

IoT of Things:

**How Autonomous Cars Drive Better
Than Humans and How to Insure Them**

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Agenda

- Insurance Disruption Revolution
- How is Auto Insurance Risk Exposure Changing
- How Does Insurance Product Need to Change
- Develop New Auto Insurance Product
 - Redesign Coverage / Rates
 - Data Source for Rates
 - State Regulatory Filing Support
 - Implement
- How Does Autonomous Drive Better

Insurance Disruption Revolution

- Property Insurance Innovators
- Auto Insurance Innovators
- Disrupter Traits
- Disrupter Glide Path

Insurance Disruption Revolution

Property Innovators



Homeowners online bind with 3 questions: name, date of birth, address. Pre-populate advanced automated rating and underwriting inputs.



Renters online targeting Millennials. Includes bed bug, simplified personal property blanket package limit, etc.



Commercial Small Business online (GL & IM) pre-packaged.



Real-time title insurance to fast track bind without taking time to underwrite and clearing all encumbrances. Bought large traditional title ins co.



Insurance Disruption Revolution

Auto Innovators



Zendrive

Smartphone driving score incl. distracted driving & rating by trip location. Fleet on-demand & ride sharing.



Trov on-demand fleet rental insurance including personal property with sliding scale limit & for Waymo fleet passengers.



Fully autonomous commercial fleet of vehicles to provide transportation services to passengers rolling out globally.



Personal auto vehicles with increasing autonomous features. Driving behavior and location tracked at granular level



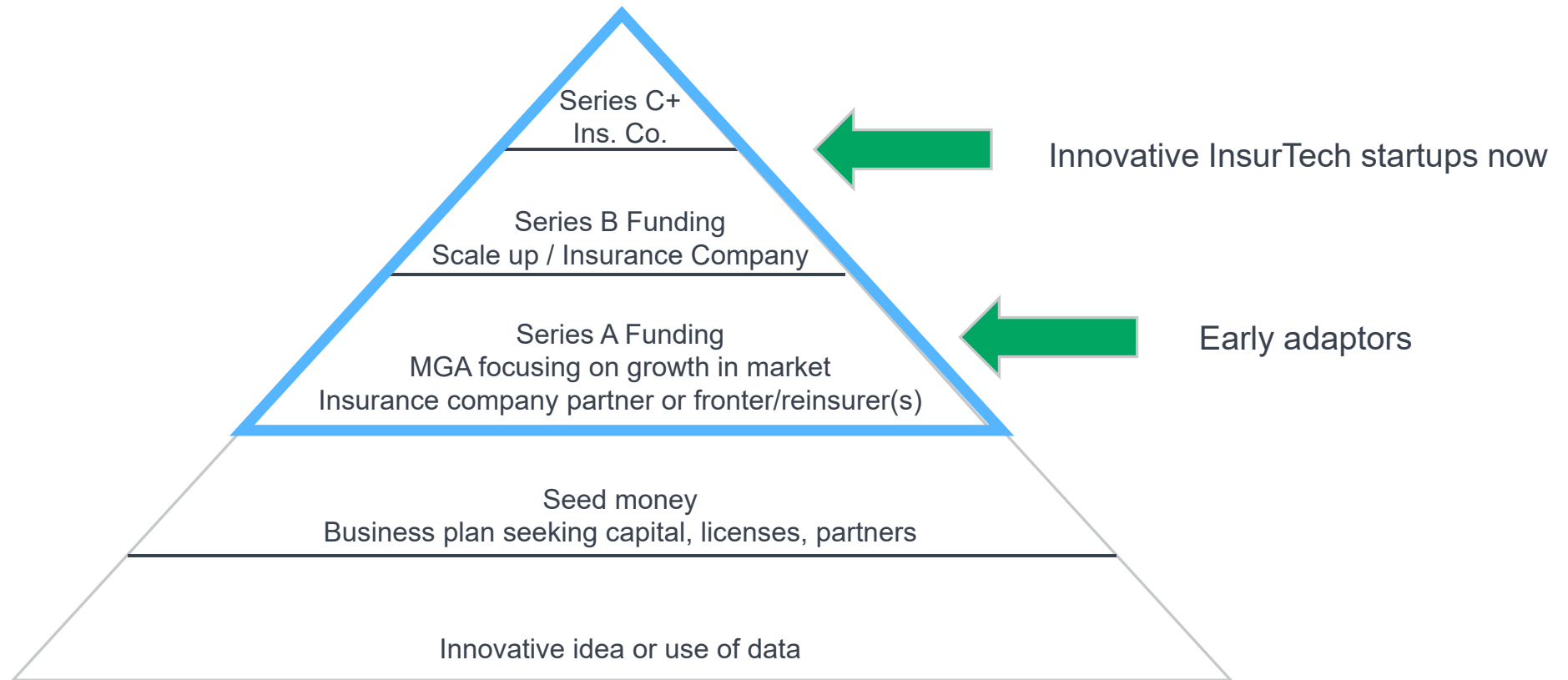
Insurance Disruption Revolution

Disrupter traits

- Typically tech backgrounds (Facebook, Amazon, Google, etc).
- Founders of previous start ups.
- Non-insurance backgrounds.
- Challenge everything.
- Don't accept inertia (legacy systems and renewals).
- Inventing new risks without historical insurance losses to develop rates.

Insurance Disruption Revolution

Disrupter Glide Path



How Is Auto Insurance Risk Exposure Changing

- Today
- Today's Solutions
- Tomorrow
- Tomorrow's Solutions

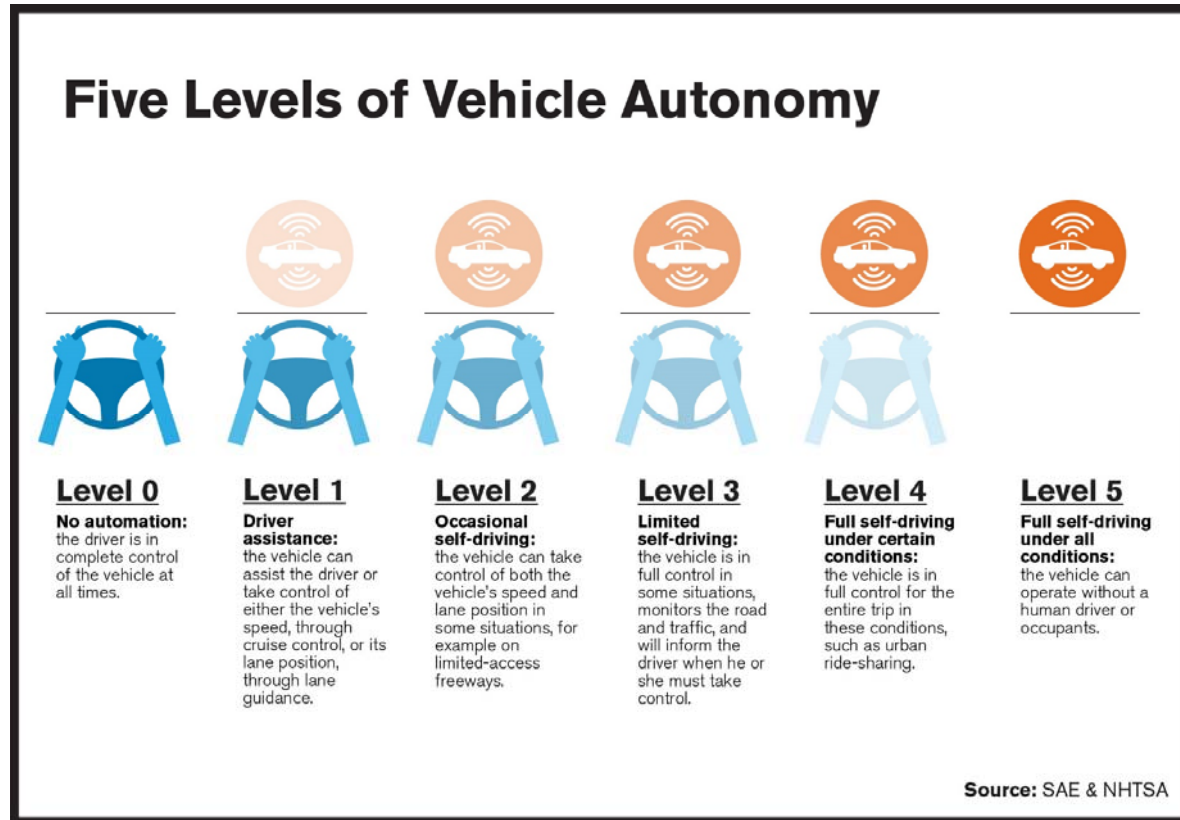
How is Auto Insurance Risk Exposure Changing Today

- Transportation Network of Private Passenger Drivers Using Own Cars
 - TNS: Lyft, Uber, etc.
 - ODNC: Uber Eats, Postmates, etc.
- Shifting Car Ownership From People to Fleet Owners. Fleet Owners Need Coverage
 - On-Demand Micro-Duration Rental
 - On-Demand Micro-Duration Lease Membership (Auto Clubs, Auto Dealers)
- Drivers of On-Demand Micro-Duration Need Coverage While They Are Driving

How is Auto Insurance Risk Exposure Changing Today's Solutions

- Personal Auto Insurance Replaced By Commercial Auto Fleet Insurance Products
 - Fleet Owner Liability
 - Fleet Owned Vehicles
- Hybrid Insurance For Personal Auto Drivers While Transporting
 - Passengers (TNS)
 - Goods (ODNC)
- Incorporate Telematics Micro-Duration Coverage Needs, GPS, Driving Data Into Rating

How is Auto Insurance Risk Exposure Changing Tomorrow



How is Auto Insurance Risk Exposure Changing Tomorrow

- Autonomous Features
 - Level 2 Occasional Self Driving
 - Level 3 Limited Self Driving (Tesla)
 - Level 4 Autonomous With Steering Wheel (Waymo)
 - Level 5 Fully Autonomous

How is Auto Insurance Risk Exposure Changing Tomorrow - Tesla

- All new Tesla cars come standard with advanced hardware capable of providing Autopilot features today, and full self-driving capabilities in the future, through software updates designed to improve functionality over time.
- Cameras + Radar + Ultrasonic sensors
- Sell Private Passenger Vehicles (Cars & SUVs) to Public
- <http://www.tesla.com/autopilot> 3/23/19

How is Auto Insurance Risk Exposure Changing Tomorrow - Waymo

- Waymo's fleet of self-driving vehicles include Chrysler Pacifica Hybrid minivans and Jaguar electric self-driving vehicles for the purpose of full autonomy.
- Cameras + Radar + LIDAR
- 7 billion miles in simulation + 10 million miles on public roads
- Fleet of Waymo Vehicles to Provide Transportation Service
- <https://waymo.com/tech/>

How is Auto Insurance Risk Exposure Changing Tomorrow's Solutions

- Autonomous Features Shifting Crash Liability From Driver to Operating System
 - Passenger Owned Vehicles (ie: Tesla)
 - Passenger Transportation Fleets (ie: Waymo)
 - Goods Transportation Fleets (ie: Trucks/Delivery)
- Need to Provide Insurance For
 - Autonomous Driving Operating System Provider: Product Liability
 - Electronics In Car, And Stuff Outside Car to Operate Car: Chargers, Apps
 - Recognize Autonomous Safety Feature Impact on Insurance Rates
 - Measure Impact on Rates Of Different Driver Operating Systems and Versions

Develop New Auto Insurance Product

- Redesign Coverage / Rates
- Data Source for Rates
- State Regulatory Filing Support
- Implement

Develop New Auto Insurance Product

Redesign Coverage / Rates

- Innovative Coverage Forms and Rates
 - ODNC: Commercial Auto Using Private Passenger Type
 - TNS: Commercial Auto Using Taxi for Passenger Transportation
 - Personally Owned Vehicles: Personal Auto Insurance
- Innovative Delivery
 - Online & Smart Phone Capable
 - On-Demand
 - Micro-Duration
 - With Car, Not Household

Develop New Auto Insurance Product Data Sources For Rates

- Advisory Organization
- Company Insurance Loss History Data
- Telematics Coupled With Crash Data
- Car Manufacturer Crash Data
- Autonomous Operating System Provider Data

Develop New Auto Insurance Product State Regulatory Filing Support

- State Specific Liability & Product Differences
- State Specific Regulatory Differences
- Telematics Model Filing (WA, FL, CT, CA, TX, etc)
- Actuarial Indication and Support / Certification
 - Memo
 - Rate including loss and expense support
 - Rates and forms
 - Underwriting and rating rules / manuals

Develop New Auto Insurance Product Implement

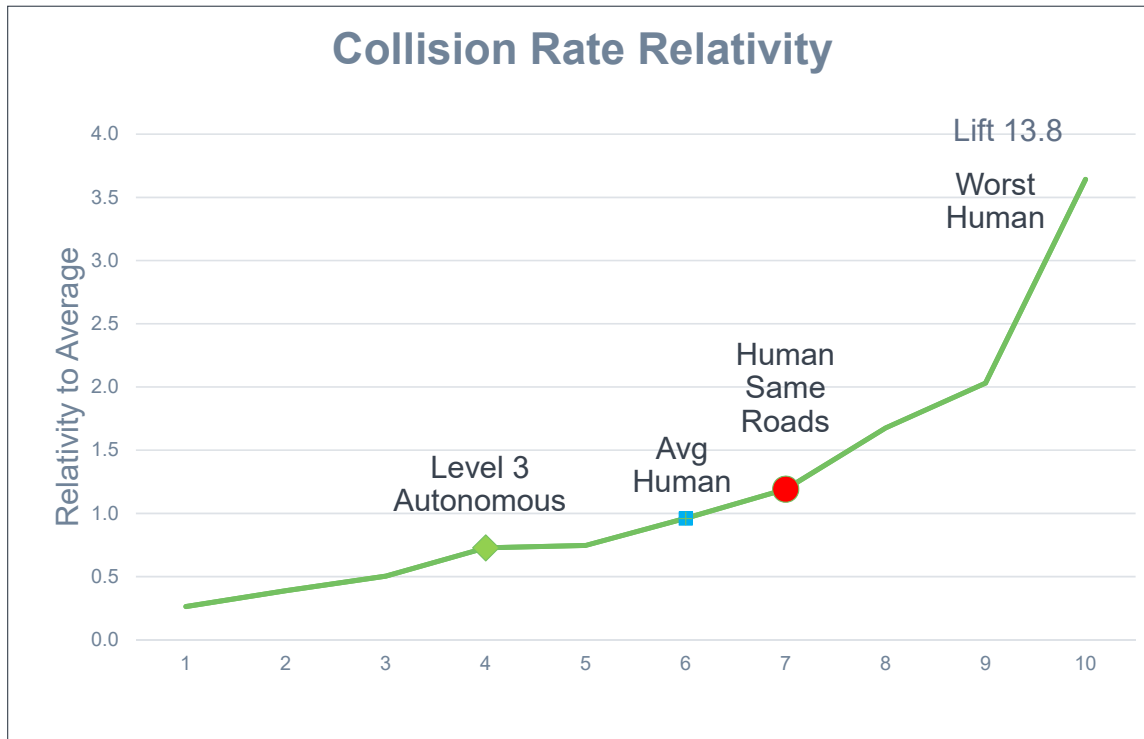
- Competitive Analysis
- Test Online Quote Applications
- Respond to Changing Autonomous Operating Systems and Rates Quickly

How Does Autonomous Drive Better

Case Study

- ZenDrive's 100 Billion Miles of Driving Data & Driving Score Built on Human Drivers
- 10 Groups of Drivers
- Created Model that Scored Human Drivers
- Worst to Best Driver Lift of 13.8
- Used Same Model to Score Tesla Level 3 Driver Assist Autonomous Features Available January 2019

How Does Autonomous Drive Better Case Study



Level 3 Autonomous	Relative To	% Improvement
Average Human	0.7	-30%
Human On Same Roads & Conditions	0.6	-40%
Worst Human Group	0.2	-80%

How Does Autonomous Drive Better

Conclusions

- Reduces Distracted Driving
- Reduces Drunk, Sleepy, and Reduced Reaction Time Driving (Aging Drivers)
- Level 3 Semi-Autonomous is 30%-40% Better Than Average Human Driver Based On 1 Tesla:
 - Compared to 1 Human on the Same Roads In Same Conditions
 - Compared to Human Driver Developed Collision Score Algorithm
- Link to Trov/Milliman autonomous car video:
https://spaces.hightail.com/space/xtHkG2ADBe/files/fi-977e3afc-bc1a-447d-b3ad-f9edb3fe538e/fv-b2d8ec44-9df8-45ef-acd0-1d8e61b7635c/AUTONOMOUS%20CARS%203_11b.mp4
- 'Fully Autonomous Will Make It Safe And Easy to Move Around' (www.waymo.com)

Thank you.

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Curriculum Vitae



Sheri Scott, FCAS, MAAA, CSPA
Principal & Consulting Actuary
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Education and Qualifications

Casualty Actuarial Society, FCAS
University of Western Ontario, BSc

Current responsibilities

- Lead Milliman Orange County CA office focusing on InsurTech & emerging insurance markets
- Price disruptive insurance products and features
- Integrate analytic solutions, automate End 2 End insurance processes
- introduce predictive analytics into insurance delivery, rating, underwriting.
- Prepare 50 state regulatory filings with efficient approval and launch

Relevant experience



- Helped design fully automated quoting, underwriting, and rating for first direct start up insurer Canada
- Developed fully automated personal and commercial lines products for over two dozen insurance disrupters removing all underwriting questions to policyholder
- Introduced credit, telematics, policyholder behaviour, smart home, and other innovative features into insurance
- Helped Zendrive develop first smartphone based insurance score that includes distracted driving and other non-traditional predictive variables



- Created cost per mile for fleet of autonomous vehicles in several countries

Relevant skills

- History of helping insurers and agents be at the bleeding edge and disrupt
- Applying advanced actuarial and predictive analytic techniques to innovate insurance and improve profitability across product lines and countries



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