

ASIAN
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LET'S TALK
DIGITAL

2020

EDITION

Let's Talk Digital is a monthly newsletter that was created to build awareness on Digital Banking and provide a platform for industry practitioners to share insight and current trends on this exciting subject matter in relation to the Banking and Finance industry.

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JUNE 2020

edition

A DIY Guide to Implementing Data Science Projects

By Koh Wyhow

Data science is an upcoming field which attracts a lot of interest among the public. This trend has been keenly followed by tertiary education institutions, private training agencies, and online providers which offer courses to those interested in combining their domain expertise and data analysis. This article explains that data projects are not merely about coding - they also include building a business case, a proof of concept, and testing, which tend to come only with working experience.

The Paradigm Shift of Cybersecurity in 2020

By Fong Choong Fook

Everyone is living in a century where modern society is dominated by computers and Internet connected devices. It has since created momentum for these businesses to step into the online world. Unfortunately, this has also introduced a doorway to numerous cyber threats towards their business, paving the way to a whole new cybersecurity paradigm shift.

The article explains how the shift has affected everyone throughout the entire world in our present year, 2020.

I'll start by breaking down the first myth. Coding does look intimidating in the beginning, especially if one has no programming background. There are two skills every good coder has: the patience to read and understand code documentation, and the ability to break large problems into smaller solvable bits. Most codes available online have some sort of documentation which describe what each parameter supplied by the user does. As for decomposing large problems into several ones, a lot of us have done it before. For example, organising an event like a conference requires several steps:

1. Getting a venue
2. Booking caterers for food and beverages
3. Confirming agenda and speakers
4. Trial run of events to make sure everything runs smoothly

The second myth is about the expensive setup and infrastructure costs, which can largely be addressed via cloud computing platforms. Organisations in the airline, media, and e-commerce platforms rely on the likes of Google Cloud Platform and Amazon Web Services because these services allow users to quickly experiment and test the feasibility of deploying their code for internal or external use quickly.

As for the third myth: for people to work as data scientists, they require a few components:


1. Proficiency in mathematics, statistics, or computer science
2. Soft skills for presentations and stakeholder management
3. Domain expertise



Data science is applicable in various industries but those with in-depth domain expertise will have better understanding of what the data means and will be able to manipulate data to come up with better machine learning models. For example, a data scientist with little domain expertise will fit a regression model to find the relationship between annual GDP, and variables like consumer expenditure household, total goods and services exports, total imports goods and services etc. Someone with domain expertise would know it's better to use variables like total exports, total imports, and domestic demand per GDP without construction.

CLOUD COMPUTING PLATFORMS

Let's assume I'd like to build an image recognition system which recommends recipes based on user-submitted images. Here are the comparative steps I'd take to deploy an image recognition system.

ONSITE SERVER	CLOUD DEPLOYMENT
<p>1 Build image recognition algorithm, and house within a server</p>	<p>1 Build image recognition algorithm, and place the code in a virtual machine</p>
<p>2 Estimate the incoming number of images to determine the hardware specifications needed</p>	<p>2 Choose the appropriate virtual machine specifications, enable scaling options, and select region where images would be stored</p>
<p>3 Estimate the software license and hardware costs, power consumption, etc.</p>	<p>3 Control access to the core code by assigning permissions to user IDs like how it's done on Google Docs</p>
<p>4 Backup plan in the event of server maintenance and upgrades</p>	
<p>5 Ensure security steps taken are adequate for data protection</p>	

There are a few advantages of cloud computing platforms.



MAINTENANCE AND BACKUPS OUTSOURCED

Hardware maintenance and software backups are outsourced to the cloud computing service provider.



FREE CREDIT

All cloud computing platforms also provide users with some free credit for users to experiment with, so users can rapidly test and conclude whether their deployments are feasible.



REDUCED WASTE CAPACITY

Onsite servers tend to be underutilised outside of peak hours, so the extra capacity is wasted.

Cloud computing platforms give the option of scaling services according to usage, so wasted capacity is reduced.



SOFTWARE ONLY

If I were to build, test, and deploy an image recognition system, I would be able to complete the end-to-end construction within a few days, as my development work would focus only on the software side.

It's more effective for someone already familiar with the industry or domain to pick up data science skills, compared to someone already familiar with data science to pick up domain expertise over time. Here are a few more examples of roles where data science skills can be paired with and applied:

1. Financial Planning & Analysis: estimate marketing expenditure in a given city by predicting the number of new users of an app/product.
2. Sales: classify and segment their customers based on creditworthiness using historical patterns of credit term, payment frequency, amount of orders, etc.
3. Risk Management: provide early warning predictions of potential defaults, loan delinquency, and customer churn (whether these customers will change banks soon)
4. Customer Service: provide valuable input onto constructing a chatbot to address customer needs and inquiries, and advise customers through certain steps



If you are still keen to implement your own project whether to help your team manage their workload better or to increase efficiency, here are the 4 steps I usually take to implement data projects:

1. Assess talent within team/organization
2. Identify use case, perform business and technical diligence
3. Build proof-of-concept and gain confidence among stakeholders via insights
4. Scale up project, test results, and productionalize

For the initial assessment, I try to find out whether I have people I can count on for advice in the organisation. It's entirely possible that you want to effect the change, but lack the technical know-how of what to do or what services are needed.

Granted that you'll be doing most of the grunt work, it's easy to gain allies when you can demonstrate a clear advantage / value proposition. If your organisation doesn't have a data team in place, you're going to need to rely on your network of friends, or those in the IT department for advice. If your organisation already has a data team in place, your journey will be easier as you can ask them for guidance.

The next step is to identify a use case, and to perform the business and technical diligence. A few examples of solid use cases would be:

1. Build a chatbot to reduce lag time to customer inquiries to a few minutes from 3 days
2. Construct an Optical Character Recognition (OCR) system to speed up information retrieval from physical documents within a few seconds from a few days (from data entry work)
3. Automatically recommend products for cross-sell/upsell to customers periodically by inferencing from their demographics, daily transactions, web activity, etc.

Any successful experiment requires a proof-of-concept: basically, a simple version of the code which works. Going back to my image recognition system example, the proof-of-concept would be to demonstrate the code works on my computer, and the approximate accuracy based on real world input. The code should work by considering images which come in that have various resolutions, lighting conditions, background noise, etc. You should test extensively to find out the weaknesses of your code. Once you have a functioning proof-of-concept and a few thoughts on how to address the weaknesses of your code, the hard part of convincing your stakeholders to invest time and money into your project begins.

The last phase of the project would involve stakeholders like Management, Corporate Communications, and IT for purposes ranging from ensuring the correct message is reflected on your system/app, end-to-end integration with your organisation's systems, and budget approval. Most data professionals are under the impression that the technical bits are the most difficult part of their job. I can attest that it's not: it's the stakeholder engagement and management which takes up the most of my time.

The past 4 years have been an adventure for me: from exploring and using Microsoft Azure for database operations during my INVOKE days, developing and deploying image recognition and chatbot systems for enterprises, and now exploring applications of augmented reality systems for applications in the media industry. I've learnt a lot of what I know with minimal guidance from my peers, and I hope you will be able to leverage the expertise among your own social circles to implement your own data projects. One of my observations is those who excel in their careers tend to invest a lot of their time learning new skills and exploring new fields. By highlighting interesting facts from my readings, studies and observations from my career, I hope these pointers inspire you to be better in your respective careers.

PERFORMING BUSINESS AND TECHNICAL DILIGENCE

WHEN IMPLEMENTING A DATA SCIENCE PROJECT

What do business and technical diligence mean?

BUSINESS DILIGENCE

- 1) Researching on whether others have implemented similar systems;
- 2) Learning from their lessons; and
- 3) Estimating the effort and costs needed to achieve the business value intended.

TECHNICAL DILIGENCE

- 1) Knowing which systems or platforms to integrate to realise your goal;
- 2) Experimenting and estimating the possible margins of error, false positives, and false negatives; as well as
- 3) How well your solution integrates with existing systems.

Assuming I'm building an image recognition system, here are the questions I would seek to answer.

BUSINESS DILIGENCE



- 1 Have others tried using image recognition to recognise ingredients?



- 2 How successful are these systems, and how much value did they bring to their business?



- 3 What are the costs and effort needed to develop such a system?



- 4 How much value does this create for your business?

TECHNICAL DILIGENCE



- 1 What's the most efficient way to build the script? Does it require building from scratch, or can I rely on a few public APIs?



- 2 Once the first code is created, how do I construct the pipelines to feed real-time data? How do I deploy this model, and where will the code output be used?



- 3 Using your proposed solution, what are the limitations of your code? Under what conditions will it function well or poorly?



- 4 Can the code be integrated with existing systems?

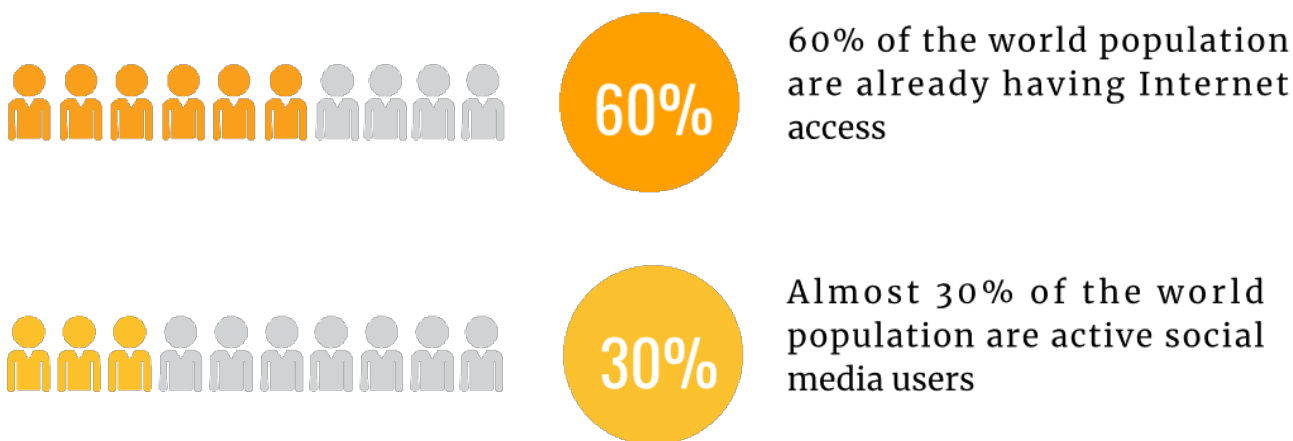
THE NEW CYBERSECURITY PARADIGM SHIFT IN 2020

PART 1 OF 2

By Fong Choong Fook

In the 21st century, computers and a plethora of Internet connected devices are dominating the modern society. I personally believe that we are living in one of the greatest times for mankind, where information is gold and virtually everything is accessible at the tip of our fingers.

AS OF JANUARY 2020



Source: Simon Kemp. 30th January 2020. Datareportal: Digital 2020 Global Digital Overview. <https://datareportal.com/reports/digital-2020-global-digital-overview>

With integration of the Internet into our daily lives, what we used to know about business and life has drastically changed over the last two decades: the largest retail stores in the world today are no longer in physical forms, communications are no longer confined to telephones, private transportations are now shared, food are delivered to our doorsteps with just a click of a button. Our wealth is essentially just a set of digits recorded in our mobile phones.

Technologies are shaping our culture, life and even our behavior. Unfortunately, technology has not done much in helping us remodel how we perceive personal security, especially digital security while using the Internet.

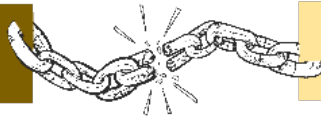
CYBER CRIMINALS TODAY

When I first set foot in Makati City, the Philippines during a business trip back in 2004, I was told that the city has the lowest bank armed robbery rates in Asia. I have to agree, because everywhere I went, I can see armed guards operating at almost all business premises. Even the security guards at Starbucks were holding a double barrel shotgun. These are strong deterrent signs to anyone who has the slightest thought of doing something dumb.

Moving forward in time, some of the largest bank heists today are done purely online; it is clean, swift and efficient.

WHEN BUSINESS OPERATIONS MOVED ONLINE

PHYSICAL SECURITY



SOLE PROTECTION

Many business operations have moved online, such as e-commerce stores, financial services, education, gaming, healthcare, call centers and so on. The trend also signifies the need for business owners to realize that they are now facing a whole new battle ground since catching a thief is no longer as simple as applying brute force.



Assailants are now coming from **ALL OVER THE WORLD**

A whole new set of strategies and tactics need to be redefined accordingly.

Throughout the articles of this series, I will be introducing concepts that may illuminate in high contrast against our conventional beliefs about Security, particularly Cyber Security.

PARADIGM SHIFT NO.1: "THE BAD GUYS ARE OUT THERE"

Eversince we were in our adolescence, we have all been taught the same doctrine that the "Bad guys" are out there. This belief is taught universally, regardless of your religion, creed, education level or culture. It is not too much to assume that we still have this same belief firmly injected into our DNA, even passing the same belief onto the next generations.

Our principal design for security is to put the focus on protecting us from External Threat. While the principal still holds true today, we are merely focusing on the threat of infiltration and missing out on a very important part: the Exfiltration – a scenario where the bad people have already come into our houses, and are moving our valuable information assets out from it.

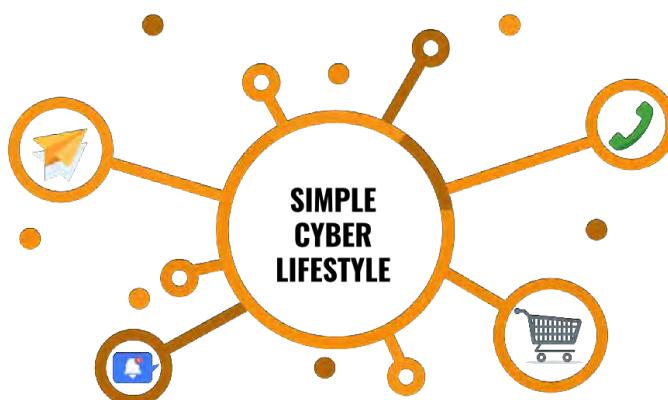
The questions that we need to ask ourselves today is no longer about infiltration, it is more about our contingency readiness – are we capable to detect and respond if the enemies have already infiltrated our protected realm?



Source: Nucleus Cyber 2019 Insider Threat Report, conducted with Cybersecurity Insiders.

PARADIGM SHIFT NO.2: "I HAVE NO VALUABLE INFORMATION TO BE STOLEN"

Let's be honest, not every one of us think that we have information that is worth any value. Some of us just live by a simple Cyber Lifestyle: we use messenger to communicate with friends and family; we read our social media postings and shop online occasionally; some of us do not even trust online banking, so we do not even have any online bank accounts.



Assuming you are living with a simple cyber lifestyle, then you are amongst the **5.19 BILLION** Internet users subjected to **ONLINE FRAUD** and **SCAMS**

Now, if you fit into the profile above, you are already amongst the 5.19 billion Internet users who are subjected to online fraud and scams.

You may feel like you do not have any 'valuable' or 'sensitive' information to be stolen, however, people on your phones' contacts lists and social media accounts do: their names, phone numbers, and email addresses can all be used by Cyber criminals to formulate Cyber-attacks, especially online fraud.

In the Cyber world, our digital identities are merely our usernames and passwords. Once we lose control of these credentials, we lose our identity.

When
CYBER CRIMINAL
take control of your computer

They can impersonate you and communicate with your friends 

CYBER CRIMINALS WILL THEN SEND OUT



Strange emails and messages



Unusual request

 It's a clear sign that someone's identity has been taken over by Cyber Criminal

PARADIGM SHIFT NO. 3 "MY COMPUTERS ARE STRICTLY USED FOR WORK ONLY"

This may be true. However, if your computers are connected to the Internet, you may have something that is equally, if not more valuable: your network bandwidth.

- Malicious hackers are hacking into computers to install backdoors that can be used to facilitate their attacks.
- These backdoors allow the hackers to take full control of the compromised computers and also control the computers to perform Cyber-attacks for them.
- When all these compromised computers are grouped together, the hackers can form a Bot-Net (a network of "Robots").
- The "Robots" infected computers can function as normal computers without the owners noticing any differences.
- These computers will also allow hackers to go in and out as and when they like; whilst listening for the command from hackers to launch Cyber-attacks against the target.



CONCLUSION

There seems to be a lot of information to be consumed at one go, I hope the examples above can give everyone a jolt in their common belief system of what Security is about.

In my following articles, I will continue to elaborate about the paradigm shifts we have to adapt to in order to meet the ever-growing Cyber Threats in our digital life.

Cybersecurity may seem to operate like conventional physical security, but the truth is that managing Cybersecurity is far more challenging in comparison.

Our assailants today are coming from all over the world. We are in a constant loop of a rat and cat chase; it will never end. We need to regularly assess our security postures to adapt to new technologies, to ensure that we are always staying ahead of Cyber criminals.

Let's start by changing the way we perceive Cyber Security, learn and adapt to the new digital paradigm of the 21st century.

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Big Data Application in Banking & Finance

By Peter Kua Seng Choy

Financial institutions sit on a vast amount data generated daily through a variety of customer and B2B interactions. Big data analytics (BDA) and the banking sector are a perfect match to improve and grow its business. We take a look at some of the high-value BDA applications in this sector.

Cloud Computing

By Ian Goh Suan Hooi

In a scene from the 2015 movie Creed, Adonis Creed son of Apollo Creed uses his mobile to take a photo of a note written by Rocky Balboa (Sylvester Stallone). Rocky then proceeds to ask Adonis if he should write it down instead, to which Adonis replies, "it's cool it's in the cloud". Rocky then proceeds to look at the sky to try and find the note in the cloud.

"The cloud" is a term had been bandied about rather freely for the past five to ten years. And like all IT related lingo we have been rather free with its use and its definition. This article attempts to give some real-world examples of what the cloud is and in doing so (hopefully) dispel some myths.



Big Data Analytics **Applications** in Banking and Finance

By Peter Kua Seng Choy

Banking customers create an enormous amount of data every day through millions of transactions. This data comes from the numerous touchpoints provided by the financial institutions, like online banking, e-commerce, phone banking, credit card swipes, and even face-to-face interaction.

Analysing this big data brings plenty of untapped possibilities - from understanding their customers to better risk compliance and more accurate purchase propensity - to grow the bank's revenue and profitability.

Let's review some of the most prevalent big data analytics (BDA) applications in banking and finance.

CUSTOMER SEGMENTATION

Dividing customers into groups based on some common traits is essential to understand the customer's needs and preferences. Banks target these needs and preferences to increase their revenue. Traditional segmentation centres on demographics like age, gender, and income. BDA enhances customer segmentation by bringing in a variety of data from all customer touchpoints. BDA also enables banks to achieve micro-segmentation to uncover valuable information such as customer value, life stage, attitude, and behaviour. Examples of micro-segmentation: female millennials with degrees who don't own a home; high-income couples without children.

CREDIT SCORING

Conventional credit scoring employs statistical models using the borrower's data – such as age, repayment history, income, and previous loans – to decide whether to accept or reject a loan. There is, however, increasing demands for scoring precision. Big data and AI can improve scoring accuracy by bringing in alternative data (social media, internet activity, and e-commerce transactions) and analysing them together with the conventional borrower's data. Online behaviour, for instance, can show if a person is likely to service their loans, and allows banks to factor this in when accessing potential borrowers.

PURCHASE PROPENSITY

Customer data and previous purchase history are used to predict who would likely buy a product (purchase propensity). Like advanced credit scoring models, a bank can improve its purchase propensity model by incorporating alternative customer data such as social media, location, and online activities. All this data typically goes into the bank's Customer 360, which offers a single, unified view of its customers. With Customer 360, the bank can then use BDA to create highly sophisticated purchase propensity models and run targeted campaigns to increase its sales. A popular campaign that banks frequently run is targeting credit cardholders with the precise merchant offerings.

ANTI-MONEY LAUNDERING (AML)

Money laundering is a threat to the financial world as criminals try to convert dirty money into clean cash. Detecting money laundering is tricky because criminals are always finding new ways to launder money. Standard anti-money laundering mechanisms cannot keep up and it ends up highlighting many routine and legitimate transactions. Auditing these flagged transactions wastes a lot of money and resources. Therefore, BDA provides an effective way in fighting money laundering. Advanced algorithms can uncover hidden relationships; they can identify individuals and their associations with one another. They can also detect behaviours as most customers don't commit fraud, and their actions are predictable. When these behaviours change, they potentially indicate fraudulent activities. Advanced analytics algorithms can easily detect them.

ALGORITHMIC TRADING

Financial markets tend to be unpredictable and illogical. In the past, predicting stock prices was an extensive and arduous process because it was tough to find patterns. However, the power of BDA today allows traders to analyse large amounts of historical financial data and to find essential indicators that would guide them to make informed decisions. These advanced algorithms require as much unbiased data points as possible to generate outcomes. We can also give BDA the power to execute trades at optimal prices. Algorithmic trading reduces the possibility of mistakes by human traders by taking emotions and irrationality - like fear and greed - out of the way.

We have just scratched the surface with the BDA applications discussed in this article. The potential of big data analytics in banking and other financial institutions looks bright. Innovative BDA is critical to success. Banks need to continuously evaluate their data-driven strategy and deploy high-value BDA business cases that will positively influence their bottom line.

BIG DATA ANALYTICS APPLICATIONS IN BANKING AND FINANCE

Banking customers generate an enormous amount of data through touchpoints like online banking, e-commerce, phone banking, credit card swipes, and even face-to-face interaction. Analysing this big data carries lots of untapped potentials to increase the bank's revenue. We review some of the most popular big data analytics (BDA) applications in banking and finance.



CUSTOMER SEGMENTATION

Traditional segmentation focuses on demographics like age, gender, and income. BDA improves customer segmentation by bringing in a variety of data from all customer dealings. BDA also enables banks to achieve micro-segmentation to expose valuable information such as customer value, life stage, attitude, and behaviour.



CREDIT SCORING

Conventional credit scoring employs statistical models on the borrower's data - like age, repayment history, income, and prior loans - to decide whether to accept or decline a loan. BDA improves scoring accuracy by bringing in alternative data (social media, internet activity, and e-commerce transactions). Online behaviour, for instance, can show if a person is likely to service their loans.

PURCHASE PROPENSITY

Customer data and previous purchase history are used to forecast who would likely buy a product. A bank can increase purchase propensity by incorporating other customer data like social media, location, and online activities. The bank can then use BDA to create highly sophisticated models and run targeted campaigns to increase its sales.



ANTI-MONEY LAUNDERING (AML)

Detecting money laundering is tricky because criminals are always finding new ways to launder money. Standard anti-money laundering methods cannot keep up. BDA provides an effective way to fight money laundering through its ability to uncover hidden relationships and detect suspicious behaviours.



ALGORITHMIC TRADING

Financial markets tend to be unpredictable and illogical, and predicting stock prices in the past was tough. The power of BDA today allows traders to analyse large amounts of historical financial data to discover essential indicators. Algorithmic trading also lessens the possibility of blunders by human traders by taking away emotion and irrationality.



WHAT IS CLOUD COMPUTING?



By Ian Goh Suan Hooi

Have you ever stored your files on Google Drive or Drop Box? Used Google Docs or Office 365 to edit documents? Gmail or Yahoo mail to manage your email or Prezi to create presentations?

Then congratulations, you have used Cloud Computing!

Quite simply, instead of having all the computer related hardware and software that you are using sitting in your office or somewhere else on your companies' computer network, Cloud Computing is about the delivery of computing hardware and software such as servers, storage, databases, networking, applications over the Internet i.e. the Cloud.



For companies, these business models offer some advantages.

YOU PAY FOR WHAT YOU USE

Jeff Bezos, the CEO of Amazon famously said “You don’t generate your own electricity. Why generate your own Computing?”

What this means is that Cloud Computing essentially allows you to treat Computing like a utility. You only pay for what you use.

REDUCED CAPITAL EXPENDITURES

Say you were a startup software company and you were in the business of developing applications for your customers. In the traditional model, the company would have to purchase all the computing resources required for the developers to build and test the applications. Cloud Computing allows these companies to use these resources over the Internet in a “pay as you use model”. Thus, reducing the initial capital expenses is required. The flipside to this, however, is that the ongoing operating costs go up, as well as the cost to ensure sufficient bandwidth and stability of networking services.

SCALE UP OR DOWN AS REQUIRED

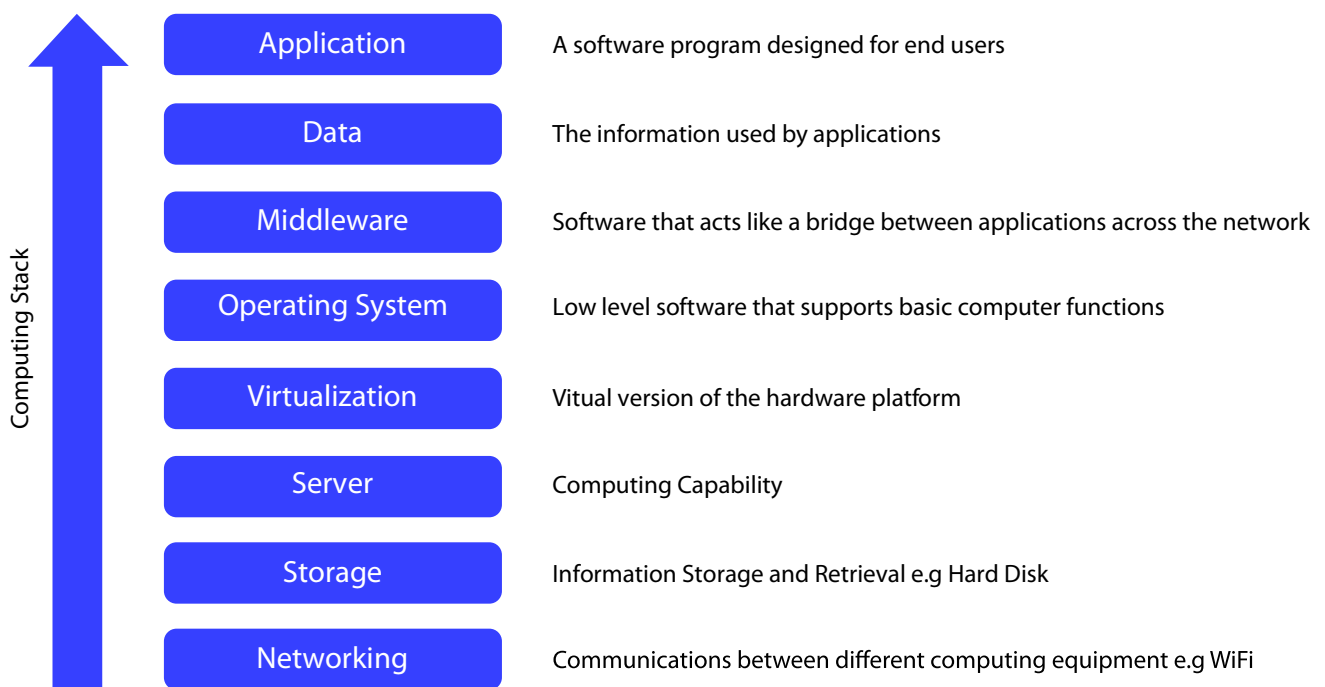
Traditionally, a company would have to purchase enough IT capacity to cater to the peaks in their traffic or processing volume. This means that for most of the time, this capacity is lying idle and underutilized. As Cloud works on a pay as you use model, a company can purchase as much processing capacity as they require to cater to their peak volumes and then scale back as the volume decreases.

SCALE UP OR DOWN AS REQUIRED

We can think of the different types of cloud computing models in two dimensions – the deployment models – HOW we put things on the clouds and the Services or WHAT we put on the Cloud.

Let us discuss the WHAT first.

There are a series of things that need to be put in place for an application to work. When you double click on the Microsoft Excel icon and an excel spreadsheet comes to life, there are a series of services that need to be active for this to happen. We can visualize this as a stack of services as illustrated in Figure 1.



Source: <https://www.crucial.com.au/blog/2013/05/27/types-of-cloud-computing/>

Figure 1: A typical computing Stack

If you are using a cloud service, you can decide how much of this will be managed by the cloud service provider and how much of it will be managed internally by you. Figure 2 illustrates this concept.

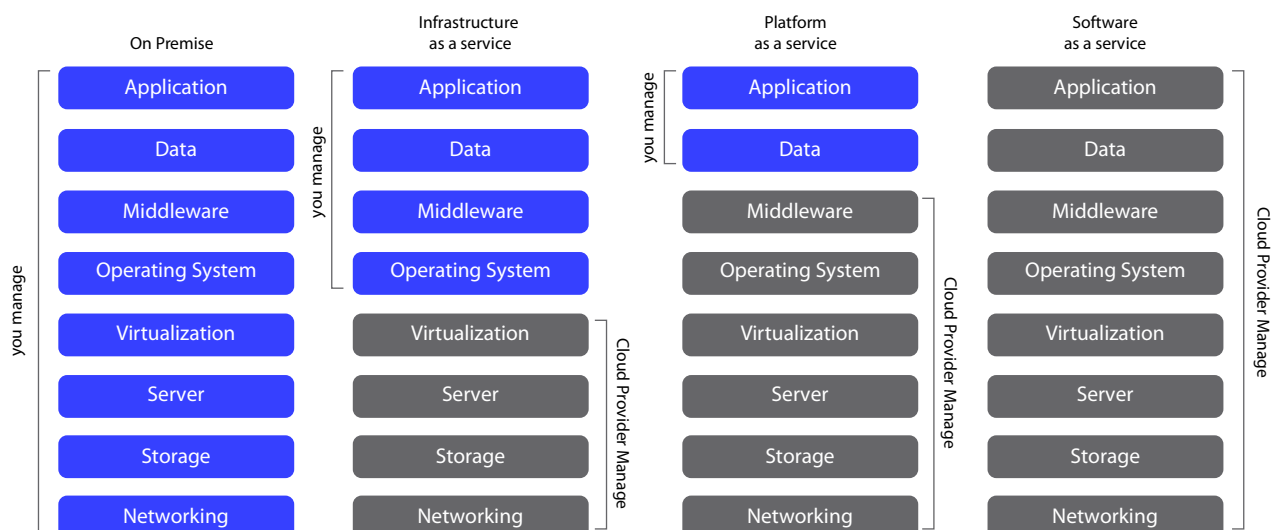


Figure 2: Cloud Services

This provides a degree of flexibility on the level of control that you have over the environments and applications.

ON PREMISE

As the name suggests, this implies nothing is on the cloud. i.e. the traditional deployment model where all components of the computing stack are managed internally.

INFRASTRUCTURE AS A SERVICE (IAAS)

As the name suggests in this model, the cloud service provider provides the basic computing resources such as data storage, (virtual) servers and networking. The rest of the stack must be managed by the customer themselves. Examples of IAAS include Amazon Web Services EC2, Rackspace Managed Infrastructure services, and Azure Virtual Machines.

PLATFORM AS A SERVICE

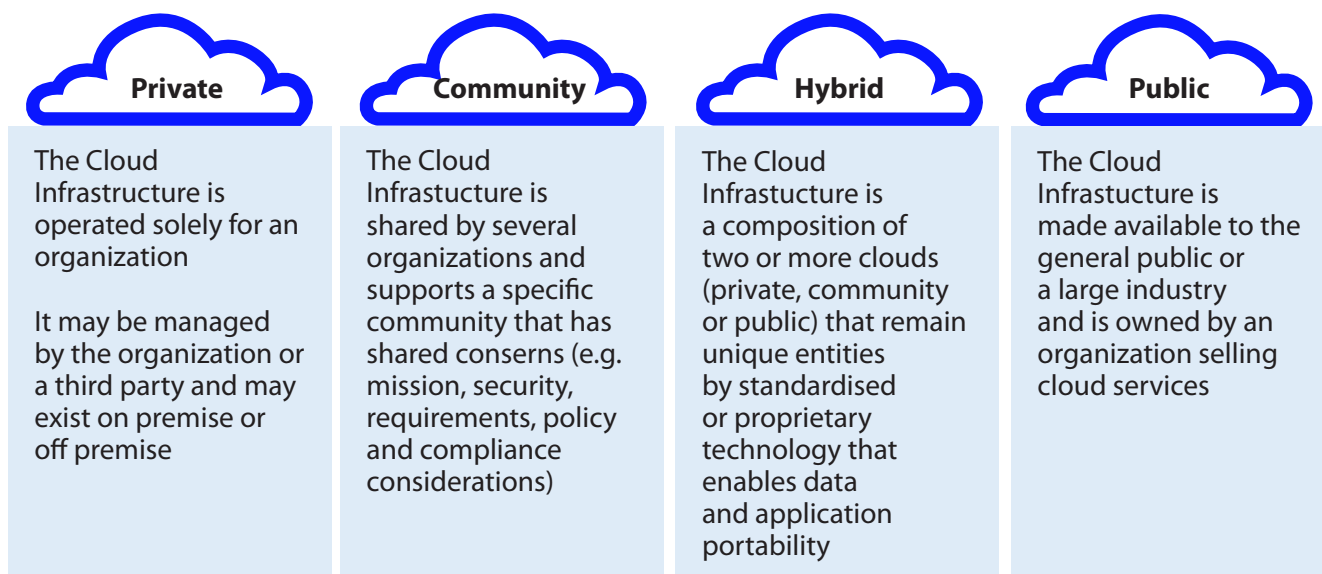
In some instances, companies need the flexibility to run and manage their own applications. However, they would rather leave the more “commodity” portion of computing stack to the cloud vendor. E.g. the Operating System, programming language, execution environments and databases. This model is known as ‘Platform as a Service’ (PAAS). Examples of these include Microsoft Azure PaaS, Google App Engine and Alibaba Cloud. A company might be interested in this model if, for example, they are utilizing applications from diverse sources, or application development is done within teams across multiple geographies.

SOFTWARE AS A SERVICE (SAAS)

The SAAS model means software applications are utilized on a pay per use basis rather than the outright purchase of the software licenses. Typical examples of these are Microsoft Office 365 and Salesforce.com.

DEPLOYMENT MODELS

There are several ways applications can be deployed to the Cloud as described in Figure 3



<https://sites.google.com/site/cloudwikipedia/home/types-of-services/deployment-models-in-cloud-computing>

Figure 3: Cloud Deployment Models

At the extreme ends of the spectrum are the Private and Public clouds.

With Public Cloud, the computing infrastructure is owned and operated by the cloud computing company. All resources are shared across their customer base, thus creating massive economies of scale. However, as a customer you have no physical control over the infrastructure

As Public Clouds use shared resources, they do excel mostly in performance, but are also the most vulnerable to various attacks.

In the Private Cloud model, the entire cloud infrastructure is owned and used solely by one organization. While the security and control are high in this model, it does not enjoy the economies of scale (i.e. cost reductions) of the Public cloud.

Community and Hybrid cloud models are essentially permutations of the Public and Private cloud models.

Apart from merely hosting customer applications, cloud service providers have now created offerings around services that can be difficult for a company to develop internally such as analytics, support for blockchain, machine learning and artificial intelligence, and augmented or virtual reality.

CONCLUSION

Cloud Computing essentially offers a company more options on how it can leverage on technology in order to meet its business objectives. Its main value propositions are the benefits in scalability and the utility model. The use of cloud services also helps an organization improve agility by reducing the amount of time required to deploy new capabilities and services.

Concerns exist about the risks of using cloud services. Bank Negara has been cautious of cloud usage and while not outright disallowing FIs from using cloud services, have stated that FIs must notify BNM for non-critical systems and prior consultation with BNM is required for Critical systems (Risk Management in Technology, Bank Negara Malaysia 10.50,10.51)

Cloud computing will shift an organization's IT expenses model from one which is more Capital Expense focused to a more Operational Expense focused. So, depending on how your company views the capex/opex split, this may be a pro or a con.

While Cloud Computing does offer many benefits, it is not a magic pill. A company needs to be clear on its own objectives and strategies, and whether or not the cloud is the answer.

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Deploying Your Data Project

By Koh Wyhow

What are the processes needed to bring a proof of concept version of your code, to deployment to achieve a business outcome? This article answers that question by providing examples, and highlighting the difference between two projects, one is customer-facing, and the other is for consumption by an app/website.

Enterprise Architecture and Your Digital Transformation Journey

By Ian Goh Suan Hooi

A common problem in the corporate world is the disconnect between Business and IT. Business and IT tend to work in silos and quite often IT is perceived as a tactical or operational function rather than a strategic function within an organization.

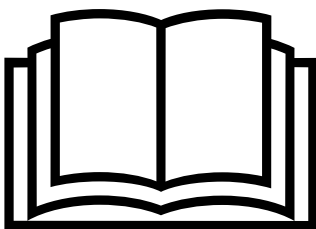
Given how embed technology is in every aspect of our lives and business, this stance confirms a business' position as a laggard in the industry. This article discusses the discipline of Enterprise Architecture which promotes a mindset of value co-creation between business and IT functions within an organization.



A Case Study

By Koh Wyhow

In Deploying a Data Project



There are numerous sources (e.g. MOOCs like Coursera and edX , online labs like Qwiklabs , and bookstores like No Starch Press and O' Reilly) from which one can independently venture into areas such as Infrastructure & DevOps, Big Data, Websites & App Development etc. The resources I used to pursue my independent studies are available on my GitHub via tQR code on the right. Some of the resources are free, while others are paid (and those books are a lot cheaper than courses in physical classrooms).

- <https://www.coursera.org/>
- <https://www.edx.org/>
- <https://www.qwiklabs.com/>
- <https://nostarch.com/>
- <https://www.oreilly.com/>
- https://github.com/atlas-github/20190731StarMediaGroup/blob/master/7_Recommendations.ipynb

The variety of online courses cover the technical parts needed to achieve certain tasks like using Machine Learning APIs from Google Cloud Platform, Machine Learning Infrastructure, or classifying images into certain categories. The examples found in the books from the QR code, and exercises from Qwiklabs should be enough for you to build your own proof-of-concepts (POCs). However, online courses rarely cover the deployment bit as this varies depending on your organizational structure.



I'll walk you through the process I went through to deploy my chatbot on The Star Online via Facebook Messenger . Some context is necessary for readers to understand this process:

- The social media team replies inquiries coming in via Facebook Messenger manually, and more often than not, the questions are rather repetitive
- The queries which come in can vary significantly, such as asking the Star's journalists to cover an event, reporting a mistake on an article, sponsorship inquiries and so on
- Not all inquiries receive replies from the social media team due to the sheer volume of questions from users
- The Star Online's registration wall came online sometime in November 2019, so the social media team will be overwhelmed with questions from users about technical problems like being unable to register, forgetting their passwords, etc.

DEPLOYING

PROOF-OF-CONCEPTS

Here are a few checkpoints you should consider before deploying a POC.

1) Once the POC is completed, what insights are expected to be generated?

1

It's good that you've learnt something new via online courses or books, but you also need to describe or quantify the value your insights give to your business.

For example, creating a chatbot allows an organization to reply to customers quickly and funnelling the correct inquiries to the relevant departments instead of solely depending on the customer service team.

2

My CS team would only have to focus on questions the chatbot cannot answer.

3

An insight a chatbot can give you from its logs are what types of questions customers ask via various social media platforms, so you can plan on augmenting or enhancing your knowledge base accordingly.

2) Can the POC be scaled up to production-grade code, and where do I house the code? Can the code be integrated with existing systems, legacy or otherwise?

1

It's entirely possible for an organisation's IT infrastructure to rely on legacy systems, and the vendor would have to be called in to integrate your code to a legacy CRM or ERP software via APIs.

2

The impact of relying on vendors for integration work is the need to obtain budgetary and IT approval, and this process is often cumbersome and lengthy.


3

The insight of your POC should yield more value than the effort invested in the development and integration work for the POC to be considered feasible by your organisation's management.

DEPLOYING A CHATBOT

The following lists the process I went through to deploy a chatbot.






1) IDENTIFY PROBLEM STATEMENT




The volume of inquiries from users is expected to increase once the registration wall comes up, and the team won't be able to get back to users in a timely manner.

It is difficult for inquiries from users to be routed to the correct department as there is no such capability within Facebook Messenger, while creating additional usernames and passwords to be shared between the social media and customer service teams may risk coordination problems.

2) CONDUCT BUSINESS AND TECHNICAL DILIGENCE

BUSINESS DILIGENCE	TECHNICAL DILIGENCE
 <p>Wall Street Journal and AirAsia created their chatbots to circulate content every morning, and answer FAQs from their users respectively. This allows users to read articles on their way to work or while having their breakfast, and get answers to their questions quickly.</p>	 <p>Google has a Natural Language Processing engine called Dialogflow which can be integrated with Facebook Messenger. This POC should take only 2-3 days to develop. There are also sample bots available within Dialogflow to speed up your development work.</p>
 <p>The conversations seem to be guided using the conversation bubbles located at the bottom of the chatbot interface. This allows users to just click buttons to achieve their intent with minimal typing effort.</p>	 <p>Dialogflow is free until you hit 180 conversations a minute, and a Facebook page and app will need to be created for testing and demonstration purposes.</p>
	 <p>No coding work involved, unless you would like to connect the chatbot to an external database.</p>

3) CONCLUDE INITIAL ASSESSMENT AND BUILD POC




Compile research work and present proposed solution.

Get green light to proceed with POC development work.

Aim to complete POC within a few days, and demonstrate POC to management for approval to proceed with further development work.

4) PROJECT PLANNING AND DEVELOPMENT



Plan milestones and timelines for chatbot project.


Inform product owners about your proposed solution, and get their input on what other features should be included.

Think about what makes users interact with chatbot frequently, and include or stagger the deployment of such features.

Alert IT and Corporate Communications of proposed solution, so they can support with the deployment bit of the project.

Develop chatbot and review progress of work every few days with colleagues to minimise mistakes.


5) FINAL REVIEW OF PROJECT AND TEST



Have your own team test the chatbot before presenting to external stakeholders.

If testing goes well, inform IT to assist with deployment.

6) ASSESS ACCURACY OF RESPONSES AND ENHANCE CHATBOT



Monitor user interactions and chatbot responses over the next month, to ensure there are no post-deployment mistakes.

Begin development work of other features to be included in the chatbot.

You'll notice there is significant stakeholder management work in a data project, with product owners, management, IT, and Corporate Communications. A number of data projects fail or stall as there is no buy-in from stakeholders other than your team, and this is a fact that online courses seldom highlight. It is good to be technically capable, but you will also need to balance it out with the business side of data projects.

I'll also highlight another type of data project, one which depends on externally available information and deploying it into your organisation's systems. External datasets can be obtained via two common methods: publicly available Application Programming Interfaces (i.e. APIs) and web-scraping.

A good analogy of an API is a customer walking into a restaurant and receiving the menu from the waiter.

- The customer gives his order (which is his parameter) to the waiter, and the waiter returns with the customer's order (which is the result) later on.
- The waiter is the equivalent of an API: the user of the API provides the parameters to the function, and the function returns the value to the user.

An example of a publicly available API is Bank Negara Malaysia's Open API . Let's use this API to get some information about current base rates and base lending rates from retail banks in Malaysia. We'll start by breaking this problem into smaller pieces using Google Colab as follows:

1) Call BNM's OpenAPI

- a) Install a Python library called requests to make the API call

```
!pip install requests
```

- b) After installing the Python library, import the requests library onto your Notebook

```
import requests
```

- c) Write the 1-2 lines of code needed to make the API call. How the headers parameter is written usually depends on the documentation of the API call, which is in the BNM Open API Base Rates/BLR/Effective LR page, under the latest header.

```
headers = {"Accept": "application/vnd.BNM.API.v1+json"}
response = requests.get("https://api.bnm.gov.my/public/
base-rate/", headers = headers)
```

- d) Verify the connection is successful by getting a Response [200] result from the API call

```
response
<Response [200]>
```

2) Verify you have the data from the API call

- a) The data from API calls are usually in a json format – it looks intimidating to read at first, but spend a few minutes to understand the structure of the json format, and you'll quickly understand how the data is organised in the json file.

```
base_rate = response.json()
base_rate
```

3) Process the resulting data into a structured table

- a) You'll need to import another Python library called pandas

```
import pandas as pd
```

-
- <https://api.bnm.gov.my/portal>
 - <https://colab.research.google.com/>

- b) Select the data you would like to convert into a table and store the data in the variable `base_rate_table`.

```
base_rate_table = pd.DataFrame(base_rate['data'])
```

- c) Verify the tabular structure of your data

```
base_rate_table
```

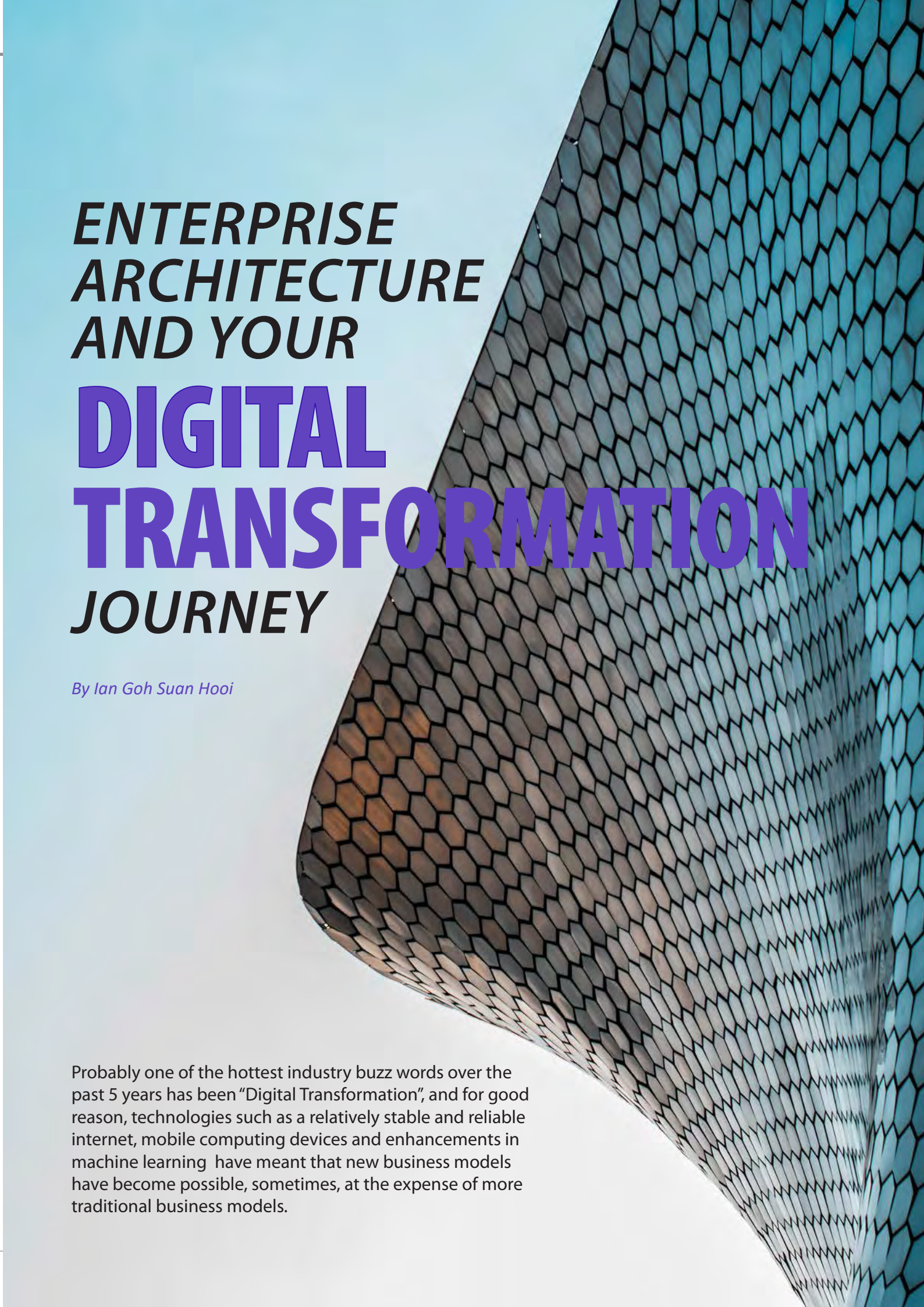
- 4) The next step is usually to upload your table into a data warehouse, where the data is used by your app or web service. The code can be run on a weekly basis using Google Cloud Platform's Cloud Scheduler, or a your preferred cron job scheduler. The Python code above has been written in a Google Colab notebook accessible via the QR code on the right. There is a section at the end of the notebook on how to upload `base_rate_table` into Google's BigQuery data warehouse.



Notice a difference in stakeholder management from the first project, and the one involving Bank Negara's OpenAPI. This contrast stems from the fact that chatbots are customer facing projects, while calling external APIs tends to be more of a backend solution. The stakeholder management part of the second project would come from integrating with your organisation's internal systems, which is mainly the IT or Technology department. When your project caters to external customers, do expect more stakeholder management work.

Don't worry if solving problems using data and unfamiliar methods is intimidating for you, whether you have experience or not. My latest adventure involves building a POC for augmented reality applications. This required me to learn how to use a Unity Engine with Vuforia, and some C# programming, all over the course of a week. Take it as a step to learn something new in your lifelong quest to upgrade yourself. The sooner you get used to taking that leap of faith when dealing with new methods, the faster you get to upskill.

-
- <https://cloud.google.com/scheduler>
 - <https://colab.research.google.com/drive/1aZicfZX5SLLwKjRXIhBDeJksScfA48bo>



ENTERPRISE ARCHITECTURE AND YOUR DIGITAL TRANSFORMATION JOURNEY

By Ian Goh Suan Hooi

Probably one of the hottest industry buzz words over the past 5 years has been “Digital Transformation”, and for good reason, technologies such as a relatively stable and reliable internet, mobile computing devices and enhancements in machine learning have meant that new business models have become possible, sometimes, at the expense of more traditional business models.

Companies such as Grab, Airbnb, Alibaba have shown how these new technologies can disrupt long established business models in various industries.

The financial Industry has not been spared either. With the emergence of eWallet and remittance services, virtual banks and other online financial services providers, banks are finding that their revenue streams are being eroded by some of these niche service providers who are more flexible, asset light and cater to a niche clientele.

Fundamentally, digital transformation happens when an organisation figures out how to leverage technology in order to drive business goals; whether this means developing new business models, digitalisation of existing processes, transforming customer experiences or developing insights through data.

This requires tight integration between the business and IT organisations within a company. The challenge is that this is not how companies normally operate.

Traditionally, IT was seen primarily as a tool to improve business efficiencies. IT systems basically automated the work that could have already been done by a human, did it faster, and with fewer errors. Thus, the operating model in most organisations was that business would develop requirements and this was then passed to IT to execute.

Business and IT essentially worked in silos, by and large this model worked as businesses knew what they wanted, and IT would build a system to do it. Thus, businesses would develop the requirements, get IT to fulfil them and when the project was completed, pass "the system" to businesses as seen in Figure 1.

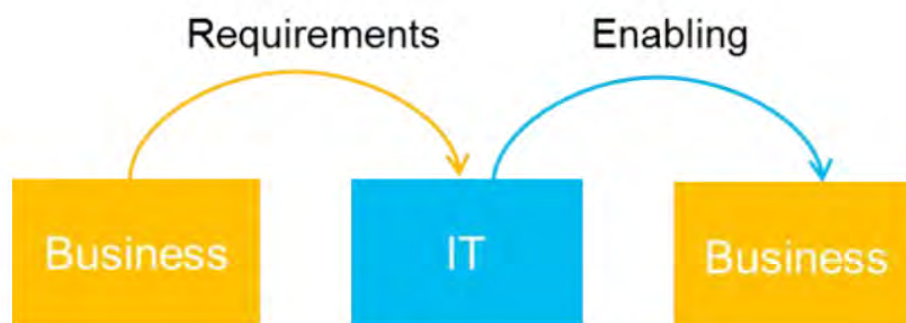


Figure 1: Traditional Business and IT working model

However, technology has evolved beyond merely the ability to automate. Technology capabilities, the pervasiveness of technology in our everyday lives, the shortening of time frames to respond, and market uncertainties mean that if we are to succeed, much tighter integration between business and IT functions are going to be required. (Figure 2)

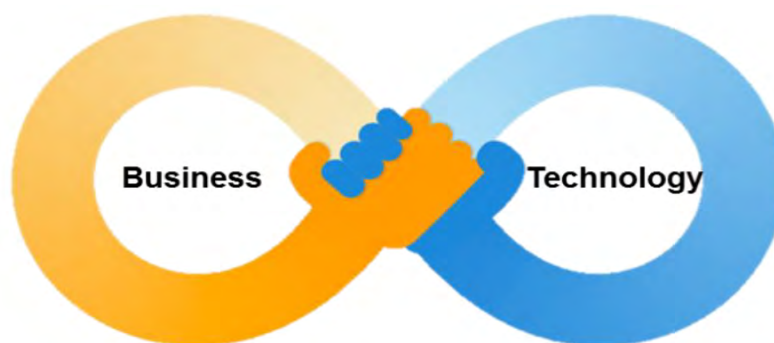


Figure 2: Value Co-creation between business and IT

The table below illustrates some of the shifts that are going to be required in how we think about business and IT functions within an organisation.

Traditional	Digital Age
Business Decides, IT creates	Value Co-creation between business and IT
Do it right the first time	Produce a minimally viable product and evolve
Inside out (the inner strengths and capabilities of the organisation will make the organisation prevail)	Outside in (customer value creation, customer orientation and customer experiences are the keys to success)
Command and Control	Sense and Respond
IT is an Operational Necessity	IT as a Strategic Enabler
Segregation of Functions between business and IT	Integration of Skills across the enterprise

Table 1: Traditional versus Digital Age IT

ENTERPRISE ARCHITECTURE

The reality today is that business transformation should not be seen as an activity that is undertaken once every 5 to 10 years, rather it is a continual process of evolving the business to ensure its relevance in the environment. The need for Enterprise architecture is to ensure that this continuous process is part of an organisation's culture and way of work.

Enterprise Architecture is about strategy realisation. It bridges the business goals and strategy to the execution activities by identifying the gaps between the target and current state of an enterprise and the recommended actions required to close those gaps across four domains; Business, Data, Applications and Technology.

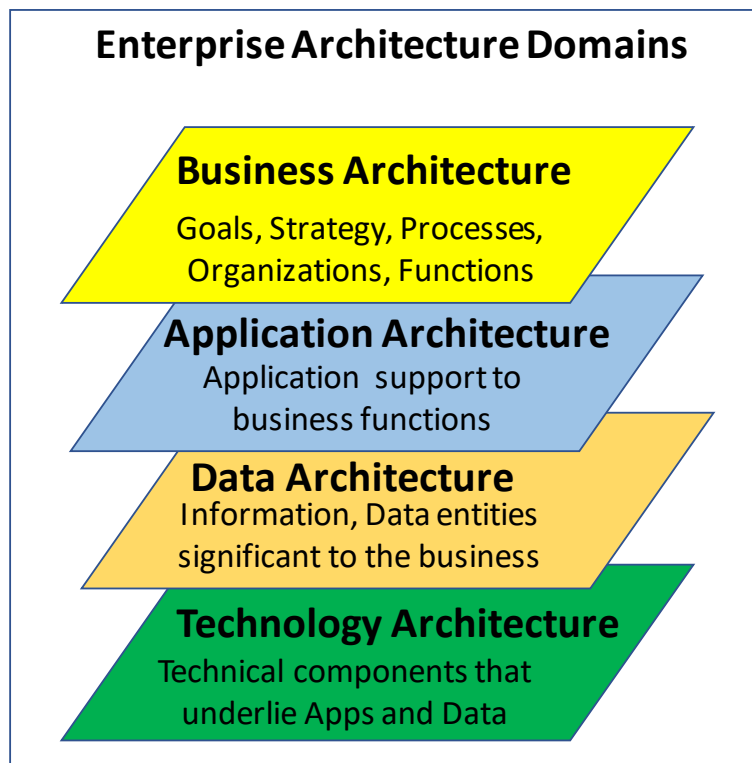


Figure 3: Enterprise Architecture Domains

Enterprise Architecture is guided by a business' goals and strategy. It defines how transformations in the business data, applications and technology domains should happen and the relationships between the domains. This is especially relevant today as enterprises are trying to decide how new technologies such as machine learning, blockchain and other emerging technologies can be leveraged in their digital transformation journey.

Some of the benefits of Enterprise Architecture include: -

- Allowing more open collaboration between IT and business units
- Giving businesses the ability to prioritise investments
- Making it easier to evaluate existing architecture against long-term goals
- Establishing processes to evaluate and procure technology
- Giving comprehensive view of IT architecture to all business units outside of IT
- Providing a benchmarking framework to compare results against other organisations or standards

Source: <https://www.comptia.org/content/research/planning-a-modern-it-architecture>

POPULAR EA FRAMEWORKS

As with other disciplines such as project management, process improvement and IT Operations, over the years, several frameworks have emerged for Enterprise Architecture.

According to COMPTIA, the following are the leading Enterprise Architecture Frameworks.

Source: <https://www.comptia.org/content/research/planning-a-modern-it-architecture>

TOGAF: The Open Group Architecture Framework (TOGAF) is a framework for enterprise architecture that provides an approach for designing, planning, implementing, and governing an enterprise information technology architecture. The Open Group claims that TOGAF is employed by 80% of Global 50 companies and 60% of Fortune 500 companies.

Source: https://en.wikipedia.org/wiki/The_Open_Group_Architecture_Framework

Zachman: The Zachman Framework for Enterprise Architecture, named after one of its founders, John Zachman is best described as a taxonomy or a collection of views of an Enterprise Architecture across six architectural focal points and six primary stakeholders. The framework does not do much from the perspective of methodology or process on how to create and maintain EA.

FEAF: In 1996, The National Association of State Chief Information Officers (NASCIO) created a framework which eventually became the Federal Enterprise Architecture Framework (FEAF) under the Office of Management and Budget (OMB) in response to the Clinger Cohen Act. FEAF is focused on the U.S. government, but the taxonomy and process can also be applied to private companies.

Gartner: After acquiring the Meta Group in 2005, Gartner established best practices in enterprise architecture and applied them to the company's consulting practices. While not strictly providing a methodology or a taxonomy, it focuses on bringing the business owners, information specialists, technology implementers together and unifying them behind a common vision.

Source:

<http://www3.cis.gsu.edu/dtruex/courses/CIS8090/2013Articles/A%20Comparison%20of%20the%20Top%20Four%20Enterprise-Architecture%20Methodologies.html>

CONCLUSION

To summarise, in order to effectively embrace the digital transformation,

- The siloed working mentality (business decides, IT builds) between business and IT needs to be replaced with a more cooperative approach (we co-create)
- IT needs to position itself as a strategic capability rather than a tactical enabler of business demands.

Recognising the importance of the integration of skills and capabilities within an Organisation, Bank Negara Malaysia has provided guidance that “A financial institution should establish an enterprise architecture framework (EAF) that provides a holistic view of technology throughout the financial institution” in their Risk Management in IT policy document (July 2019).

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Big Data Analytics: from Laboratory to Life

By Peter Kua Seng Choy

A primer on big data analytics (BDA) and its celebrated 3Vs – volume, velocity and variety. BDA is only as useful as the value it creates to drive economic prosperity, government efficiency, and social good. Today, BDA is available to anyone who wishes to exploit it to create a better world.

Digital Forensic Readiness in Organizations

By Kayne Hoo Kah Yan

The digital transformation of business processes and operations opens up potential surface of attack for cyber-criminals. Organizations have to step up to be forensically ready so that they will be able to manage cyber incidents effectively by maximizing available digital evidence within their environment. Hence, limiting damage and minimizing costs associated with a breach or compromise.

This article discusses why organizations should be forensically ready and outlines how forensic readiness can be implemented within the organization.

Big Data Analytics: From **Laboratory** to Life

By Peter Kua Seng Choy

Big data includes a wide variety of large datasets that can be processed and analyzed using big data analytics or BDA. Among big data's most significant features are the 3Vs - Volume, Velocity and Variety.

VOLUME covers the large amounts of data that is produced and amassed by organizations. Over 40 billion videos and photos have been posted on Instagram since its launch; every year, Google handles over two trillion searches, and Netflix users consume over one billion hours of video weekly. BDA must be capable of handling and analyzing the enormous quantities of data that are generated by machines and people.

VELOCITY refers to the speed of data generated today. Data velocity can be best highlighted through social media examples. In a single minute, Twitter sees over half a million tweets, 4.5 million YouTube videos are watched, and Tinder users collectively swipe 1.4 million times. BDA must be capable of analyzing and processing such high-speed data.

VARIETY represents both unstructured and structured data. Unstructured data is unorganized data such as emails, handwritten documents, voicemails, ECG readings and audio recordings. Structured data on the other hand, represents strings, dates and numbers that can be arranged in database-like repositories. Over 80% of all data exists in an unstructured form. BDA needs to be competent in analyzing and processing these datasets, specifically unstructured data.

TRANSFORMING THE 3VS INTO VALUE

Unless value can be obtained to benefit the economy, government and society, big data and BDA are useless.

Organizations employ BDA to gather, process and analyze big data in a bid to gain competitive advantage. They utilize the insights from BDA to make decisions that will increase profits, drive down costs and maximize efficiencies.

Big data analytics can also help a government enhance its competency and productivity. And through BDA's positive effects on the government and the economy, society at large stands to gain.

BDA MADE POSSIBLE FOR EVERYONE TODAY

Big data analytics used to be confined to academic institutions and major R&D houses since only they had the resources to buy the computing power and storage required to perform advanced simulations and predictive analytics.

Today, cheap storage and powerful microprocessors are easily accessible to people who have the data and skills to implement advanced analytics.

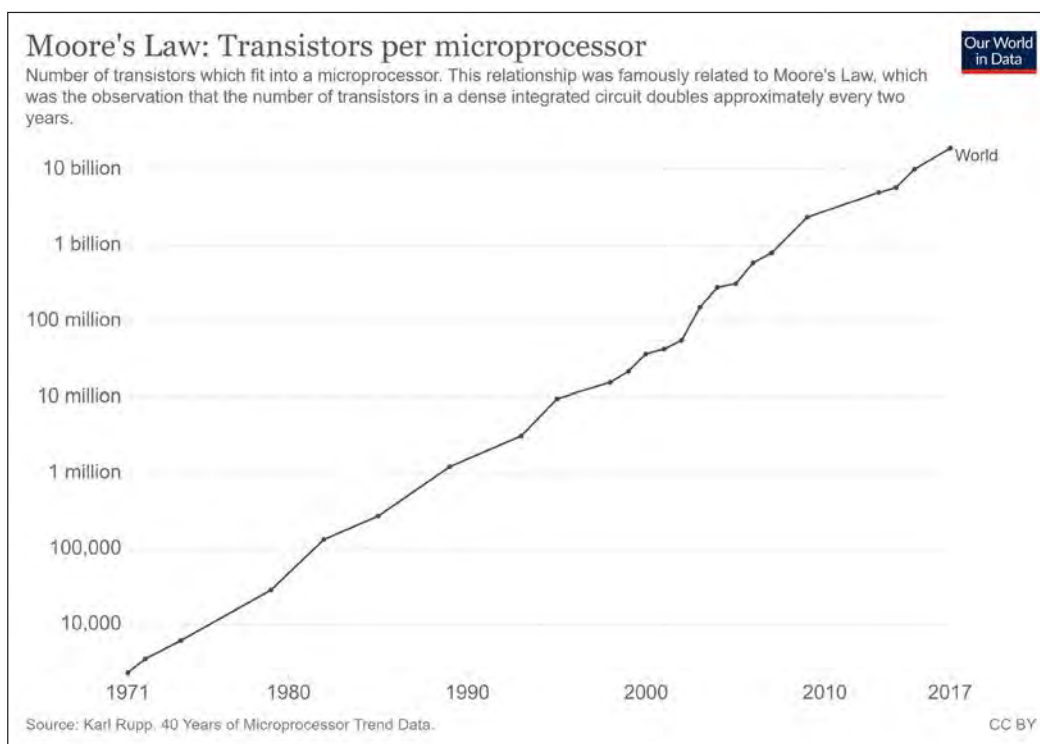


Figure 1: Computing power has doubled every 2 years

Ever since the first 2300-transistor Intel 4004 was introduced in 1971, integrated circuits have doubled their transistor count every two years. To put it simply, computing capabilities have doubled every 2 years. A 6-core Intel i7 microprocessor today contains over 2.6 billion transistors.

This incredible rise in computing power has accelerated BDA. It has enabled high-speed and complex predictive analytics. Advanced technologies like machine learning and deep neural networks require enormous amounts of computer processing power to learn and achieve a high degree of accuracy.

Computer memory prices have fallen drastically as well, which has helped the cause of big data analytics. Lots of storage and data are required for preparing advanced predictive analytic models like artificial neural networks. These models need access to plenty of historical data in order to make accurate forecasts.

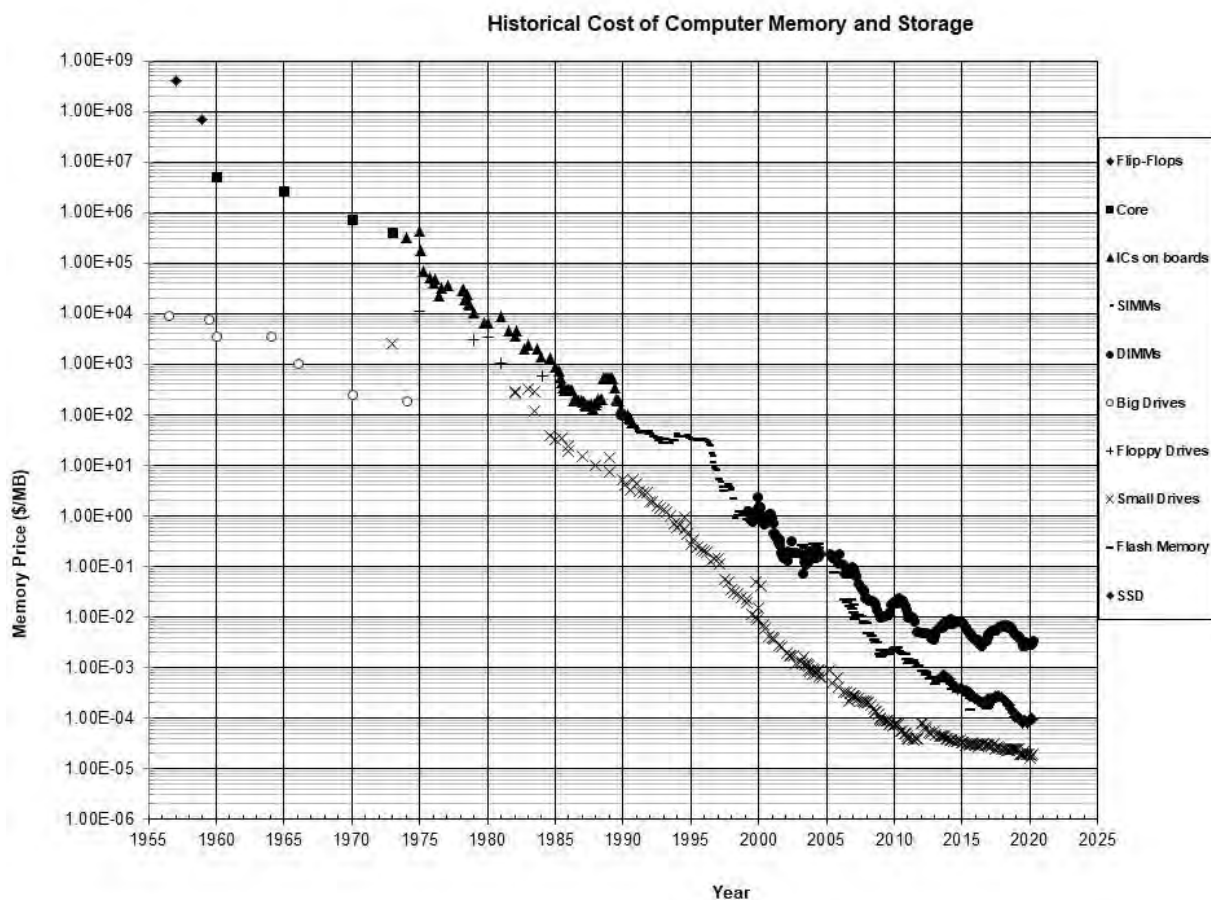


Figure 2: Price of computer storage has drastically fallen since its conception - Source/jcmnit.net

Back in the 80s, a 1 GB hard drive would have cost more than \$500,000. Now, these drives can be bought for prices less than \$0.03 per gigabyte.

Additionally, cloud computing has enabled individuals and organizations to rent the storage and computing power they require for analyzing and processing big data.

Cloud computing has lowered the entry barriers for BDA through its cost-effective pay-per-use business model. Cloud computing frees organizations from having to purchase and manage physical machines, databases and licenses.

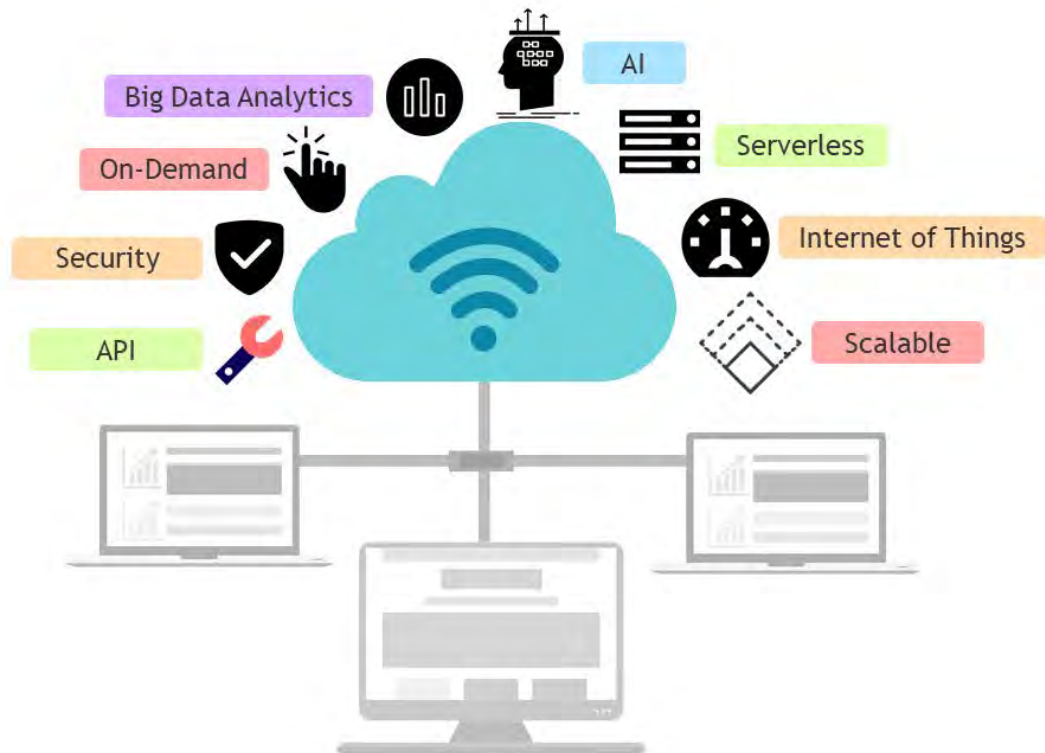


Figure 3: Cloud computing empowers on-demand big data analytics

It is now possible to lease an unlimited amount of computing power and storage. Huge amounts of data can be processed by cloud-based infrastructure. The training and validation of predictive models can also be done on the cloud. Once these intelligent models have been trained and corroborated, the cloud's virtual machines can be terminated.

DIGITAL FORENSIC READINESS IN ORGANIZATIONS

By Kayne Hoo Kah Yan

Is Your Organization Prepared for CYBER INCIDENTS ?



Cyberattacks are **300 times** as likely to hit **Financial Institutions** than business from other industries

Source: Boston Consulting Group, 20 June 2019. For Wealth Managers, Off Year Sparks Opportunity to Reignite Growth
Overview: <https://www.bcg.com/d/press/20june2019-global-wealth-report-222692>

In the current trend, the growth of applications and device capabilities to accommodate various online services leads to a higher risk of exposure to cyberattacks. Some common examples of online services include bank transfers, bill payments, online shopping, trip booking, and membership management.

Despite protective measures in place, there is no guarantee that an organization can be risk-free or immune to cyberattacks. These breaches come with a cost as recovering from a breach consumes time and money.



Source: The Cost of Cybercrime, conducted by Ponemon Institute LLC

Current approaches for most organizations in incident handling are oriented to business continuity and disaster recovery. As a result, a proper root cause analysis is often overlooked.

Many organizations face difficulties in gathering sufficient quality evidence for a comprehensive investigation to be carried out when an incident happens.

RESPONDENTS do not have formal cyber resilience plan in their organization



Source: IBM study more than half of organizations with cybersecurity incident response plans fail to test them

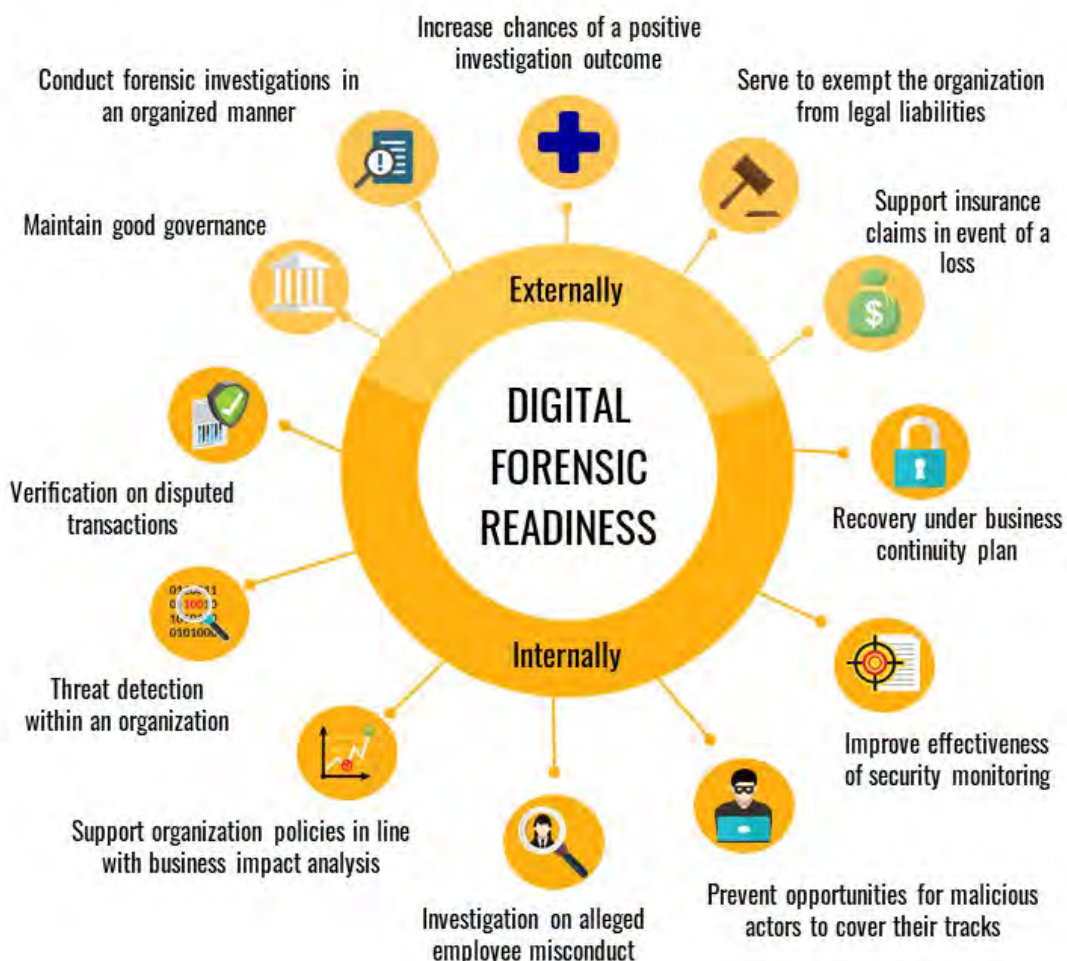
Digital forensic readiness can be described as an organization's capability to collect, preserve, and analyze digital evidence.

The objective is to maximize the potential in using digital evidence while minimizing the cost and time required for an investigation.

In other words, it is the condition of being prepared in such a way that digital evidence is appropriately acquired before an incident so that it can be readily available when the need arises without interrupting business operations.



By adopting digital forensic readiness, organizations can leverage this for both external and internal purposes.



Implementation of DIGITAL FORENSIC READINESS

 1	Identify the business scenario that involve digital evidence	 7	Assess circumstances where a full formal forensic investigation is required
 2	Identify potential sources and types of evidence (e.g. database, application, etc)	 8	Educate staff on incident response and awareness of digital forensic processes
 3	Determine the criteria for evidence collection and storage	 9	Document evidence-based cases, describing the incident and its impact
 4	Establish a capability for securely gathering legally admissible evidence	 10	Ensure legal review to facilitate appropriate action in response to an incident
 5	Establish policy using a proper chain of custody	 11	Regular testing on the applicability of the plan
 6	Awareness of security operations center (SoC) and incident response (IR) team capability	Sources: Digital Forensic Readiness Planning and Readiness Checklist in Order to Reduce Business Risk, Enterprise Security Digital Forensic Readiness Checklist, Reserve Banks Information Technology Private Limited A Ten Step Process for Forensic Readiness, International Journal of Digital Evidence	

In essence, the planning for digital forensic readiness requires identification and assessment of risk areas within an organization and actions to be taken to avoid and minimize the impact of the identified risks.

It should also involve a comprehensive review and analysis of an organization's current security posture, which covers implemented technical controls, policies, procedures, and employee skillset.

Today, increased dependency on information technology for business operations has resulted in the creation of digital footprints which can be used to unravel the specifics of an unexpected incident. Organizations should shift their focus from reactively approaching incidents to being proactively prepared even before incidents are likely to occur to maximize the potential of investigations that will yield positive outcomes while minimizing time and cost.



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Applications and a Guide to Web Scrapping

By Koh Wyhow

All organisations have some internal data, whether transaction or customer records. They are also aware of external data all over the internet, from the Department of Statistics Malaysia, or public Application Programming Interfaces (APIs). This article explains a basic approach to web-scraping to enrich internal data sources, which can be used to achieve business outcomes.

Alternative Data & Credit Scoring for the Unbanked

By Peter Kua Seng Choy

Both consumers and financial institutions can now benefit from alternative data for credit scoring. Customers with insufficient credit records would have the opportunity to obtain loans and lenders would be able to apply alternative data to significantly strengthen their credit risk modeling.

Applications and a Guide to *Web Scrapping*

By Koh Wyhow

This article is about making use of external data to complement your organisation's data sources by web-scraping. Most organisations like financial institutions have rich datasets on their users: they are able to identify who are the large spenders, who are likely to register for exclusive credit cards, who are likely to go into default when given a loan etc. These organisations are not likely to have data to answer questions like what customers think of their products and services, which companies are likely to perform well in the stock market in the near future, and how live updates on critical events can directly impact businesses. The answers to those questions lie scattered all over the web on sites like Lowyat.NET, Reddit, The Star Online, The Edge Markets and so on. Most of the data needed can be obtained by using automated systems to harvest data from selected sites.

THE APPLICATIONS OF WEB SCRAPING/CRAWLING

The applications of web scraping/crawling for banking and financial institutions are vast.

Competitor price research	Equity research	Financial ratings	Market sentiment
To monitor the performance of competitors' funds, such as unit trusts	To gain insights of a few stocks compared against the industry average	To get live updates and drive high-velocity research and analytics	To gauge how users feel about your organisation's products and services from public forums



Web-scraping isn't too useful when you only want to copy and paste information from a website on a one-off basis.



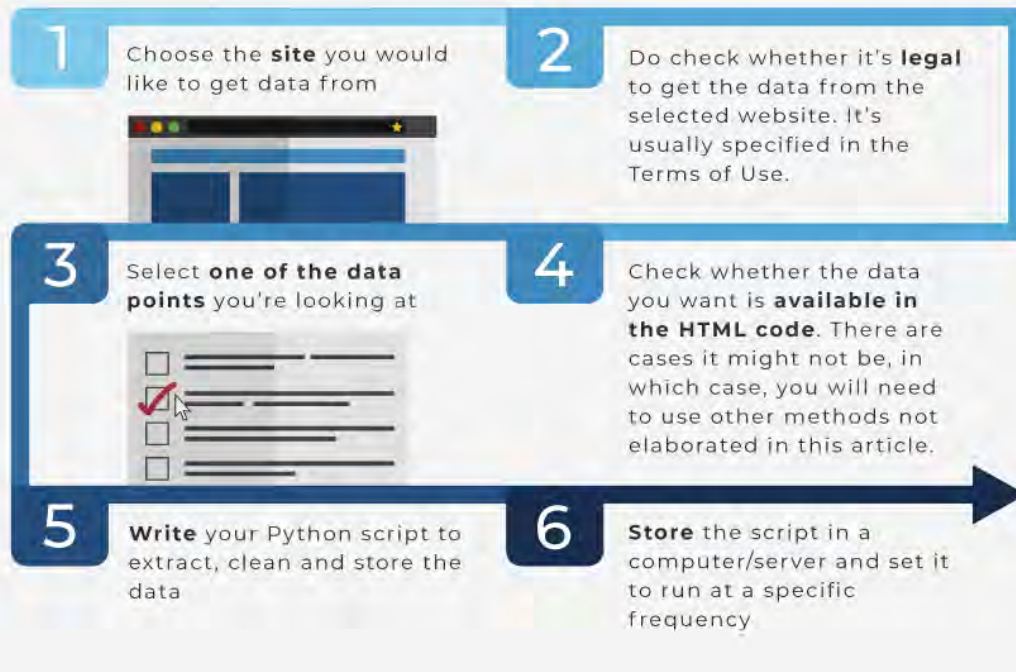
The efficiency gains can only be observed when you have to get that information every 5 minutes in every day or in near real time.



The objective is for you to write the code, store it somewhere, and let it run at a frequency you choose, so you only spend time on the analysis from then on.

WAYS TO SCRAPE DATA FROM WEBSITES

There are several ways to scrape data from websites. The steps below should give you an idea of what's involved.



Say if I were to be looking for cheap dividend stocks to invest in, the criteria I would look for are:

- 1) low or moderate Price-to-Earnings (PE)
- 2) high Dividend Yield (DE)
- 3) high Return on Equity (ROE)

Bursa Malaysia's Equities Prices page doesn't have this information, but I did find another site which has on [malaysiastock.biz](https://www.malaysiastock.biz). The ratios I'm looking for are available, but the stocks are listed alphabetically, so I would not be able to see the ratios across the entire stock market. This is where web scraping can help, and the steps below show how to accomplish this.

1. Import the relevant Python libraries

```
import pandas as pd
import requests
import urllib.request
import time
from bs4 import BeautifulSoup ##other options are scrapy and Selenium
```

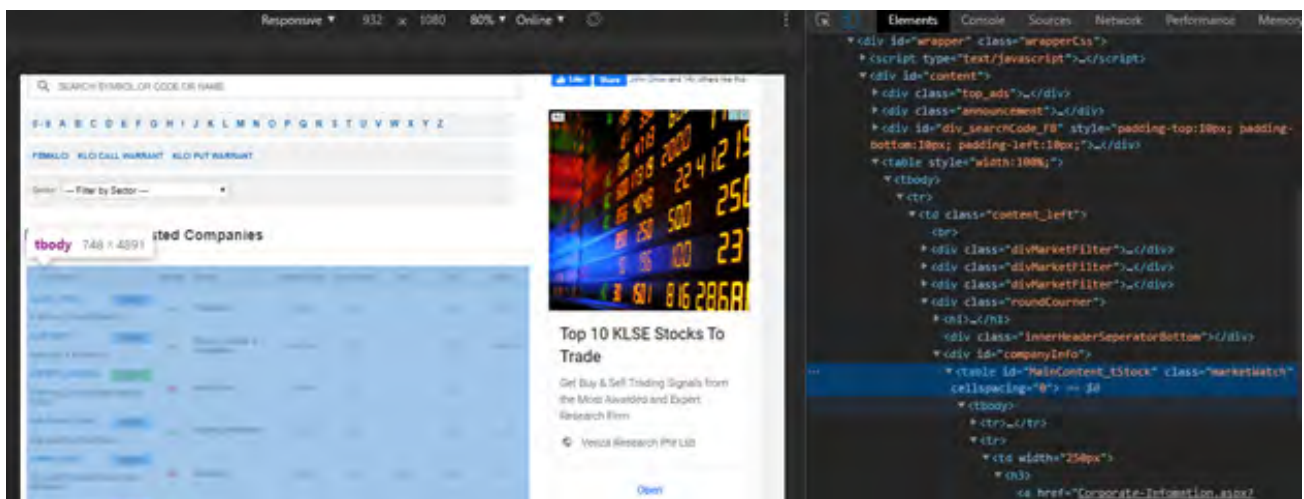
- https://www.bursamalaysia.com/market_information/equities_prices
- <https://www.malaysiastock.biz/Listed-Companies.aspx?type=A&value=A>

2. Scrape malaysiastock.biz

```
url = 'https://www.malaysiastock.biz/Listed-Companies.aspx?type=A&value=A'
##scrape only stocks starting with A
response = requests.get(url)
response
<Response [200]> ##this confirms the connection is successful
```

```
soup = BeautifulSoup(response.text, "html.parser")
##now use BeautifulSoup's html.parser to display the data
table = soup.findAll('table', {'class': 'marketWatch'})
##and look for a table called marketWatch
table
```

Using Chrome, if you were to right click on **AASIA (7054)**, and click **Inspect**, you will be able to see the html code of the webpage, as snapshot below. Since the data on the website is displayed in a table, it would be reasonable to look for a table within the html code. While parsing the html code, notice the table on the webpage is highlighted when you hover your cursor over `<table id="MainContent_tStock" class="marketWatch" cellspacing="0">`.



- The next part is the pre-processing bit. This is usually deemed the most laborious part of this process. Most data which comes from a html.parser is usually in html format, and it not easily converted into a neat table.

```
example = list(table[0]) ##converts table into a list
example2 = [x for x in example if x != "\n"] ##get rid of empty lines

prices = [] ##creates an empty array to store data

for i in range(1, len(example2)):
    entry = example2[i].get_text(separator="\n").split("\n")
    entry_filtered = [x for x in entry if x]
    prices.append(entry_filtered)

prices
```

The for loop is for me to separate the data using the delimiter \n , get rid of any more delimiters \n, and to append the result in the prices array. A snapshot of the prices array is to the right.

```
[[ 'AASIA (7054)',
  'MAIN',
  'ASTRAL ASIA BERHAD',
  'Plantation ',
  '49.50m',
  '0.08',
  '-',
  '0.00',
  '-5.12'],
 [ 'AAX (5238)',
  'MAIN',
  'AIRASIA X BERHAD'.
```

- Once your data is in an array, it's easy to convert it into a table and to rename the columns. A snapshot of the resulting table is below.

```
complete_table = pd.DataFrame(prices)
complete_table.rename(columns = {0: "Company Code", 1: "Market", 2: "Company Name", 3: "Sector", 4: "Market Cap", 5: "Last Price", 6: "PE", 7: "DY", 8: "ROE"})
```

	Company Code	Market	Company Name	Sector	Market Cap	Last Price	PE	DY	ROE
0	AASIA (7054)	MAIN	ASTRAL ASIA BERHAD	Plantation	49.50m	0.08	-	0.00	-5.12
1	AAX (5238)	MAIN	AIRASIA X BERHAD	Travel, Leisure & Hospitality	290.37m	0.07	-	0.00	-236.00
2	ABFMY1 (0800EA)	ETF	ABF MALAYSIA BOND INDEX FUND	Bond Fund	1.584b	1.23	-	3.20	-
3	ABLEGRP (7086)	MAIN	ABLEGROUP BERHAD	Building Materials	13.19m	0.05	-	0.00	-1.53
4	ABMB (2488)	MAIN	ALLIANCE BANK MALAYSIA BERHAD	Banking	2.849b	1.84	6.50	9.08	7.41
...
74	AXIATA (6888)	MAIN	AXIATA GROUP BERHAD	Telecommunications Service Providers	29.325b	3.20	21.48	2.97	8.42
75	AXREIT (5106)	MAIN	AXIS REAL ESTATE INVESTMENT TRUST	Real Estate Investment Trusts	2.596b	1.80	12.41	5.14	10.02
76	AYER (2305)	MAIN	AYER HOLDINGS BERHAD	Property	415.43m	5.55	31.20	0.90	2.55
77	AYS (5021)	MAIN	AYS VENTURES BERHAD	Building Materials	60.87m	0.16	-	6.25	-2.75
78	AZRB (7078)	MAIN	AHMAD ZAKI RESOURCES BERHAD	Construction	101.65m	0.17	-	5.88	-

79 rows x 9 columns

- The resulting table only contains the statistics of stocks starting with A. The remaining tasks are to construct a for loop, to run this algorithm for stocks starting with B, C, D, and so on. This can be achieved by running the algorithm above and changing the url variable to: 'https://www.malaysiastock.biz/Listed-Companies.aspx?type=A&value=B' for stocks starting with B, and doing the same for other alphabets. The full code can be accessed via the QR on the right or the link below .



To deploy this code:

1. Adjust the output directory of the code to point to a data warehouse
2. Store this script in a Docker container, and set the cron job to run it every 15 minutes

Web scraping is useful for other sorts of data too:

1. To gauge what customers think of your organisation's products and services based on comments from public forums like Lowyat.NET and Reddit using sentiment analysis
2. To find out what topics are trending on Twitter and Instagram for product development using topic modelling
3. To gather information from news sites which may impact your organisation's products and services like news coverage about competitor's products

One important takeaway is to identify the problem your business is trying to solve. If it involves web scraping, it's vital to understand the structure of the website on which you would like to scrape the information. Scraping different sites will involve multiple pre-processing methods, which means someone in your team will need to maintain the scraper if the target site's structure changes.

-
- https://github.com/atlas-github/malysiastockbiz_scraper/blob/master/malysiastock_biz_scraper.ipynb

ALTERNATIVE DATA & CREDIT SCORING FOR THE UNBANKED

By Peter Kua Seng Choy

Alternative Data and Credit Scoring for the Unbanked

Credit score, the numerical representation of an individual's creditworthiness, didn't exist until the 1950s. Then, loan officers at banks decided - purely based on their own judgement - whether an individual qualifies for a loan or not. The approval process was biased and subjected to racial discrimination and favouritism.

With the introduction of credit scoring in 1956, the entire loan exercise was standardised. Based on data points such as the individual's payment history, amount of debt, credit age, and credit types, the credit score is calculated. This score helps lenders evaluate the candidate's credit risk and their ability to repay a loan.

Recently, credit scoring saw the introduction of alternative data as an additional category of information. This data further refines the eligibility of a candidate for loans by assessing factors outside the traditional credit scoring datasets. Incorporating alternative data into credit scoring can increase the overall accuracy in evaluating a person's financial standing.

What is Alternative Data in Credit Scoring?

Alternative data is information collected from non-traditional sources that helps financial service providers gain a complete view of an individual's creditworthiness. While traditional credit data includes an individual's credit history and debt amount, alternative credit data includes information such as rental and utility payment history, asset ownership, alternative financial data, and shopping history.

Why is Alternative Data Important in Credit Scoring?

Alternative credit data helps lenders expand their services to "credit-invisibles"; people who were previously unqualified for loans based on the conventional credit scoring system. As traditional credit data reports uphold a person's credit history as a decisive factor for scoring, an individual without credit history will have a tough time qualifying for new credit. With alternative data, credit-invisible consumers have improved chances of obtaining a loan.

Alternative Data Can Increase Credit Scoring Accuracy

A primary concern for lenders is the risks associated with each candidate. Even if an individual has a perfect credit score, there is a chance that he or she poses a threat. For example, if an individual maintains a decent credit score but defaults on insurance payments, this person is considered high risk. Yet traditional credit data fails to assess this.

Taking advantage of alternative data, lenders can gain crucial insights into candidates even if they are eligible under conventional credit scores. Lending decisions become more precise.

For consumers who are already eligible for loans under the traditional credit scoring system, alternative data can further improve their credit scores, qualifying them for more attractive interest rates.

Consumers cannot easily influence conventional credit data. With alternative credit data, however, an individual is empowered to contribute their rental or insurance payment history to shape their credit score.

Having said that, financial institutions would do well by combining both traditional and alternative credit data sources to create more accurate credit risk models. They would then be able to better predict the risk of an individual or business defaulting on a loan.

Examples of Alternative Data That Can be Used

To incorporate alternative data into credit scoring, it must be accessible for analysis. The data must also be a good predictor of credit behaviour and comply with all laws associated with consumer credit evaluation.

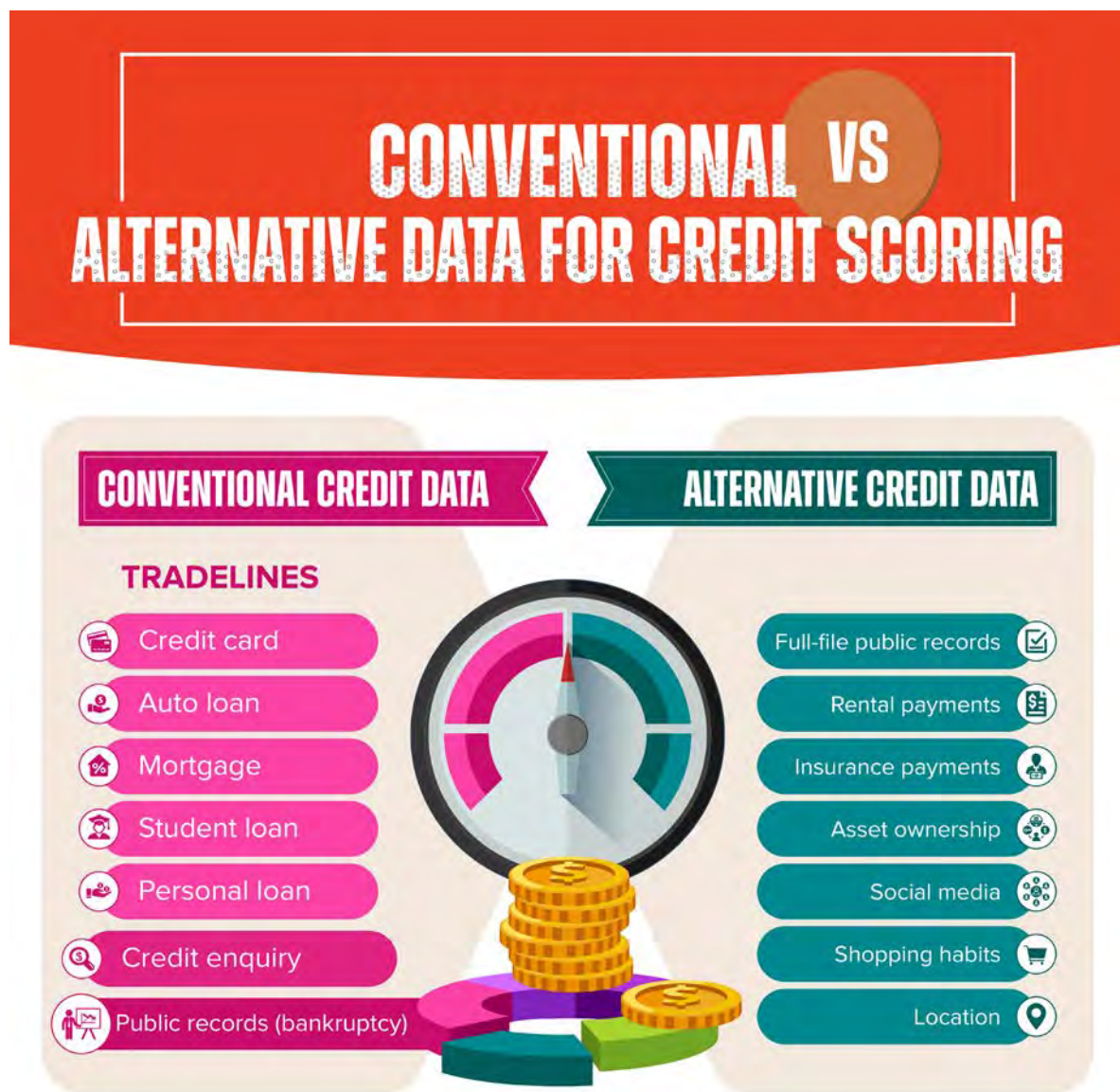
Data analytics company FICO uses a six-point-test to determine whether any new form of data is worthy of inclusion into the credit scoring system. The test covers the following key dimensions:

- Regulatory Compliance - Data must comply with all regulations associated with consumer credit evaluation.
- Depth of Information - The more in-depth and broader a set of data, the higher its consideration will be.
- Accuracy - Data collected must be accurate; otherwise, it compromises predictiveness.
- Predictiveness - Data should be capable of predicting a consumer's future repayment behaviour.
- Consistency - Data must be consistent and did not undergo significant changes.
- Additive Value - Data must supplement or complement the information already used in credit bureau reports.

Here are some examples of alternative data for credit scoring:

- Full-file public records of an individual.
- Utility bill payment history for services including water, electricity and gas.
- Rental payment history.
- Insurance payment history.
- Information on alternative financial services used such as micro loans, point-of-sale financing and title loans.
- Financial account aggregation, which contains combined information from different books, such as bank and investment accounts.

For commercial loans, a business' location, amenities and accessibility can be used as alternative credit data. Lenders can also consider social media and online information. If a retailer has excellent ratings online and social networking platforms wax lyrical about their products, then they are likely to have good ROI. Such a business should be reliable in terms of loan repayments.



Final Thoughts

Employing alternative credit data to generate credit scores has remarkable benefits for both consumers and lenders.

Alternative credit data offers consumers with scant credit histories hope for obtaining loans. This data also allows people to add more value to their existing credit scores by including additional financial information not covered by traditional credit data.

For financial institutions, alternative credit data brings more accuracy to the lending system and can help them better understand the repayment capacity of an individual or business.

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How Do Machines Learn

By Ian Goh Suan Hooi

Interest in machine learning grew from research into methods of creating Artificial Intelligence. One of the most popular approaches towards machine learning currently is the use of “neural networks”. While the field of research itself is not new, the advent of faster processing capabilities has made machine learning commercially viable, from simple tasks like cataloguing pictures of animals, all the way to detecting insurance fraud.

Ethics in AI

By Peter Kua Seng Choy

Although artificial intelligence is reshaping how financial institutions operate, it comes with substantial risks. There are various methods to deceive AI, and one of them is through data that is biased. Banks need to think about the instructions and data fed to AI systems and establish strict guidelines to maintain its ethical usage.

How Do Machines Learn?

By Ian Goh Suan Hooi

Differences between traditional programming techniques and machine learning.

Traditionally, if we wanted a computer to do something, a person, normally referred to as a Programmer would develop something called a Program. A Program is essentially a step by step series of instructions which you want the computer to execute. The computer would then take these set of instructions and execute each of these instructions in the sequence you told it to. Thus, leading to the famous adage that “computers do what you tell it to do, not what you want it to do.”

In most used cases, this is exactly what is required; you need the computer to calculate the tax on a set of invoices, or to print a report in a predefined format. You want to be able to explicitly define how tax is calculated or how wide the margins on your printed report should be. But what if you had a large collection of pictures of animals and you wanted the computer to identify what animals they were? You could, in theory, use the same approach as the report example, but you would have to define what a cat or dog looks like.

What if computers could learn the way humans do, i.e. through exposure to stimulus? So, if I wanted to teach a child what a dog was, I would show her a dog and tell her this is a dog. She would probably get it wrong the first few times, probably by saying “dog” when she sees any animal that has 4 legs. Through feedback and more examples, she will be able to make better and better distinctions.

Eventually, she will also be able to notice traits that define the different dog breeds; the elongated body of the Daschund, or the long floppy ears of the Beagle.

In short, humans learn by exposure to stimulus (i.e. seeing pictures of animals) and feedback (i.e. being told which one is a dog and which isn't). This is essentially how machine learning works.

Artificial Neural networks

The science behind machine learning is the Artificial Neural Network (ANN). Neural networks are (loosely) modelled after the neurons in the human brain. (Figure 1)

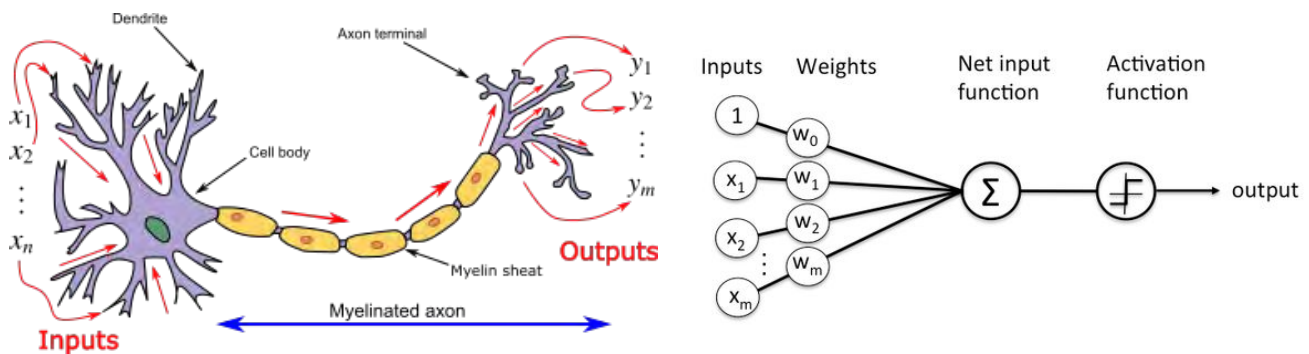


Figure 1: A brain Neuron vs an Artificial Neuron

<https://pathmind.com/wiki/neural-network>

https://en.wikipedia.org/wiki/Artificial_neural_network

The Artificial Neurons are that combined into a dense collection of layers to form the neural network (Figure 2)

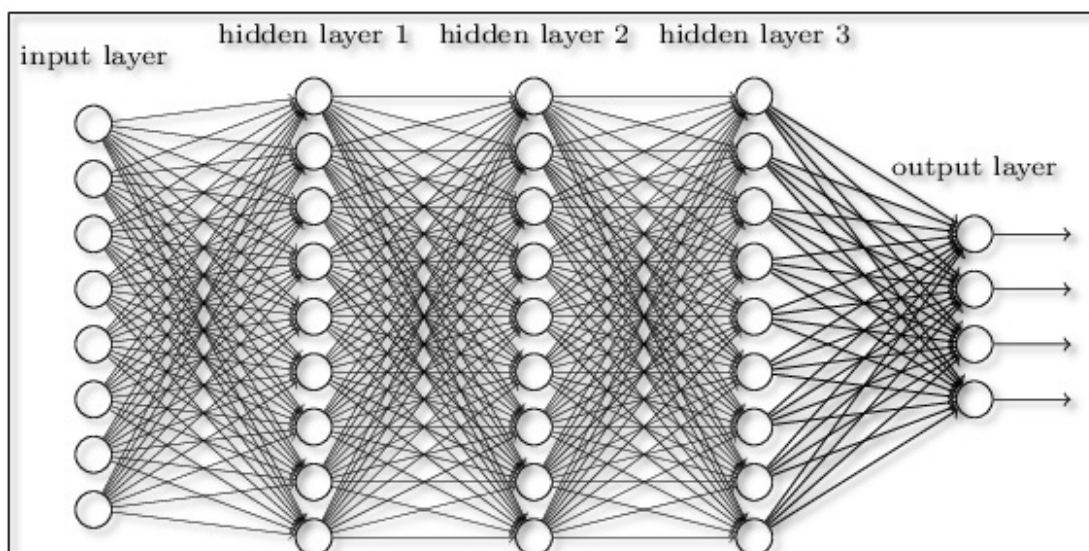


Figure 2 and Artificial Neural Network.

<https://www.houseofbots.com/news-detail/1442-1-what-is-deep-learning-and-neural-network>

With enough data sets (inputs), the neural networks “learn” by adjusting the weights until the desired outputs are achieved. This is known as the training phase. The trained neural network can then be used to recognize other data sets.

Some Applications of Machine Learning in the finance industry

Following are some areas where Machine Learning has been used in the Finance Industry

(<https://algorithmxlab.com/blog/applications-machine-learning-finance/>)

Portfolio Management – Robo-Advisors	Online applications used to provide automated financial information.
Algorithmic Trading	Computers execute programmes with a predetermined set of instructions (an algorithm) for placing a trade on behalf of a trader.
Fraud Detection	Scan through vast data sets, detect unusual activities (anomalies), and flag them.
Loan/Insurance Underwriting	Based on historical consumer information, algorithms can look for patterns to decide if the application qualifies for a loan or insurance.
Document Analysis	ML used to scan and analyze legal and other documents to meet compliance requirements and combat fraud.
Money-Laundering Prevention	AI software used to collect internal, publicly-existing and transactional data to attempt to spot money laundering signs.

Conclusion

Neural Networks have essentially moved out of the labs and into practical use over the past decade or so and has shown great promise in areas which are difficult to address with traditional programming techniques.

Ethics in AI

By Peter Kua Seng Choy

Incorporating Ethical AI into Banking Innovations

Artificial intelligence (AI) is redefining financial institutions. Along with preventing payment fraud, enhancing the scope of anti-money laundering (AML) and offering 24/7 chatbot assistance to clients, AI is improving customer service standards and security, and is estimated to help banks save nearly \$447 billion by 2023.

However, the endless possibilities offered by AI come with substantial risks. Only recently did Google apologise for the racist results produced by Vision AI, an automated image labelling software. The service labelled an image of a dark-skinned individual who was holding a thermometer as a “gun”. And a picture of a light-skinned person was classified as an “electronic device”.

Similarly, in 2016 Microsoft released a chatbot named Tay as an experiment in “conversational understanding”. Although the company designed Tay to be friendly and engaging, within a few hours of its release, it posted highly derogatory tweets, influenced by the interactions it had online.

Such incidents highlight that AI can be deceived in numerous ways and can be manipulated by biased data. As a result, when banks decide to adopt AI into their system, they need to establish precise guidelines to maintain their usage as both ethical and explainable. Here are some of the critical standards that banks must deliberate over.

Customer Data and Privacy Protection

Customers have the right to safeguard their personal data, and it is the responsibility of the banks to enforce this protection against any forms of data thefts or misuse.

The European Commission implemented the GDPR standards, which established seven principles to grant more control to individuals over how their data is collected, in addition to regulations to maintain its integrity and confidentiality by businesses.

For surviving in a highly competitive environment, it is tempting for financial institutions to sell user data to maximise profits. Not only is this practice unethical, but it can also have severe implications on the privacy and security of their customers.

Banks must ensure that customer data does not end up in the hands of other businesses or data brokers. Otherwise, these entities will exploit the data to identify prospective customers and tailor their acquisition strategies for financial gains.

Customers must also be able to inspect the type of personal data used by their banks. They must have full liberty to revise or revoke any data exchange agreements with the financial institution.

Transparency in the Usage of AI

Many consumers do not realise that they are dealing with AI when they receive certain financial services. For instance, in the case of chatbots, a bank must inform its customers they are talking to a conversational AI and not a real representative. It will help the patron understand the limitations of such technology.

Customers are more likely to trust their bank when it is transparent with the type of technology it uses. Banks must also inform users about the kind of data the AI algorithm ingests and operates on to eliminate unjustified fear, such as the invasion of privacy.

AI systems must also be regulated only to collect the essential data it requires to perform the job efficiently. In the chatbot example, it will only need information such as the customer's name, phone number, and account details, to display their account balance on request. Collecting other data, such as the location history of the customer, is unnecessary and should not be done.

AI Explainability and Accountability

When employing AI for decision-making processes, banks must ensure they are fully aware of how the system works and how the algorithm forms a particular result. For instance, banks are starting to use alternative data for credit scoring with the help of AI to gain a three-dimensional overview of a customer's creditworthiness.

In such a situation, financial institutions must be competent enough to explain the data and assumptions applied. It will help customers improve aspects of their lives, such as prompt utility and rental payments, which are some of the alternative data used for credit scoring.

Banks need to have employees who are well-informed about how the AI system works, and they must be capable of explaining it to the customers. Otherwise, customers who are not tech-savvy will be perplexed by the system.

Similarly, clearly defined guidelines about the accountability of decisions made by AI need to be drafted out. Who will be responsible for the consequences of the algorithm's incorrect outcomes? Who has the decision-making authority, higher than the AI algorithm? We need to answer such queries before deploying AI.

Equal Treatment of Differences

One of the most debated ethical concerns of AI in banking is the racial discriminations it can cause due to thoughtlessly developed data sets used to train AI. Any forms of prejudices the system creates can be traced back to the creators who developed and taught it. AI systems must be free of any sorts of racial or economic preferences while making decisions.

While designing algorithms for AI, organisations need to have onboard stakeholders with varying skills and backgrounds. These people will help expose the AI to more diversity and improve its effectiveness in solving real-world issues.

Positive Impact on Workforce

Many repetitive tasks can be automated with the help of AI. But AI automation can adversely impact the jobs of specific segments of employees, making their skills look irrelevant to the bank.

Rather than replacing humans with AI, banks should focus on creating an alternative plan of action that utilises AI to add more precision to the task or reduce the burden placed on employees. Banks must also upskill employees to work alongside AI.

AI chatbots, for instance, can reduce employee workload by answering frequently asked questions and directing the more complex queries to human workers. AI can also very quickly calculate the risks associated with a customer accompanied by human oversight.

In Conclusion

Many consumers do not realise that they are dealing with AI when they receive certain financial services. For instance, in the case of chatbots, a bank must inform its customers they are talking to a conversational AI and not a real representative. It will help the patron understand the limitations of such technology.

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5

Ethical Considerations When Implementing AI in Banks



Although artificial intelligence (AI) is reshaping how financial institutions operate, it comes with substantial risks. There are various methods to deceive AI, and one of them is through data that is biased. When banks choose to implement AI into their system, they need to establish strict guidelines to maintain its ethical usage.



CUSTOMER DATA AND PRIVACY PROTECTION

- Customers have the right to protect their personal data
- Banks must ensure that customer data is not sold to third parties
- Customers must be able to scrutinise the kind of personal data used by the banks
- Customers can revise or revoke any data exchange agreements with the banks



TRANSPARENCY IN THE USAGE OF AI

- Banks must inform their customers when they are dealing with AI
- Banks must notify users on the type of data the AI algorithm works on
- AI systems must only collect the necessary data it requires to perform the job



AI EXPLAINABILITY AND ACCOUNTABILITY

- Banks must be aware of how the AI system works and how results are produced
- Banks need to have employees who can explain their AI systems to customers
- The accountability of decisions made by AI need to be spelled out by banks



EQUAL TREATMENT OF DIFFERENCES

- AI systems must be free of racial or economic bias when making decisions
- Banks need to involve stakeholders with different skills and backgrounds who will subject the AI to diversity and enhance its effectiveness in solving real-world issues



POSITIVE IMPACT ON WORKFORCE

- AI automation can render some human roles irrelevant to the bank
- Rather than replacing humans with AI, banks should exploit AI to add more precision to the task or lessen the burden placed on personnel
- Banks must upskill its workers to work alongside AI and to provide human oversight



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- <https://www.uhi.ac.uk/en/about-uhi/governance/policies-and-regulations/data-protection/the-seven-principles/>
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- <https://www.regulationasia.com/building-ethical-ai-into-banking-innovations/>
- <https://www.finextra.com/newsarticle/34337/filtering-the-ethics-of-ai>
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Agile Organizations in a Digital Age

By Ian Goh Suan Hooi

The Digital Transformation is characterized by the need for organizations to be able to rapidly adapt to a rapidly evolving business landscape. This implies flexibility not just in IT systems, but in the way, companies are structured, how decisions are made and how value is measured. To this end, companies have had to rethink how they should be organized to be responsive in the Digital Age. This article presents some of the current thoughts on this subject

Run Your Code Without Managing Servers

By Koh Wyhow

You have an algorithm written in Python either in Google, Colab or Jupyter Notebook. How do you make it simple for your business users to run this code themselves? This is usually referred to as productionalizing your code. There are several ways to do this depending on your requirements, whether for internal or external clients. In this example, I demonstrate a way to do this using Google Cloud Functions. This example is also applicable in AWS' Lambda and Azure's Functions

AGILE ORGANIZATIONS IN A *DIGITAL AGE*

By Ian Goh Suan Hooi

The digital transformation is pervasive in its impact on an organization. More than about the use of technology, for an organization to effectively digitally transformed, it may have to challenge its preconceived ideas about organization structures and decision hierarchies.

If I were to choose one acronym to describe the current business environment, it would be VUCA (Volatility, Uncertainty, Complexity and Ambiguity).

The rate and difficulty in predicting change have created several conditions that require an organization's attention: -

- The demands of Customers, Vendors, and Regulators are changing to keep up with the evolving environment. The right go to market strategy one day may fall on the wayside as technology enables new access channels. New capabilities in digital IDs may require regulators to issue new guidelines to FIs. To cope, organizations must have the agility or nimbleness to change course when required.
- Access to Information (and misinformation) has never been easier. With the digitization of information, the volume, veracity, variety and velocity mean that organizations must rapidly and frequently communicate with customers, partners and colleagues.
- The definition of a "good" employee is evolving. Creative knowledge and the ability to learn have become more important. To attract and retain these "learning workers", organizations are required to offer a distinctive value proposition.
- Technology is disrupting traditional, well established business models. For example, ride share services disrupt Taxi services, Airbnb has disrupted the hotel industry and more recently, virtual banks and traditional banks. To remain relevant, organizations need to at least be aware of these threats and develop capabilities to deal with them.

In order to be responsive to the changes in the environment, McKinsey suggests that our view of organizations as rigid machines which served us well during the industrial and information age should be superseded with a view of organizations as a dynamic organism as described in figure 1 <https://www.mckinsey.com/business-functions/organization/our-insights/the-five-trademarks-of-agile-organizations>

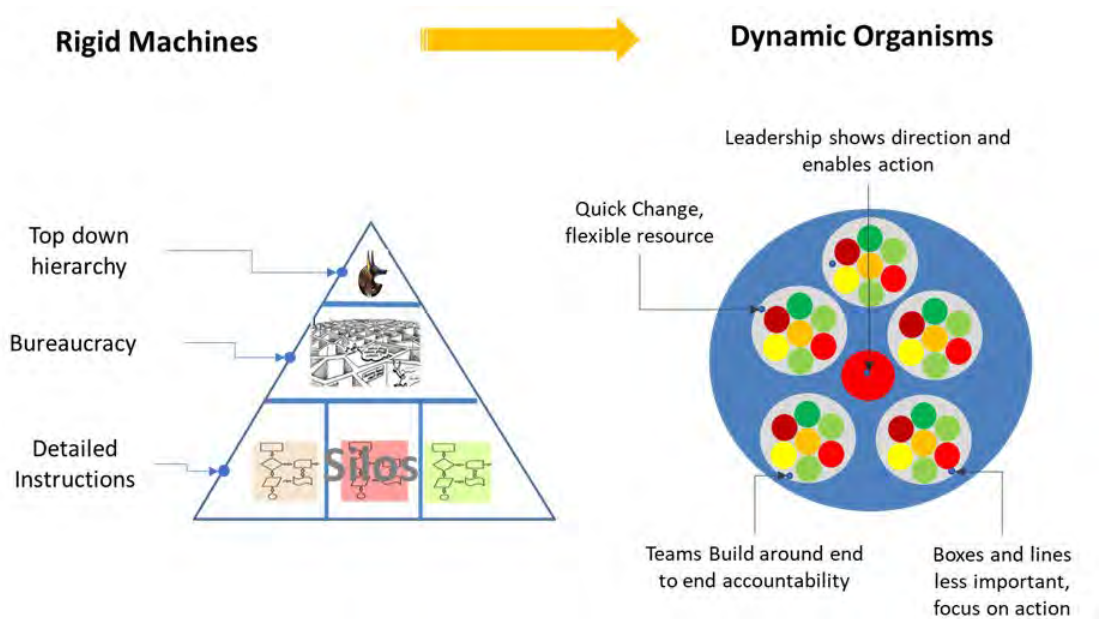


Figure 1: Organizations as Dynamic Organisms

Another way to look at this is that the traditional “Command and Control model” as we normally observed in traditional organizational hierarchies assume that Change is predictable and that an organization’s goal is to become an efficient enterprise. This view is changing to one of “Sense and response”, acknowledging that the nature of change itself is unpredictable and thus the goal of an enterprise is to be able to adapt to the changes i.e. an “adaptive enterprise” [Adaptive Enterprise: Stephen H. Haeckel 1999]

Five key characteristics of organizations which have achieved this agility as described by McKinsey are [<https://www.mckinsey.com/business-functions/organization/our-insights/how-to-create-an-agile-organization>]: -



Figure 2: Characteristics of agile organizations

- **Strategy**
 - Agile organizations have clearly articulated visions and goals which are agreed upon and shared across the organization.
 - Proactively seek customer feedback and utilize the information to create new offerings or business models.
 - Clear metrics set up for resource allocation and are subject to regular review (i.e. know when to stop an initiative)

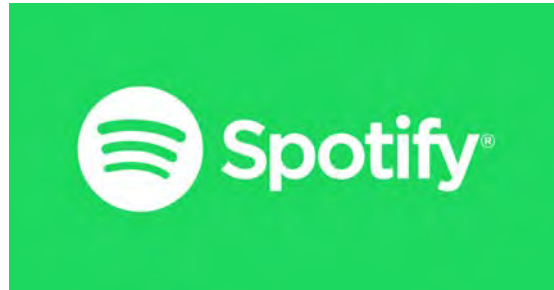
- **Structure**
 - Clear definition on the accountability of each roles
 - Decisions are made as close to the relevant teams as possible (minimize escalation)
 - Promote the development of external networks so the organization can have access to the best talents and ideas

- **Process**
 - Shared common language, processes and ways of work.
 - Shared goals measured by business impact, rather than activity.
 - Frequent and open discussions of performance against target

- **People**
 - Visionaries, architects, and coaches, rather than Planners, Directors and Controllers.
 - Promote positive peer behavior through a high trust environment rather than rules, processes, or hierarchies
 - Ability for employees to move horizontally or vertically between roles based on personal development goals.

- **Technology**
 - Incorporate technological innovations such as micro services, containers and serverless architectures.
 - Employ Cross functional teams throughout the entire product lifecycle
 - Extensive use of automated testing and deployment

A Case study of an Agile organization



An often-cited example of an agile organization is Spotify. Spotify is an international media services provider based in Sweden. It allows for users to browse for music or search for music by artist, album, genre, playlist or record label.

Users can create, edit and share playlists, share tracks on social media and make playlists for other users.

Spotify provides access to over 50 million songs, 450,000 podcasts and 2 billion playlists.

Multiple articles have been written on how their teams were structured (Two are referenced below). Instead of Divisions, Departments and Teams, Spotify speaks of Squads, Tribes, Chapters and Guilds.

<https://medium.com/scaled-agile-framework/exploring-key-elements-of-spotifys-agile-scaling-model-471d2a23d7ea>

<https://www.youtube.com/watch?v=jyZEiKKWhAU&feature=youtu.be>

Spotify essentially developed their organization structure based on the following principles.

- Autonomy and trust
- Ownership and Accountability
- Failure is an opportunity to learn, innovate and change

Based on their own reports, these were the observed benefits.

- Enhanced velocity
- Processes are reduced to a minimum
- Minimized dependencies
- Lack of a firm structure makes problem solving easier
- Promotes clarity and transparency

RUN YOUR CODE

WITHOUT MANAGING SERVERS

By Koh Wyhow

Most data professionals run their Python or R scripts on notebooks hosted on their local machines, or on the cloud like AWS' SageMaker, GCP's AI Platform notebook, or even Google Colab. After writing code, it's likely your code will be used:

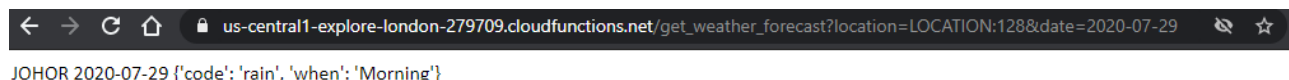
1. To send notifications to users in an app
2. To perform data cleaning and maintenance
3. To run tasks in the cloud instead of on the app
4. To integrate your code with third-party services or APIs or etc.

Traditionally, most of these applications would require your code to be hosted in an on-site server for it to run in a production environment. This obviously comes at a cost from server maintenance and other hardware costs. There are now cheaper options where you can write code, and deploy into the cloud for a production environment, without the hassle of managing servers or instances. One example of this is using Google Cloud Functions . This example is applicable to AWS' Lambda as well.

Google's Cloud Functions is a serverless environment for developers to build and connect cloud services. All developers need to do is to write simple functions which are automatically triggered when an event being watched happens. Here is a simple example: notice the URL below has several parameters: `location` and `date`. This is a cloud function I built to extract weather forecast data using APIs offered by the Malaysian Meteorological Department for Pagoh for 29 July 2020.

https://us-central1-explore-london-279709.cloudfunctions.net/get_weather_forecast?location=LOCATION:128&date=2020-07-29

Using a browser to head to the URL gives you a snapshot below.

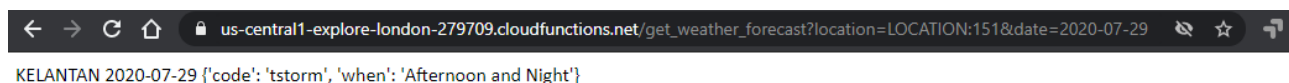


JOHOR 2020-07-29 {'code': 'rain', 'when': 'Morning'}

The URL returns the weather forecast for a location in Johor on a specified date.

Varying the URL to a location in Kelantan gives

https://us-central1-explore-london-279709.cloudfunctions.net/get_weather_forecast?location=LOCATION:151&date=2020-07-29



KELANTAN 2020-07-29 {'code': 'tstorm', 'when': 'Afternoon and Night'}

<https://cloud.google.com/functions>
<https://aws.amazon.com/lambda/>
<https://api.met.gov.my/>

The URL now returns the weather forecast for a location in Kelantan on a specified date.

At the time of writing, the MET API Version 1 is working but due to be replaced with API Version 2 to be released at an unspecified date.

Feel free to try varying the location and date parameters. A sample of 10 location codes are listed as below:

ID	NAME	ID	NAME
LOCATION:135	Segamat	LOCATION:154	Kuala Krai
LOCATION:123	Batu Pahat	LOCATION:128	Pagoh
LOCATION:157	Pasir Mas	LOCATION:410	Kubang Pasu
LOCATION: 426	Serdang	LOCATION:156	Machang
LOCATION:122	Ayer Hitam	LOCATION:153	Kota Bahru

```
import requests

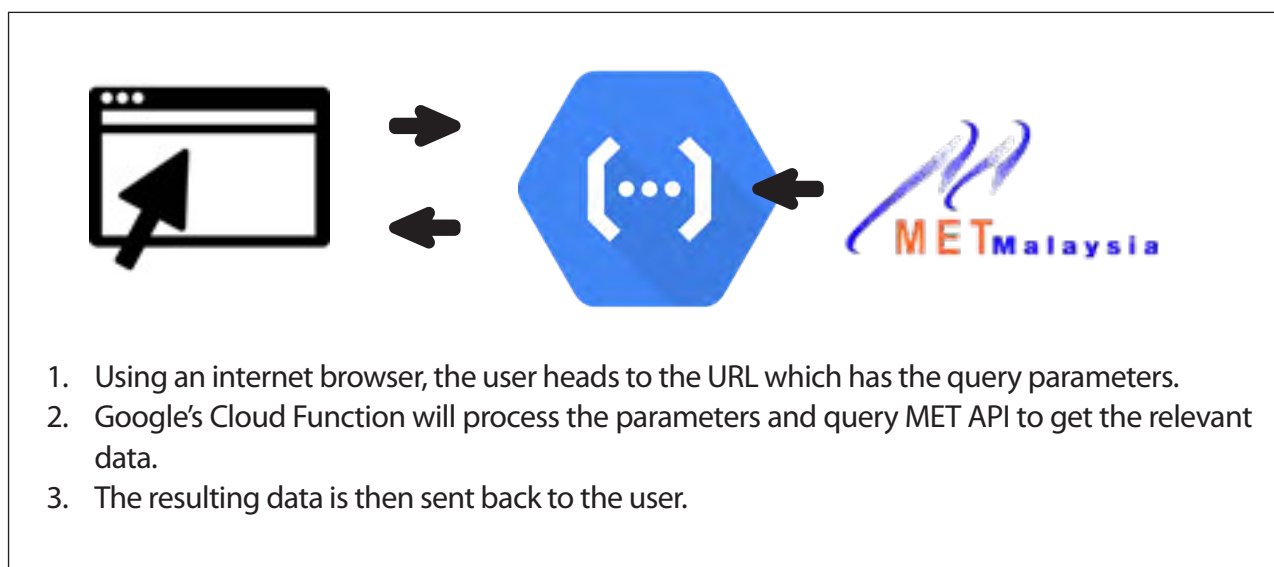
def get_location_date(request):
    location = request.args.get('location','LOCATION:237')
    date = request.args.get('date','2020-07-27')
    location_date = get_weather_forecast(location, date)
    return location_date

def get_weather_forecast(location, date):
    headers = {'Authorization':'METToken __INSERT TOKEN HERE__'}
    params = (
        ('datasetid','FORECAST'),
        ('datacategoryid','GENERAL'),
        ('locationid', location),
        ('start_date', date),
        ('end_date', date),
    )
    response = requests.get('https://api.met.gov.my/v2/data', headers=headers, params=params)
    sample = response.json()
    return(str(sample["results"][5]['locationrootname']+" "+str(date)+" "+str(sample["results"][5]
    ['attributes'])))
```

`get_location_date(request)` accepts the location and date parameters from the URL. The default parameters have been set for `'LOCATION:237'` and `'2020-07-27'` for demonstration purposes.

`get_weather_forecast(location, date)` takes the location and date parameters, feeds it into the MET API, and processes the response for display on a website.

The architecture diagram for this script is a simple one:



This cloud function has been programmed to respond to a HTTP request, which means the parameters the users are looking for are available within the URL. The response can be displayed on a website or be sent to an app for user consumption purposes.

Such functions can be configured to run at a certain frequency. One example would be a data cleaning function to run at the end of every day. The function can also be triggered in the event of new information being made available, i.e. a financial transaction to update a customer database etc. A common application would be to integrate a function with third-party services and APIs.

The advantage of using Functions-as-a-Service (FaaS) like Cloud Functions or Lambda, is the ease of deploying functions to a production environment, and the low cost involved (since no hardware costs are involved).

If you would like to do some hands on work with Google Cloud Functions, there are tutorials available on [Tutorials | Cloud Functions Documents](#) . A few example architectures can also be found on [What can I do with Cloud Functions?](#)

PROFILE OF AUTHORS



Fong Choong Fook

Fong has strong working relationships with various law enforcement agencies worldwide, as a trusted figure in the information security arena; he is also the distinguished guest speaker for The Federal Bureau of Investigation (FBI) INFRAGARD event, Polis Diraja Malaysia (PDRM) Info Security trainings and various industry associations, governments and law enforcement agencies on Cyber Security Topics.

Fong is the author of the "Certified Lead Forensic Examiner" (CLFE) courseware for Professional Evaluation and Certification Board (PECB www.pecb.org, USA). The CLFE course is currently distributed worldwide by PECB in training information technology professionals in conducting computer crime investigations and digital forensic.

Fong also has had experience to be called as an Expert Witness to study, assess, evaluate and testify in the court of law.



Ian Goh Suan Hooi

With more than two decades in the industry, Ian's career spans multiple industries including Financial, Logistics, and Telecommunications both as a vendor and end user. He has held roles in multiple parts of the IT delivery value chain including operations, project and program management, systems integration and more recently IT strategy and architecture. He has experience in various domains including CRM, Business Intelligence and SOA.

Ian's current interest is in the impact of the digital economy on an organization. Given the need for agility within IT and the availability of Infrastructure, Platform and Software as near commodity services through cloud service providers, the lines between IT and business are blurring. Thus, requiring individuals to have a broader understanding of organizational dynamics and the need to embrace new approaches to service management such as bimodal IT, DevOps and Lean. Ian is passionate about helping IT professionals in redefining their role within this context.

Ian holds a master degree in electronics engineering and a bachelor degree in Information and Electronics Engineering from Curtin University, Western Australia. He also holds professional certifications from ITIL, TMForum, IASA and the Open Group.



Kayne Hoo

Kayne Hoo Kah Yan is experienced in project planning, project resource management, digital forensics and penetration testing. She has practical experiences in cyber security incident handling, computer crime investigation and is experienced in performing digital forensics analysis for various cases and in maintaining the chain-of-custody and preparing a court admissible report.

Additionally, she also conducts technical assessments such as vulnerability assessments, host security assessment, network device configuration security assessment and more.

Kayne Hoo Kah Yan has conducted digital forensics investigations on various cyber security attacks such as server intrusions, defaced websites and ransomware attacks, as well as provide consultation to clients on improving their IT security to prevent recurring incidents.

She has also supports lead forensic examiner in digital forensics analysis in relation to computer crime in addition to preparing chain-of-custody and digital forensics reports for use in prosecution.

She has assisted several clients in strengthening their IT security posture through managing and performing technical assessments based on international IT security industry baselines and benchmarks.



Koh Wyhow

Koh Wyhow is the manager of the data science team at Star Media Group Berhad. He focuses on delivering advanced analytics and business intelligence solutions for the organisation like chatbots and image recognition solutions. He consulted for client in the airlines, media, property, and FMCG industries during his time as a senior consultant at EY's Data and Analytics team.

He was one of the data scientists which implemented strategies to run a national data-driven campaign for INVOKE in the 14th General Elections. As an independent learner, he picked up basic Python programming skills after office hours during his days as a Further Mathematics lecturer at a private college. Wyhow holds a BSc in Mathematics from the National University of Singapore.



Peter Kua Seng Choy

Peter Kua is currently Head of Data Science and Analytics in Media Prima Digital. His responsibilities include finding ways data can be used as a competitive advantage as well as identifying new business opportunities with data.

Peter was also instrumental in driving the National Big Data Analytics (BDA) Initiative under the Malaysia Digital Economy Corporation (MDEC) in the areas of thought leadership and industry development. He played a key role in developing the first National BDA Framework that delivered strategic recommendations / action plans to achieve the National BDA vision.

Peter has extensive tech-related experience in various roles: Big Data / Data Science Strategy, Technopreneur, CTO, Project Manager and Software Developer. Startup leadership & management style. Excellent communication skills. Solid network of contacts in the private sector, government and universities/colleges.



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DIGITAL TRANSFORMATION

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