FinTech and the Traditional Insurer: Disruption or Distraction?

Stephen J. Mildenhall

November 10, 2017

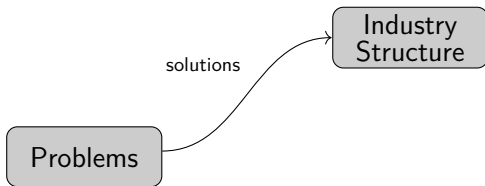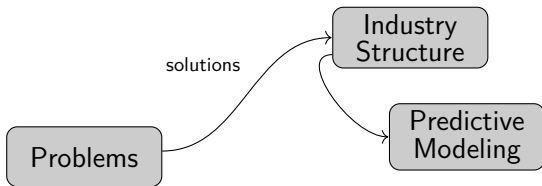
ST. JOHN'S UNIVERSITY — Tobin College of Business / School of Risk Management
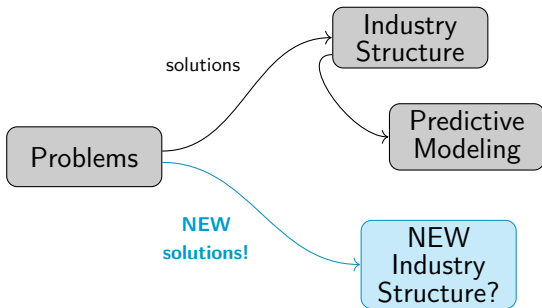
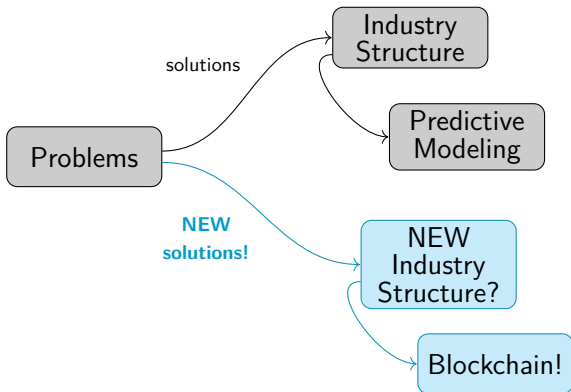*The insurance industry is prime for disruption in its current state.*

Managing change is a mix of art and science, especially in an **antiquated** *sector such as Insurance.*
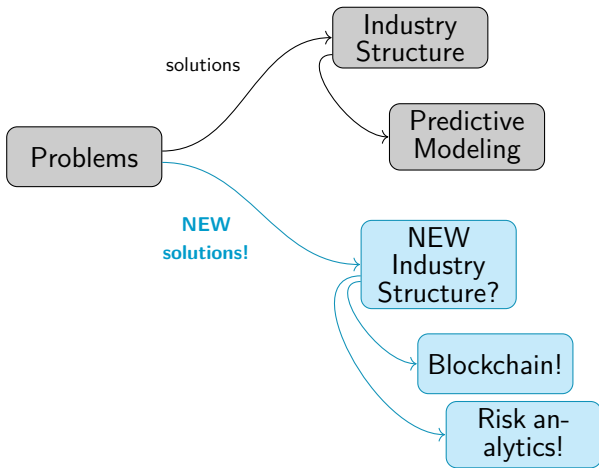
Insurance: Strong but Stealth Innovation Track-Record

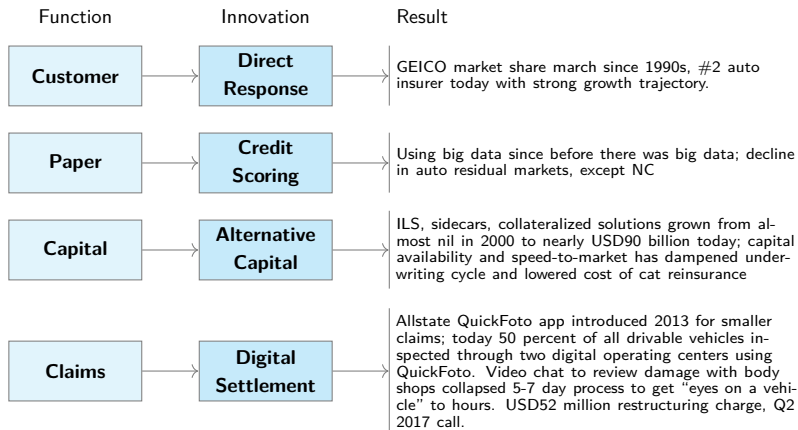| Function	Innovation	Result
Customer	**Direct Response**	GEICO market share march since 1990s, #2 auto insurer today with strong growth trajectory.
Paper	**Credit Scoring**	Using big data since before there was big data; decline in auto residual markets, except NC
Capital	**Alternative Capital**	ILS, sidecars, collateralized solutions grown from almost nil in 2000 to nearly USD90 billion today; capital availability and speed-to-market has dampened underwriting cycle and lowered cost of cat reinsurance
Claims	**Digital Settlement**	Allstate QuickFoto app introduced 2013 for smaller claims; today 50 percent of all drivable vehicles inspected through two digital operating centers using QuickFoto. Video chat to review damage with body shops collapsed 5-7 day process to get "eyes on a vehicle" to hours. USD52 million restructuring charge, Q2 2017 call.

Figure 1: Insurance industry has a strong but stealth track-record of innovation!

Hard Problem: Big Impact
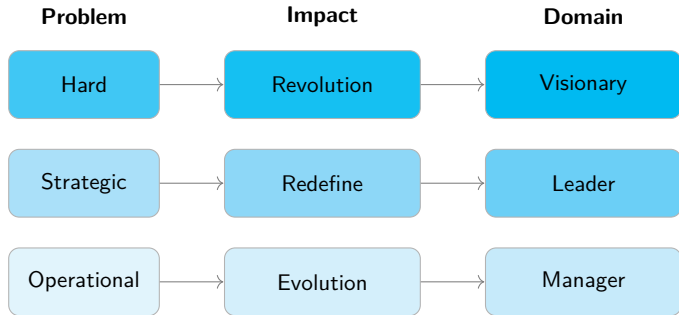
The Hard Problems of Insurance

Theoretical Model of Insurance

If. . .

- we all **agree** on possible outcomes and their **probabilities**, and if. . .

- final states are known with certainty, **then**. . .

- there will be lots of risk trading **between** risk averse individuals

- The **mutuality principle**: everyone will **quota share** the **economy**

  - One decision variable: your participation percentage
  - Arrow, Debreu, Borch, 1960s

Assumptions Do Not Hold. . .

Ambiguity, uncertainty, opinions abound

- **Risk aversion** does cause agents to **share** risk, but. . .

- Behavioral economics and cognitive biases: framing, recency, zero-risk, status quo, optimism, outcome, illusion of control

- Ambiguity aversion: prefer bets with known probability distributions over ones where the probabilities are unknown

- **Ambiguity** provides an incentive to **bet** against each other, Tsanakas and Christofides (2006)

Even if Assumptions Did Hold. . .

. . . insurance has a behavioral dimension

The insurance policy might itself change incentives and therefore the probabilities upon which the insurance company has relied.

. . . it is clear that this principle explains the limitations of both insurance in particular and risk-shifting through the market in general.

Insurance, Risk and Resource Allocation, Kenneth J. Arrow (1971). Emphasis in original.

Hard Problems of Insurance

Information, information, information

- What do I know?

- What do you know?

- Will you tell me?

- How will knowing it change behavior?

Hard Problems of Insurance

Information driven problems

- Adverse selection
    - Insured to insurer
    - Insurer to capital markets
- Moral hazard
    - Ex ante: before the event, less care
    - Ex post: after the event, less remediation, claim padding
- Fraud

In Practice Management Preoccupied With Difficult Problems...

...but not **hard** information-related problems

- New market entrants
- Substitute products
- Buyer power
- Supplier power
- Competitors
- Growth
- IT

- Product differentiation
- Brand and image
- Business processes
- Efficiency
- Catastrophe risk
- Emerging risks
- ORSA & Regulation

KYC and Insurance Buying Motivations
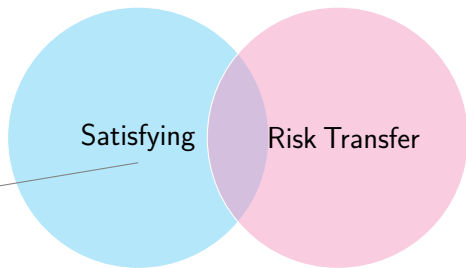
KYC and Insurance Buying Motivations

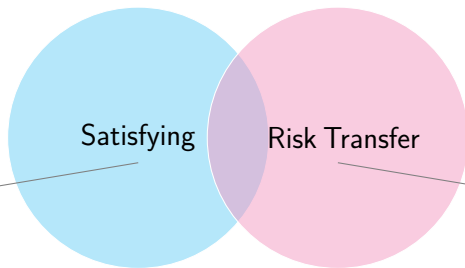Satisfying

KYC and Insurance Buying Motivations

Satisfying

- Non-standard auto
- GL for judgment-proof corp.

KYC and Insurance Buying Motivations

KYC and Insurance Buying Motivations

Satisfying

Risk Transfer

- Non-standard auto
- GL for judgment-proof corp.

- Term life insurance
- Cat re, outside rating agency PMLs
- High limit property per risk re

KYC and Insurance Buying Motivations

Risk Financing

Satisfying

Risk Transfer

- Non-standard auto
- GL for judgment-proof corp.

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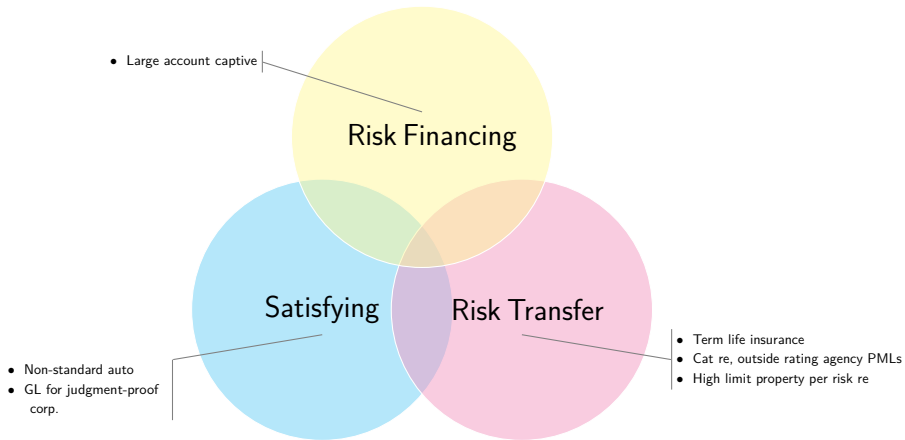- Cat re, outside rating agency PMLs
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KYC and Insurance Buying Motivations

KYC and Insurance Buying Motivations

- Large account captive

Risk Financing

- Working layer casualty excess of loss

- Structured quota share, requiring a risk transfer test

- Middle market commercial lines, work comp, commercial auto

Satisfying

Risk Transfer

- Non-standard auto
- GL for judgment-proof corp.

- Term life insurance
- Cat re, outside rating agency PMLs
- High limit property per risk re

- Personal lines for affluent customers
- Small account commercial lines
- Major medical
- Cat re, within rating agency PMLs

The Insurance Stack

The Insurance Stack

Lemonade could collapse the Insurance stack #insurtech

The current Insurance stack

The insurance industry works through a 3 layer stack:

- **Layer # 1: Brokers**. Their job is to gather premiums from customers.

- **Layer # 2: Insurance Companies**. Their primary job is claims processing. They take in premiums via brokers, invest the cash flow and pay out claims when needed.

- **Layer # 3: Reinsurance Companies**. They are the payers of last resort. They insure the insurance companies. Their job is to have enough capital to pay out claims, even if the models did not predict the volume of claims.

Figure 2: Tech view of insurance

The Insurance Stack

CUSTOMER	PAPER	CAPITAL	CLAIMS
• Education	• Pool management	• Guarantee solvency	• FNL
• Needs analysis	• Solvency	• Liquidity	• Investigation
• Sales, marketing	• Capital structure	• Reinsurance	• Litigation
• Origination	• Regulation	• ILS / Alternative	• SIU
• Distribution	• Compliance	• Debt	• Fraud
• Servicing	• Rating agency	• Hybrid	• Loss control
• Billing	• Product design	• Equity	• Bill review
• Loss control	• Pricing	• Frictional cost	• Payment
• Engineering	• Underwriting policy		• Assistance
• Risk management	• Line underwriting		

Figure 3: Four primary functions within the Insurance Stack

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Traditional insurer

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Quantifying Value by Stack Function

Table 1: Average customer, paper, reinsurance and claim function expenses as a percent of direct earned premium, calendar years 2007-2016. 2016 direct earned premium USD599 billion. Combined expenses **USD245 billion** excluding cost of capital.

Line	Customer	Paper	Net Re	Claim	Combined
All Lines	0.187	0.084	0.023	0.115	0.409
Commercial Auto	0.205	0.095	0.005	0.118	0.424
Commercial Property	0.211	0.093	0.096	0.060	0.460
Other	0.182	0.093	0.043	0.045	0.362
Other Liability	0.203	0.086	0.019	0.204	0.512
Personal Property	0.211	0.070	0.056	0.089	0.426
Private Passenger Auto	0.167	0.076	-0.009	0.119	0.354
Workers' Compensation	0.167	0.105	0.006	0.136	0.414

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Observations

- Stunningly high
- Stunningly stable

Figure 4: Reinsurance function expenses, calendar years 1996-2016.
Non-proportional assumed reinsurance is included in Other.
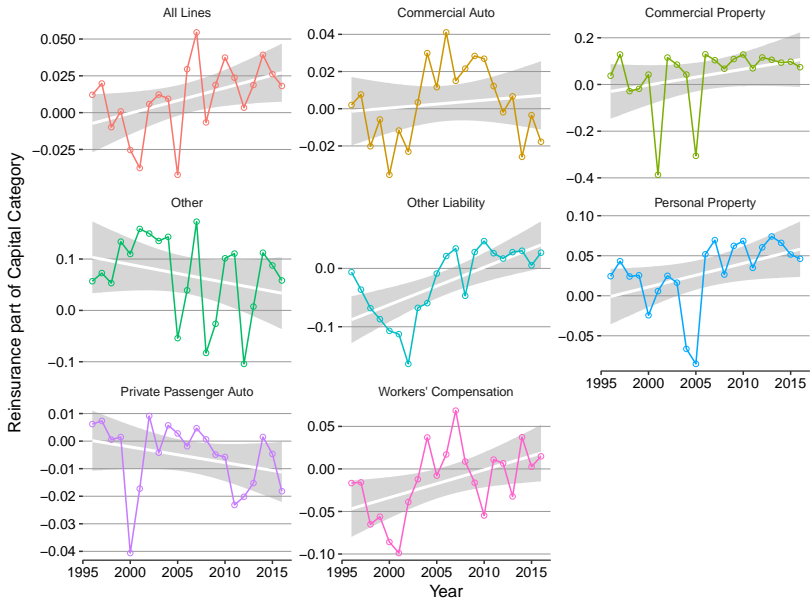
Figure 5: Reinsurance function expenses, separate scale by line, calendar years 1996-2016. Non-proportional assumed reinsurance is included in Other.

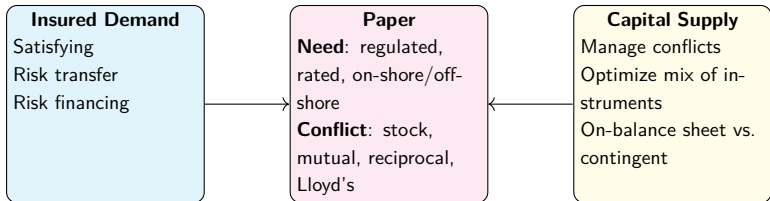# Structural Implications for Paper

Insured Demand	**Paper**	**Capital Supply**
Satisfying	**Need**: regulated, rated, on-shore/off-shore	Manage conflicts
Risk transfer		Optimize mix of instruments
Risk financing	**Conflict**: stock, mutual, reciprocal, Lloyd's	On-balance sheet vs. contingent

Figure 6: Insurance buying motivations and demand interact with Capital supply considerations within Paper function to determine form and organization.

X-Tech Enabled Solutions

FinTech, InsurTech, FinancialTech Solutions

Fin**Tech**, Insur**Tech**, **Financial**Tech Solutions

Hardware
• Mobile
• Cloud
• Internet of Things (IoT)
• Home sensors
• Auto telematics
• Drones, micro satellites
• Augmented reality (AR)
• Alexa

Software
• Text analysis, semantics
• Voice recognition
• Chat bots, Siri, Alexa
• Image recognition
• Augmented reality
• Tensor Flow, Go
• Hadoop, MongoDo, Redis
• Python, R, Julia

Algorithms
• Neural networks
• Deep learning
• Artificial intelligence (AI)
• Hash functions
• Cryptography
• Clustering
• Compressed sensing

Data
• Big data
• Text, speech, image, video
• Behavioral data
• Social media
• Spending
• Credit
• Trading, financial data

Fin**Tech**, Insur**Tech**, **Financial**Tech Solutions

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Trust
• Blockchain
• No central authority
• Distributed, decentralized
• Peer-to-peer
• Public
• Anonymous
• Cryptography
• zk-SNARKs

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Algorithms	Data	Financial
• Neural networks	• Big data	• Lloyds
• Deep learning	• Text, speech, image, video	• ILS/Cat Bond
• Artificial intelligence (AI)	• Behavioral data	• ILW
• Hash functions	• Social media	• Collateralized
• Cryptography	• Spending	• Sidecars
• Clustering	• Credit	• Hedge fund permanent
• Compressed sensing	• Trading, financial data	• P2P

FinTech, InsurTech

FinTech and InsurTech Narratives

FinTech and InsurTech Narratives

Figure 7: Silicon Valley: comedy with a serious message.

FinTech and InsurTech Narratives

Better experience, simpler process, comparison, guides

- $\left\{ \begin{array}{c} \text{Mobile} \\ \text{Instant} \end{array} \right\}$ personalized expert $\left\{ \begin{array}{cc} \text{assistance} & \text{recommendations} \\ \text{education} & \text{advice} \end{array} \right\}$

  simplifies the $\left\{ \begin{array}{c} \text{experience} \\ \text{process} \end{array} \right\}$ of $\left\{ \begin{array}{c} \text{buying} \\ \text{finding} \end{array} \right\}$ the most suitable

  insurance

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Better experience, simpler process, comparison, guides

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  simplifies the { experience / process } of { buying / finding } the most suitable insurance

- Deliver { quick / fast / instant }, { simple customized / accurate actionable } quotes you can { trust }

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- Deliver $\left\{\begin{array}{l}\text{quick} \\ \text{fast} \\ \text{instant}\end{array}\right\}$, $\left\{\begin{array}{ll}\text{simple} & \text{customized} \\ \text{accurate} & \text{actionable}\end{array}\right\}$ quotes you can $\left\{\text{trust}\right\}$

- **Rethinking** the relationship between insurers and their customers and the ways in which they interact

FinTech and InsurTech Narratives

Online and mobile insurance and insurance markets places

- **Online** simple $\left\{\begin{array}{ll} \text{car, renter insurer} & \text{insurance supermarket} \\ \text{policy aggregator} & \text{claims reporting} \end{array}\right\}$ platform

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- . . . **automated** insurance agent. . . quicker, easier and **more personal**

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- . . . **automated** insurance agent. . . quicker, easier and **more personal**

- **Redefining** how insurance is priced and delivered

FinTech and InsurTech Narratives

Peer-to-peer insurance: back to the Arrow!

- **Online** $\left\{ \begin{array}{c} \boxed{\text{pool}} \\ \boxed{\text{peer-to-peer}} \end{array} \right\}$ insurance... lowering annual insurance premiums by up to 50%

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- If you **submit a claim** within your team, your teammates **pay it**

FinTech and InsurTech Narratives

New coverages and risk products

- { On-demand / Micro-duration } insurance for your
  { smart phone, camera / laptop, tablet / standalone car rental / driving friend's car } entirely from your phone

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- Enable $\left\{ \begin{array}{l} \text{bulk purchase} \\ \text{self-insurance} \end{array} \right\}$ for $\left\{ \begin{array}{l} \text{small groups} \\ \text{individuals} \end{array} \right\}$

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- A **better way** to insure your gizmo

FinTech and InsurTech Narratives

Blockchain

- The vision is $\left\{\begin{array}{c} \boxed{\text{more insurance}} \\ \boxed{\text{less admin}} \end{array}\right\}$

- Blockchain empowers $\left\{\begin{array}{c} \boxed{\text{immutable transactions}} \\ \boxed{\text{decentralised agreement}} \end{array}\right\}$ with audit history, **smart contracts**, high resilience and built in **fraud protection** mechanisms

- ... $\left\{\begin{array}{c} \boxed{\text{democratize access to}} \\ \boxed{\text{increase transparency of}} \end{array}\right\}$ reinsurance investments

- The market for insurance products broken into small **insure-bits**, each of which fundamentally represents an investment

- **Arrow** again!

Blockchain

Figure 8: Bitcoin combines four separate functions and some magic.

Blockchain

Chained
key-value
database

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Blockchain

Blockchain can refer to a combination of one or more of

Chained **key-value** database

Hash-enforced **integrity**

Peer-to-peer distributed consensus **validation**

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Bitcoin!

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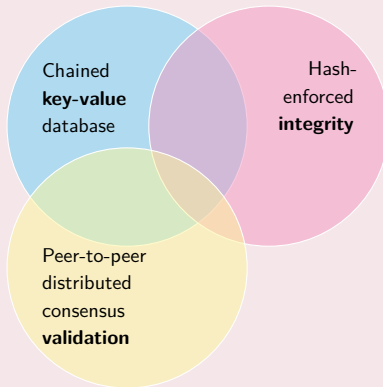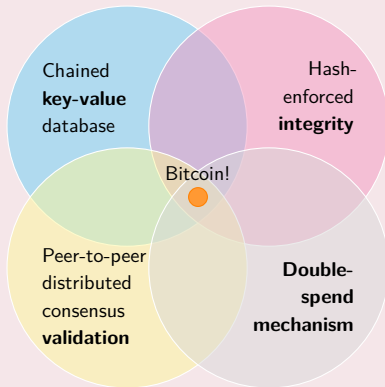
Figure 8: Bitcoin combines four separate functions and some magic.

Blockchain: Bitcoin Mining Network

Figure 9: Racks of machines mining Bitcoins and Ether at a server farm in Guizhou, China, June 2017. Current hash rate estimated at **10 million trillion** SHA256 hashes per second! Over USD1.1 billion of electricity consumed annually, about the use of Ecuador. Sources: photo Gilles Sabrié for The New York Times, https://blockchain.info/charts/hash-rate, https://digiconomist.net/bitcoin-energy-consumption

Blockchain: Finance and Insurance

R3 and Corda, Chain; B3i, Blocksure, Etherisc, TeamBrella

- Blockchain incorporating some, but not necessarily all, components of Bitcoin network would enable efficiencies
  - Shared view of truth: not my copy vs. your copy, no reconciliation; hash integrity and validation ensures we all have identical databases
  - Database can be private
  - Validation can involve authorities or decentralized consensus mining
- Effectiveness requires a willingness to change processes and behaviors
  - One party can post a contract and the other signs it to finalize
  - Definitive language available to both parties. . . but they sill have to do the work
- Blockchain: $\left\{ \begin{array}{l} \text{a good tool to } \textbf{enable} \\ \text{won't magically } \textbf{enforce} \end{array} \right\}$ contract certainty

Blockchain and the Future

Zero knowledge proofs

- It is possible to **verify** information without **revealing** it: a **zero knowledge proof**

- Where's Waldo? with a mat

- Alibaba's Cave

- Distributed database of all private credit, health, behavioral data

    - One-time **read/verify-only** access
    - Read, **act** and **forget**, rather than read, act and **store**
    - User **cannot pass along** what they've learned

- No possibility of Equifax hack: data encrypted, you hold keys

- Central database of underwriting information: easier quotes

- Theoretic potential is huge: commercial model less clear

FinTech and InsurTech Narratives: Lessons

Within Sales and the Customer Function

- Simpler, faster, more engaging

- Game-ification, risk feedback

- Customizable: coverage, duration, location

- Perception: **serious distribution problems**

Within Trust $\subseteq$ Paper Function

- Current narrow thinking misses full potential: more than admin

- Industry actively engaged with Blockchain

- Need for education: there are magic ingredients

- At peak of Gartner innovation curve?

FinTech and InsurTech Narratives: Lessons

Within the Claims Function

- Less confrontational, on your side

- You or your team in control

- Algorithmic, deterministic, coverage certainty

- Perception: **serious willingness-to-pay problems**

FinTech and InsurTech Narratives: Lessons

Industry addresses claim payment meme

Figure 10: Farmers Insurance ad promoting claims paying.
https://www.farmers.com/hall-of-claims

FinTech and InsurTech Narratives: Lessons

Figure 11: Farmers Insurance ad, coverage explanation and education.
https://www.farmers.com/hall-of-claims

FinTech and InsurTech Narratives: Lessons

Good news for incumbents

- **New product ideas have limited scale**
    - No one is going after auto!
    - Phone, camera, renters
    - JIT-insurance

- Beware: disruption starts at low end

- Driverless cars will take care of auto in due course. . .

FinTech and InsurTech Narratives: Lessons

Bad news for incumbents

- **New product ideas have limited scale**
    - No strong grow-the-pie concepts
    - Particularly weak in mature markets

- **Stealing market share**, e.g. granular underwriting, auto telematics, can be very **effective** and **disruptive** to slow-reacting incumbents
    - UK motor has seen disruptive change since mid-1980s
    - US auto more gradual ascent of GEICO

- Though **traditional insurer** structure will persist, **specific** traditional insurers need not!

- Recommend **vigorous engagement** with FinTech