

Revolutionizing the Future with Fintech

Special Issue from Singapore

Keyword Fintech, Fintech Infrastructure, AI, Big Data, Cloud Services

In this time and age, many financial institutions are turning to Fintech solutions to enhance customer experiences and improve their operational efficiencies. Some of these solutions include peer-to-peer lending, robotics process automation, predictive data analytics etc., and the list goes on.

This special issue zooms in on MRDD Singapore Desk's participation in the recent Singapore Fintech Festival that concluded on 17 Nov. It also seeks to provide key insights on the Fintech trends and developments, and address how financial institutions, venture capitals etc. can harness the power of Fintech solutions to revolutionize their value chain, both now and in the near future.

SINGAPORE FINTECH FESTIVAL 2017 - BRINGING TOGETHER THE GLOBAL FINANCIAL COMMUNITY

Organized by the Monetary Authority of Singapore (MAS), the Singapore Fintech Festival is an event that brings together the world's policy makers and financial institutions to discuss the global state of the Fintech industry, and provides opportunities for Fintech entrepreneurs to access funding by showcasing their latest innovations to their potential clients.



Held between 13 and 17 Nov 2017, the week-long festival drew more than 30,000 participants from across 100 countries. The festival began with an island-wide Innovation Lab Crawl, which was held on 13 Nov. A total of 24 participating companies organized tours and exhibitions at their company premises to showcase their latest Fintech solutions.

Between 14 and 16 Nov, a Fintech conference was held at the Singapore Expo Convention and Exhibition Centre. One of the key conference highlights was the keynote speech delivered by Her Majesty Queen Maxima of the Netherlands, who is also the UN Secretary-General's Special Advocate for Inclusive Finance for Development. She touched on many issues, where one of them involves the potential opportunities of using inclusive technology to build a vibrant future. Mr Arun Jaitley, India's Finance Minister and Minister of Corporate Affairs, and Ms. Yuriko Koike, Mayor of Tokyo were also invited to speak on the global Fintech landscape. Besides the interesting keynote speeches, forums and dialogue sessions, there were also many Fintech venture booths which showcased their creative Fintech innovations to the conference visitors.



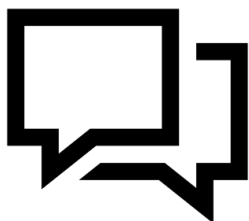
Night at Marina Bay, Singapore's Central Business District by Al Habshi.

Can you spot Mizuho's Singapore Office? Hint: in the center of the picture ☺

Last but not the least, an Investor Summit or "Deal Day" was held on 17 Nov. Besides providing opportunities for other investment-worthy start-ups to access funding from local and global investors, workshops were also conducted during the Investor Summit to allow participants to learn from leading companies on the integration of disruptive technologies in daily business operations to better meet business and strategic objectives.

NOTEWORTHY EVENTS DURING THE FESTIVAL

FORUMS / DIALOGUES



Regardless whether you are a start-up, technology company, investor, financial institution, research institute or innovation professional, everyone is excited about the Singapore Fintech Festival. As mentioned earlier, there was a series of keynote speeches, forums and dialogue sessions delivered/led by prominent figures during the festival. For those who missed out on all the actions, MRDD Singapore Desk has prepared an interesting scoop to

update everyone on the essentials that were shared during these keynote speeches, forums and dialogue sessions.

CHIEF FINTECH OFFICER OF MONETARY AUTHORITY OF SINGAPORE

Mr. Sopnendu Mohanty mentioned MAS encourages Banks to make use of Cloud Services rather than disrupting it. FinTech should be based on cloud architecture. Besides, Bank APIs is one of the most important themes for FinTech. MAS would like to foster Banks to develop open-APIs for other banks.

He launched the concept of AFIN(ASEAN Financial Innovation Network) Platform which can materialize Single Sandbox Platform for the ASEAN. AFIN Platform will be able to gather each participant's Core Banking & Services into unified Sandbox. Sandbox will be composed of Cloud Platform and its middleware will hold API Layers. The purposes of AFIN platform are facilitating KYC approach & Credit Scoring & SME Lending among participants.



“HOW WE GET HERE”

In this group chat, several industry leaders⁺, who are in charge of data/customer analytics in local financial institutions, discussed how they are using Big Data and other technologies to enhance their business' effectiveness and profitability.

Many macro-level thoughts and ideas were exchanged and debated. This has broadened the audiences' understanding on these technologies. In particular, Mr. Donald McDonald from OCBC (2nd largest bank in Singapore) raised several actual use-cases that we feel are applicable for financial institutions in general. Hopefully, colleagues from other departments might find these successful applications of technologies below helpful and encouraging 😊

- (1) For credit card business, OCBC would launch marketing campaigns from time to time to push partners' promotions and sales to customers, encouraging the latter to pay using OCBC's credit cards. Based on historical figures, this marketing technique usually yields a low conversion rate of around 0.2%, i.e. Out of a thousand who receives such marketing materials, only 2 of them would actually spend using their OCBC's credit cards. Now, by using Big Data to analyze customers' historical spending behaviors, OCBC can offer them more relevant, tailor-made promotions to greatly improve the conversion rate. For example, when a customer swipes their OCBC card in an overseas tourist destination, OCBC can scan the surrounding shops immediately to identify the products/services that match this customer's spending habit, and notify him/her of similar promotions via SMS. The results were astonishing - 23% of the

Credit card conversion rate is increased by 100 times using Big Data and other technologies.

OCBC Bank

notifications/recommendations led to subsequent OCBC credit card spending, which was a 100 times increase!

- (2) Another successful application of technology is related to Data Integration. Before Big Data can be ‘mined’ and used to generate useful business insights, they have to be converted from different systems with different formats (csv with header and footers, Word, scanned picture etc.) into a unified flat file such as CSV for consolidated analysis. For banks, this task is particularly difficult and costly, because of the large number of legacy systems and sheer amount of data. OCBC tackled this problem by using Big Data technology such as Hadoop to perform the Export, Transform, and Load (ETL) tasks. The result? Only 5% of the costs were incurred, as compared to the traditional method.

Similar stories were also shared in another discussion. DBS (largest bank in Singapore) shared that they are also using data science to improve efficiencies in departments that traditionally do not rely on such technologies: Operations Department is using technology to predict the length of queue in front of ATM; Compliance/Internal Audit Department is using it to schedule next audit optimally to prevent potential breach; HR department is predicting which individual will most likely apply for leave during a specific period! Sounds cool!

*Donald McDonald - Head, Group Customer Analytic & Decision OCBC. Kevin Lee - Head, GIC Labs. Richard Lowe - Chief Data Officer, UOB. Mike Blalock - GM, Financial Services Industry.

LAB CRAWLS



Other than the keynote speeches, forums and dialogues held during the festival, MAS also collaborated with a number of financial institutions (e.g. Citibank, SCB, UOB, OCBC and MUFG, Visa and Prudential) and Fintech service providers (e.g. AWS, Bloomberg and Intel) to host innovative lab crawl sessions all across Singapore. These sessions include live demonstrations, tours, exhibitions and workshops. As always, MRDD Singapore Desk was at the

scene to report on all these actions.



Located in SCB's main office building which was at the heart of Singapore dynamic financial district, the innovation lab 'eXellerator' is a SCB initiative that fosters close working relationships between SCB business units and Fintech partners to explore the use of emerging technologies and data science to transform SCB customers' and employees' experience by incorporating Artificial Intelligence, Machine Learning, Natural Language Processing, Blockchain, Program Synthesis and Image Analytics in their business processes.



SCB employees and vendors giving demonstrations of their Fintech products

During our tour, we met up with a few SCB employees, who shared their experiences on how some manual operational processes, e.g. credit risk scoring and monitoring, were improved significantly with Fintech solutions. A few Fintech vendors who are currently collaborating with SCB were also present to give us a live demonstration of their innovative products and how their products could be applied in a financial institution's setting.

VISA

We were also privileged to be sponsored by CITIBANK to participate in their bespoke innovation lab tours together with a select few of their clients and partners. The lab tour was happening away from the main festival and the lab floor was exclusively presented to us. The first part of the tour featured VISA.



During the lab tour, VISA showcased their slew of current and future services that covered a wide range of areas from payments, bank transactions, authentication and mobility.



The image above shows their “API-like” services that banks, non-bank financial institutions and merchants could mix-and-match to provide better services to their clients.



The second part of the CITIBANK bespoke innovation lab tour involved Accenture and the session was conducted in the Accenture Liquid Studio (ALS). The objectives of the ALS involve four major ideas - (i) Innovation Experience, (ii) Rapid Prototyping, (iii) High-Touch Engineering & (iv) Mobilize to Scale.

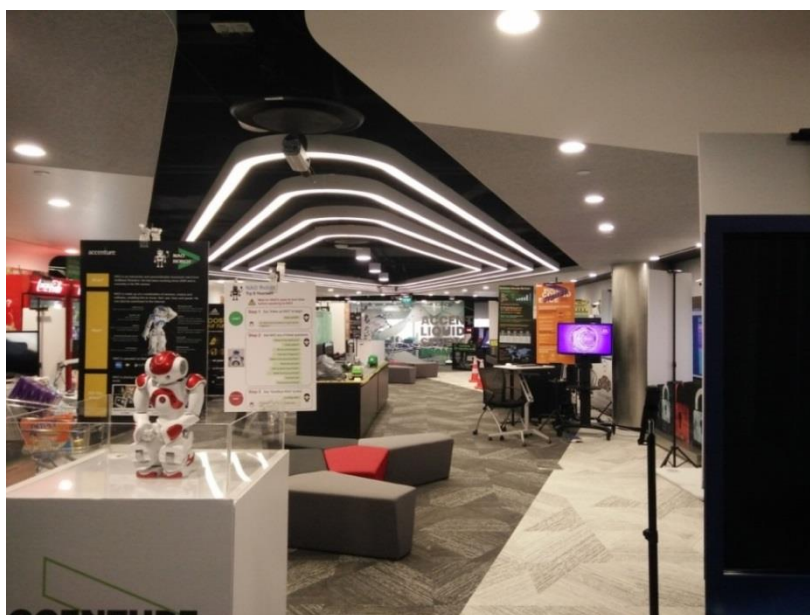


Photo showing ALS Interior

(i) Innovation Experience

Accenture promotes proactive interaction among their ALS residents to inspire and foster new ideas and solutions to tackle challenges and exploit opportunities. They leverage design thinking to explore use-cases and create solutions quickly.

(ii) Rapid Prototyping

Accenture believes in rapid deployment of solutions using Agile sprints, lightweight architecture, DevOps and the Cloud. They also build proofs of concepts, pilots and demonstrations for Internet of Things (IoT), wearables, mobile and web applications. Leveraging user feedbacks, they perform test-drive ideas and rapid iterations.

(iii) High-Touch Solution Engineering

This aspect makes use of modern methods, architectures and delivery models to responsively address business needs.

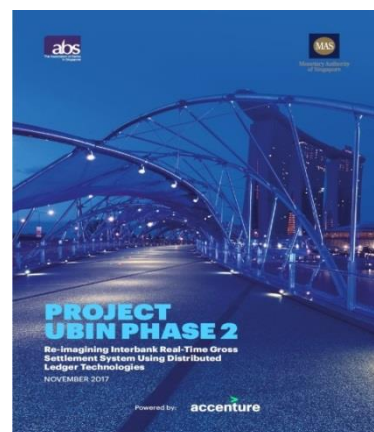
(iv) Mobilize to Scale

The last idea is about embarking on large-scale projects rapidly and establishing the right platforms, tools and operating models with an onsite Liquid Studio team. Accenture makes use of their delivery centers to scale development.

In their innovation lab, Accenture also showcased several use-cases that they have embarked on using the latest technology we have today:

(a) Project UBIN Phase 2

Project UBIN Phase 2 is a joint project that involves Accenture, MAS and Association of bank in Singapore (ABS) to create a system for real-time interbank settlement using distributed ledger technology (i.e. blockchain). They gave a quick demonstration of how it works and how it would benefit the banks here in Singapore. Currently, Project UBIN is still a proof-of-concept and Accenture has confirmed that there is no timeline yet as to when it will be used in production. Having said that, it is only a matter of time. Let's wait and see!



(b) Augmented Reality/Virtual Reality (ARVR)



Using the product Microsoft HoloLens, Accenture demonstrated how it can be used for tackling tasks that are rather difficult or sometimes impossible for humans to solve physically. They illustrated using an example where an engineer has to go inside a turbine engine to identify the parts that might have been damaged. ARVR could be implemented in this setting by giving the engineer the opportunity to peek

into a virtual image of the engine, so that he could identify and plan how to fix the damaged parts without being physically inside.

(c) RPA (Robotic Process Automation)

Lastly, Accenture demonstrated one of the RPAs that they have developed for an undisclosed client, which led to significant man-hour savings. The process involves opening of applications, transferring of data from one application to another and inputting of data to an application.



The last part of the CITIBANK bespoke lab tour was with MasterCard and happening in the MasterCard Innovation Lab. The lab is the largest innovation lab space worldwide to date. MasterCard has plans to use the same lab space for different events such as developer networking events and university dialogues.

During the tour, MasterCard representatives presented their plan for the advancement on digital payments method, marketing and IoT. The presentation was



delivered by Mr. Tobias Puehse, VP on Innovation & Management, Digital Payments & Labs. The photo above shows the humanoid robot Pepper, which MasterCard is using to take orders inside their lab via voice commands.



Other than the CITIBANK bespoke innovation lab tours above, we also attended the Innovation Lab Crawl session hosted by Amazon Web Services (AWS), which is well known for their on-demand cloud computing platforms. The AWS presenters gave us a live demonstration of Alexa, which is an intelligent personal assistant that taps on AI voice recognition system. Alexa is capable of voice interaction, making to-do lists, setting schedules and providing weather, traffic, stock price and other real-time information (e.g. news). These



functions are called “skills”. The biggest difference between Alexa and other voice recognition systems (e.g. “Siri” and “Google Assistant”) is that Alexa’s platform is opened for third-party developers, which makes it easier for Alexa to gain new “skills” (i.e. due to add-ons developed by various developers) and makes it more attractive.



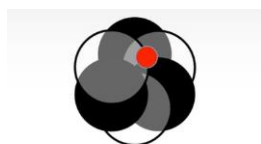
Besides producing microprocessors that are found in most personal computers, Intel Corporation has also invested more than \$1 billion in AI companies. At the workshop “AI Transforming Financial Services” conducted by Intel, they revealed some of their innovative products: (i) Powerful processors to improve computing performance, (ii) Developing Tool & Software Development Kits (SDK), such as Intel Data Analytics Acceleration Library (DAAL) and Intel Threading Building Blocks (TBB). Intel DAAL helps to boost machine learning and big data analytics, whereas Intel TBB provides a wide range of features for parallel programming. We can download them for free from Intel website. There are also other trial products provided by Intel that are available for download on their website.



VENDORS / COLLABORATIONS



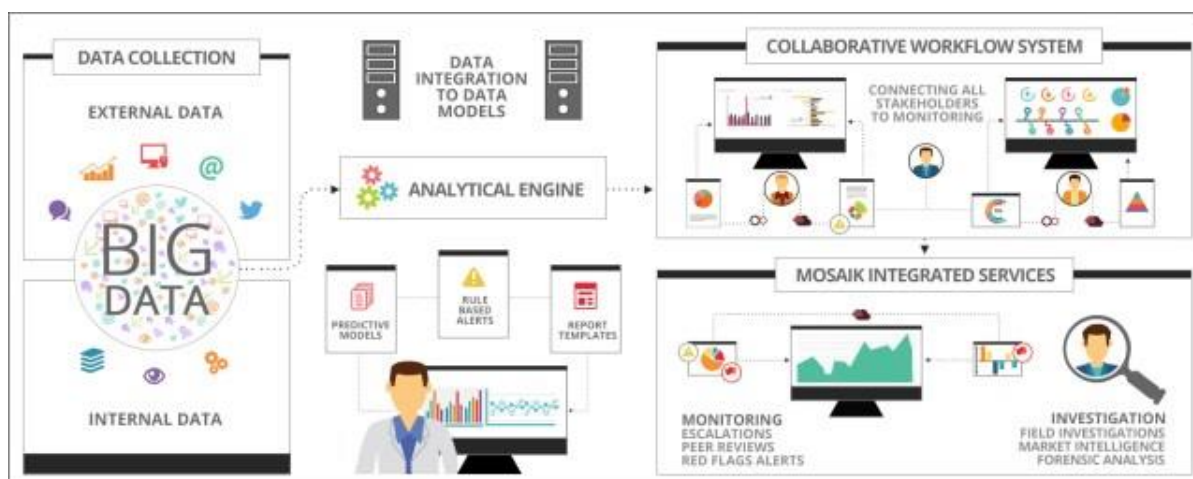
Last but not the least, MRDD Singapore Desk managed to check out most of the Fintech venture booths and meet up with a few entrepreneurs who gave us a demonstration of their creative Fintech innovations. Some of these innovations have capabilities that would help the bank streamline manual processes and improve user decision-making. In the coming weeks, we would be inviting some of these Fintech companies listed below to give a demonstration of their innovative products to the respective departments based in Singapore.



Mosaik Risk Solutions

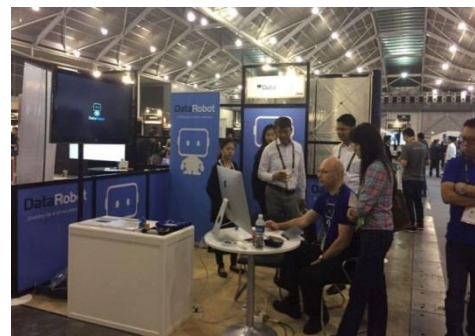
Mosaik Risk Solutions is a risk analytics company that offers an integrated platform solution, which is designed to assist their clients to respond to and capitalize from risk events.

One of their key innovations is the Early Warning Platform (EWP). It is a unique system that synthesizes data from multiple sources internal to the company, as well as numerous external sources in varying formats (structured, unstructured and semi-structured). Each data source is objectively tagged with a factor based on reliability and credibility of source information. It then provides a 360-degree view of the loan portfolio by aggregating the data obtained about the borrower and its affiliated parties, which allow the company to better manage its time-sensitive credit risk. The platform also provides visual risk analytics to enhance users' understandability and situational awareness.



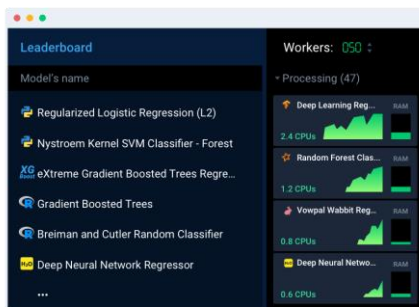
DataRobot

While browsing through the various forum/dialogue sessions at the festival, a particular one '*Delivering world-class Fintech predictive models with automated machine learning*' by DataRobot caught our attention. We sat in for the session and had an interesting conversation with the speaker subsequently at their exhibition booth (Colin Priest, sitting in front of his Mac, picture to the right).



It turned out that DataRobot is a data science start-up incorporated in Boston (US) since 2012. Their product can generate data analytic models automatically in minutes. Such models used to take experienced data scientists months to create!

During the speech/demonstration, Colin illustrated a scenario of training models to predict the default probability of a customer loan. In what we believed to be a highly simplified setup, he fed the Robot 1000+ lines of historical loan transactions, which had field columns such as default outcome (Yes/No), loan amount, tenure, and free text fields that describe the loan's purpose (wedding, housing, new business) etc. After the information was uploaded, the Robot would automatically choose, say, 100 suitable models to train on the first x% of raw data. Thereafter, it would



evaluate each model's performance and discard the bottom 50 models (i.e. models that do not adequately describe or fit the data). This process was repeated for a few times and the best models were shortlisted (picture to the left). As the models' internal metrics are visible, instead of a black box, users can choose the best model(s) based on their judgement. This is a very convenient tool to complement & augment business users, such as a credit risk analyst/loan approval officer in their daily work, because while they are the domain experts in loans and credit risks, they might not necessarily be a data scientist.

According to Colin, it is very simple to deploy the trained model on DataRobot's platform as an API. Alternatively, users can download the trained model and deploy on their own platform. In addition to the model training, DataRobot can also provide some useful insights to the raw data directly, such as heat map, trends and others (picture to the right). They also have training sites called DataRobot University, where they teach stuff such as DataRobot essentials with Python for executives etc. Classes are also available in Singapore, Japan, India, Europe and US.



Hewlett Packard Enterprise

We met up with Hewlett Packard Enterprise Co.(HPE) which is an information technology company based in Palo Alto, California, founded on 1 November 2015. Their business scope is composed of technology providers in the field of servers, storages, networking, and consulting. They have already evacuated from Sier (System integrator) Business. As per their explanation, since user side is getting more familiar with system development, Sier will be extinct in the future. DBS Bank in Singapore is a good representative which can demonstrate IT projects managed by business users. Hence, HPE became a technology provider in order to survive from current dramatic IT inclination change.

HPE is focusing on Open source AI Platform based on Cloud environment. They have deployed AI Platform in JP Morgan US. They unveiled the outline of AI Platform in JP Morgan US (Please have a look at below picture). The concept belongs to open source platform. You can see several open source software on the platform. In terms of big data management, "Kafka" is important open source software for coping with vigorous message data.

With respect to AI algorithm such as machine learning/ deep learning, the platform uses Python and TensorFlow provided by Google. Users can implement machine learning easily without intricate mathematic process. Machine learning requires high spec machine. GPU computing is indispensable for solving machine learning algorithm.

The platform can distribute calculation task to either GPU or CPU in accordance with its load without coding automatically.

Deployed AI Platform in JP Morgan US

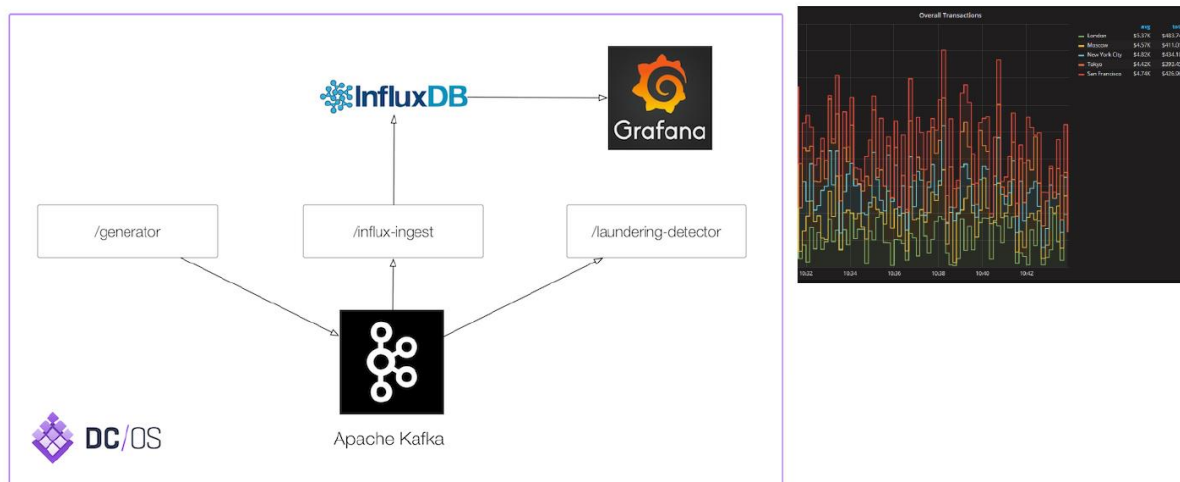


How Kafka works

Demo : Visualize Financial Data Transactions

Industry: Financial services

Key benefit: Scalability of processing time-series data



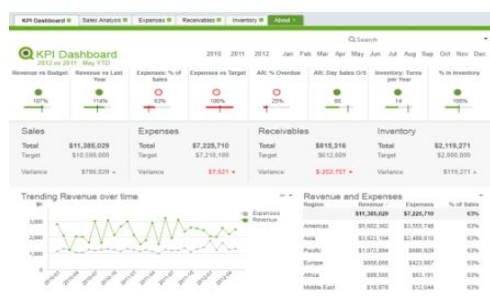
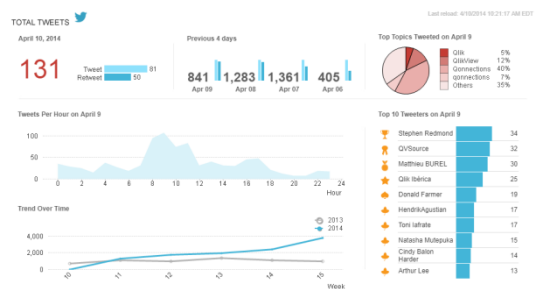
Regarding other pragmatic AI projects in Japan, HPE is collaborating with JCB and Softbank. They will launch the collaborations in the near future.



We also checked out Qlik, which is a company focusing on Business Intelligence and Data Visualization.

Based on Qlik's demonstration, we gathered that they are able to help users 'discover deeper insights by building rich, guided analytics applications with a flexible, business-ready solution'.

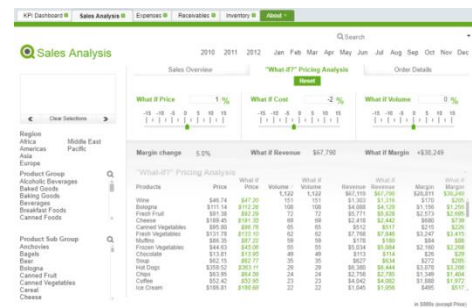
In one of the data visualization demonstrations, we can clearly see what people were tweeting about during Qonnections 2014 (picture to the right). We can also follow hashtags, analyze sentiments and find the top tweeters.



In another demonstration (picture to the left), the Qlik representative presented an Executive Dashboard using Qlik that showcased an overview of 'KPI Dashboard', 'Sales Analysis', 'Expenses' etc. Such information and visualizations are useful to the decision maker as they can provide a structured business intelligence overview. Users can also drill in the various items such as Revenue vs Budget, Expense vs Target, Trending

Revenue over time etc. to find out more details.

An interesting feature in the Sales Analysis is the 'What-if? Pricing Analysis' function (picture to the right). This function allows users to adjust the hypothetical levels of sales parameters, such as Price, Cost and Volume, and observe the simulated sales results intuitively.



ib Instabase

Founded by Anant Bhardwaj, Instabase serves as an operating system where users are offered a wide range of apps (app ecosystem) that tackles services or tasks such as ingestion, curation, integration, discovery, query, analytics, visualization, clustering, prediction, and machine learning. Comparing with other operating systems such as iOS and Android, Instabase already has certain "pre-installed" applications which users can utilize to perform common tasks such as OCR and data visualization. It is also open for third-party developers and vendors to create additional apps that would suit different business needs. The image below shows a high-level architecture of where Instabase comes into place.



At the festival, Anant demoed a couple of applications which users can readily use out-of-the-box. One of it was the use of OCR with NLP for a loan application form. Based on the demonstration, the application appeared to have captured the fields and values accurately. In fact, the company claimed that the application has achieved 90% accuracy as of demonstration date. Anant also took the opportunity to demonstrate their in-house RPA, which could perform clerical tasks such as opening of other applications, transferring of texts and strings and creating reports.

IBM

Similar to Amazon Web Services, IBM is also offering IBM Cloud which provides more than 170 unique services such as storage solutions, API management, Application services, Data analytics, Watson apps (e.g. Natural Language Understanding, Visual Recognition) etc. They also cater for selected 3rd party vendors and services, where one of them is Xignite. On top of the cloud services that they are offering, they also provide physical gateway hardware for those geographies where cloud platform is not yet available, such as Malaysia and Indonesia. These gateways provide a secure and high-performance access for the same services.



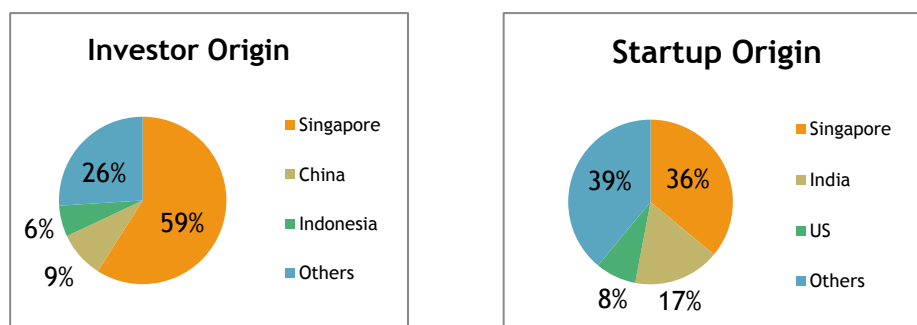
TransferWise

We also met up with Taavet Hinrikus, CEO and co-founder of TransferWise, along with other CITIBANK bank directors from Singapore and Hong Kong to know more about TransferWise. Taavet summarized the benefits of using

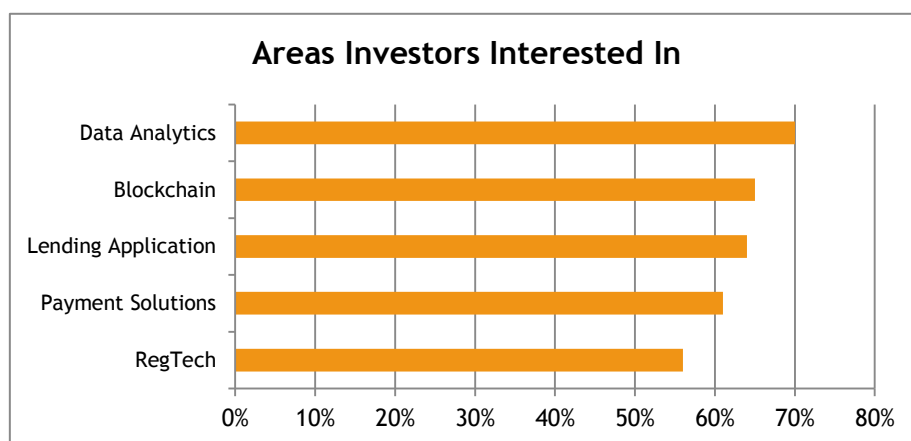
TransferWise to transfer money, compared to banks. He also claimed that TransferWise can provide up to 10x cheaper rates and 5x faster transfers. Currently, it is providing fund transfer services for personal and small business.

INTERESTING FACTS ABOUT THE FESTIVAL

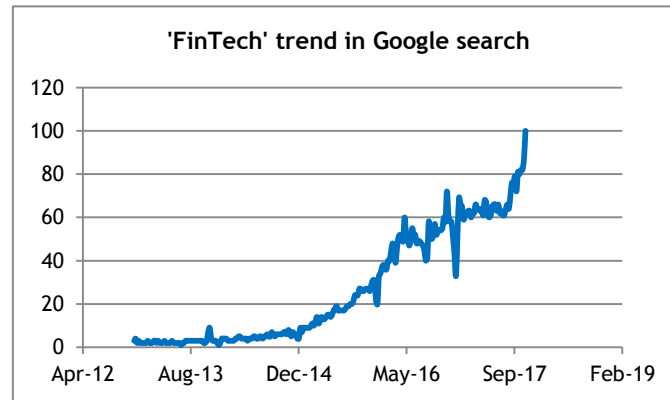
- On the final day of the festival, or the Investor Submit, a total of \$2.71b was raised for startups, according to Monetary Authority of Singapore (MAS).



- Investor interest concentrated in areas like 'Data Analytics', 'Blockchain', 'Lending Application' etc.



- Within the last 5 years, 'Fintech' has grown to be a popular keyword search in Google. The time-series graph below clearly illustrates the upward trend in 'Fintech' related searches in Google. It is separately reported that Singapore has become the top country that is most interested in FinTech, followed by Luxembourg and Hong Kong.



Interest by region ?

Region ▾ ⬇ ⬅ ➡ 🔗



1	Singapore	100	<div style="width: 100%;"></div>
2	Luxembourg	76	<div style="width: 76%;"></div>
3	Hong Kong	60	<div style="width: 60%;"></div>
4	Taiwan	30	<div style="width: 30%;"></div>
5	Switzerland	28	<div style="width: 28%;"></div>

☐ Include low search volume regions

< 1-5 of 58 regions >

- During the festival, Her Majesty Queen Maxima of the Netherlands gave a speech regarding FinTech inclusion.

