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Navigating Technological Disruption (back to the future)

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4 December 2024

Presented at the 2024 Young Actuaries Conference

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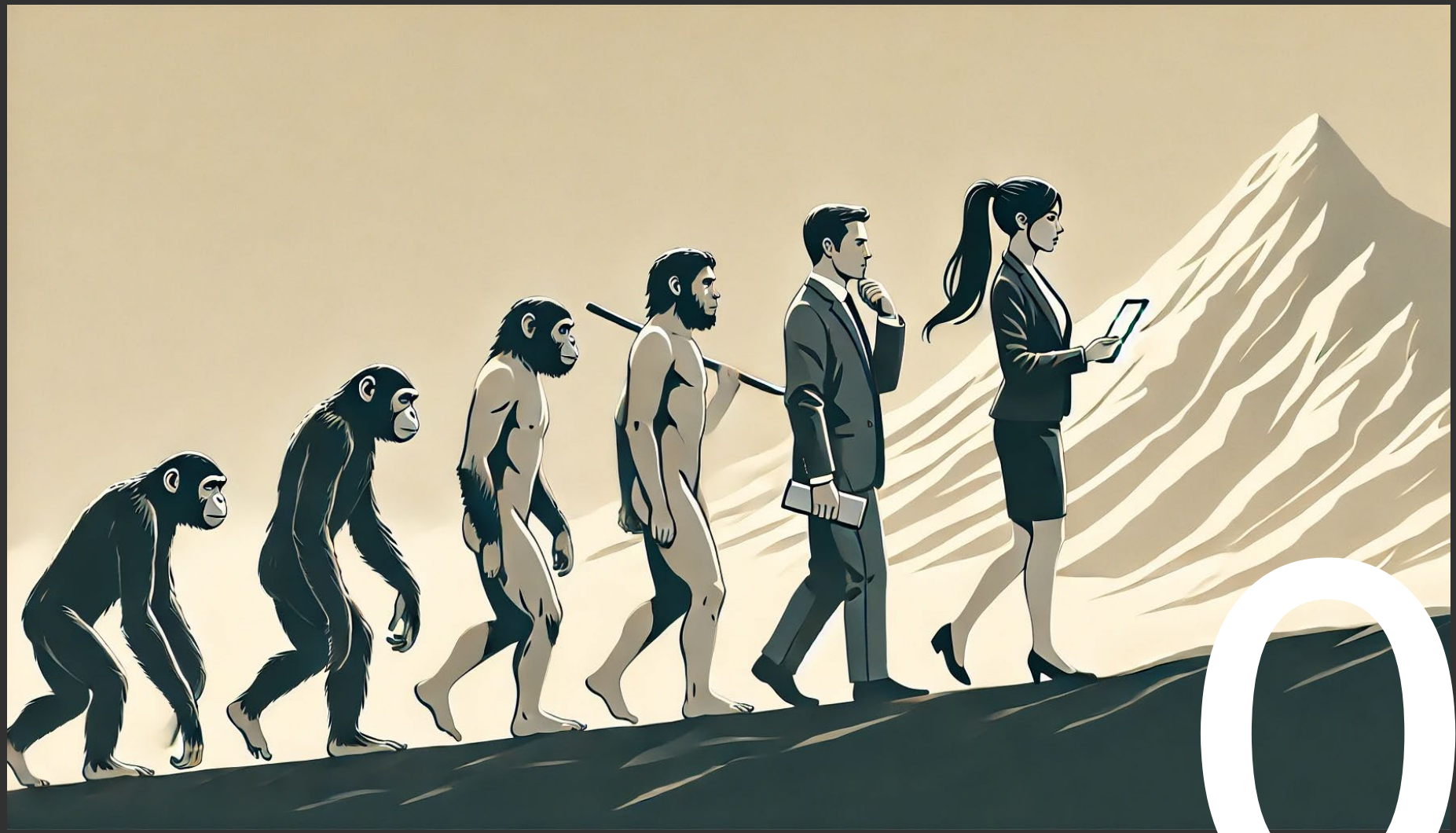
Introduction: A Journey Through Time



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A Journey Through Time

- The past 20+ years have transformed the actuarial profession with technology's rapid advancements.
- Actuaries, skilled in managing uncertainty, have consistently adapted to disruptions—from manual calculations to advanced algorithms and neural networks.
- Today, we'll explore the history of these changes and how we can prepare for future disruptions.

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Actuarial History: Navigating Past Disruptors

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Key Technological and Analytical Shifts in Actuarial Work... a LONG time ago!

1. **Early Actuarial Mathematics: Manual Calculations (Pre-1990s)**

Analytical Tools:
- Relied on basic probability theory and life tables.
- Simple linear regression models were the norm, calculated manually or with basic calculators.

Computing Environment:
- Actuaries used paper-based methods, mechanical calculators, and early mainframes, which were slow and limited in data capacity.

2. **The Excel Era: Personal Computing Revolution (1990s)**

Analytical Tools:
- Excel revolutionized actuarial work with automated calculations, dynamic models, and scenario testing.
- Simple stochastic modeling became more accessible through spreadsheets.

Computing Environment:
- The rise of personal computers (PCs) allowed actuaries to work independently.
- PCs typically had limited RAM (4-16 MB) and storage, but were sufficient for early Excel models.
- Processing was entirely local, often constrained by hardware limitations.

3. **The SAS, Prophet/Moses, and SQL Era: Server-Based Calculations (Late 1990s–2000s)**

Analytical Tools:
- SAS provided advanced data handling and statistical analysis capabilities.Prophet and Moses enabled actuaries to model insurance products, including stochastic projections.SQL facilitated large-scale data retrieval and manipulation

Computing Environment:
- Increased use of servers to handle heavier computations, particularly for tools like Prophet. "Workers" (distributed computing units) were introduced for parallel calculations in Prophet, enhancing efficiency for larger models.
- Actuaries transitioned to a mix of local desktops and server-based workflows, with typical desktops having 128–256 MB of RAM and servers offering greater scalability.

Key Technological and Analytical Shifts in Actuarial Work... This is more like it!

4. The R & Python Era: Flexibility Meets Data Analytics (2010s)

Analytical Tools:

- Tools like **Excel, SQL, SAS**, and **Prophet** remained the backbone of many actuarial processes, often running alongside R and Python as actuaries transitioned to more sophisticated workflows
- **R** provided robust statistical computing and data visualization capabilities, gaining adoption for actuarial work.
- **Python** offered unmatched flexibility, enabling data manipulation and advanced analytics through libraries like pandas, NumPy, and scikit-learn.

Computing Environment:

- **Personal Computers:** Desktops with increasing RAM (4–16 GB) supported more demanding local computations.
- **Virtual Desktops:** Virtualized environments allowed actuaries to run SAS, Prophet & other tools remotely, reducing reliance on local processing power.
- **Servers:** Server clusters handled large-scale computations, particularly for stochastic modeling, but actuaries primarily relied on localized and virtualized workflows.
- **Cloud Adoption (Emerging):** While some exploratory use of cloud platforms occurred, the focus remained on local and server-based computation, with cloud technologies still in their infancy for actuarial purposes.

5. The Transition to Cloud Technologies: A Gradual Shift (2020s)

Analytical Tools:

- **Traditional Tools Persist:** Excel, SAS, Prophet, R, and Python remain central to workflows, still leveraging local or virtualized environments.
- **Cloud-Enhanced Tools:** Platforms like Databricks and Snowflake are increasingly integrated into computation pipelines, offering scalability for data-intensive tasks.
- **AI and LLMs:** Tools such as ChatGPT and other large language models (LLMs) are being explored for supplementary tasks, such as code development, data queries and model interpretation.

Computing Environment:

- **Hybrid Workflows:** Many actuarial workflows continue to rely on local computation pipelines or virtual desktops, transitioning gradually to cloud.
- **Incremental Cloud Adoption:** Cloud technologies like serverless computation and big data analytics are being phased in, but they coexist with traditional server and desktop-based systems.
- **Streaming Data (Emerging):** Actuaries are beginning to model real-time data from telematics and wearables, with cloud platforms facilitating data ingestion and processing.
- **Collaboration Tools:** Cloud platforms support global collaboration, but integration with legacy systems remains a challenge for many

Lessons from the Past: How Actuaries Managed Disruption

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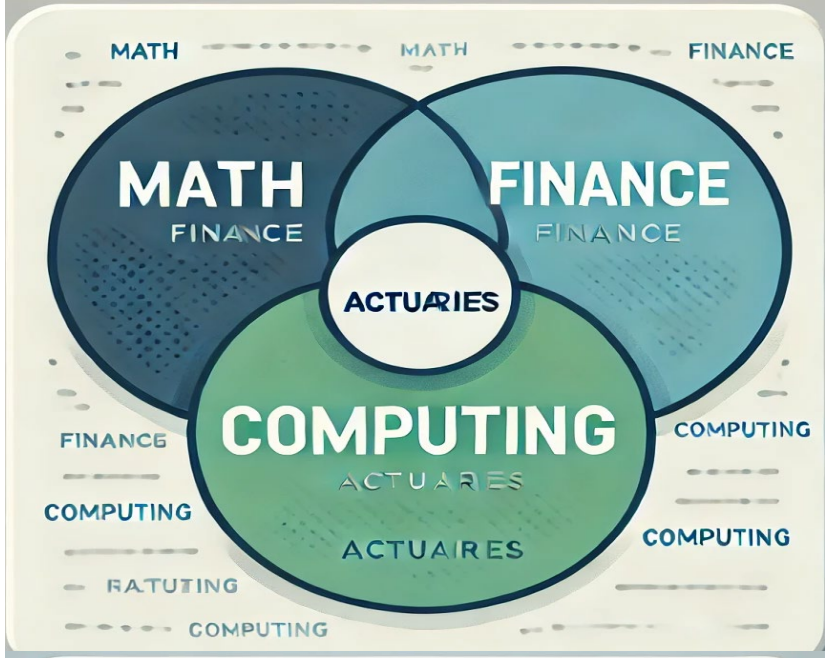
Lessons Learned from Technological Disruption

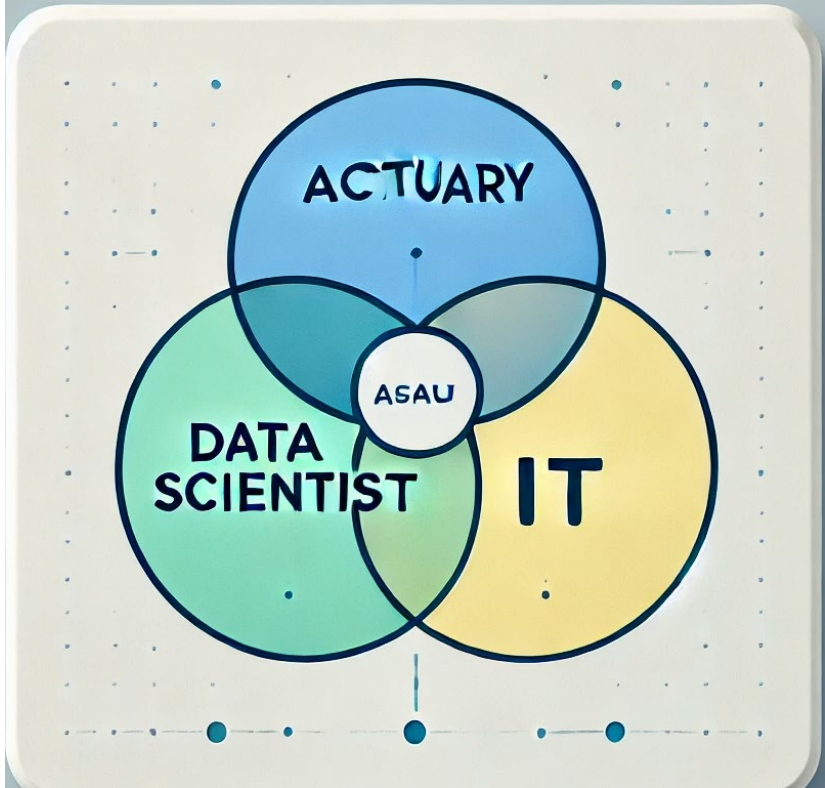
Traditional Expertise:
Actuaries have long combined mathematics, statistics, economics, and finance to model uncertainty, assess risks, and guide decision-making. Tools like Excel, SAS, SQL, and Prophet supported this work alongside strong business acumen.

The Transition to Modern Tools:
As technology advanced, actuaries adapted by incorporating programming languages like Python and R for data analysis, enabling more sophisticated models and insights. Cloud technologies and virtual desktops began complementing traditional tools to handle larger datasets and complex workflows.

Complementary Data Science and IT Skills:
Today, actuaries enhance their core expertise with data science and IT skills, including machine learning, big data platforms (e.g., Databricks, Snowflake), and collaborative tools. These skills expand their ability to integrate real-time data and provide scalable, actionable insights.

Education Keeping Pace:
The actuarial education system has evolved to meet technological demands, introducing new courses and electives like the data analytics fellowship stream, preparing actuaries for data-driven roles.





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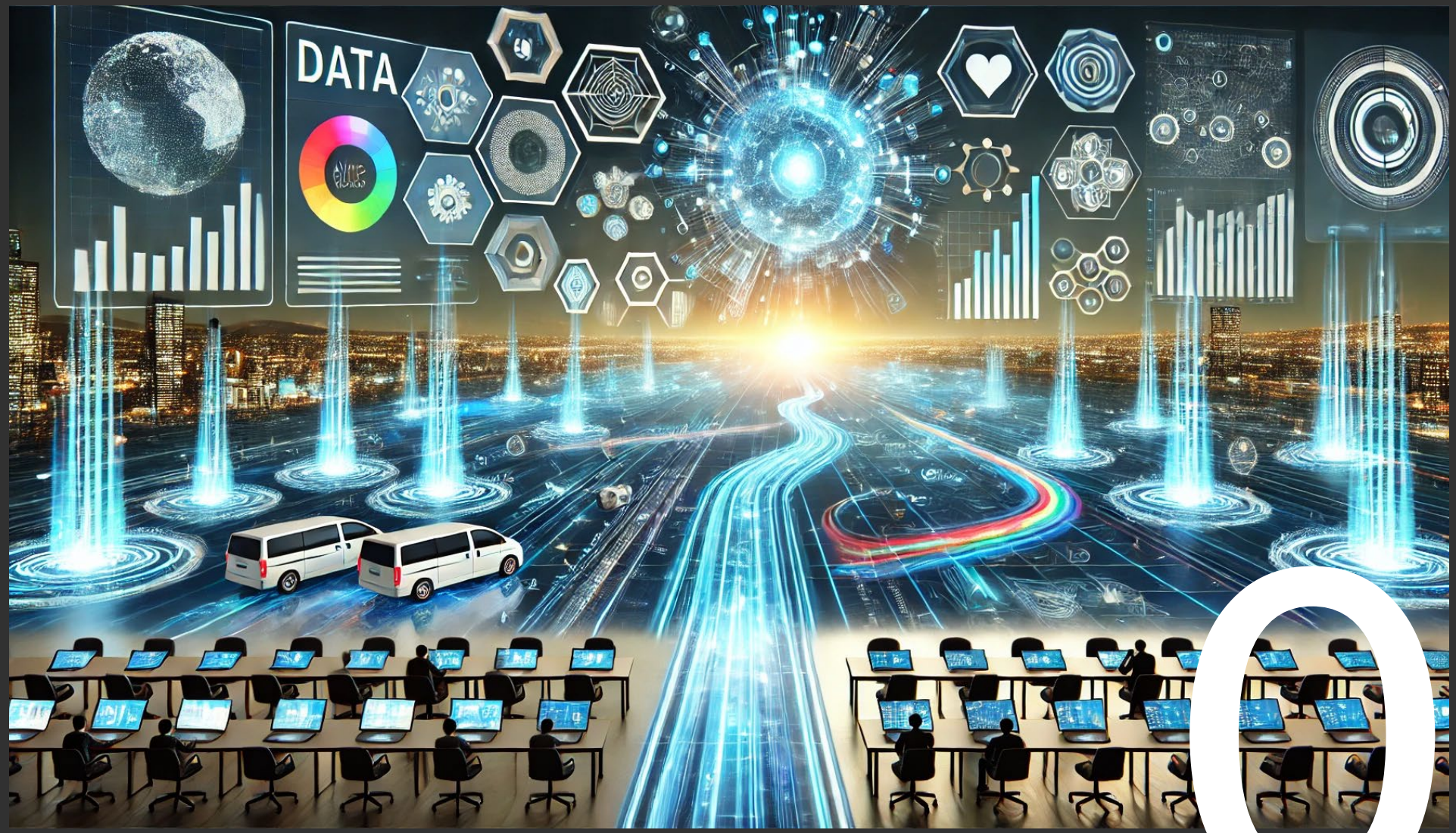
The Current Landscape: Disruptors Today



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Today’s Technological Disruptors

1. AI & Large Language Models (LLMs):
Tools like ChatGPT have democratized access to powerful models. Actuaries now focus less on understanding the technical mechanics of these models and more on effectively applying them to solve problems.

2. Insurtech & Automation:
Automation is transforming underwriting and claims processes, with Insurtechs disrupting traditional methods.

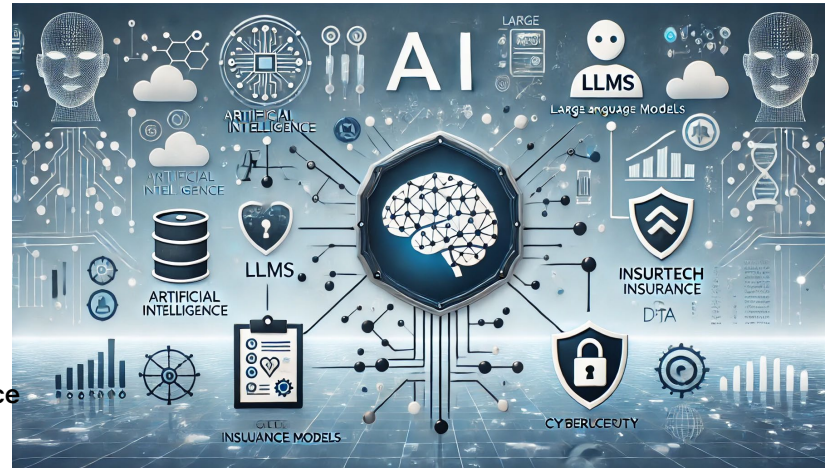
3. ChatGPT and LLMs:
Large language models, like ChatGPT, support better decision-making and
customer interactions. Actuaries can use them for risk explanations, data queries, and model outputs.

4. Democratization of Models:
AI and machine learning are more accessible than ever. Actuaries no longer need deep technical expertise to use powerful models.

5. Cloud Computing & Serverless Architectures:
Platforms like Databricks and Snowflake provide immediate access to scalable computing, enabling actuaries to process massive datasets and run complex models with ease.

6. Data Partnerships and Streaming Data:
Emerging data partnerships promise unparalleled access to rich datasets, including real-time, streaming data from sources like IoT devices and telematics. This transforms the potential for dynamic, on-demand risk modeling.

7. Cybersecurity & Data Privacy:
With more data comes the need for modeling and managing cyber risks.



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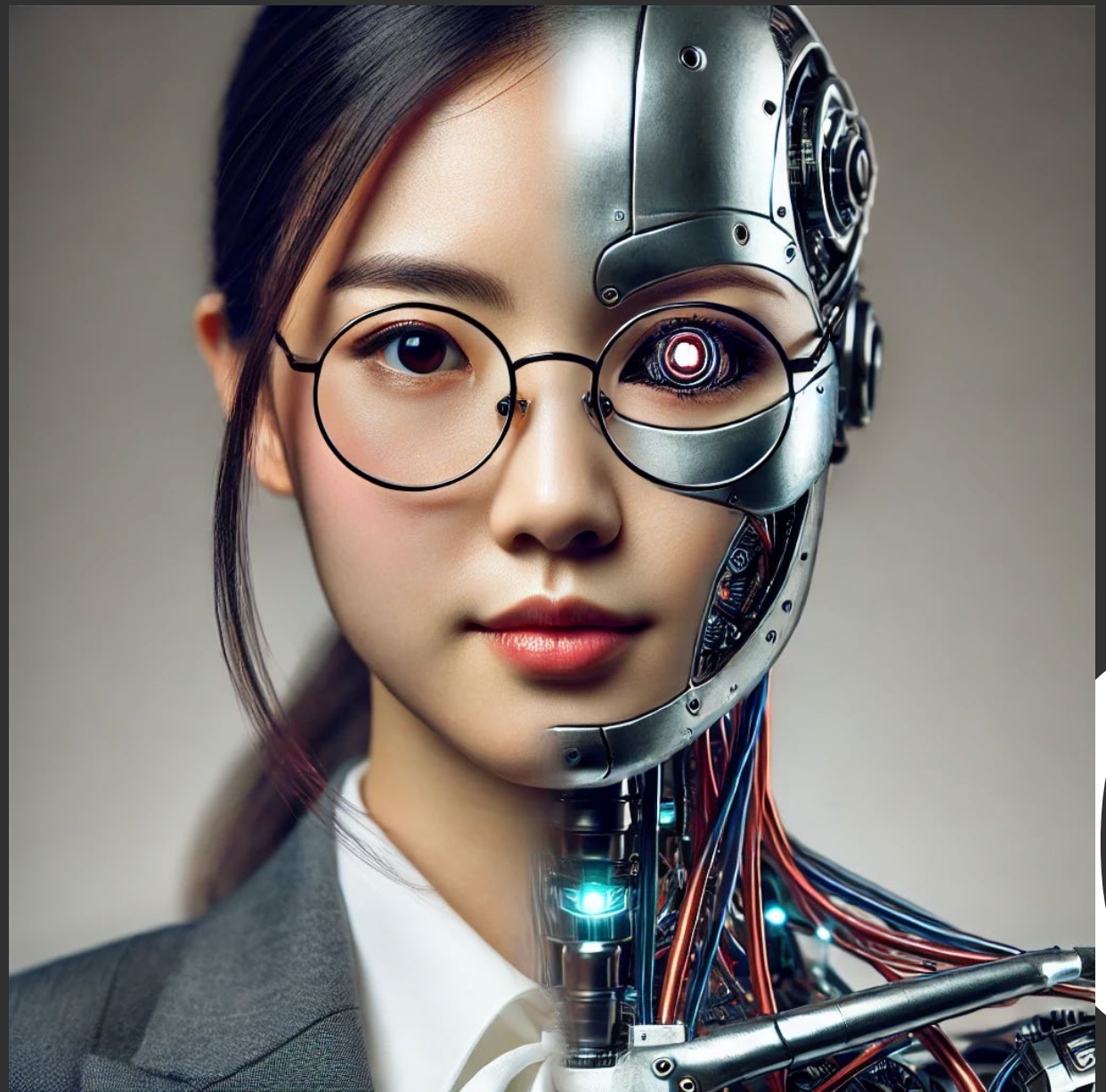
Preparing for the Future: Future-Proofing Your Career



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The Future of Actuarial Work: Key Focus Areas

Foundations of Knowledge:

Success begins with understanding the data and the problem to solve. Actuaries must focus on preparing data for the task at hand, leveraging their expertise in actuarial science, statistics, computing, and business acumen to deliver meaningful value to their company or client.

Analyzing Big Data:

The true value lies in interpreting and using the massive flood of data from wearables, telematics, and IoT devices to deliver more effective risk models and insights.

Real-Time Data and Scalable Computing:

Streaming data from sources like wearables and telematics, combined with serverless platforms, will enable actuaries to perform instantaneous dynamic pricing, real-time analytics, and scalable predictions, transforming risk assessment and decision-making processes.

Focus on Applications, Not Just Models:

The future is less about understanding the intricate mechanics of complex models (like neural networks) and more about effectively applying them to solve real-world problems.

Ethics and Responsible AI Use:

Actuaries must ensure that AI and machine learning models are fair, transparent, and aligned with regulatory and societal expectations, advocating for responsible use and robust governance.

Continuous Learning and Adaptation:

Actuaries must embrace technological change, focus on learning new tools, and let go of the need to understand every detail of how these technologies work, instead prioritizing their practical application.

Navigating Tomorrow's Disruptors

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My challenge to you!

- The future of actuarial work isn't just about crunching numbers—it's about shaping the future with data-driven insights, AI-powered tools, and lightning-fast computation.
- Real-time data will unlock opportunities we've only dreamed of—think less "predicting the future" and more ***designing it***.
- So, buckle up, actuaries! Whether you're mastering machine learning or finding meaning in wearables data, the next big disruptor isn't coming for us - **IT IS US.**

Time to make SIRI jealous.

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Thank you

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