

## mthree Alumni Training



### Day 1 – Welcome



Go through logistics of the room, bathroom, breaks, coffee, tea, timing, slack, etc.

## mthree Alumni Training – Introductions



### **Ice Breakers**

How much does a polar bear weigh?

Each person:

- Introduce yourself, including:
- Your academic background
- Reason you applied for this job
- Fun fact about yourself



Answer: Enough to break the ice!

Use the introduction to get people out of their comfort zone – each person should stand up and introduce themselves

Reason for exercise: We often need to talk to a large group of people on the fly when at work, such as in meetings. We need to sound confident and clear when talking. (Check for things such as volume, speed of speaking, etc., and provide feedback.)



## mthree Alumni Training – Introductions



### Logistics

- Training topics covered
- Logistics – timings, venue and equipment
- Social events – during training and at the workplace
- mthree alumni – career progression

On training topics – mentioned key to self study as well and expectations

Logistics – go through all the timings of training, the venue logistics such as bathrooms/coffee etc and anything important with respect to the laptops

Social events – talk about appropriate work behavior – mention about alcohol (if event is a happy hour you don't have to drink) and accessibility issues

Career progression at mthree – also go through any examples of alumni that have not been successful e.g. sleeping at desk or vaping at desk

## mthree Alumni Training - Introductions



### Speaking to large groups of people

- The ability to speak to large groups of people, often about subjects you are not fully familiar with, will become part of your day to day in the workplace.
- Being concise and clear will be a measure of success.

Exercise: Choose a question from the following list – speak for two minutes on the subject in front of the class.



The ability to speak up concisely and clearly in meetings and outage calls will be key for all roles.

For the exercise, no two people should do the same subject

Describe what a good presentation style is:

- An intro
- The main subject
- Conclusion
- Q+A

## mthree Alumni Training – Introductions



- Write Hello World in your favorite computer programming language
- Draw a diagram of the internal components of a computer
- If you could pick up a new skill in an instant what would it be
- Explain a for loop with an example
- What was your worst class in college and why?
- How do you tell the difference between a real email and a phishing email?
- How do investment banks make money?
- What are the differences between linux and windows?
- What is a website? Draw a diagram at minimum showing your laptop and webserver
- What is the internet? How does it work?
- Draw a diagram of a fibre optic cable and explain it
- Create a html page which has a title and a table displaying your top three favorite meals (name, how long it takes to cook, cost)
- What is a variable (including high level and low level descriptions)
- What are the properties of a flat file?

Not all questions have to be picked – when you get low please go onto the next page.

Should be a 2-minute presentation with Q+A and feedback on presentation style afterwards from the class. Ideally they should do a quick intro, deliver their point and then do a summary wrap up.

Talk about why constructive feedback is important.

## mthree Alumni Training – Introductions



- What is your strategy to quickly learn a new skill?
- What is a log file? What is its purpose?
- Tell us your favorite quote and explain why you like it.
- What is the difference between a lit and dark venue?
- How do you know if a website is secure and is safe to use your credit card on?
- What is something you want to do in the next year that you haven't done before?
- What is bitcoin and how does it work?
- Do you have a favorite charity you wish people knew more about?
- What is the meaning of your name?
- Do you prefer iPhone or Samsung and why?
- What is a hacker?
- Compare and contrast two programming languages.
- What technology innovation made the most impact on your life?
- Explain compound interest.
- If you could live anywhere on the planet where would it be and why?
- How did you come to be in this program?

## mthree Alumni Training – Introductions



- What happens when you double click an icon on the desktop?
- What is XML?
- What is a stock exchange?
- What are the differences between computer science, computer engineering and information technology?
- Who had the most influence on you growing up and why?
- Do you have any phobias you would like to break?
- What is the best piece of advice you have ever been given?
- What is a recent book you have read and would recommend and why?
- Explain how you would pull some information out of an SQL database.
- Would you rather give up your smartphone or your computer?
- In Linux – how would you check the health of a server? Walk through some of the commands.
- Explain an if statement in your favorite language.

## mthree Alumni Training – Introductions



### Summary

Your network is your strongest resource.

The ability to speak clearly and concisely and think on your feet will be a key skill in the workplace.

The ability to provide constructive feedback is very important.

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Emphasize the point that the mthree class is a great network for them to have – especially if they are all going into the same company.

Give a real-life example of how it has worked for you.

Re-emphasize the point around ability to be clear and concise and a good format for presentations: intro, body and wrap up.

Remind the class about constructive feedback and why it is important.



## mthree Alumni Training



### Communication Skills

- mthree Engagement structure
- Personal Brand
- Communication across various mediums
- LinkedIn
- Resumes

## mthree Engagement Structure



Once on-site, you will be part of the mthree engagement program. You will be introduced to your engagement manager during training. The engagement team are your point of contact for any on-site concerns in your role. As part of this, you will have the following during your time at mthree:

- Quarterly check-ins
- Reviews every 6 months to track performance and set objectives
- Quarterly workshops focusing on tech/business topics
- Quarterly events – networking/activity-based things (cultivating mthree community across locations)

- For Montreal – this will be Emily and Gaby.
- For front office concerns, they should go to the engagement team.
- For things like Healthcare, etc., go to HR.

## Communication Skills



### Objectives

The ability to communicate clearly and concisely in the workplace and being able to tailor your communication style depending on the situation is key to success.

After this training, you should understand the different styles of communication required to be successful in the workplace.

- Highlight the importance of different styles of communication – e.g. to peers, to management, to business users

## Personal Brand



What is a personal brand?

Thoughts/Emotions

Competency/Skills

Integrity

Ask the class to brainstorm what a personal brand is.

- “The process of personal branding involves finding your uniqueness, building a reputation on the things you want to be known for and then allowing yourself to be known for them.”

Personal branding can be broken down into the above boxes – further info on the next slides

## Personal Brand



### Thoughts/Emotions

- Think about what emotions are appropriate to express in the work place.
- Take a step back; think objectively.
- Do not be afraid to take a step away from the desk if appropriate.

Discuss the following emotions:

- Happy
- Unhappy
- Anger/Frustration/Annoyance
- Boredom
- Fear
- Annoyance
- Jealousy
- Panic
- Interest
- Shyness
- Stupidity
- Complaining
- People shouting at you – think outage scenario

## Personal Brand



### Competency/Skills

- What competencies or skills are good for personal brand?
- Showing willingness and ability to learn new skills will put you in a good position

Skills and competencies that are good:

- Ability to listen
- Ability to connect
- Courage to speak up
- Character
- Integrity and credibility
- Technical skills required for the job
- Organization
- Self starter

## Personal Brand



### Integrity

- A fundamental value that employers seek in their employees
- Honesty and trust are central to integrity
- The ability to do what is right, not necessarily what is expected, even when no one is watching

Can participants think of some examples?

- Acting with respect in terms of timekeeping
- Admit your mistakes
- Give credit where it's due
- Follow the rules
- Stand up for what is right

## Communication - Phone



### Conference call etiquette

Mute/Equipment  
Understanding

Notes/Minutes

Concise Updates

Dial In Early

Appropriate places  
to take a call

- Talk about understanding the phone equipment and when is appropriate to be on or off mute
- Notes and minutes – referring to minutes of meeting – and send out updates afterwards
- Always deliver concise updates – talk about outage scenarios here
- Dial in early – good business etiquette for all meetings
- For places to take a call – talk about the BBC news reader who got interrupted by wife/kids

Conference call video on next slide

## Communication – Conference Calls



### Conference call etiquette



- Play this video: [https://www.youtube.com/watch?v=DYu\\_bGbZiiQ](https://www.youtube.com/watch?v=DYu_bGbZiiQ)
- Have participants take notes during video of problems that occur during the conference call.
- After playing the video, do a round table of what problems they saw (one at a time) and how to avoid those problems in real life. E.g.,
  - Shut out pets/children
  - Check equipment before starting the call
  - How to avoid/handle late arrivals
  - Turn off notifications (especially when presenting)

## Communication - Written



### Email

- Be polite, formal and concise
- No emojis
- Check spelling and grammar
- Pay attention to the subject

### Wiki

- Be clear – write as though the reader has no previous knowledge of the system
- Living documents – always keep updated
- Document everything

### Chat

- Less formal form of communication
- Do not write anything you would not be comfortable seeing on the front page of the WSJ

- On email go through etiquette – how it's a document that is stored for years and is an audit trail of conversations
- Wiki – discuss the importance of documenting everything – and the concept of runbooks
- Chat – be very clear on the proper use of chat – and that you should be very careful with what you communicate on those channels

## PowerPoint + Excel



- Creating PowerPoint presentations and Excel reports is likely to be part of most jobs. Here are some pointers on creating a good presentation/report:

Consistent  
Fonts/Sizes/Styles

Concise – Slides should be  
a summary of message

Ensure that the content is  
aimed at the right level  
based on audience

Ensure appropriate  
formatting in excel of  
numbers/text

Use Notes section if  
needed to remind you  
what to say

Do not over animate

- Brainstorm what a good PowerPoint presentation will look like:
  - Introduction
  - Main material
  - Summary
- Excel – talk about reports and need for accurate data, appropriate charts, etc.

## Communication - Stakeholders



### Team/Peers

- Be responsive and clear on what you are owning
- Ensure any responsibilities you have are covered if you are absent
- Ensure clear communications on any handovers
- Constant communication

### Management

- Concise summary
- Keep them in the loop
- Keep an open dialogue with management – understand what style works for them
- Understand how they want to be updated on progress of your work

### Stakeholders

- If communicating with external parties, do not let them know of details of internal issues without sign off from management
- Be concise – tailor language appropriately

- Talk about clear communication and updates to the team
- Ownership is important and clear communication on handovers, etc. – especially if in a follow-the-sun role
- For management – go over the demands of management and understanding management style – also talk about 1:1s
- For external stakeholders – make it clear again about not revealing internal details
- For business stakeholders – talk through outage summaries and what is important in removing tech speak – brainstorm with the class

## Communication Exercises



In groups, for example 1, discuss what behaviour is good and what behaviour is bad.

### Example 1

George's neighbors keep him up all night playing loud music. He wakes up feeling grumpy, gets ready and gets on the train to work. When the train gets to his stop, people won't get out of the way, so he says 'excuse me', and pushes people out of the way.

As George walks to his desk, the people he knows call out 'good morning', 'morning', 'hey'; ignoring all this he sits at his desk, breathes out a big sigh and logs in.

'This thing is such a piece of crap' he exclaims as the system refuses to let him login for the 7th time. George calls the Desktop support hotline and angrily complains about the system not letting him login. The desktop support team come up to his desk 30 minutes later and replace his thin client with a properly patched one; enabling him to login and start his work day.

- Discuss as a class afterwards

## Communication Exercises



In groups, for example 2, discuss how the production support analyst could have better responded:

Example 2

*The scenario below is a transcript of a phone conversation between a production support analyst named Todd(T) and one of his regulatory reporting clients Carolyn(C). Help T to improve by reworking his responses.*

*C: Hi Todd*

*T: Hi*

*C: The MiFID2 reports didn't get sent out last night. Can you take a look?*

*T: Yeah, they are always breaking. Sometimes they fix themselves. Give it some time and then check again.*

*C: Oh, um, OK, thanks.*

- Discuss as a class afterwards

## Communication Skills



### Feedback

Giving and receiving feedback can be one of the most challenging things to do in a work environment.

Stick to facts and be specific

Consider the medium in which you report

Always listen

Be positive

Focus on the behavior

Be timely

- Show examples of bad feedback:
  - “wow you are really bad at that”
  - “why are you always late”
- How would you tell a junior team member that the report they have provided you is not correct? (brainstorm as a class)

## LinkedIn Profiles



LinkedIn is your online resume and a way of building and keeping in touch with your professional network.

Below is an example of how you should reflect your job status as an mthree alumni and onsite with a client:

Experience

 Morgan Stanley	<b>Technology Analyst</b> Morgan Stanley · Full-time Jan 2020 – Present · 2 mos
 mthree	<b>Alumni Associate</b> mthree Oct 2019 – Present · 5 mos

## Your Resume



Having a professional resume is highly important – it will be the first impression people will have of you professionally – so spending time on getting it right is important.

**Exercise:** Work on getting your resume into mthree format.

- Distribute the mthree template and work with the class to go through it.



## mthree Alumni Training



### ITIL (Information Technology Infrastructure Library)

- Overview
- Incident Management
- Problem Management
- Change Management
- Knowledge Management



## Objectives

The aim of this course is to provide a foundation in some key ITIL principles that are used regularly within the workplace.

You will also complete some practical exercises, simulating real-life examples you may experience out in the field.

- Highlight ITIL for production support is the bread and butter of the role – for development they need a good understanding of the process as they will be involved in some parts.

## What is ITIL



- ITIL is a standardized framework around providing IT Services in a generic way.
- It was created by the UK Government in 1989 and is now used globally and continually updated.
- It covers 4 main topics:
  - Defining services
  - Defining service quality targets
  - Implementing services
  - Managing evolution
- ITIL will provide you with guidelines to follow in your day to day work.

ITIL material on the internet is vast – the textbook is large. You can get certified

Defining services – for example google provide a service by ensuring their website is available 24x7.

Service quality – ask the class what they think that is?

talk about if a payment system goes down (for example consider online banking) how long is appropriate to recover the system? Does it change within business hours or out of business hours?

talk about helpdesk of somewhere like amazon – how long is appropriate before you expect a response to a ticket?

Managing evolution – how do we change services over time to meet business needs.

ITIL provides a standardized set of good practice guidance to help align IT with "the business"

# Incident Management

*What is incident management?*

- Brainstorm as a class what they think incident management is
- Goal of incident management as a process is to restore normal service operation as quickly as possible and to minimize the impact to business operations – ensuring the best possible levels of service quality and availability are maintained

# Incident Management



## Key Points

An incident is an unplanned interruption to an IT Service or reduction in quality of an IT Service.

An incident can also be an impending disruption; e.g. if disk space is filling up quickly and the server will be out of space in 3 hours.

Incidents can be detected in multiple ways.

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Get them to brainstorm what an incident is

Example incidents: slow internet – degradation of quality of service; a trading application performing slowly; full interruption – a payment system being down

Brainstorm how an incident can be detected: user reported, monitoring reported, team reported, client reported, service desk

# Incident Management



## Incident Priority

As an incident is detected, the incident management process seeks to understand the impact and urgency of the incident and act accordingly.

The combination of impact and urgency will determine the priority of the incident.

Priority	Description	Examples
Critical	Extreme business impact	Reserved for impact across multiple business lines e.g. losing a data center
Priority 1	Major business impact	A large-scale outage impacting one business line e.g. trading system down
Priority 2	Medium business impact	A degradation in service – e.g. payments are processing slower than usual
Priority 3	Limited or potential business impact	Usually reserved for incidents with imminent business impact
Priority 4	Often reserved for non-production impacting incidents	Usually reserved for UAT/DEV environments

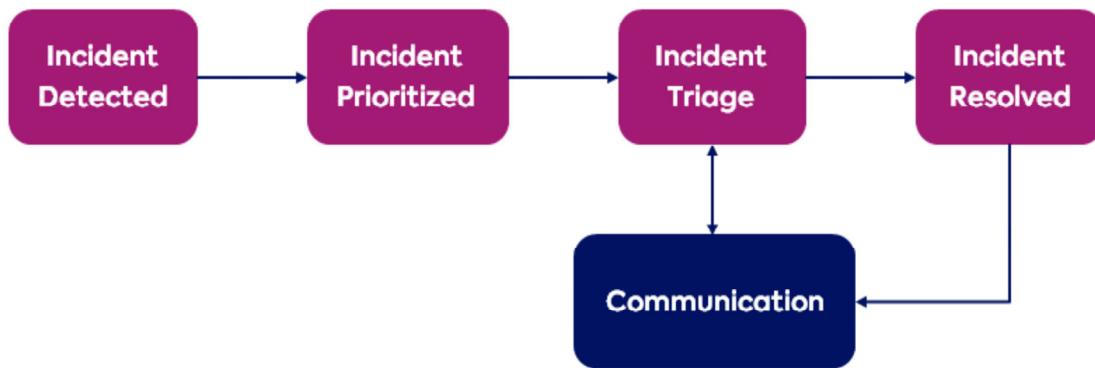
- Discuss what we mean by business impact here
- Other metrics for measuring incident priority – e.g. if an issue happens multiple time it maybe reassessed due to cumulative business impact
- Client impact can cause a change – for example if a large business client is impacted the priority may get elevated

# Incident Management



## The Process

The incident management process can be summarized as below:

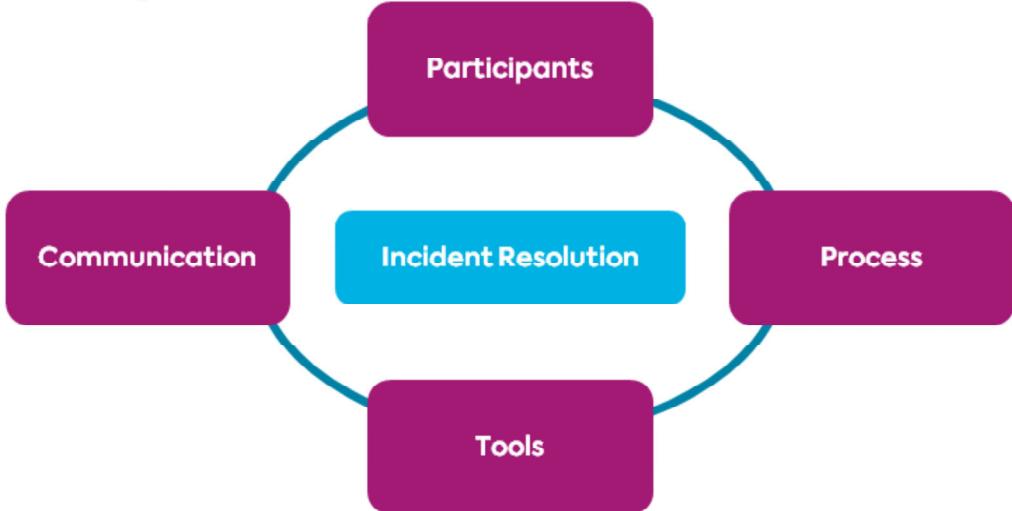


- Discuss what we mean by business impact here
- Other metrics for measuring incident priority – e.g. if an issue happens multiple time it maybe reassessed due to cumulative business impact
- Client impact can cause a change – for example if a large business client is impacted the priority may get elevated

# Incident Management



## Incident Triage



- Each one of these four things is key to triaging an incident well
- Participants – get them to brainstorm who they think might be involved in incident triage
  - Infrastructure, development, operations, talk about the advantages/disadvantages of having business on the call
- Process – brainstorm the process
  - Conference calls, chat rooms, command centers, runbooks, how do you approach solving the problem yourself
- Tools – brainstorm what tools might be useful aside from those facilitating the chat
  - Scripts, monitoring, analytical tools used by infra, sql dev
- Communication – brainstorm what we mean about communication here
  - Talk about communication within the incident bridge/triage process
  - Talk about incident communication out to users – in person, broadcast, management – style of business communications that are good

# Problem Management

*What is problem management?*

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- Brainstorm as a class what they think problem management is
- Problem management is the process by which the cause of one or more incidents is troubleshooted and actions completed to the point that a reoccurrence of the issue will not happen

# Problem Management



## Key Points

Follow on from the Incident management process.

- **Problem:** "The cause of one or more Incidents. The cause is not usually known at the time a Problem record is created"
- **Error:** "A design flaw or malfunction that causes a failure of one or more IT services or other configuration items"
- **Known Error:** "A Problem that has a documented root cause and workaround"
- **Root Cause:** "The underlying or original cause of an incident or problem".

Problems can be pro-active or reactive.

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Follow on from the incident management process – what do we mean here?

Brain storm what we mean on proactive and reactive problems

- Reactive problem management – problem solving reaction after an incident occurs
- Proactive problem management – identifying and solving problems before an incident occurs – part of continual service improvement.
  - Ask them to brainstorm what a proactive problem might look like e.g. patching of OS – if a security vulnerability patch was released for OS – roll out before it becomes an issue

# Problem Management



## Value of Problem Management

A well-run problem management process provides immense value back to the business

Service Availability

Decreased Problem  
Resolution Time

Productivity

Service Quality

Incident Reduction

Cost

Customer  
Satisfaction

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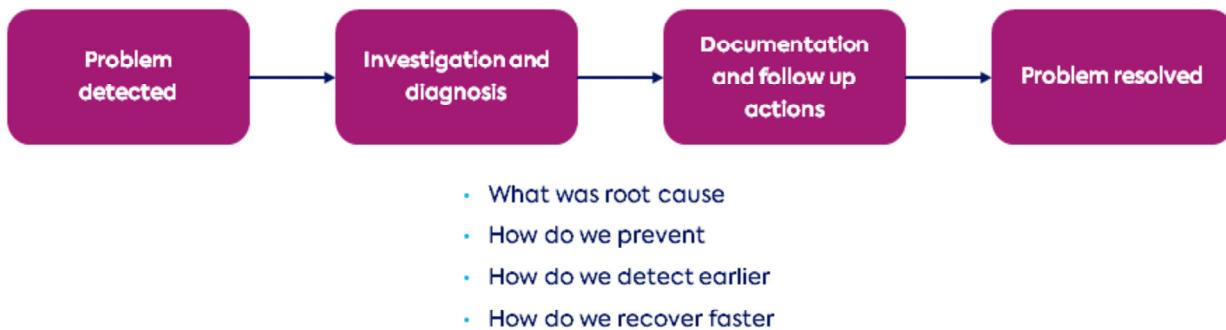
- Brainstorm how problem management helps service availability and service quality - improves
- Brainstorm what we mean by decreased problem resolution time and incident reduction
- Brainstorm how it can increase productivity/customer satisfaction
- Brainstorm on how it will impact cost - reduction of cost due to less issues

# Problem Management



## The Process

The problem management process can be summarized as below:



- As part of the process, you are effectively trying to make sure that the same issue does not occur again.
- Talk about various problem methodologies such as the 5 whys used by Amazon.
- The problem management process is done on a conference call usually – into a service management tool with defined tasks and actions and owners and dates.
- There can be more than one problem management call.
- In recovery talk about things like monitoring/scripts to help/automation etc., etc.

# Change Management

*What is change management?*

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**Exercise:** Brainstorm with the class what is change management?

The Change Management process is designed to help control the life cycle of strategic, tactical, and operational changes to IT services through standardized procedures

# Change Management



## Key Points

**Goal:** The goal of Change Management is to establish standard procedures for managing change requests in an agile and efficient manner in an effort to drastically minimize the risk and impact a change can have on business operations.

**Benefits:** Structured and well planned change will help manage the risk of changing the environment and support against unnecessary errors.

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More details of benefits on the next slide

# Change Management



## Value of Change Management

A robust change management process leads to the benefits:



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- Brainstorm each one of these topics as to what they mean:
  - IT to business alignment helps ensure that the change is what the business requested as well as everyone being on the same page for the change
  - Improved stability as well as less impact to business operations – discuss what happens when a change goes wrong
  - Visibility into an IT change – this is important to understand the environment properly
  - Regulations – talk about the importance of change documentation, how it is something that regulators look back on now and ask for
  - Risk management – talk about change in the environment and how managing the risk is important
  - Productivity – talk about how much time is wasted in managing bad change and the impact
  - Faster change implementation – talk about how it is easier to implement faster changes with a robust process

# Change Management



## Types of Change

A request for change is a formal proposal submitted by someone in the organisation to alter a configuration item.

Change Type	Description	Examples
<b>Emergency</b>	A change implemented as quickly as possible to resolve a major incident	Deploy a bug fix to code that has broken in production
<b>Standard</b>	Frequent change, low risk and pre-established procedure with documented tasks for completion	A simple client configuration change
<b>Major</b>	A change that may have significant impact or be high risk	A software upgrade to a trading system
<b>Normal</b>	Requires an important change to a service or the IT infrastructure	A minor change to deploy a new version of monitoring software

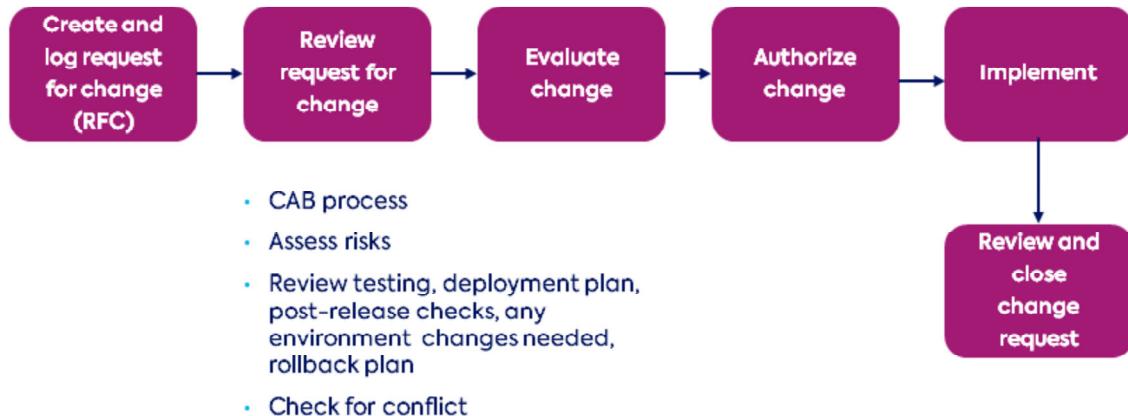
- Talk about tools such as remedy or service now which are a change ticket for this
- Different types of change:
  - Emergency – usually in heat of moment, does not require full approval before deployment – linked to an incident
  - Standard – repeatable, often do not require any approval – for standard repeatable changes
  - Major – usually requires the most approvals and sign offs
  - Normal – will go through the CAB

# Change Management



## The Process

The change management process can be summarized as below:



Brainstorm with the class who they think can raise RFC (answer is pretty much anyone)

Talk about the cab (change advisory board) process:

- Need to cover especially around review of testing
- Is UAT signed off?
- What does the deployment plan look like
- Is deployment window appropriate
- What are the post release checks
- What are the start of day checks
- Does anything need to change in environment to support the change e.g. scripts and monitoring
- What do SOD checks look like
- Does the rollback plan make sense and has it been tested
- Does it clash with any other major releases – brainstorm what you would do if it does

Authorise and sign off change – need all the stakeholders to do it

Implement change – sometimes by a different team, sometimes by the prod support team

Reviewing change and closing the ticket post change extremely important

- Talk about various problem methodologies such as the 5 whys used by amazon
- The problem management process is done on a conference call usually – into a service management tool with defined tasks and actions and owners and dates

- There can be more than one problem management call
- In recovery talk about things like monitoring/scripts to help/automation etc etc

# Knowledge Management

*What is knowledge management?*

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- Brainstorm as a class what they think knowledge management is
- Talk about the following example:
  - Recently upgraded software that causes an error on your desktop when you perform a certain activity
  - Call the helpdesk – how does the person on the desk know how to troubleshoot this issue?
- Enter knowledge management

# Knowledge Management



## Key Points

**Goal:** To gather, analyze, store and share knowledge within an organisation

**Benefits:** A well maintained knowledge system will not only benefit individuals but the team as a whole. If implemented properly it will improve the efficiency of the team as well as allow for statistics to be run on the frequency of issues in the environment.

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When talking about the statistics – a good knowledge management system will mean people are tagging when they use knowledge articles – this data can be used to run statistics on what people are doing on their work all day as well as the frequency of known errors

# Knowledge Management



## Value of Knowledge Management

A robust knowledge management process leads to the benefits:

Measure the response to incidents

Increase business volume without increasing staff

Productivity

Measure the number of known errors

Increase quality of service

Employee development

Control loss of intellectual capital

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- Brainstorm each one of these topics as to what they mean:
  - Response to incidents – think about an FAQ on a website – how is that beneficial
  - Known errors – details of an event and what happens to work around the issue – talk in more detail here around when known errors are used
  - Business volume increase – more people know how to do the same thing, so can create efficiencies
  - Quality of service increases as documented processes to solve issues
  - Loss of IP – this is around people remaining the single point of failure
  - Productivity – knowing how to do things will increase productivity
  - Employee development – good for training as well as for people documenting things

# Stages of Knowledge Management



Data	Information	Knowledge	Wisdom
Raw data – facts that are available that you and your team use on a daily basis	Once data has context, it becomes information – answering “who, why, what, when”	When you analyze information while taking into account your own experience – can now be used to make decisions	Using personal judgement, experience and expertise to properly apply knowledge in a situation

These stages of information basically describe the transition of facts into the knowledge that people will use on a daily basis in their job

# Knowledge Management



## The Importance of runbooks

### What is a runbook?

- A runbook is your “how-to” or manual guide to an application
- It contains the following information in a standard format (proprietary to each company):
  - Architecture – how the application is laid out physically and all data related to that (including diagrams)
  - How it works - how does this application run?
  - Business purpose – what does this application do?
  - Operating the application/standard procedures – day to day running of the application
  - Links to known errors – what are the workarounds needed for this application

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Typically a runbook is a compilation of procedures and operations to run the application. Allows people to effectively manage and troubleshoot a system

Runbooks are your friend – a good support/development person will ensure they are up to date – also a good thing to ask for on day 1 in the job so you can review

Top tip: do not store things like passwords for applications, etc. in public documents such as runbooks

# ITIL Relationships

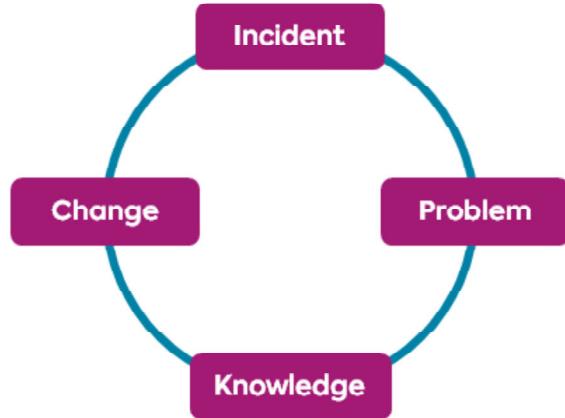
## How do they work together?

There can often be a relationship between change and incident.

An incident will be fully resolved by a thorough problem management process.

Knowledge management will be used to document any errors/known work arounds.

A change can be applied to fix an issue.



- While not always cyclic the processes are all intertwined and important
- Changes are often the root cause of incidents – they also fix incidents as well
- Problems run properly will ensure incidents never occur again
- Correctly documented knowledge is also important
- All of these can be linked together in a service management tool and allow you to run statistics

# ITIL Tooling



The two most popular industry standard tools used to track IT workflows are ServiceNow and Remedy – on the left is an example incident ticket from ServiceNow.

Incident - INC0011211

Number	INC0011211	Opened	2015-07-07 12:02:19
Caller	Enterprise Manager Connector	Opened by	System Administrator
Location	Grand Rapids	Contact type	Phone
Category	EM Incident	Status	Active
Subcategory	-- None --	Assignment group	EMSampleGroup
Configuration item		Assigned to	
Impact	1 - High		
Urgency	2 - Medium		
Priority	2 - High		
Short description: CPU Utilization for 1 is 19.400%, crossed warning ( ) or critical (0) threshold.			
Related Search Results >			
Notes			
Watch list		Work notes list	
Additional comments (Customer visible)			
Work notes			
Activity			
2016-07-07 12:02:19 System Administrator Changed: Assigned to, Additional comments, Impact, Incident state, Opened by, Priority Assigned to: (Empty) CPU Utilization for 1 is 19.400%, crossed warning ( ) or critical (0) threshold.			

Source: oracle.com

## ITIL Tooling examples



The screenshot on the left shows an example of a problem ticket being opened and linked to a knowledge article

A screenshot of a ServiceNow problem ticket interface. The ticket number is PRB0000007. The ticket is set to 'Open' with 'Impact' at '3 - Low' and 'Urgency' at '3 - Low'. The priority is '5 - Planning'. The 'Knowledge' checkbox is checked and highlighted with a red border. The 'Assigned to' field is set to 'ITIL User'. The 'Short description' is 'Router Down' and the 'Description' is 'The 1st floor router is down again. Nobody down there can get at anything outside their own subnet.'

Source: servicenow.com

# ITIL Tooling examples



Home > IT (Knowledge Base) > Email - Outlook - Outlook 2010

The screenshot shows a knowledge base article titled "Create An Email Signature" (KB0000024). The article is authored by Ron Kettering and has 1 view. It includes a "How to" section with steps for creating a signature, a "Options" section with links for adding an electronic business card, a hyperlink, or a picture, and a "NOTE" section stating that the signature won't appear in the currently open message. On the right side, there are sidebar modules for "Most Recent Tasks", "Affected Products", "Most Viewed" (listing "About Windows 10" and "How to Deal with Spam"), and "Most Useful" (listing "Sales Force Automation is DOWN" and "Testing the Create Article button").

The screenshot on the left shows an example of a knowledge article within service now

Source: servicenow.com

## ITIL Tooling examples



The screenshot shows a ServiceNow interface for a Change Request (CHG0030079). The top navigation bar includes 'Change Request' and various action buttons like 'Follow', 'Request Approval', 'Update', 'Copy Change', and 'Delete'. Below the navigation is a process flow diagram with steps: New → Assess → Authorize → Scheduled → Implement → Review → Closed → Canceled. The main form fields include:

- Number: CHG0030079
- Requested by: System Administrator
- Category: Other
- Configuration item: \*BETH-IBM
- Priority: 4 - Low
- Risk: Moderate
- Type: Normal
- State: New
- Conflict status: Conflict (highlighted with a red box)
- Conflicts detected, see the Conflicts section below
- Conflict last run: 2018-03-15 16:50:28
- Assignment group: [empty]

Below the main form, tabs are visible: Planning, Schedule, Conflicts (selected), Notes, and Closure Information. A 'Check Conflicts' button is located at the top right of the conflicts section. The 'Conflicts Detected' table lists two entries:

Change	Affected CI	Type	Schedule	Conflicting change	Last checked
CHG0030079	*BETH-IBM	Not In Maintenance Window	Weekend Maintenance		2018-03-15 16:50:28
CHG0030079	*BETH-IBM	Not In Maintenance Window	Global Infrastructure		2018-03-15 16:50:28

The screenshot on the left shows an example of a change in service now – and also how the tool will automatically detect if multiple changes are scheduled at the same time impacting the same configuration item (CI).

Source: [servicenow.com](http://servicenow.com)

### Monitoring

- Why is monitoring important?
- Types of monitoring
- ITRS Geneos



# Monitoring



## Objectives

It is important to understand the role monitoring plays within a banking environment and its importance.

This deck will take you through various monitoring solutions as well as give you an overview of ITRS Geneos monitoring solution.

# Monitoring



## The Importance of Monitoring

- Monitoring the health of a system is as important as the system itself. It allows for a proactive response to an event and is the eyes and ears to the environment.
- From a development viewpoint, it is extremely important that applications are coded in a way that they can be monitored – integrating with the internal monitoring systems of the company.
- From a production support point of view, the monitoring is your key tool to allow you insight into what is happening in the environment and potentially solve issues faster.

- Ask the class to define what proactive response is
- Talk about how important it is when coding that there is a way of seeing instrumentation of the health of the app – what metrics will tell the support team my app is healthy – for example is it okay if I have high cpu to run?
- For production support – monitoring is part of the bread and butter of the job – the monitoring tool should be open at all times and is part of the day to day responsibility of the team to maintain and respond to



## Types of Monitoring

### What can we monitor?

- Hardware level monitoring: disk, CPU, network, system monitoring, databases, middleware
- Application level monitoring: processes, log files, connections, custom output scripts, batches

### Monitoring tools

- A company may use any number of monitoring tools, varying from infrastructure teams looking specifically at hardware to application teams having a multitude of tools available to them.
- Examples include: Nimsoft, ITRS Geneos, Autosys, Control-M, AppDynamics, Splunk

- Build a view up of monitoring from the hardware level upwards. Emphasize that although multiple teams may monitor, it is beneficial to see holistically from a support point of view.
- For application-level monitoring – mention that some tools allow you to output displays of scripts to a screen – can be useful for instrumenting how an app is performing
- For the tools overview – Nimsoft (hardware), ITRS Geneos does both hardware and application, autosys and control m have a gui to monitor job schedules, AppDynamics for real time monitoring and splunk allows dashboards to be built for data analysis

# Monitoring



## ITRS Geneos

- ITRS Geneos is widely used across the financial services industry to monitor application environments.
- It is owned by the production support team, but developers need to be aware of its existence, its capabilities and be thinking about its uses in relation to instrumenting their application.
- Monitoring should always be at the forefront of the production support analyst's mind. Any change to the environment may require an update to the monitoring.

- Touch on the joint responsibility for production
- Be very clear on ownership by the production support team

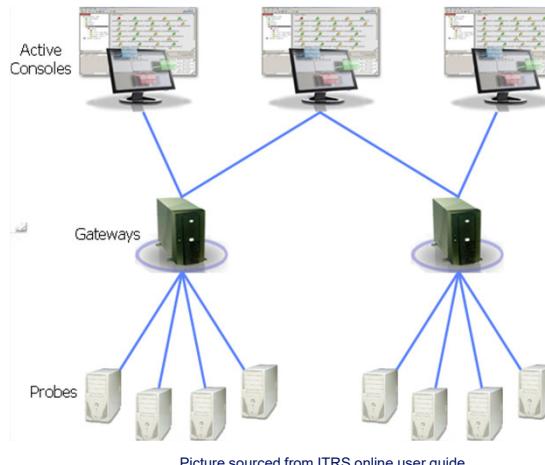
## ITRS Geneos Examples



### Important Geneos Terms

There are a series of terms you will hear when using ITRS Geneos:

- Gateway – core configuration component between the netprobe and active console processes (consolidation layer)
- Netprobe – lightweight agent running on every server monitored (instrumentation layer)
- Active Console – the GUI used to display and interact with monitoring (visualisation layer)
- Plug-In – component tailored to a specific management or monitoring capability
- Sampler – configured instance of a plug - in
- Managed Entity – logical grouping of samplers

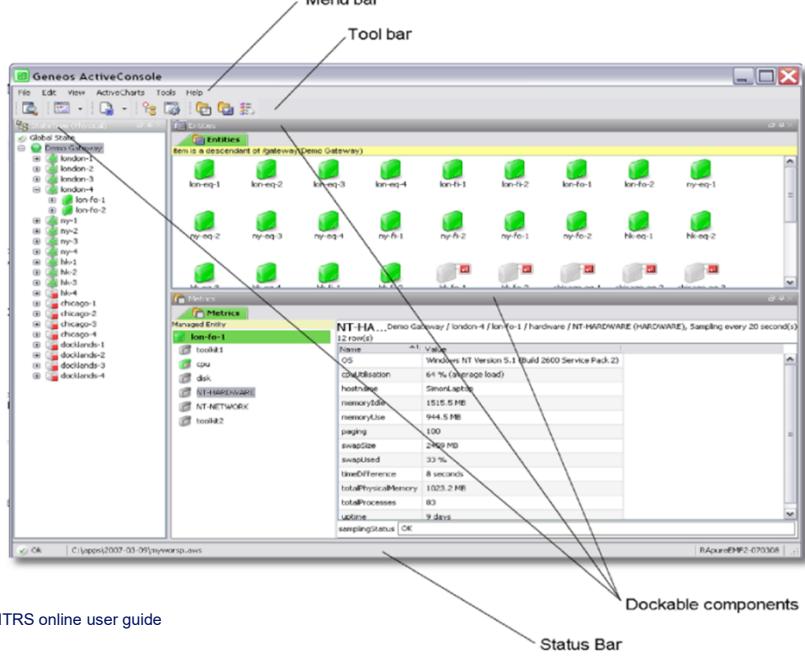


Picture sourced from ITRS online user guide

Gateway/netprobe and active console all make up the main components of your monitoring system

Plug ins followed by samplers and managed entities are what make up your view within active console ( see next slide )

## Active Constraints



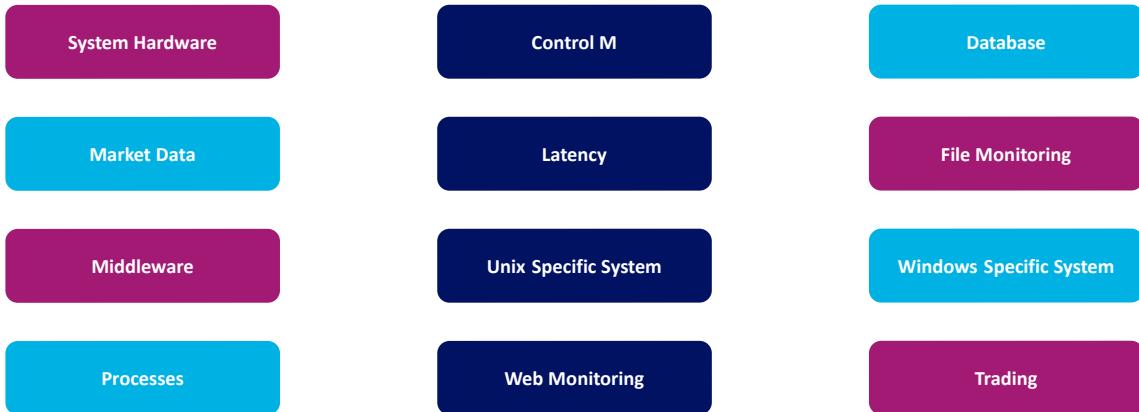
Picture sourced from ITRS online user guide

- Talk through this view: the state tree on the left
  - Managed entities in the main window
  - View of samplers and metrics on the lower right

## Example Plug-ins

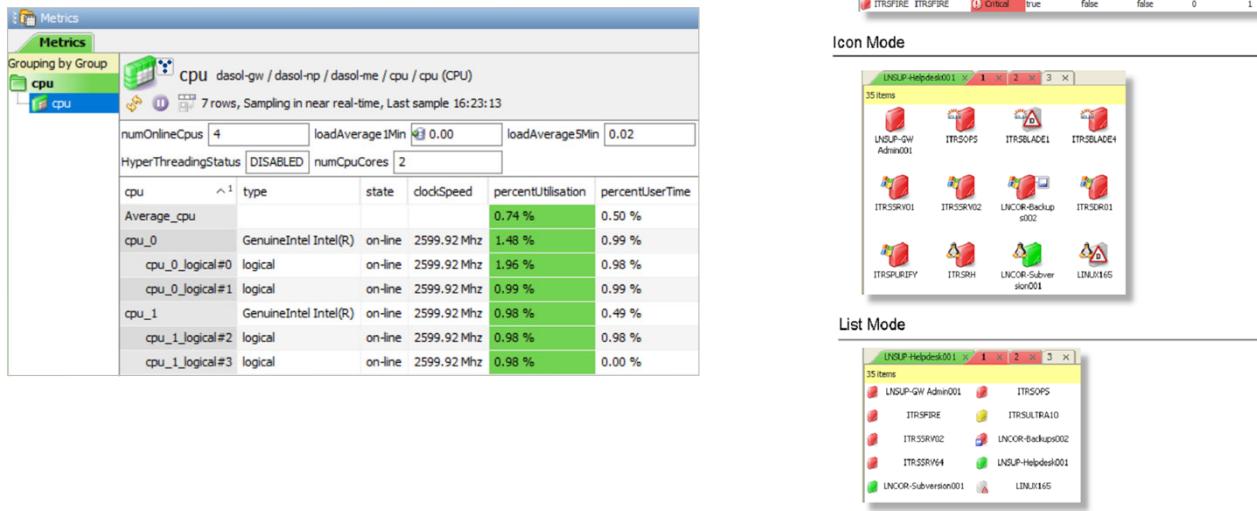


ITRS Geneos have developed a wealth of plug-ins that can be run on a server – each of these can be configured to run at a certain sample rate.



- System hardware: CPU; Device IO; Disk; Hardware; IPC
- Control m – the status of batch processing jobs
- Database – metrics from database as well as sql samplers
- Market data – potential Bloomberg and Reuters feeds
- Latency – can track some message types through a system and understand the latency behind the messages
- File monitoring – allows you to search for specific words in a file and alert
- Monitoring of middleware components and their health
- Unix specific system – specifically telling you who is logged into the system
- Windows specific monitoring – such as desktop, windows services and windows apps
- Processes – telling you all about the health of a process, if it's up or down, or the cpu involved
- Web monitoring – web monitor – checking web servers ability to supply pages/files by regularly pinging
- Trading – specific plug ins for vendor software used for trading such as Fidessa

## Some Example Screenshots



Pictures sourced from ITRS online user guide

- The left hand screen shot gives a view in more detail of CPU utilization
  - Talk here about how you can put rules on cells – anything that shows a color is a rule being applied – so you can set thresholds to alert on
  - The right hand screen shot gives you different ways of showing the health of a managed entity – in each you can click the alert for more info on the issue



## Monitoring do's and don'ts

### Good Practice

- Monitor infrastructure as well as application-specific components
- Think carefully about sensible sample rates
- Fix the problem with monitoring as soon as you can – do not ignore it
- Link knowledge articles to monitoring so people know how to action

### Bad Practice

- Do not build business-level monitoring into the technology view
- Do not sample too frequently
- Do not snooze alerts for indefinite periods of time
- Be careful with custom scripts and their impact to the system

- While the infra team will be monitoring the system – it is good practice to be able to see the whole estate health
- Sample rates are important – you do not want to overload the system
- Do not ignore monitoring in the GUI – it clouds the alerting and can cause issues later on
- Business level monitoring should alert the business – not the technology team of an issue e.g. your order was rejected because a client sent something invalid
- Custom scripts – ensure not too taxing on the system. Test in UAT first

## Exercise: What should I monitor?



- You are supporting a trading system that runs on two Linux servers. One server has a market data process on it and a trading engine process. The second server has a connectivity process on it.
- In groups – discuss what components you would want to monitor?

- For each server – you want to ensure there is Unix-specific monitoring as well as the system monitoring including CPU; Device IO; Disk; Hardware; IPC
- For the market data process you would want to use the market data specific plug in, as well as process monitoring and log monitoring on that process (File monitoring)
- For the trading engine process –you would want to potentially use the trading plug in, as well as the process monitoring and log monitoring (file monitoring)
- For the connectivity process – process and log monitoring again

## Useful Resources



Geneos:

- [ITRS Geneos Documentation](#)

App Dynamics:

- [App Dynamics Home Page](#)

Splunk:

- [Splunk Home Page](#)

Geneos:

- <https://docs.itrsgroup.com/docs/geneos/4.8.0/index.html>

App Dynamics:

- <https://www.appdynamics.com/>

Splunk:

- <http://www.splunk.com>

## Introduction to DevOps

- Introduction to DevOps
- What is DevOps and why do we need it?
- DevOps challenges
- SDLC and Agile



# Introduction to DevOps



## Objectives

DevOps is a term used widely across the technology industry.

This deck will present you with a high-level overview of what DevOps is and how we can use the principles/practices in our day-to-day work.

## What is DevOps?



DevOps is a set of practices and methodologies used to increase the speed, productivity, quality and security of organizations.

DevOps applies across people, processes and technology.

DevOps brings about major cultural and organizational changes while leveraging the power of automation and cloud computing.

DevOps is not specific to industry/market – its practices can be leveraged across big and small companies.

DevOps tries to bring together the development and operations team – to streamline and create efficiencies as well as to bring together expertise between the two groups.

What challenges do the group see with this? Brainstorm as a class.

How should we use technology to do productive/meaningful work ?

## Why do we need DevOps?



1. Improve quality and performance of applications
2. Pressure to release applications faster to meet market demands
3. Reduce IT costs
4. Improve end-customer experience
5. Greater collaboration between Dev and Ops teams

*State of DevOps Report, 2018 – InteropITX*

Brainstorm these with the class:

- Why do we need to improve the quality and performance? - business availability and performance and experience are now key performance indicators – think about things like transferWise vs western union or Netflix vs blockbuster
- Why do we have pressure to release faster? New features – need to be able to make small incremental changes
- Why reduce IT Costs? IT is biggest expense for the business – want to do more with less
- Need to improve customer experience – market differentiation
- The need for greater collaboration – this will help be more efficient across the group

## DevOps Practices



There are several practices associated with DevOps:

Continuous  
Integration/Deployment

Automated Testing

Version Control

Configuration  
Management

Monitoring

Cloud Computing

Containers/Orchestration

Continuous integration/deployment – the ability to do rapid small change to the environment without breaking things

Configuration management – all configuration is included in source control

Automated testing – as automated as possible – quicker and easier to verify than with a human – what challenges can the class see with this?

Monitoring – being able to monitor the systems accurately

Containers/orchestration – being able to orchestrate repetitive processes – why is this an advantage?

Version control – being able to properly manage the environment you are maintaining

Cloud computing – the ability to spin up different environments and manage the environment as a service

## High Performing Teams



DevOps methodology helps to bring together higher performing teams:

Increased  
Collaboration

Shared  
Responsibility

Elimination of Silos

Increased  
Communication

Shared  
Accountability

Working in  
Pipelines

DevOps practices, when implemented efficiently, will make organizations run faster.

Talk through each bullet point and how it helps with DevOps – also ask why the class thinks these things will be useful.

### Elimination of silos

- team members do not cling to their roles
- a dev person understands operations and QA
- team members can be flexible and wear many hats

## Challenges with Implementing DevOps



- Outdated technology
  - A lot of technology has been around for many years - how do you make technology fit into the agile deployment methods?
  - How do you ensure stability?
  - How do you ensure continuous change?
  - How do you setup automated testing on highly complex environments?
- Cultural challenges
  - Teams adopting to new practices and procedures can be reluctant to change
  - Fears around job security
  - People need to be able to communicate and collaborate, as well as be flexible within their team and roles

Think about the “if its not broke, why should we fix it”

Job fears – if you don’t participate in automation – then you will skill yourself out of a job

J.P. Morgan has almost 50,000 employees in technology. See this article about J.P. Morgan's fintech office, scheduled to open in 2020.

<https://www.cnbc.com/2018/10/19/jp-morgan-ceo-jamie-dimon-bets-on-silicon-valley-with-fintech-campus.html>



## Metrics for DevOps

It's important to be able to measure the success of implementing DevOps practices in the organization.

### Deployment Frequency

DevOps should allow you to deploy frequently and often with small, incremental releases to the environment.

### Incident Mean Time To Detect (MTTD)

The mean time to detection of an incident should decrease.

### Change Failure Rate

With smaller incremental releases, change failure rate should decrease.

### Number of Deployments

The number of deployments should increase, allowing for successful change to continually occur.

### Incident Mean Time To Repair (MTTR)

The time to fix an incident should decrease.

### Service Availability

Effective DevOps practices should mean higher availability of services,

Go through each point and ask them why they think this is the case

## Software Development Life Cycle (SDLC)



Some software development methodologies that made sense in the past **no longer scale**; for example – the waterfall methodology.

**Waterfall** was adapted from construction and manufacturing.

- Changes in design are prohibitively more expensive.
- It requires each stage of design to be 100% correct before moving onto the next.

**Agile** methodology is collaborative across teams and self-organizing. The longer and more dynamic a project is, the more waterfall models no longer work. Agile is more adaptable.

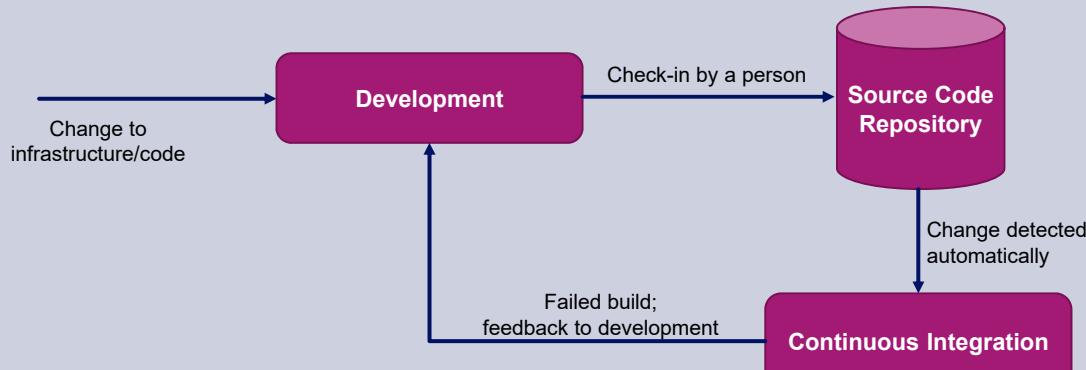
The next slides give a better view of DevOps in context through agile

## Software Development Life Cycle (SDLC)



Development should use test driven methodologies to simultaneously write code and test cases.

Code is checked into a repository, monitored automatically and continuous integration begins. Below demonstrates what happens when continuous integration fails



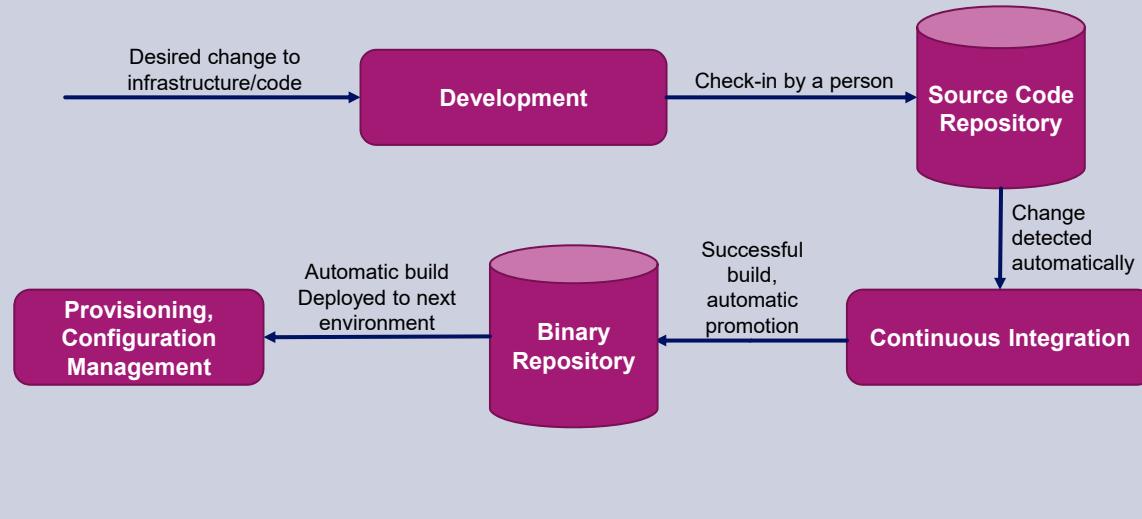
Continuous integration: regression and validation tests are performed against the code to verify that it is fit for purpose and does not break any previous systems.

- The code may undergo symbolic execution, which calculates how variables mutate in the code.
- It may undergo checks for code coverage, which determines what percent of the code base is exercised by the test base.
- Different forms of analysis may be static, which does not execute the code, or dynamic, which does.

## Software Development Life Cycle (SDLC)



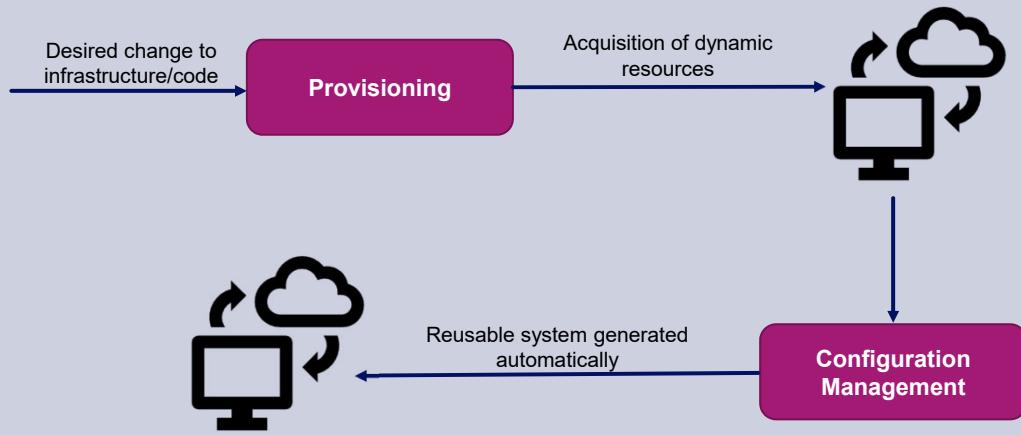
Below demonstrates the next stage of the cycle after a successful build:



## Software Development Life Cycle (SDLC)



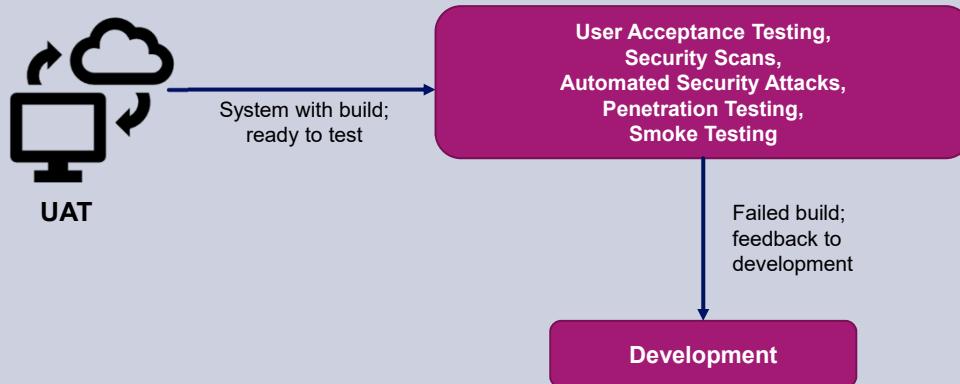
A system that is configured dynamically and can be re-build easily, at will, according to a set recipe is far better than a system that has been created by hand over time by many people who may have forgotten how they built the system.



## Software Development Life Cycle (SDLC)



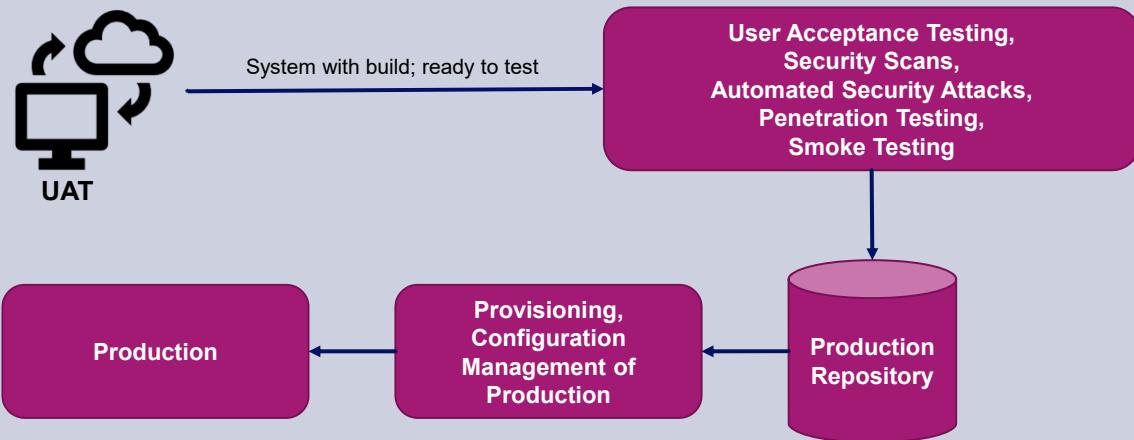
Once in User Acceptance Testing, if any issues are found, we can go back to the development stage of the cycle.



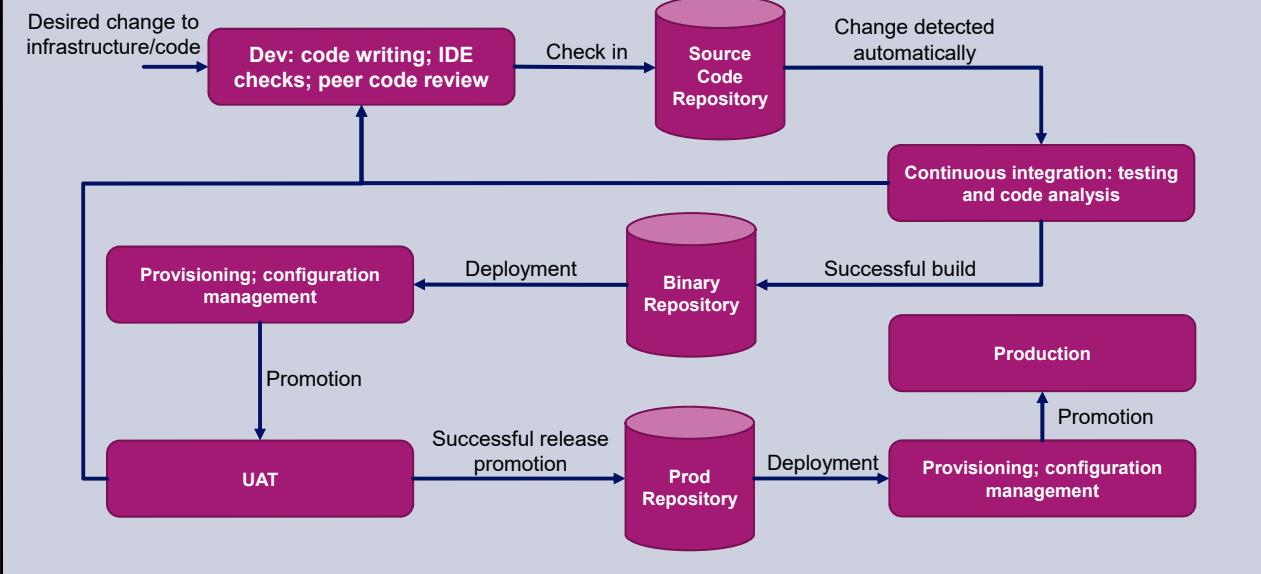
## Software Development Life Cycle (SDLC)



Once UAT testing is successfully signed off – the release will be deployed to production.



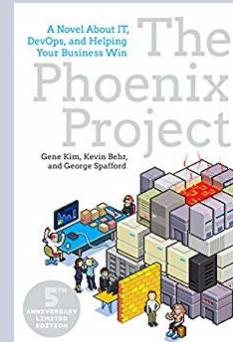
## Software Development Life Cycle (SDLC)



Showing the full cycle

## Recommended Reading

The Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win – Gene Kim





Mthree Alumni Training



## Introduction to Site Reliability Engineering

- What is SRE?





## Introduction to SRE

### Objectives

- SRE (site reliability engineering) is another part of the DevOps world
- This module will provide an overview of what SRE is and how organizations will work towards transformation to SRE

### Trainer/Trainee Notes

While SRE is an extension of what production support is, it is also important for developers to understand what SRE is and how that will grow in the future

## The Current Landscape

- There are many challenges that exist in “running production” at present.

### Manual Intervention

- Production environments often require a large amount of manual intervention to keep running
- This includes incidents as well as day to day work

### Incidents and change

- It has been seen that up to 80% of production incidents are in fact caused by a change to the production environment
- Change processes are cumbersome and not effective at ensuring changes do not break the environment

### Trainer/Trainee Notes

Running a production environment is not always glamorous. Some day to day work can be repetitive manual tasks as the environment does not support self service. This is apparent in day to day requests as well as incident remediation. For example, a developer may request access to log files, and this may not be self service.

Change processes can take a long period of time – even just to get the paperwork signed off however we still see issues in the environment.

How can SRE help with this?

## Change and SRE

While organizations have a robust change process in place, we still see problems.

- Many applications will not follow continuous integration/continuous deployment
- Changes are rolled into large scale releases
- The change process and paperwork to get a release into production requires a lot of time (and usually a lot of signoffs)
- People are not usually well informed about changes to environment
- We still end up with incidents

### Trainer/Trainee Notes

Applications that have been around for years will have not been developed with agile methodology – changing these applications to this process will be difficult. As such we see a more traditional approach to releases with several changes being rolled into one release.

We also may not have the environment in UAT/Production to support a continuous integration/deployment setup

The CAB process and chasing for approvals can also be a challenge

Because of the difficulty in testing (most likely manual) some of these changes we do still see production incidents



## Change and SRE (continued)

So how do DevOps and SRE help this?

### Automated Release

Automated releases leads to less manual intervention

### CI/CD

Smaller and more controlled releases

### Automated Testing

Each change is tested automatically

### Approval Process

Approval process automated and appropriate people approve

### Communication

Automated communication process around changes

### Trainer/Trainee Notes

**Automated releases** – This allows us to ensure no manual mistakes are done when the release is put into the production environment. I would also expect ready for business checks to be automated so the operator will know everything is good ahead of the next business day

**CI/CD** – The idea behind continuous integration and deployment is that small changes are tested and pushed to the environment. This makes it easy to test each change and understand any issues in the production environment.

**Automated testing** - agile methodology talks about ensuring that the tests are built at the same time as the change is written – this will lead to automated testing and a higher confidence that a change is good

**Approval Process** – As you automate all of the steps to get the change into production it would make sense that the approval process and paperwork involved is also automated. This includes ensuring that the people signing off the change will have access to automatic test results and be the right informed people to sign them off (for example, it would not make sense for a non tech person to sign off test results from a technology change)

**Communication** – Communication around a release should be as automated as possible. As well as sending emails what other tooling options are there? A subscribe service website or dashboard? Automatic mentions in chatrooms? Integration with performance monitoring tooling – why would this be important?

## How to Make Operations Visible?

How do we drive towards this SRE change model? Let's think about this in a phased process:

### Phase 1

Stabilize the environment – freeze any changes outside of the change process

### Phase 2

Catch and release – find the fragile parts of your change environment

### Phase 3

Establish repeatable build library

### Phase 4

Enable continuous improvement

### Trainer/Trainee Notes

What is most important to take away here is that you need to have metrics to measure this. You need to know your change failure rate and be able to measure that over time to know where you need to make the most improvements. Metrics and the ability to measure are so important to dev ops and SRE.



# Automation

Elimination of manual work is key to successful SRE. As previously mentioned, there is a lot of manual work that goes into keeping production running. A focus of SRE is how to automate this workload.

## How do we decide what to automate?

- Do analysis on the repetitive work that production support completes manually
- Analyze and understand the work that production support are a bottleneck for the rest of the organization
- Prioritize automation and decrease the work in progress likely sitting in ticket queues within the organization

Again – this all requires METRICS!

## Trainer/Trainee Notes

How do we decide what we want to automate? How do we get our biggest bang for our buck? It all comes down to metrics and how you trace that through your environment. Think about ticketing process – and quality of tickets needed to track this. Really think about how data is important for this.



## Automation Lifecycle

We can look at the process of automation as below:

### Individual

Here we automate tasks with individual scripts

### Team

Here these scripts are now shared within the team and it becomes part of the entire team's process to use them

### Externalized

The automation is then pushed to a level where people can use it without having to ask a member of operations to operate it

As with anything like this, there will always be organizational resistance to this level of change.

### Trainer/Trainee Notes

In a true devops model the production support/SRE people will focus on getting this automation in place. Of course we also rely on development of software that does not require any manual intervention from the operations team in the first place.



# Service Availability

The measure of service availability – how reliable a service is for the user of the service are key metrics that production support/SRE care about.

## **SLA – Service Level Agreement**

- A contract the service level provider promises stakeholders on the availability of systems and response times to queries

## **SLO – Service Level Objectives**

- Goals set by an organization around the availability of the service

## **SLI – Service Level Indicator**

- The measure you use to understand the availability of the service

## **Trainer/Trainee Notes**

Once again, we come back to metrics and how important they are. We go into more details on the next slide about how we chose our goals for an organization.



## Choosing Achievable Goals

When setting organizational goals (SLO), you should look at what is achievable and measurable. Again this all comes down to metrics.

### Frequency

How often does something have to occur and how does that impact the service (also think about the time of day it happens)

### Aggregation

Think about the cumulative impact of issues occurring multiple times

### Geography

Does the location of where the issue happens impact the service availability?

### Monitoring

How do you monitor the system to gather these metrics?

### Trainer/Trainee Notes

What does a service being down really mean?

Example SLO: “90% of users should experience a load time of less than 1 second” – again, can you actually measure this

To successfully set SLOs the conversation should be open with the team:

- Use simple metrics
- (need to fit in an engineer's head)
- Skip absolute language
- Avoid marketing these SLOs to external clients – as then it will become more like an SLA
- Do a study on “error budgets” – determine actually how unreliable a service can be



## Incident Management and SRE

Ensuring that Incident Management is a smooth-running process is part of SRE:

- A high-quality playbook for incidents must be in place
- Regularly train organization on the IM process
- Ensure designated roles during the incident
- Have tooling in place for alert routing and call outs, etc.
- Ensure communication throughout the incident is clear, using tooling such as a subscribe service and alerting page

Some companies push development to be the ones to run incidents for SRE – “eat your own cooking”

### Trainer/Trainee Notes

Google are a classic example of a company that get the development team to run incidents until the product matures. This ensures they are very careful around the products they develop and ensuring stability. This supports the statistics that 80% or so of production incidents are caused by changes

## Metrics During Incidents

Some typical metrics that we would use during incidents to measure include:

MTBF

Mean Time Between Failures

MTTA

Mean Time To Acknowledge Failures

MTTR

Mean Time To Resolution

### Trainer/Trainee Notes

These are all measures that can be used to roll up into SLOs – obviously you need to ensure during incidents all of these measures are recorded properly and usually a service management tool such as ServiceNow will record this.

Other things to measure to ensure a solid SRE team is around the engineers' quality of life – hours they are working and shifts, number of incidents, number of call outs, etc.

## Postmortems

As we know from ITIL – effective management of a production environment needs a robust problem management process.

SRE looks to ensure that:

- Blameless postmortems are run to be effective
- There is not usually one single root cause to an incident
- Need to also understand any cultural impact from the organization on an incident
- Process needs a central coordinator who will complete the postmortem document

### Trainer/Trainee Notes

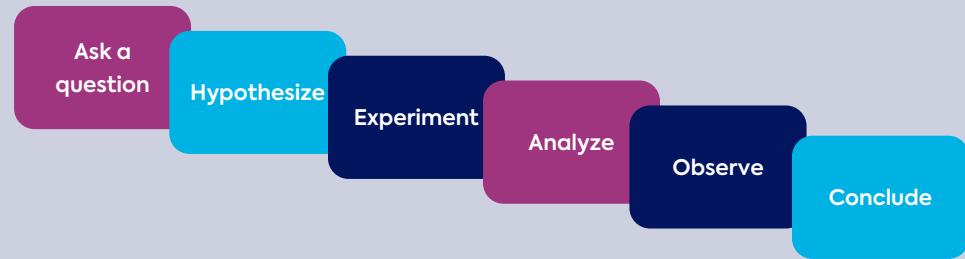
Running a blameless postmortem is key to getting to all the root causes – people need to be able to speak without fear of retribution from their mistakes. As with the problem management process we reviewed as part of ITIL the following things will need to be discussed:

- Incident description
- Timeline
- Sources e.g. monitoring
- What went well
- Contributing causes – can be communication as well as tech – hardest part to keep blameless
- Corrective actions
- Metrics

Need to ensure actions are assigned owners/dates

## SRE – Approach to Troubleshooting

SRE requires the use of “scientific method” to troubleshoot issues within the system. We can summarize this methodology as below:



### Trainer/Trainee Notes

Remember to always ask questions to understand the scope of the impact of the issue. Prioritize nonintrusive tests where you can – but always be aware of impact to production of your investigations

This method will highlight that the more parts of the system that are instrumented, the better it is

## SRE: Performance Engineering

As is apparent from this module so far – metrics are extremely important. Performance engineering, ensuring applications can perform as expected and being able to measure that performance is key.

- Start measuring performance in the front end – i.e. user interaction
- Optimize performance where it adds business value
- Transaction tracing is a common way to measure performance (e.g., AppDynamics)
- Can you feed metrics back into the application, so it automatically adjusts?

### Trainer/Trainee Notes

Application design is by far the biggest driver around performance

In distributed systems – external calls will always be expensive – due to having to go over the network

## Capacity and Scalability

Ensuring applications can handle changes in transaction volume is extremely important. To do this you need a good handle on your performance bottlenecks.

### Scalability

- Short term to handle changes in volume
- Can include things such as pooling connections, caching, tuning memory usage before looking at changes in hardware

### Capacity

- Longer term planning
- If this is done properly, you will be studying metrics and forward predicting capacity needs ahead of time, before they become an issue
- Need a production-like test environment to test

### Trainer/Trainee Notes

Need to always think of systems end to end when planning capacity – think about pushing a watermelon down a pipe

Cloud computing is definitely the future of this – as it removes the dependency on physical hardware which can take a long time to order and put into the environment.

Also consider distributing systems – load balancing across servers to remove single points of dependencies

## Design for Operability!

- When writing software, best practice is to always think about operability.
- Netflix introduced the concept of chaos monkey – inject failure into their live production systems to constantly test recoverability.
- Chaos engineering is a controversial topic depending on the organization. We must ensure that chaos engineering does not effectively bring down the company
- “Be mean to your code”

### Trainer/Trainee Notes

There are tools such as gauntlet allows you to test and be mean to your code.

It is a delicate balance with chaos engineering around what you want to do and protecting your business.



## Transforming the Organization

To effectively run an SRE org in partnership with DevOps you will need the following:

- Software skills in the ops teams
- Operational knowledge within development team

It can be a challenge to break the old habits of development and operations teams.

How do organizations effectively merge their teams?

### Trainer/Trainee Notes

There is no right answer and way of doing this across organizations as culture also plays a part as well as type of business.

Some companies will look at rolling up the teams under one manager or look at placements of ops into dev teams and vice versa. The whole organization needs to be bought in

This will quite often lead to having a central platform management team that will be setting standards around things such as monitoring etc.

## SRE/DevOps and Audit

There are concerns within companies about adopting devops while complying with audit/regulatory obligations.

### Change control

- Smaller changes and faster deployment will require streamlining of change control processes (emergency changes deploy quickly)
- What part of change control can you automate?

### Security

- Code must be in version control
- Can do automated scanning for things such as clear text passwords (during build)
- Deployment and test execution – test results stored for traceability

### Trainer/Trainee Notes

Automating change control to satisfy audit. This can be done to things such as:

- Static code analysis
- Verification of what has changed
- Successful regression testing
- Load testing
- Performance testing

Security – ensuring the application is safe



## SRE/DevOps and Audit (continued)

### Releases

- Deployment should be automated, as well as test execution
- Have production and Beta test environments
- Can look at doing canary releases

### Segregation of duties

- Automation of deployment process will allow development to deploy to production without having access
- Break glass setup will help maintain segregation

### Trainer/Trainee Notes

Canary releases is similar to how coal miners used to send canaries into mines

BETA testing involves routing a subset of production flow to a new environment with the new code, limiting exposure

Break glass – allowing temporary elevated access to developers to production when needed

### Disaster Recovery

- What is Disaster Recovery?
- Business Continuity Planning
- Types of Disaster Recovery Setup
- Disaster Recovery Testing



# Disaster Recovery



## Objectives

It is important to understand what disaster recovery is, and why it is a critical part of a bank's operations.

This deck will take you through the type of disasters that can impact a bank's operations and the technology solutions to them.

Brainstorm with the class what they think a disaster is before moving to the next slide



## What is a disaster?



There are many things that can constitute a disaster situation:

System Hardware

Datacenter Issues

Natural Disasters

Application Issues

Weather

Infrastructure Issues

How do you think these impact a bank's ability to do business?

For each of these – go through examples of how each of these are important:

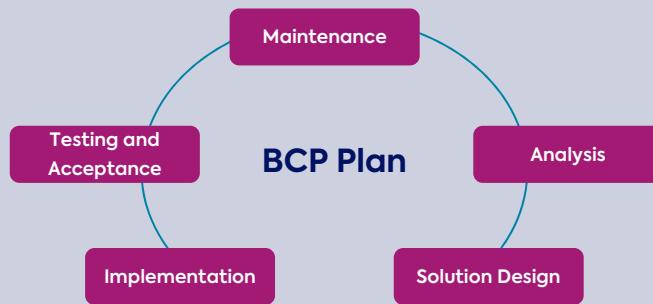
- System hardware – what happens if you have an infrastructure issue on a host? E.g. motherboard fails
- Application issues – what if an application deployment breaks – and the application does not run anymore? E.g. bug in the code that is not recoverable
- Datacenter issues – what if all the power to a datacenter goes out? Or if the cooling fans break?
- Weather – what happens if there is hurricane?
- Natural disasters – what happens if there is flooding at your datacenter ?
- Infrastructure issues – what if someone digs up a network cable leading into the datacenter – what if there is no resiliency

# Business Continuity Planning (BCP)



Business continuity planning aims to manage the risks that could seriously impact IT services. Planning for these events and practicing them ensures minimal amount of business disruption due to an unforeseen event.

- Does the organization have the ability to withstand changes to its environment and still function?



The BCP plan is usually maintained centrally and tested regularly. Talk through an example of a hurricane about to hit a city, e.g. NYC. What do you do with the technology? What do you have to do with the people in the office?

- Talk about working from home
- Working from an alternate site
- Transfer of work?
- Transfer of applications, etc.

Why is this so important to test and verify?

Talk briefly about FED white paper on business continuity after September 11:  
<https://www.sec.gov/news/studies/34-47638.htm>

## Types of Disaster Recovery Setup



### How do we ensure we can continue operations in the event of a disaster?

A company will build in different levels of resiliency into their applications and infrastructure to ensure that they can continue operations in the event of a disaster.

- As well as having resiliency within a datacenter and data being constantly backed up, most companies will have the option to failover to an alternate site in the event there is an issue impacting an entire data center.
- There are also usually multiple levels of infrastructure resiliency built in:
  - Power resiliency - dual power supplies
  - Dual network setup
  - Cabling into a building/datacenter

This is simply setting the scene around having multiple data centers and the reasons behind it

The next slide will go through more details on different datacenter setup options and how that tends to work

Alternate sites tend to be a certain distance away from each other – so that if there is some kind of natural/terrorist event both data centers would not be impacted

On infrastructure setup – talk about the need for dual power supplies etc. Example of an office not having resiliency on network cabling into the building – and if someone digs up the road. Also talk about how network providers are usually different between primary and backup so if one provider has an issue it likely will not impact the other circuit

Remember that some regulators will require a certain level of resiliency

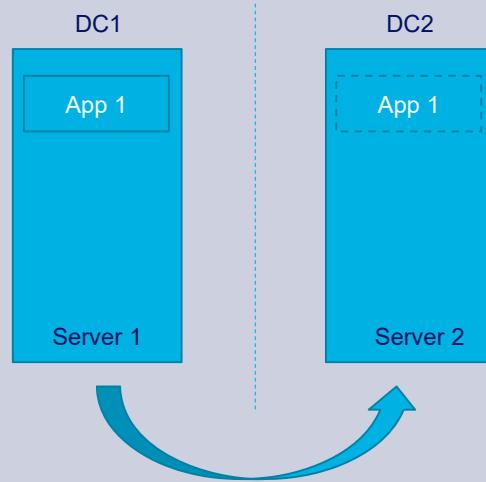
## Types of Disaster Recovery Setup



### Hot – Cold Setup

One of the more traditional/legacy disaster recovery setups.

- Either requires part of the application and infrastructure to fail over to the alternate site or a replicated version of the application stack is started to recover services
- Requires the longest time to recover operations
- Usually the cheapest option



In this setup – there can be a cold version of the application on the backup host – will require the first one to be shut down and then starting up the other application in the secondary site. Often data can be replicated from the primary host to the DR host – may have some issues with data recoverability

Alternately – it is possible that there is a clustering setup – the storage and application groups can be moved from host to host – so you effectively lift the application and mount it onto the DR host – if there is an issue with the disk – this will effectively move the issue from one host to another

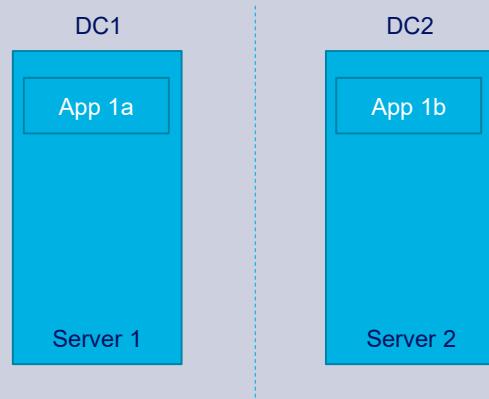
## Types of Disaster Recovery Setup



### Hot – Warm Setup

A warm backup site has hardware and data communication established.

- Data replication may not be fully current and may require some restoration in the event of a failover.
- Usually the application instance is running and will require some kind of signal to start running as the production instance (varies by technology).



There are usually two instances of the application – one that is running as primary and one that is running but not processing any data – replication of data is also present

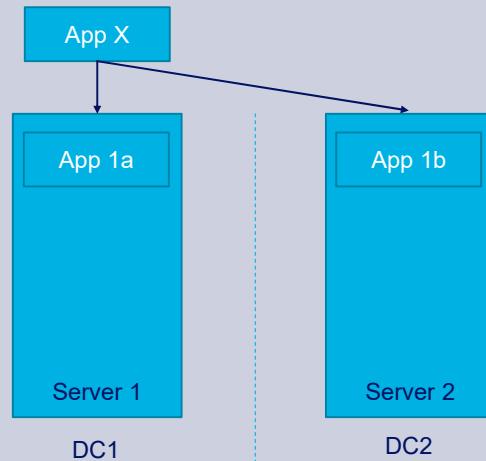
## Types of Disaster Recovery Setup



### Hot – Hot Setup

Also known as active-active setup.

- While this is the most expensive option (effectively running a duplicate of the production setup), it is the best for recovery.
- Usually flow is split 50% to each site, and in the event you have an issue with one site you can switch all new flow immediately to the secondary.
- Best for real time processing applications



The question is how do you recover flow that is in flight ? This is one of the biggest challenges in a disaster recovery scenario.

When recovering from an outage remember that you want to ensure new business is fine and then recover impacted flow hit by the issue.

## Disaster Recovery Testing



### Why do we test?

It is important to test your disaster recovery solutions regularly – ensuring the solution works as well as the support teams being familiar with the process.

A company will usually test their DR solution for each datacenter once a year. Applications will have a disaster recovery plan – this will have specific tasks defined in it for all teams that need to be involved.

An application will also have a RTO (Recovery Time Objective) – the time limit the application is expected to be up and running in the alternate site.

Tests usually occur outside of business hours – usually on a weekend. A disaster will be simulated and a full site recovery tested.

Some applications will run from the alternate datacenter for multiple weeks to prove that it works as a solution.

Production support and development teams will need to be fully involved in the DR planning and tests

Applications are measured on whether they can meet the RTO or not

## Cloud Disaster Recovery



Cloud computing is the on-demand delivery of computing services over the network (can be internal or external). These services are generally broken down as follows:

**IaaS (Infrastructure as a Service):** Allows you access to infrastructure components such as servers, storage and network.

**PaaS (Platform as a Service):** Allows you access to a computing platform for developing, testing and configuring software applications.

**SaaS (Software as a Service):** Allows access to software applications hosted on the cloud.

Being on the cloud allows you to scale up and down services as needed.

Some companies are looking at using an external cloud solution – although presents some challenges around data security and privacy

A lot of companies are working on building their own internal cloud solution

## Cloud Disaster Recovery



### Advantages of cloud computing with disaster recovery:

- You do not need to maintain a secondary site
- Easy scalability for on demand capacity needs
- Only “pay for” services you use
- Disaster recovery in a cloud environment usually only takes a matter of minutes
- You can store backed up data across multiple geographical locations (eliminates single point of failure)
- State of the art infrastructure

Some companies are looking at using an external cloud solution – although presents some challenges around data security and privacy

A lot of companies are working on building their own internal cloud solution

## Introduction to Finance

- Types of Banks
- Investment Banking Details



# Introduction to Finance



## Objectives

The objective of this course is to give you a good foundation in the finance industry and the various business lines that operate within a bank.

You should also understand various financial products that banks offer and that you may end up working with.

## Different types of banks



There are four main types of banks we will be covering in this course:

### Central Banks

Manage the money supply in a single country or series of nations. Set monetary policy goals.  
US: Federal Reserve; Europe: European Central Bank

### Retail Banks

Offer general public financial products and services such as bank accounts and loans.

### Universal Banks

Provide a wide variety of comprehensive financial services; tailored to retail, commercial and investment services.  
E.g., Deutsche Bank, Bank of America, HSBC

### Investment Banks

A financial intermediary that performs a variety of services. Specializing in large and complex financial transactions as well as acting as a broker or financial advisor for institutional clients.  
E.g., Goldman Sachs, Morgan Stanley

The central bank of the United States is the [Federal Reserve System](#), or “the Fed,” which Congress established with the [1913 Federal Reserve Act](#).

Read more: [Central](#)

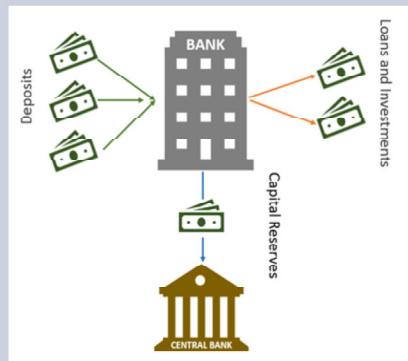
Bank <https://www.investopedia.com/terms/c/centralbank.asp#ixzz5GSAqJr67>

## A Bank: The Basics

As hard currency came into existence, so the bank was born, traditionally taking surplus cash from lenders and acting as a financial mediator to borrowers.

**Deposit:** a sum of money left with a bank

e.g. 3% paid by bank to depositor



**Loan:** a sum of money lent from a bank

e.g. 6% charged by the bank for a loan – the bank retains the 3% and usually invests in money markets

**Fractional Reserve:** banks assume that depositors will only want access to a fraction of their deposits at a time – the rest they will invest in money markets

Brainstorm: Do you see an issue with fractional reserve?

What happens when all customers try and pull their money from a bank? Bank's reserves may not be able to cover all of the requests for money.

## Interest Rates



### Interest

Can be defined as a fee for the use of money

### Interest Rate

A percentage of the loan or deposit that is charged as interest

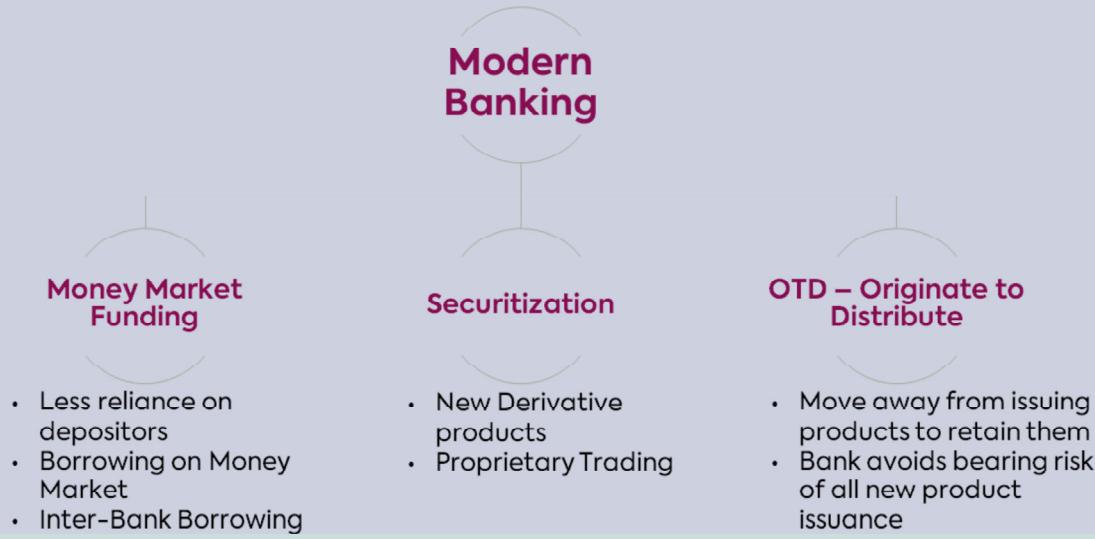
### APR

Annual percentage rate of interest

e.g. You borrow \$1000 at 6% for a year. After a year you must pay back \$1060.

1. Depositors receive interest for money saved with Banks.
2. Banks can use this money to lend to Borrowers.
3. Borrowers pay interest for money lent from a Bank.
4. Banks can use that loan interest to pay interest to Depositors.

## Evolution of Banking



Key aspects of Modern Banking that are a complete departure from the traditional banking model

Money market funding

Securitization

- Derivative products made out of bank's own assets or others' assets, purchased for securitization, like loans and mortgages. A contract for the cashflows from the underlying loans and mortgage repayments

Previously Originate to Hold – Bank's would underwrite the products they issued, like loans, bearing the risk of default OTD – no limit to the scale of distribution if you don't have to underwrite the risk

## 2008 Financial Crisis



Factors that led to the crisis:

Focus on short term profits

Proprietary interest over clients

New Regulatory Bodies

Ring Fencing

Return for risk taking

Inadequate risk assessment

Effect risk assessments

Transparent Markets

Junk debt traded in securities

Inadequate capital reserves

Stress resilient Capital Reserves

Ethics and culture

Who knows what happened in the crisis

## Retail Banking



Banking for individual consumers, they cover the following product types. Also known as chartered banks in Canada.

Current Accounts

Mortgages

Debit Cards

Savings Accounts

Personal Loans

Checks

Overdrafts

Payments

Money Transfers

Telephone Banking

Branches

Online Banking

## Banks – Monetary Policy



Retail banks can set their own rates for lending and borrowing money to their clients. The rate to lend between banks is usually set by the central bank.

**LIBOR:** Benchmark interest rate at which major global banks lend to one another in the international interbank market for short-term loans. (Rate is calculated and published each day by the Intercontinental Exchange – ICE).



What is a liquid asset? You can convert an asset into cash within a short amount of time – e.g. cash or shares etc.

## Central Banks – Interest and Inflation



**Interest Rates:** The percentage of principal charged by the lender for the use of its money.

**Inflation:** Quantitative measure of the rate at which the average price level of selected goods and services in an economy increases over time. It indicates a decrease in the purchasing power of a nation's currency.

The central banks will make changes to interest rates to have an impact on inflation. (They usually have a target of what inflation should be over a given time period.)



**Central Banks** = Banks for the Banks and State/Government

- Bank of England
- Federal Reserve System
- Bank of Canada
- European Central Bank
- Hong Kong Monetary Authority

**Functions**

- Holds Bank fractional reserves
- Banking services for the State and other Central Banks
- Bank Supervision
- Lender of Last Resort
- Money supply
- Monetary policy/Setting Interest Rates

## Quantitative Easing (QE)



- The Central Bank creates new money electronically – **Quantitative Easing (QE)**
- This money is used to purchase Government Bonds or other assets
- Increases bond prices, reduces yield and encourages/frees up money to be invested elsewhere, such as lending
- Increased lending supply, lowers the cost of borrowing
- Used when interest rates and inflation are very low and need boosting via spending

### *“Central Banks as a Safety Net”*

Quantitative Easing was first used in the UK in 2009.

The Objective of the Monetary Policy and Quantitative Easing is to meet the Government's 2% inflation target.

If inflation then looks too high, the BoE can then sell the assets they purchased to reduce the amount of money and spending in the economy.

There were news articles published last year that Canada may try Quantitative Easing since oil prices were falling so significantly and interest rates are already very low  
<https://www.bloomberg.com/news/articles/2016-01-19/meet-four-guys-betting-canada-is-due-for-quantitative-easing>

## Corporate Banking



Banking for different size businesses offering retail banking services plus:

**Multi-Bank Syndicated Loans**

Larger loans supported by a group of banks to spread the risk of the loan and raise the capital required, usually available at short notice, cheaper than a bond issue

**Foreign Exchange Facilities**

Providing competitive foreign exchange facilities including help with balance sheet analysis and hedging solutions and managing exposure and risk to FX movements

**Cash Management Services**

Movement of money between various accounts as needed

**Letters of Credit and Guarantees**

Assurance from the bank that an exporter will be paid after shipping goods

**Lines of Credit**

Business form of an overdraft but not set up as a negative balance on your account; the line of credit is set up on another account

Cash management services – you can use an example of Amazon here. Amazon needs to pay all of its marketplace sellers – so the customer pays Amazon – Amazon then needs a bank to move all that money to the marketplace sellers' accounts.

## Private Banking and Wealth Management



Banking for high net worth individuals with more than \$1 million of liquid assets.

Examples of such individuals:

- Entrepreneurs
- Executives
- Landowners
- Celebrities
- Royalty

In addition to retail services they also offer:

Advice and Management

Tax Planning

Personal Relationship

Investment Planning

Wealth Structuring

Discretion

What is a liquid asset? You can convert an asset into cash within a short amount of time – e.g., cash or shares, etc.

# Investment Banking



Who are clients of an investment bank?

## Professional Clients

- Assumed to be more informed investors and as such, are able to take more financial risks than other types of investor
- Have experience, knowledge and expertise to make their own investment decisions & risk assessment
- covered by less regulatory guarantees

## Institutional Investors

- Investment firms, pension funds, insurance firms, commodity dealers, hedge funds, asset managers, national and regional governments, sovereigns
- International and supranational institutions: World Bank, IMF, Central Banks

Institutional investors are investing money on behalf of their members

Investment Banking							 mthree	
		Timeframe: Year to date 2019	Display: Top Banks					Reset filters
Services include:	Top 10 Banks	Fees (\$m)	Changes in Fees vs. Prev Period*	% of Fees collected by product Year to Date 2019				
	JP Morgan	6,329.31	-9.51%	28	22	30	19	
	Goldman Sachs & Co	5,528.35	-13.98%	45	25	20	10	
	Bank of America Merrill Lynch	4,946.15	-1.86%	22	19	36	23	
	Morgan Stanley	4,830.35	-7.81%	36	27	28	8	
	Citi	4,341.65	-7.37%	25	19	36	19	
	Barclays	2,987.26	-6.25%	28	13	38	22	
	Credit Suisse	2,932.57	-12.09%	25	21	33	21	
	Deutsche Bank	2,223.38	-13.42%	24	12	42	22	
	Wells Fargo & Co	2,050.81	-4.22%	12	10	43	35	
Mizuho Financial Group		1,918.77	--	9	6	34	50	
<b>Total</b>		<b>98,487.26</b>	<b>-5.68%</b>	<b>28</b>	<b>17</b>	<b>32</b>	<b>22</b>	

Data from Jan 1 2019 - Dec 31 2019 and Jan 1 2018 - Dec 31 2018  
Data as of Dec 31 2019

After the Great Depression in America in the 1930s, banks had to either be commercial (corporate banks) or investment banks. If they were investment banks, they couldn't take deposits, but they could operate in market related activities. If they were corporate banks, they could take deposits but were restricted from market activities. (Glass-Steagall Act 1933, which was repealed in 1999)

Image source: <https://markets.ft.com/data/league-tables/tables-and-trends>

## IB – Research and Advisory



Research and advisory is often offered to clients free of charge to gain good will and encourage them to use other fee-based services.

### Buy/Sell/Hold Recommendations

Stock ratings; portfolio balancing; overweight/underweight on securities

### Financial Trends and Forecasting

Market trends and consumer trends

### Politics and Macro Economics

Information on major events and news, supply and demand

### Market Analysis

Technical analysis and market risk models

## IB – Financing and M+A



### Financing

Used when a client needs to raise capital:

- Advice
- Investor Introductions
- Syndicate Loans
- Bond and Securities Issuance
- Project Financing

### Mergers and Acquisitions

Very lucrative part of the IB business.

Why would you want to merge?

- Make money for shareholders (ideally)
- Economies of scale, especially in areas such as research and development
- Gaining larger market share
- Better competition against other firms

e.g., Bank of New York and Mellon Financial Corporation combined to form BNY Mellon.

Syndicate Loans – a group of people supporting a single loan –i.e. banks, hedge funds, pension funds (spreads risk for lenders and allows them to take part in an investment opportunity that would be too big for them on their own)

(distinct from multi-bank syndicated loans that a corporate bank would offer, due to different types of investors supporting the loan).

Bonds and Securities issuances – IPOs and new bond issuance

Investment banks also support:

- Corporate Restructuring
- Selling off subsidiaries

These are all corporate actions.

## Capital Markets



Investment banks facilitate the operation of the capital markets alongside exchanges, brokers, interdealer brokers and market data providers.

Markets have generally moved on from open out-cry trading, which has been replaced by electronic trading.

We split the markets into primary and secondary:



Quiz: what is the difference between a security and a share?

Securities are financial instruments that are exchanged among the investors **in the** forms of debt, equity or an agreement for a specific return value for the principal **is** decided. **Shares** are identified as a type of **security** that aims to raise funds for the corporations from the market.

## Secondary Market Services



### Brokerage - Brokers



### Market Making - Dealers



# Investment Banking



## Risks – Diversification

**Diversification:** A risk management strategy that mixes investments within a portfolio – this limits exposure to one type of asset.

All investments involve some level of risk.

**Operational Risk**

System, people and process failures

**Market Risk**

Loss due to market volatility

**Credit Risk**

Defaults leading to financial loss

Financial and  
Reputational  
Damage

What do we mean by exposure here?

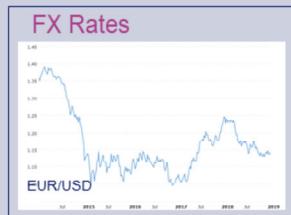
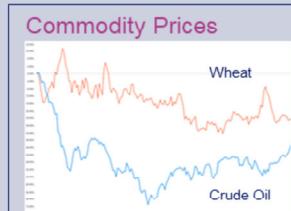
Talk through risk appetite with the group and their own risk appetites – investors have these as well as banks

## Market Risk



These are four standard market risk factors:

- Prices rising and falling due to market sentiment
- The risk that movements in prices lead to losses
- Hedging to mitigate against market risk



# Investment Banking



Investment banks are usually split up into front office, middle office and back office functions.

## Front Office

**Client-Facing:** Interact with clients; build relationships  
**Revenue-Generating:** Sell research, advise, brokerage

## Middle Office

**Support:** Support front office functions  
**Validation:** Verifying front office transactions

## Back Office

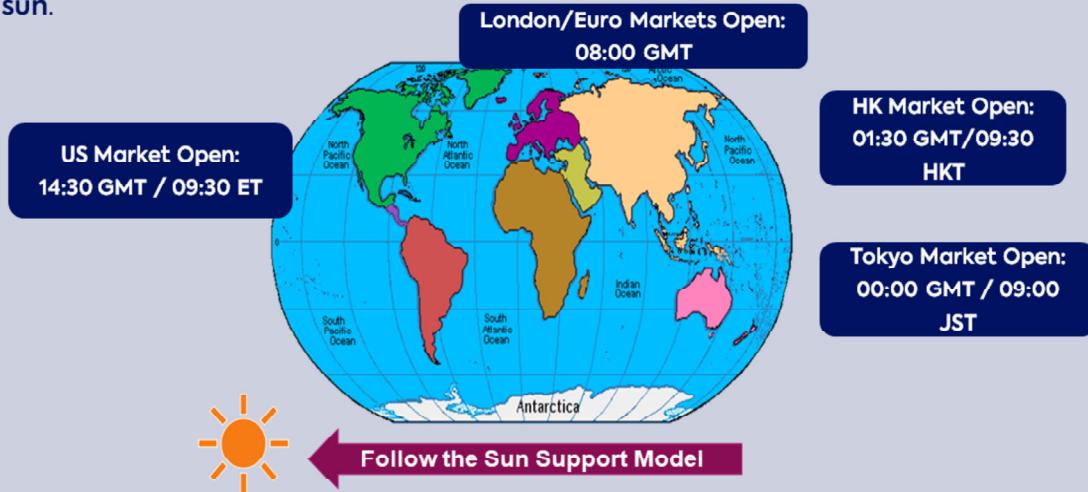
**Settlement:** Daily trades are netted/paid and received  
**Custody:** Register new product owners  
**Regulatory Reporting**  
**Accounting:** Financial reporting

What is netting? Offset a position in one security with another – e.g., bought 100 shares of Apple and sold 50 in two different transactions – left with 50

## The 24 hour banking day



Depending on the business area the bank applications could be being used through 24 hours and potentially 7 days a week (think online banking). This introduces **follow the sun**.



This generally refers to the stock markets. Daylight savings can have some impact to this.

<https://www.stockmarketclock.com/>

## Front Office Trading



Front office trading can be divided into proprietary trading, brokerage and research areas. There are rules around what interactions these areas can have and they are generally separated by Chinese walls.



Proprietary Trading



Brokerage



Research

### Buy Side

Prop trading occurs when a trader trades stocks, bonds, currencies, commodities, derivatives or any other financial instruments with the firm's own money (nostro account)

### Sell Side

The sell side is involved in creation, promotion and sale of stocks, bonds, fx and other financial instruments.  
Investment bankers serve as intermediaries between security issuers and investing public and the market makers who provide liquidity in the market.

Examples of buy-side people: e.g. hedge funds, pension funds – most banks have a prop desk.

## Types of Asset Classes



There are multiple types of asset classes that investment banks deal in.

### Equities

Shareholders equity: represents the amount of money that would be returned if all assets of the company were liquidated.

### Fixed Income

An investment that provides a return in the form of fixed periodic interest payments and eventual return of principle at maturity

### Cash and Money Markets

Trade in short term debt – relatively low rate of return but considered low risk

### Foreign Exchange (FX)

The trading of currencies

### Commodities

Tradable commodities consist of basic goods used in commerce; e.g., energy. Usually executed through future contracts that standardize quantity and quality

### Real Estate

Property made up of land as well as anything on it; e.g., buildings, natural resources and animals

Other examples of commodities – metal or animals

### Equity Trading

- What is equity trading?
- Shares
- Types of equity trading
- Orderbooks
- Trading – algos and SOR
- HFT and market making



# Equity Trading



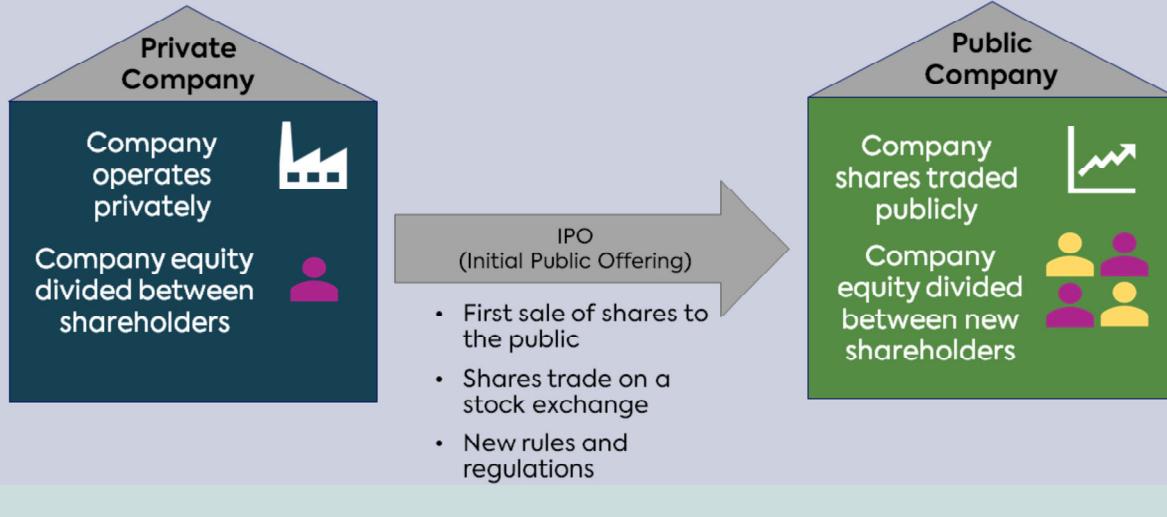
## Objectives

The objective of this course is to give you a good foundation in the equity trading business.

Brainstorm: what is equity trading?

## Equity Trading

### Company Equity and Shareholders



#### Reasons for an IPO

- Raising Capital / Liquidity
- Exiting venture capitalist
- Attracting top talent – they get stock options
- Company status / founder pride.

With a publicly traded company, if you have the cash, you can invest in it.

## Equity Securities: Market Cap



A company's worth, or its total market value is called its market capitalization – or **Market Cap**

Outstanding shares



Stock Price



Market Cap

- **Outstanding Shares:** Shares issued by a public company and are freely available to be bought by anyone
- **Restricted Stock:** Shares that can only be traded under SEC regulations
- **Floating Stock:** Shares currently available to trade

The Market Cap is publicly available information. Companies are ranked in size – large cap, mid cap, small cap.

SEC: Securities and exchange commission

Exercise: look up the market cap for Apple and google and Morgan Stanley

## Dividends



Investors invest in equities for two main reasons:

- The capital value – share price
- The dividend value – income

Dividends are typically paid twice a year – a way of distributing company profits to shareholders. These can be cash payments, stocks or other assets and is taxable income.

Apple issued \$0.77 dividend on February 13 2020 –  
If you owned 500 shares you would have received \$385

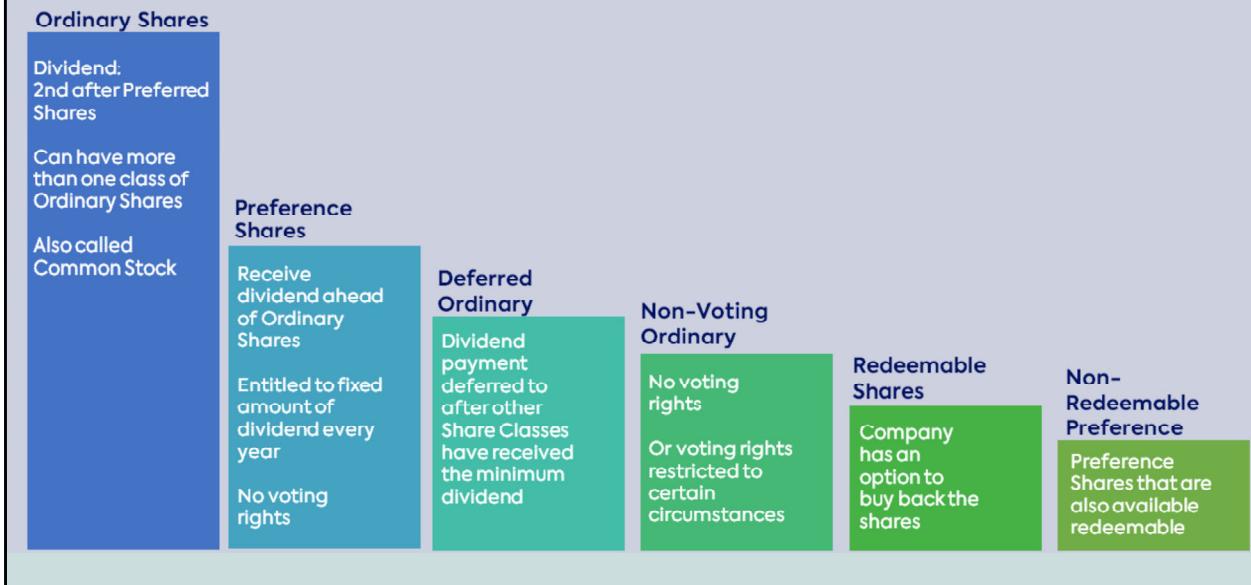
### Why pay dividends?

If a company has 1000 shares outstanding a share price of \$2 – its market cap is \$2000. If this company has \$10,000 in the bank then in theory it could be bought for \$2000 and liquidated giving an \$8000 profit to new owner. The company would prefer to give the \$8000 away as dividends.

Apple buys back shares for cash about once per month, then destroys them.

Why do they want to buy back shares? To make cash go away and slightly increase the price. The market knows this will happen every so often, it's already built into the price.

## Share Classes



A Company's Articles of Association sets out the different share classes it has. These are some of the types of share class available. Most shares issued will be ordinary shares.

Usually the different share classes are based around to entitlements to the following:

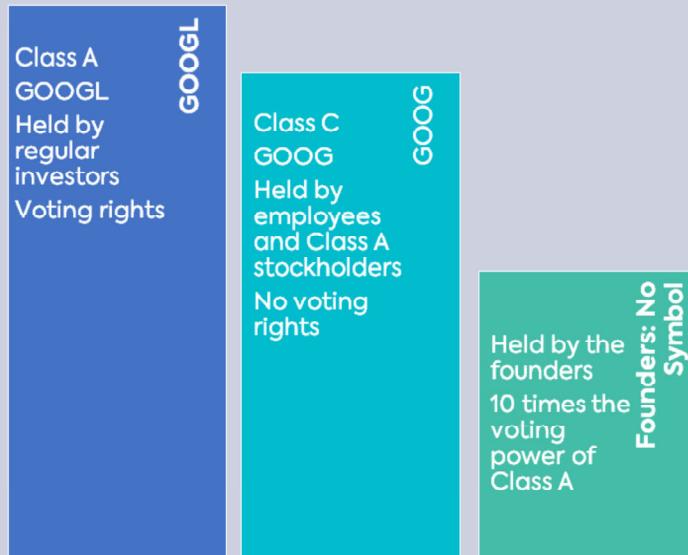
1. Dividends
2. Capital on winding up
3. Voting rights (decision making)

Multiple Ordinary Share Classes provides flexibility to pay different dividends and voting capacity to different shareholders

Redeemable shares – the company will buy back the shares at a future date. Can be fixed or not fixed date. Redemption price is often the same as the issue price but doesn't have to be.

Not to scale but the sizes represent the number of each class issued. Ordinary shares are much more numerous. Ordinary shares are interesting because they are most likely to be part of an M3 Alumni's day-to-day work.

## Share Classes: Google



Google has three types:

*Class A* — Held by regular investor with regular voting rights (GOOGL).

*Class B* — Held by the founders and has 10 times the voting power compared to Class A.

*Class C* — No voting rights, normally held by employees and Class A stockholders (GOOG).

Read more: [GOOG vs. GOOGL: Alphabet's Stock Ticker Difference | Investopedia](#) <https://www.investopedia.com/ask/answers/052615/what's-difference-between-googles-goog-and-googl-stock-tickers.asp#ixzz5FUL38qNM>

**Question:** Why do Google's founders shares have 10 times more voting rights, why not just create more shares?

**Rabi's suggestion:** Keeps the founders in control. Rather than making more shares, which can be given away, or sold, it might be a better strategic move to

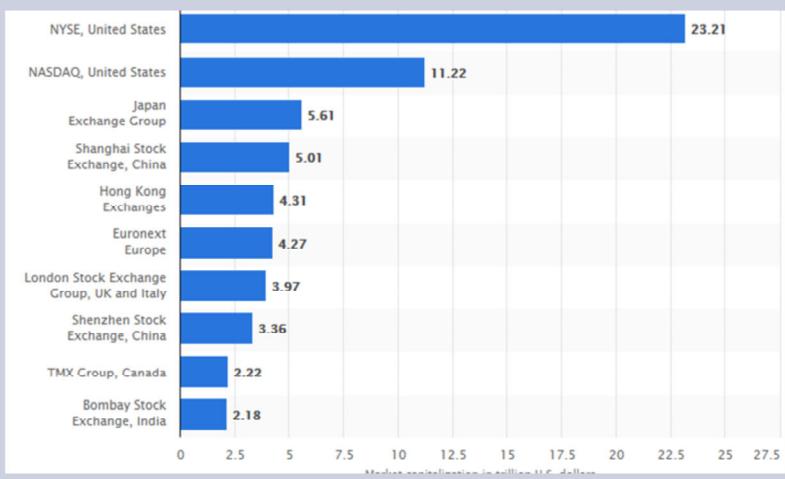
concentrate more power into fewer shares so if someone does decide to sell out, they have to give up a significant chunk of their voting rights along with it.

## Stock Exchanges



Stock exchanges are electronic marketplaces for trading of shares.

- Stocks are listed on one domestic exchange only (but can be listed at other venues).
- Companies pay a listing fee plus annual fees.
- **NYSE:** New York Stock Exchange – physical exchange, auction market
- **Nasdaq:** Totally electronic, greater daily traded share volume



Picture from Statista

# The fundamentals of Trading



Buy Low and Sell high is one of the most famous sayings about making money in stock markets

BUY LOW

SELL HIGH

The price of stocks follow a consistent pattern around business cycle and sentiment.

Times of maximum fear are good times to buy, times of maximum business greed, the time to sell.

BULL MARKET

Condition of the market in which prices are rising or expected to rise  
– optimistic times of economic growth

BEAR MARKET

Condition of the market in which prices are falling or expected to fall  
– times typically shrouded in pessimism

## Why invest?



Why would you invest in equity?

Regular Income

Capital Growth

Long Term Investment

High Liquidity

Transparent  
Marketplace

Ownership Voting  
Rights

Equities is the 'plural' of shares, which is a collection of shares in the same company.

Having stocks indicates you have shares in more than one company.

Annual income – regular dividends

Capital Growth – hopefully share price will rise over time

Long term investment – ride out the highs and lows of the market

Transparent market place – on exchange trading

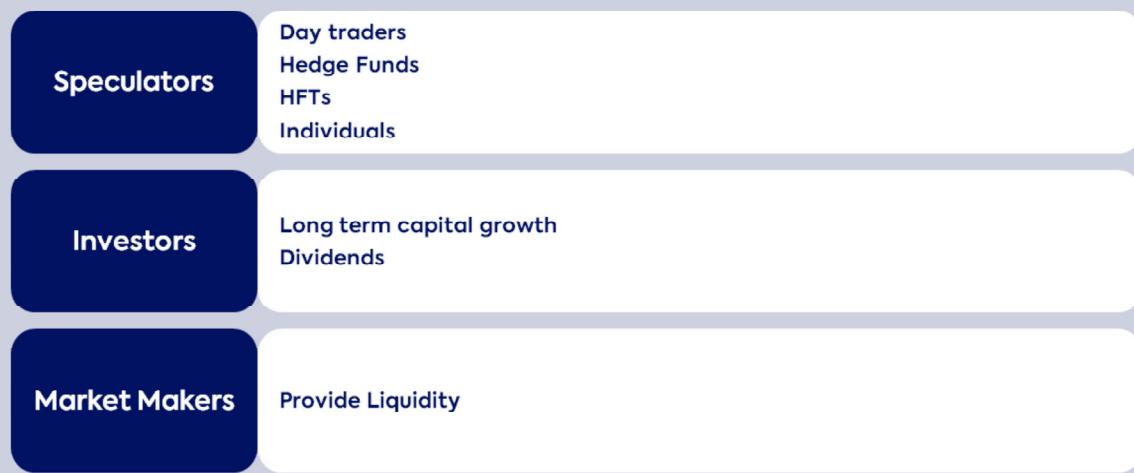
High liquidity – stock is available to buy and sell when you want to get in/out

Plus, limited liability – you're only exposed by the amount you've invested – not for more than that, unlike some high risk securities

## Market Participants



There are multiple people who participate in equity markets.



We will go through some of these concepts more later in the course

We will also cover rules around speculation (regulation called the Volcker rule).

A day trader buys and sells stocks, ending the trading day with cash, and no stocks (known as open positions).

## Snapchat IPO Case Study



1<sup>st</sup> March 2017  
Day before the IPO

- Stock priced at \$17 a share
- Values Snap at \$24bn
- Controversially shares have no voting rights
- Snap has great revenue growth but not yet profitable

2<sup>nd</sup> March 2017  
Day of the IPO

- Price soars to \$26.05
- Stock closes at \$24.48 – 44% up
- Values Snap at \$34.56bn

3<sup>rd</sup> March 2017  
Day after the IPO

- FT: 'Snap IPO is the foolish leading the blind'
- Fortune: 'Here's how Snap's IPO just proved we're in a tech bubble'
- CityAm: 'Hold off on criticizing...it may be a Facebook, rather than a Twitter'

## Exercise



What is the current share price of:

1. Snapchat
2. Facebook
3. Twitter

For each of the above – compare their IPO price and their previous close price



Tickers:

FB

SNAP

TWTR

## A Market Index



A market index is a hypothetical portfolio of investment holdings which represents a segment of the financial market.

Aggregated price of a number of securities

Trend Indicator

Performance Benchmarks

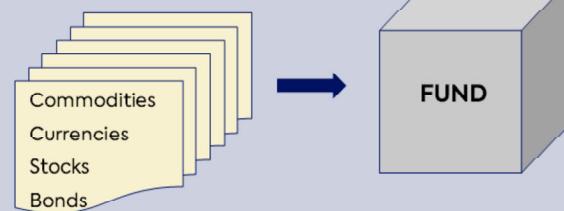
### FTSE 100 Index

FTSE:FSI

PRICE (GBP) TODAY'S CHANGE SHARES TRADED 1 YEAR CHANGE 52 WEEK RANGE  
7,007.97 **▲ 39.12 / 0.56%** 168.74m **▼ -6.44%** 6,536.53 - 7,903.50  
Data delayed at least 15 minutes, as of Feb 01 2019 11:25 GMT.

### Sample of Constituents in FTSE100 Index

Code	Name	Cur	Price
ADM	ADMIRAL GRP	GBX	1,865.00
AAL	ANGLO AMERICAN	GBX	1,339.50
ANTO	ANTOFAGASTA	GBX	858.00
AHT	ASHTEAD GRP.	GBX	1,716.00
AZN	ASTRAZENECA	GBX	4,569.50
AV.	AVIVA	GBX	504.50
BAB	BABCOCK INTL	GBX	899.50
BA.	BAE SVS.	GBX	609.50
BARC	BARCLAYS	GBX	235.50



### ETF Funds:

Collection of securities which are bundled into a single financial product and traded just like stocks

## Example Indexes



Ticker	Provider	Locality	Filter	Size Limit	Weighting
NDQ	Nasdaq	National	Equities (non financial companies)	100 (largest companies)	Adjusted Market Cap
NDXE	Nasdaq	National	Equities (non financial companies)	100 (largest companies)	Market Cap (Equal)
MID	S&P	National	Mid Cap (derived from Dow Jones)	400	
OMXS30	Nasdaq	National (Stockholm)		30 most traded companies	Market Cap
DRG	Nasdaq	Global	Pharmaceutical	All companies larger than \$75m	Market Cap

ndx            6,541.04        100 largest non financial listed on NASDAQ including international rebalance annually unless company drops out of top 125 in which case replaced, sometimes rebalance quarterly

ndxe            3,462.96        equally weighted version of NDX

ndx - sum(market caps[capped])%index divisor  
if (1) is >24% then all >4.5% scaled towards 1% proportionally, and many other such rules  
<https://www.slickcharts.com/nasdaq100>

price return normal  
total return normal+dividends reinvested since 1999 - which makes dividend paying companies bigger  
net return div70% since 2011

[https://indexes.nasdaqomx.com/docs/Methodology\\_NDX.pdf](https://indexes.nasdaqomx.com/docs/Methodology_NDX.pdf)  
[https://indexes.nasdaqomx.com/docs/methodology\\_NDXE.pdf](https://indexes.nasdaqomx.com/docs/methodology_NDXE.pdf)

ndxe - equally weighted is sum(market caps)%index divisor

total return - dividends are assumed to be reinvested thus more accurately representing:

- companies with dividends
  - companies with share buybacks/which reinvest profits
- [http://www.investopedia.com/terms/t/total\\_return\\_index.asp](http://www.investopedia.com/terms/t/total_return_index.asp)  
<https://www.msci.com/documents/1296102/1359536/MSCI+Index+Definitions+2015.pdf/6bf1625d-f592-42bf-b5f9-ab47ef0ac815>

[https://en.wikipedia.org/wiki/Stock\\_market\\_index](https://en.wikipedia.org/wiki/Stock_market_index)  
<http://www.investopedia.com/terms/i/index.asp>

## American Depository Receipts (ADRs)



ADRs are a way of investing in a foreign company on a US stock exchange.  
It is a certificate issued by a US bank representing shares in a foreign stock.  
An ADR can be one share or multiple shares.  
Averts currency exchange issues: dividends will be converted into US dollars.



DRs (for American stocks) and ADRs (for foreign stocks) both allow packaging of multiple shares into a single unit. Shares in the US tend to trade in the \$100 region whereas shares in the UK trade in the \$/£1 region, and rather than changing the minimum share price rules on exchanges, they bundle the shares. E.g., 1 unit of HSBC ADR might be 12 common shares. These are fungible, so you can buy a HSBC ADR in dollars and then sell 6 HSBC shares on London in £ and 6 in Europe in Euros.

## Exercise: Market Crashes



Stock markets are built on the confidence of the inherent value of stocks

For each crash:

- What happened?
- What was the underlying cause?



Prep 15mins

Presentation 2-3 mins

Groups of 3

What happened?

What was the underlying cause?

## Circuit Breakers



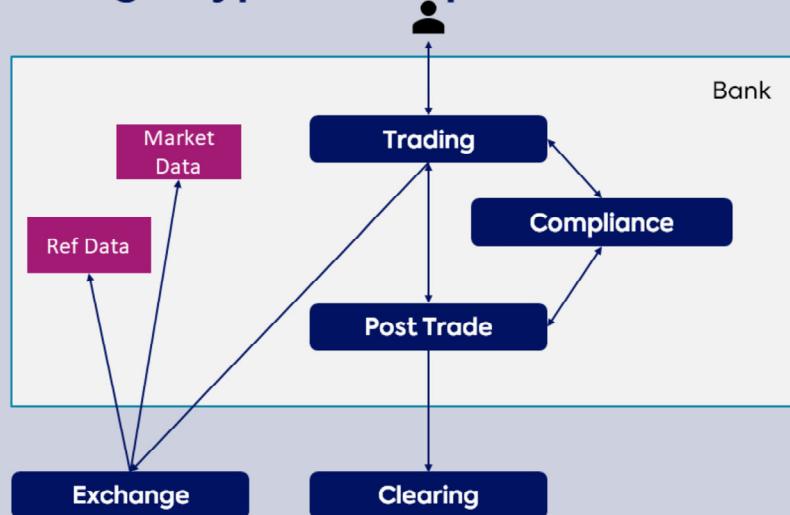
First put in place after Black Monday in 1987, circuit breakers are measures used to curb panic selling on US Stock exchanges.

These circuit breakers have been updated over the years to apply to both individual securities and market indices

- For individual securities (can include ETFs), circuit breakers can be triggered if the price increases or decreases
- For indices:
  - level 1 circuit breakers – a 7% decline in the S&P 500 index from the previous closing price
  - Level 2 circuit breakers – a drop of 13%
  - Level 3 circuit breakers – a drop of 20%
- For level 1 and 2 circuit breakers trading is halted for 15 mins (unless after 3.25pm when trading is allowed to continue)
- Level 3 halts trading for the remainder of the day

March 9<sup>th</sup> 2020 – circuit breakers were triggered at the NYSE as the Dow Jones industrial average fell 7% at the open after a 30% sell off in crude oil prices

## Sales and Trading – typical setup



Talk here about the things needed to trade (in pink) as well as the overall teams and groups that interact here as part of trading

## Data Categories



There are various types of data important to equity trading:

- Client
- Reference
  - Costs
  - Symbology
  - Trading Calendar
  - Index Constituents, Weightings, Rebalances
  - Fundamental data
  - Corporate Actions
- News
  - Positive/Negative
  - Analyst recommendations
- Order and Execution(fills, rejects, cancels)
- Market (trades, quotes)

**Expiries:** Triple witching is the quarterly expiration of stock options, index futures and index options on the same day – four times of year on the 3<sup>rd</sup> Friday of March, June, September and December

Rebalances are quarterly

M&A and Bankruptcy can cause non rebalance changes to constituents.

Triple witching is a big day in equities – can cause market volatility – talk about preparation – running calls to monitor, etc.

## Stock Identifiers



There are multiple ways to identify a stock (instrument). When instruments are traded electronically they can use the following identifiers:

### Instrument Code/ticker

The main identifier of an instrument; does not list where it is traded  
e.g. AAPL

### Sedol

Stock exchange daily official list – 7 characters  
e.g. B0YQ5W0

### RIC (Reuters Identity Code)

The Reuters-specific identity code: shows where the primary listing is  
e.g. AAPL.N

### ISIN

International securities identification number: 12 characters  
e.g. US0378331005

### Bloomberg ID

Bloomberg ID for an instrument  
e.g. AAPL:US

### CUSIP

Committee on uniform securities identification procedures  
e.g. 037833100

CUSIP is similar to ISIN and is typically used by Canada and US

ISIN may contain the sedol but doesn't always

## Types of Equity Trading



### Low Touch

Dealing with trading electronically (e-trading):

- On exchange trading
- High speed (low latency)
- Transparent
- Standardized
- Facilitates algorithmic trading, high frequency trading and direct market access

### High Touch

Can refer to traditional cash trading – verbal agreements

- OTC (over the counter) trading
- Agreement to make a trade – often verbally
- May take several days to settle
- Off exchange
- Flexible
- Facilitates complex deals

High touch trading can also refer to traders who talk to clients but will then execute their trades electronically on the exchange (maybe using the algos as well)

## A day in the life of trading



Traditional markets like NYSE have multiple phases. These are split up into auctions (open and close) and continuous trading.

### Opening Auction

- Orders can be entered as early as 7.30am EST (NYSE) – these are market on open (MOO) orders or limit on open (LOO)
- Reference price is the previous days closing price

### Continuous Trading

- Continuous trading on NYSE opens at 9.30am
- Orders are placed onto the orderbook throughout the day and matched on price

### Closing Auction

- Orders can be entered as early as 7.30am EST also – these are market on close (MOC) orders or limit on close (LOC)
- At 3.58pm EST orders can no longer be cancelled – market closes at 4.00pm

## Order Types



Here are some of the most common order types:

**Market**

Execute order regardless of price

**Limit**

Execute order at a specific price

**On Open**

Execute order in the opening auction

**On Close**

Execute order in the closing auction

**Hidden Limit**

A limit order where price and volume is not displayed

**Min Execution Size**

Hidden order that executes when the minimum volume is met

**IOC**

Immediate or Cancel – execute part or all of the order immediately else cancel

**FOK**

Fill or Kill –execute the full order immediately or not at all

## What is an orderbook?

This is an orderbook: it shows live what orders in a stock are active on an exchange .

- **Bid** – the maximum price a buyer is willing to pay for the stock
- **Ask** – the minimum price a seller is willing to sell their stock for
- **Spread** – the difference between the highest bid price and the lowest ask price
- **Consolidated order book** – there may be multiple buyers/sellers at each level of the order book and it is consolidated into one view
- **MPID** – market participant ID
- **BBO/NBBO** – best bid and offer (national best bid and offer)
- **Liquidity** – ease of converting security into cash

The screenshot shows the NASDAQ BookViewer interface for the stock GOOG. At the top, it displays the stock symbol 'GOOG' and the current price '576.53'. Below this, there are sections for 'Last Match' (10:58:01.135) and 'Today's Activity' (Orders: 57,513, Volume: 285,290). The main area is a grid titled 'BUY ORDERS' and 'SELL ORDERS'. The 'BUY ORDERS' section lists bids with columns for TIME, MPID, SHARES, BID, ASK, and MPID. The 'SELL ORDERS' section lists offers with columns for TIME, MPID, SHARES, BID, ASK, and MPID. The grid uses color coding for different market participants (MPID). At the bottom, there are links for '4512 More', '3357 More', and 'Show More', along with a note 'As of 10:58:01.504'.

NASDAQ® BOOKVIEWER								Export	Help				
GOOG		Last Match			Current stock: GOOG								
GET STOCK		10:58:01.135			Today's Activity								
Filter:	▼	Aggregate By:			Price	MPID							
BUY ORDERS				SELL ORDERS									
TIME	MPID	SHARES	BID	ASK	SHARES	MPID	TIME	MPID	TIME	MPID			
10:58:01.021	NSDQ	300	576.42	576.52	80	NSDQ	10:58:01.367						
9:30:13.227	CDRG	75	576.40	576.58	100	NSDQ	10:58:01.367						
10:45:38.954	UBSS	500	576.40	576.67	100	NSDQ	10:58:00.289						
10:58:00.901	NSDQ	10	576.37	576.73	100	TMRR	10:58:00.223						
10:58:00.899	NSDQ	10	576.36	576.74	100	NSDQ	10:58:01.369						
10:58:00.225	NSDQ	8	576.26	576.80	100	NSDQ	10:58:01.213						
9:30:13.227	CDRG	2	576.25	576.85	100	NSDQ	10:58:00.225						
9:37:01.074	AUTO	30	576.20	576.85	100	NSDQ	10:58:01.138						
10:56:18.648	NITE	100	576.20	576.86	100	NSDQ	10:57:40.157						
10:58:00.400	NSDQ	22	576.12	576.87	22	NSDQ	10:58:01.367						
10:58:00.175	NSDQ	22	576.10	576.88	8	NSDQ	10:58:01.368						
10:56:34.266	NSDQ	50	576.08	576.89	22	NSDQ	10:58:01.136						
10:58:01.136	NSDQ	22	576.08	576.90	10	NSDQ	10:58:01.369						
10:58:01.136	NSDQ	22	576.06	576.91	10	NSDQ	10:58:00.623						
10:57:13.883	NSDQ	100	576.05	576.91	22	NSDQ	10:58:01.137						
( 4512 More )				( 3357 More )			Show More						
As of 10:58:01.504													

Picture from Nasdaq

Orders: Ask=Sell      Bid=Buy  
Cancel

Spread=Best Ask - Best Bid

**mthree**

Type	Size	Price
Ask	1150	93.05
Ask	2205	93.04
Ask	300	93.03
Ask	7658	92.99
Spread=0.0 One sided book		
Bid	500	93.03
Bid	100	93.03
Bid	349	93.02
Bid	857	93.01
Bid	5136	93.00
Bid	5900	92.99

New Order

Best Ask

Best Ask

Trade 300 93.03

Trade 100 93.03

Trade 12342 92.99672

26

Order  
Ask, Bid  
Best  
Spread  
Animation

Orders: Ask=Sell      Bid=Buy  
Cancel

Spread=Best Ask - Best Bid

**mthree**

Type	Size	Price
Ask	1150	93.05
Ask	2205	93.04
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Ask	7658	92.99
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Bid	857	93.01
Bid	5136	93.00
Bid	5900	92.99

New Order

27

Order  
Ask, Bid  
Best  
Spread  
Animation

## Short and Long Positions



On the trading floor, you will often hear “I’m long this stock” or “I am shorting this name.”

### Long

- Taking a long position
- Buying shares with the expectation they will increase in value
- Maximum loss: the amount of money you invested
- Maximum gain: unlimited

### Short

- Short selling/Taking a short position
- Selling shares that you have borrowed with a contract in place (locate) that you will buy them back later – hopefully at a cheaper price!
- Maximum loss: unlimited

Lot of regulation around the ability to short sell

## Basis Points and Ticks



You will frequently hear the words basis points and ticks while on a trading floor.

### Basis Points

Often referred to as BIPS

1 BIP is 1/100 of a % point

For example: an interest rate of 5% is 50 BIPs higher than a rate of 4.5%

100 BIPs is 1%

### Stock ticks

A tick is the smallest change in price valid for that stock

e.g. 1 cent tick (for USD); 1 pence tick (for GBP)

## **Listing on Multiple Venues**



Cross listing is listing common shares on a different exchange than the primary exchange (original stock exchange).

Firms may list on multiple exchanges to gain more of an overseas investment base. This also means the company can be traded across different hours of the day.

### **ATS: Alternate Trading System**

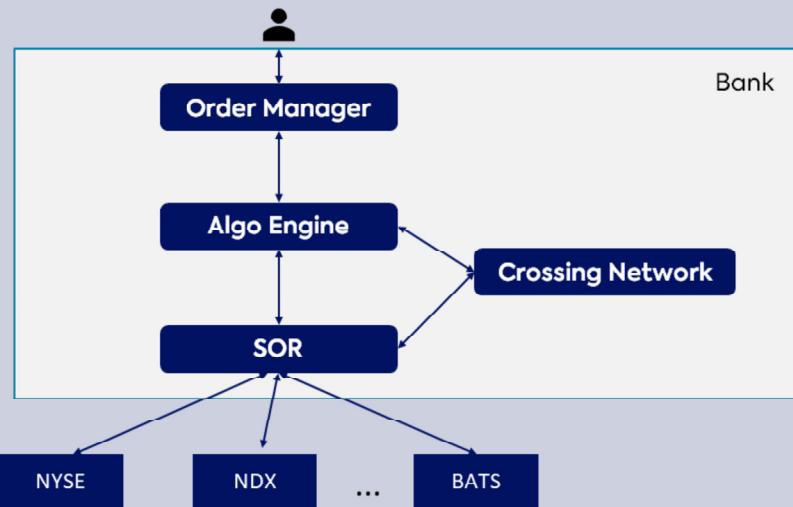
- A venue to match buy and sell orders but not regulated as an exchange
- Also known as multilateral trading facilities (Europe), electronic communication networks (ECNs) and cross networks
- Most are registered as broker dealers.
- Some ATS are **LIT** venues – the orderbook is visible to the public
- Some ATS are **Dark** venues (or dark pools) – there is no transparency here

To list on multiple venues, the company must meet all the regulations of each venue.

Examples of ATS: Turquoise

Example of dark pools: Instinet, Liquidnet, ITG Posit, Goldman Sachs's Sigma X, Morgan Stanley's MS Pool

## Typical electronic trading setups



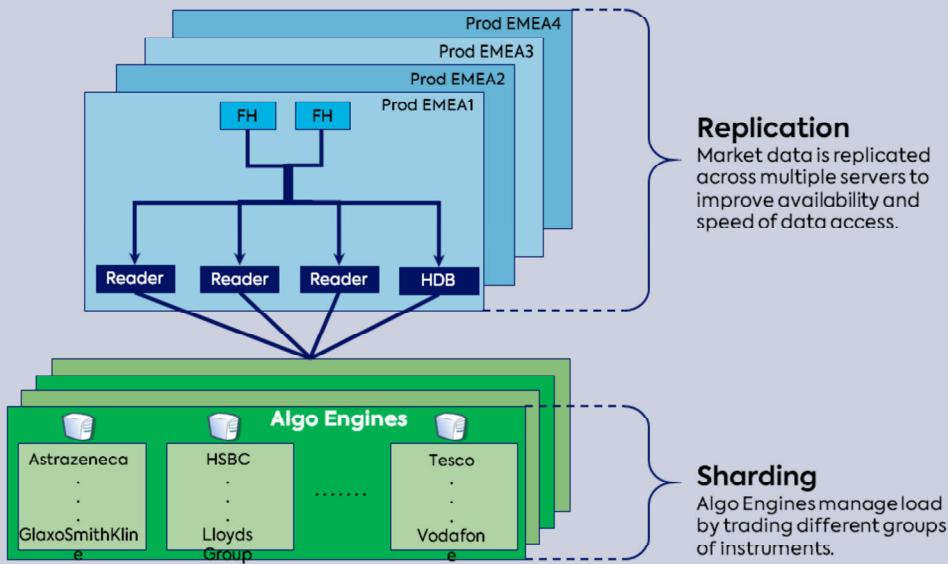
Talk through the example if you wanted to buy a million shares of AAPL over the day

If you put this on the order book everyone would see it – what would this do?

Each dark pool is required to release execution details to the consolidated tape after a delay

Additional reading Michael Lewis: *Flash Boys: A Wall Street Revolt*,

## Trading System – Load Balancing



## Algorithmic Trading



Algorithmic trading allows you to execute orders in a programmatic way around variables such as price, timing and volume. Below are some example of common strategies.

**VWAP**

**Volume Weighted Average Price** – use historical data to split an order to achieve average market price ( (number of shares bought \* share price) / total shares bought )

**TWAP**

**Time Weighted Average Price** e.g. split this order up evenly over the next two hours

**POV**

**Percentage of Volume** – take % of volume until done

**IS**

**Implementation Shortfall** – Trade more when the price is favorable, less when not

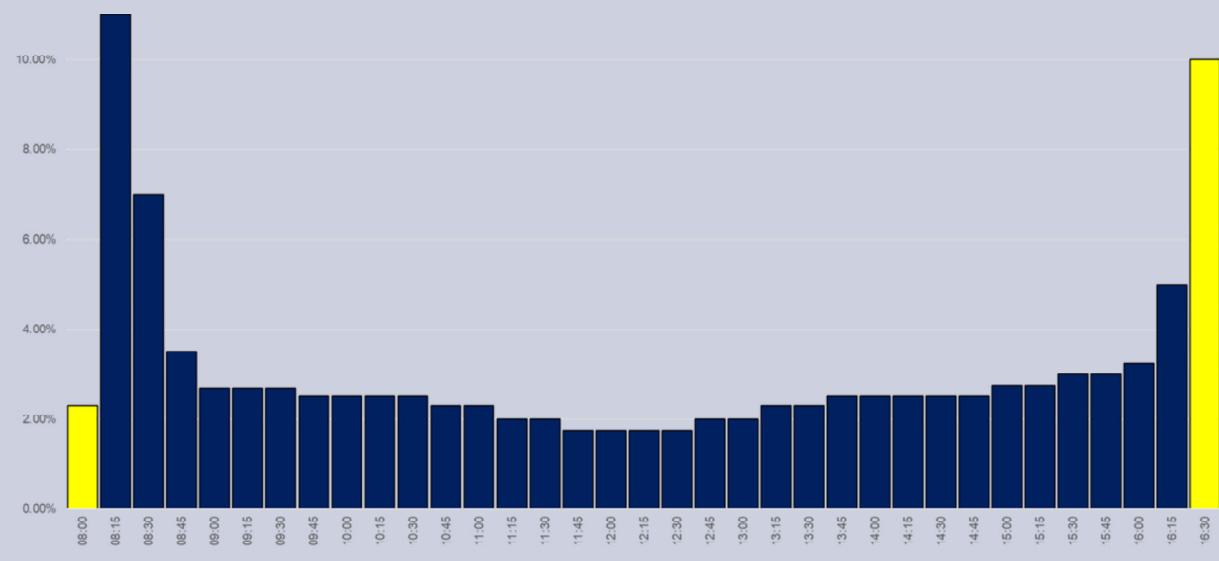
**Requirements:** Historical trading data as well as live market data to make decisions

Use the example of what you would do if you wanted to buy 1000 shares over the day but you didn't want to execute all at once.

### Benefits

- Instant and accurate order placement
- Reduced transaction costs
- Simultaneous checks on multiple market conditions

## Example VWAP Curve



Equity market participation is skewed towards start and end of day with low point over lunch. It's estimated that 70-75% of all volume is booked in the first and last hours of the market. (Investopedia)

Market makers do not hold much inventory over night:

- specific quantity to return to

## Dark Pools



A private exchange or forum for trading where the order book is not visible. Often also referred to as a crossing network. Most big trading companies will have their own dark pool.

- It costs money to trade on an exchange: if you have two separate traders at Morgan Stanley, one selling Apple and one buying Apple, why send to the exchange and pay a fee?
- An internal crossing network or dark pool allows you to trade (cross) with no fees.
- Banks have access to other companies' dark pools.
- Dark pools came about to facilitate placing large orders without impacting the market price.

Talk through the example if you wanted to buy a million shares of AAPL over the day

If you put this on the order book everyone would see it – what would this do?

Each dark pool is required to release execution details to the consolidated tape after a delay

Additional reading Michael Lewis: *Flash Boys: A Wall Street Revolt*,

## Smart Order Routing



Once an algo has decided it wants to trade a certain amount of shares, it will usually be sent to a smart order router (SOR) so that it can be sent to the exchange that has the best price for that stock at the time.

- Liquidity varies across multiple exchanges
- SOR will also consider dark pools – strategies will vary
- Aim to find the best price as quickly as possible
- Will have a consolidated orderbook feed via market data to know where to send the order

Talk about the ability to understand the price of a stock all at once and then making a decision on it. Can use a supermarket comparison or something like a flight search engine such as skyscanner

## HFT – High Frequency Trading



High frequency trading is an automated trading platform that allows for large numbers of orders to transact at extremely high speeds.

Uses Algorithms

High Speed

Low Latency

Orders are usually sent as limit orders and cancelled immediately if they do not trade.

Technology is constantly being analyzed to bring down the time it takes to make a trading decision and execute on the exchange (low latency trading).

### Co-location (Colos)

Some exchanges allow HFT firms to locate their servers directly next to the exchange servers for a high fee.

Colos – low latency access – limits the time spent on the wire

## Market Making



A lot of banks have a market making desk.

- Market makers trade principally (i.e., use the bank's own accounts) to enter and adjust quotes to buy, sell, execute and clear orders on an exchange.
- Primary goal is to profit on the bid-ask spread
- Aims to keep the financial markets liquid
- Market makers commit to continuously quote prices for a set of securities.

Market makers – i.e., “make the market”



mthree Alumni Training



## FIX Protocol

- FIX – Financial Information eXchange



ALUMNI  
BY MTHREE CONSULTING

## Objectives

This course will give you a high level overview of FIX protocol and how it is used in trading.

## FIX



**FIX – Financial Information eXchange** – an industry-driven messaging standard for exchange of trading-related information between financial institutions.

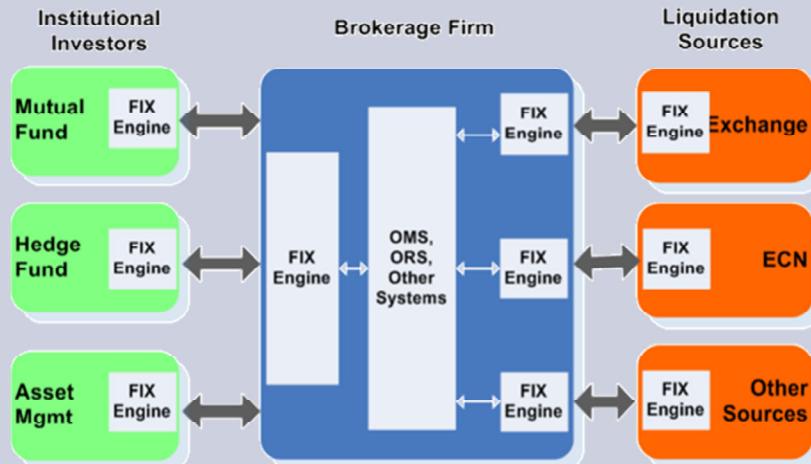
- Supports pre-trade, trade and post-trade messaging
- Used by financial institutions like broker-dealers, exchanges, institutional investors and others in industry to communicate with each other
- Platform independent – works with various types of computers and communication systems
- Open free protocol that can be used by anybody
- Flexible and can be customised

The FIX protocol website is the central point of reference and communication for all things FIX – [www.fixprotocol.org](http://www.fixprotocol.org)

# FIX



This is an example trading system to show how FIX is used.



As you can see from this picture, the usual setup is that a fix engine talks to another one within the flow

Internally systems will likely use fix protocol to communicate as well

Image source: <https://jeruliu.wordpress.com/2009/06/11/fix-protocol/>



## FIX Messages

A FIX message is divided up into three parts:

- **Header:** contains administrative information about the message – who sent the message, who the message is going to, what time it was sent.
- **Body:** contains the actual financial information – fields like Symbol, Shares, Price.
- **Trailer:** usually there is only one field set in here – the Checksum for the message – to ensure message integrity.

Message types can be session-level messages, i.e., negotiating a connection (login, logoff and resend requests) or application messages, i.e., financial messages (e.g. new trading order).

The FIX protocol itself specifies hundreds of different tags. In this case, the tags are different fields that could be in a message. In each message, you will see the tag number and value as a pair: e.g. , 55=AAPL; The tag number can be looked up in the FIX dictionary to see what it stands for. In this example, it is symbol.

Depending on the message type some tags are mandatory or optional.

<http://www.fixprotocol.org>

<http://www.fixglobal.com>

[https://en.wikipedia.org/wiki/Financial\\_Information\\_eXchange](https://en.wikipedia.org/wiki/Financial_Information_eXchange)

FIXimate *FIX Interactive Message And Tag Explorer*

<http://fiximate.fixtrading.org/index.html>

## FIX Message Header



Each administrative or application message is preceded by a standard header. The header identifies the message type, length, destination, sequence number, origination point and time.

- Who sent the message
- Who the message was sent to.
- Who was the trader that sent the message (if applicable)
- What version of FIX is being used in the message.
- What type of message type being sent
- Where the message is to be routed to (if applicable)

## FIX Session Layer Messages



Session level messages allow applications to establish and maintain connection with each other.  
Once a FIX connection is established, it will start sending the following messages:

### Logon (35=A)

Message authenticates a user establishing a connection to a remote system  
– must be the first message sent by the application to initiate a fix session

### Heartbeats (35=0) /Test Requests (35=1)

Keep alive messages used to detect if any network connectivity issues during slow message traffic periods

### Resend Requests (35=2)

Used to request missed messages after detecting a gap

### Sequence Reset (35=4)

Message is used to reset the incoming sequence number on the opposing side

### Reject (35=3)

Message indicating a serious error that maybe the result of faulty logic in either the sending or receiving application

### Logout (35=5)

Message to logout of session – nothing should be sent further unless a resent request comes in

## FIX Sequence Numbers



In tag 34, the FIX protocol also specifies the use of sequence numbers in the session layer for all FIX Messages.

- This is a unique identifier for each incoming and outgoing message.
- Used by the FIX engine to keep track of how many messages have come in and gone out (Incrementing number)
- In a normal day, the first message sent out by both sides will be sequence number 1
- Sequence numbers are unique for each connection and each incoming and outgoing message
- Resetting sequence numbers during the middle of the trading day can cause major issues and should only be done with care. (This will effectively wipe out knowledge of the whole day's worth of trading.)
- If a sequence number is missed, the counterparty sends a resend request asking for that data.



## FIX Message Body

The body of a FIX message contains the actual financial information that will be important to the receiver of the message. Important fields that would be in the body of a FIX Order message tags are:

- 55 = Symbol – Security Ticker
- 11 = ClOrdID – Client Order ID
- 38 = Order Quantity
- 40 = Order Type Limit\Market
- 44 = Price – This value would only be present on Limit Order indicated by tag 40
- 54 = Side – Buy\Sell
- 21 = Handle Instructions – Instructions for order handling on broker trading floor
- 59 = Time In Force – When the order will expire. Note: if this value is not present, it is assumed the order is for the day only.

### Optional Tags Security\Instrument Identification

22 = Security ID Source Main values used are [2 - SEDOL] [4 – ISIN Number] [5 – RIC Code]

48 = Security Identifier Value – Sample FIX Message 48=VOD.L & 22=5

100 & 207 = Used to determine which Exchange the order should be executed on i.e London Stock Exchange

## FIX Message Trailer



The trailer of a FIX message usually contains only one field – tag 10 the checksum.

The checksum in a FIX message provides a simple message integrity check. The checksum is the sum of all the binary values in them message. E.g. 10 = 193

Upon receiving a message, a FIX engine will compute the checksum of the message and make sure it matches the checksum in the actual message; this helps to identify transmission problems.

For transmission, the checksum must be sent as printable characters, so the checksum is transformed into three ASCII digits.

## How to connect a FIX session



There is a strict protocol followed to connect two FIX engines:

- The side that has agreed to initiate the connection (the Initiator) first makes a socket connection to the counterparty's FIX engine and then sends a FIX Logon message.
- Upon receiving that FIX Logon message, the Acceptor counterparty must acknowledge that FIX Logon message with its own FIX Logon acknowledgement message (ack).
- Once the ack has been received, the connection has been established and trading can begin.

8=FIX.4.2^9=0060^35=A^34=1^49=MS^56=UBS^52=2018031514:58:07^98=0^108=30^10=0015

MS ----->

8=FIX.4.2^9=0060^35=A^34=1^49=UBS^56=MS^52=20180315-14:58:08^98=0^108=30^10=0016

<----- UBS

Tag 49 – sender comp id

Tag 56 – target comp id

### HeartBtInt (tag 108)

The Logan message authenticates a user establishing a connection to a remote system as seen above

Must be the first message sent by the party requesting to initiate a FIX session

*HeartBtInt* (tag 108) field is used to declare the timeout interval (how long we are idle outbound) before a Heartbeat is sent.

Upon receipt of a Logan message, the session acceptor will authenticate the party requesting connection and issue a Logan message as acknowledgment

A heartbeat message is a simple way to know that there is a connection to a counterparty, and that the counterparty is still up and running

A heartbeat is sent at a pre-determined interval (normally every 30 seconds) and it is bi-directional (both sides send). It can be set at run-time in the Logan message.

## Message Type Codes



Message type (tag 35) is one of the most important fix tags used – not all of these maybe supported by financial institutions

Tag Code	Meaning	Tag Code	Meaning	Tag Code	Meaning
A	Logon	J	Allocation	4	Sequence Reset
B	News	K	List Cancel Request	5	Logout
C	Email	L	List Execute	6	Indication of Interest
D	New Order Single	M	List Status Request	7	Advertisement
E	New Order List	O	Heartbeat	8	Execution Report
F	Order Cancel Request	1	Test Request	9	Order Cancel Reject
G	Order Cancel/Replace Request	2	Resend Request		
H	Order Status Request	3	Reject		

## Example New Order Message



Here is an example new order fix message:

```
8=FIX4.2|9=0132|35=D|57=ADMIN|34=2|49=TESTA|56=TESTB|52=20100315-
13:45:28|55=BARC|40=2|38=1000|21=2|11=OrderNumber0|60=2010031517:45:20|5
4=1|44=110.5|10=9
```

FIX Logs	Tag Description
35=D	(MsgType = D / Order)
49=TESTA	(SenderCompID = TESTA)
56=TESTB	(TargetCompID = TESTB)
55=BARC	(Symbol = BARC)
40=2	(OrdType = 2 Limit)
38=2000	(OrderQty = 2000)
11=OrderNumber0	(ClOrdID = OrderNumberO)
44=110.5	(Price = 110.5)
54=1	(Side = 1 / Buy)

*The table shows required tags and their meaning*

## FIX Execution Reports



These are sent by the recipient (Broker\Exchange) who is managing your order

- Confirm the receipt of an order
- Confirm changes to an existing order (in response to order cancel request, etc.)
  - Relay order status information
  - Reject orders
  - Relay Fill (execution) information, etc.

Each execution report contains three fields which are used to communicate both the current state of the order as understood by the broker and the purpose of the message:

OrdStatus <39>, ExecType <150> and ExecTransType <20>.



## Execution Report Messages



Execution transaction type (tag 20) indicates the type of transaction:

Tag Code	Meaning
0	New order acknowledgement
1	Cancel previously reported execution due to error etc
2	Correction to the previously reported execution.
3	Reports the status of the orders



## Execution Type

ExecType (150) field describes the specific Execution Report (i.e., Pending Cancel) while Order Status <39>, will always identify the current order status (i.e., Partially Filled).

Tag Code	Meaning	Tag Code	Meaning
0	New	8	Rejected
1	Partial Fill	9	Suspended
2	Fill	A	Pending New
3	Done for Day	B	Calculated
4	Cancelled	C	Expired
5	Replace	D	Restated
6	Pending Cancel	E	Pending Replace
7	Stopped Set		

## Order Status



Identifies current status of order. **OrdStatus <39>** - sent by the counterparty on an acknowledgement message

Tag Code	Meaning	Tag Code	Meaning
0	New	8	Rejected
1	Partial Fill	9	Suspended
2	Filled	A	Pending New
3	Done for Day	B	Calculated
4	Cancelled	C	Expired
5	Replace	D	Accepted for
6	Pending Cancel	E	Pending Replace
7	Stopped Cancel/Replace Request		

## Execution Report – Other Values



**Order/D** (tag 37) – Unique identifier for this order as assigned by the Sell Side – this is how the sell side keeps track of the orders that it is executing

**Exec/D** (tag 17) – unique ID for each execution report. Note the difference between order ID – one order (with Order ID "Order1") might have multiple execution reports, each with own ExecID, but the same OrderID.

**LastShares** (tag 32) – the number of shares that were filled by this Execution Report

**LastPx** (tag 31) – the price at which the shares in this particular execution report were filled at

**AvgPx** (tag 6) – Calculated average price of all fills on this order.

**CumQty** (tag 14) – total number of shares filled by all execution reports at this point

**LeavesQty** (tag 151) – amount of shares available for further execution.

**Symbol, Side & OrderQty**, are used in the same manner as in the Order Message

In the execution reports sent back for the order, these fields must match the values that were in the original Order message



## Example FIX Messages



Order / Acknowledgement		Order Partially Filled		Order Filled	
FIX Logs	Tag Description	FIX Logs	Tag Description	FIX Logs	Tag Description
35=8	MsgType=8/Execution Report	39=1	OrdStatus=1/Partial Fill	39=2	OrdStatus=2/Fill
39=0	OrdStatus=0/New	150=1	ExecType=1/Partial Fill	150=2	ExecType=2/Fill
150=0	ExecType=0/New	20=0	ExecTransType=0/New	20=0	ExecTransType=0/New
20=0	ExecTransType=0/New	17=63187160	ExecID=63187160	17=63187161	ExecID=63187161
17=63187159	ExecID = 63187159	14=1000	CumQty=1000	14=2000	CumQty=2000
37=63089743	OrderID = 63089743	151=1000	LeavesQty=1000	151=0	LeavesQty=0
14=0	CumQty = 0	31=110.5	LastPx=110.5	31=110.375	LastPx=110.375
151=2000	LeavesQty = 2000	32=1000	LastShares=1000	32=1000	LastShares=1000
31=0.0	LastPx = 0.0	6=110.5	AvgPx=110.5	6=110.4375	AvgPx=110.4375
32=0	LastShares = 0				
6=0.0	AvgPx=0				

This does not include all the parts of the fix message.

## FIX Message Order Flow Example



### New Order to Buy 20 Shares in Vodafone limit Price 110

```
8=FIX.4.2^9=0138^35=D^57=CASH_DESK^34=2^49=MTHREE^56=UBS^52=20180318-
11:16:56^55=VOD^40=2^38=20^21=2^11=Order_M1^60=20180318-11:16:58^ 54=1^44=110^10=252
```

### Order Acknowledgment By Broker

```
8=FI X.4.2^9=0214^35=8^50=TRADER_ID^34=2^49=UBS^56=MTHREE^52=20180318-
11:17:00^151=20^55=VOD^40=2^11=Order_M1^31=0^150=0^39=0^54=1^44=110.5^32=0^
^17=6941651^38=20^21=3^60=20180318-11:17:00^6=0^20=0^14=0^37=Broker_ID^10=200
```

### Partial Fill of the Order Sent By Broker

```
8=FIX.4.2^9=0222^35=8^50=TRADER_ID^34=3^49=UBS^56=MTHREE^52=20180318-
11:33:11^151=10^55=VOD^40=2^11=Order_M1^31=110^150=1^39=1^54=1^44=110^32=10^31=110^
17=63187160^38=20^21=3^60=20180318-11:33^6=110^20=0^14=10^37= Broker_ID ^10=140
```

### Client Issuing Cancel Order Request to Broker

```
8=FIX.4.2^9=0141^35=F^57=CASH_DESK^34=3^49=MTHREE^56=UBS^52=20180318-11:40:02^41=
Order1^55=VOD^38=20^11=Order_M3_CANCEL^41 = Order_M1^60=20180318-11:40:03^54=1^10=052
```

To be Continued Next Slide.....

## FIX Message Order Flow Example



### Order Pending with Broker to be Cancelled

```
8=FIX.4.2^9=0230^35=8^50=TRADER_ID^34=4^49=MTHREE^56=UBS^52=20180318-
11:41:05^151=10^55=VOD^11=Order_M3_CANCEL^31=0^150=6^39=6^54=1^44=110^17=69416^32
=0
^41=Order_M1^38=20^60=20180318-11:41:05^6=0.0 20=0^14=10^37=Broker_ID ^10=025
```

### Broker Acknowledgment Accepted Order Cancelled

```
8=FIX.4.2^9=0221^35=8^50=TRADER_ID^34=4^49=UBS^56=MTHREE^52=20180318-
11:41:05^151=10^
55=VOD^11= Order_M3_CANCEL^31=0^150=4^39=4^54=1^17=69416^32=0^41=Order_M1^
38=20^60=20180318-11:41:05^6=0^20=0^14=10^37=Broker_ID ^10=124
```

## Order Cancel Reject (35=9)



The Order Cancel Reject <9> message is issued by the broker upon receipt of a cancel request or cancel/replace request message which cannot be honored.

Requests to change price or decrease quantity are executed only when an outstanding quantity exists.

Filled orders cannot be changed (i.e., quantity reduced or price change). However, the broker/sell side may support increasing the order quantity on a currently filled order).

When rejecting a Cancel/Replace Request, the Cancel Reject <3> message should provide the ClOrdID <11> and OrigClOrdID <41> values which were specified on the Cancel/Replace Request message for identification.

The execution message responds to accepted cancel request and cancel/replace request FIX messages.

## The Don't Know Trade Message (35=Q)



The Don't Know Trade <Q> (DK) message notifies a trading partner that an electronically received execution has been rejected. This message can be thought of as an execution Reject <3> message.

This message has special utility when dealing with one-way execution reporting. If the initial Order Acknowledgment message (LastShares <32>=0 and OrdStatus <39>=New) does not match an existing order, this message can be used to notify the broker of a potential problem order.

Note that the decision to DK an execution lies with the institution. Some of the mismatches listed in the DKReason <127> field may be acceptable and will not require a DK message to be generated.

Key FIX Tag ExecID <1/> to point out which Execution Report that the client has DK'd this would confirm which Partial fill they have not accepted or even the order.

Reason for execution rejection.

Valid values:

- A = Unknown symbol
- B = Wrong side
- C = Quantity exceeds order
- D = No matching order
- E = Price <44> exceeds limit
- Z = Other

## FIX – Reject Messages (35=3)



FIX provides a mechanism that allows a FIX engine to reject an invalid message. A message could be rejected for one of many possible reasons, including:

- The message is garbled or corrupted.
- The message does not pass the integrity check based upon the Checksum field in the trailer.
- A required field in the message is missing. (For example, if I received an Order with no Symbol field set.)
- A message with an improperly formatted field. (For example, if I received an Order with a Order Quantity field set with a non-numeric value.)

The text field tag 58 usually contains the reject reason.

## IOI – Indication of Interest (tag 6)



Indication of interest messages market merchandise which the broker is buying or selling in either a proprietary or agency capacity. These are usually time sensitive offers that are sent to a large number of clients; as such a response is needed quickly.

The key fix tags needed for an IOI include:

Tag Code	Value/Meaning	Tag Code	Value/Meaning
35	6	54	Side
27	IOIShares	55	Symbol
23	Unique identifier of IOI Message	28	IOITransType Values
N	New	C	Cancel
R	Replace		

## FIX Message IOI Example



Message indicates a buyer for a 200 shares of BNP Paribas SA

8=FIX.4.2^9=198^35=6^34=5^49=UBS^52=20181005-14:34:35^56=MTHREE^15=EUR^22=5^23=l15850

^27=100^28=N^44=15.5^48=BNPP.PA^54=1^55=BNP^62=20181005-15:04:35.677^107=BNP Paribas SA

^130=Y^10=036

### Response IOI - New Order Sent by Client

8=FIX.4.2^9=137^35=D^34=8^49=MTHREE^52=20181005- 14:35:46.672^56=UBS^11=1223217346597

^21=1^38=100^40=1^54=2^55=BNP ^59=0^60=20181005-14:35:46.668^10=153

### Order Acknowledgment

8=FIX.4.2^9=177^35=8^34=9^49=UBS^52=20181005-14:36:07^56=MTHREE^6=0

^11=1223217346597^14=0^17=E1223217367463^20=0^31=0^32=0^37=O1223217347023^38=100^39=0^54=2^55=B  
NP^150=0151=100^10 =164

### Completed Filled Order

8=FIX.4.2^9=189^35=8^34=11^49=UBS^52=20181005-14:36:43.201^56=MTHREE^6=15.5^

11=1223217346597^14=100^17=E12232173738^20=0^31=15.5^32=100^37=O1223217347023^

38=100^39=2^54=2^55=BNP^150 =2^151=0^10=237

In the example below, this message indicates a buyer for a 100 shares of BNP at the price of 15.50. “35=6” indicates that it is an IOI message. IOIShares (27) indicates that 200 shares are being advertised at a price specified in Price (44).

As you will see some other addition tags being sent which we have discussed on the previous slide 23=IOIid 28=New.

You will notice additional tag 130 this indicate hat IOI is the result of an existing agency order or a facilitation position resulting from an agency order, not from principal trading or order solicitation activity.

Valid values:

Y = Natural

N = Not natural

For this example the buy side responded by ordering 100 shares because they had an order for that quantity in their order book.

OrderQty (38) specifies the number of shares, Side (54) set to 2 implies that this is a sell transaction of the security specified by a ticker symbol in this case “IBM” in the Symbol (55) field. Separated by an exchange of Heartbeat (0) messages, there are 2 Execution Report (8) messages as indicated by the MsgType (35) field being set to “8”.

The first of these two is called an “acknowledgement” which simply indicates the receipt of the order. The status of an order can be tracked by the OrdStatus (39) field. An acknowledgement is achieved by setting the OrdStatus (39) field to “0” to indicate the order status of “New”.

The second Execution Report (8) fills the order as indicated by the OrdStatus (39) field being set to “2” to indicate the status as “Filled”. The price and the quantity of the fill are indicated in LastShares (32) and LastPx (31). In the above case 100 were sold at a price of 15.5 as originally advertised in the IOI.

## Useful Websites



[FIX Trading Community](#)

[Global Trading](#)

[Wikipedia: Financial Information eXchange](#)

[FIXimate FIX Interactive Message And Tag Explorer](#)

<http://www.fixprotocol.org>

<http://www.fixglobal.com>

[https://en.wikipedia.org/wiki/Financial\\_Information\\_eXchange](https://en.wikipedia.org/wiki/Financial_Information_eXchange)

FIXimate FIX Interactive Message And Tag Explorer

<http://fiximate.fixtrading.org/index.html>



**mthree Alumni Training**



## **Derivatives**



## Derivatives



### Objectives

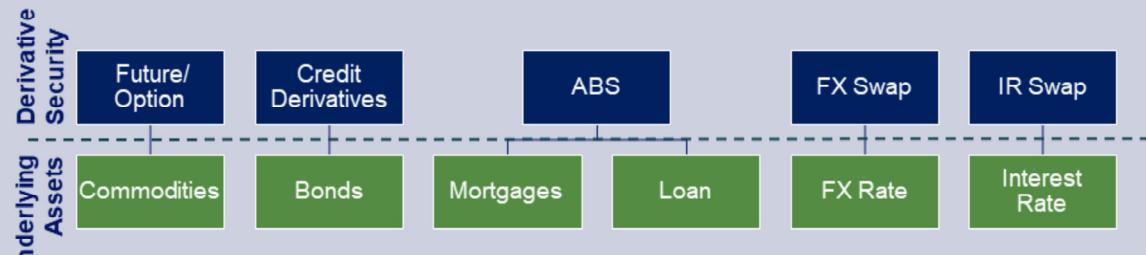
The objective of this course is to give you a good foundation in the derivatives trading business.

Brainstorm – what is derivative trading – answer on next page

## Derivatives Securities



Derivative securities are contracts whose value is based on the assets underlying the contract. These are traditionally the most complex of financial instruments.



ABS – asset-backed security

Used for hedging or speculation.

What Is hedging?

The best way to understand hedging is to think of it as insurance. When people decide to hedge, they are insuring themselves against a negative event. This doesn't prevent a negative event from happening, but if it does happen and you're properly hedged, the impact of the event is reduced.

Hedging occurs almost everywhere, and we see it everyday. For example, if you buy homeowner's insurance, you are hedging yourself against fires, break-ins or other unforeseen disasters.

Read more: [A Beginner's Guide To Hedging](https://www.investopedia.com/articles/basics/03/080103.asp) <https://www.investopedia.com/articles/basics/03/080103.asp>

Allow for the transference of risk from buyer of derivative to seller of the derivative

## Derivative Structure



Here are some of the terms you will likely hear when dealing with derivatives:

**Forward**

Agree to buy or sell something at a specific point of time in the future

**Future**

A forward that is traded on an exchange

**Swap**

An exchange of two things

**Options**

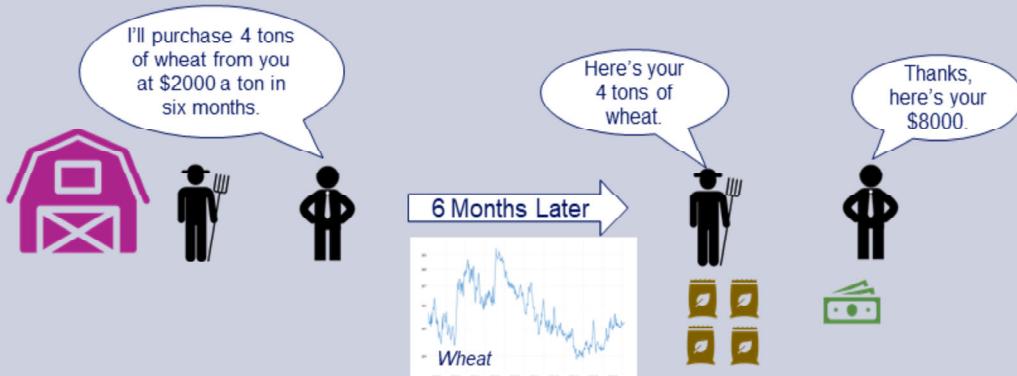
The right to buy/sell a security on an agreed future date at a pre-agreed price

**Warrant**

An option issued by the company itself and traded over the counter

Forwards are unregulated by the government – trade over the counter (OTC)

## Forwards



- Forwards are privately negotiated, sold over the counter and the terms are negotiable.
- The price is established at the inception of the contract.
- Higher risk than future as they do not use a central clearing house and so both sides are exposed to credit risk.
- Mainly used for hedging.

Mainly used for hedging to avoid the volatility risk of asset's price.

For example, a homeowner may decide to buy a forward contract on home heating oil that specifies a price. If the price of home heating oil rises, the homeowner is protected but might miss out on price drops.

## Futures



**Future:** a contract that commits to selling or purchasing a specific amount of assets, at a specific price, at a particular point in the future.

- Traded on exchanges
- Standard sizes
- Standard maturity dates
- Profits/losses settled each day

Chicago SRW Wheat Futures Contract	
Contract Unit	5000 bushels (~136 metric tons)
Price Quotation	Cents per bushel
Settlement Method	Cash
Termination	Bus. Day preceding 15 <sup>th</sup> of month
Currency	USD
Quotes	July 2017: 429 cents

Futures are highly standardized and are traded on exchanges such as CME, Euronext, London Metal Exchange (LME), ICE Futures Europe, Eurex.

Most exchanges clear their own trades and act as central counterparty.

Often bought by speculators betting on the price of the commodity or underlying asset rising or falling.

$$5000 \times 4.29 = \$21,450$$

Futures contracts are marked to market (what's the market price for this contract on exchange); the close price at the end of each day triggers the daily settlement of a buyer's profits or loss.

This means that the margin accounts of the buyer and seller will be adjusted by the difference in price from what the original contract price was compared to today's price.

If, in our example, the market price moves to 409 cents per bushel, the farmer has gained 20 cents per bushel because the buyer has committed to buying at a price that is higher than the market price, so his account would be credited by \$1000 (20 cents x 5000) and the buyer's account would be debited by \$1000.

Futures tend to settle in cash rather than with physical delivery. But if the parties on the contract still need to sell or buy the underlying goods, they can offset a loss on a future by selling at a higher price or buying at a cheaper price on the cash market for that asset.

## Options



**Option:** a contract for the option to purchase or sell a specific amount of assets. at a specific price, at a particular point in the future.

The option price is influenced by the underlying asset's market price, the length of the contract, the current volatility of the underlying asset, supply and demand, dividend rate of the underlying asset.

<http://www.nasdaq.com/investing/options-guide/pricing-options.aspx>

Wheat Option contracts on CME:

[http://www.cmegroup.com/trading/agricultural/grain-and-oilseed/wheat\\_quotes\\_settlements\\_options.html](http://www.cmegroup.com/trading/agricultural/grain-and-oilseed/wheat_quotes_settlements_options.html)



## Option Underliers

Options give you the right but not the ***obligation*** to buy or sell the underlying asset at a specified price in the future.

**Put option:** Buyer makes a profit if the price falls below the strike price before the expiration.

**Call option:** Buyer stands to make a profit if the underlying asset, such as a stock, rises above the strike price before expiry.

### FX Options:

Largest market for options, traded on exchange or OTC, underlying asset is currency

EUR/USD Put	
Call / Put	Put
Currency Pair	EUR/USD
Notional	€1,000,000
Strike price	EUR/USD 1.5
Expiration Date	December

### Equity/Stock Options:

The right to trade X number of share at a certain price

Put GOOGL \$976 Sep.	
Call / Put	Put
Symbol	GOOGL
# of Shares	100
Strike price	\$976
Expiration Date	September

<http://www.nasdaq.com/investing/options-guide/definition-of-options.aspx>

The currency option example is a call on USD and a put on EUR. Could also be represented as a USD/EUR call. In this illustration the put side sells and the call side buys.

### Example

(O) owns option to give (C) counterparty €1,000,000

in exchange (C) gives (O) \$1,500,000

A call option would be:

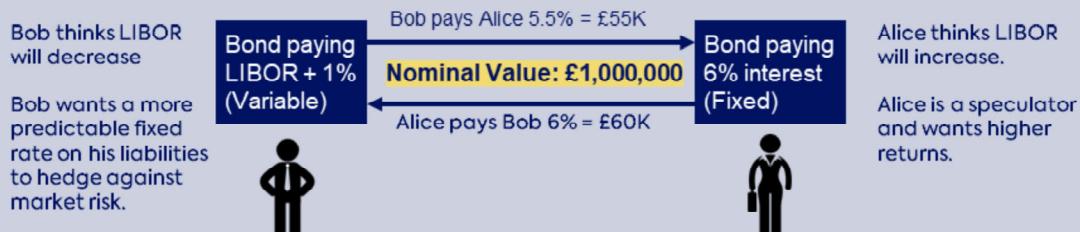
Notional \$1,500,000 Strike price EUR/USD 0.66

## Interest Rate Swaps (IRS)



**Swap:** a contract to exchange a series of cash flows at a specific point in the future based on a specific principal amount

- Assume that LIBOR is 5%, the contract is 1 million GBP.



- Rate goes down to 4.5%. Bob pays less and receives more.
- Zero-sum game. There is always a winner and a loser.

$$5000 \times 4.29 = \$21,450$$

Futures contracts are marked to market (what's the market price for this contract on exchange); the close price at the end of each day triggers the daily settlement of a buyer's profits or loss

This means that the margin accounts of the buyer and seller will be adjusted by the difference in price from what the original contract price was compared to today's price.

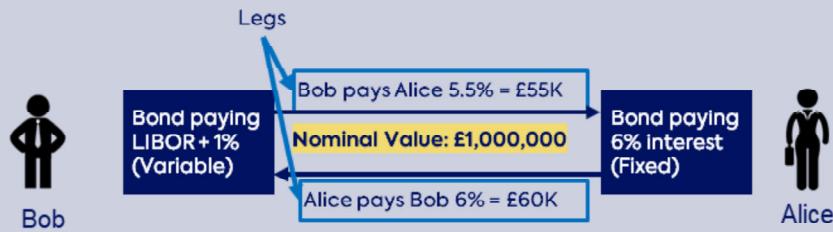
If, in our example, the market price moves to 409 cents per bushel, the farmer has gained 20 cents per bushel because the buyer has committed to buying at a price that is higher than the market price, so his account would be credited by \$1000 (20 cents x 5000) and the buyer's account would be debited by \$1000.

Futures tend to settle in cash rather than with physical delivery. But if the parties on the contract still need to sell or buy the underlying goods, they can offset a loss on a future by selling at a higher price or buying at a cheaper price on the cash market for that asset.

## Interest Rate Swap Legs



**Legs:** The cash flows exchanged in an interest rate swap are referred to as legs.



The two legs may be fixed or floating.

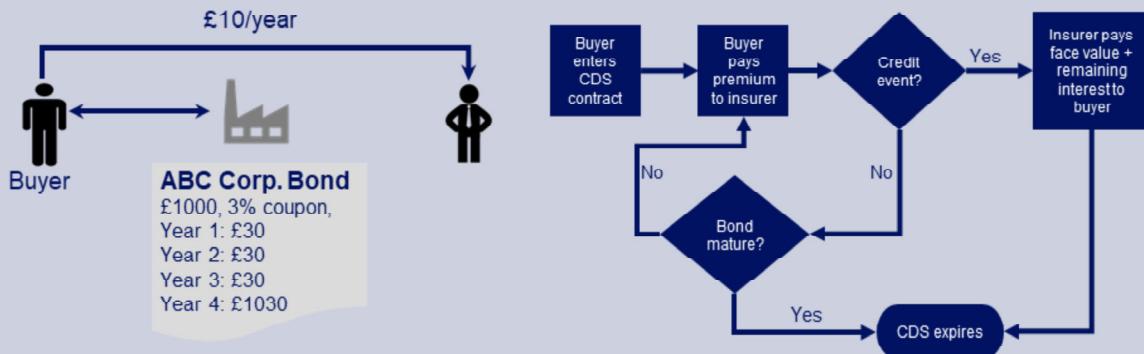
- **Fixed:** Pays a series of payments agreed at the outset of the contract
- **Floating:** Linked to the future level of interest rates
- **Vanilla swap:** where a floating interest rate is exchanged for a fixed rate or vice versa

Mostly traded OTC although some have to be traded on a SEF (swap execution facility trading venue)

## Credit Derivatives



**Credit Default Swap (CDS):** a contract to insure the credit risk of an underlying bond for an agreed fee over an agreed amount of time. Types: **Single name CDS; Basket CDS and Index CDS**



Most CDS will require an ongoing premium payment to maintain the contract

Example credit events are on the next slide

## Credit Events



The Credit Default Swap is triggered when the following events occur:

### Bankruptcy

The issuer becomes insolvent or unable to pay debts

### Failure to pay

The issuer becomes insolvent or unable to pay debts

### Debt restructuring

The configuration of the debt obligations is changed in a way that negatively affects the credit holder

### Obligation acceleration

Also known as obligation default: the debt payment is scheduled before their maturity date

### Repudiation/ Moratorium

The issuer refuses to pay the principle and interest amounts

ISDA (International Swaps and Derivatives Association) determines whether a credit event has taken place or not. It takes a lot to trigger a credit event :

<https://isda.derivativew.org/2011/11/08/the-first-rule-about-cds-read-the-contract/>

Greek debt crisis did trigger CDS payments – due to a Restructuring Credit Event:

<http://uk.reuters.com/article/us-greece-cds-isda-trigger-idUSBRE82817B20120309>

Russia – Repudiation in 1998 – it defaulted on its foreign debt, even after a bailout by the IMF.

<http://www.nytimes.com/2010/05/12/business/global/12iht-ruble.html>

<http://www.nytimes.com/1998/09/25/business/the-holders-of-russian-debt-begin-blocking-overseas-assets.html>

[https://en.wikipedia.org/wiki/1998\\_Russian\\_financial\\_crisis](https://en.wikipedia.org/wiki/1998_Russian_financial_crisis)

See: AIG Financial Crisis

## Swaptions



**Swaption:** a contract for the option to enter into a swap agreement at a specific price, at a particular point in the future. In exchange for an options premium, the buyer gains the right but not obligation to enter into a specified swap agreement with the issuer on a specified future date.



### Credit Default Swap Options: 'Swaptions'

These options are 'knocked out' if the underlying bonds default during the term of the option contract.

Types:

- On a single entity
- On a basket of entities
- On an index (CDX)

You can also have options on futures and on Interest Rate Swaps. Both of these are standardized and traded on exchanges (IRS Options on CME from 2016).

At the start, purple has bought a kind of second level agreement to optionally do a swap in the future, at a price agreed at the start.

## Mortgage-Backed Securities



**MBS:** Investment similar to a bond made up of a bundle of home loans bought from the banks that issued them. Investors receive periodic payments similar to bond coupon payments. Investors are purchasing the cash flow from the underlying mortgages – the monthly mortgage payments.

This leaves you open to the following risks:

Repayment defaults such as:

- Falling house prices
- Job loss
- Imprisonment
- Mental illness
- Bankruptcy

Falling interest rates

Rising interest rates

RMBS – Residential MBS



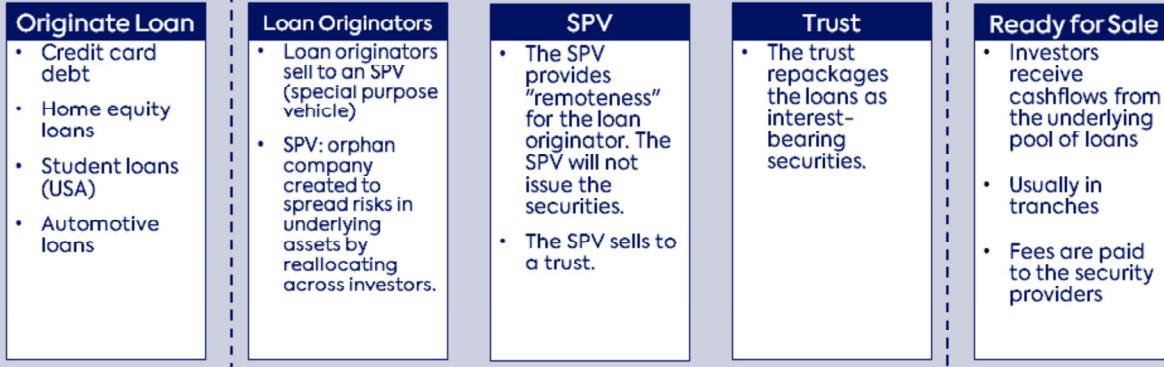
CMBS – Commercial MBS



# Asset-Backed Securities



## Securitization



- SPV = Special purpose vehicle

## CDOs: Collateralized Debt Obligations



**CDOs:** These are complex types of asset backed securities with either mortgage-backed assets, non-mortgage-backed assets or a combination of both.

They come in two flavors:

- **CLO:** Collateralized Loan Obligation – often corporate loans that have a low credit rating
- **CBO:** Collateralized Bond Obligation – bond backed by a pool of junk bonds

### Tranches

Tranches are pieces of a pooled collection of securities, usually debt instruments.

- Split up by the risk of other characteristics to make them marketable.
- The best quality tranches will yield the lowest reward; the low quality tranches are more risky and therefore potentially more rewarding.

CBO is an investment grade bond as the bonds that make up the pool are diversified enough to make it investment grade.

CDOs – targeted at institutional investors only

*Collateralized debt obligations* allow banks and corporations to sell off debt and free up capital to re-invest or loan.

<http://www.investinganswers.com/financial-dictionary/bonds/collateralized-debt-obligation-cdo-2123>

Definition of tranche:

<https://www.investopedia.com/terms/t/tranches.asp>



## mthree Alumni Training



### Currencies – FX

- Currencies
- Swaps



## Currency



## Objectives

The objective of this course is to give you a good foundation in the FX business within the bank.

Brainstorm – what is derivative trading – answer on next page

## FX – Foreign eXchange



Forex (FX) is the marketplace in which various national currencies are traded. The Forex market is the largest most liquid market in the world with trillions of dollars traded per day.

- 24 hour trading available Sunday – Friday (GMT).
- No centralized location: it is actually an electronic network of banks, brokers, institutions and individual traders.
- Forwards and futures can be used to trade in the market.

Traded currencies are listed in pairs (e.g., USD/CAD; EUR/USD) with a price associated with each

FX spot trades settle on a T+2 basis.

- Spot is a deal for immediate delivery – which in this case is T+2, except for USD/CAD which settles in 1 business day.

A spot price is the current price in the marketplace at which a given asset such as a security, commodity or currency can be bought or sold for immediate delivery.

Read more: [Spot](#)

[Price <https://www.investopedia.com/terms/s/spotprice.asp#ixzz5FlzR2soT>](https://www.investopedia.com/terms/s/spotprice.asp#ixzz5FlzR2soT)

Example currency pairs:

AUDCAD

AUDCHF

AUDEUR

AUDGBP

AUDJPY

AUDNZD

AUDUSD

CADCHF

CADJPY

CHFAUD

CHFDKK

CHFJPY

CHFNOK  
CHFSEK  
DKKJPY  
EURAUD  
EURCAD  
EURCHF  
EURDKK  
EURGBP  
EURJPY  
EURNOK  
EURNZD  
EURSEK  
EURUSD  
GBPAUD  
GBPCAD  
GBPCHF  
GBPDKK  
GBPEUR  
GBPJPY  
GBPNOK  
GBPNZD  
GBPSEK  
GBPUSD  
JPYDKK  
JPYNOK  
NOKDKK  
NOKJPY  
NOKSEK  
NZDAUD  
NZDCAD  
NZDCHF  
NZDEUR  
NZDGBP  
NZDJPY  
NZDSEK  
NZDUSD  
SEKDKK  
SEKJPY  
SEKNOK  
USDCAD  
USDCHF  
USDDKK  
USDJPY  
USDNOK

USDSEK  
AUDCZK  
AUDPLN  
AUDSGD  
CHFCZK  
CHFPLN  
DKKCZK  
DKKSGD  
EURCZK  
EUREEK  
EURTLT  
EURLVL  
EURPLN  
EURSGD  
EURSIT  
EURSKK  
GBPCZK  
GBPPLN  
GBPSGD  
MTLEUR  
MTLUSD  
NZDCZK  
NZDPLN  
NZDSGD  
PLNJPY  
SGDJPY  
USDCZK  
USDEEK  
USDHRK  
USDLTL  
USDLVL  
USDPLN  
USDSGD  
USDSIT  
USDSKK  
AUDHUF  
AUDTHB  
CHFHUF  
CHFZAR  
CYPEUR  
CYPUSD  
DKKHUF  
DKKTHB  
DKKZAR

EURHKD  
EURHUF  
EURTHB  
EURZAR  
GBPHUF  
GBPTHB  
GBPZAR  
HKDJPY  
NZDHUF  
NZDTHB  
THBJPY  
USDHKD  
USDHUF  
USDILS  
USDMXN  
USDTHB  
USDTRY  
USDZAR

## FX trading venues



FX trading is done across an electronic network rather than having a physical location. Here are some examples of trading locations:

HotSpot

CurrenEx

FXall

BrokerTec

Deutsche Bank

Morgan Stanley

BAML

HotSpot - [https://fx.cboe.com/products/hotspot\\_order\\_book\\_overview.jsp](https://fx.cboe.com/products/hotspot_order_book_overview.jsp)

CurrenEx - <https://www.curenex.com/>

Refinitiv FXall - <https://www.refinitiv.com/en/products/fxall-electronic-trading-platform>

BrokerTec - <https://www.cmegroup.com/trading/market-tech-and-data-services/brokertec.html>

DB - <https://autobahn.db.com/microSite/html/fx.html>

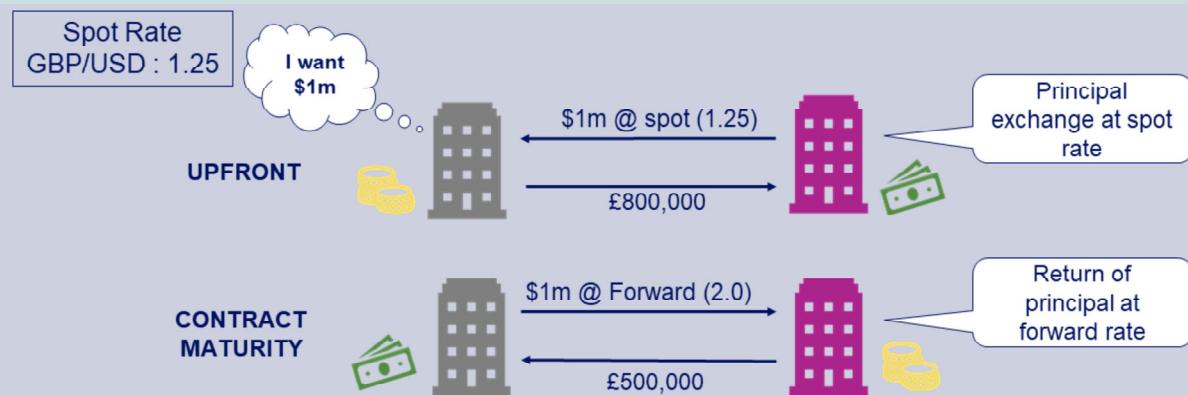
MS - <http://www.morganstanley.com/matrixinfo/>

BAML - <http://www.bofa.com/en-us/content/trader-instinct-fx-orders.html>

## FX Swaps



**FX Swap:** a contract to exchange a matching amount of two different currencies with different value dates – spot vs. forward rate.



An FX swap exchanges cashflows in different currencies.

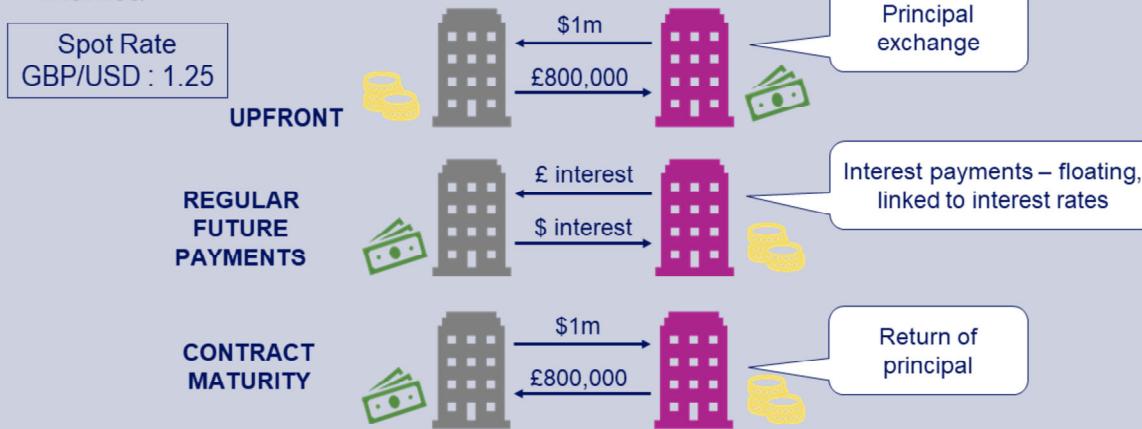
This forex swap deal effectively results in no (or very little) net exposure to the prevailing spot rate, since although the first leg opens up spot market risk, the second leg of the swap immediately closes it down.

For example, a global company such as Walmart might want to understand or predict some rate of exchange.

## Currency Swaps



**Currency Swap:** a contract to exchange fixed interest rate payments on a principal amount for floating rate payments. Usually done to procure loans in foreign currency at a more favorable interest rate than if it is borrowed from the market.



### Benefits:

obtaining financing at a lower interest rate than available in the local market  
locking in a predetermined exchange rate for servicing a debt obligation in a foreign currency.

This contract is not the same as the one on the previous slide because there are interest payments.

Among types of swaps, the Bank for International Settlements (or BIS) distinguishes “cross-currency swaps” from “FX swaps.” Unlike in a cross-currency swap, in an FX swap there are no exchanges of interest during the contract term and a differing amount of funds is exchanged at the end of the contract. Given the nature of each, FX swaps are commonly used to offset exchange rate risk, while cross-currency swaps can be used to offset both exchange rate and interest rate risk.

<https://www.fxcm.com/insights/how-do-currency-swaps-work/>

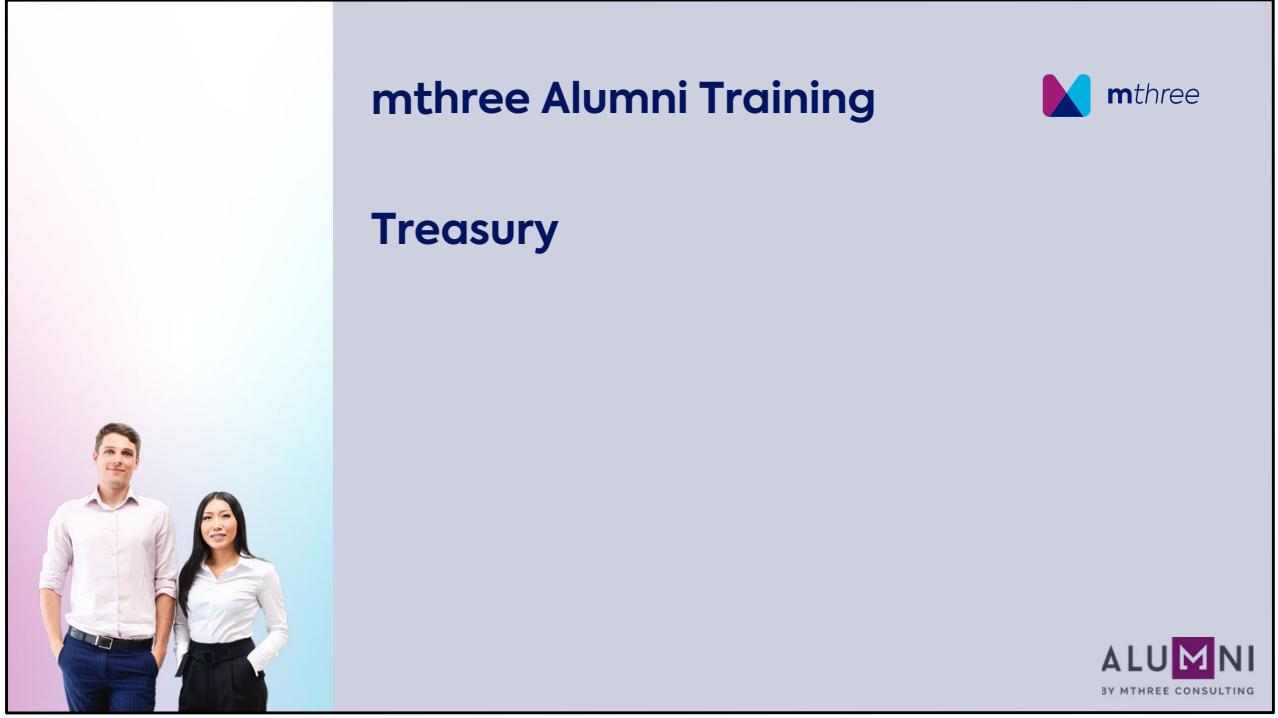
### Basis Swaps

Interest payments can be based on Rate + Index:  
GBP/USD+LIBOR

## Glossary of terms



Keyword	Definition
<b>Spot rate</b>	Price quoted for immediate settlement on a commodity, a security or a currency.
<b>Base currency</b>	First currency that appears in a FX pair quotation
<b>FX swap</b>	Simultaneous purchase and sale of identical amounts of one currency for another with two different value dates
<b>Currency swap</b>	A transaction in which two parties exchange principal and interest in different currencies
<b>EQ</b>	Equities
<b>FI</b>	Fixed Income
<b>Quote</b>	Price of a commodity, security or currency
<b>Swap</b>	Exchange of assets, interest rates or cash flows
<b>FX</b>	Short for "Forex" – i.e. the currency market



**mthree Alumni Training**



## Treasury



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# Treasury



## Objectives

The objective of this course is to gain an understanding of the treasury business in a bank.

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# Treasury



The treasury department controls and manages the bank's own money.

Treasury operates in a global environment of market volatility and ever-increasing regulation.

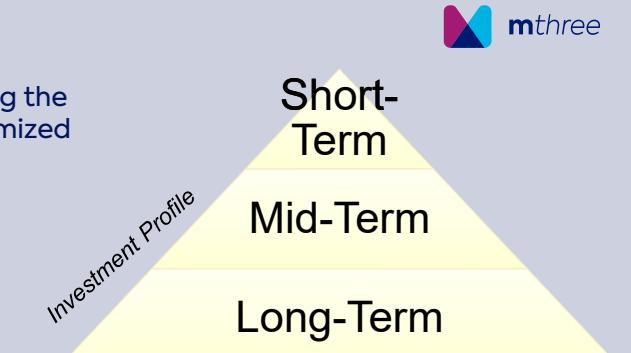
Treasury manages funding, capital management and liquidity for the bank.



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## Capital Management

Treasury has responsibility for structuring the bank's funds to ensure returns are maximized whilst meeting regulatory standards.



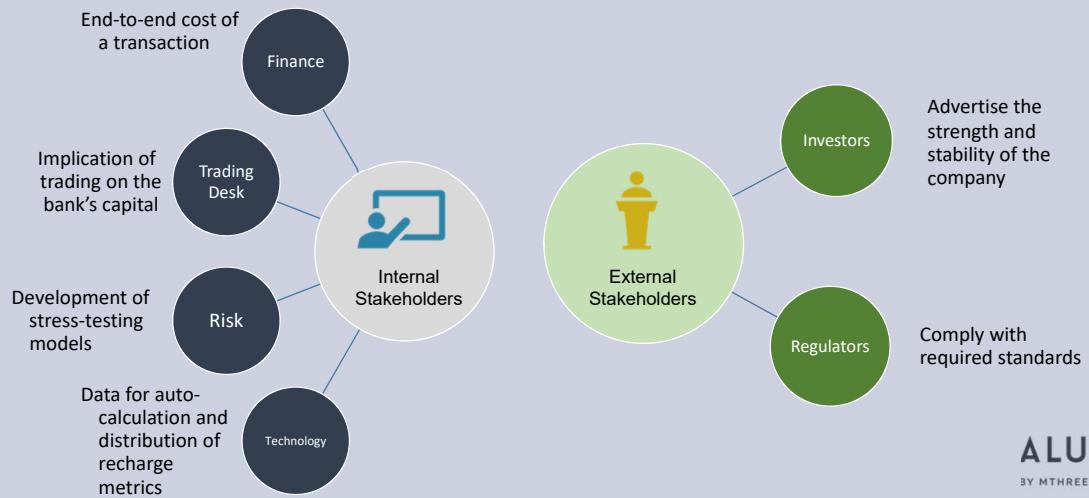
Global banks will take positions in multiple currencies to efficiently fund transactions undertaken across the bank in those currencies.

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## Treasury Stakeholders



Due to the nature of the treasury business – they have many stakeholders across the bank. The below shows examples of some of them (not exhaustive list):



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## Execution Services



Treasury manage the bank's requirement to execute multiple transactions in multiple currencies.

For example, a front office team, like the capital financing, may have agreed a business loan in euros. They need to purchase the euros on the money market.

Treasury Execution services will facilitate this and advise on cost.

Bank A needs  
\$300,000,000



How many £ will buy  
\$300,000,000 today?



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<http://www.investopedia.com/terms/i/interbankrate.asp>

## Interbank Lending

- Banks loan assets to each other for A specified period, usually short term, often overnight.
- Interest is calculated using the interbank rate.
- The interbank rate is driven by the availability of money in the market: more lenders = lower rates, fewer lenders = higher rates.
- Interbank rates include: ICE LIBOR, EURIBOR, US Dollar LIBOR.
- Banks have credit ratings which also impact the rate paid for borrowing.



Borrow money on  
the interbank  
market and pay  
interest



Loan money on  
the Interbank  
market and  
receive interest



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<http://www.investopedia.com/terms/i/interbankrate.asp>

## LIBOR – London Interbank Offered Rate



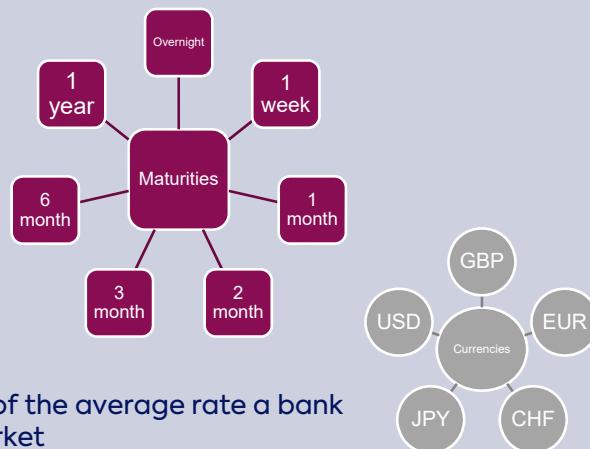
LIBOR : A benchmark rate for currency borrowing

Produced on daily rate submissions from 11 - 17 contributor banks who answer the question:

*“At what rate could you borrow funds, were you able to do so by asking for and then accepting interbank offers in a reasonable market size just prior to 11am London time?”*

The rate is intended to be representative of the average rate a bank could borrow at in the London money market

LIBOR rates are quoted as an annualized interest rate: a 1 month GBP rate at 2.00000% interest = payment of 2% divided by 365



[www.theice.com](http://www.theice.com)

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<http://www.investopedia.com/terms/i/interbankrate.asp>

## LIBOR History

### LIBOR then....

- Pre-2012 LIBOR Rigging Scandal
- Little oversight
- Rates were submitted that would benefit rates swap traders instead of being the actual rates that the bank would pay to borrow money
- Traders colluded across different banks to collectively adjust the rate

### LIBOR now....

- New governance: ICE LIBOR
- Rates based on actual transactions with records kept
- Criminal sanctions in place to enable prosecution in case of manipulation of benchmark interest rates

Who knows about the Libor Rigging scandal?

<http://www.telegraph.co.uk/finance/libor-scandal/>

## Funding



Funding teams ensure that the investment bank has sufficient liquidity to meet payment obligations on a daily basis.



Sufficient cash must be available in the correct currencies in all required locations to ensure that trades can be settled as agreed.



Banks hold a proportion of highly liquid assets to meet short-term liabilities: cash, FX swaps, overnight deposits, etc.

Forwards are unregulated by the government – trade over the counter (OTC)



## Stress Testing

After the 2008 financial crisis, banks have been subject to stress tests that assess how well a bank can withstand market shocks and liquidity disruption.

The Bank of England introduced stress testing of UK Banks in 2014; the Federal Reserve does stress testing as part of Dodd Frank Regulation.

*The BoE set a 4.5% minimum Core Tier One Capital ratio (hurdle rate) in 2014 but adjusted this in 2016 tests to reflect differences required by global systemically important banks.*

Core Tier 1 Capital = Shareholders' equity & retained earnings

Core Tier 1 Capital Ratio = 'the comparison between a banking firm's core equity capital and its total risk weighted assets'

<http://www.bankofengland.co.uk/financialstability/Pages/fpc/stresstest.aspx>

### Regulation and Risk

- Regulators
- Scale of regulation
- Risk agencies
- Types of regulations



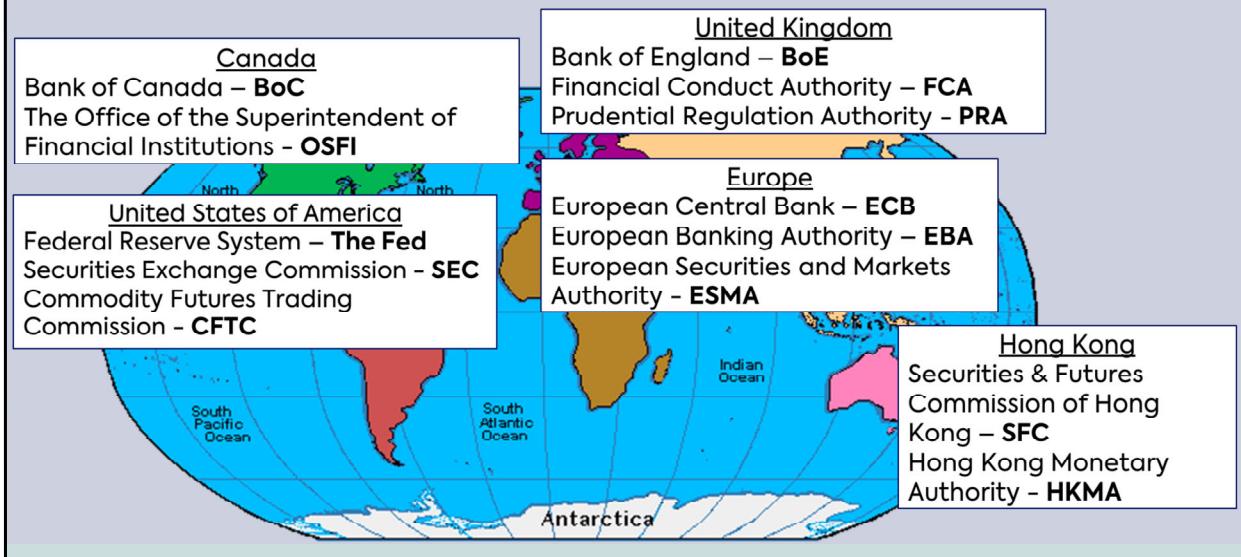
### Objectives

The objective of this course is to provide an overview to some of the regulatory scrutiny in the financial markets today as well as the risk banks have to take into consideration while operating on a day-to-day basis.

Class – what do we mean by regulatory scrutiny?

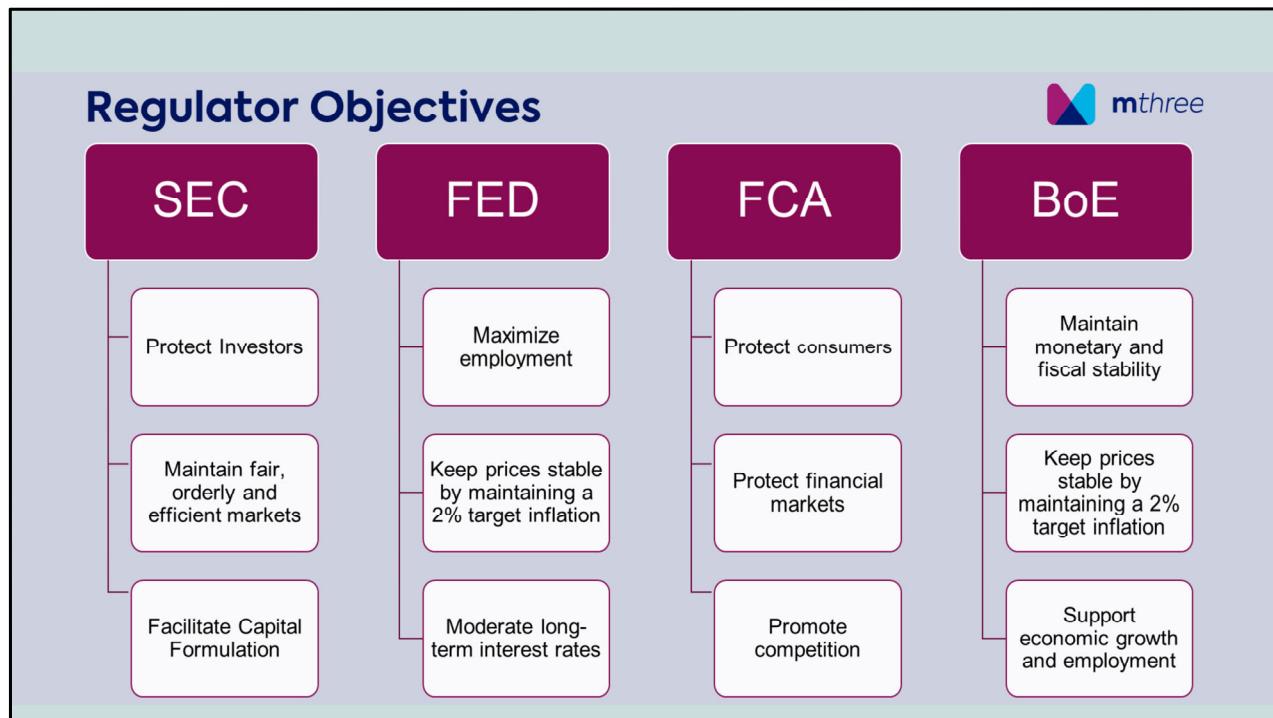
Brainstorm what kind of risks we think banks face

## Regulation and Risk



Banks have to comply with regulations in the jurisdiction they are based in, PLUS any others that they operate or trade in

Result = a massive amount of regulatory requirements and processes that will all be slightly customized to each particular regulator.



**Key theme:**

- Safety and soundness

**How?**

- Legislation
- Reporting mandates
- Stress testing
- Solvency ratios
- Supervision
- Authorizations

<https://www.sec.gov/about/whatwedo.shtml>

<http://www.bankofengland.co.uk/pru/Pages/default.aspx>

[https://www.federalreserve.gov/faqs/money\\_12848.htm](https://www.federalreserve.gov/faqs/money_12848.htm)

BoE – Bank of England

FCA – Financial Conduct Authority (CONDUCT – how they behave, consumer

protection, effective markets)

PRA – Prudential Regulatory Authority (PRUDENCE – being cautious, risk management, measuring reserves)

EBA – European Banking Authority (PRUDENCE)

ESMA – European Securities and Markets Authority (protection of investors and promotion of stable and orderly markets)

ECB – European Central Bank

## Regulatory rules



Below details some of the frameworks in place by regulators that impact the day to day operations of a bank.

Transaction Reporting

Ring Fencing

Stress Testing

Risk Management

Capital Requirements

IB Separation

Transparency

Prop Trading

Market Abuse

Investor Protection

OTC Derivatives Reform

Electronic Trading

### Transaction Reporting:

- FCA: all investment firms which execute transactions must follow FCA submit reports including
  - # information about the financial instrument traded
  - # the firm undertaking the trade
  - # the buyer and the seller
  - # the date/time of the trade
- 

### Capital Requirements:

- Must keep a minimum amount of liquid assets (i.e. cash with BoE)

### Market Abuse:

- Must not manipulate or abuse the markets and keep things fair!

### Ring Fencing:

- IB assets/profits are financially separated, but still operates as one entity with the whole banks
- FCA: Banks with a 3 year average of > £25bn 'core deposits' must separate their

core banking services from the rest of the group. Core services include:

1. accepting deposits or other payments into an account
2. offering facilities for withdrawing money or making payments from an account
3. overdraft facilities

IB Separation: (what are the regulations, when do they apply?)

- IB division treated as a completely different entity
- Investment banking division activities should be kept separate from other divisions, to isolate high risk activities.

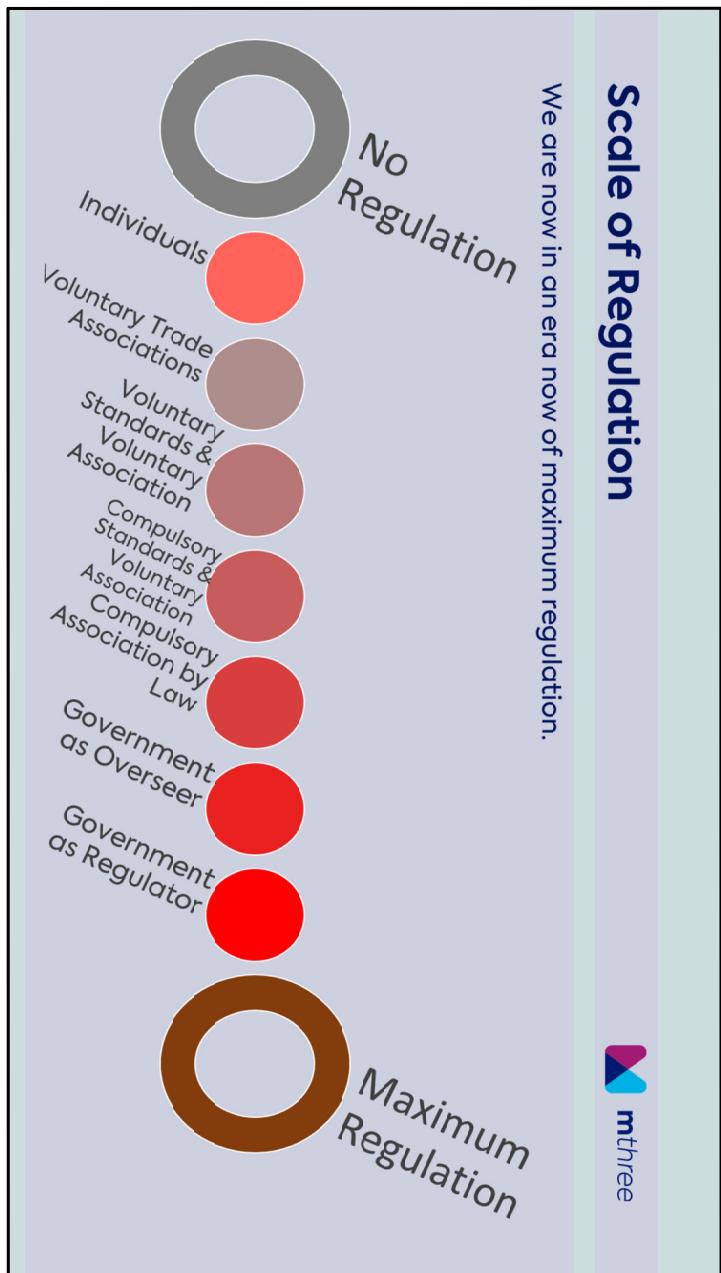
Electronic Trading:

- MIFID II imposes requirements on firms using algo's to trade.
- Algo's automatically determine parameters e.g. when to execute order, when to sell, etc.
- Can lead to high rate of order cancellations, overload systems and cause market volatility
- Firms must ensure effective risk controls are in place, e.g. thresholds and limits to prevent erroneous orders
- Effective monitoring should be in place
- Testing algo's in non-live controlled environment

## Scale of Regulation



We are now in an era now of maximum regulation.



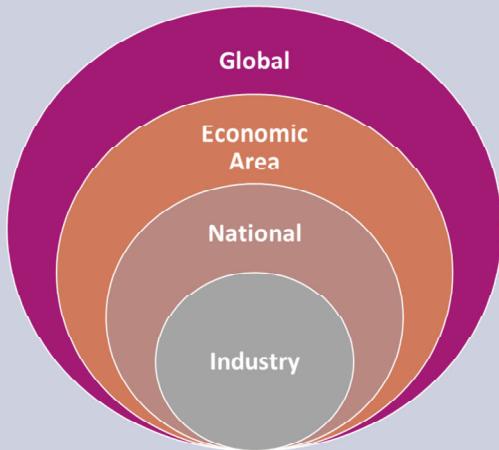
The US Securities Act of 1933 and the Securities Exchange Act of 1934 were created after the 1929 US Stock Market Crash, when the markets were 'rife with fraudulent stock and bond sales, stock pools, insider trading, price manipulations, and other abuses'.

<http://www.cfapubs.org/doi/pdf/10.2469/ccb.v2007.n7.4819>

## Layers of Regulation



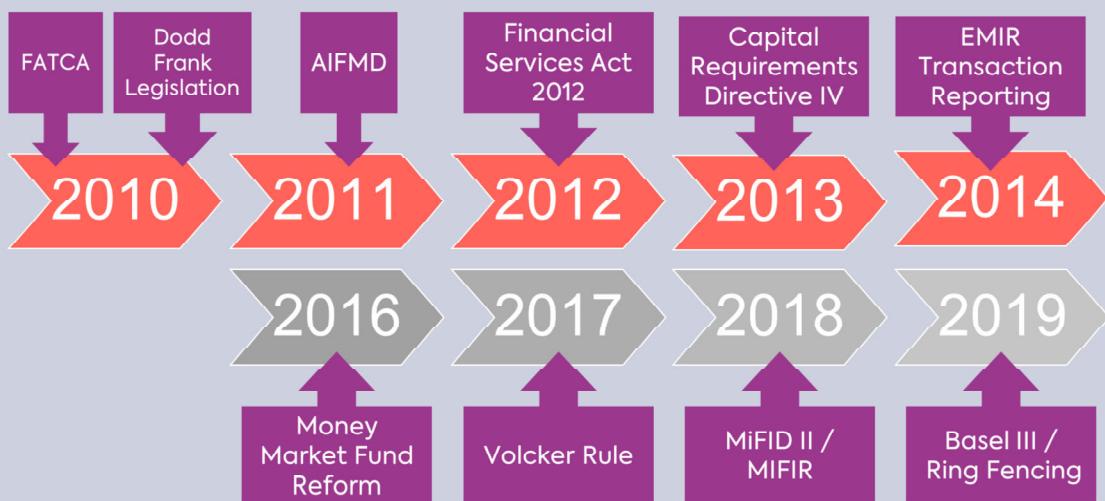
Regulation can be applied at multiple levels – and all rules need to be complied with.



## Exercise: Regulatory Compliance Timeline



These are just a few of the regulations introduced in the last few years.



Let's have a look at some key Regulations in more detail – start with the most recent

**Exercise(20 minutes prep, then 10 minute break, then 2-3 minutes per group to present):**

- In pairs, research one of these pieces of legislation and present about it.
- After each presentation do a peer review, then add trainer feedback for anything missing. Discourage people from being overly polite to each other in the reviews and only saying good things.

## Risk Metrics: Value at Risk



**VaR** – Value at Risk is used to measure market exposure assessing what could be lost in the worst case.

**VaR**

Assessing the VaR considers the following:

- Time Period Holding the asset
- Confidence level in the asset
- Loss amount

*“We expect that our worst daily loss should not exceed 5% on 99% of occasions if we invest £5000 in this asset.”*

Only 1% chance that our worst loss will be more than £250

VaR provides a measure of the maximum loss expected within a specified time period for a certain proportion of occasions.

Defines a loss level that won't be exceeded (in theory)

VaR can be calculated at asset, book or company level

Used for managing market risks, short term risks that can be closed out of quickly

New Expected Shortfall (ES) metric

<http://www.risk.net/risk-magazine/technical-paper/1506669/var-versus-expected-shortfall>

## Credit Risk

The risk of a debt issuer defaulting on a credit obligation. This will result in:

- Loss of principal investment
- Loss of expected cash flows

This can be mitigated by:

- Upfront and continual assessment of the credit risk of debt issuers the bank is involved in

Examples include:

- A company is unable to repay asset-secured fixed or floating charge debt, e.g., Repo.
- A business or government bond issuer does not make a payment on a coupon or principal payment when due.
- A consumer may fail to make a payment due on a mortgage loan, credit card, line of credit, or other loan.



### Credit Events

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Credit Events on an underlying asset trigger a CDS insurance payment

They include:

1. Bankruptcy
2. Credit Rating Falls
3. Failure to Pay
4. Repudiation
5. Restructuring



## Credit Rating Agencies



Fitch

Standard &  
Poor's (S&P)

Moody's

These agencies rate the Credit worthiness of companies, products and countries, borrowers of debt and debt products, effectively asking:

**"How likely are they to repay their loan?"**

Debt or Debtor	Type	Rating	Outlook
USA	Bond	Aaa	Stable
UK	Sovereign	Aa	Stable
Greek Government	Sovereign	BB-	Positive
Canada	Sovereign	AAA	Stable
Mexico	Sovereign	BBB+	Negative

Sortable Table Key	Moody's
Highest grade credit	Aaa
Very high grade credit	Aa1, Aa2, Aa3
High grade credit	A1, A2, A3
Good credit grade	Baa1, Baa2, Baa3, Baa4
Speculative grade credit	Ba1, Ba2, Ba3
Very speculative credit	B1, B2, B3
Substantial risks - In default	Caa1, Caa2, Caa3, Ca

Data accurate to the end of 2019

**Credit Ratings by Country:**

<https://tradingeconomics.com/country-list/rating>

## Hedging



You will likely hear the term hedging mentioned on trading floors. It is typically a short term strategy to protect long term positions by mitigating the effect of market volatility. Below are some examples of strategies used:

### Pairing

Find a similar security (industry, yield, volatility, PE Ratio, etc.) and use to offset position

### Short Against the Box

Short sell the exact same stock and then close positions when needed (complying with any short selling restrictions)

### Futures

Buying a security for an agreed price but you will receive it on a future date

### ETFs

Access to lots of hedging securities in small increments

### Options

The right to buy/sell a security on an agreed future date at a pre-agreed price

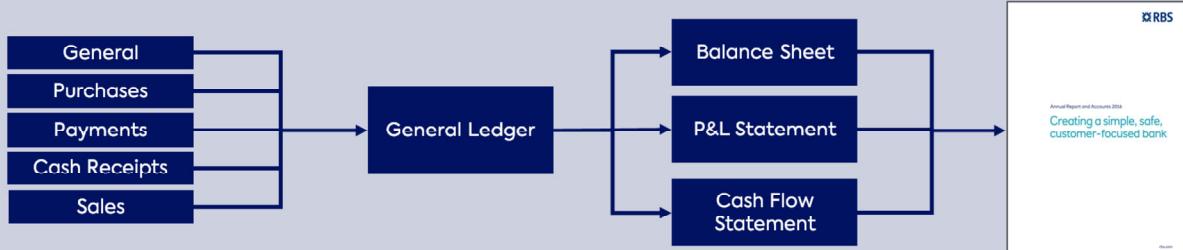
Can you think of examples in your life where you hedge? E.g. carrying an umbrella

## Financial Statements



Public companies issue annual and interim financial statements. These offer a comprehensive view into the health of a company. Financial statement key components:

- Income Statement
- Balance Sheet – shows the assets, liabilities and equity
- Cash Flow Statement



##### SCRIPT #####

Financial statements are an important part of measuring a company's health.

The General Ledger is a very important document which is made up of lots of journals. These include:

- General Journal
- Purchases journal
- Payments Journal
- Cash Receipts Journal
- Sales Journal

These are then combined in the general ledger which then makes up the 3 pieces of the financial statement:

1. Balance Sheet – shows you the assets and liabilities. i.e. what they have and what they owe to others
2. P&L Statement – how they performed throughout the reporting period
3. Cash Flow Statement – Where the money came from and where it went

These combined make up the all important financial statement.

## Financial Statements – Key Points



The financial statement is needed for the following reasons:

- This will help the company to make purchasing or corporate decisions.
- It will help investors evaluate the value of a company.
- It will help regulators to audit the company to ensure they are complying with regulations (e.g., make sure they are not hiding cash and laundering money).

Key Terms in the statement:

Revenue	Money coming in	Net Profit	Revenue minus expenses, interest, tax, depreciation and amortization
Expenses	Money going out (not including tax, interest, depreciation, amortization)	EBITDA	Revenue minus expenses but including interest, tax, depreciation and amortization
Gross Profit	Revenue minus expenses	Exceptional Items	Unusual things that adversely impact profits for the period

## Asset Depreciation



Depreciating assets include machinery, buildings, computers, vehicles, furniture, equipment and fixtures

The cost of a depreciating asset is divided across income statements for the life of the products in question.

### Example:

Laptop purchased in 2014	Year 0 (2014): £1000
Amount paid: £1000	Year 1 (2015): £850
Expected life: 5 years	Year 2 (2016): £700
Salvage value: £250	Year 3 (2017): £550
Laptop will lose $(1000-250)/5 = £150 \text{ p/a}$	Year 4 (2018): £400
	Year 5 (2019): £250

### Why is it important?

- The cost of an asset is not captured in expenses as it is a non-cash expense.
- The cost of the asset can be divided through multiple statements rather than all at once.
- Helps to match the cost of the asset with the revenue it generates.
- Companies dilute large value assets across their lifetime making balance sheets healthier.

When is your iPhone or smart phone worth the most? When you first purchase it, when it is new.

Think about a new car as an example as well

## Company Share Metrics

### Earnings per share (EPS)

$$\text{EPS} = \frac{\text{net income} - \text{dividend payout}}{\text{outstanding shares}}$$

Company ABC has a net income of £50m

It has 14m shares outstanding.

It pays a dividend of £0.50 a share (£7m)

Earnings per share = £3.07

Earnings per share is the portion of the company's profits allocated to each outstanding share

### Price to Earnings Ratio (P/E)

$$\text{PE} = \frac{\text{current share price}}{\text{earnings per share}}$$

Company ABC shares are currently priced at £22.24 a share.

Earnings per Share = £3.07

The P/E Ratio is 7.24

A high P/E usually represents investors are expecting higher future earnings growth

A low P/E usually means a company is outperforming or is undervalued

<http://www.investopedia.com/terms/p/price-earningsratio.asp>

## Return on Investment (ROI)



$$\text{ROI} = \frac{\text{profits from investment}}{\text{cost of investment}}$$

An investor buys £1000 shares

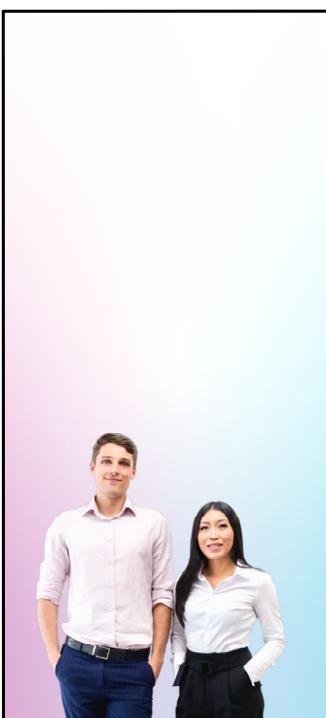
2 years later they are worth £1250

The profit is £250

The ROI is 25%

Used in company financial analysis to assess:

- Profitability of past expenditure
- Potential profitability of future expenditure
- Investment worthiness
- Investments comparisons



## mThree Alumni Training



### Regulations In Detail

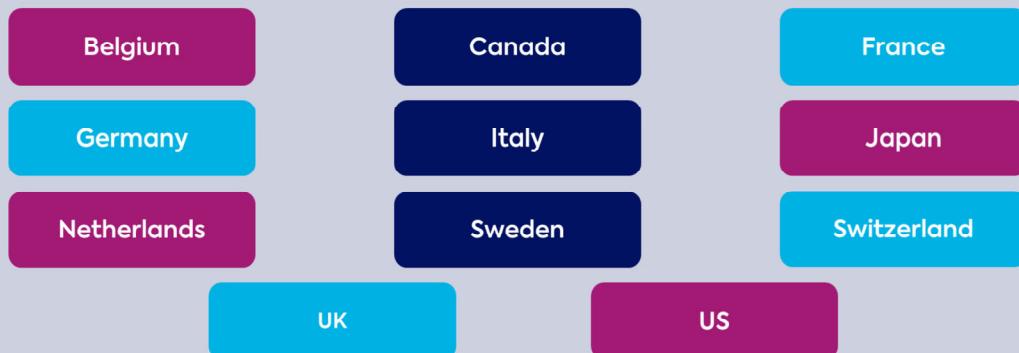
- Basel
- MiFID
- ESMA
- EMIR



## The Basel Committee



The Basel Committee on Banking Supervision (BCBS) was formed in 1974 – a committee of central bank governors from 10 countries with the aim of enhancing finance stability by improving banking supervision globally



Now has 45 members from 28 different countries

Formed after serious disturbances in international

Basel, Switzerland. Hold meetings 3 or 4 times a year.

G-10 was initially formed in 1962 to participate in GAB (General Agreement to Borrow) to provide the IMF (International Monetary Fund) with more money to loan. Switzerland joined in 1964.

The initial Basel 'Concordat' paper published in 1975 set out principles to ensure:

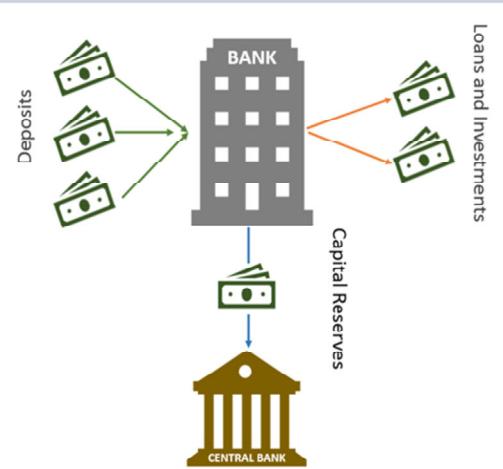
1. No bank globally would escape supervision
2. Supervision would be adequate and consistent across member states

BCBS have no legal force, but the onus is on member states to implement the standards in their own countries. The EU have put Basel I into banking directives to make it law.

<http://www.bis.org/bcbs/history.htm>

## Capital Adequacy

The minimum capital reserves a bank must have available to be available to absorb losses; this acts as a protection for depositors.



This is sometimes difficult to measure due to the complicated nature of financial instruments

## Basel I

In 1988, the Basel Capital Accord (Basel I) required a minimum of 8% ratio of capital to risk weighted assets. Standards were adopted by more than 120 countries and focused mainly on credit risk.

### 5 Risk Capital Weights:

**0% Risk** Cash, Central Bank Reserves, Government Debt

**10%**: Public Sector Debt

**20%**: Bank Debt

$$\text{Risk Assets Ratio} = \frac{\text{Capital}}{\text{Total Risk Weighted Assets}}$$

**50%**: Residential Mortgages

**100% Risk** Private Sector Debt, Real Estate, Equipment, Capital Instruments

The Basel Accord states a bank must have Capital (Tier 1 or 2 )  $\geq$  8% Risk Weighted Assets

The Basel Accord defined a way of measuring your capital and ensuring your ratio of reserves to risk - credit risk specifically – the likelihood that debtors will default and an asset's value is lost.

Banks must have capital worth at least 8% of their risk weighted assets. – i.e. there should be \$8 set aside for every \$100 lent out.

The fundamental idea to this calculation is that a Bank should be holding more capital as backup for riskier assets. Banks holding less risky capital wouldn't need to hold as much capital (since they may not be as likely to use it).

Capital Tier 1 – shareholder equity and cash reserves

Capital Tier 2 – some forms of debt (i.e. money lent to the bank via bonds that it has to pay back) (likely included as a compromise, often not included when analysts assess a bank's soundness as it is still debt to paid back to another party)

## Limitations of Basel I

Basel I had several limitations:

- The broad risk weights are a blunt tool – for example, is all mortgage risk equal at 50%?
- Newer securitized products and derivatives are not accounted for and therefore skew the profile.
- It doesn't account for diversification as a strategy to manage risk.
- Difficult for regulators to assess based on the opaque portfolio view.
- Doesn't take into account market risk .

More relevant for banks that include retail and corporate banking services rather than pure investment banks exposed to large market risk.

## Basel I: Market Risk Amendment (MRA)



In 1996, Basel I was amended to account for Market Risk

- A methodology to account for market risk in capital requirements
- Specifically addresses risks arising from trading activities vs. holding loans
- Banks can calculate VaR daily
- Or, use 'building block' approach: Calculate general market risk and specific security risk and combine

*"This asset has a 3% 10 day VaR of 1%, representing a 3% chance of the asset declining in value by 1% in 10 days"*

Essentially, banks have to calculate their market risk exposure via the proprietary risk model method or the standardized building block method and then calculate the 'capital charge' (the capital they must hold) for that level of risk exposure.

Using VAR (the proprietary model method), the capital charge = higher than the previous day's VAR and 3x the average of the daily VAR of the proceeding 60 business days.

The Building block approach adds together the capital charges for each category of financial instrument, i.e. for each equity securities.

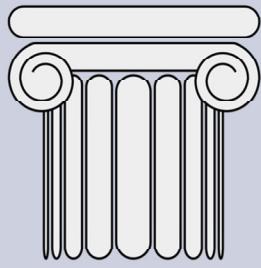
A 4% capital charge is applied to general market risk and an 8% capital charge is applied to specific security risk.

## Basel II

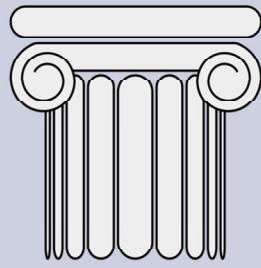
In 1999, a new Capital Framework was proposed to replace the original accord. The framework was finally published in 2004.

The framework consisted of 3 pillars:

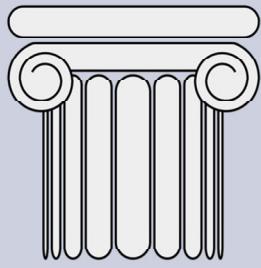
Minimum Capital Requirements



Supervisory Review and Internal Risk Assessment Process



Market Discipline via Disclosure of Risk



## Basel II – New Credit Risk Assessment

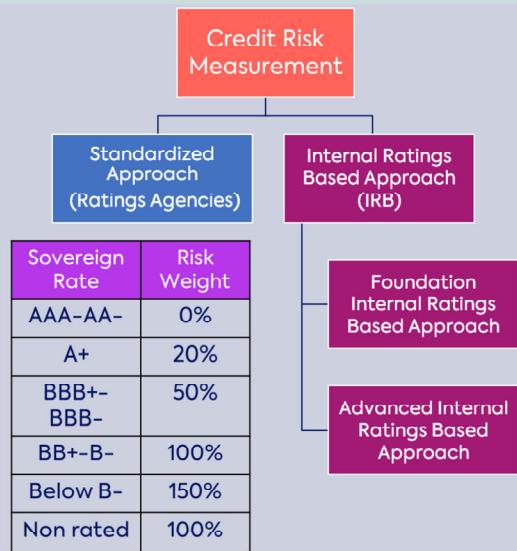


In the new assessment, the 8% ratio of capital to RWA was kept, but banks had the option to use either external credit rating agencies' risk assessment values or internal risk categorizations.

### It wasn't enough

As Lehman Brothers failed in 2008, it became clear it wasn't enough. The Basel committee published the following on Lehmen:

- Too much leverage and inadequate liquidity buffers
- Poor governance and risk management
- Inappropriate incentive structures



These changes allow credit risk to be more accurately estimated and allocated for using external Credit Ratings agencies like Standard & Poor's, Moody's, Fitch. For example, whereas previously, bonds (debt) bought from the US and Greek governments would be considered to be of equal risk (0%), the use of external ratings would account for the risk of the Greek government debt having a greater likelihood of default. i.e. US AAA rated bonds = 0% weighting and Greek bonds rated below B- would have 150% weighting

Google a government to find out what their Moody's rating is and what risk weight they will be given.

The Ratings approach is open to criticisms:  
How accurate are the external agencies ratings?

The IRB approaches are quite different to the original Basel I Accord.  
To use the IRB, banks need a comprehensive grading system that they use already and loss data to calculate the probability of default. They also need to prove to regulators that their assessment system is rigorous and stable enough.  
But are IRB ratings sufficiently conservative if they are designed around the bank in

question? Does it give big banks a competitive advantage if their own ratings are slightly less conservative?

## Basel III



In 2010 Basel III was created:

### Capital Buffers

- Requires banks to hold more capital of higher quality

### Leverage Ratio

- A minimum leverage ratio to ensure banks are not over leveraged

### Liquid Coverage Ratio

- Requires banks to have sufficient liquid assets to withstand a 30-day stressed funding scenario

### Net Stable Funding Ratio

- Long term structural ratio designed to incentivize banks to use stable sources of funding

Builds on Basel I & II to make Banks and the Banking system more resilient

Revises and extends the 3 Pillars of Basel II

Also introduces:

1. the Capital Conservation Buffer
  - Outside periods of stress, banks should hold buffers of capital above the regulatory minimum that can be drawn down on during periods of stress
  - When buffers have been used and reduced, banks should look to rebuild them by reducing dividends or employee bonuses (discretionary distribution of earnings)
2. The Leverage Ratio
  - A bank should not be leveraged more than 33 times the regulatory capital stated at the time, regardless of risk weighting
3. the Liquidity Coverage Ratio (LCR)

- To ensure that sufficient liquid funds are available to survive a one-month stress period

#### 4. the Net Stable Funding Ratio (NSFR)

Basel III changes and requirements are being phased in over time

It aims to make the whole banking system more resilient, using a bottom-up approach.

The overall regulatory capital required still remains at 8%, but the tier 1 and tier 2 capital requirements have increased to 4 - 4.5% and 4 – 6% respectively.

## MiFID I



2004 Markets in Financial Instruments Directive – applicable to banks across Europe since 2007, primarily focused on Equities. Its aim was to facilitate cross-border trading within the EU. It covers:

- Business conduct for investment firms
- Authorization requirements for regulated markets
- Regulatory reporting requirements to prevent market abuse
- Trade transparency obligations for shares
- Rules on the admission of financial instruments to trading

After the 2008 financial crisis it became apparent that it was not adequate and needed a full overhaul.

## ESMA – European Securities and Markets Authority



Began operating in 2009 as an independent EU authority accountable to the European Parliament.

It has 3 objectives:

- Investor Protection
- Orderly Markets
- Financial Stability



It achieves these objectives by:

- Assessing risks to investors, markets and financial stability
- Completing a single rulebook for EU financial markets
- Promoting supervisory convergence
- Directly supervising specific financial entities



## MiFID II

Changes needed for greater investor protection and improved functioning of markets post-2008 has led to:

- revised Markets in Financial Instruments Directive (MiFID)
- new Markets in Financial Instruments Regulation (MiFIR)

Aims:

- Increased market and costs transparency
- Move to trading on structured marketplaces
- Lower cost market data
- Improved best execution
- Orderly trading behavior

**Effective from 3 Jan 2018**

The EU predicts it MiFID II will have a transformative effect on markets – it's very wide reaching and ambitious. From where products should be traded, to risk measures, to supervision of financial advisors.

It aims to be a 'single-rulebook' from ESMA, learning from past mistakes that led to the 2008 crisis.

Was agreed by European Parliament and national governments in 2014. Was due to be effective from Jan 2017, but was delayed in 2015 to Jan 2018.

This was mainly because the legislation doesn't contain the implementation details (what should do vs. how you should do it). The legislation expects that ESMA will draft technical implementing standards which will then be reviewed by EC, governments and European parliament – and this process has been very lengthy – the standards themselves run to 1000s of pages. IT changes then have to be made by regulators and regulated firms to be able to comply with it all. The year long delay was the result of the European Parliament not be happy with ESMA's implementation standards.

<https://www.esma.europa.eu/policy-rules/mifid-ii-and-mifir>

<https://www.fca.org.uk/markets/mifid-ii>

<https://www.ft.com/content/77d46b66-87aa-11e5-90de-f44762bf9896>

## MiFID II Coverage



MiFID II became very ambitious in coverage compared to Basel II

- OTF (Organised Trading Facility) – a new trading platform to capture unregulated trades on non-regulated platforms
- Increased transparency, pre- and post-trade
- New Commodity Derivative Position Limits to reduce speculative trading
- New rules for algorithmic and high frequency trading
- Increased product and service information to safeguard Investors
- Increased coverage of transaction reporting

## Non-Financial Reporting (NFR)



NFR is a 2014 EU Non-Financial Reporting Directive to harmonize non-financial reporting across EU member states

- Applicable to public-interest entities with 500+ employees
- UK is due to create legislation based on the directive

Mandates disclosure of policies, risks and outcomes relating to:

- Environmental matters
- Social and employee aspects
- Respect for human rights
- Anti-corruption and bribery issues
- Diversity of their Board of Directors

BP Deepwater Horizon Explosion and Oil spill in 2010 had catastrophic human and environmental impact – 11 workers died and possibly the largest environmental disaster in US history with a huge oil spill in the Gulf of Mexico

The rig was drilling for BP. BP lost 55% of shareholder value after the explosion and spill.

BP 2015 Strategic Report for investors – includes Corporate Responsibility Section, Environment and Society reporting and outcomes of Gulf of Mexico Oil Spill (p.41)  
<http://www.bp.com/content/dam/bp/pdf/investors/bp-strategic-report-2015.pdf>

## EMIR Reporting



In 2012 the European Market Infrastructure Regulation (EMIR) Reporting was introduced:

Applies to all types of Derivative Contracts:

- Interest rates, FX, credit, equities, commodities

Parties involved in any Derivative Contract must:

- Report every contract to a Trade Repository (TR)
- Clear applicable trades via a Central Counterparty (CCP)
- Implement new risk management standards for all bilateral OTC derivatives not cleared via a CCP

**LEI:** Legal Entity Identifier

**UTI:** Unique Trade Identifier

Introduced to improve transparency of OTC derivative markets and reduce the risks associated with those markets

OTC – Over the Counter

<https://www.esma.europa.eu/regulation/post-trading#title-paragrah-1>

Both parties on the trade have to report the trade to the TR

The deadline for Transaction reporting is T+1 (next working day)

It's a massive reporting obligation because it applies to all derivative trades (over 300 million weekly submissions)

6 EU trade repositories collected a total of nearly 44 billion derivative reports in 2016.

<http://www.emissions-euets.com/emirreporting>

LEIs – identify the counterparties

UTIs – identify a specific trade and must be agreed by counterparties before reporting

Example Trade Repositories:

- DTCC
- CME
- ICE
- Regis
- UnaVista

**DTCC – The Depository Trust and Clearing Corporation**

An American post-trade financial services company, 3<sup>rd</sup> party proving Clearing and Settlement services

Established in 1973, prior to that, brokers physically exchanged security certificates via messengers

## Clearing and Counterparty Credit Risk



In every trade, both parties of the trade are at risk of the other party defaulting on the obligation of the trade – this is Counterparty Credit Risk



Central Counterparty Clearing has been introduced to try to reduce this risk. Once a trade has been agreed, the CCP (Central Counterparty) will sit between the two parties of the trade and acts as a trade guarantor



An Example is CME Group.

A key benefit of central clearing is 'multilateral netting' – consolidates all transactions with a client into one transaction – 'Simplifies outstanding exposures vs. complex web of bilateral trades'

## FATCA



2010: Foreign Account Tax Compliance Act

- To promote cross border tax compliance
- Aims to reveal US persons investing and earning income via non-US institutions
- Implements an international standard (CRS) for the automatic exchange of information relating to US tax payers
- At least 96 countries will share information on residents' assets and incomes
- Tax withholding by the US can be used if reporting is not provided
- Biggest burden is on Foreign Financial Institutions (FFIs)

It has significant structural changes to improve global tax compliance.

<https://www.treasury.gov/resource-center/tax-policy/treaties/Pages/FATCA.aspx>  
<https://tax.thomsonreuters.com/fatca-crs/what-is-crs-fatca/>

## The Dodd Frank Act



### 2010: the Dodd–Frank Wall Street Reform and Consumer Protection Act

- Created in response to the 2008 Financial Crisis
- Aims to decrease risk in the US Financial System
- Approximately 2,300 pages of provisions
- Named after sponsors US Senator Dodd and US Representative Frank
- Provisions are being phased in over a number of years

<https://www.brookings.edu/research/no-dodd-frank-was-neither-repealed-nor-gutted-heres-what-really-happened/>

## New Agencies Established by Dodd Frank



Several new agencies were introduced as part of Dodd Frank regulation on the basic idea that if there is not a governing body to oversee banks and related financial agencies, then the systems is exposed and vulnerable

### The Financial Stability Oversight Council (FSOC)

Monitors the stability of companies “too big to fail”

### The Federal Insurance Office

Monitors insurance companies that are “too big to fail”

### The Consumer Financial Protection Bureau (CFPB)

Aims to prevent financial harm to consumers via abusive financial practices

### SEC Office of Credit Ratings

Monitors ratings agencies with the aim of improved accuracy

### Swap Execution Facilities (SEFs)

Exchange platforms for transparent trading and processing of swap securities

## OTC Derivative Regulations



**Regulatory Authority of the Swap Market is divided between SEC (Securities Exchange Commission) and CFTC (Commodity Futures Trading Commission)**

Implemented in 2012, with the reporting of interest rate swaps and credit index swaps first via clearing houses, then from the dealers themselves. Then reporting of FX swaps, commodity and equity swaps followed.

- Moved Derivative contracts from OTC on to exchanges – SEFs
- Created more transparency and standardization in the market
- Introduced clearing to reduce the risk of counterparty default
- Mandated rigorous transaction reporting of Derivatives contracts to an SDR (swap data repository)
- Best execution demands a minimum of three independent quotes

<https://www.sec.gov/spotlight/dodd-frank/derivatives.shtml>

## Criticisms of Dodd Frank



**President Trump has been extremely vocal in criticizing Dodd Frank and its effectiveness:**

- No evidence it has made US banks safer
- Might make the US anti-competitive
- Limiting risk to such an extent hinders profit-making ability
- Too cumbersome and expensive for smaller financial institutions
- Capital reserve requirements have reduced liquidity in the market
- Lending regulations have blocked business and middle class borrowing

The Derivatives industry are not keen to repeal the structural changes that were made to the market under Dodd Franks:

<https://www.ft.com/content/1f6ccfbe-ed2e-11e6-ba01-119a44939bb6>

## The Volcker Rule



**Part of the Dodd Frank Act – named after the former US Federal Reserve Chairman Paul Volcker who encouraged Obama to include it in new legislation.**

- Legislates against Proprietary (Prop) Trading by Banks
- Aims to prevent banks from acting like hedge funds
- Banks cannot trade with their own funds for their own profits
- Legislates against banks owning hedge fund or private equity funds
- Stemmed from banks taking on complex, high risk positions and losing



Bear Stearns were a US-based global investment bank; their hedge fund division made big bets on real estate investments that failed in 2008. A year later after huge losses and a lack of confidence, the bank collapsed.

CNN Video explaining the Volcker Rule:

<http://money.cnn.com/2017/01/09/investing/volcker-rule-trump-wall-street/>

## CNN Video explaining the Volcker Rule



CNN Video explaining the Volcker Rule:

<http://money.cnn.com/2017/01/09/investing/volcker-rule-trump-wall-street/>

YouTube: <https://youtu.be/CiOuqGPp7Yc>

## SOX (Sarbanes Oxley)



### 2002 – The Sarbanes-Oxley Act

- US legislation that applies to all public companies
- Aims to ensure confidence in financial statements
- Aims to prevent accounting fraud

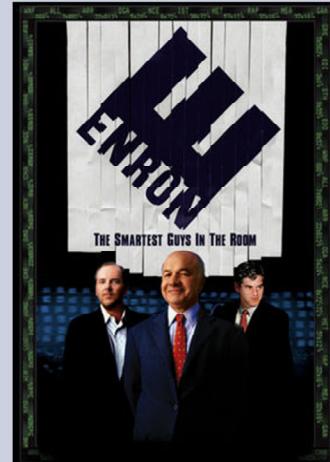
Key provisions include:

#### Section 302

- Senior managers must certify the accuracy of the financial statement

#### Section 404

- Internal controls must be established and their adequacy reported on
- IT departments must keep specific company records for set periods



Passed after a number of corporate scandals (Enron and WorldCom and Tyco International) which shook confidence in company Financial Statements

Enron, a US energy company, hugely successful and great returns for shareholders – was America's 4<sup>th</sup> largest company at the end of 2000, it was named by Fortune magazine as America's Most Innovative Company for six consecutive years (1996-2001)

Scandal became public in 2001, led to the bankruptcy of Enron and the dissolution of Arthur Anderson, one of the 5 largest audit and accountancy partnerships in the world. (Wikipedia: [https://en.wikipedia.org/wiki/Enron\\_scandal](https://en.wikipedia.org/wiki/Enron_scandal))

The Enron executives used accounting loopholes, poor financial reporting and SPVs to hide billions of dollars of debt. Shares in Enron fell from \$90 a share to less than \$1.

SOX also known as the "Public Company Accounting Reform and Investor Protection Act"

Contains 11 sections

Includes criminal penalties for misconduct

Required the SEC to create regulations to define how corporations must comply with the law.

## Challenges with Regulations



Costly

Reactive

Ineffective

Anti -  
competitive

'Regulatory  
arbitrage'

Government  
bailouts  
underwrite  
risk taking

## Self Regulation



In US law, Self-Regulatory Organization is a defined term: they operate either in addition to state regulators or in their absence (i.e., in industries where there is no state regulation).

Avoid ties to specific country regulation, useful when business activities are across countries

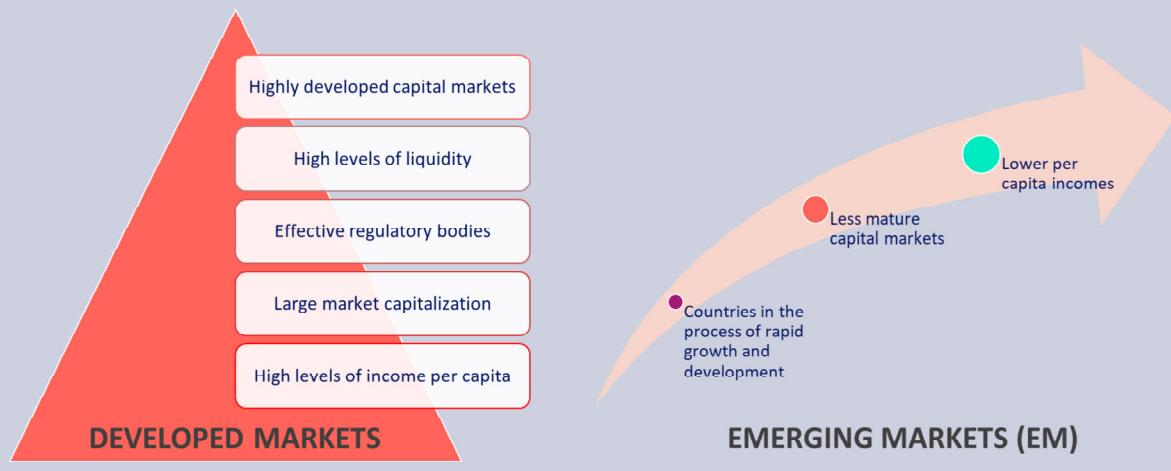
- Responsible for regulating itself
- Either through external agreements between businesses
- Or internal operations and process mechanisms
- Governing from within
- Sets regulations and guidelines for those associated with it

### FINRA: Financial Industry Regulatory Authority

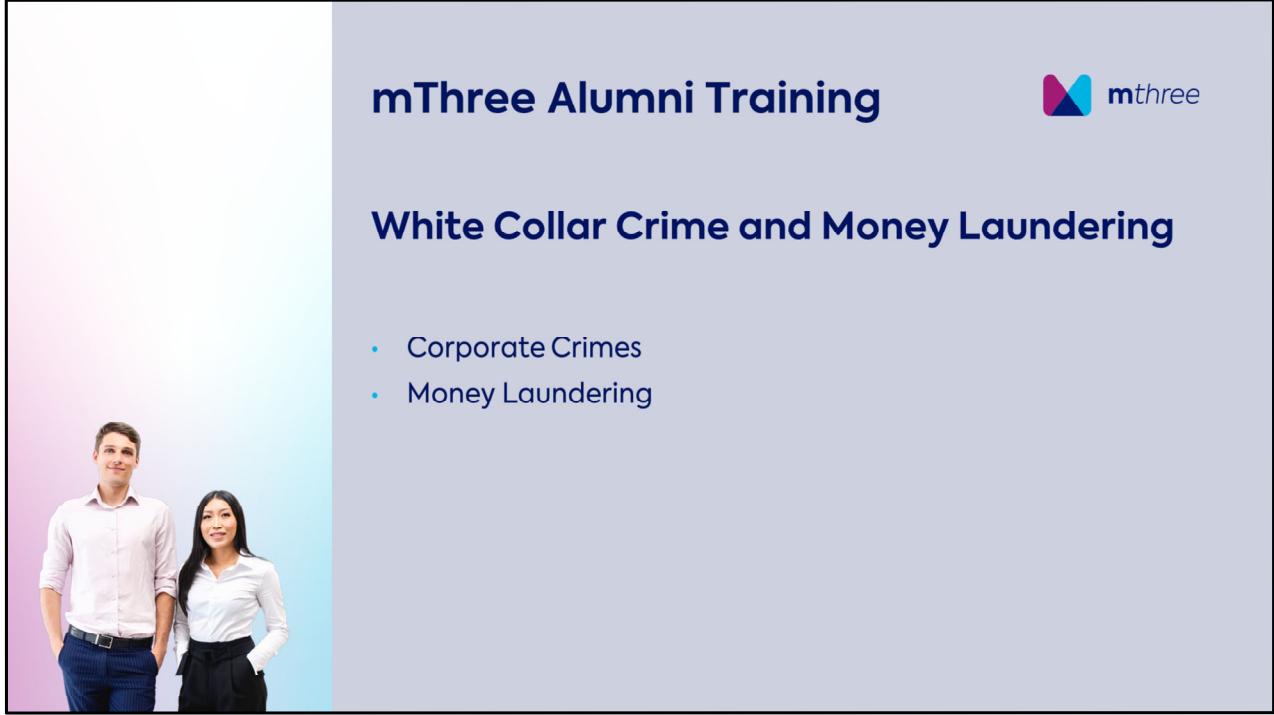
- An example of an SRO
- Regulates the US broker-dealer industry
- Independent, not for profit



## Developed vs Emerging Markets



<http://www.nasdaq.com/article/what-is-the-difference-between-a-developed-emerging-and-frontier-market-cm140649>



## mThree Alumni Training



### White Collar Crime and Money Laundering

- Corporate Crimes
- Money Laundering



## Corporate Crimes



There are a vast array of “corporate crimes” – it is the responsibility of every employee to be vigilant and report any misdemeanors seen in the workplace.

Corruption

Bribery

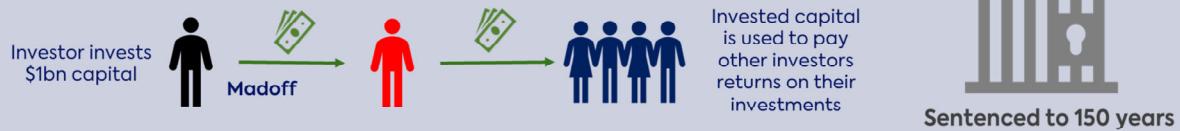
Fraud

Tax Evasion

Money Laundering

A fraud example: Bernie Madoff

- Fraudulent Ponzi scheme: pays old investors with funds from new investors
- Deceived investors, banks and regulators over 16 years
- Largest Ponzi scheme in history: \$20bn taken from investors
- Was a former Chairman of the Nasdaq exchange and vice-chairman of the National Association of Securities Dealers – the industry self-regulatory body



Bernie Madoff - sentenced

<https://www.ft.com/content/a29d2b4a-60b7-11e0-a182-00144feab49a>

Banks were potentially negligent too as they should probably have noticed the large amounts of funds being moved between accounts – it should have raised some red flags.

## Fraud – RMBS Mis-Selling



Pre-2008, banks marketed Residential Mortgage Backed Swap (RMBS) to investors as safe investments despite underlying loans being sub-prime.

2016: Goldman Sachs  
fraud settlement  
agreed at \$5.1bn

2016: US Justice  
Department sues  
Barclays over RMBS  
misselling

2016: Deutsche Bank  
and Credit Suisse  
agree \$12.5bn  
settlement

2017: RBS makes  
provision for a £multi-  
billion settlement

<http://www.dw.com/en/goldman-sachs-reaches-51-billion-mortgage-bond-fraud-settlement/a-18981568>

<https://www.theguardian.com/business/2016/dec/22/us-justice-department-accuses-barclays-over-mortgage-misselling>

<https://www.theguardian.com/business/2017/jan/25/rbs-braced-for-multi-billion-pound-settlement-for-loan-misselling-scandal>

## Whistleblowing



'Making a disclosure in the public interest'

When an employee reports suspected wrongdoing at work like:

- a criminal offence
- covering up wrongdoing
- damage to the environment
- danger to someone's health and safety

2015 UK FCA Whistleblowing rules mandate firms to:

- Appoint a senior whistleblowers' champion
- Implement whistleblowing arrangements
- Inform UK based employees about the FCA whistleblowing services
- Present an annual report on whistleblowing to their board



In the US, the Dodd Frank strengthened the whistleblowing program by allowing whistleblowers to receive some of the proceeds of any litigation settlements. The scope of people considered to be an employee was widened for whistleblowing purposes and lengthened time whistleblowers have to report violations.

Brainstorm – how does the class feel about whistleblowing?

## What is a Bribe?



What is the difference between a bribe and a gift? A gift is given without expectation of anything in return; it becomes a bribe when something is expected in return.

It is likely that the bank will make it very clear what is acceptable and what is not acceptable as a gift from a client, and all gifts have to be declared.

What do you think of the following ?

A secret bundle  
of cash

Tickets to a  
football match

A ski weekend

A bottle of wine

### US: 1977 Foreign Corrupt Practices Act

- The first legislation to criminalize bribes
- Prohibits the payment of bribes to foreign officials to assist in obtaining or retaining business
- Applies to conduct anywhere in the world and all company stakeholders

<http://www.morganstanley.com/about-us-governance/ethics>

Remember: 'There's no such thing as a free lunch'

<http://www.canadianbusiness.com/business-strategy/what-is-a-bribe-in-2011/>

## Politically Exposed People (PEPs)



Clients at higher risk of potential involvement with bribery and corruption are subject to enhanced due diligence; this also extends to relatives and close associates.

- Heads of State
- Member of Parliament
- Public office holders (past or current)
- Members of Courts of Auditors
- Ambassadors
- High-ranking Armed Forces officials
- Board members of central banks

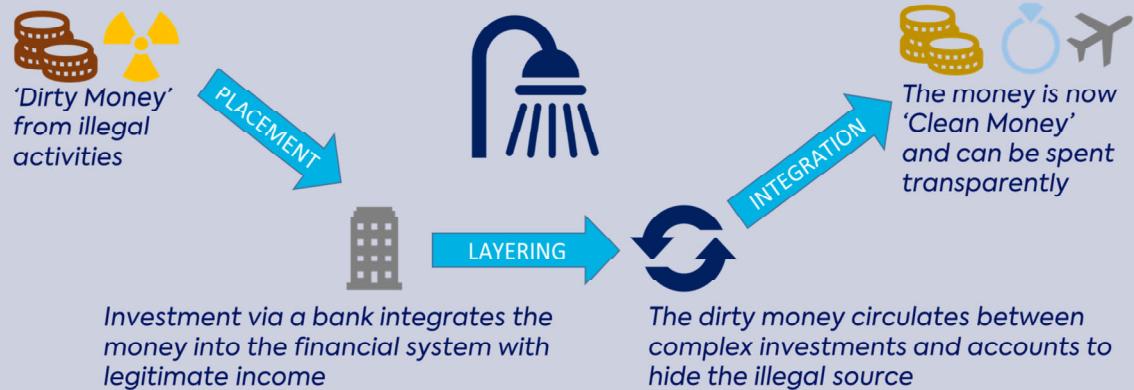


<http://www.investopedia.com/terms/p/price-earningsratio.asp>

## Money Laundering



Money laundering involves the placement, layering and integration of illegally-sourced funds into a legitimate business in order to 'wash' them. They then appear to be from legal activities



Money laundering can be other assets instead of money

## Anti-Money Laundering

After the 9/11 attacks, counter terrorist finance strategies have been introduced

### Terrorism Financing:

- finances illegal terrorist activities, or supports persons engaged in illegal activities or who intend to engage in illegal terrorist activities
- the collection or provision of funds with the intention that they should be used in order to support or commit terrorist activities

### Counter Terrorism Financing (CTF) measures have been introduced

- CTF recommendations were modelled on the AML framework
- Both terrorist financers and money launderers are keen to disguise the source and destination of funds

### Fines for Money Laundering Violations

- Jan 2017: Deutsche Bank fined by UK and US £506m for not preventing \$10bn worth of Russian money laundering between 2012-2015
- Feb 2017: Coutts (RBS) fined 6.5m Swiss Francs by Swiss regulators for breaching AML laws by processing \$2.4bn of unlawfully generated funds

<http://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/31/Fight-Against-Money-Laundering-the-Financing-of-Terrorism>



## mThree Alumni Training



### Compliance

- The role of compliance in the bank



## Compliance Responsibilities



The compliance team in a bank have many responsibilities. Each business area will have a compliance team

Monitoring

Checking

Control

Rules

Practices and  
Procedures



The team will translate new rules into procedures as well as advise the business and interact with regulators.

For example – sales and trading compliance will monitor deal sizes and impact to market; counterparties involved; trading mandates; recording agreements; electronic trading