

# **2019 Predictive Analytics Symposium**

## **Session 19: ALL - Embracing Disruption: InsurTech and the Future of Actuarial Science**

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# Embracing Disruption

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9/20/2019



# What is disruption?



A detailed black and white engraving of Johannes Gutenberg, showing him from the chest up. He has a long, full beard and is wearing a cap with a fur trim. The background of the engraving is filled with faint, repeating text, likely from a printed page.

# johannes gutenberg

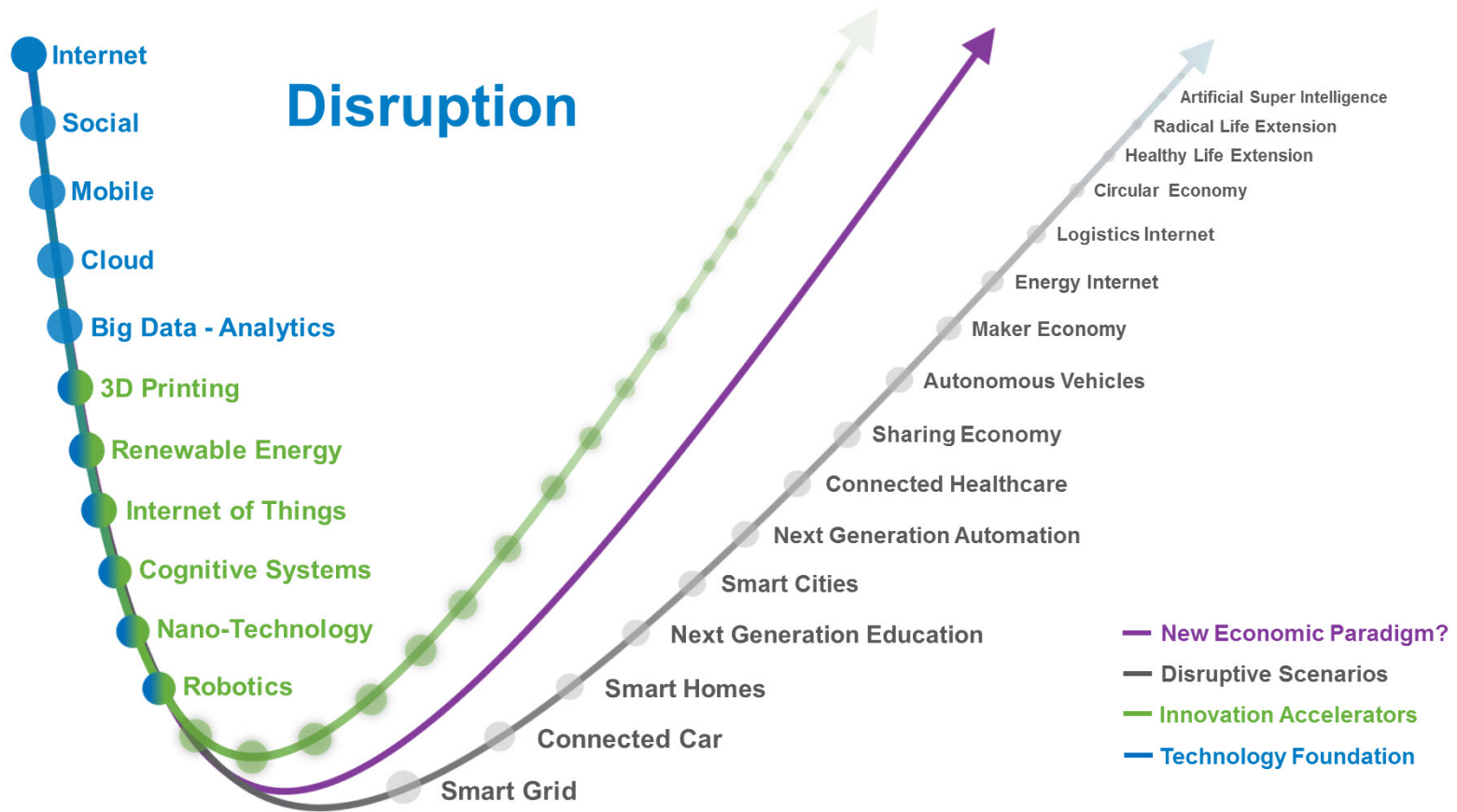
'IT IS A PRESS, CERTAINLY,  
BUT A PRESS FROM WHICH  
SHALL FLOW IN  
INEXHAUSTIBLE STREAMS  
THROUGH IT.'

# COMPONENTS OF DISRUPTION

- ACCESS: LIBERATING WALLS OFF INFORMATION
- EFFICIENCY: EASIER WAY TO EXECUTE PROCESS
- KNOWLEDGE: LEARNING MORE....FASTER

DEMOCRITIZING CURRENT PROCESS  
LIBERATES A NEW PRODUCT

# LEADING TO PRODUCT INNOVATION



# AND MARKET TRANSFORMATION



Largest communications provider owns no infrastructure.



UBER

Largest taxi service owns no taxi vehicles.

facebook

Largest media company creates no content.



Fastest growing bank & currency, has no banks, nor central authority.



Largest entertainment company produces no content.



Largest global retailer has no inventory, and no stores.



ethereum

Fastest growing "cloud" development platform has no servers.



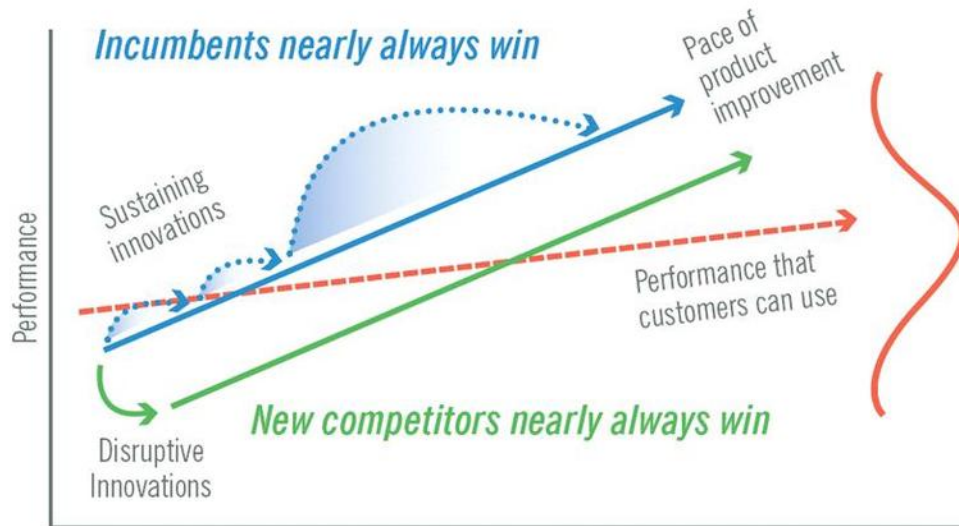
Leading software & services brand monetizes people, not software.



Largest hospitality company owns no real-estate.



# INCUMBENTS DON'T DISRUPT....

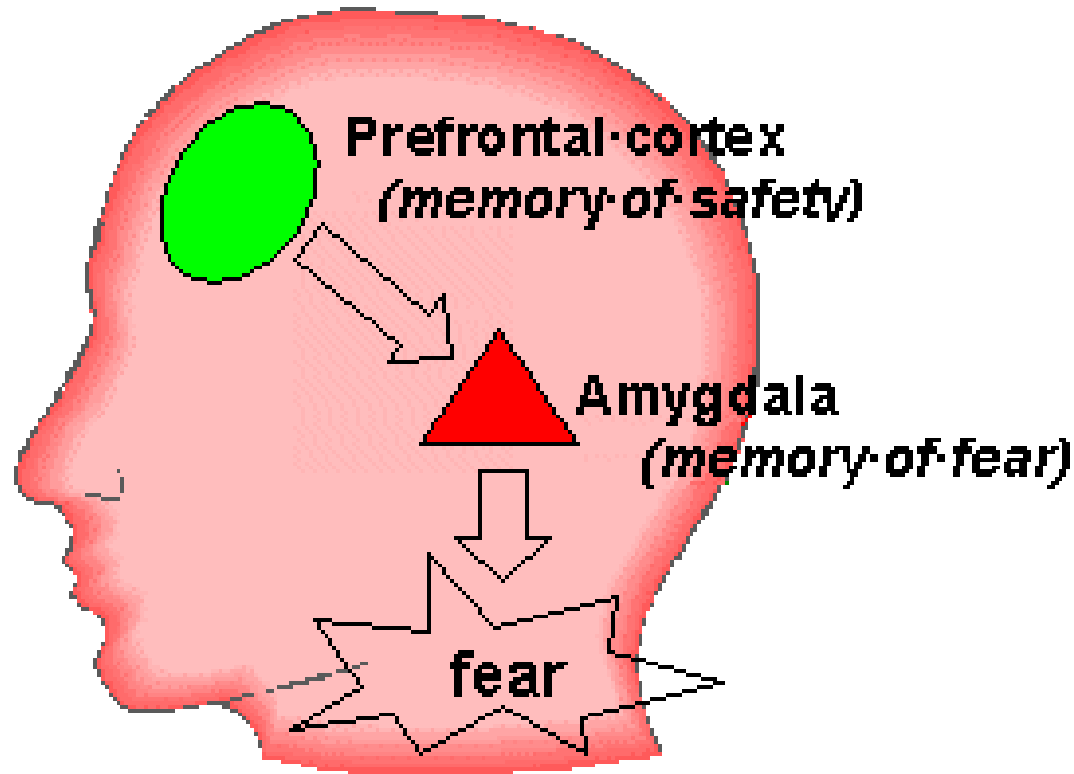


Source: Clayton Christensen, *The Innovators Solution*

.....THEMSELVES



# MOSTLY DUE TO FEAR .....



# OF THE UNKNOWN



CartoonFeeds.CartoonStock.com

**"This really is an innovative approach, but I'm afraid we can't consider it. It's never been done before."**

# DOUBLING DOWN ON STATUS QUO

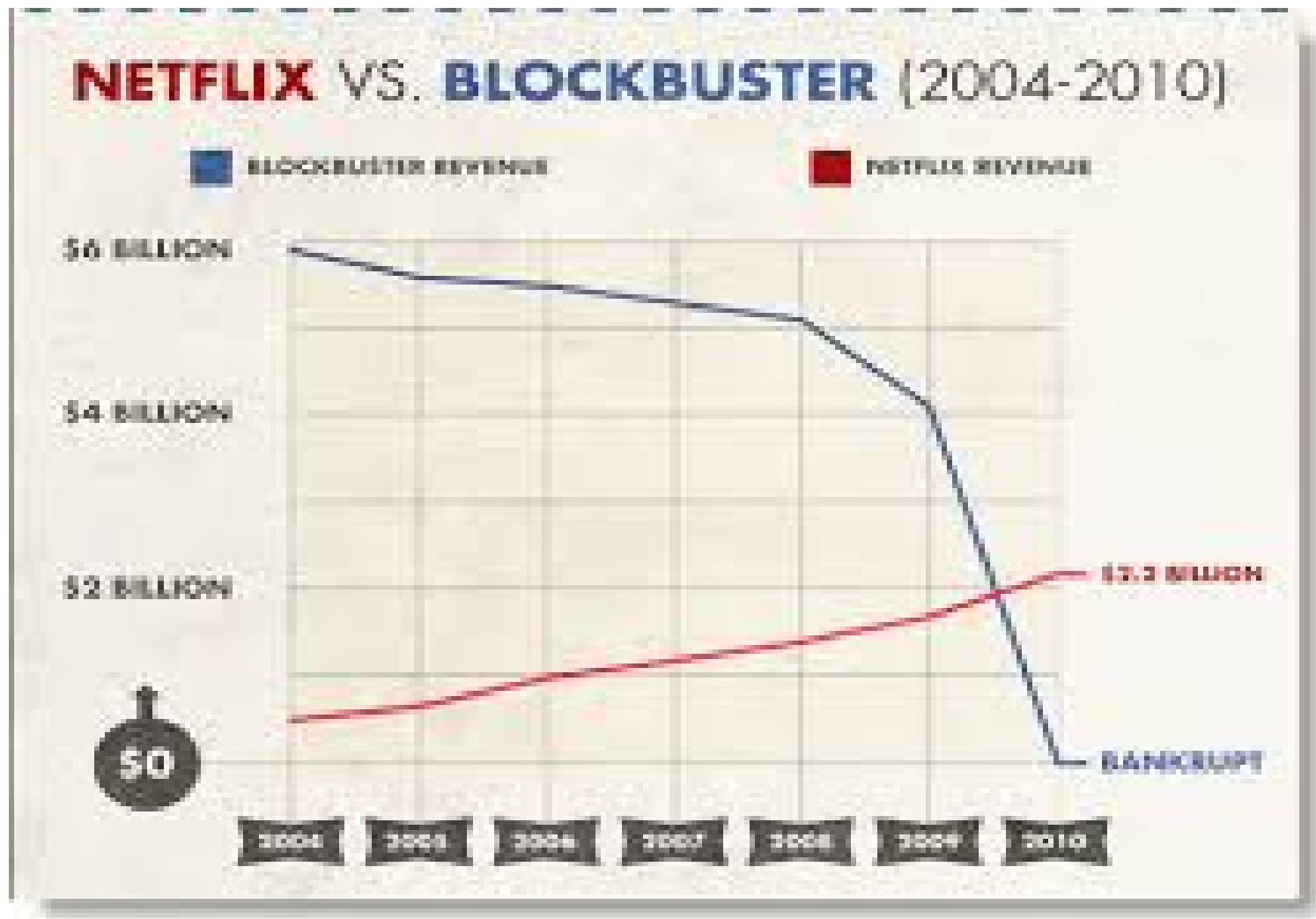


**TRADITION**

JUST BECAUSE YOU'VE ALWAYS DONE IT THAT WAY  
DOESN'T MEAN IT'S NOT INCREDIBLY STUPID.

Despair, Inc.

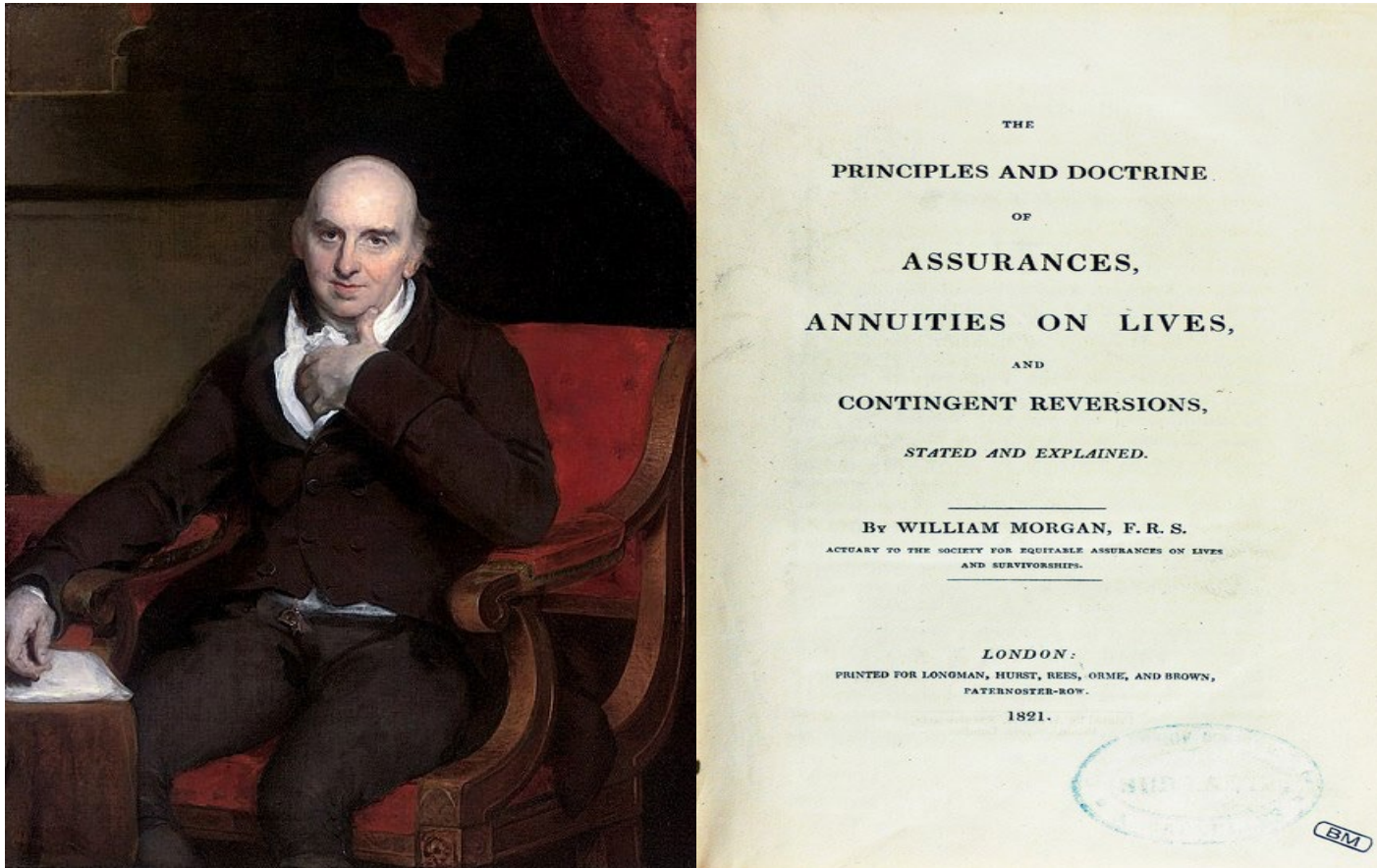
# UNTIL THEY ARE DEAD....



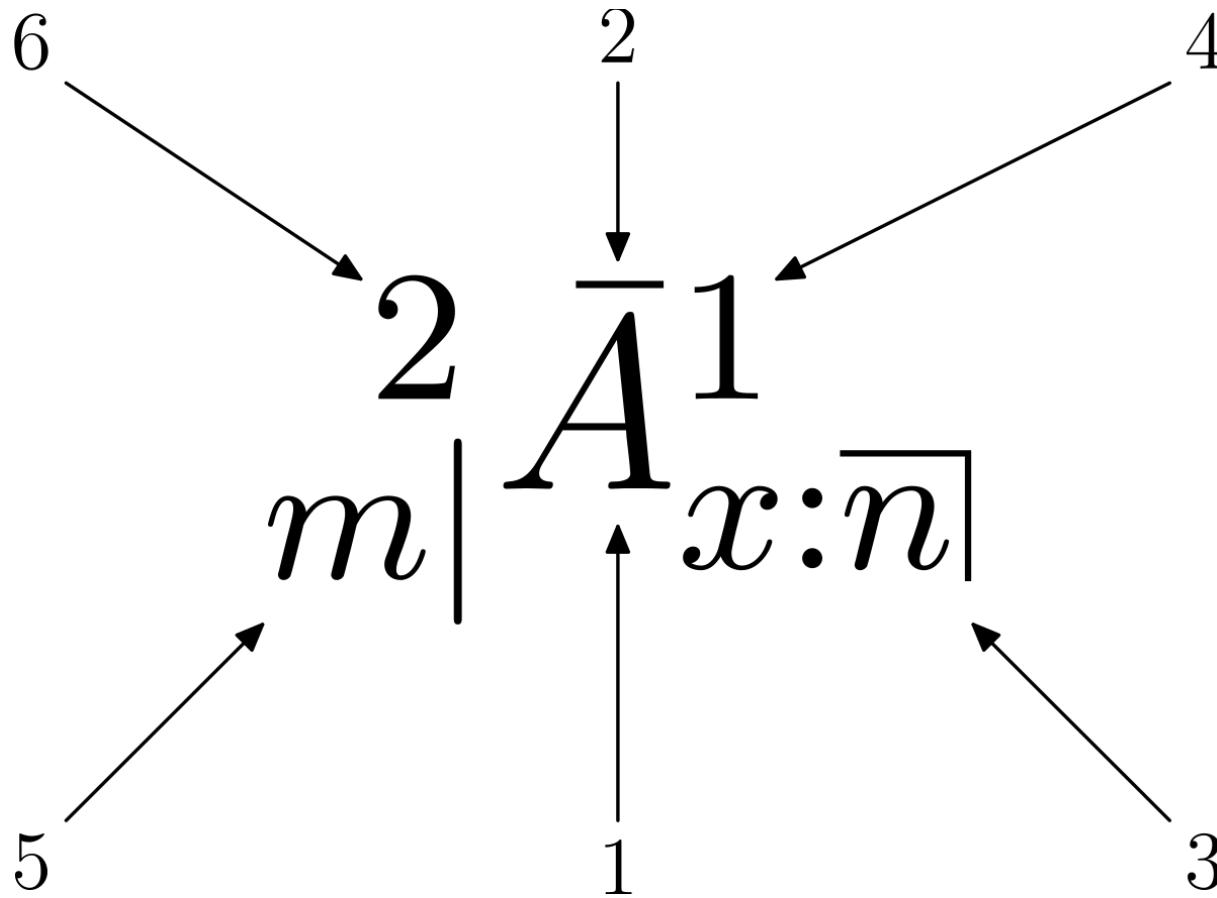
# OR IRRELEVANT



# Actuaries were once innovators.....



# Using discrete math and probability



# To calculate the financial reward

**Insurances** Now consider a benefit of one unit of capital payable immediately on transition into state  $k$  for a life initially aged  $x$  in some state  $i$  of a MSM. Further, suppose that in this case  $i \neq k$ . The EPV of the payment is

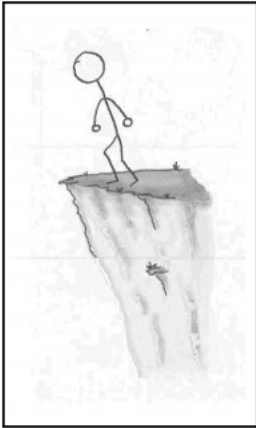
$$\bar{A}_x^{ik} = \int_0^{\infty} \sum_{j \in \mathcal{S}, j \neq k} e^{-\delta t} {}_t p_x^{ij} \mu_{x+t}^{jk} dt.$$

Let us consider the components of the above equation which can be taken as the definition of  $\bar{A}_x^{ij}$ . A non-rigorous description would be as follows.

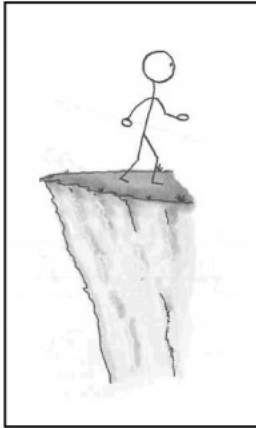
The product  ${}_t p_x^{ij} \mu_{x+t}^{jk}$  is the probability that in the life aged  $x$  and in state  $i$  at time  $t = 0$  is in state  $j$  at time  $t$  multiplied by the (approximate) probability of transitioning from state  $j$  to state  $k$  in the very short interval of time  $dt$ . This represents the probability the payment will be made in the time interval  $(t, t + dt)$ . We then discount this payment using the factor  $e^{-\delta t}$ . In order to allow for all possible states  $j$  which are not the destination state, we must sum. Finally, to allow the point in time of transition  $t$  to vary, we must integrate with respect to  $t$ .



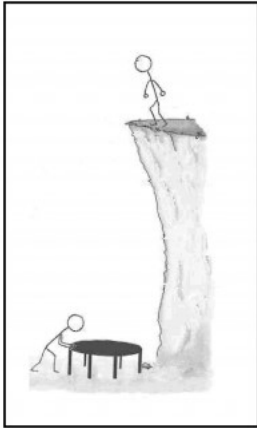
# Of risk mitigation



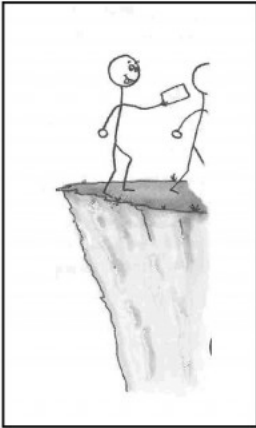
Your project



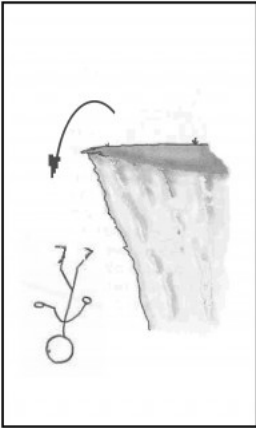
Avoid



Mitigate

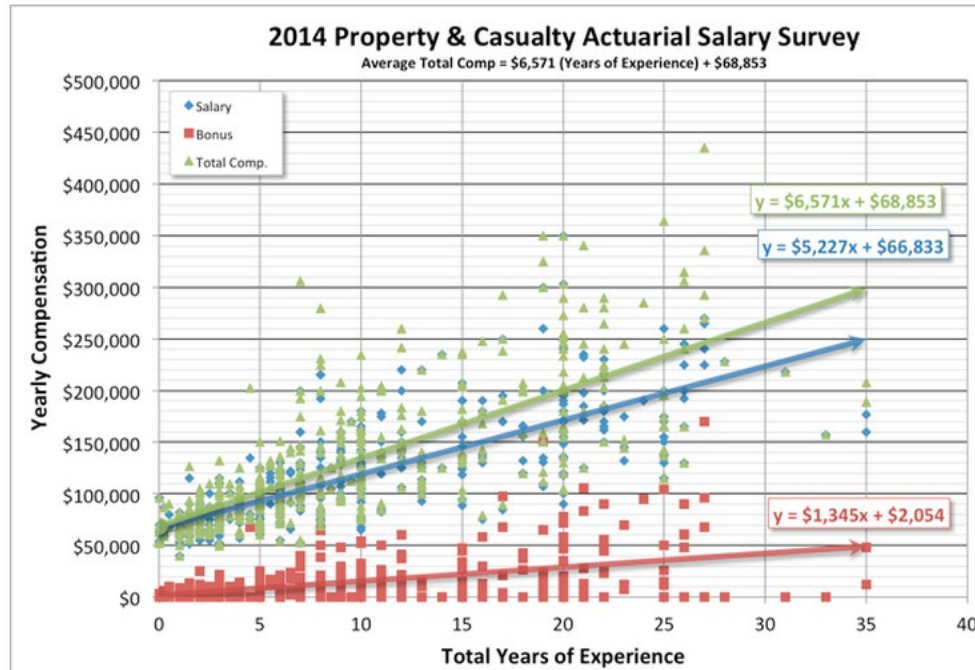


Transfer



Accept

# Which has made them wealthy



And expensive to hire...

# WHY SHOULD ACTUARIES CARE?

- MORE DATA LIBERATED THIS YEAR THAN ALL PREVIOUS YEARS OF HUMAN HISTORY (ACCESS)
- COMPUTER ASSISTED MODELING CREATING MORE ACCURATE OUTCOMES IN LESS TIME (KNOWLEDGE)
- MACHINE LEARNING AIDED MATHEMATICAL CALCULATION IS ONLY LIMITED BY CPUS...NOT HUMANS!

**MACHINES CAN NORMALIZE DATA, MODEL THE  
OUTCOME AND DO THE MATH.....  
MUCH CHEAPER THAN YOUR COST!**

# SO WHAT IS IT YOU DO HERE?



# And because you won't change.....

$p_x$  = probability of dying in year  $x$

$(1 - p_x)$  = probability of not dying in year  $x$

$\prod_{x=1}^n (1 - p_x)$  = probability of still being alive at end  
of year  $n$

$\prod_{x=1}^{\infty} (1 - p_x)$  = probability of living forever

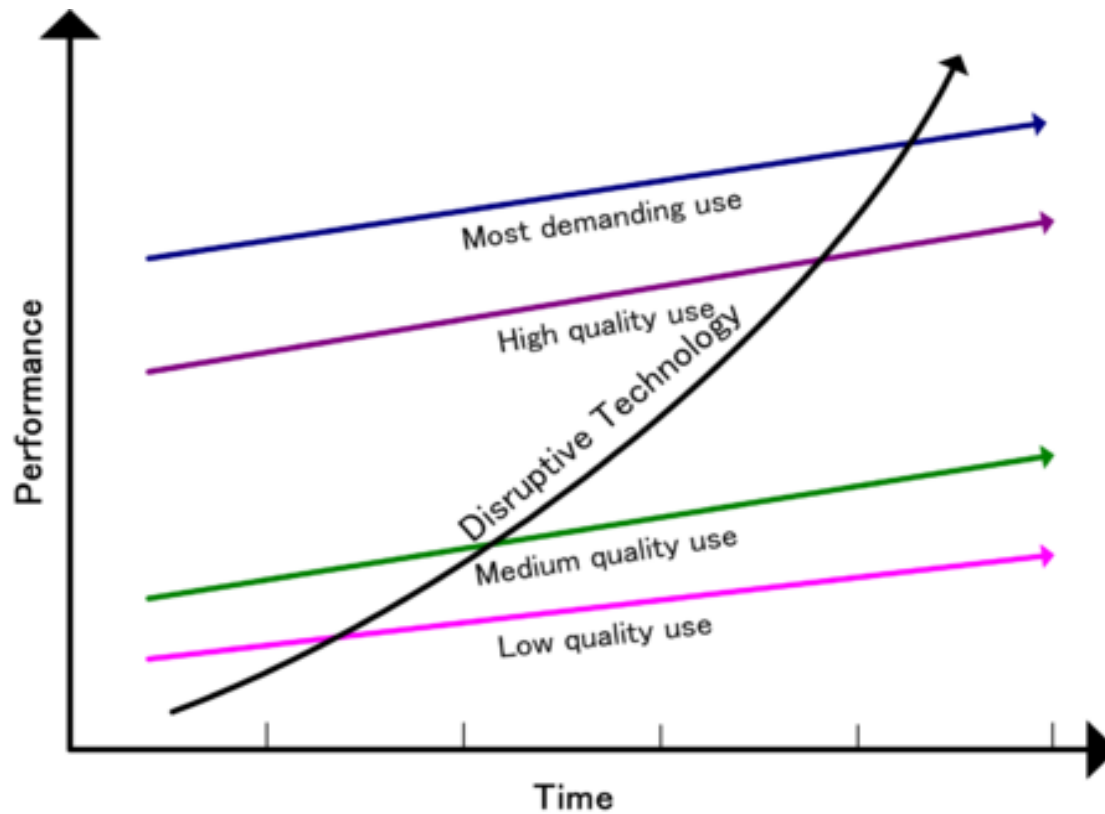
**The solution to mortality:**

$$\prod_{x=1}^{\infty} (1 - p_x) > 0$$

# New Entrants Arrive

ANALYTICS ARMS DEALERS	BENEFICIAL BOTS
	
CREATIVE CARRIERS	DIGITAL DISTRIBUTORS
	

# To Disrupt You....



# Through...

- Getting real time data about customer behavior while you still use credit reports
- Knowing their customer's name while you still know them as an age, gender, industry and geography
- Not using experience to deny coverage broadly
- Providing their brokers information instead of paperwork



# Which allows them to....

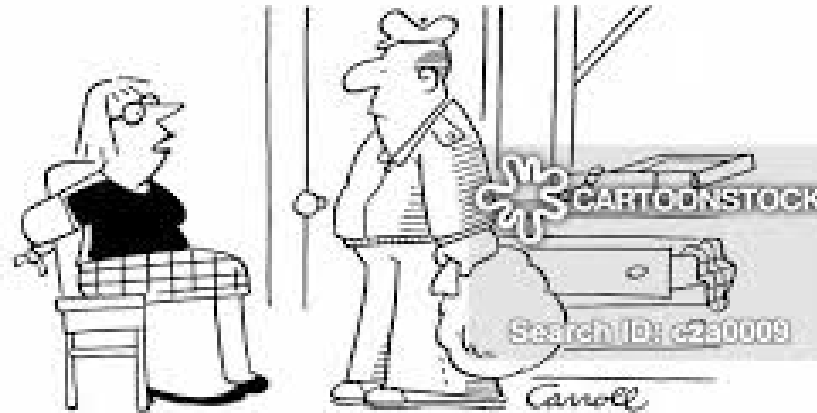
- Create carriers that offer new products
  - Hippo, Root, Lemonade, Next
- Enable Digital Distribution
  - Embroker, Matic, Jetty
- Automate Underwriting Function
  - Cape, Terrene, RiskAlyze

# Foundation of Insuretech

## DATA....DATA....DATA

- Make it easy for the customer to liberate it
- Format it so that it can fit any rate table easily
- Match it to your risk so that you aren't overexposed but the product is still affordable
- HARD CODE INTO THE PROCESS OF QUOTING, BINDING AND CLAIMING SO THAT THE CUSTOMER..NOT THE COMPANY..IS ALWAYS FIRST!

# Eliminate the #1 customer problem



*"Would you mind giving me a receipt for what you're stealing? If I don't have one I know I'm going to have a big hassle with my insurance company."*

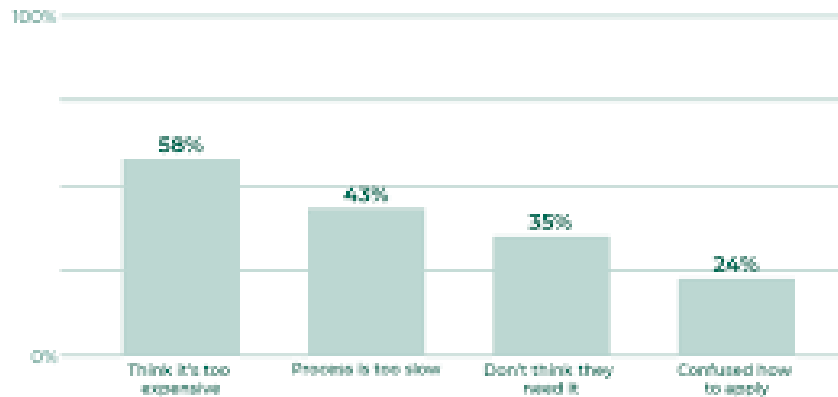
Affordable rate, hassle free approval,  
and great service

# Data + ML = New Insurance

- Lemonade's AI Jim does claims adjudication in less than 5 minutes including fraud checks
- Metromile Auto Insurance price is quoted on just your full address and is on average 30-50% lower
- Hippo uses home sensors plus machine vision informed aerial pictures to offer home insurance even in flood zones
- Haven Life extending simplified issue up to one million dollars by using behavioral data to understand morbidity beyond just disease

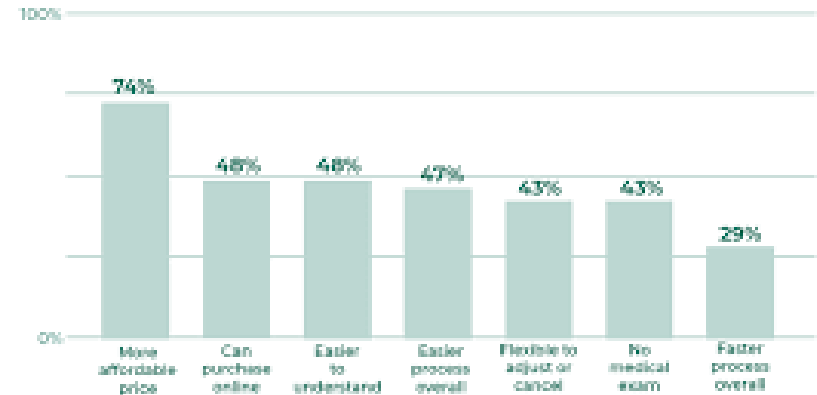
# ACTUARIES SET THE PRICE....

## Reasons Why Americans Don't Have Life Insurance



Source: Elinex's "Survey: Why Most Americans Don't Have Individual Life Insurance Coverage"  
<https://hallibronson.com/blog/life-insurance-research-findings>

## Which of the Following Would Make You More Likely to Purchase a Life Insurance Policy?



Source: Elinex's "Survey: Why Most Americans Don't Have Individual Life Insurance Coverage"  
<https://hallibronson.com/blog/life-insurance-research-findings>

# NOW THEY ARE IN THE WAY

# With the Wheel of Denial



# Why do Carriers....Care?

- Deflation of the US dollar has reduced underwriting float requiring increased volume to sustain capacity
- Agents asked to take on underwriting responsibility with only ad hoc understanding of risk
- Consumers shop on their own and churn quickly
- Profitability with pricing flexibility hard to maintain without reduction of expenses

EXPENSE REDUCTION IN MARGIN COMPRESSION  
ENVIRONMENTS DRIVEN BY AUTOMATION

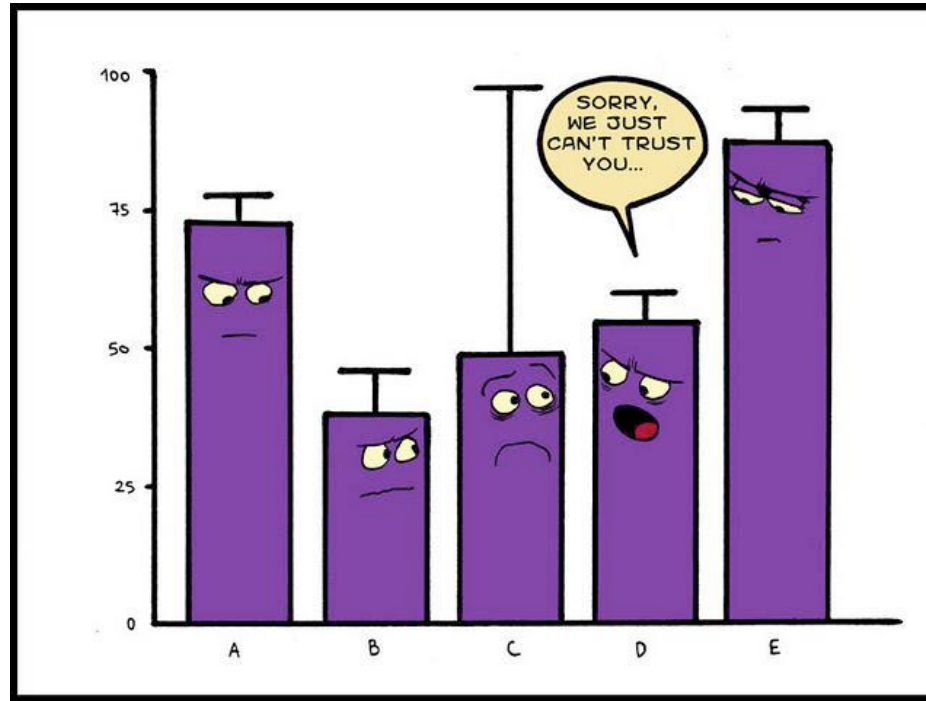
# HOW ARE THEY GOING TO DO IT?

- Automate underwriting using AI
- Use NPL to accelerate claims submission and payment
- Reduce time on form with prefilled data
- Hire up predictive analytics and data science to improve pricing yield

**THE BIGGEST THREAT TO ACTUARIAL SCIENCE IS  
PREDICTIVE ANALYTICS**



# But WHY?!



The high bar of credibility that drives actuarial science

# Which for the carrier means....

- Actuarial models have to fit every possible person which means rating variables are VERY generic
- Rating flexibility which comes from experience is both expensive and time consuming to ascertain
- Pricing is used to mitigate exposure so carriers rely on ad hoc underwriting by agents to be competitive
- Adjustments are made AFTER exposure so pricing is always trailing actual market experience

# But are Carriers right?

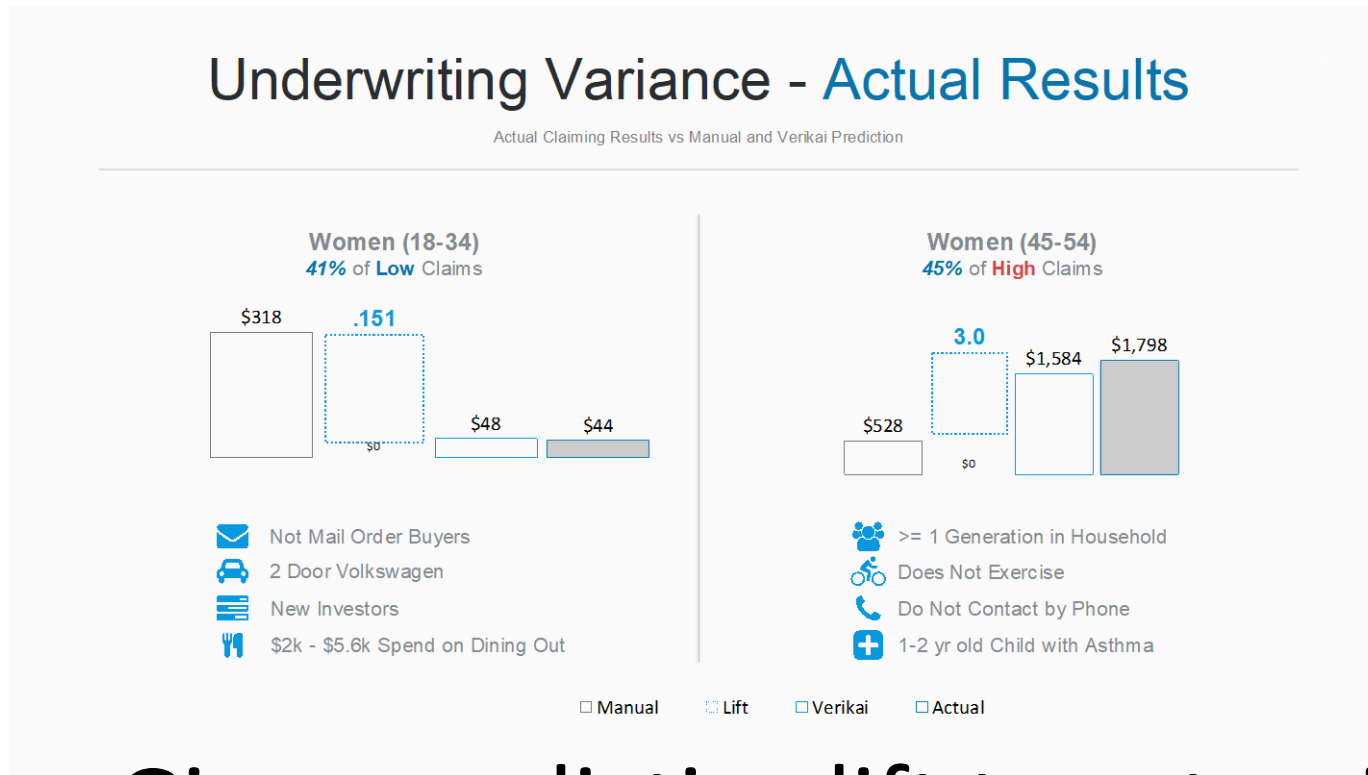


Modeling to an outcome needs an actuary to tell you what the outcome is....

# If you merge the two you get....

- Mathematical understanding of the cost of exposure
- Probabilistic knowledge around rare events
- Models grounded in the credibility of historical experience
- Applicable to all possible outcomes of the business
- Perfect balance between profit and capacity with meaningful flexibility for the carrier and the customer

# Informing variance to the manual....



Gives predictive lift to actuarial accuracy

# LONG TERM RELEVANCE

- Underwriting changes can be automated BY YOU rather than informed ad hoc
- Agents can be bots because YOU are informing risk
- Prospective modeling allows dynamic pricing adjustments rather than retrospective hand wringing
- Prescored data can offer lift to actuarial understanding such that profitability meets capacity

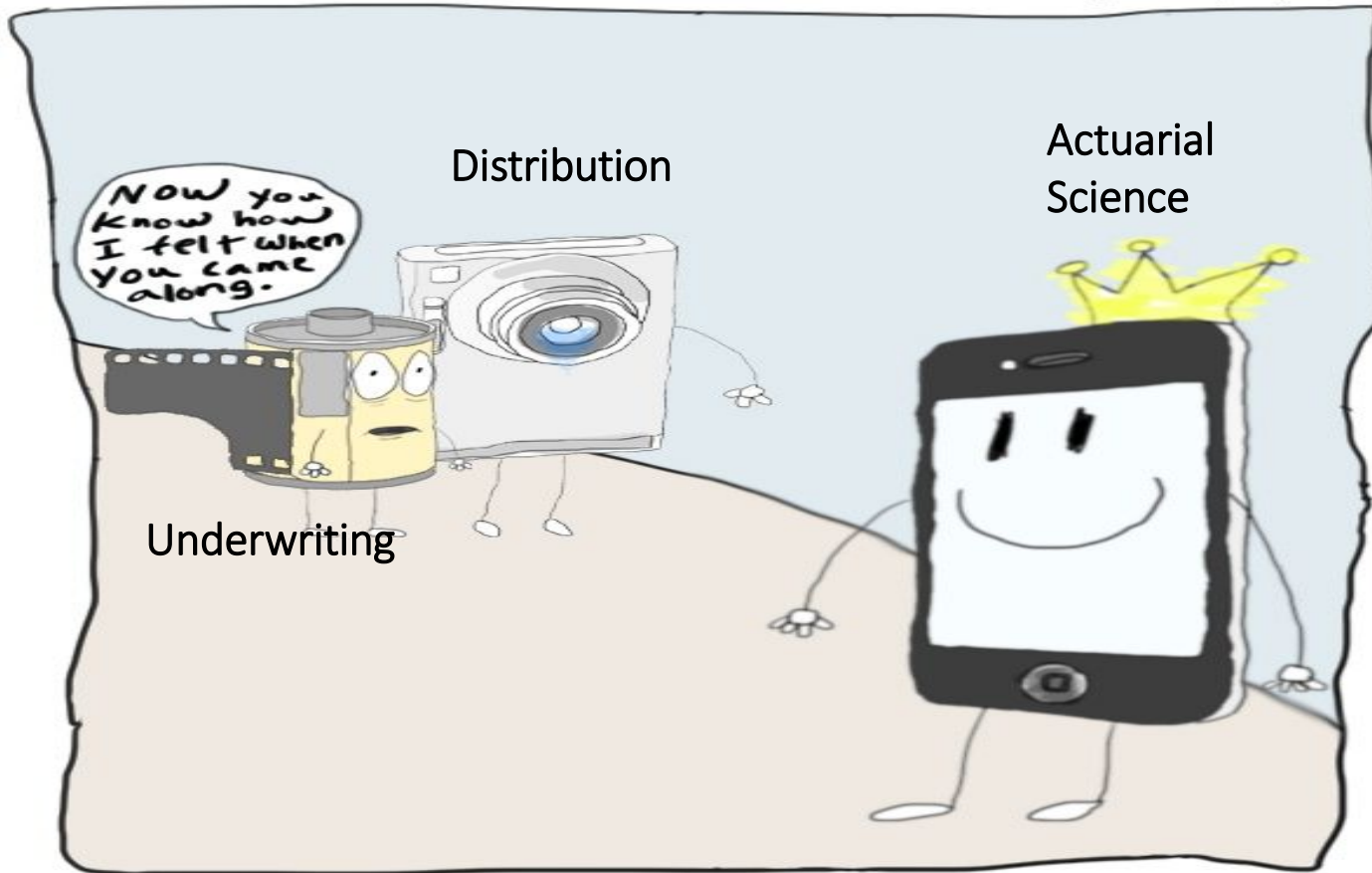
You prevent disruption by being faster...



.....than the next guy

# That is how you stay indispensable...

by ryan patrick



cloudypastime.com



*THANK YOU*