Disrupt or Be Disrupted

Owen Lewis PhD, Partner, Management Consulting
Jean Rea FSAI, Director, Actuarial Services

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Owen Lewis
Partner

Insurtech
Enterprises around the world are facing a “perfect storm” of change.

— Is the enterprise of the past century still fit for purpose in this century?
— What does it take to be a 21st Century Enterprise amidst these changes?
— How will today’s leaders transform their business models, organisational structures and operations to thrive today and in the future?
Data driven customer service...

A 21st Century Enterprise unlocks value from **non-traditional assets** such as **Data**, to drive decisions and efficiencies in companies’ front and back offices, and **APIs** to collect and deploy data.

Citi and other major financial institutions have adopted data-driven and automated approaches to drive business growth and enhance the services it provides to customers including user experience analytics, AI/Cognitive, and Chatbots.
Organisations have been analysing the impact on their business, chosen a strategy, defined requirements, designed and implemented solutions and be able to demonstrate ongoing compliance…but what next?

As-a-Service Economy
53 percent of senior vice presidents and above see the ‘As-a-Service economy’ as critical or absolutely critical for their organisation, per a survey conducted in partnership with Accenture.

Digital Twins
By 2020, digital twins for industrial equipment will drive 25 percent reallocation of end-user spend from “procure and maintain” to “service” models provided by manufacturers.

Manufacturing
By 2018, 40 percent of top 100 discrete manufacturers and 20 percent of top 100 process manufacturers will provide Product-as-a-Service platforms.
Technical & Creativity Skills Required?

Industry Profile
Financial Services & Investors

Skills Forecast
Skills Change, Overall Industry

Social skills
Cognitive abilities
Process skills
Resource management skills
System skills
Content skills
Technical skills
Complex problem solving skills
Physical abilities

Change Management and Future Workforce Planning

67% believe future workforce planning is a leadership priority

Barriers
Insufficient understanding of disruptive changes
67%
Workforce strategy not aligned to innovation strategy
53%
Pressures from shareholders, short term profitability
47%
Resource constraints
43%
Insufficient priority by top management
27%
Insufficient priority by line management
27%

Strategies
Invest in retaining current employees
67%
Support mobility and job rotation
47%
Target female talent
39%
Attract foreign talent
23%
Other apprenticeships
20%
Collaborate, educational institutions
20%
Collaborate, other companies across industries
17%
Don't know
17%

53% are confident strategies are suitable

Emerging Job Family in Focus: Computer and Mathematical

Occupations
Information Security Analysts
Database and Network Professionals
Data Analysts

Key skills for 2020
Complex Problem Solving
Programming
Logical Reasoning
Critical Thinking
Creativity
21st Century Enterprise architecture

Customer engagement
Changing nature and value of assets
Everything as a service
Workforce of the future

Interface/Application Layer
- Mobile
- Voice/NLP
- AR/VR
- Drones
- Autom Vehicles
- Bots
- IoT

Data Layer
- Customers
- Operations, Equipment
- Suppliers, Partners
- Employees, Gig Workers, Bots

Smart Engine Layer
- AI
- Insights Engines
- Analytics

Infrastructure Layer
- Cloud
- APIs
- Blockchain

Security Layer

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Rules of engagement...

A Model for Types and Levels of Human Interaction with Automation

Raja Parasuraman, Thomas B. Sheridan, Fellow, IEEE, and Christopher D. Wickens

HIGH
1. The computer decides everything, acts autonomously, ignoring the human.
2. The computer decides everything, acts autonomously, informing the human as it sees fit.
3. The computer narrows the selection down to a few, and asks the human which one to choose.
4. The computer offers a complete set of decision/action alternatives, and asks the human to choose one.
5. The computer executes that suggestion if the human approves, or
6. The computer allows the human a restricted time to veto before automatic execution, or
7. The computer executes automatically, then necessarily informs the human, and
8. The computer informs the human only if asked, or
9. The computer informs the human only if it, the computer, decides to
10. The computer decides everything, acts autonomously, ignoring the human.

LOW
1. The computer offers no assistance: human must take all decisions and actions.
What are the risks?

• Do you know what AI is in place in your organisation?
• Have you thought about how you might audit AI?
• What about regulations...GDPR...the right to understand an automated decision
• How do you avoid entanglement and bias?
• Augment workforce or replace
• Artificial stupidity...
• Hype: over promise and under deliver...
Setting Up for Effective Innovation

Innovation Governance and Process

Individual Innovation Cycle (4 – 12 weeks)

1. Empathize & Understand
   - Problem Statement

2. Hypothesis Formulation
   - Solution Shortlisting

3. Startup Scouting

4. Value Proposition Development
   - upon successful pitch

5. Develop prototype

6. Pitch

Integration of life events and business: eliminating the boundaries…
Millennial attitudes - How accurate are they?

**Empathy**

**TODAY’S BANKING CUSTOMERS HAVE NEW AND DIFFERENT BEHAVIORS & EXPECTATIONS**

- Always Connected
- Explore & Experiment
- Share Opinions
- Research First
- Trust in Social
- Messaging vs Talking
- DIY / Collaborate
- DIFM & Everything As A Service
- Fast
- Easy To Use & Decomplexified
- Personalized
- Multi-Channel (Mobile First)
- Integrated
- Transparent
- Customer Focused
- Secure
Jobs to be Done Among Consumer Segments:

- Young professionals without children
- Parents with young children
- Empty nesters
- Entrepreneurs or start-ups
Fin/Insurtech innovation is evolving in unique ways in many different geographies as a result of their unique skills bases, innovation centers, government priorities and collaborations. Leading companies often have a presence in key fintech ecosystems in order to stay on top of signals of change and to help identify potential partners from outside their local jurisdictions. For example, Canada’s CIBC, the National Australia Bank and Bank Leumi of Israel have formed an alliance in order to leverage joint innovation to improve the customer experience for all three banks. CIBC and the National Australia Bank have also partnered on a blockchain project.
And From the Start-up POV...

The path to successful collaboration

A research into successful startup-corporate collaborations. Both parties need each other to innovate and scale, but on the journey to success there are many things that can go wrong. Sample size: 137 startups (companies younger than five years with a strong focus on building a scalable business).

Why collaborate?
1. Access to the market (65%)
2. Capital / Funding (54%)
3. Sales networks / economies of scale (56%)

How to enter?
1. Come prepared and know the problem you will be solving
2. Use your investor network to get introductions at the right level
3. Go to the preferred supplier of the large organization

What are roadblocks?
1. Slow decision making and red tape
2. Culture clash
3. The difficulty is finding the right person that actually needs the product and has budget

Speed up forces at the corporate side
1. Establish a clear entry point, have a process in place to deal with startups
2. Have a budget ready for pilots and experiments
3. Alliance managers, supplier dedicated, to help the startups to navigate internally

Governance model of the collaboration
- Joint venture (21%)
- Customer - supplier (24%)
- Licensing agreement (19%)
- Licensing (54%)
- Equity investment (10%)

Thumbnails
1. Define and discuss the objective for the startup-corporate collaboration upfront
2. Use standardized governance of partnerships/collaborations
3. Scrap clear evaluation phases

Company DNA of Outperforming startups with a successful collaboration
- Funding: at least 80% is funded
- Startup stage: 40% in making-ready, 24% is ready to scale up, 4% is already beyond scaling
- Company age: 2 years
- Team: 9 full-time employees with a total of 32 years sales and business experience and 28 years technical experience (e.g., software development)
Emerging technology - illustrative packages

The emergence of new technology, coupled with enhanced computing power, has the potential to radically disrupt this historic approach.

- Data preparation
- Cognitive – machine learning
- Visualization
- Robotic process automation

Computing power has increased significantly over time

We have seen a 1 trillion-fold increase in computer processing capabilities over the past 60 years (1)

Today’s smartphone has more computing power than the Apollo 11 Guidance Computer

CPU speed in GHz

Source: (1) Experts Exchange, “Processing Power Compared”
Source: (2) Frost & Sullivan, “Addressing Mobile Cybersecurity”

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Blockchain Transaction - How it Works

Entity A wants to send value, e.g. a Bitcoin, to Entity B, and creates a request.

Entity A's request is broadcast to every User (node) across the entire network.

Each node verifies the transaction using blockchain algorithms.

The new block is added to the ledger and is replicated on all nodes across the entire network.

Once verified the transaction is combined with other verified transactions into a block of data for inclusion in the ledger.

Entity A's transaction is complete and Entity B is now the owner of that Bitcoin.
Bots in the Back-Office – NLP & ML are helping customer care agents standardise their responses (quality, compliance & cross-sell opps)
How to train your chat bot...

—Define outcomes / intent (what services should the chatbot cover?)
—Collect corpus of knowledge (e.g. real demand from customers and responses)
—Train the chatbot using the training set
—Develop the dialogue
—Review errors and refine training
—Use the trained chatbot with alpha / beta community
—Continue to train with additional utterance
—Add new outcomes / intents over time
What really is AI?
What really is AI: contact centre example?

ID&V

Biometrics

Voice to Text

Text to Intent

How to respond?

What words did they say?

What do they want?

What else did I detect?

- Emotions
- Fraud
- Opportunity
Robotic process automation has the ability to improve operational efficiencies across the entire claims operation. The reserving process is particularly ripe for automation.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>FNOL</strong></td>
<td><strong>Case Creation</strong></td>
<td><strong>Limited RPA opportunities or not enough information</strong></td>
</tr>
<tr>
<td><strong>Collect Information</strong></td>
<td><strong>Assignment</strong></td>
<td><strong>Limited RPA opportunities or not enough information</strong></td>
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<tr>
<td><strong>Identify Policy</strong></td>
<td><strong>Refer to Investigator</strong></td>
<td><strong>Refer to Investigator</strong></td>
</tr>
<tr>
<td><strong>Score and Segment</strong></td>
<td><strong>Detect / Manage Fraud</strong></td>
<td><strong>Detect / Manage Fraud</strong></td>
</tr>
<tr>
<td><strong>Complete Case Evaluation Report</strong></td>
<td><strong>Perform Appraisal</strong></td>
<td><strong>Perform Appraisal</strong></td>
</tr>
<tr>
<td><strong>Verify Coverage</strong></td>
<td><strong>Prepare Data</strong></td>
<td><strong>Prepare Data</strong></td>
</tr>
<tr>
<td><strong>Assign Claim Adjuster</strong></td>
<td><strong>Analysis of Legal Matter</strong></td>
<td><strong>Analysis of Legal Matter</strong></td>
</tr>
<tr>
<td><strong>Validate Claim Information</strong></td>
<td><strong>Notify of Legal Matter</strong></td>
<td><strong>Notify of Legal Matter</strong></td>
</tr>
<tr>
<td><strong>Send Notification to Adjuster</strong></td>
<td><strong>Review Claim History</strong></td>
<td><strong>Review Claim History</strong></td>
</tr>
<tr>
<td><strong>Refer to Investigator</strong></td>
<td><strong>Liqutation</strong></td>
<td><strong>Ligation</strong></td>
</tr>
<tr>
<td><strong>Review Claims</strong></td>
<td><strong>Calculate Claim Value</strong></td>
<td><strong>Calculate Claim Value</strong></td>
</tr>
<tr>
<td><strong>Review Reserves</strong></td>
<td><strong>Adjust for Recovery</strong></td>
<td><strong>Adjust for Recovery</strong></td>
</tr>
<tr>
<td><strong>Review Invoice</strong></td>
<td><strong>Duplicate Payment Check</strong></td>
<td><strong>Duplicate Payment Check</strong></td>
</tr>
<tr>
<td><strong>Approve</strong></td>
<td><strong>Closing the Claim</strong></td>
<td><strong>Closing the Claim</strong></td>
</tr>
<tr>
<td><strong>Payments</strong></td>
<td><strong>Closing of Legal Matter</strong></td>
<td><strong>Closing of Legal Matter</strong></td>
</tr>
<tr>
<td><strong>Finance to Process and Issue Payment</strong></td>
<td><strong>Corrective Action</strong></td>
<td><strong>Corrective Action</strong></td>
</tr>
<tr>
<td><strong>Inform Customer</strong></td>
<td><strong>Secondary Fraud Investigation Research</strong></td>
<td><strong>Secondary Fraud Investigation Research</strong></td>
</tr>
<tr>
<td><strong>Issue Check</strong></td>
<td><strong>Adjust for Recovery</strong></td>
<td><strong>Adjust for Recovery</strong></td>
</tr>
</tbody>
</table>

**Legend:**
- **CLASS 1: Basic Process Automation**
- **CLASS 2: Enhanced Process Automation**
- **CLASS 3: Autonomic /Cognitive**

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**Robotic process automation** has the ability to improve operational efficiencies across the entire claims operation. The reserving process is particularly ripe for automation.

Robotic process automation (RPA) has the ability to improve operational efficiencies across the entire claims operation. The reserving process is particularly ripe for automation. **Robotic process automation** (RPA) has the ability to improve operational efficiencies across the entire claims operation. The reserving process is particularly ripe for automation.
Act Tech

Jean Rea
Director
Buzzwords

ROBOTICS PROCESS AUTOMATION
VIRTUAL WORKFORCE
DIGITAL
COGNITIVE
ANALYTICS
MACHINE LEARNING
ARTIFICIAL INTELLIGENCE
BIG DATA
DISRUPTIVE TECHNOLOGY
INTERNET OF THINGS
Non life claim reserving - decades of the same approach

How reserves are established has changed little over the last century.

- New York Insurance Law requires sufficient general reserves to pay all claims.

- Tarbell paper in CAS Proceedings outlines a method of calculating one year runoff of pure IBNR, to add to case basis reserves.

- Remarking how little has changed in reserving since 1934, Bornhuetter and Ferguson lay out methods of loss development, and the BF method that still underpins reserving techniques today.

- These are designed around batch computer printout reports, and green paper spreadsheets.

- Electronic spreadsheets like Visicalc, and later Excel, are adapted to calculate the 1972 methodologies, replacing the paper greensheets.

- Automated software tools are developed, such as ReservePro and ResQ that incorporate the 1972 methods.

- Advances like statistical ranges are introduced.

- Modern version of SAS, R introduced - computing power increases exponentially.

- Visualization tools such as Qlik and Tableau introduced.

- Later, tools such as Hive and Hadoop empower "big data" techniques, and RPA is introduced - these are little used in loss reserving.

- Reserve modernization using detailed data, new tools, and computing power becomes practical.

- While GLM and MCMC methods have been developed, they are not widely in use.
Emerging technology - illustrative packages

The emergence of new technology, coupled with enhanced computing power, has the potential to radically disrupt this historic approach.

Data preparation

Cognitive – machine learning

Visualization

Robotic process automation

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We have seen a 1 trillion-fold increase in computer processing capabilities over the past 60 years\(^1\)

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<table>
<thead>
<tr>
<th>Year</th>
<th>CPU Speed in GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apollo 11 (1969)</td>
<td>0.016</td>
</tr>
<tr>
<td>IBM x86 (1981)</td>
<td>0.16</td>
</tr>
<tr>
<td>Intel DX4 (1994)</td>
<td>0.16</td>
</tr>
<tr>
<td>Pentium II (1998)</td>
<td>0.43</td>
</tr>
<tr>
<td>Pentium III (1999)</td>
<td>0.7</td>
</tr>
<tr>
<td>iPhone 4 (2010)</td>
<td>1.0</td>
</tr>
<tr>
<td>iPhone 5 (2012)</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Source: \(^1\) Experts Exchange, “Processing Power Compared”
Source: \(^2\) Frost & Sullivan, “Addressing Mobile Cybersecurity”
Reserve modernization - movement along the maturity curve

Reserve capabilities will mature through a combination of advances in both data and cognetics.

- **Data**
  - Transaction-level & unstructured
  - Aggregated
  - Claim & policy-level

- **Cognetics**
  - Based on existing
    - Automation Current Method
  - Near-term
    - New reserving methods
    - Detailed data
  - Long-term
    - Full reserve methods
    - Claim-level reserves

- **Machine learning & artificial intelligence**
- **Decision modeling**
- **Rules based**

Reserve modernization – movement along the maturity curve.

Reserve capabilities will mature through a combination of advances in both data and cognetics.
Optimisation

Manual Analysis:

- Manually check data and reports. Apply manual adjustments
- Prepare analysis, charts and narrative
- Compile reporting and submit for review

Optimised Process:

- Bot reviews data and flags any errors and makes recommendations
- User Reviews findings and adds additional analysis
- Feedback Additional time for Insight

- Review data architecture and process flow
- Identify areas for efficiency gains:
  - Step reduction
  - Automation
  - Collaboration and reporting
- Control
  - Strategic validation
  - Review, challenge and feedback
  - Continuous improvement
Automation – non-life reserving example

Streamline a manual reserving process in 10 weeks:

- 8 of the 18 high-level manual tasks automated in the analysis process.
- automated 18% of analyst effort in analysis
- We also identified process re-engineering opportunities (incl. RPA)

Expected to reduce analyst effort approximately 50%

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Next generation development - non life reserving example

**Traditional methods**
- Existing chain-ladder and reserving techniques link development factors to development period

**Machine Learning Methods**
- At an triangle level, we can include more information to compare
- Build towards a more granular approach

Additional Fields
- Exposure
- Policy details
- Experience

Traditional experience only projection

Projection based on non-linear relationships and exposure data
Machine Learning Example

Machine Learning approach

- Machine learning techniques can be employed to provide a more detailed analysis.
- For an aggregate triangle, this means
  - More predictive factors can be included in the analysis
  - The pattern is estimated separately for each accident year
  - Projected triangles can be validated against existing methods

Policy-Level Reserving

- The same methods can be employed to reserve on a policy-by-policy basis
  - using features of individual policy and claims
- Aggregate triangles can still be created, and compared against the new methods
- Analysis tailored to the risk profile of each year

### Predictor Weight in Data Model

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accident Year</td>
<td>5%</td>
</tr>
<tr>
<td>Development Lag</td>
<td>4%</td>
</tr>
<tr>
<td>Premium</td>
<td>5%</td>
</tr>
<tr>
<td>First Dev Paid LR</td>
<td>3%</td>
</tr>
<tr>
<td>First Dev Incurred LR</td>
<td>8%</td>
</tr>
<tr>
<td>First Dev To Incurred</td>
<td>7%</td>
</tr>
<tr>
<td>Incurred LDF Mean</td>
<td>25%</td>
</tr>
<tr>
<td>Incurred LDF min</td>
<td>4%</td>
</tr>
<tr>
<td>Incurred LDF max</td>
<td>9%</td>
</tr>
<tr>
<td>Average Driver Age</td>
<td>5%</td>
</tr>
<tr>
<td>Average NCD</td>
<td>5%</td>
</tr>
<tr>
<td>Average Veh Value</td>
<td>5%</td>
</tr>
<tr>
<td>Paid LDF min</td>
<td>4%</td>
</tr>
<tr>
<td>Paid LDF max</td>
<td>4%</td>
</tr>
<tr>
<td>Paid LDF mean</td>
<td>5%</td>
</tr>
</tbody>
</table>

### Predictor vs. Weight in Data Model

| Accident Year | Premium | First Year Paid / Incurred | Avg. Driver Age | Avg. Driver NCD | Avg. Vehicle Value | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------------|---------|----------------------------|-----------------|-----------------|-------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988          | 98,658  | 20%                        | 28.7            | 2.6             | 2.35              | 96,661 | 91,122 | 94,748 | 95,847 | 92,518 | 89,087 | 87,827 | 86,727 | 89,541 | 93,263 |
| 1990          | 115,339 | 18%                        | 29.6            | 3.1             | 2.72              | 114,563 | 120,860 | 116,530 | 115,167 | 112,542 | 108,505 | 105,573 | 104,558 | 104,988 | 104,602 |
| 1991          | 148,270 | 15%                        | 30.6            | 3.2             | 2.74              | 140,708 | 135,980 | 131,180 | 136,037 | 127,123 | 122,509 | 119,437 | 104,988 | 104,602 | 104,988 |
| 1992          | 180,318 | 14%                        | 30.9            | 3.3             | 3.53              | 167,168 | 150,172 | 152,042 | 147,005 | 140,820 | 135,698 | 135,069 | 134,820 | 135,069 | 134,820 |
| 1993          | 209,457 | 15%                        | 31.7            | 3.6             | 3.75              | 180,072 | 174,823 | 182,437 | 173,562 | 162,630 | 0.9   | 1.0  | 1.0  | 1.0  | 1.0  |
| 1994          | 225,356 | 15%                        | 31.3            | 3.8             | 4.11              | 195,314 | 184,302 | 184,126 | 173,711 | 0.9   | 0.9  | 0.9  | 1.0  | 1.0  |
| 1995          | 266,022 | 14%                        | 31.5            | 4.2             | 4.26              | 221,350 | 210,412 | 208,135 | 190,872 | 184,126 | 174,823 | 162,630 | 150,172 | 147,005 | 140,820 |
| 1996          | 308,204 | 16%                        | 31.5            | 4.5             | 4.54              | 244,749 | 239,482 | 140,872 | 135,069 | 134,820 | 0.9   | 1.0  | 1.0  | 1.0  | 1.0  |
| 1997          | 358,511 | 17%                        | 32.3            | 4.5             | 4.97              | 280,808 | 229,482 | 140,872 | 135,069 | 134,820 | 0.9   | 1.0  | 1.0  | 1.0  | 1.0  |
Why is Data Science important?

**Machine learning is great as a theme, but why do we need it?**

**Iceberg Analogy**
Looking to understand centuries of climate change by profiling ice production

**Triangle Reserving: Ice Axe**
- Based on latest summarised data. Much of the detail is lost but gives the latest behaviour.
- Well understood analysis but only scratches the surface.

**Machine Learning: Icemaster 3000**
- Tools to drill down to capture a lower level of data in the analysis.
- Same objective but ML scales to handle more factors and information to make the predictions more accurate.
- However, it requires different tools to evaluate results.
Thank you