About CyberCube

Mission
Deliver the world’s leading analytics to quantify cyber risk

History
- Founded in 2018
- Focused solely on cyber risk quantification and analytics
- Largest
  - single investment in cyber risk data and analytics
  - dedicated multi-functional team (>115)

Market Position
- > 100 (re)insurance clients
  - 20/30 top cyber carriers
  - 9/20 top global reinsurers
- > 95% client retention rate
- > 66% of global cyber insurance premiums

Regulatory Engagement
- Maintain active dialogues with regulators in key markets, and regularly engage on projects to develop cyber risk governance frameworks and risk management structures
- Partner with rating agencies to develop approaches to underwriting and rating cyber risk

CyberCube Solutions leveraged
- Portfolio Manager
  - SPoF scenario-class based cyber cat model
  - Quantify attritional and tail risk
- Account Manager
  - Predictive security score and risk factors
Insurance Industry loss modeling analysis: Carrier Count by Type

Company Count

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>1.2%</td>
</tr>
<tr>
<td>Life</td>
<td>14.5%</td>
</tr>
<tr>
<td>Health</td>
<td>20.9%</td>
</tr>
</tbody>
</table>

# of Carriers by Type

- **Total**: 4155
- **Excluded**: 679
- **Subtotal**: 3476
  - **P&C**: 1960
  - **Health**: 867
  - **Life**: 601
  - **Title**: 48

Premiums N/A: 6.5%
<=0 Premiums: 9.8%
Premiums by Carrier Type

- **Title**: 0.8%
- **Health**: 33.4%
- **P&C**: 29.3%
- **Life**: 36.5%

**Premiums by Carrier Type***

- **P&C**: $1,055B
- **Life**: $967B
- **Health**: $848B
- **Title**: $21B

*excluding N/A, Zero, Negatives
What questions did we tackle?

1. Which companies are most vulnerable from a security perspective?

2. Which of the insurer’s technology dependencies are the vector for loss?

3. What types of events are most likely to cause losses across the insurance industry?

4. What is the financial cost of cyber attacks on the US insurance industry?

5. Which companies present the largest risks?
Executive Summary

1. **Which companies are most vulnerable from a security perspective?**
   a. Micro-sized insurers (<$10mn premium), on average, have the weakest cyber security postures and are most vulnerable to loss
   b. Large companies, on average, have the best cyber security among insurers
   c. The Insurance sector, on average, is below the Financial industry average on cyber security

2. **Which of the insurer’s technology dependencies are the vector for loss?**
   a. Cyber attackers are most likely to access systems via shared technology dependencies such as certificate authorities, cloud service providers and content management systems

3. **What types of events are most likely to cause losses across the insurance industry?**
   a. Ransomware and Data Theft are the sources of largest loss to the insurance industry

4. **What is the financial cost of cyber attacks on the US insurance industry?**
   a. In any given year, the insurance industry will suffer $434mn in losses. At the 1-in-250 return period, the insurance industry could suffer losses of $8.3bn

5. **Which companies present the largest risks?**
   a. In a breakdown of individual companies that drive the industry loss, larger insurers contribute most to the loss quantum
1a. Which companies are the most vulnerable from a security perspective?

- CyberCube’s security scores consider 45 security risk factors, including Open Ports, End-of-Life products, Unpatched software

- These top-10 vulnerable* companies are all Micro size (<$10mn GwP). Company names obscured below, because…

- ‘Vulnerable’ does not equal ‘Negligent’. Cybersecurity is fast moving and requires resource. The likelihood of being attacked is a function of cybersecurity, the company’s value as a target and the volume of data/assets to be stolen

### P&C
- Superior Specialty Ins Co
- Far
- Nev
- Unit
- Cali
- Wis
- Mid
- Pen
- Jet
- Consumer Specialties Ins

### Life
- American Mut Life Assn
- Alliance Of Transylvanian Saxons
- KJZ
- Ass
- Fou
- Nat
- Wef
- Port
- Dakota Capital Life Ins Co

### Health
- Magna Ins Co
- Uniil
- Pro
- Digi
- Opt
- Ryd
- Sol
- Mor
- Econ
- Central Mass Hlth LLC

### Title
- American Eagle Title Ins Co
- Nati
- Sou
- Cali
- Ape
- Title
- AHF
- ARI
- Dak
- Conestoga Title Ins Co

* lowest CyberCube security scores
1b. Which segment is the most vulnerable from a security perspective?

- CyberCube Security Score averages show all Financial industry companies
- For all insurers, the averages by segment range from 42-48, therefore slightly below average Financial companies
- For P&C and Health insurers, two-thirds are below average for all Financials
- Life and Title insurers sit around the Financial industry average
- Overlaying company size, Large and Medium companies have above average scores. Small are average and Micro are below average

<table>
<thead>
<tr>
<th>Industry-size Averages</th>
<th>P&amp;C</th>
<th>Life</th>
<th>Health</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>87</td>
<td>87</td>
<td>86</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>35% above average</td>
<td>42% above average</td>
<td>36% above average</td>
<td>50% above average</td>
</tr>
<tr>
<td>Large</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>42</td>
</tr>
<tr>
<td>Small</td>
<td>63% below average</td>
<td>57% below average</td>
<td>63% below average</td>
<td>50% below average</td>
</tr>
<tr>
<td>Micro</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

(Least) 100 — (Most) 0
2. Which of the insurer's technology dependencies are main vectors for loss?

- CyberCube loss modeling is based on Single Points of Failure (SPoF) technology dependencies that act as vectors to cause loss.

- We show here the top SPoF groups for the insurance industry.

- Research highlights 4 main SPoF types as vulnerabilities for attack: Certificate Authority, File sharing providers, Email services providers and Content Management Systems.

**Insurer technology dependency groups**

- **Cloud Service Provider (Omni)**
  - AWS, Azure, Salesforce

- **Content Delivery Network Provider**
  - Cloudflare, Akamai, Amazon CloudFront

- **Certificate Authority**
  - DigiCert, Let's Encrypt, GoDaddy

- **Cloud-based Enterprise File Sharing Provider**
  - MS OneDrive/Azure, Google Drive, Apple iCloud

- **Email Services Provider**
  - MS Exchange, Gmail for Business, Zoho Mail

- **DNS Provider**
  - Route53, Cloudflare, GoDaddy

- **Operating System - Server**
  - Ubuntu, Unix, Linux

- **Content Management System Provider**
  - WordPress, Adobe Experience Manager, HubSpot CMS

- **E-Commerce Platform**
  - Shopify, Magento, Amazon
### 3. What type of event(s) can cause the largest losses to the Insurance Industry?

#### Five highest loss scenario classes

<table>
<thead>
<tr>
<th>Loss type</th>
<th>SPoF exploited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ransomware</td>
<td>File Sharing Provider</td>
</tr>
<tr>
<td>Data Theft</td>
<td>Fund Administrator</td>
</tr>
<tr>
<td>Destructive Malware</td>
<td>Cloud Services Provider</td>
</tr>
<tr>
<td>Ransomware</td>
<td>Endpoint Operating System</td>
</tr>
<tr>
<td>Data Theft</td>
<td>Enterprise Payroll Provider</td>
</tr>
</tbody>
</table>

#### Five lowest loss scenario classes

<table>
<thead>
<tr>
<th>Loss type</th>
<th>SPoF exploited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Theft</td>
<td>Financial Transaction Provider</td>
</tr>
<tr>
<td>Data Theft</td>
<td>E-Commerce Platform</td>
</tr>
<tr>
<td>Ransomware</td>
<td>Medical Device Manufacturer</td>
</tr>
<tr>
<td>Data Theft</td>
<td>Mobile Point of Sale Vendor</td>
</tr>
<tr>
<td>Extortion</td>
<td>Point of Sale Vendor</td>
</tr>
</tbody>
</table>
### 4. What is the financial cost of cyber attacks on the US insurance industry?

<table>
<thead>
<tr>
<th>Annual Probability</th>
<th>US Insurance Industry</th>
<th>P&amp;C</th>
<th>Life</th>
<th>Health</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0% or 1-in-50yr</td>
<td>4,267</td>
<td>1,167</td>
<td>1,738</td>
<td>1,387</td>
<td>35</td>
</tr>
<tr>
<td>1.0% or 1-in100yr</td>
<td>5,782</td>
<td>1,585</td>
<td>2,458</td>
<td>1,896</td>
<td>54</td>
</tr>
<tr>
<td>0.4% or 1-in-250yr</td>
<td>8,284</td>
<td>2,077</td>
<td>3,642</td>
<td>2,735</td>
<td>87</td>
</tr>
<tr>
<td>0.2% or 1-in-500yr</td>
<td>11,501</td>
<td>3,101</td>
<td>4,917</td>
<td>3,876</td>
<td>122</td>
</tr>
</tbody>
</table>

Losses shown in $millions.

Individual Life & Health company contribution to loss is higher.
5. Which companies drive the most losses – on average vs in a cyber catastrophe?

<table>
<thead>
<tr>
<th>P&amp;C</th>
<th>Average Annual Loss</th>
<th>1-in-250yr cat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State Farm Mut Auto Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>United Specialty Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>State Farm Fire &amp; Cas Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nations Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Federal Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>United Serv Automobile Assn</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life</th>
<th>Average Annual Loss</th>
<th>1-in-250yr cat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Health Net Life Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>American Nat Life Ins Co of NY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Globe Life Ins Co of NY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wysh Life &amp; Hlth Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reliance Standard Life Ins Co</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health</th>
<th>Average Annual Loss</th>
<th>1-in-250yr cat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pacificare Life &amp; Hlth Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clover Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Golden Security Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anthem Ins Co Inc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cigna Dental Hlth of NC Inc</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title</th>
<th>Average Annual Loss</th>
<th>1-in-250yr cat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conestoga Title Ins Co</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attorneys Title Guaranty Fund Inc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>National Title Ins Of NY Inc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alliant Natl Title Ins Co Inc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Real Advantage Title Ins Co</td>
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