” We recommend that organisations expand and build an ecosystem that makes sense for their business.

The API Journey

Closed-source APIs then started to make little sense to us. Eventually, we put our APIs on GitHub, to allow customers to work with them to extend and add value to our APIs and their content.



Mr Steve Schiff, Global Head of Elektron APIs and Transactions, Thomson Reuters.



Mr TS Anil, Senior Vice President, Visa.

THOMSON REUTERS

Our ecosystem, in general, connects content providers with content consumers. We also provide liquidity pools to connect people who wish to execute trades. These systems make up a financial trading community.

Our API journey started when we began to republish market data. This helped us realise we had a platform for content publishers to reach target audiences.

We then created the Elektron platform, on top of the associated Elektron APIs, to comprise an aggregation platform for consolidating all of our real time content, such as company, reference, risk, news, and analytics data. We thus learnt that basing our content distribution on APIs can create a collaborative environment.

Closed-source APIs then started to make little sense to us. Eventually, we put our APIs on GitHub, to allow customers to work with them to extend and add value to our APIs and their content.

VISA

APIs have been at the forefront of our approach to the digital economy. We have been exposing core digital solutions as APIs for years, and with the Visa Developer Centre (developer.visa.com), we provide an open platform for developers across the globe to easily consume Visa solutions, thus significantly eliminating the friction developers face in accessing and creating payment apps. To further accelerate the pace of innovation, we are launching over seven innovation hubs around the world to facilitate more open collaboration across the expanding digital ecosystem.

IN CONVERSATION



Is it necessary to impose governance on public APIs?

Yes, governance is absolutely necessary for public APIs, to ensure standardization and compliance and ensure ongoing productivity of the developers using those APIs.

BNY Mellon



How do you decide when to build an API in-house & when to partner the developers?

This is largely set by our strategic roadmap. As an executive team, and particularly within Product and Engineering, we have made decisions on what we feel are key areas the company can build proprietary solutions for that can lead the market vs. products or solutions that we either don't have the expertise or resources to focus on in the near term. The less strategic ones (often niche areas, or technology areas that we don't feel are the critical to our future success) are left open for partners to build.

Often there are product ideas we hadn't thought about that partners bring to the table that may not be proven yet or there may not be an early market for. In these cases we will simply monitor the traction closely and determine whether there is truly a strategic opportunity here that we should look for a closer partner relationship on.

OANDA



Do you use any industry data format standards for your APIs?

We try to use industry standards whenever appropriate, but this is mostly applied to the technology stack and protocols. We use RESTful API standards and JSON document formats. Our API utilises standard ISO currency codes, bid/ask formats etc.

For trading purposes, we do offer a FIX API, which is considered a financial industry standard. However FIX is not a very easy to use interface, and despite being a standard there are so many versions and implementations that it is not easy for users to support. We do keep an eye on standards and try to comply if it makes sense for our customers. But a standard is only useful if it's adopted and adds some value to your user base. We won't adopt a standard just for the sake of it being a standard.

OANDA



How does OANDA set and maintain the level of quality and compliance of its partner developers? What expectations have been set by OANDA for its partner developers and network?

We have developed an internal process that we follow for our partner program. Anyone can get started quickly by creating a practice account and developing against our practice environment, which is a mirror of our live trading platform except it uses virtual money instead of real money. Once a partner has completed their development they can request access to our live platform, at which point they go through an internal review process.

In terms of expectations, we want to make sure the partner understands we are looking for stable businesses that plan to support and evolve an application over a long period. Individuals who are just building an app on the side but can't support it for our customer base are encouraged to launch it as open source first and set the expectations appropriately. We don't want to market or recommend a product that has inadequate support or will be shelved after a year.

We also try to encourage partners building applications in areas that OANDA doesn't focus on, and we try to give them a heads up if we are also intending to build an application or feature that would potentially compete with their own, so that they don't feel misled or that we stole their idea. Building a level of trust and transparency with these partners is critical for both parties' success.

OANDA

? What are the use cases that OANDA has gotten its partner network to develop using its APIs?

One of the key use cases has been targeting a Professional Trader customer segment. OANDA has traditionally focused on new and intermediate retail traders. Many experienced day traders have years of experience using a variety of sophisticated platforms, that they tend to be loyal to. We've started working with these mature platform vendors such as MultiCharts, MotiveWave, eSignal etc. to attract that segment.

We are also working with up-and-coming vendors targeting the same space like QuantConnect and Seer Trading who are building new web and cloud based services for Algorithmic Traders. We have a number of partners focused on niche segments like trading off news events, tracking investment bank analysis, social trading networks and a few that have built simple mobile applications.

OANDA

? How much does the partner network and developer community influence the availability of OANDA APIs? How does OANDA engage and support the partner network and developer community?

We engage our developer community through a few channels - GitHub has been great to publish open code like reference implementations for different programming languages, sample projects and a number of our developer partners open source their own projects.

We have a discussion forum where people discuss the API and provide feedback. And we get a lot of direct feedback through our support channel where users or partners ask for specific features or changes. We try to prioritise requests and add them to the backlog based on user demand and how it fits into our strategic roadmap.

OANDA

? We hear that APIs are a new business enabler, and are interested in how it can be implemented successfully. This includes implementing it securely. Could you share your view on the technology risks of APIs?

First, all the risks that are present in the Web or the internet world apply to APIs. Security bugs can exist in the APIs that allow a cyber-criminal to penetrate systems or databases. Denial of service attacks can also bring down API services. In addition, there could be new risks. For example, an infinite loop can occur when one API waits for another API that in turn waits for another API and so on, causing all systems to come to standstill.

All technologies carry risks, but that should not stop us from moving forward; because there will always be ways to mitigate these risks.

PwC

? What percentage of SGX's operations are virtualised and how much reliance is there on APIs?

SGX adopts a virtualisation-first approach to server deployments. Only systems that require stringent and deterministic latency, or extreme throughput are exempt.

In the area of Trading, APIs account for nearly all customer connections and transaction flows. The recent Securities Post Trade System (PTS) upgrade will allow customers' back office systems to connect directly to the API. Internally, SGX systems are heavily dependent on APIs to exchange information. SGX will continue to develop APIs with an increasing focus in offering APIs for Internet systems.

SGX

? Is the certification of external systems automated before they are allowed to interface with SGX systems through API connections?

SGX has embarked on an initiative to implement automated conformance tests for developers when certifying for the new Derivatives System (Titan). This will include existing and new API protocols being offered (ie. ITCH/OUCH). SGX has plans to offer the same certification process for the Securities Trading system as part of the next refresh and will continue with this strategy for other API-enabled systems.

SGX

? How is Visa engaging the developer community to create wider awareness on their latest APIs? What are the public APIs available from Visa?

With the launch of Visa Developer (developer.visa.com) the developer community will be able to connect to Visa more easily and access Visa payment capabilities. Visa Developer allows the global community easy and secure access to a broad range of Visa APIs and SDKs for payments, risk and fraud management and other network service functionality.

We've also recently launched Visa's Innovation Centre (Visa Collab SG); an open, engaging and inspirational space where clients explore the future of payment with us. In the innovation centre, clients co-create innovative new concepts with Visa using human-centered design. Once the concept is defined, our developer teams co-develop prototypes with clients using Visa and third party APIs.

Visa

Challenges to Adopting APIs

BNY MELLON

As one of the world's oldest banks, we have a long history, which can produce heritage and legacy issues. "Heritage" teams that have been with us for longer periods may not understand modern technology such as APIs. To combat this, we ensure that we invest sufficiently in training to get our teams to where they need to be.

The APIs in our API store are only as good as their underlying services – these have to be as modern as possible. This means the tiers of APIs in our API architecture have to work well together, even though there are underlying tensions in their aims.

The base APIs (the foundation of the program) should be stable, resistant to change, safely protected and controlled. In contrast, due to current demands, for the top layer of APIs (the layer that is visible to the public and developers), companies will want as much velocity as possible, so that they can keep up with current trends and attract developers who want to work on the latest technology. These tiers mean we should think of APIs as two-system models, where the chaos at the top layer has to be managed whilst protecting the foundational layer of APIs.

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Mr Martin Pickrodt, Chief Data Officer, Mesitis.

MESITIS

We propose that one way to understand APIs is to look at them through the lens of Michael Porter's Five Forces model.

Firstly, the model predicts there will be rivalry amongst existing competitors. Secondly, incumbent firms face the threat of new entrants, such as FinTech companies. Furthermore, FinTech firms have no legacy issues, which is an advantage for their implementation of APIs. Banks do have the asset of being the incumbents, and this is a great opportunity for banks to close out newer entrants.

A third aspect of the model is the bargaining power which buyers and sellers of APIs possess. We recommend that financial institutions mine and understand their data better. Firms have to realise customer acquisition is not about spamming credit-card holders with different

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offers every month, or trying one's luck with personal loans to people who do not need them. This is where data management and data analytics of client needs come into play. Firms can note that APIs don't always have to be external, and that firms have to make sure their information is better extracted and put to use.

The last aspect of the model is the threat of substitute products. We believe that in the future, clients may not always pay with credit cards, as they could be using their phones.

MAS

We understand that financial institutions have fears regarding APIs: that an open API would open the banks or financial institutions' systems to the regulators. This is not the case. Rather, we are seeking to break away from our traditional role. We aim to collaborate with financial institutions so we may mutually understand each other's data strategies and build something more efficient and effective together.

APIs could expose institutions to cybersecurity risks. While a system may be protected, there is always the chance of human error - one cannot expect everyone to think and operate with the best practices in mind at all times. However, we are addressing this issue by ensuring that companies possess key IT competencies.

OANDA

We created a beginner's platform, and this ended up incurring technical debt. Every time infrastructure or regulations changed, we had to change the products on the platform, and we had to shut some products down after a year of operations and within eighteen months of their creation.

PwC

We understand many banks have legacy issues that bog them down. For example, they may be operating mainly on legacy architectural design, systems and applications, and hence introducing new technology may result in complex integration issues. In addition, the front-end team can adopt



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agile software development methodologies to develop new applications quickly but the overall progress of deployment is likely to be held back by the back-end team which remains stuck due to legacy constraints.

Banks may be eager to jump into APIs by hiring people with the right competencies or acquiring FinTech firms, and expecting them to infuse their enthusiasm into the organisation. However, we recommend there be a cultural approach to ensure their enthusiasm does not get killed by the firm's organizational culture.

SGX

We found that the key effort involved in running an electronic and computer-enabled API platform is in supporting the end users. Documentation and upgrades need to be as simple as possible. Our previous API was SDK-based (software development kit-based), limited to either Linux or Windows. When a firm uses an SDK that is not based on one of these, they need to repackage it, which adds complexity. Ideally, firms need to offer APIs which are device and operating system agnostic, clear documentation with business examples, along with sample code and quality test environments.

An open API can be a differentiator providing access and capability to a larger addressable market but it can also lead to the ease of customers switching to a competitor. The platform and supporting services are key in

maintaining your competitive edge. It was not possible to go on the API journey alone, and we sought advice from key partners like NASDAQ to develop our next generation platform. Major transformations are a journey, revolving around solving issues on all levels, whether these are about intellectual property, emerging technology risks or simply the risk of change. One key thing for firms is to resolve these evergreen issues upfront using a consultative and collaborative approach.

THOMSON REUTERS

We advocate open source APIs, but we also recognise that not all open source projects are equal. Choosing which projects to carry forward and recognising which projects will be active is a difficult task. Firms should take care that whatever projects they choose will not be a dead-end.



Mr Arun Prasad, Head of Enterprise, ASEAN, Thomson Reuters.

IN CONVERSATION



What are the key challenges for financial institutions when implementing cognitive analytics through APIs? How are these challenges overcome?

We have experienced multiple challenges in the implementation of cognitive analytics using APIs. Some of the key ones are as explained below:

Data sensitivity considerations in financial institutions: We should plan in advance and evaluate internal and external regulations. Data masking techniques along with hybrid application designs consisting of (On-Premise & Cloud) leveraging open and flexible architecture should be considered.

Training data: It is imperative to have the right training data required for the learning of cognitive systems.

Adoption: Continuously educate and manage the expectations of multiple stakeholders in your journey to build cognitive systems.

IBM



What would be your advice based on the top 3 learning points from the SGX API journey?

Senior management support for the adoption of APIs as the primary mode of interacting with our customers at the very beginning (of the journey), otherwise it would have proven difficult to transition away from exchange provided front-end solutions.

Minimise the constraints around the use of the API, such as hardware type, operating system versions and supported software stack. Technology moves very fast and it's often difficult to predict who will be the dominant force or what new innovations will emerge over the period.

Embed the necessary controls, monitoring and alerting as part of the API design. This will allow you to produce meaningful reports, billing and/or analyse behavioural changes on the API usage.

SGX

? How do you manage changes to the APIs to allow new parties while supporting older users?

Thomson Reuters does not often change major technical features of its APIs. When this is necessary, customer notification on deprecated capabilities is made, and every effort is made to insure that new technical features do not cause quality or stability issues with previous versions.

The majority of new features are generally related to data model and data additions changes, which due to the self-describing nature of Thomson Reuters' Open Message Model do not generally affect applications.

Thomson Reuters



The Future of APIs

Companies should continue enhancing the developer experience, by making APIs accessible and easy for developers to use.



Mr Michael Gardner, Head of Innovation Center, Silicon Valley, BNY Mellon.

BNY MELLON

We have one key piece of advice: The world has gone digital, and will only continue to grow increasingly so. A bank with no API strategy will not be able to compete in the long run. We believe the initial cost of setting up API systems may be high but the opportunity cost of not doing so is higher in the long term.

Business growth through API implementation is possible only if developers are encouraged to consume the APIs. Companies should continue enhancing the developer experience, by making APIs accessible and easy for developers to use. We believe this will drive their business; otherwise there will not be a return on the investment created.

They must think in terms of building communities of developers, which will take the burden off core teams. They must also be prepared for perfunctory implementations that may not be what is desired in terms of quality. Lastly, they can gamify the developer experience; by having visible metrics or scorecards that keep track of progress and the level of advancement within the team.



Mr Gaurav Bansal, Advanced Analytics Solutions Lead, IBM.

IBM

We have actively deployed our APIs in retail banking. In one case, we brought in social, mobile, and analytics platforms into the traditional home loan process. This also allowed these APIs to acquire training data to enhance their capabilities.

MAS

There is a lot of potential in the wealth of data that we receive, such as exchange rates and taxes. We are thus taking steps to make the relevant data available via APIs, which then will be more easily accessible for external use to benefit businesses and consumers.

Also, we believe the future of personal portfolio banking can be transformed through APIs. For instance, currently, customers may

The Future of APIs

If banks can come together to collaborate and provide authenticated access to consumer data in a standard format, such as through APIs, application developers can, for example, develop a personal finance management application to enhance the consumer experience.

get three different documents from three different banks in different formats. We observe that consumer data is not standardised across financial institutions, and this makes it challenging for the consumer to have a consolidated view of one's dealings with financial institutions. This affects the consumer experience.

If banks can come together to collaborate and provide authenticated access to consumer data in a standard format, such as through APIs, application developers can, for example, develop a personal finance management application to enhance the consumer experience. Financial institutions can take this further by offering products and services through APIs that third party developers can use. In this way, APIs will create a sea of change, with limitless possibilities.

MASTERCARD

After five years of working with developers to expose APIs for external use, we understand the wishes of developers and consumers, and have thus started engaging the larger FinTech community. We are continuing our yearly hackathon competitions to solve and find better solutions to problems in the financial ecosystem.

OANDA

From our perspective, APIs are a way to develop new sales channels. APIs can also help to optimise business processes. For instance, we have a number of affiliates that introduce brokers to our APIs. We also advise companies to be open in exposing elements of their analytics APIs.



Mr Trevor Young, Vice President, OANDA.

The Future of APIs



Mr Tan Shong Ye, Partner, PwC.

PwC

APIs open up new opportunities for innovation in application development, but to sustain the proliferation of APIs, we believe that it is essential to have a clear understanding of data; namely, what it is for and how it can be used. There must also be further cooperation between financial institutions and FinTech firms.

We encourage financial institutions to be part of the emerging FinTech buzz, where you can feel the passion of millennials throwing their lives into something even while they're not sure what the future holds, and work together towards growth for both parties.

SGX

The future of APIs in the financial market relies on the robustness of the Singapore financial system, its regulatory framework, and our strong trading and clearing ability. Underpinning this growth will be electronic markets. We believe such growth is likely to increase at a greater speed and this is why financial firms need to invest in the right technology and infrastructure.

VISA

We believe the bank of the future will be a digital platform that connects millions of users and capabilities to best serve end consumers. By focusing on APIs and efficient integration, we aim to collectively solve real problems in the financial ecosystem, such as doing away with physical credit cards and moving towards digital services.



Mr Ruben Genovez Salazar,
Head of Product Design & Development,
Asia Pacific, Visa.

The challenge today is to find the best ways to extend payment capabilities into mobile and other connected devices.

With the current global proliferation of 10 billion connected devices, and with more than 40 billion devices anticipated to come online within the next 5 years, the challenge today is to find the best ways to extend payment capabilities into mobile and other connected devices. APIs will play an integral role in enabling this transformation and empower consumers to embrace a digital lifestyle.

IN CONVERSATION



? Have any governments or regulators adopted Thomson Reuters' Eikon platform?

Eikon has an Auction app that is used by several central banks around the world to manage and automate all Market Auctions (FI ,FX and MM). Also Eikon is subscribed to by many regulators, central banks and other supranational organisations.

Thomson Reuters

? How does Visa see its partnership model with banks evolving vis-a-vis the proliferation of payment FinTech companies?

Visa's fundamental partnership model does not change; however as part of the shift from plastic to digital, Visa is opening up the edge of our network to help industry players meet the changing demands of consumers and merchants. We are transforming VisaNet, the world's largest retail payment network, into an open platform for payments and commerce and for the first time in the company's history, developers at merchants, financial institutions, technology companies and startups will have open access to Visa technology, products and services.

Visa

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