International Actuarial Association
Association Actuarielle Internationale

AI-Augmented Underwriting

Balancing benefits and risks

First Session of a Webinar Series hosted by the Data Analytics Virtual Forum (DAVF) held on 24 April 2025

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Welcome to the Webinar
We will begin shortly

A few housekeeping items before we begin:

1. Questions & Comments – Verbal capabilities have been turned off however questions or comments can be submitted by clicking on the Q&A icon at the bottom of your screen. All questions will be answered during the Q&A session at the end of the presentations.
2. Recording and presentation – A YouTube recording along with the presentation will be made available on the IAA website within the next day or so. They can be found where the paper has been posted under Publications/Papers on the IAA website at www.actuaries.org .

Welcome and thank you for joining today's webinar.

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Webinar topics

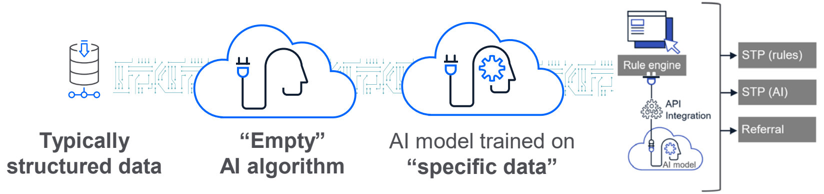
- Traditional AI vs. GenAI: automation vs. recommendation and risk differences
- Evolution to AI-Augmented underwriting, benefits & actuarial control cycle 2.0
- Case study
  - Traditional AI deployments already delivered value since 5 years
  - Illustration of AI-Augmented Underwriting in production
  - Role of the actuary: AI risk implications, actuarial risk sign off, professionalism
  - Actuarial control cycle 2.0 and the AI lifecycle
  - Considerations to go beyond the POC to sustainable value in production
- Vision of the future of underwriting and how actuaries can help balance automation and profitability, public interest and regulations

Success stories now exist on **traditional AI** but…

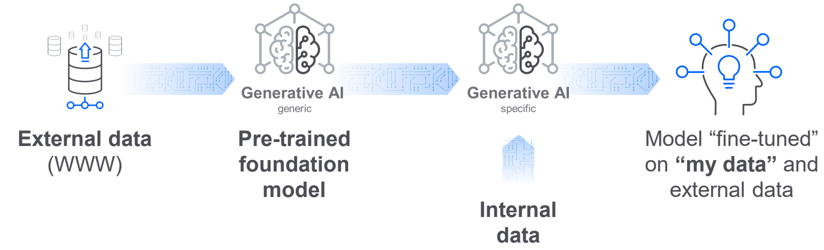
For the first time, **GenAI** can systematically access large amounts of unstructured data

Traditional AI vs. GenAI

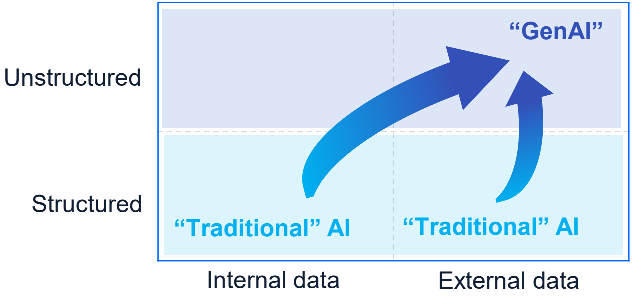
Traditional AI (enables automated decisioning)



GenAI (human decisions assisted by AI)



GenAI systematically accesses extensive unstructured external data



- Traditional AI enables auto decisioning vs. GenAI with human in the loop. Resulting risks differ
- GenAI integrates **external knowledge** through pre-training
- GenAI facilitates **systematic analysis of extensive external data** (e.g., websites, documents), extraction of information, and generation of new documents

Traditional AI (e.g. machine learning) better suited for automated decisioning. GenAI (at this stage) assists human expert decisioning and productivity. The risk implications of automation vs. assistance are different

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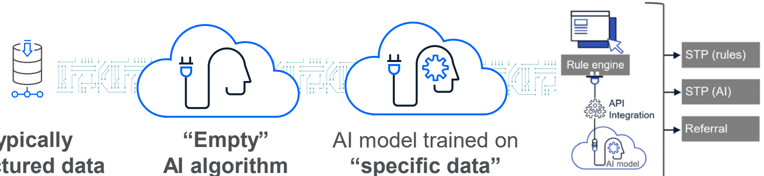
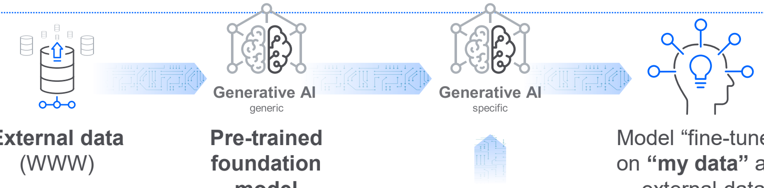


Typically structured data

"Empty" AI algorithm

AI model trained on **"specific data"**

GenAI (human decisions assisted by AI)



External data (WWW)

Pre-trained foundation model

Internal data

Model "fine-tuned" on **"my data"** and external data

Example use cases

AI-Augmented Underwriting

Grow sales and improve profitability:

- Improve underwriting automation with controlled claims risk
- Lower customer drop off
- Waive medical evidence and save costs
- Manage non-disclosure/fraud

GenAI-based underwriting / claims copilots

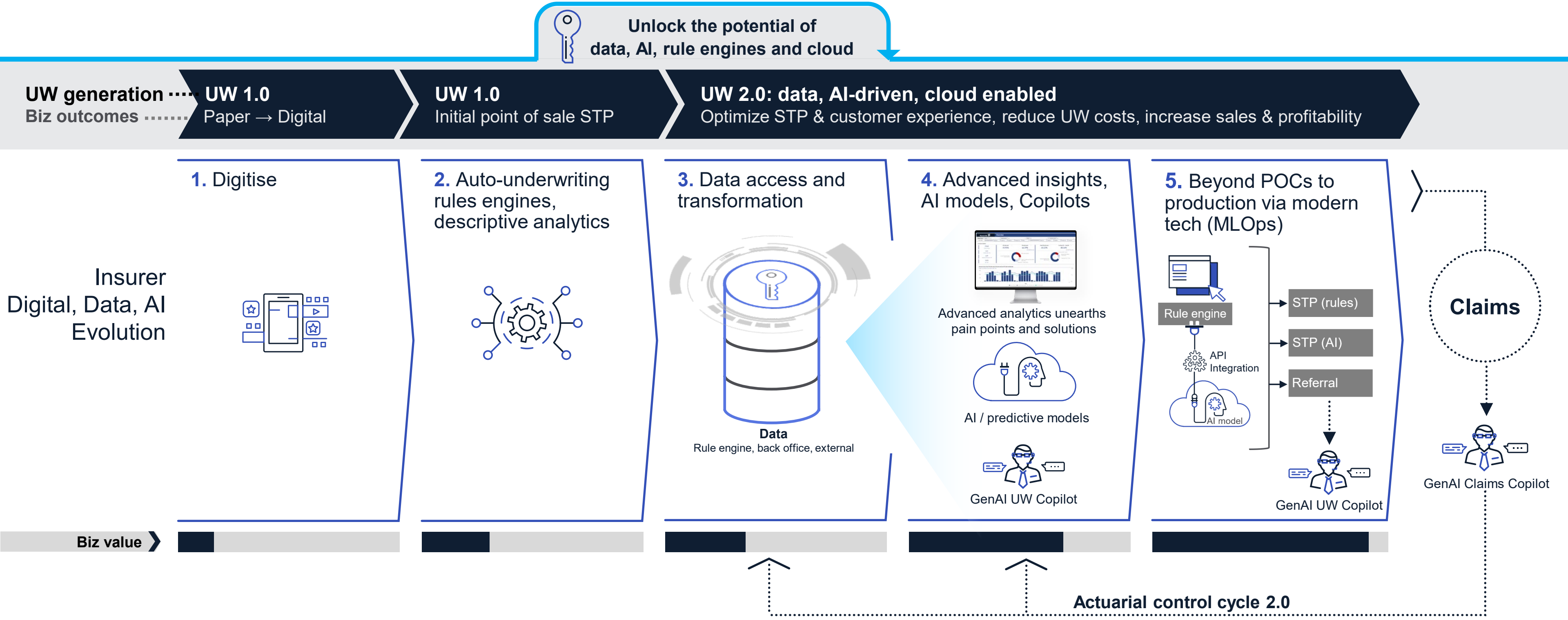
- Improve **underwriting** / **claims turn-around times**
- Manage **non-disclosure**
- **Insights** from **new structured data**
- Improve **health business profitability**

Traditional AI is mature <u>but higher-risk use cases</u> require deep domain knowledge, modern tech & model risk management
GenAI has great potential to boost productivity & accuracy. Open topics include explainability, hallucinations, evaluation and monitoring

Evolution to and benefits of AI-Augmented underwriting

Actuarial control cycle 2.0

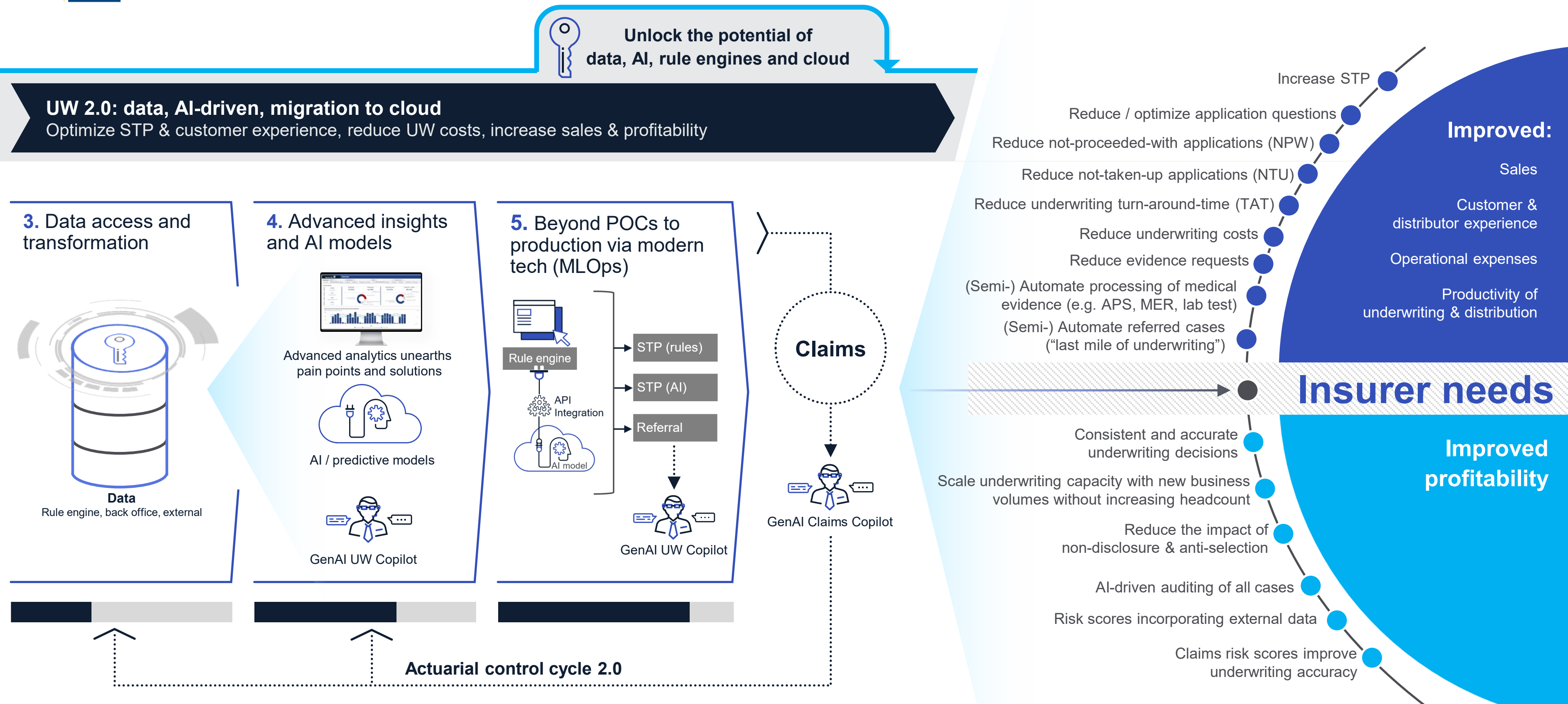
Roadmap to AI-Augmented underwriting and claims



Opportunity: grow sales (instant decisions, less friction and customer drop off), cost efficiency & profitability

Business as usual … (rule engine, human) **… is augmented with Responsible AI**

Benefits



Unlock the potential of data, AI, rule engines and cloud
UW 2.0: data, AI-driven, migration to cloud
Optimize STP & customer experience, reduce UW costs, increase sales & profitability
3. Data access and transformation
Data
Rule engine, back office, external
4. Advanced insights and AI models
Advanced analytics unearths pain points and solutions
AI / predictive models
GenAI UW Copilot
5. Beyond POCs to production via modern tech (MLOps)
Rule engine
API Integration
AI model
STP (rules)
STP (AI)
Referral
GenAI UW Copilot
Claims
GenAI Claims Copilot
Actuarial control cycle 2.0
Increase STP
Reduce / optimize application questions
Reduce not-proceeded-with applications (NPW)
Reduce not-taken-up applications (NTU)
Reduce underwriting turn-around-time (TAT)
Reduce underwriting costs
Reduce evidence requests
(Semi-) Automate processing of medical evidence (e.g. APS, MER, lab test)
(Semi-) Automate referred cases ("last mile of underwriting")
Improved:
Sales
Customer & distributor experience
Operational expenses
Productivity of underwriting & distribution
Insurer needs
Consistent and accurate underwriting decisions
Scale underwriting capacity with new business volumes without increasing headcount
Reduce the impact of non-disclosure & anti-selection
AI-driven auditing of all cases
Risk scores incorporating external data
Claims risk scores improve underwriting accuracy
Improved profitability

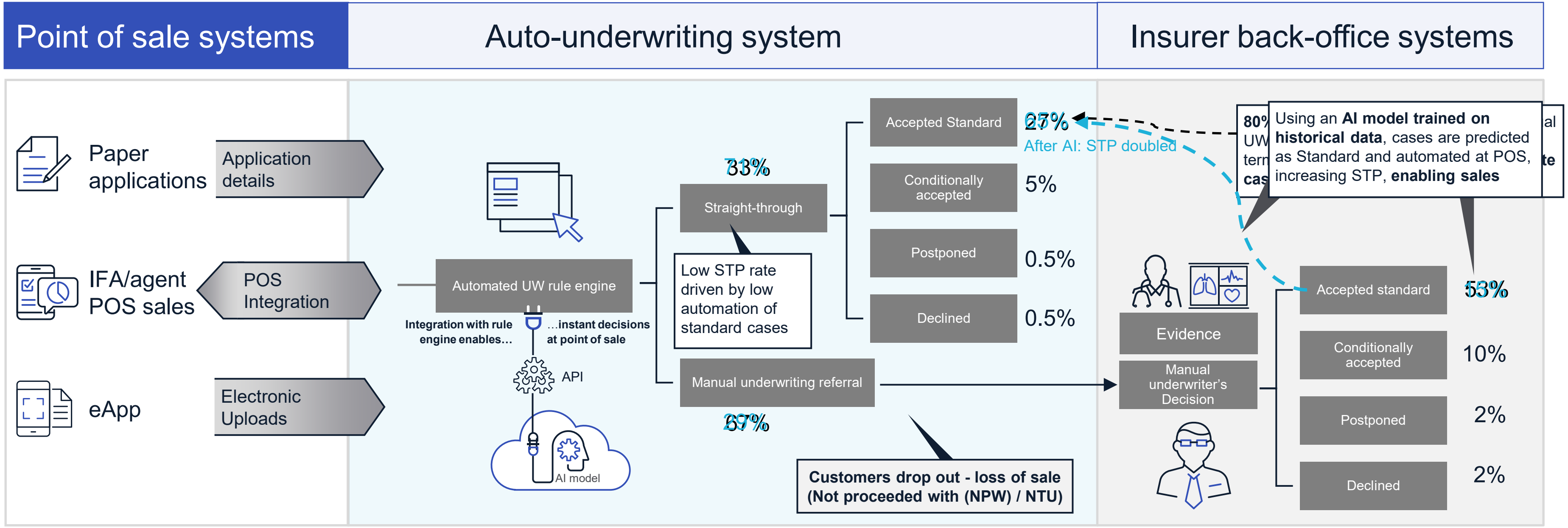
Case study

AI-Augmented underwriting

Case study: AI-Augmented underwriting

Overview of business problem and value

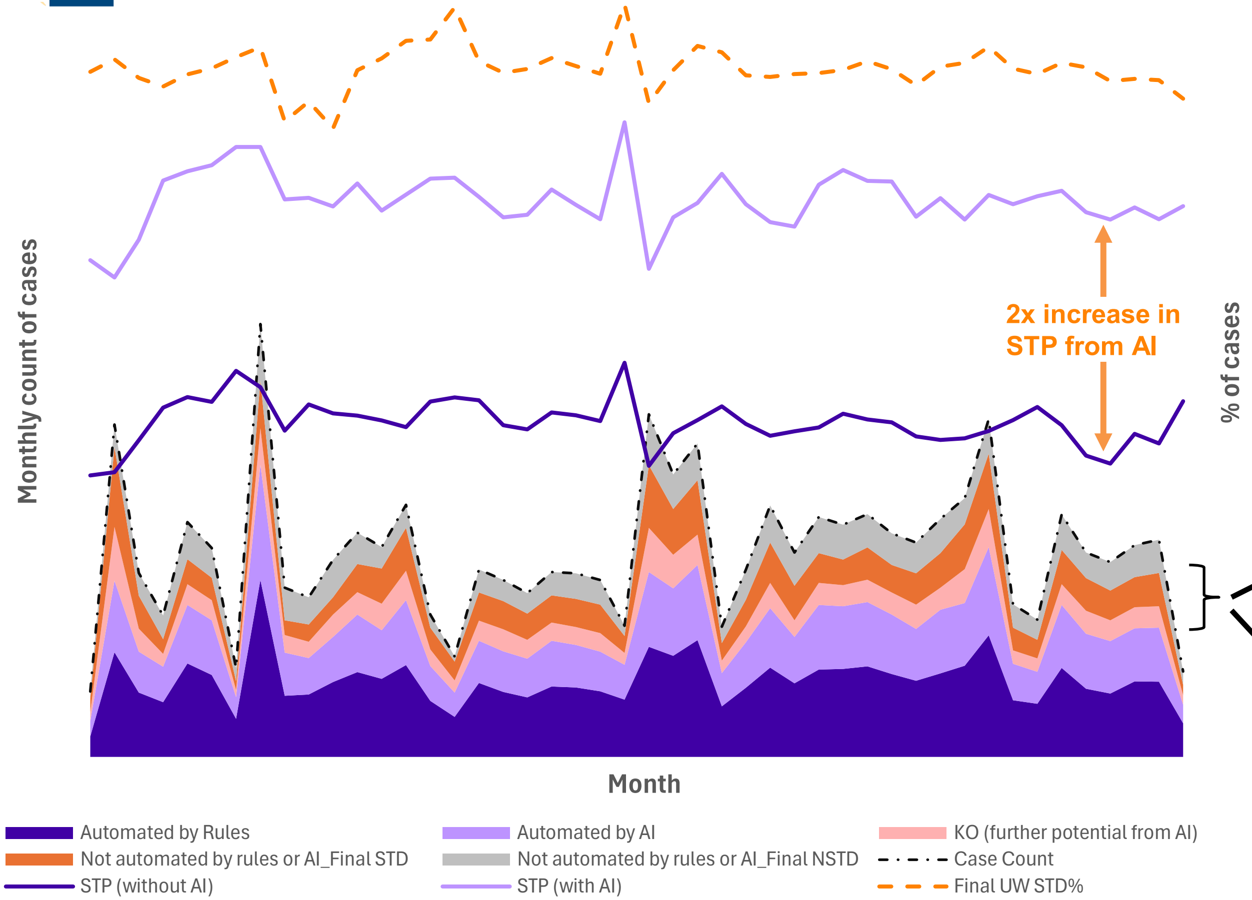
Business problem: low STP impacts customer experience and insurer's ability to grow sales (customer drop outNTU) and remain competitive
Value added: STP more than doubled with minimal risk increase, instant decisions enable growth in sales, transformed customer experience and cost efficiency

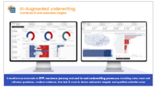


Existing underwriting process…
(rule engine, human)

… is augmented with Responsible AI

Case study: AI-Augmented underwriting





Insurer needs

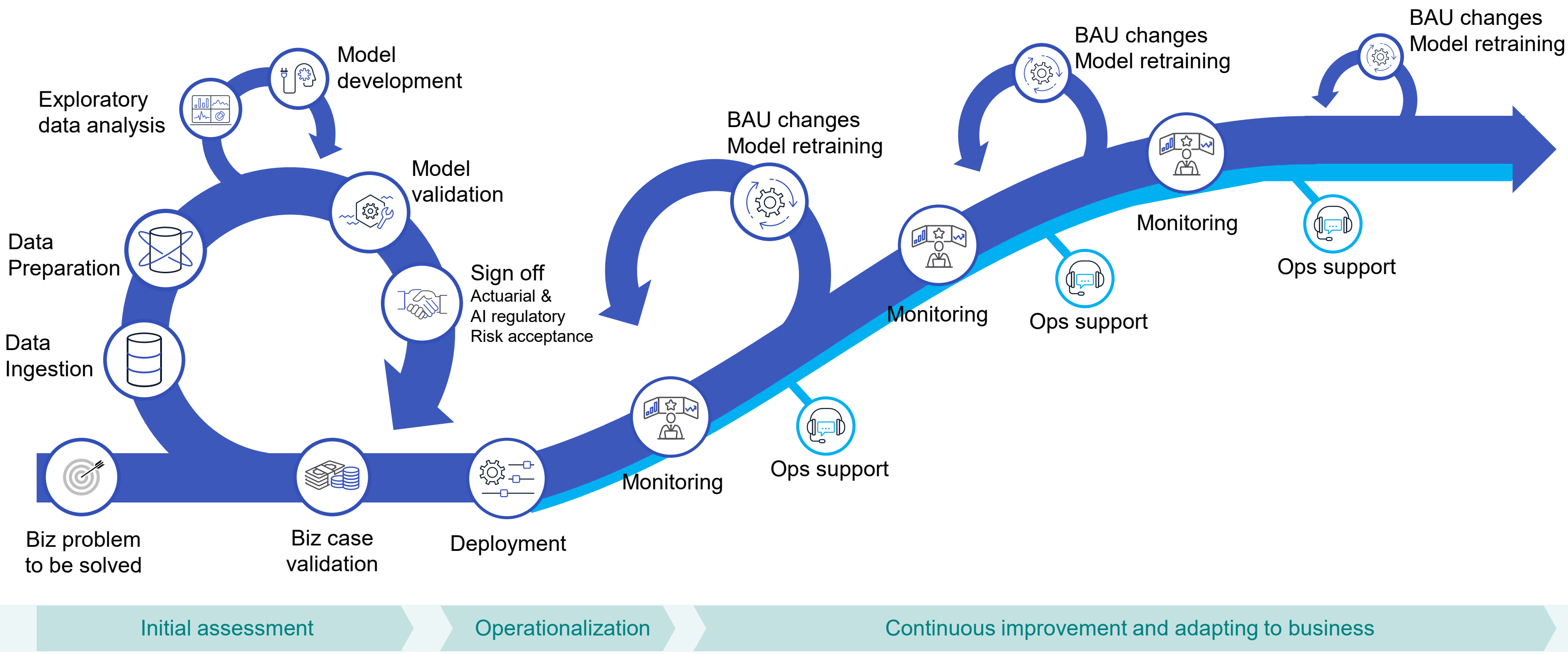
- Automate underwriting with minimal increase in claims risk
- Reduce turn around time through instant decisions at point of sale
- Improve customer/agent experience
- Reduce customer drop off from medical evidence
- Stay competitive as other insurers transform customer journeys with AI

Benefits

- More instant decisions…helps to grow sales by reducing drop off & improving customer experience
- Reduced UW costs
- Agents more productive with faster TAT
- Scales UW capacity without further UW headcount

AI-Augmented underwriting lifecycle

Considerations to go from POC to implementation, achieve & **maintain** business case



Actuaries have a key role to play in achieving a business case via optimising the trade-off of benefits and risk costs

Maintaining a business case in production requires robust model management, adapting to BAU changes and responsible AI compliance

Responsible AI framework

Risk implications key for actuarial risk management

Bias detection & mitigation
Define, detect and mitigate bias through range of metrics and algorithms.

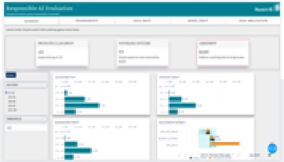
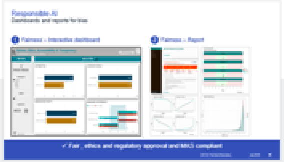
Explainability and Transparency
Distil AI decisions for higher transparency and debugging.

Monitoring & Governance
Monitor AI solutions for data drift, profile change, model errors and governance of the whole solution.

Privacy, Ethics & Regulations
Ethical and regulated implementations of AI based on guidelines from Insurer and regulator.

Risk implications
Detailed cost implication of implementing AI solution encompassing the cost of errors from model, reputational risks, cost of human capital.

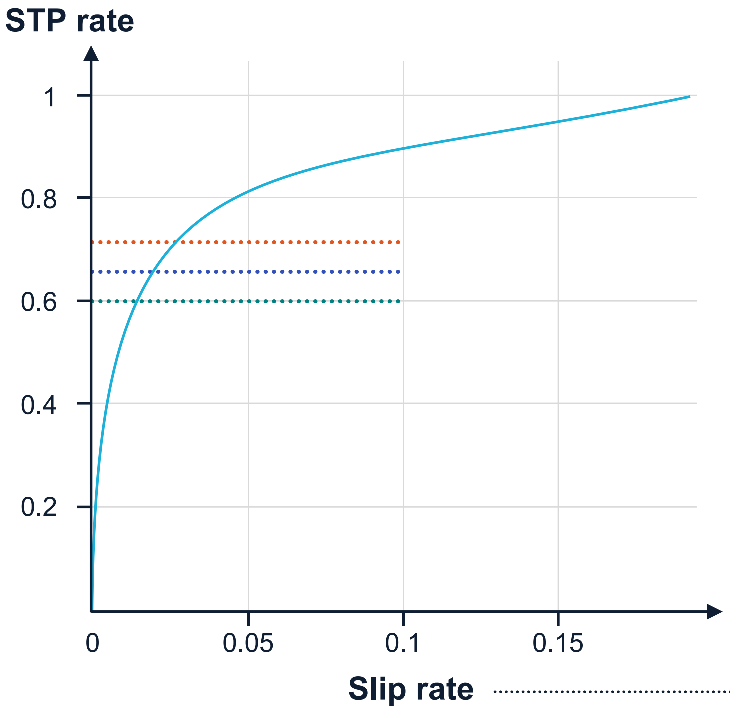
A successful AI model achieving **stakeholder adoption, regulatory compliance** and **actuarial risk management sign off**
Munich Re is an official member of the MAS Veritas Consortium that developed Responsible AI principles and practices for insurers in Singapore.

Balancing benefits and risks

Quantifying the implication of AI model error for future claims

STP rates explored for all thresholds

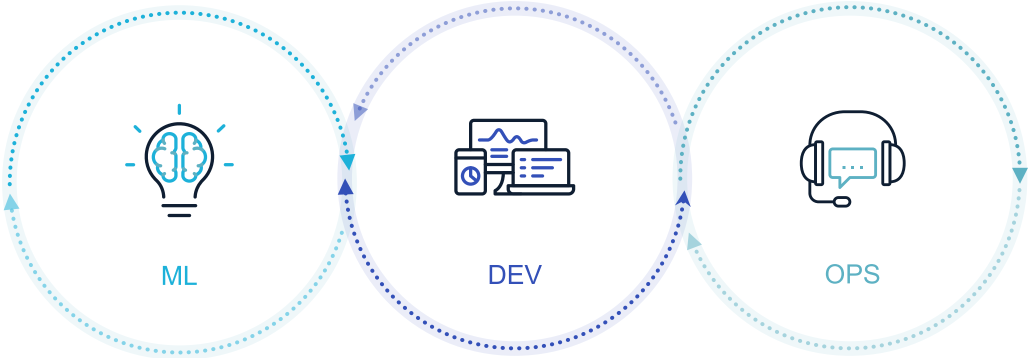


AI risk calculator
Estimates increased claim risk

Translate slip through cases into actuarial pricing impact

MLOps – enables actuarial control cycle 2.0

What is MLOps?....and how does it enable financial risk management in production



01 Data ingestion processing

02 Feature engineering Model training

03 Monitoring & maintenance

Machine learning DevOps (MLOps) is a specialized subset of DevOps tailored to produce ML applications.

MLOps is both a technological and cultural shift that requires the right people, processes, and tools to successfully implement.

Data Ingestion
- Rule engine data
- Back-office data
- 3rd party APIs
- Data integration

Data Processing
- Parsing
- Cleaning
- Validation
- Transformation

Model Development
- Model training
- Hyper parameter tuning

Model Evaluation
- Testing
- Risk implications
- Responsible AI evaluation

Model Deployment
- Automated deployment
- Rule engine integration
- Process orchestration

Monitoring, Maintenance & Retraining
- Real time monitoring
- AI regulatory checks
- Drift monitoring

Automated MLOPS pipelines

Data governance | Access management | Compliance

Technology becomes critical for actuaries to manage risk post deployment risk before claims (actuarial control cycle 2.0)

Considerations in creating real value through AI

…going beyond the POC and risk management enablers

Understand biz problem
Domain knowledge
AI model development

Data extraction & ingestion

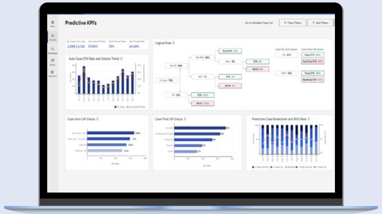
Exploration Stage

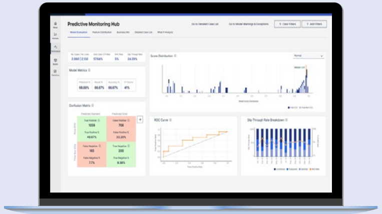
- Preliminary data exploration & model experimentation by data scientists

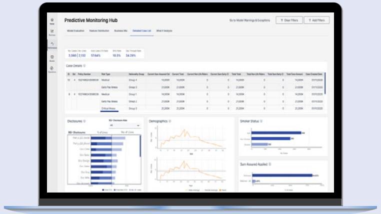
Why is MLOps needed?

Stable model performance enables stable future claims risk

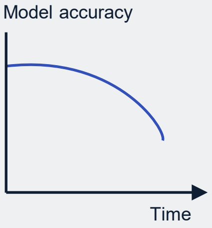
After deployment, model performance is monitored in real time…







…But may deteriorate, increasing risk



Model decay over time

Performance impacted by

- Operational changes (rules, UW philosophy, new products)
- Changing mix of business

MLOps enables rapid retraining models – key to financial risk management

Data ingestion

Data extraction → Data landing zone →

Data preprocessing

Data parsing → Data validation → Data cleaning → Merge back-office data

Model development

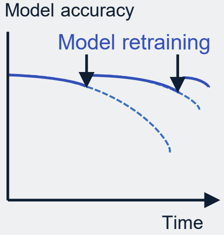
Model training ← Model validation ← Model evaluation ← Model registry ←

Code – model management

Code repos, Unit tests, CI/CD pipelines

Stable model performance and risk…

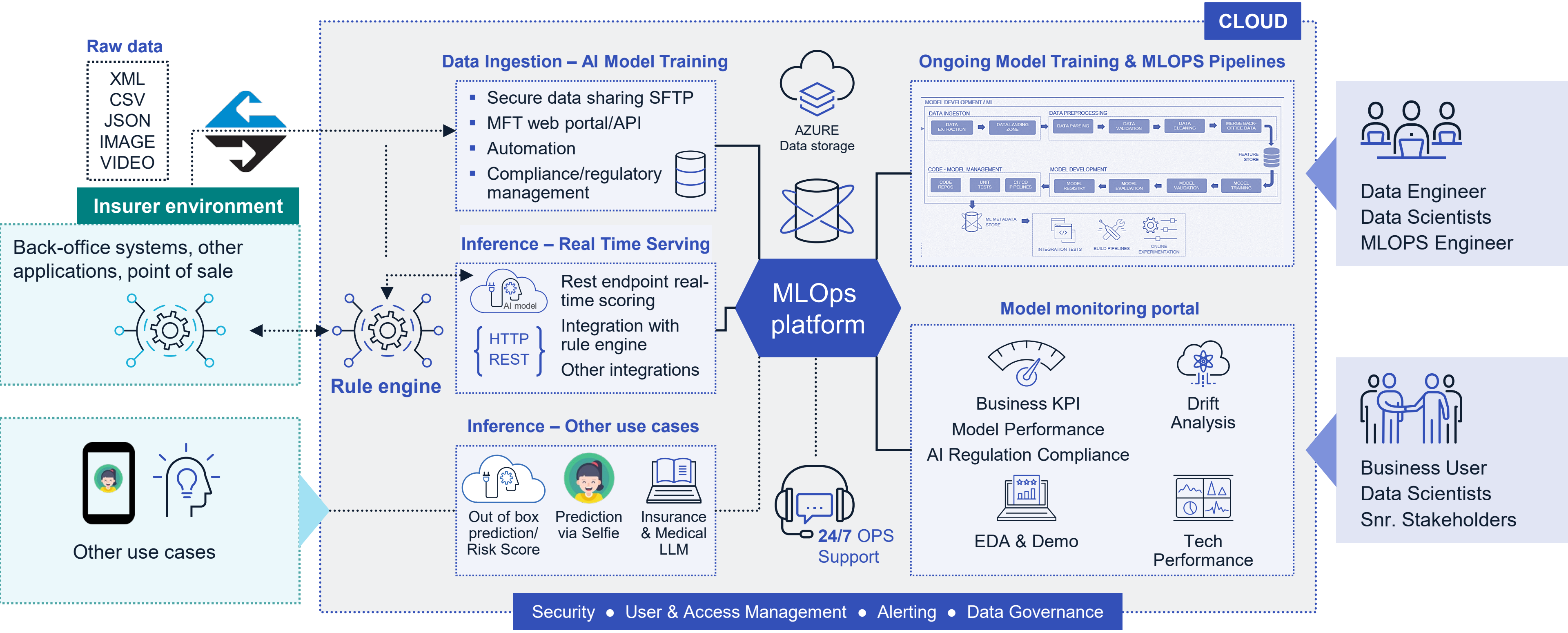
…achieved by ongoing retraining



Regularly updated model

MLOps – enables actuarial control cycle 2.0

Enables streamlined AI model implementation and maintenance with governance and risk controls



Future of underwriting

Balancing benefits and risks

Underwriting 2.0 process illustration

Multiple AI models orchestrated to power the future under underwriting process

Automation, streamlining and improving underwriting accuracy While quantifying and managing risks for future claims	Triaging	Sales	Additional sales

Applicant

- Application details

eApp

- Electronic Uploads

Data

- Application
- Back office
- Facial image, video
- Pharma/ RX
- Behavioural
- eHR
- Medical evidence
- Risk Scores
- Fitness
- Bank
- Smartphone
- Driving

Automation and streamlining

- Optimizes STP, reduce NTU with minimal risk increase
- Optimising underwriting question journey
- Personalized underwriting per applicant
- Medical test waiver with minimal risk increase

Further AI models assess risk

Improving underwriting accuracy

- BMI prediction on facial image for under-disclosure detection
- HIV status prediction for under-disclosure detection
- Smoker status prediction for under-disclosure detection
- Chronic condition prediction for wellness and non-disclosure
- Claims-based risk score for non-disclosure, fraud, anti-selection
- Vital sign / risk factor prediction from video
- Abnormal agent behaviour detection

STP Fastlane for lower risk cases

Triaging

LLMs

GenAI-assisted underwriter

- AI-augmented workbench
- Updated predictions
- Large language models

Policy issuance

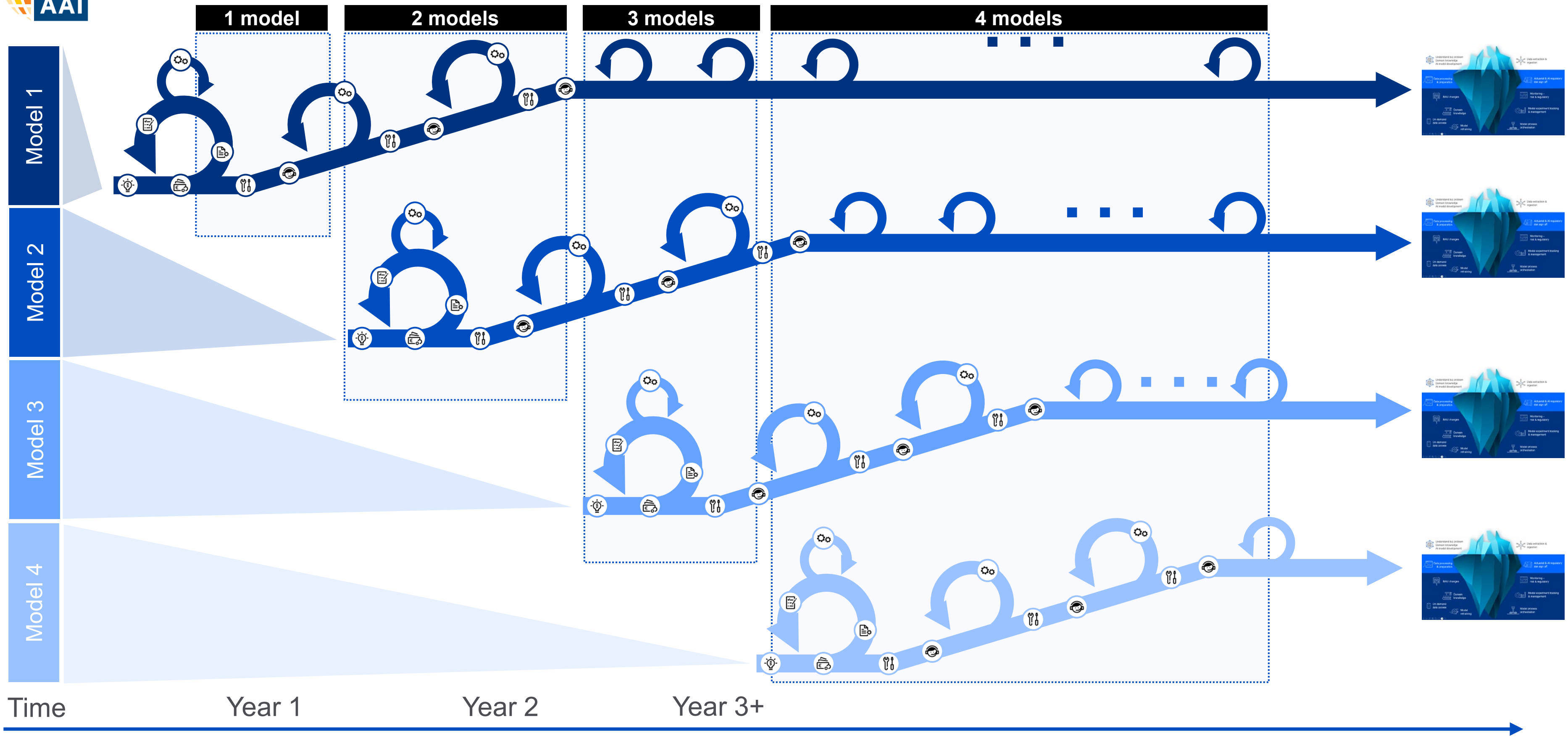
Additional sales

- Cross-/up-sell
- Cross-/up-buy
- Propensity to buy

Business as usual …
(rule engine, human)

… is augmented with Responsible AI

Risk complexity grows with increasing models…

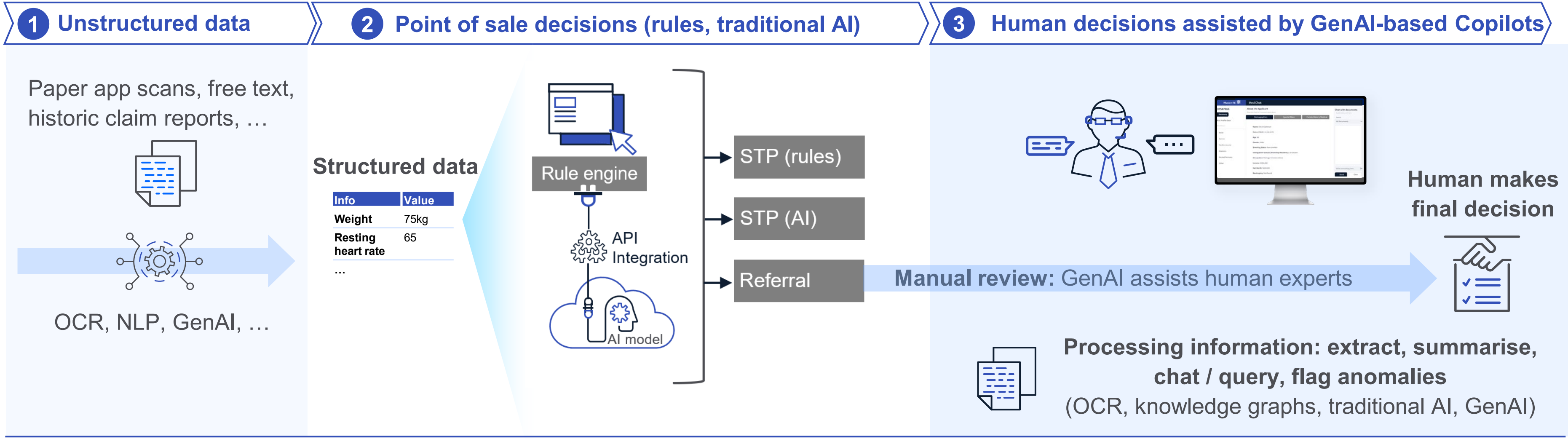


Implementing an ecosystem of AI models into insurance processes comes with <u>risk complexity…</u>
…without proper processes, tech and domain expertise, risk complexity multiplies as the AI ecosystem grows

Future of underwriting and claims

Joining the dots: across rules, traditional AI and GenAI

Example future underwriting or claims process



1. OCR, NLP, GenAI **extract & structure information** from **unstructured data** (e.g., APS, free text, historic claim reports, etc.)
2. **Hybrid of rules & traditional AI models automate decisions** on selected cases using **all available information** within **risk guardrails**
3. Human experts decision remaining referred/complex cases but with assistance of traditional AI models and GenAI-based copilots

Q&A Session

Should you have any questions or comments,
please add them to the Q&A icon at the bottom of your screen.

Thank you for joining today's webinar!

Should you have any further questions or comments, please send them directly to Technical Activities of the IAA at the following email address:

technical.activities@actuaries.org