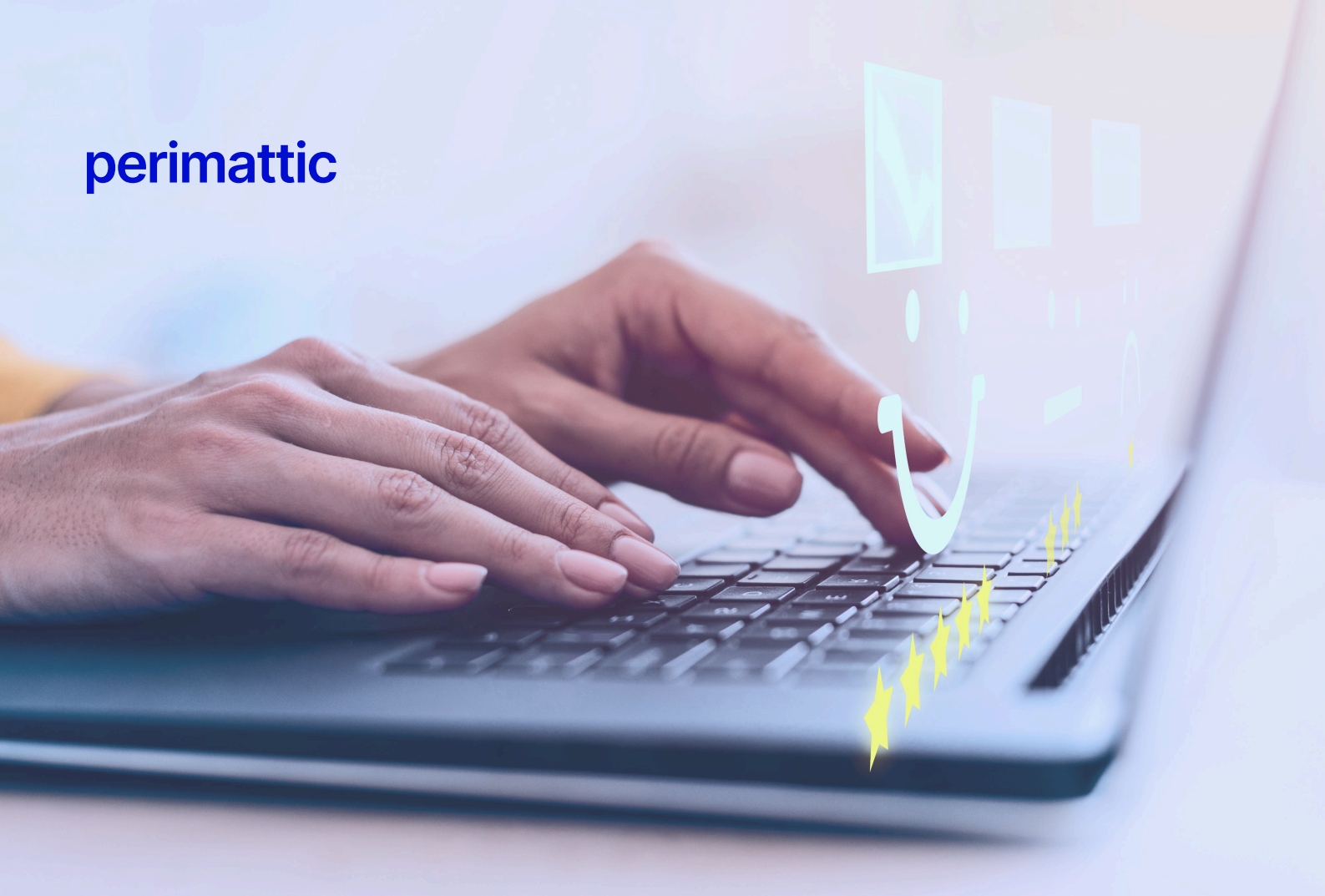


A close-up photograph of a person's hands typing on a laptop keyboard. The image is overlaid with digital graphics: a large green checkmark, a bar chart with three bars of increasing height, a green smiley face, and a yellow line graph with upward-pointing arrows. The background is a soft, out-of-focus light blue.

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Reinvention Of Risk, Claims And Customer Experience

AI In Underwriting:

Real-Time Risk Evaluation
Using Behavioural Data

JUNE 2025

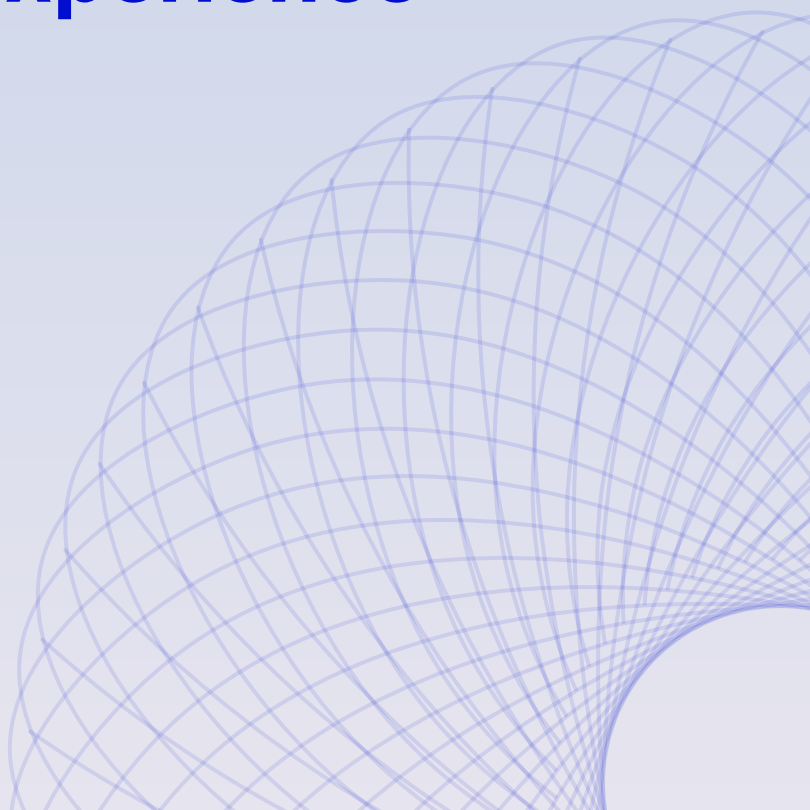
A decorative graphic in the bottom right corner consisting of a wireframe sphere or globe, made of intersecting lines, rendered in a light blue color.

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Executive Summary



The insurance and lending industries are undergoing a paradigm shift with the integration of Artificial Intelligence (AI) in underwriting. Traditional underwriting relies on historical data, credit scores, and manual assessments, leading to delays and inefficiencies.

However, AI-powered real-time risk evaluation using behavioral data is revolutionizing the sector by enabling faster, more accurate, and dynamic decision-making.

This whitepaper explores:

- **The limitations of conventional underwriting methods.**
- **How behavioral data (e.g., transaction patterns, social media activity, and IoT device usage) enhances risk profiling.**
- **The role of machine learning (ML) and predictive analytics in automating underwriting decisions.**
- **Real-world applications and case studies from leading insurers and fintech firms.**
- **Ethical concerns, regulatory challenges, and future advancements.**

By leveraging AI, insurers and lenders can reduce fraud, improve customer experience, and optimize risk pricing—ultimately driving profitability and market competitiveness.

“

Brian Duperreault, Former CEO of AIG -

The underwriter is going to need different skill sets than they've had before. And those skill sets are all around being adept, facile, being able to understand data and interpret data and use data in a way that they haven't done before.

Introduction

The Evolution of Underwriting



Underwriting has long been a cornerstone of the insurance and financial services industries. Traditionally, underwriters assess risk based on static data points such as credit history, medical records, and financial statements. However, this approach is often slow, reactive, and prone to biases.

With the rise of big data and AI, underwriters now have access to real-time behavioral insights—such as spending habits, social media behavior, and even fitness tracker data—to make more accurate and dynamic risk assessments.

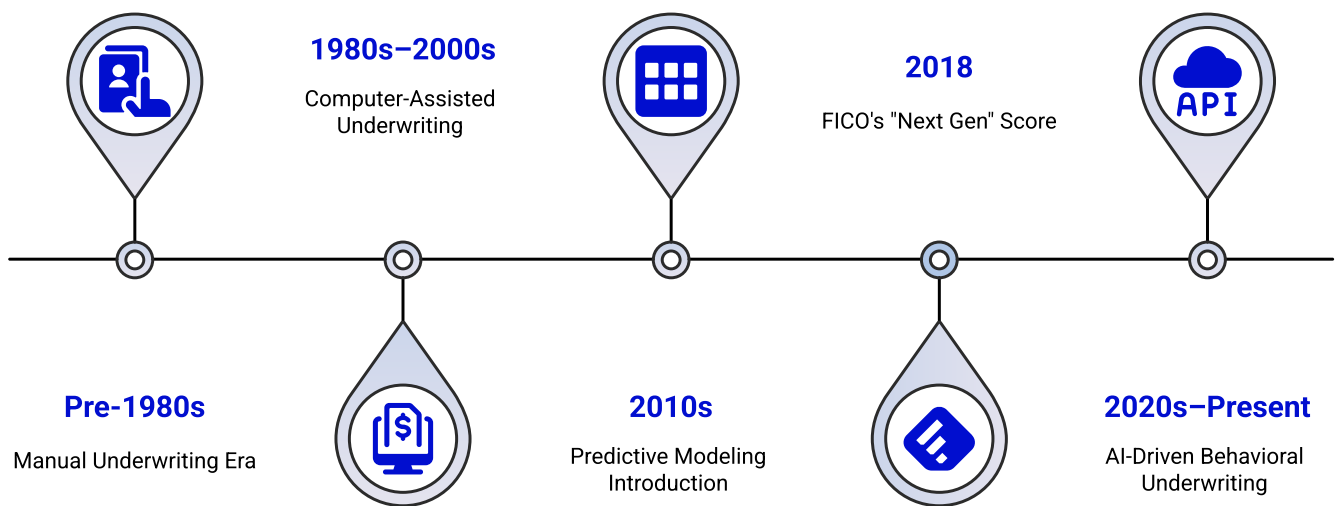
This whitepaper examines how AI-driven underwriting is transforming risk evaluation, the technologies enabling this shift, and the implications for businesses and consumers.

Insurers are already finding many use cases for AI: 76 percent of insurers in the U.S. have already implemented GenAI capabilities in one or more business functions - a 2024 Deloitte survey.

The Evolution of Underwriting: From Traditional to AI-Driven

Underwriting has undergone four distinct phases of innovation, each marked by technological breakthroughs that redefined risk assessment:

The Evolution of Underwriting: From Paper to AI



1. Manual Underwriting (Pre-1980s)

- Process: Paper-based applications, in-person interviews.
- Limitations: Subjective judgments, slow turnaround (weeks/months).
- Example: Lloyd's of London's "wet signatures" on parchment policies.

2. Computer-Assisted Underwriting (1980s–2000s)

- Tech Shift: Digitized records, early scoring algorithms.
- Impact: Reduced processing time to days; introduced standardized risk tables.
- Limitation: Still reliant on static data (credit scores, ZIP codes).

3. Predictive Modeling (2010s)

- Innovation: Early machine learning models using structured data.
- Milestone: FICO's "Next Gen" score (2018) incorporated rent/utility payments.
- Challenge: Limited real-time adaptability.

4. AI-Driven Behavioral Underwriting (2020s–Present)

- Breakthroughs:
- IoT/wearable integration (e.g., John Hancock's Vitality Program).
- NLP for social media/sentiment analysis.
- Federated learning to aggregate data without privacy breaches.
- Result: Sub-second risk assessments with dynamic pricing.

Behavioral Data in Risk Assessment



The integration of behavioral data into underwriting represents a seismic shift from static, historical assessments to dynamic, real-time risk evaluation. Unlike traditional credit scores or medical records, behavioral data captures ongoing patterns of activity, offering insurers and lenders a more accurate and nuanced understanding of risk.

Financial Behaviour as a Risk Indicator

Financial transactions provide a real-time pulse of an individual's economic health. By analysing spending habits, income consistency, and anomalies (such as sudden large withdrawals or missed payments), AI models can predict financial stability more reliably than a static credit report. For instance, a study by Accenture (2023) found that insurers using transactional data reduced default risk miscalculations by 22% compared to traditional methods.

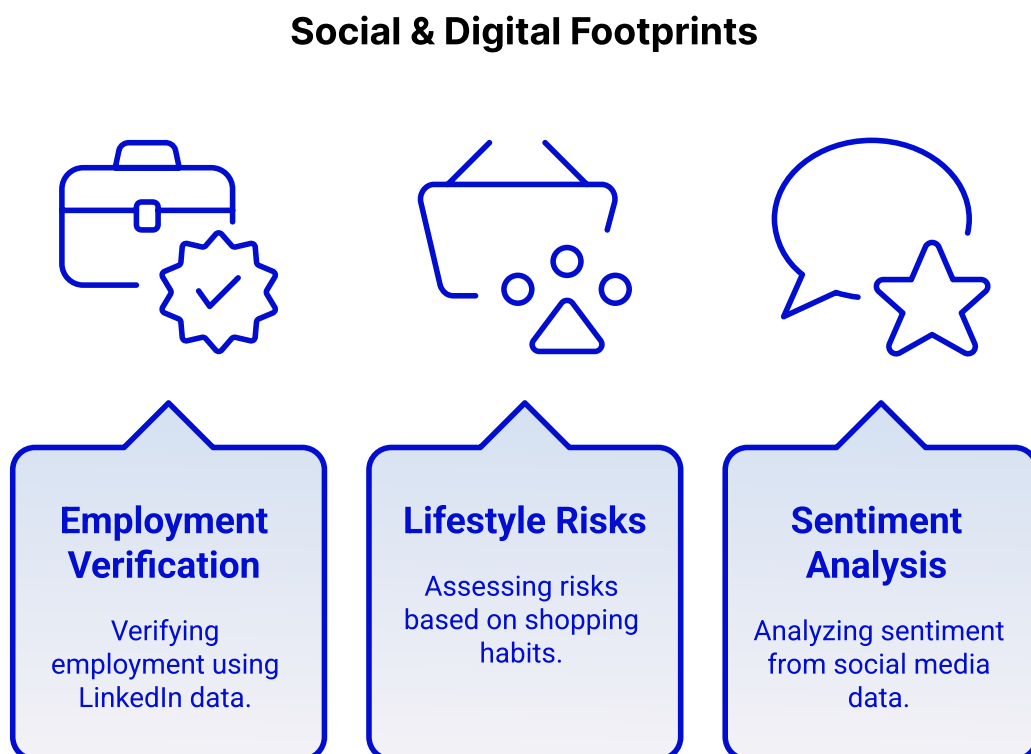
Additionally, subscription payment behaviours—such as timely Netflix or gym membership renewals—can serve as proxies for financial discipline, while erratic spending may flag potential liquidity issues.

Social and Digital Footprints

Digital activity—ranging from LinkedIn employment histories to shopping preferences—offers underwriters indirect but valuable risk signals.

- **Employment Verification:** Platforms like LinkedIn can corroborate self-reported employment data, reducing fraud.
- **Lifestyle Risks:** Frequent purchases of extreme sports gear or luxury items may correlate with higher-risk profiles.
- **Sentiment Analysis:** Natural Language Processing (NLP) can scan social media posts for signs of financial stress (e.g., complaints about debt).

A 2023 Deloitte report highlighted that 74% of underwriters now consider social media data "moderately to highly influential" in risk assessments, particularly for life and disability insurance.



IoT and Wearable Data

The Internet of Things (IoT) has unlocked physiological and behavioral metrics previously inaccessible to underwriters:

- **Health Insurance:** Wearables (e.g., Fitbit, Apple Watch) track heart rate, sleep patterns, and activity levels, enabling dynamic premium adjustments. For example, John Hancock's Vitality Program rewards policyholders for healthy habits detected via wearables.
- **Auto Insurance:** Telematics devices (e.g., Progressive's Snapshot) monitor driving behaviors (hard braking, mileage), allowing insurers to price risk based on actual driving habits rather than demographics.

Insurance changes through IoT



Health Insurance

Tracks heart rate, sleep, and activity. Used for adjusting premiums dynamically.



Auto Insurance

Monitors driving behavior (e.g., braking, mileage). Premiums based on actual habits, not demographics.

McKinsey report says, IoT-driven underwriting can reduce claims frequency by up to 30% by incentivizing safer behaviors.

The Power of Composite Behavioral Profiles

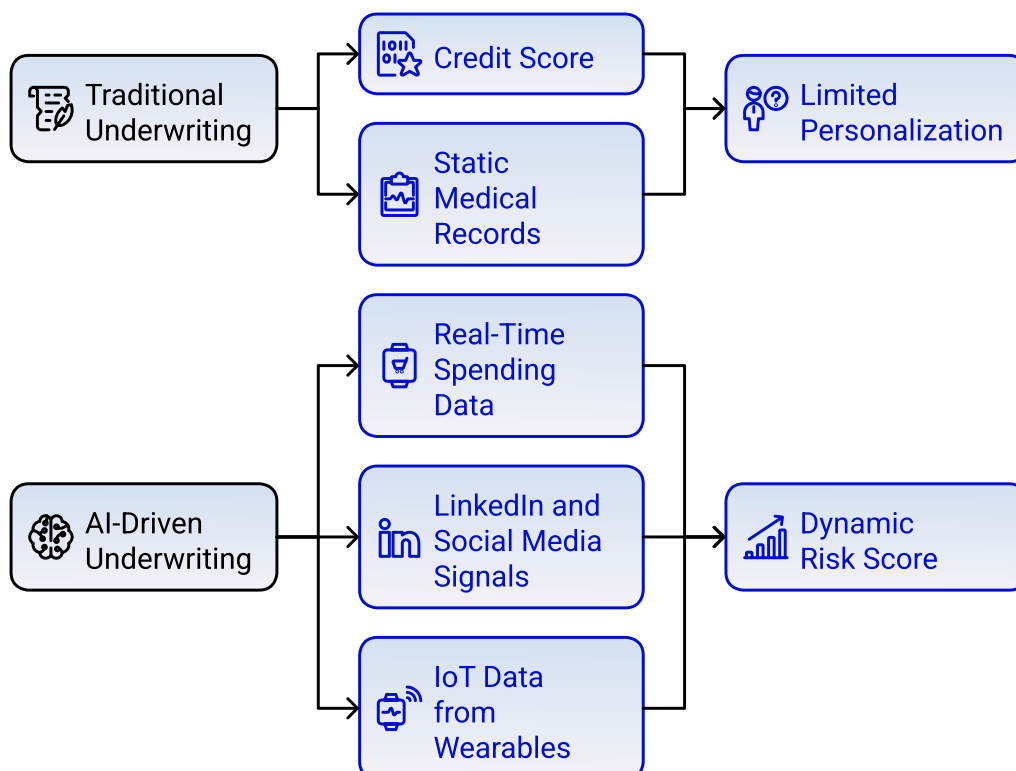
AI synthesizes these disparate data streams into holistic risk scores. For example:

"A 35-year-old applicant with a stable transaction history, active gym membership, and safe driving patterns may receive a lower premium than a demographically identical individual with erratic spending and sedentary habits."

This granularity not only improves accuracy but also expands insurability to underserved groups (e.g., thin-file millennials) by relying on alternative data.

McKinsey report says, IoT-driven underwriting can reduce claims frequency by up to 30% by incentivizing safer behaviors.

Traditional vs AI-Driven Underwriting



How AI Enhances Real-Time Underwriting Decisions

The competitive edge of AI lies in its ability to process unstructured data at scale while identifying patterns imperceptible to humans. Three core technologies enable this:

Predictive Analytics

By training on historical claims data, AI models forecast risk with uncanny precision. For example, Zurich Insurance's AI system analyzes 10,000+ variables—from weather patterns to supply chain disruptions—to adjust commercial policy pricing hourly. This reduces adverse selection by 19%.

Natural Language Processing (NLP)

NLP mines textual data (emails, social media, call transcripts) for red flags. When Lemonade's AI detects linguistic markers of fraud (e.g., exaggerated injury claims), it automatically flags them for review, slashing fraud investigation time by 75%.

Neural Networks for Anomaly Detection

Deep learning models excel at spotting subtle irregularities. In auto insurance, Tractable's AI compares uploaded accident photos against millions of past claims to detect staged collisions with 92% accuracy—a task impossible for human adjusters.

Case Studies & Industry Adoption

Lemonade: Behavioral Economics in Action

Lemonade's AI underwriter "Jim" dynamically prices policies based on real-time user behavior. During signup, applicants consent to data sharing (e.g., bank transactions, social media). The AI then:

- Adjusts premiums monthly based on habit changes.
- Uses game theory to discourage fraud (donating unclaimed money to charities).

Result: 90% of claims processed instantly, with loss ratios 15% below industry averages.

The Lemonade logo is displayed in a white, cursive script font, centered within a bright pink rounded rectangular button.

Case Studies & Industry Adoption

Ping An's "Smart Underwriting" for Life Insurance.

China's Ping An combines facial recognition (assessing health via micro-expressions) with wearable data to approve policies in 3 minutes. Their AI has processed 200 million+ applications, reducing mortality risk mispricing by 30%.

Traditional vs. Digital Insurance

Characteristic	Traditional Insurance	Digital Insurance
 Pricing	High operating costs due to multiple branches and offline techniques	Low operating costs due to online mechanisms, which are cost-efficient and quicker.
 Buying procedure	• Multi-step and complex process • Demand paperwork to begin the process	• Simple and easy to purchase insurance online • Paperless mode of dealings through online channel
 Communication	Complicated terms and conditions and difficult to understand	Easy to read and available through numerous mediums such as social media, apps, websites, emails, texts, etc.
 Claims	Requires multiple paperwork to verify the scope of liabilities	Customer-friendly and hassle-free claims. Raises claims online through the website, apps, or by phone
 Paperwork	Mandated for all transactions such as buying, renewing, raising claims, or queries	A fully digital process that demands almost nil paperwork

Challenges & Ethical Considerations

Data Privacy

GDPR and CCPA compliance remains contentious. While AI needs vast data, 68% of consumers distrust insurers with behavioral data. Solutions like synthetic data generation (creating artificial datasets that mimic real patterns) are gaining traction.

Algorithmic Bias

A 2023 MIT study found that AI models trained on credit data disproportionately denied loans to minority neighbourhoods. Leading firms now use "fairness-aware" ML that actively corrects for bias.

Regulatory Lag

Only 12% of global insurers have clear AI governance frameworks. The EU's proposed AI Act may set precedents for transparency requirements.

Future Trends



Hyper-Personalization

By 2026, 40% of life insurers will offer premiums tied to real-time health metrics (Gartner, 2024). Expect "Netflix-style" dynamic pricing where jogging daily lowers your rate.

Blockchain + AI

Decentralized finance (DeFi) platforms like Etherisc use smart contracts to automate claims payouts when IoT data verifies triggers (e.g., flight delays for travel insurance).

Conclusion

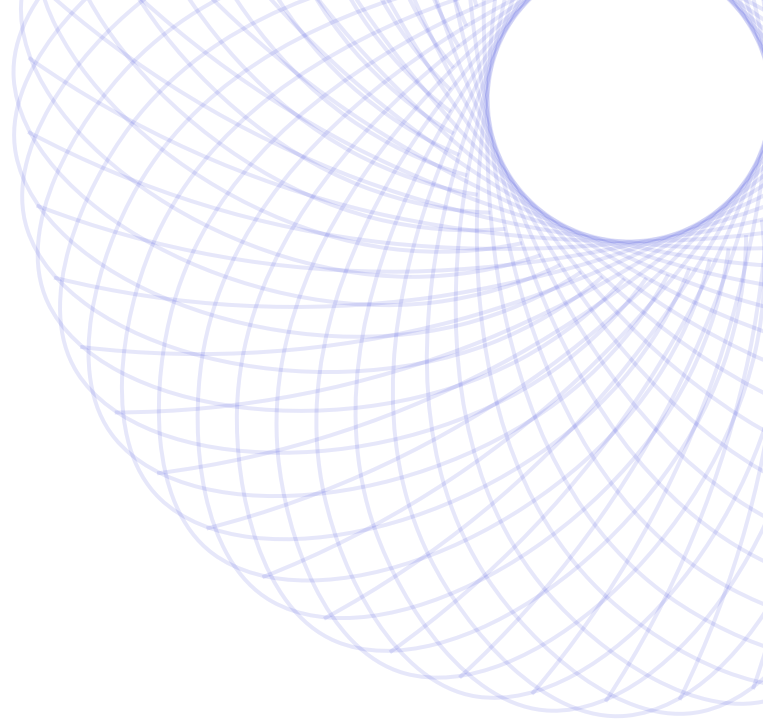
AI-powered underwriting isn't merely incremental improvement—it's a fundamental reinvention of risk assessment. Firms that lag in adoption will face existential risks, while pioneers will unlock 20–30% cost savings and superior customer loyalty.

“

Peter Zaffino, Chairman and CEO of AIG:

“In our early pilots, we've seen data collection and accuracy rates within our underwriting processes improved from levels near 75% to upwards of 90%, while reducing processing time significantly.”

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