The “Chaotic Middle”:
Automobile Insurance in the Era of Autonomous Vehicles

Federal Advisory Committee on Insurance

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Introductions - Here with You Today

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Note: This presentation was not designed and is not intended to advocate for any public policies that might be connected to the topics discussed
Summary

Change is coming, and it is coming fast

Changing Auto Insurance Marketplace

Aligning Forces
- Underlying market forces are already aligning to enable mass change

Reduced Accident Frequency
- KPMG estimates an 80 percent reduction in accident frequency by 2040

Shrinking Premium Pie and Different Coverage Mix
- Lower losses lead to lower premium – KPMG predicts industry losses to decrease by roughly $60 billion within 25 years. A shift from personal to commercial and product liability coverages is also anticipated

New Entrants and the ‘Chaotic Middle’
- Given their control of driving data and the customer relationship, automotive original equipment manufacturers (“OEMs”) are particularly well positioned to disrupt the traditional insurance market, especially over the next 10-15 years

Consumer Impact
- Fewer traffic fatalities and lower insurance premium have the potential to benefit consumers, while data, privacy and other risks will need to be evaluated and managed

Planning for the Future
- Insurers need to understand their exposure in the auto insurance space and prepare their strategy and operations accordingly

Source: KPMG LLP, actuarial analysis
Presentation Overview

1. Alignment for Mass Change: Core elements enabling transformation
2. Timing: Four phases leading to a ‘new normal’ in a decade
3. Implications for Insurers and Consumers: Potential impact on insurers’ books of business and the consumer marketplace for insurance
4. The Chaotic Middle: Potential new entrants and changes in the insurance landscape
5. What Now?: Preparing for the future
ALIGNMENT FOR MASS CHANGE

Eight Key Elements for Transformation

A variety of forces will be responsible for the foundational transformation across the driving ecosystem

- Technologies already exist
- Convergence and enhancement lead next wave

- Robust pipeline of new vehicles / capabilities
- Incremental advancements + leap frog full-autonomy plays
- Scale of operations drop costs over time

- 'Black box' driving data highly valuable
- Who owns the data – incentives, public good, etc…
- Integrity, storage, analytics and security critical

- Technology works in existing infrastructure
- ‘Smart’ infrastructure (V2I) to complement vehicle-to-vehicle (V2V) communications

- Car-sharing is a standard option for urban drivers
- Potential end of two car household

- Leader states setting first round of rules
- NHTSA key factor in mandating technology – position papers and comment letters

- More you know, the more likely you are to adopt
- Flexible value proposition tailored to individuals
- Focus on consumer education and awareness

- Driving risk will follow vehicle operator – driver to technology
- Hybrid environment of combined vehicle decisions will take time to sort

- 'Black box' driving data highly valuable
- Who owns the data – incentives, public good, etc…
- Integrity, storage, analytics and security critical
No one has a crystal ball to predict the future pace of change. As we synthesized our initial analyses, we envision there to be four potential incremental changes to the transformation over the next 25 years, with the foundation laid for a “new normal” within a decade.

**Four Phases of Transformation**

- **“Training Wheels”**
  - Introduction to autonomous vehicles as manufacturers roll out some of the underlying technology
  - High-tech companies express interest in fast-tracking production of fully autonomous vehicles
  
  *Now - 2017*

- **“First Gear”**
  - In 2017, partial driver substitution technology is introduced. A broader set of consumers experience this technology, witnessing firsthand its safety and soundness
  - This helps shift market perceptions. Potential mandate from NHTSA for V2V communications
  
  *2017 - 2020*

- **“Acceleration”**
  - Five years from now, fully autonomous all-speed vehicles become more common
  - V2V capabilities are likely to be embedded in all new vehicles and the increase in scale drives down costs, making the technology accessible to a larger segment of consumers
  
  *2020 - 2025*

- **“Full Speed”**
  - In 2025, a broad-based transformation begins. All new vehicles have autonomous capabilities and existing vehicles are potentially retrofitted
  - Over the next 15 years, integrated driving emerges, a web of information is flowing between vehicles and infrastructure tightens. A “new normal” is realized by 2040
  
  *2025 - 2040*
Currently, there is significant skepticism among insurance leaders about the potential for autonomous vehicles to transform the industry - few insurers have taken action, most likely because many believe the change will happen far into the future, if at all.

- **84%** not ready for autonomous vehicles
- **74%** little or no understanding of autonomous vehicles
- **68%** no budget allocated for preparation for autonomous vehicles
- **23%** developed a strategic plan
- **10%** significant impact on business after 2025

Source: KPMG LLP’s 2015 Automobile Insurance in the Era of Autonomous Vehicles Survey Results
**Insurer Excess Capital**

The good news is that personal auto insurers have lots of capital, giving them significant financial flexibility. The bad news is that this large capital cushion may also give many a false sense of security.

### Capital Position of Top 15 Personal Auto Insurers’ Overall P&C Businesses

<table>
<thead>
<tr>
<th>Year</th>
<th>Required Capital and Surplus ($ billions)</th>
<th>Excess Capital ($ billions)</th>
<th>Total P&amp;C Net Premium Written / Total Capital &amp; Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>131.3</td>
<td>0.92x</td>
<td>1.02x</td>
</tr>
<tr>
<td>2007</td>
<td>144.6</td>
<td>0.87x</td>
<td>0.88x</td>
</tr>
<tr>
<td>2008</td>
<td>107.9</td>
<td>1.02x</td>
<td>0.88x</td>
</tr>
<tr>
<td>2009</td>
<td>137.5</td>
<td>0.78x</td>
<td>0.62x</td>
</tr>
<tr>
<td>2010</td>
<td>172.4</td>
<td>0.79x</td>
<td>0.72x</td>
</tr>
<tr>
<td>2011</td>
<td>166.9</td>
<td>0.74x</td>
<td>0.74x</td>
</tr>
<tr>
<td>2012</td>
<td>184.2</td>
<td>0.78x</td>
<td>0.78x</td>
</tr>
<tr>
<td>2013</td>
<td>223.4</td>
<td>0.78x</td>
<td>0.78x</td>
</tr>
<tr>
<td>2014</td>
<td>224.9</td>
<td>0.78x</td>
<td>0.78x</td>
</tr>
<tr>
<td>2015</td>
<td>216.5</td>
<td>0.78x</td>
<td>0.78x</td>
</tr>
</tbody>
</table>

**Note:** (1) 2015 statutory P&C insurance data aggregated for the top 15 writers of private passenger auto direct premium written, based on SNL groups / unaffiliated companies. Required capital was calculated by dividing total P&C NPW by two given an assumed NPW / capital & surplus ratio of 2:1. Excess capital is then calculated by subtracting required capital and surplus from total capital & surplus of the top 15 personal auto insurers on an aggregate basis. Source: SNL Financial.
Autonomous vehicle technology will result in a dramatically safer driver experience, thereby significantly impacting the insurance marketplace by reducing traffic fatalities and other losses.

**Auto insurance**
Claim frequency will fall, ultimately leading to lower premiums.

**Life and annuities**
Mortality tables will be impacted – road traffic accidents leading cause of death for ages 15 to 34.

**Workers’ compensation**
6% of claims costs arise from auto accidents.

*Source: KPMG LLP actuarial analysis and US Centers for Disease Control and Prevention (2010)*
Working closely with our automotive team and leveraging their extensive research, KPMG’s Actuarial Team developed models to translate the technology and market changes in order to demonstrate the potential impact on auto insurer performance.
Given the new safety technology in autonomous vehicles, the KPMG Actuarial Team predicts a potential 80% reduction in accident frequency by 2040, which is the largest driver of loss reduction.
Implications for Insurers

Loss Severity

The KPMG Actuarial Team modeled severity broadly in line with inflationary trends. There are, however, a variety of different potential scenarios that could have a significant impact on severity over time.

![Severity per accident graph]

- **Expensive components**
- **Inflation only** (modeled scenario)
- **Inexpensive transportation pods and parts**
- **Automated driving benefits** (faster reaction time)

Source: KPMG LLP actuarial analysis
Implications for Insurers

Industry Loss Costs

Safer vehicles could result in total auto insurance industry losses decreasing by 40% by 2040 with commercial and product liability accounting for a larger portion of the loss pie.

Expected loss allocated to personal auto, commercial auto and products liability

Source: KPMG LLP actuarial analysis
Automated Vehicle Technology is Making Driving Safer...Today

Crash avoidance features which underpin autonomous vehicle safety technology are already improving the safety profile of vehicles...

...furthermore, according to recent findings(1), more than 700,000 police-reported rear-end crashes in 2013 could have been avoided if the vehicles involved were equipped with autobrake technology

Note: (1) Study analyzes police-reported rear-end crashes in 27 states during 2010-2014 involving Acura, Honda, Mercedes-Benz, Subaru and Volvo vehicles with forward collision warning (“warning”) and autonomous emergency breaking (“autobrake”) vs. the same models without the optional technology; (2) “City Safety” represents Volvo’s low-speed autobrake system. The test was conducted by comparing two Volvo models with City Safety vs. other vehicles without front crash prevention technology; and (3) Study examines Honda’s camera-based and radar-based forward collision and lane departure warning systems for vehicles equipped with these features vs. vehicles without them, bucketed by driver age group. Source: IIHS’s research papers ‘Effectiveness of Forward Collision Warning Systems with and without Autonomous Emergency Braking in Reducing Police-Reported Crash Rates’ and ‘Effectiveness of Volvo’s City Safety Low-Speed Autonomous Emergency Braking System in Reducing Police-Reported Crash Rates’ and IIHS’s ‘Status Report, Vol. 51, No.1, January 2016’
While personal and commercial auto insurance represents the whole loss pie in 2013, products liability insurance will play a greater role in the future as the vehicles themselves make more driving decisions.

Potential Business Mix Composition

2013(1)
- Products Liability: 0%
- Commercial Auto: 13%
- Personal Auto: 87%

~ $145 billion in losses

2040 – Base Case(1)
- Products Liability: 14%
- Personal Auto: 58%
- Commercial Auto: 28%

~ $85 billion in losses

2040 – Potential Alternate Case
- Personal Auto: < 30%
- Commercial Auto: 20%
- Products Liability: 50%+

~ $85 billion in losses

Note: (1) Based on KPMG LLP actuarial analysis
**Implications for Consumers**

**The Consumer, the Autonomous Vehicle and Insurance**

From safety to saving money on insurance dollars spent, autonomous vehicles have the potential to positively impact consumers in a variety of different ways, although associated risks of this new technology also must be considered.

<table>
<thead>
<tr>
<th>Considerations</th>
<th>Potential Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of vehicle</td>
<td>Safer vehicles = less auto related deaths and injuries</td>
</tr>
<tr>
<td>Cyber threats</td>
<td>Autonomous mobility-on-demand and cost effective, tailored means of transportation</td>
</tr>
<tr>
<td>Privacy issues</td>
<td>Greater access to mobility for urban youth, the disabled, the elderly and other segments of the population</td>
</tr>
<tr>
<td>Ownership of data</td>
<td>Lower premiums most likely to benefit those utilizing autonomous vehicles more</td>
</tr>
<tr>
<td>Access to mobility (urban areas most likely to benefit)</td>
<td>Lower losses lead to lower premiums</td>
</tr>
<tr>
<td></td>
<td>The “new” two car family – now one car family supplemented by mobility-on-demand – lower overall insurance (and vehicle) spend</td>
</tr>
</tbody>
</table>

**General**

- Cost of vehicle
- Cyber threats
- Privacy issues
- Ownership of data
- Access to mobility (urban areas most likely to benefit)

**Insurance Related**

- Lower premiums most likely to benefit those utilizing autonomous vehicles more
- Pricing transparency if included in sticker price
- Insurance industry disruptions – job impact
The transformation to a future marketplace defined by full autonomy and pervasive mobility on demand will be highly disruptive. We anticipate a ‘chaotic middle’ over the next 10-15 years, during which business models and the competitive landscape are transformed. Future success will require the ability to anticipate and adjust to rapid change.

**Chaotic Middle**

**The ‘Chaotic Middle’ Begins**

- New technologies and application
- Decline in accident loss frequency
- Risk shift
- Asymmetric info
- New ownership models
- New entrants and competitor actions
- Regulatory requirements and mandates
Ultimately, the original equipment manufacturers ("OEMs") have the ability to not only control the data, but also the customer relationship, thereby dramatically altering the traditional auto insurance model.
The (re)entrance of OEMs into insurance could take a variety of forms

### Illustrative Future State Business Models

<table>
<thead>
<tr>
<th>Entity</th>
<th>Scenario A</th>
<th>Scenario B</th>
<th>Scenario C</th>
<th>Scenario D</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEMs</td>
<td>Provide driving and vehicle data to insurers</td>
<td>Become distributor of insurance for a selected set of carriers</td>
<td>Act as an insurance company with many functions outsourced</td>
<td>Become a fully integrated insurance company</td>
</tr>
<tr>
<td>Strategic Angle</td>
<td>Telemetry data</td>
<td>Brand, customer connectivity</td>
<td>Product advantage</td>
<td>Product advantage</td>
</tr>
<tr>
<td>Revenue Model</td>
<td>Fees</td>
<td>Commissions</td>
<td>Underwriting profit and investment income (annuity)</td>
<td>Underwriting profit and investment income (annuity)</td>
</tr>
<tr>
<td>Insurer</td>
<td>License data from OEMs to underwrite policies</td>
<td>Form alliances with OEMs</td>
<td>Serve as third-party administrators - for example, current insurers could process the claims of the OEMs</td>
<td>Transform business model to compete with new entrants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Expand into new products and services</td>
</tr>
</tbody>
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## Preparing for the Future – Auto Insurance Considerations

### What Now?

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acknowledge that the Autonomous Vehicle Transformation is Real</td>
</tr>
<tr>
<td>2</td>
<td>Understand Exposure</td>
</tr>
<tr>
<td>3</td>
<td>Evaluate Business Strategy / Consider Diversification Options</td>
</tr>
<tr>
<td>4</td>
<td>Identify and Monitor Leading Indicators</td>
</tr>
<tr>
<td>5</td>
<td>Prepare Operations</td>
</tr>
<tr>
<td>6</td>
<td>Understand Cost Structures</td>
</tr>
<tr>
<td>7</td>
<td>Align with Other Insurers and Form Partnerships</td>
</tr>
</tbody>
</table>
Questions

Ask
Answer
Who
Why
Understand
What
Query
When
How

Questions

Answer
Apply
### KPMG Contacts

<table>
<thead>
<tr>
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<th>Jerry Albright</th>
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<tbody>
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</table>

<table>
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<th>Joe Schneider</th>
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<tr>
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