MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE:

TIPS AND TRAPS FOR INSURANCE PRICING AND BEYOND

*"Your scientists were so preoccupied with whether or not they **could**, they didn't stop to think if they **should**."*

- Dr Ian Malcolm, Jurassic Park

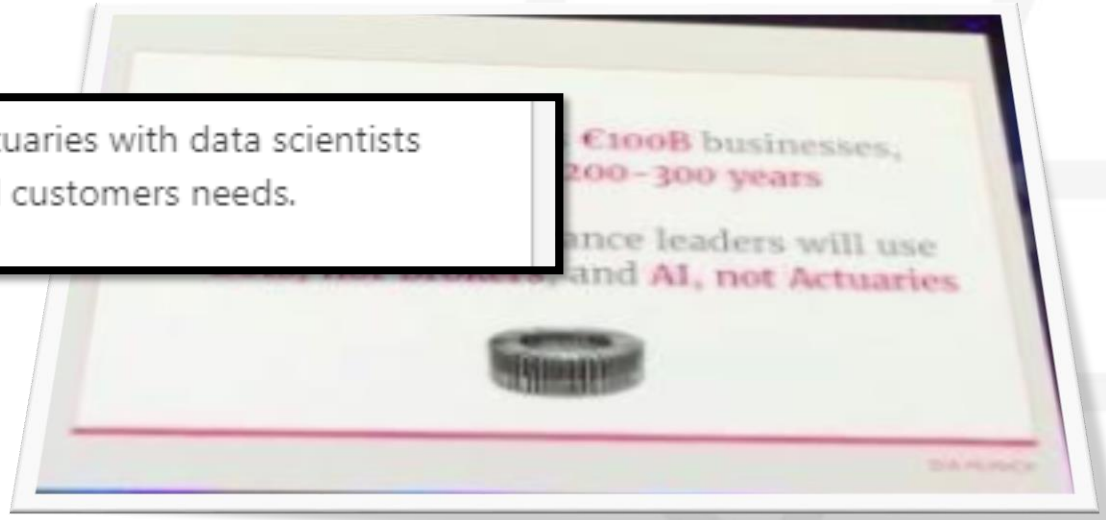
Key takeaways for this session

1. Evolution of themes on AI – and where do actuaries fit in?
2. Lets get the basics right first
3. You cannot build a model in isolation
4. It's a journey not a tool

ACTUARIAL SOCIETY OF SOUTH AFRICA

	2012	2014	2016	2018
Convention Topics	So much SAM!	Modelling / Optimisation	Uptick in Analytics	Fintech! ML and AI…
Media/Social Media		BIG DATA	CLOUD, IOT	Data science IOT, ML, Blockchain

Insurance companies will need to replace armies of actuaries with data scientists and talent that can tailor offers to specific markets and customers needs.
#insurance #hbr #iot



Looking past the hype… What is AI?

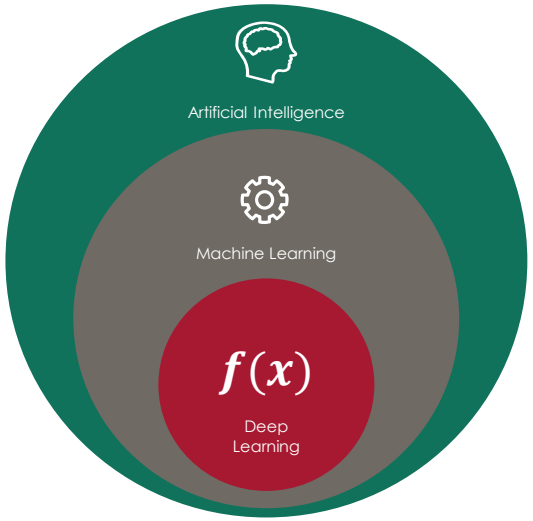
- Part of the problem is there are different definitions / views

AI Hierarchy

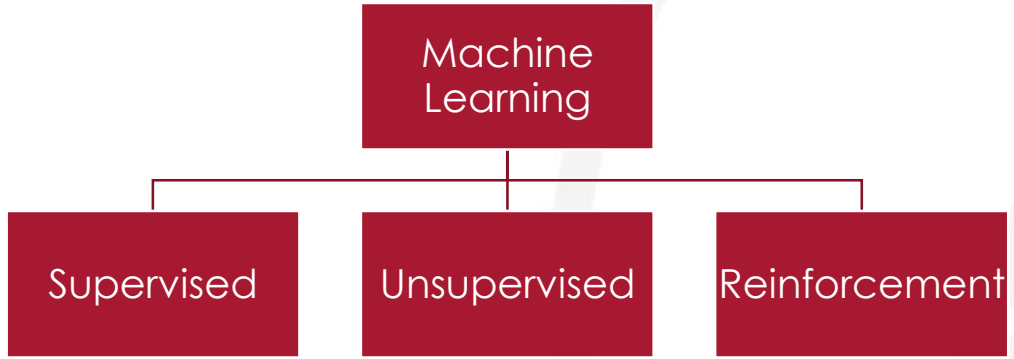
Artificial Intelligence:
Any technique which enables computers to mimic human behaviour

Machine Learning:
Subset of AI techniques which use statistical methods to enable machines to improve with experience

Deep Learning:
Subset of ML which make the composition of multi-layer neural networks feasible



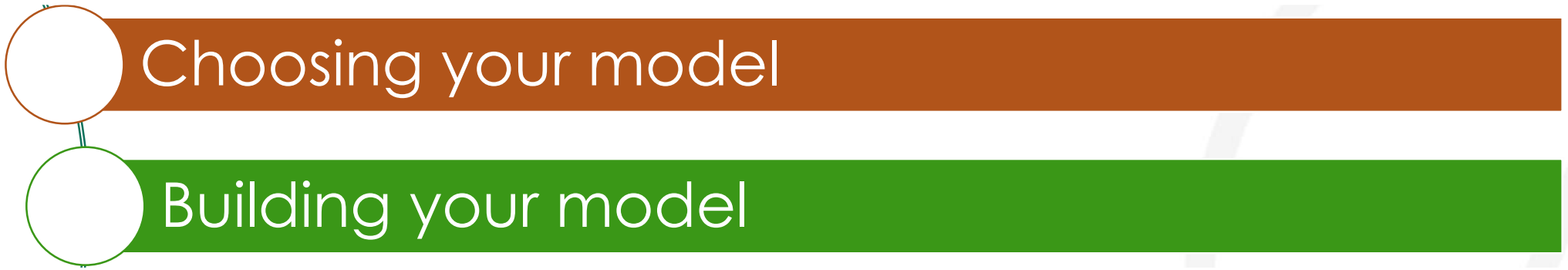
Types of Machine Learning



- **Classification**
- **Regression**
- **Forecasting**

- **Clustering**
- **Dimension reduction**

The point is… don't be scared off – as an actuary you are more equipped than you think…


Choosing your model
Building your model

“Never tell me the odds!”

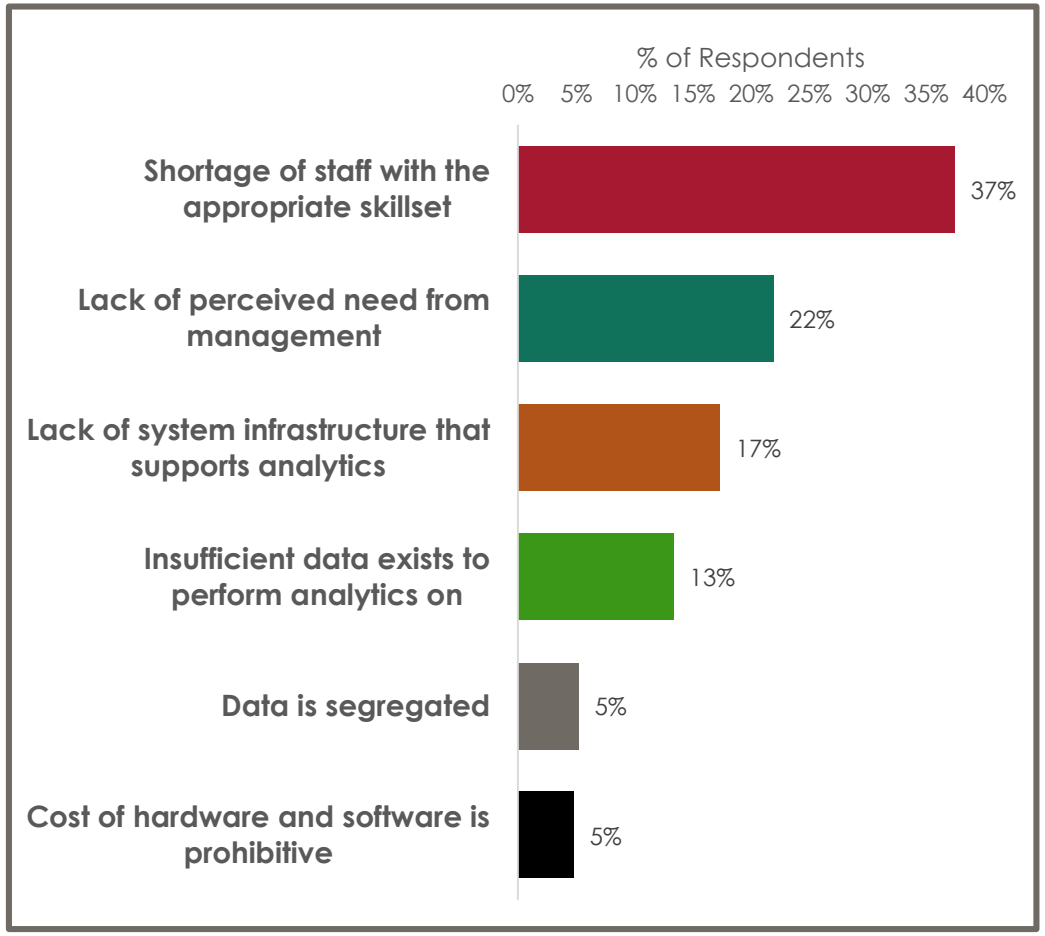
- Han Solo, Star Wars

Before we begin

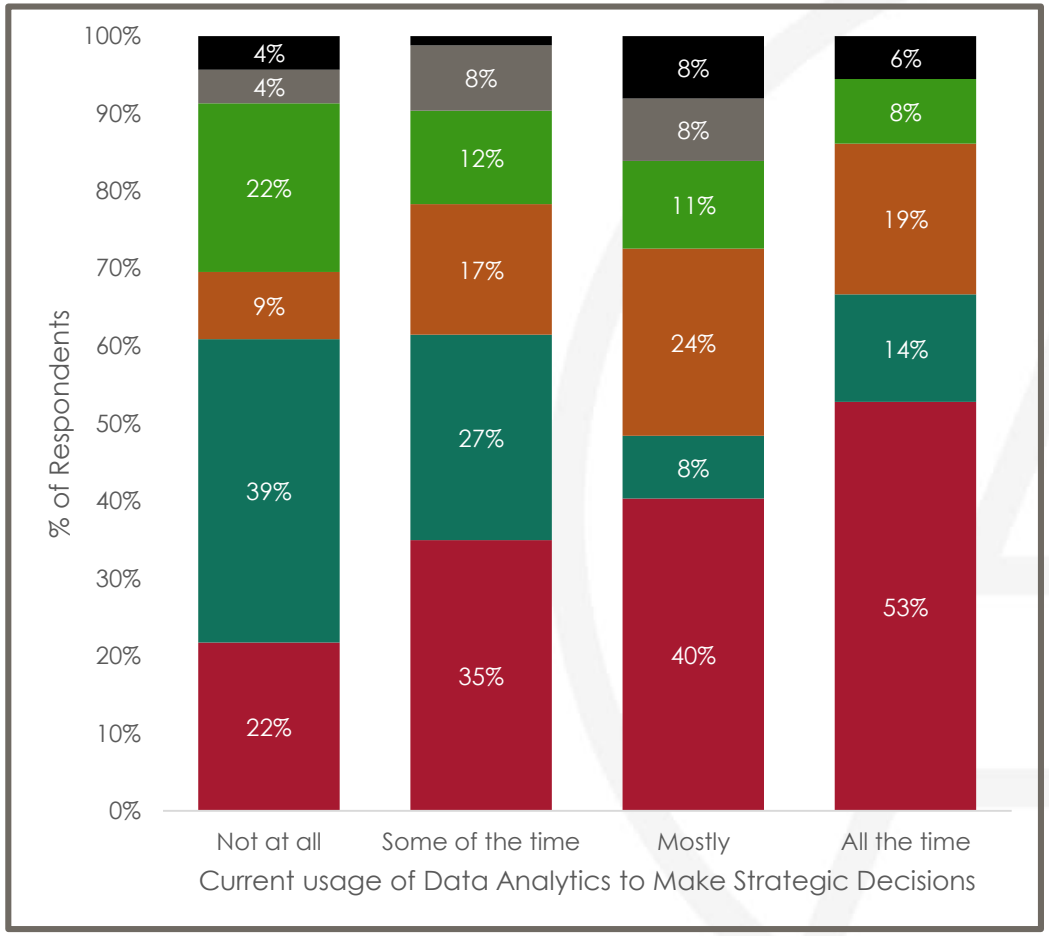
- Walk the floor!
  - Find a ***valuable*** problem to solve
  - Find out what's been done before
  - Calculate a Return on Investment
  - Find a champion for your cause
  - Consider the environment

Getting Buy In From the Wider Organisation

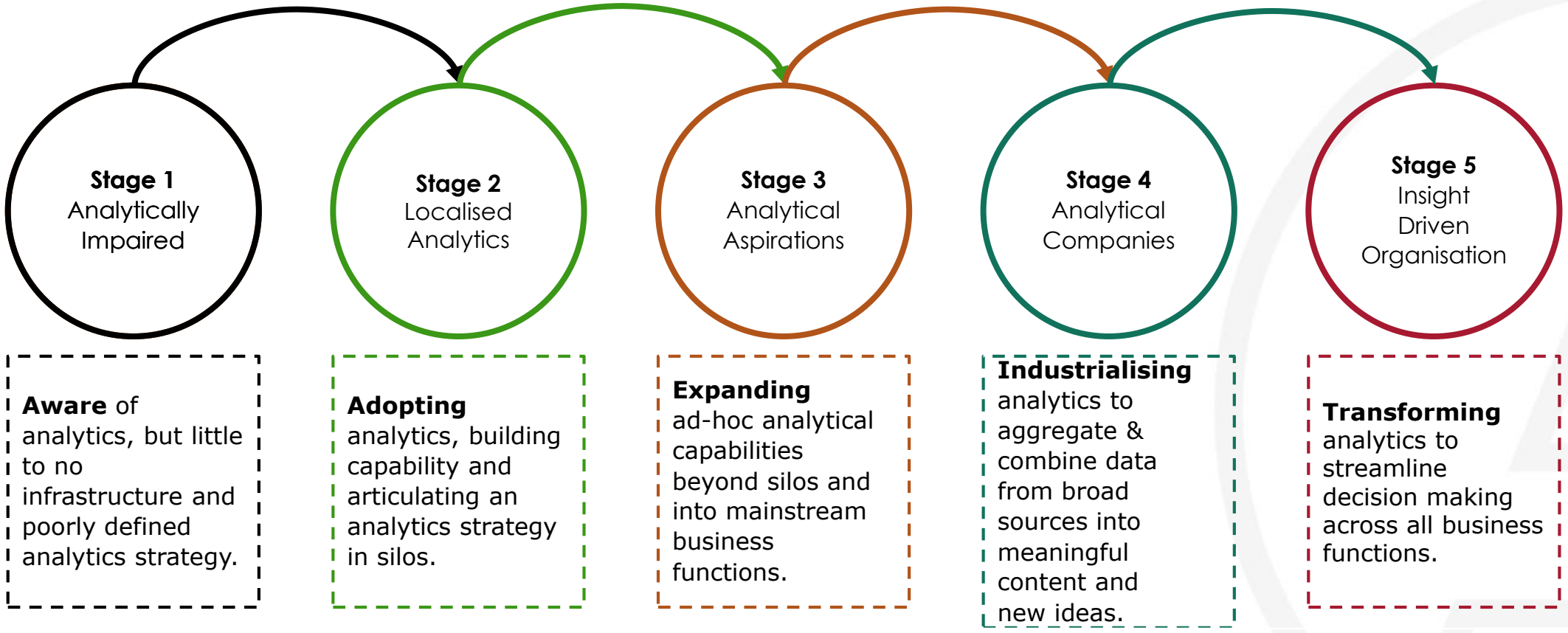
What is the greatest barrier to doing more advanced analytics?



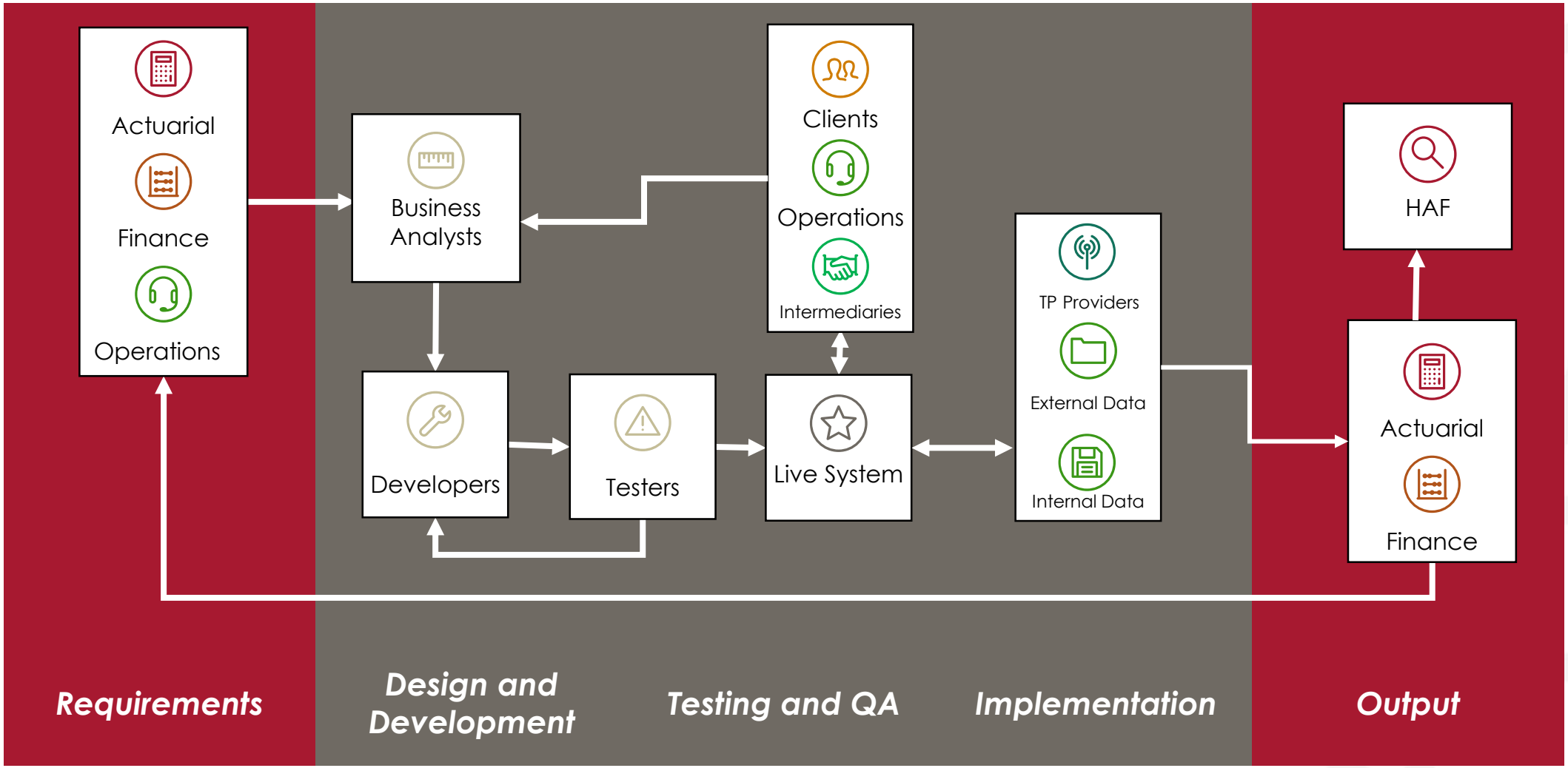
Greatest Barrier by Current Usage of Data Analytics to Make Strategic Decisions



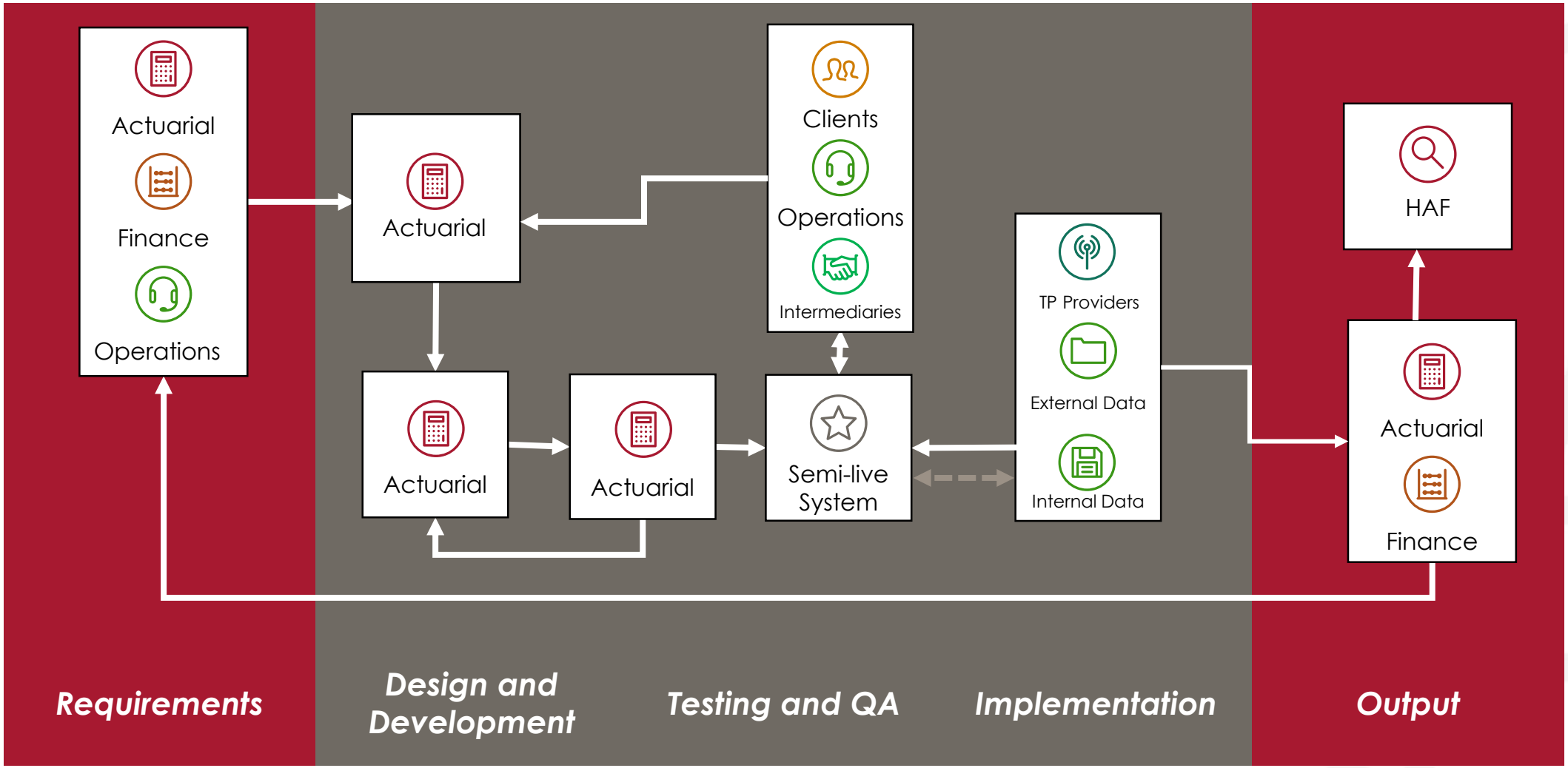
Should you be modelling?



System Stakeholders



System Stakeholders II



*"It is our **choices**, Harry, that show what we truly are, far more than our abilities."*

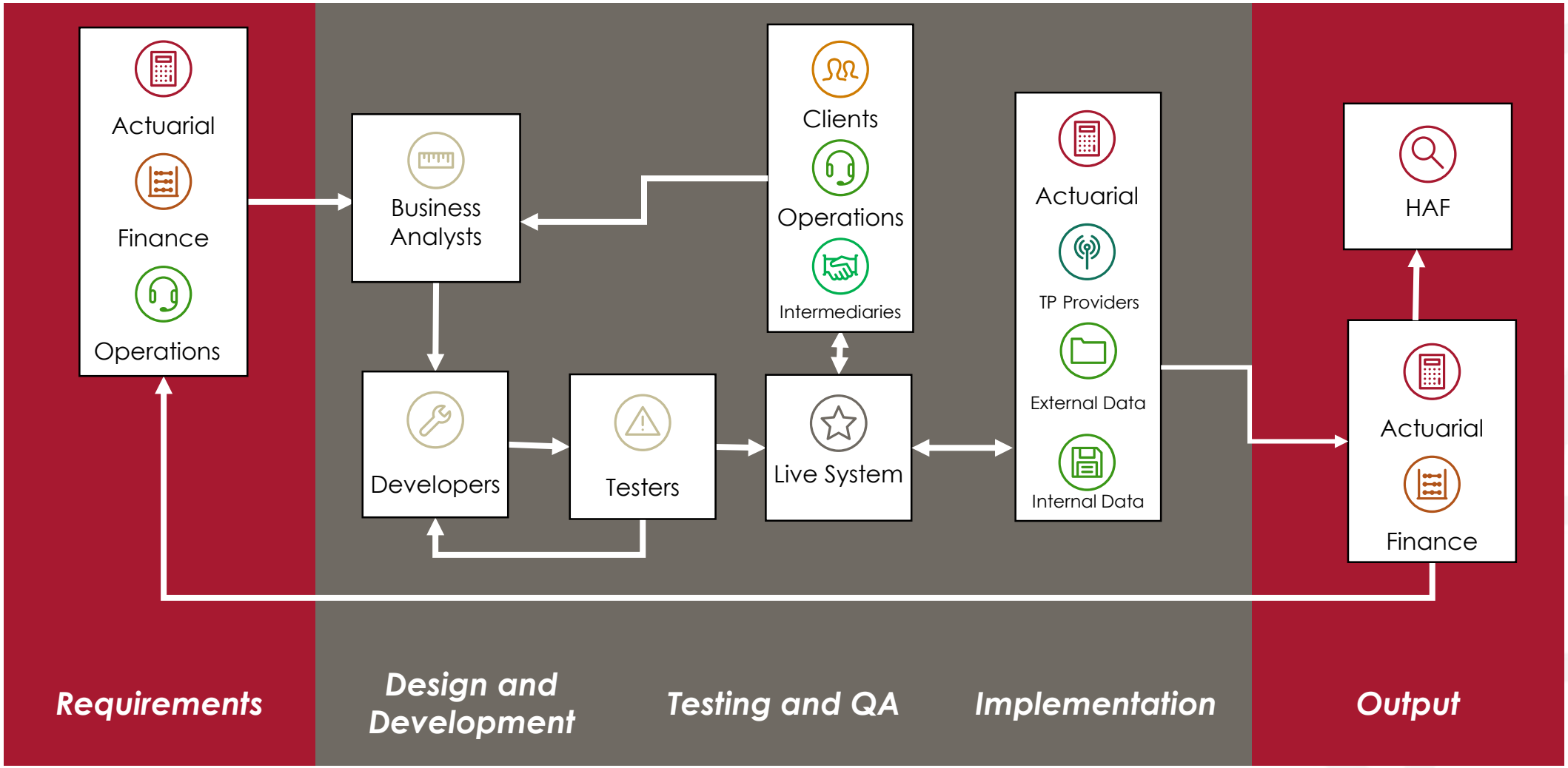
- Professor Albus Dumbledore, Harry Potter

Decisions Decisions Decisions

	Traditional Models	"Machine Learnings"

It is always possible to use a ***hybrid approach***: Use machine learning to identify interactions which feed through to a statistical model.

Design with Process in Mind

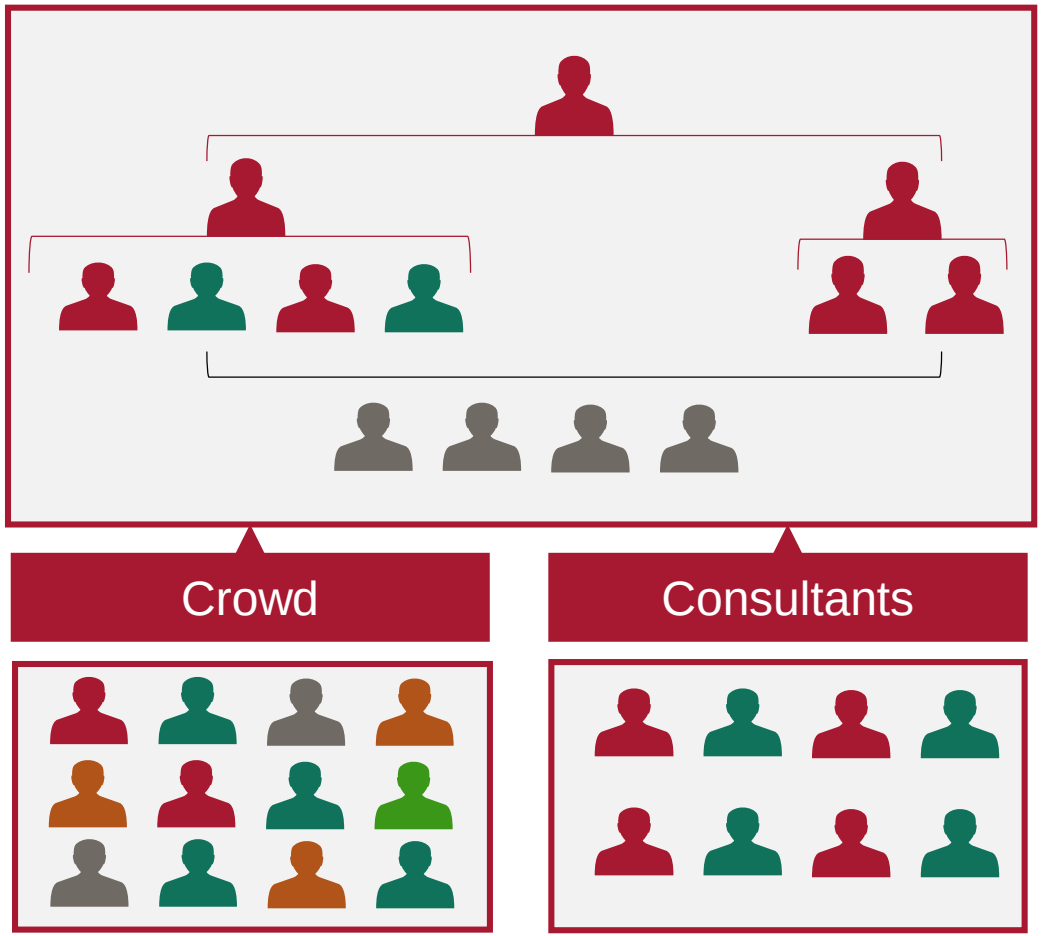


"All we have to decide is what to do with the time that is given us."

- Gandalf, Lord of the Rings

Who Should be doing the Modelling?

Structure of the Future



Construction of the Analytics Team

	Analytics Team	
	Actuarial Resources	**Statisticians / Data Scientists**
Advantages	• Good business/ risk understanding • Better softer skills • Can learn new technical skills	• Less Expensive • Better Technical Knowledge • Larger talent pool
Disadvantages	• More Costly • Scarce at senior levels • Knows enough to be dangerous	• Lack business understanding and practical application • Struggles to learn business skills

"Insufficient facts always invite danger."

- Mr Spock, Star Trek

Understand the Problem

Facebook used to measure users' interest in a given post mainly by whether they hit the "like" button on it.

Pinterest congratulated single women on their impending marriages.

Google Flu does not accurately forecast disease outcomes based on search behaviour since most people do not have a good understanding of flu symptoms.

Undergraduate students at MIT spent years building a self-driving race car, that optimised the route and not the car

- Understand your data
- Understand the drivers and relationships
  - Second order benefits
  - Walk the floor
- Be careful of proxies in the data
- Be clear of what data you will and won't have

Understand What Your Model is Doing

Recruitment models were trained to identify candidates with the highest probability of success (being promoted). The company had a history of only promoting men.

Numerous cases have been reported of image recognition software not accurately identifying non-caucasion individuals.

Social Media sites that created echo-chambers based on clustering users together.

- **Algorithmic bias:** occurs when a computer system reflects the implicit values of the humans who are involved in collecting, selecting, or using data.
  - Perception is everything
  - Consider regulations
  - Did you have all the data?
  - Be careful about feedback loops

Testing, Release and Beyond

Testing

- Be involved in the design of the testing plan
- Where do you think the model will break?
  - A agent / intermediary will find that scenario within a week
- It's not a "one and done" activity
- Automation is your friend

Post Release

- Show and tell
- Documentation and Reporting are necessary pains
- Who is using your model and where and why?
- Keep walking the floors
- Prevent feedback loops from occurring
- Performance Monitoring (a forgotten art?)

Conclusion

- The journey is just as important than the destination
- First find the right problem and then find the right tool
- Involve the rest of the business
- You don't need to know everything, you just need to know enough to get started and then build from there

*"If you want to **go fast, go alone**.*
*If you want to **go far, go together**."*

- African Proverb

Questions?

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