Implementing and Governing AI: From Use Cases to Best Practices in AI Adoption

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6th European
Congress of Actuaries
www.eca2026.org

Agenda

- Introduction to the IAA AI Task Force
- The 'Actuarial AI Case Studies' Repository
- AI Adoption Strategies
- Q&A

Introduction to the IAA AI Task Force

The IAA AI Task Force: Purpose and Structure

Statement of Intent (Link):

1. **Advance the competency of the profession** incl. AI risks & opportunities, knowledge sharing, education.
2. **Promote the role of the actuary** in existing and emerging wider fields and raise its profile.
3. **Prepare the IAA**, as the global voice of the profession, **engage with Supranational organisations** on AI-related risks and provide actuarial perspectives in their own related initiatives.

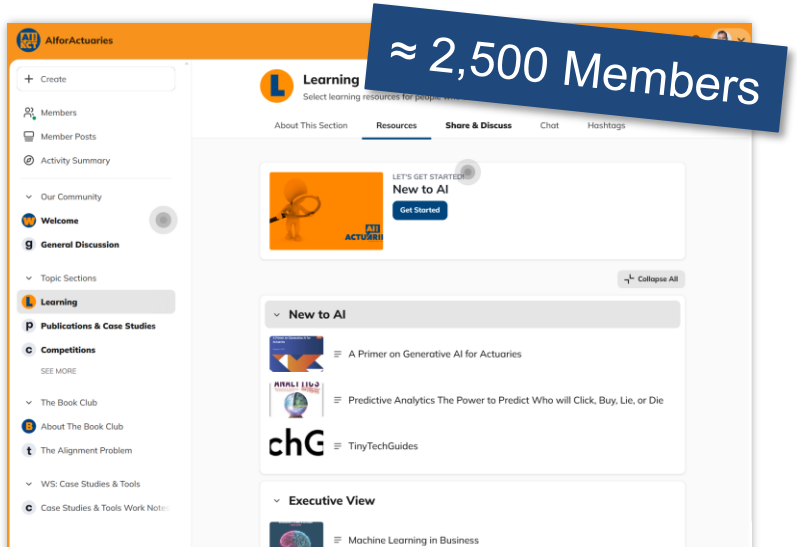
Current Organisation in 4 Workstreams:

Workstream 1: Engagement & Foundations	Workstream 2: Research & Advancement	Workstream 3: Case Studies & Tools	Workstream 4: Adoption Framework
→ generate interest → get actuaries started → engage and build community → "101-level"	→ scan / organize "201" content → develop research and educate → advance the AI-enabled actuary	→ compile and structure case studies, examples, and tools for other workstreams	→ focus on adoption, incorporating best practices, professionalism, governance, ethics, and practicality

→ **in focus today**

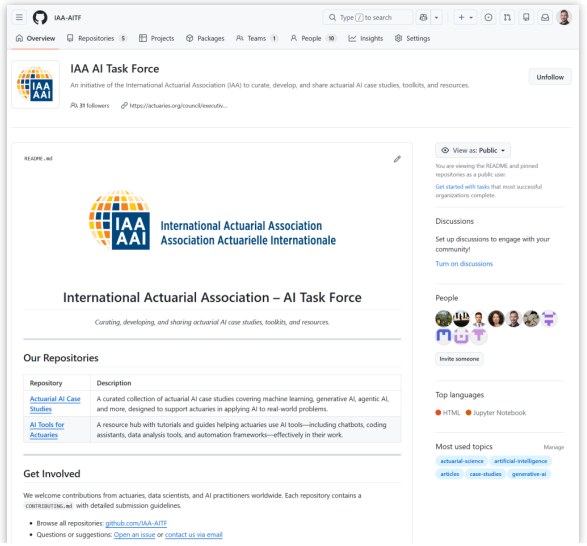
Key Deliverables of the AI Task Force

AIforActuaries



https://www.aiforactuaries.org

GitHub Repositories



https://www.github.com/IAA-AITF

Papers

https://actuaries.org/publications/papers/

in focus today

The 'Actuarial AI Case Studies' Repository

The Task Force on GitHub: Two Repositories

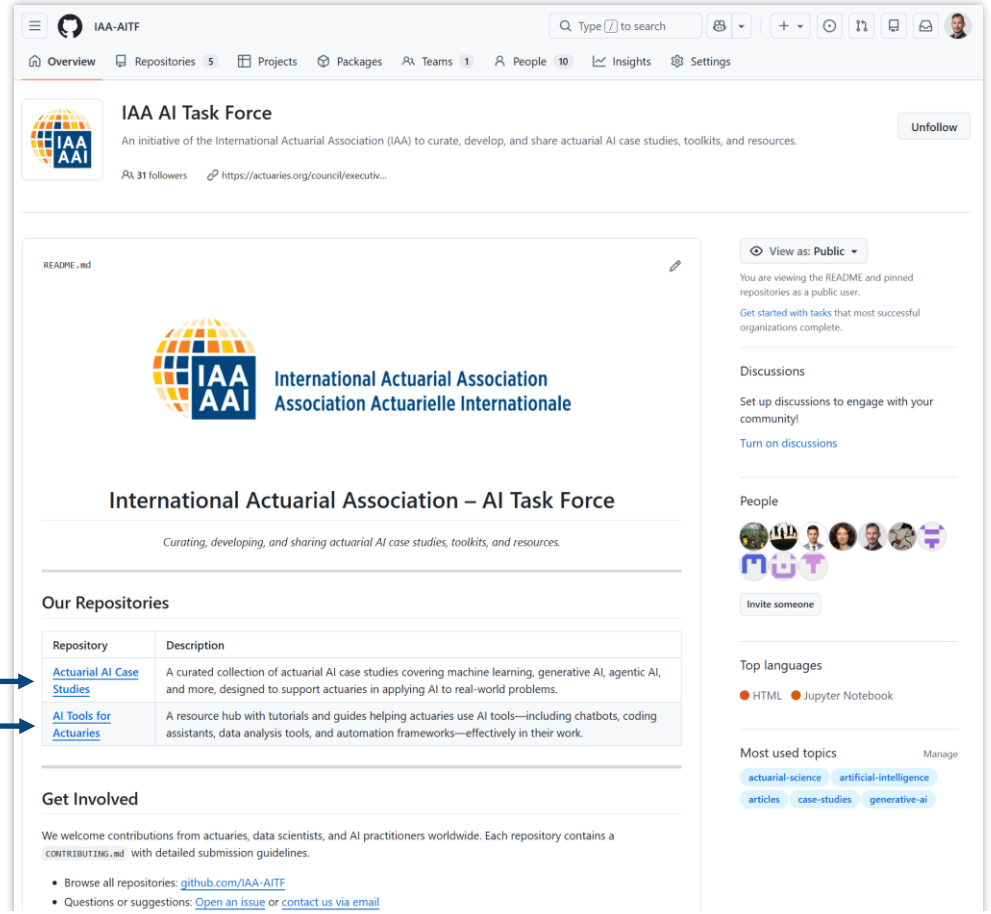
> *New to GitHub? It's a free platform for sharing code, documents, and projects. You don't need an account to browse — just click the link. Free account needed only to contribute.*

Repository #1: Actuarial AI Case Studies

A curated collection of actuarial AI case studies covering machine learning, generative AI, agentic AI, and more, designed to support actuaries in applying AI to real-world problems.

Repository #2: AI Tools for Actuaries

A resource hub with tutorials and guides helping actuaries to use AI tools—including chatbots, coding assistants, data analysis tools, and automation frameworks—effectively in their work.



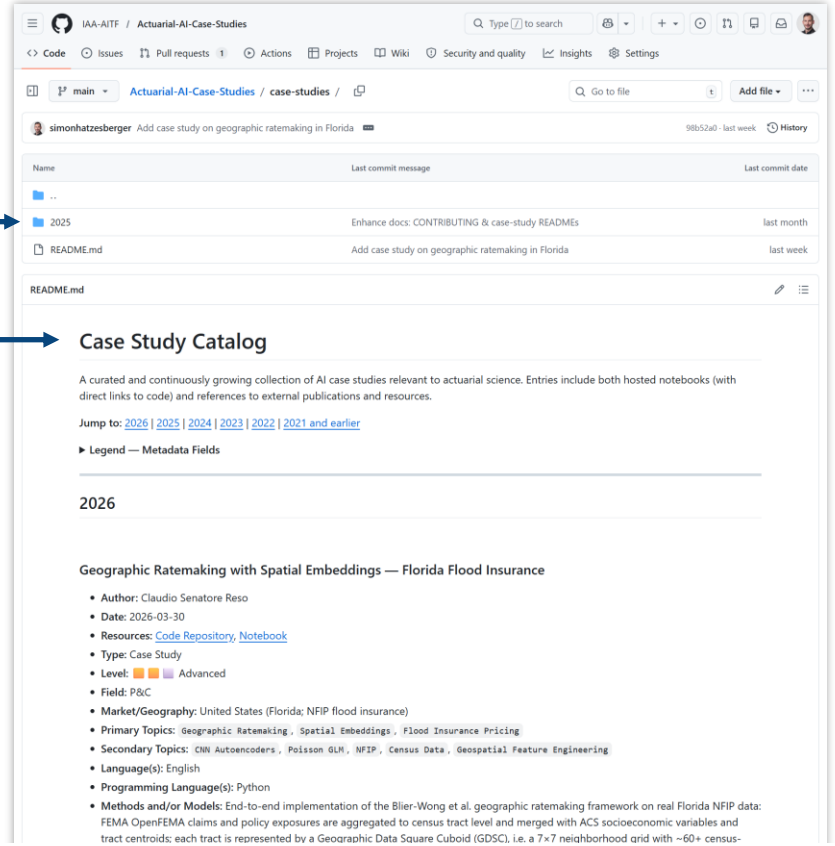
https://www.github.com/IAA-AITF

Inside the Case Studies Repository

Case Studies developed and hosted by members of the IAA AI Task Force

Case Study Catalogue

A curated and continuously growing collection of AI case studies relevant to actuarial science. Entries include both hosted notebooks (with direct links to code) and references to external publications and resources.



https://github.com/IAA-AITF/Actuarial-AI-Case-Studies/tree/main/case-studies

Examples of the Case Study Catalogue

Case Study Catalog

A curated and continuously growing collection of AI case studies relevant to actuarial science. Entries include both hosted notebooks (with direct links to code) and references to external publications and resources.

Jump to: 2026 | 2025 | 2024 | 2023 | 2022 | 2021 and earlier

▼ **Legend — Metadata Fields**

Field	Description
Author	Original author(s) of the case study or publication.
Date	Publication or release date (ISO 86
Resources	Direct links to articles, code reposi
Type	Case Study, Tutorial, White Paper,
Level	Difficulty: Beginner •
Field	Actuarial domain: Life, P&C (Prope
Primary / Secondary Topics	Key themes and methods covered
Programming Language(s)	Python, R, or other languages use
Methods and/or Models	Specific algorithms, architectures,

Enhancing Actuarial Non-Life Pricing Models via Transforme

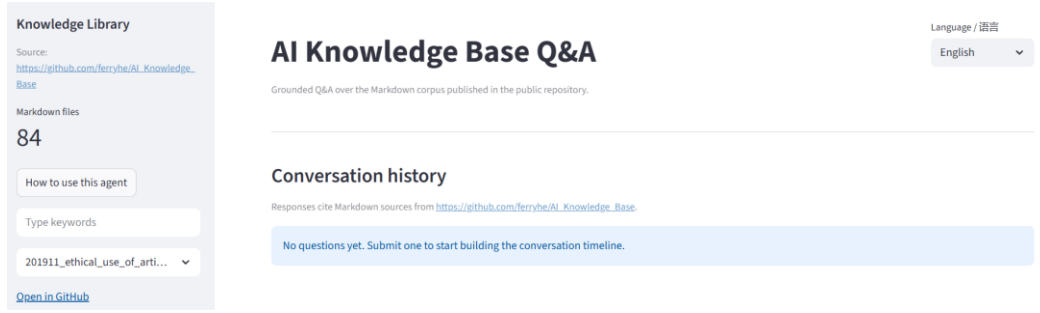
- **Author:** Alexej Brauer
- **Date:** 2024-06-12
- **Resources:** Article (European Actuarial Journal), Article (arXiv), Notebook
- **Type:** Case Study
- **Level:** Expert
- **Primary Topics:** `Transformers` , `Deep Learning`
- **Secondary Topics:** `Non-Life Insurance` , `Pricing Models` , `Tabular Data`
- **Language(s):** English
- **Programming Language(s):** Python
- **Methods and/or Models:** Feature Tokenizer Transformer, Combined Actu
- **Notes:** Enhances GLM-based models with transformer architecture for ta
- **Abstract/Summary:**
  Currently, there is a lot of research in the field of neural networks for nor power via neural networks while building upon the generalized linear mo to this current journey via novel methods to enhance actuarial non-life m upon the foundation laid out by the combined actuarial neural network a feature tokenizer transformer. The manuscript demonstrates the perform dataset and compares them with several benchmark models such as gen actuarial neural networks, LocalGLMnet, and pure feature tokenizer trans results than the benchmark models while preserving certain generalized linear model advantages. The paper also discusses the practical implications and challenges of applying transformer models in actuarial settings.

AI Tools for Actuaries

- **Author:** Mario V. Wüthrich, Ronald Richman, Benjamin Avanzi, Mathias Lindholm, Marco Maggi, Michael Mayer, Jürg Schelldorfer, Salvatore Scognamiglio
- **Date:** 2025-08-08
- **Resources:** Book (SSRN), Website (slides, notebooks, code, exercises)
- **Type:** Educational
- **Level:** Advanced
- **Primary Topics:** `Generalized Linear Models` , `Tree-Based Methods` , `Gradient Boosting Machines` , `Deep Learning` , `Transformers & LLMs` , `Explainable AI` , `Unsupervised Learning` , `Deep Generative Models` , `Model Validation & Calibration`
- **Secondary Topics:** `Exponential Dispersion Family` , `Strictly Consistent Loss / Deviance` , `Regularization (Ridge/LASSO/Elastic Net)` , `Covariate Pre-processing` , `Regression Trees` , `Random Forests` , `XGBoost/LightGBM` , `FNNs` , `LocalGLMnet` , `CANN` , `Entity Embeddings` , `CNN` , `RNN` , `Attention` , `Credibility Transformer` , `PDP` , `ALE` , `ICE` , `SHAP` , `Gini` , `Lift` , `Murphy Decomposition` , `Autoencoders` , `Clustering` , `PCA` , `t-SNE/UMAP` , `Synthetic Data` , `Actuarial Mortality Forecasting`
- **Language(s):** English
- **Programming Language(s):** R, Python
- **Methods and/or Models:** GLM within EDF; loss selection & deviance; regularization (Ridge/LASSO/Elastic Net); trees & forests; GBMs (incl. modern libraries); feed-forward neural nets; LocalGLMnet; CANN (GLM + FNN); deep learning for tensors and unstructured data (entity embeddings, CNNs, RNNs, attention/transformers for sequences & tabular); credibility transformer; explainability (variable importance, PDP, ALE, ICE, SHAP, global surrogates); unsupervised learning (autoencoders, clustering, dimensionality reduction & visualization); deep generative models (VAE, GAN, diffusion); applied notebooks (e.g., mortality forecasting).
- **Notes:** Companion site provides slides, notebooks, Jupyter & R scripts, datasets, and weights; actively updated and used in teaching (e.g., summer schools).
- **Abstract/Summary (AI generated):**
  A comprehensive, practice-oriented curriculum that takes actuaries from GLM foundations through modern machine learning and AI. The lecture notes (book) are paired with hands-on notebooks, slides, and exercises in both R and Python. Coverage spans tabular modeling (trees, GBMs, neural nets), modeling for unstructured/tensor data (embeddings, CNNs, RNNs, transformers), calibrated/validated modeling (Gini, lift, Murphy decomposition), explainability (PDP, ALE, ICE, SHAP, surrogates), unsupervised learning, and deep generative models. The final chapters introduce transformers for actuarial tasks and a concise treatment of LLMs, with applied examples such as mortality forecasting and specialized architectures like the credibility transformer.

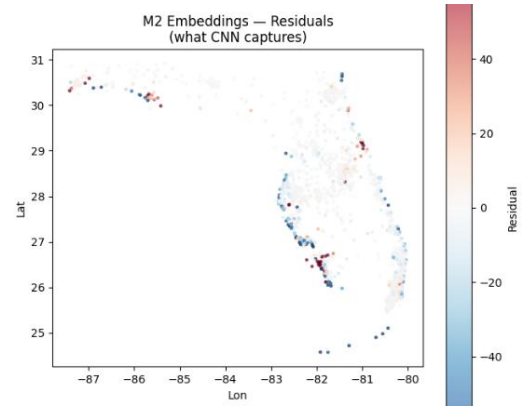
Selected Member-Built Case Studies

➜ **JianGang He & François Boulé:**
AI Knowledge Base Q&A



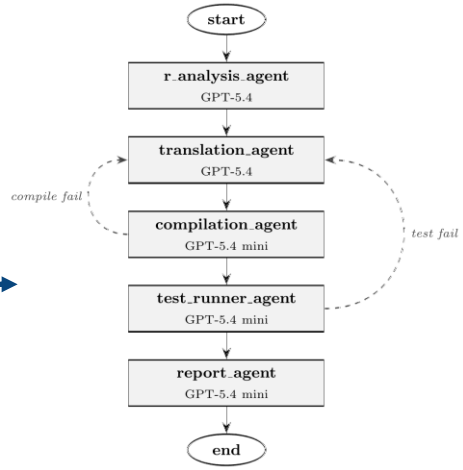
➜ **Manuel Caccone & Claudio Senatore:**
Report Generation with LLMs & R

➜ **Claudio Senatore:**
Geographic Ratemaking with Spatial Embeddings



➜ **Thu Hoang & Jasper Lok:**
LLM Distillation

➜ **Iris Nonneman & Simon Hatzesberger:**
Code Migration Multi-Agent System



… and many more.

Two Ways to Engage: Benefit and Contribute

How to Benefit

- ➜ One consolidated hub for actuarial AI case studies and tools — no more scattered hunting across journals, blogs, and conferences.
- ➜ Curated entries with consistent metadata (topic, level, methods, code link) — regularly updated.
- ➜ Most case studies pair an article with runnable code, so you choose your depth:
  - **Passive** — read the article, scroll the notebook, learn from the solution.
  - **Active** — clone, install, run, vary parameters, adapt to your own data.
- ➜ Free and public — no GitHub account needed to browse.

How to Contribute

- ➜ Every contribution path has step-by-step instructions in **`CONTRIBUTING.md`**:
  - Add an entry to the case study catalog.
  - Upload a full hosted case study (notebook + data + README).
  - Add a tutorial, guide, or tool to the AI Tools repo.
- ➜ Each guide is written for two audiences in one document:
  - **Beginners** — Web UI walkthrough with screenshots and callouts.
  - **Experts** — short CLI cheat-sheet.

AI Adoption in Actuarial Practice

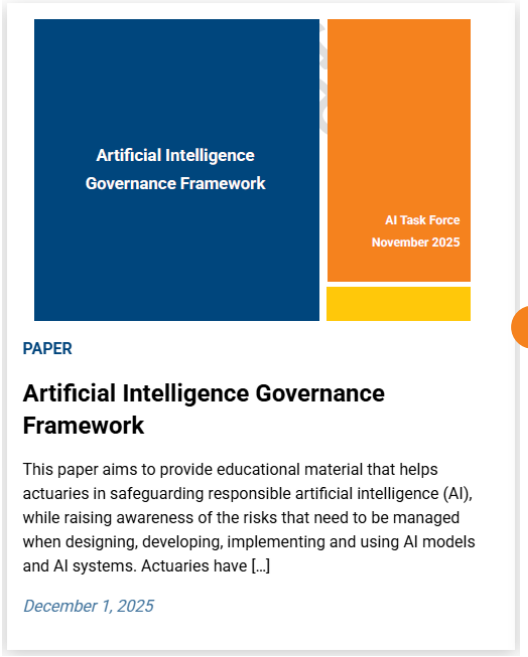
Adoption framework

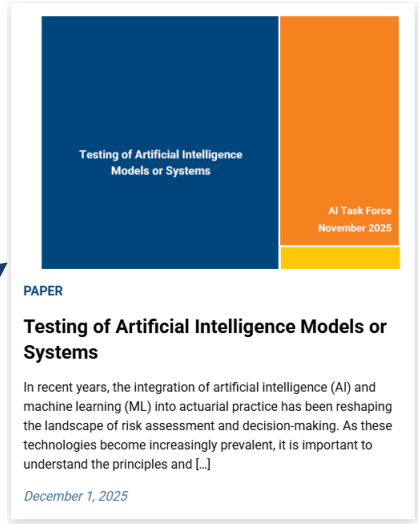
- Provide actuaries with a framework: evaluate adoption strategies
- Including considerations, best practices, professionalism, governance, ethics, as well as practicality.

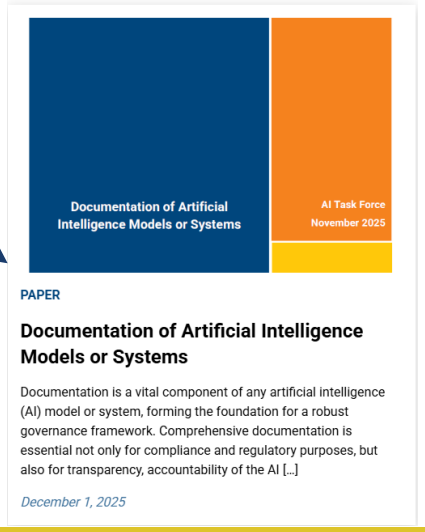
Sub-goals:

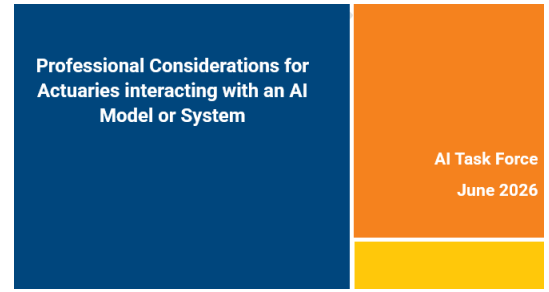
- Materialize on products from 2024
- End-to-end comprehensive framework
- Address topics that were not addressed yet
- Responsible and sustainable AI
- Cross-country and FMA importance (regulation and adoption strategies)

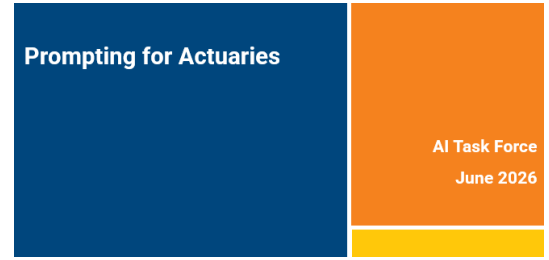
Adoption framework







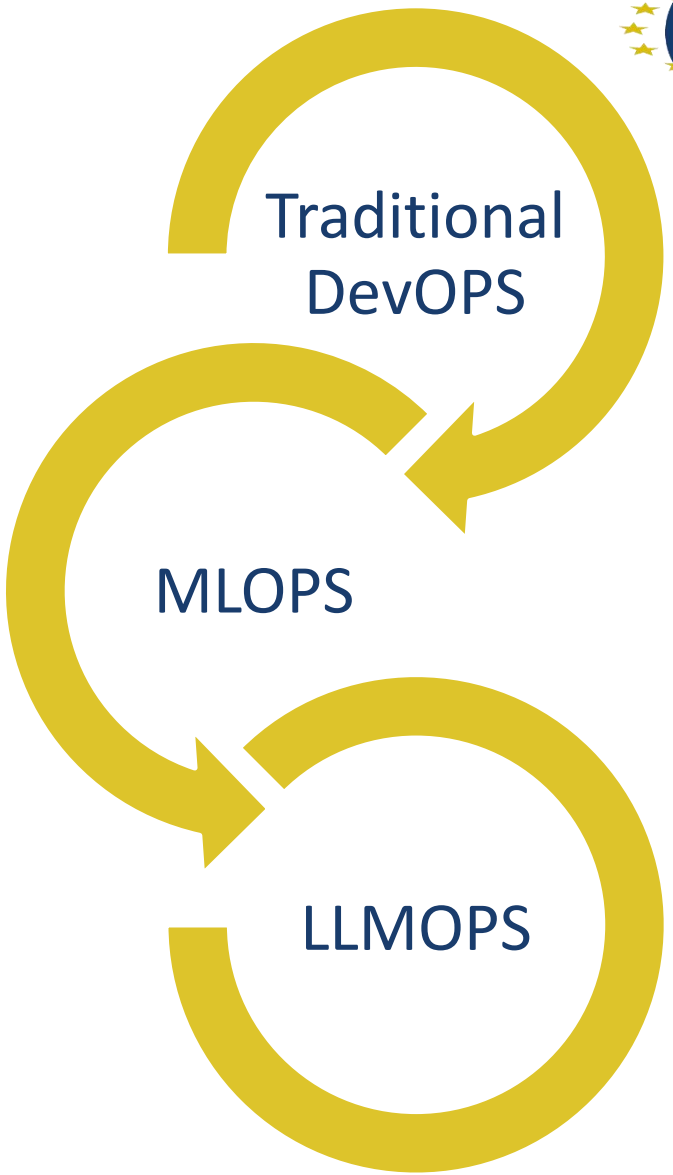




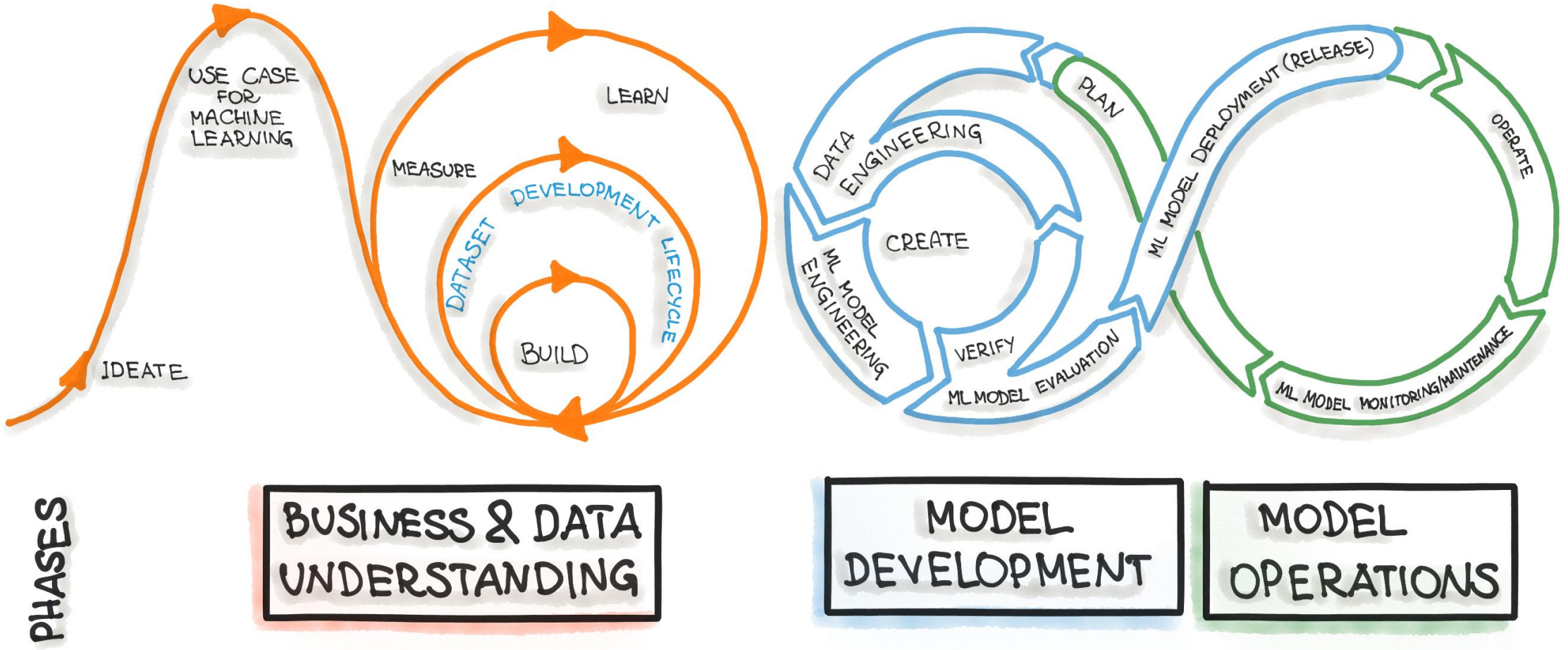
[Link to website]

A comprehensive framework

- Roles and Responsibilities
- Board of Directors
- Policies
- Key Functions
- Model Risk Ratings
- Governance & Risk Mgmt. Processes
- Independent Validation
- Third Party Vendor AI Models & Data
- Human Supervision and Oversight



A comprehensive framework



Identifying and managing risks

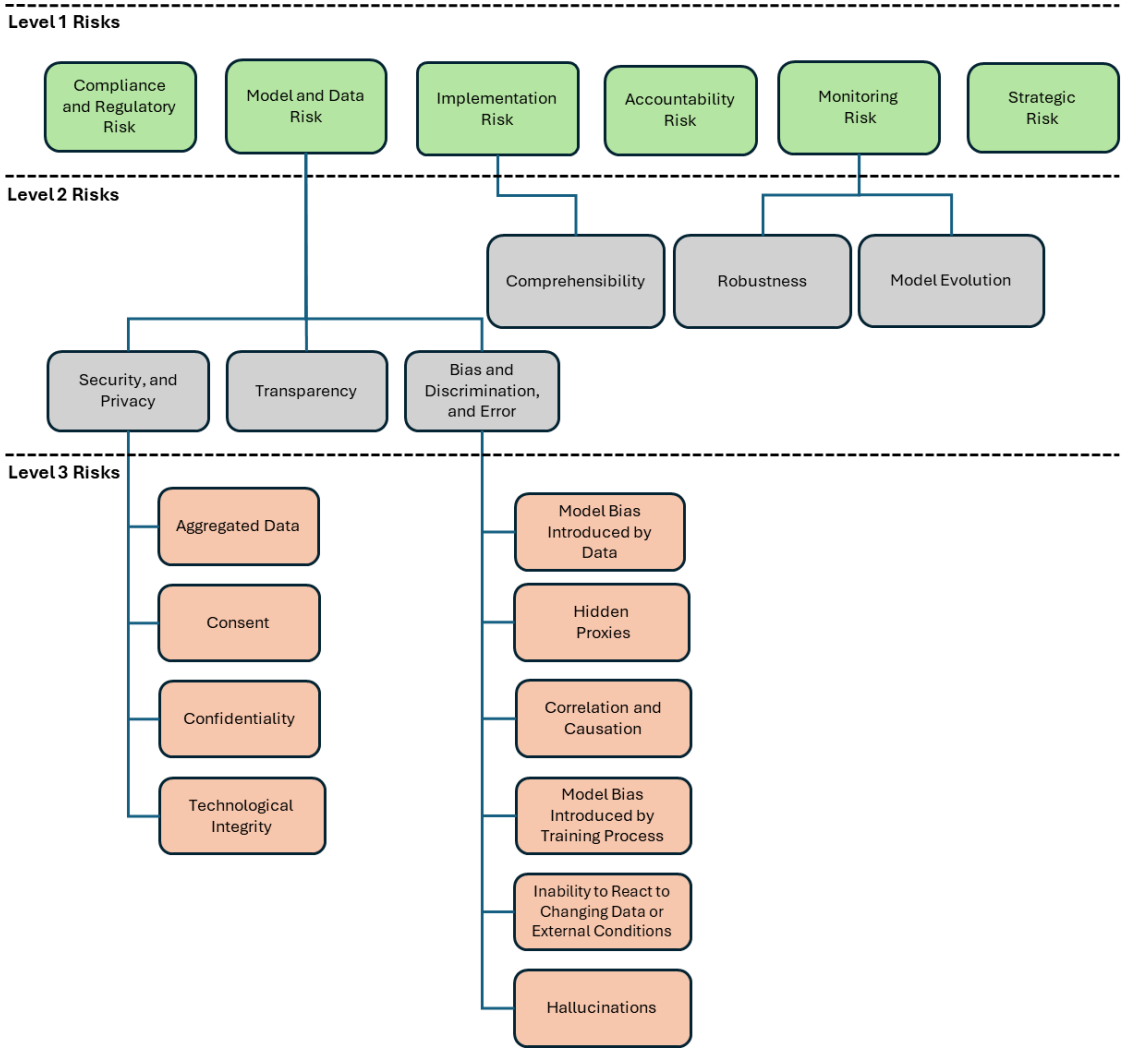


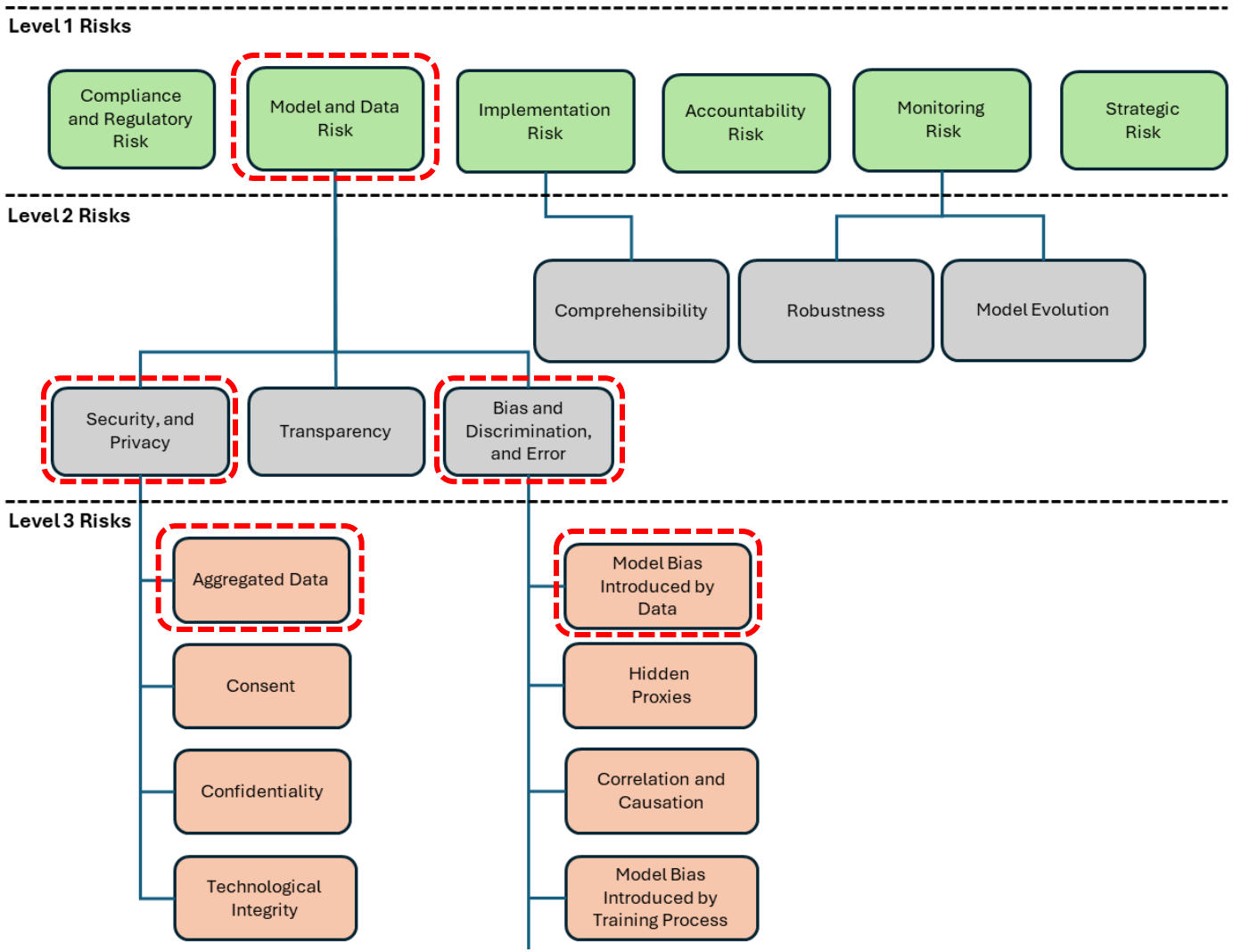
Table 1: Description of Risk Levels and Hierarchy

Note: The Table below is colour coded to represent the different risk levels, which correspond to the risk levels and colours in Figure 1, where:

Level 1= L1	Level 2 = L2	Level 3 = L3

Compliance and Regulatory Risk (L1) - Increasing model complexity makes demonstrating compliance harder.		
Model and Data Risk (L1) - The features of AI systems and models introduce new, or exacerbate existing, model and data risks compared to those actuaries are used to managing.		
	Security (L2) - The nature of AI models makes them more prone to security risks, including hostile or inadvertent misuse of the system, and design defects.	
	Privacy (L2) - The complexity of AI models makes it harder to guarantee the privacy of the data used.	
		Aggregated Data (L3) - Where data on an individual is obtained from multiple sources, it may become possible to identify them even where the individual data sets were anonymized.
		Consent (L3) - AI may use personal data in ways that were not envisaged when

Identifying and managing risks



Data enrichment example

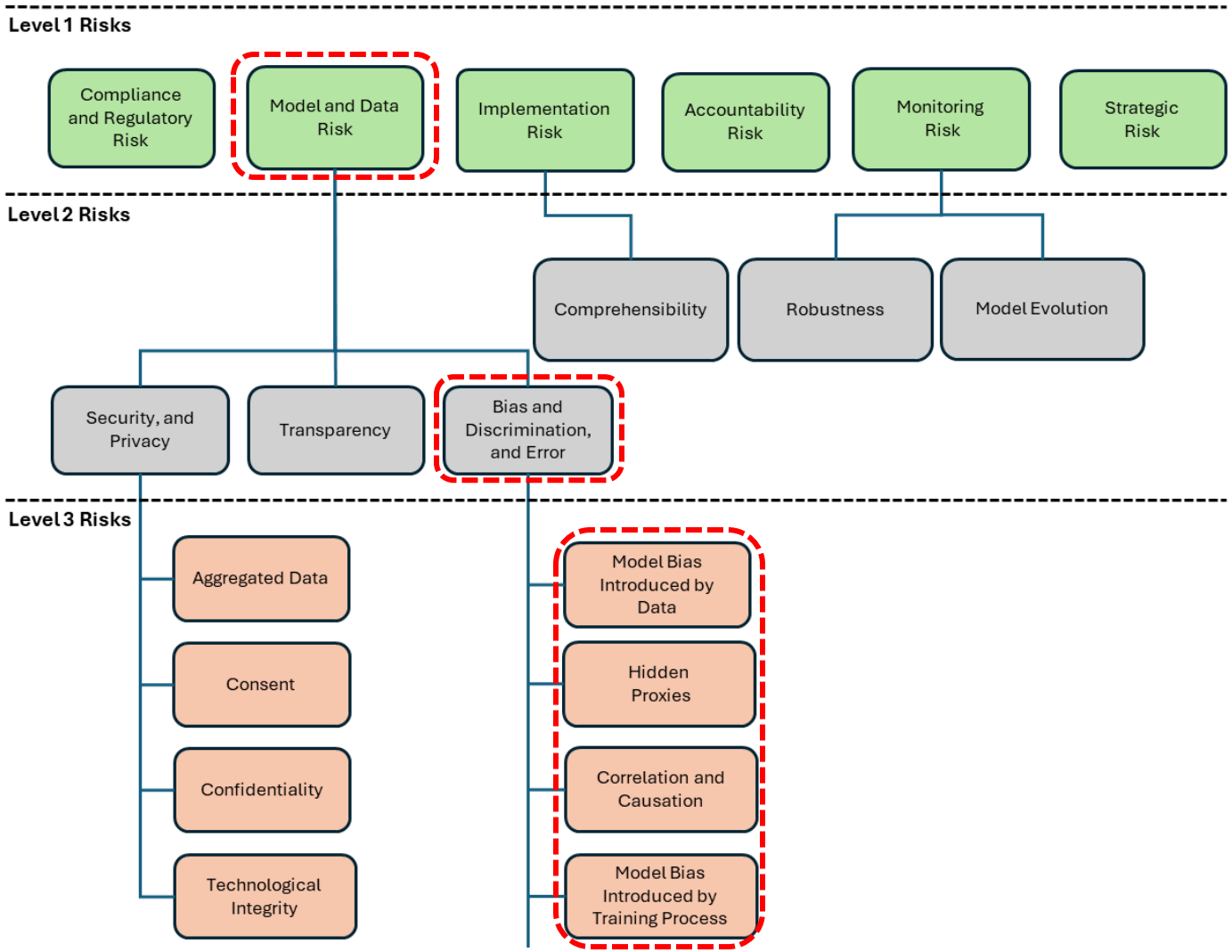
- Adding value to existent data

Active learning

Zero-shot learning

- Risks: Pre-amplifying existing biases, ethical considerations – adding irrelevant data sources
- Management: building guardrails + xAI

Identifying and managing risks

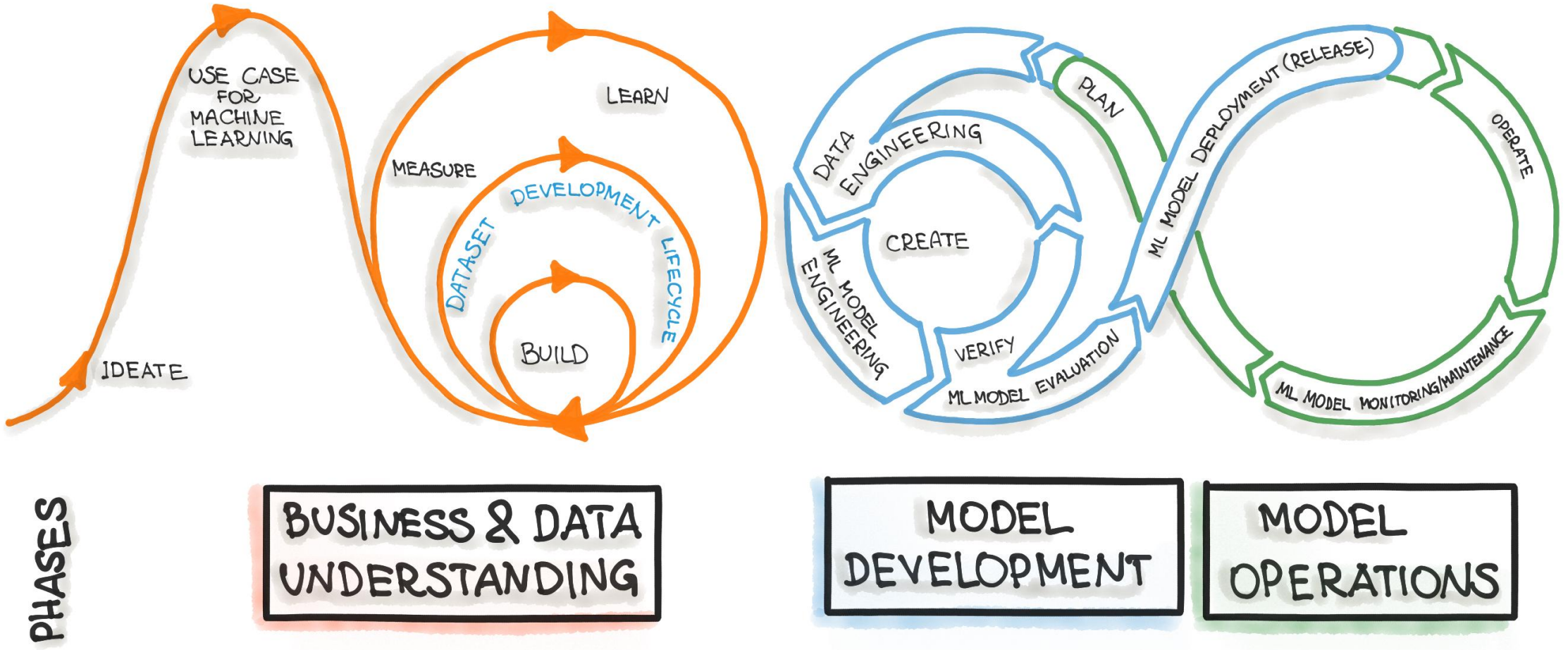


Model development

- A prediction algorithm could consist of:
  - *Algorithmic and Proxy Bias*
  - *Harmful Bias*
  - *Model Drift*
  - *Confabulations*

- Examples:
  - the output of a US healthcare prediction algorithm showed racial bias, when using past healthcare spend to predict future health requirements.
  - A ML model trained on motor insurance data – infers policyholder's gender, while not being included.
  - Parametric insurance models relying on pre-defined external data – climate patterns failing to capture policy holder behavior -> claims misalignment to contract parameters.

A comprehensive framework



Overarching interactive framework

1. Model Strategy & Planning

- Business Objective Definition
- Use Case Assessment
- Regulatory & Ethical Considerations

2. Data Management

- Data Sourcing
- Data Quality Assessment
- Data Preprocessing
- Data Governance

3. Model Development

- Model Design
- Model Building
- Model Documentation

4. Model Validation & Testing

- Validation Planning
- Performance Evaluation
- Stress Testing
- Model Risk Assessment
- Use Test
- Validation, Documentation

5. Model Approval & Governance

- Model Review
- Approval Process
- Model Inventory Management

6. Model Implementation & Deployment

- Technical Implementation
- Change Management
- User Training

7. Model Monitoring & Performance Management

- Ongoing Monitoring
- Periodic Review
- Incident Management

8. Model Maintenance & Retirement

- Model Updates
- Retirement Process

9. Documentation & Auditability

- Comprehensive Documentation
- Audit Readiness

10. Governance Structure & Roles

- Model Risk Management Policy
- Roles & Responsibilities
- Reporting

Model Lifecycle Framework

- Home
- 1. Model Strategy and Planning 3
- 2. Data Management 3
- 3. Model Development 0
- 4. Model Validation & Testing 0
- 5. Model Approval & Governance 3
- 6. Model Implementation & Deployment 0
- 7. Model Monitoring & Performance Management 0
- 8. Model Maintenance & Retirement 0
- 9. Documentation & Auditability 0
- 10. Governance Structure & Roles 0

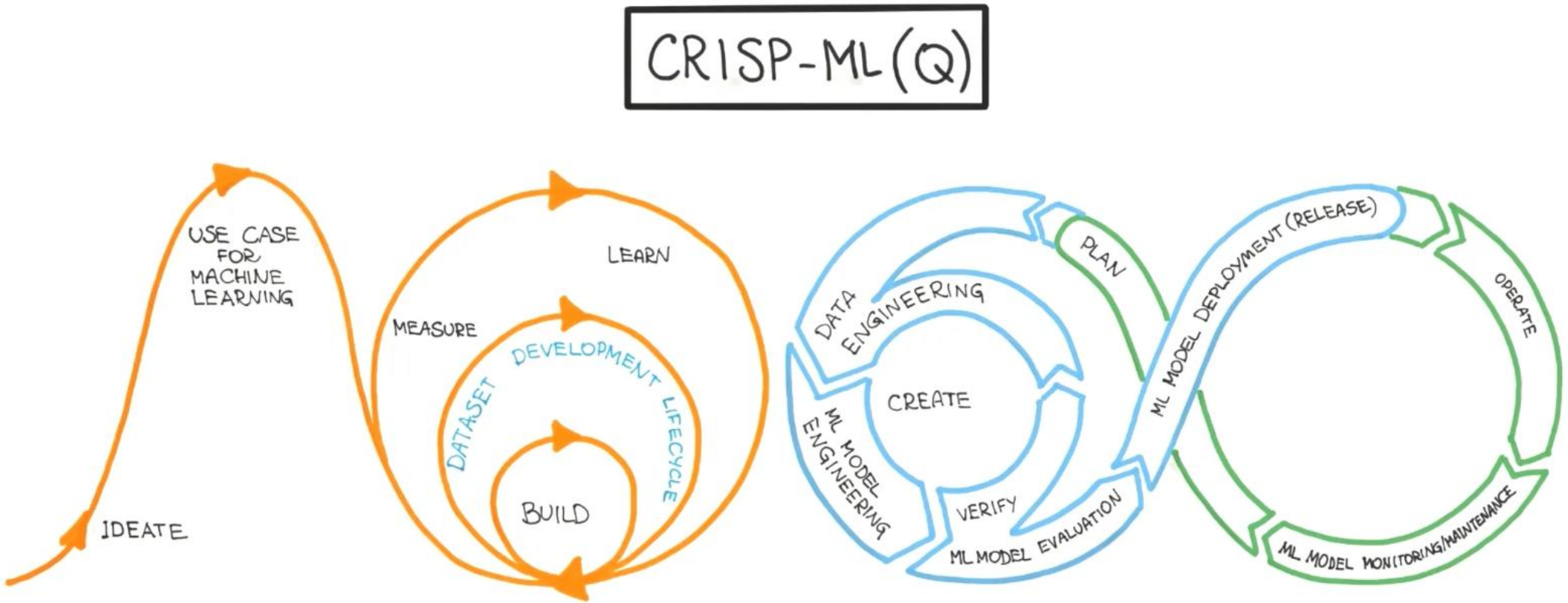
Model Lifecycle Framework

Explore each phase of the lifecycle.

1. Model Strategy and Planning | 2. Data Management | 3. Model Development | 4. Model Validation & Testing | 5. Model Approval & Governance | 6. Model Implementation & Deployment | 7. Model Monitoring & Performance Management

8. Model Maintenance & Retirement | 9. Documentation & Auditability | 10. Governance Structure & Roles

Illustration only



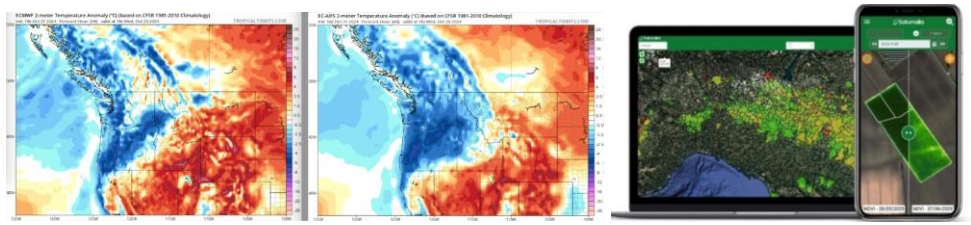
Future role of actuaries

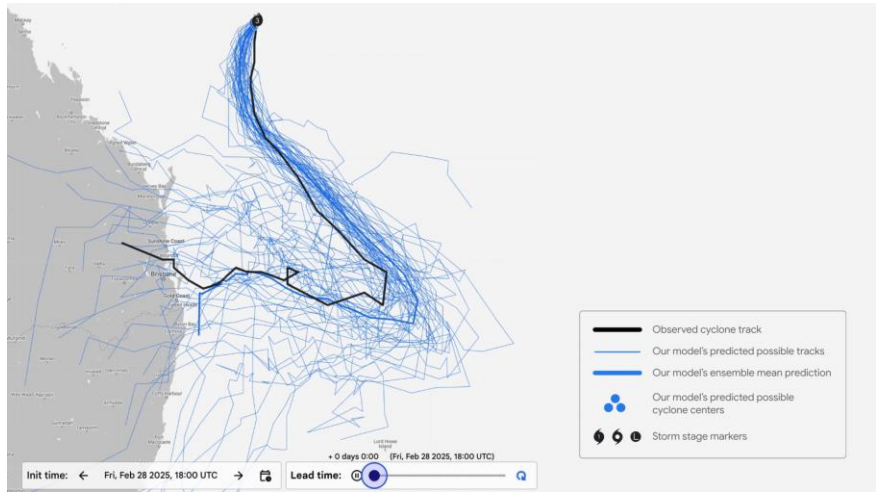
Model developer? – Risk manager of all AI models? – Model validator?

- New topics and sectors
- Right method choices / NN
- Bias | Fairness | Accuracy | Performance
- Knowledge regulatory frameworks
- Balance augmented intelligence vs artificial intelligence

- Challenges: Explainability, complex structures, accountability,..

- Being '**Fit and Proper**', work interdisciplinary and rely on existent professional ethics





Thank you!

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Q&A

Speakers

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Simon Hatzesberger is an actuary working as a Senior Manager in Actuarial & Insurance Services at Deloitte, with a focus on GenAI applications in the insurance industry. During his previous tenure in the actuarial department at Allianz Private Health, he was responsible for various data- and AI-related topics for several years. He holds an MSc degree in Financial Mathematics and Actuarial Sciences from the Technical University of Munich, as well as an MSc degree in Computer Science and a PhD in Mathematical Stochastics from the University of Passau. Additionally, he is a member of the German Association of Actuaries, a Certified Actuarial Data Scientist, and a Certified Enterprise Risk Actuary. He is actively involved in several Actuarial Data Science committees of the German Association of Actuaries, serves as a workstream lead in the Artificial Intelligence Task Force of the International Actuarial Association, and is a member of EIOPA's Consultative Expert Group on Data Use in Insurance.

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Bogdan Tautan, a Senior Reinsurance Actuary at Achmea Reinsurance with a background in economic cybernetics and actuarial sciences, manages risk transfer solutions and coordinates efforts to enhance actuarial tools, data, and IT infrastructure within the organization. As a qualified actuary, he actively contributes to the profession through roles such as Chair of the AI Working Group and member of the Professionalism Committees at the Royal Dutch Actuarial Association, co-Vice Chair of the AI and Data Science Working Group and Chair of the Risk Management Committee at the Actuarial Association of Europe, and Chair of the Adoption Framework workstream within the Task Force on AI and member of the Professionalism Committee at the International Actuarial Association.