actuarial association of europe

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# Convention A – March 2024

# What should an actuary know about Artificial Intelligence

Bogdan Tautan

Co-Vice-Chair of the Artificial Intelligence and Data Science working group

# Actuarial Association of Europe

The Actuarial Association of Europe (AAE) was established in 1978, originally as the Groupe Consultatif Actuariel Européen, to represent actuarial associations in Europe.

Its purpose is to provide advice and opinions to the various organisations of the European Union – the Commission, the Council of Ministers, the European Parliament, EIOPA and their various committees – on actuarial issues in European legislation.

The AAE currently has 38 member associations in 37 European countries, representing over 27,000 actuaries.

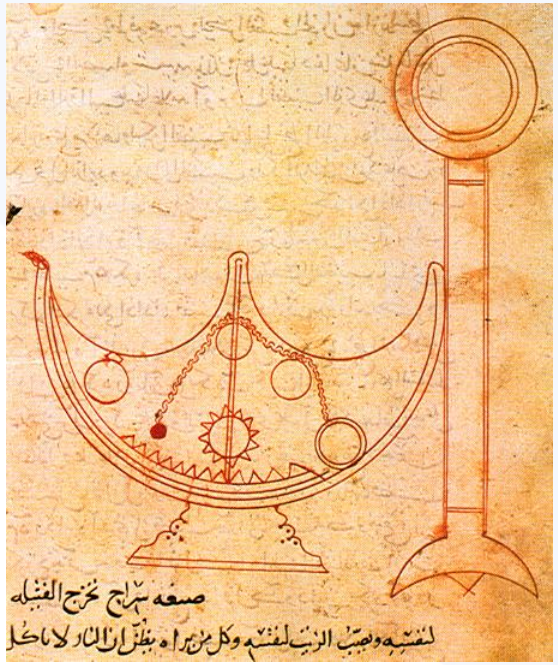
Advice and comments provided by the AAE on behalf of the European actuarial profession are totally independent of industry interests.

# Agenda

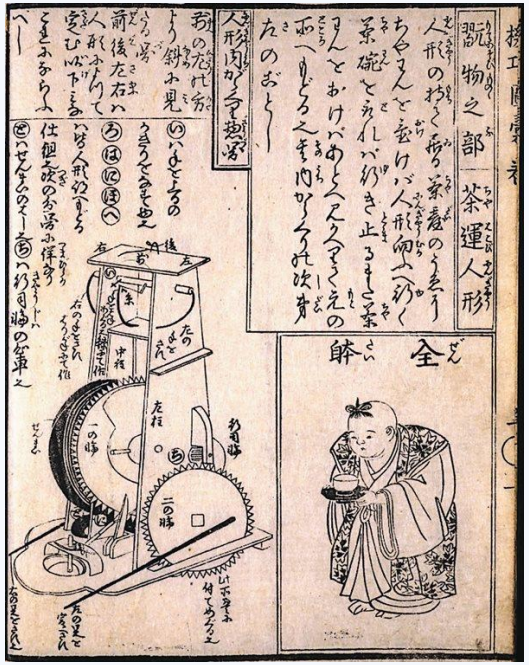
- Introduction
- The Artificial Intelligence and Data Science working group
- European regulation on the topic
- Expanding actuarial domain knowledge

# Introduction

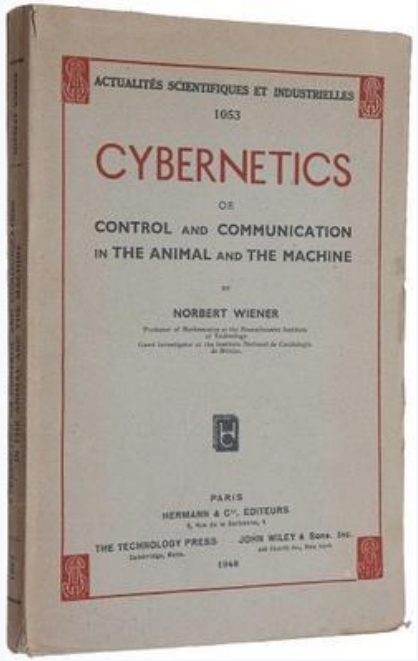
Banū Mūsā brothers
850



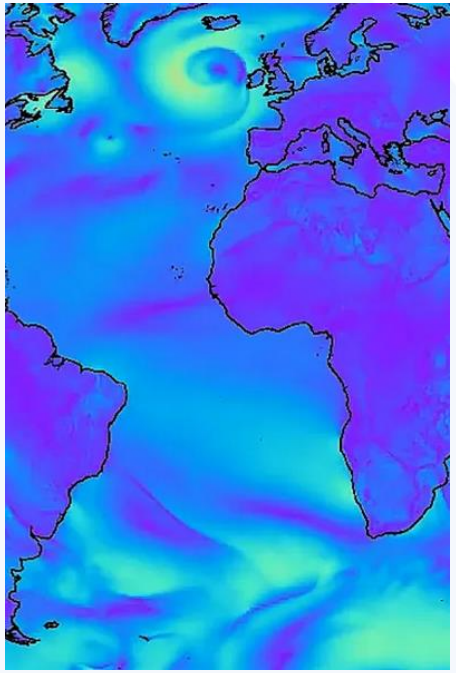
Hosokawa Honzo Yorinao
1796



Cybernetics
1948



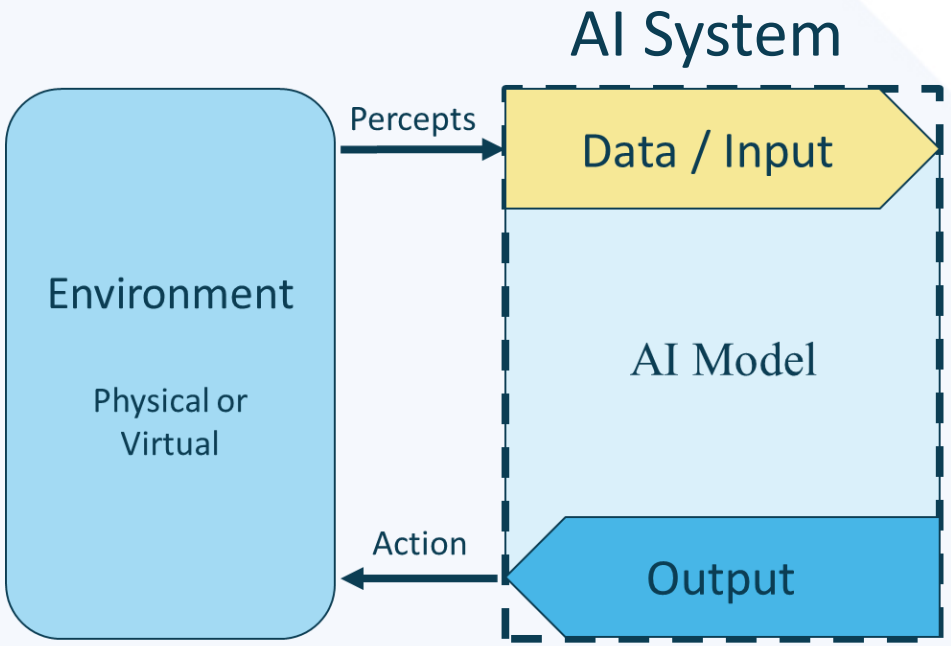

Google
GraphCast



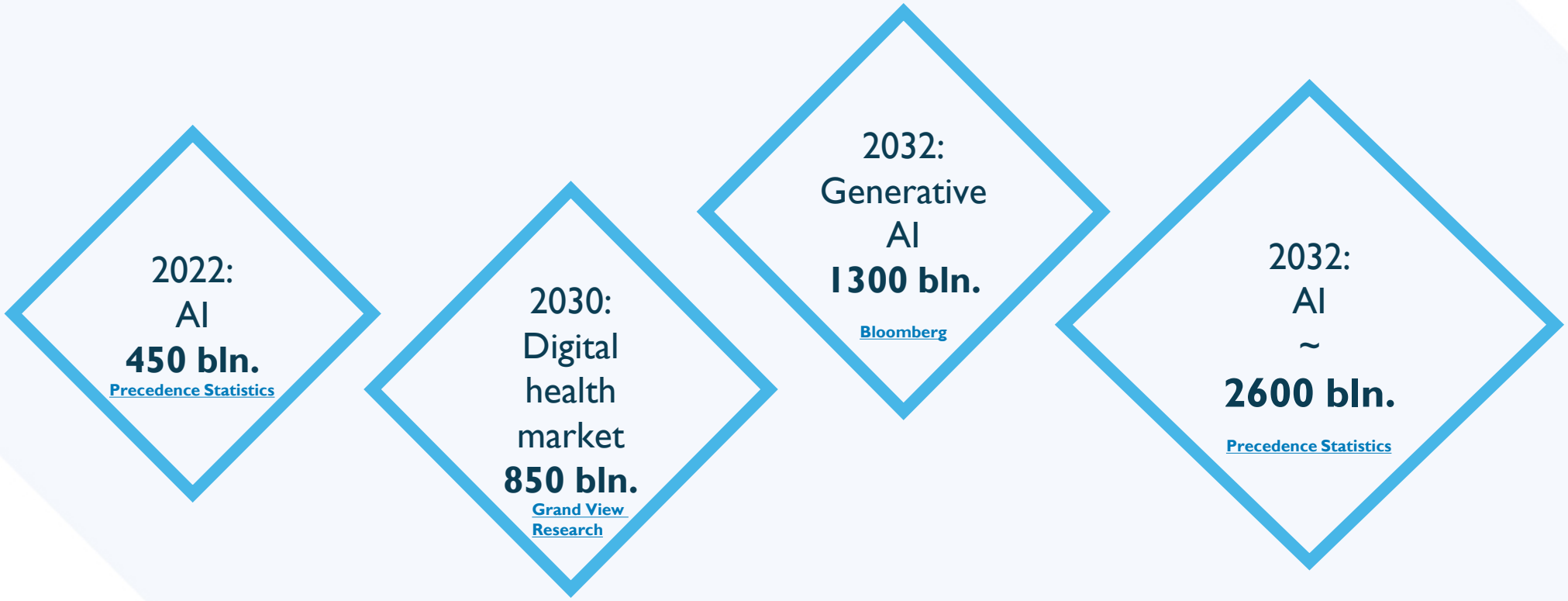
# Introduction

"An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment."

OECD Definition of an AI System



# Introduction



# Artificial Intelligence and Data Science working group

## Committees:

- Professionalism
- Education

## Working parties:

- IAA: Task Force on AI
- **Professionalism** ↔ **AAE: AI-DS Working group**

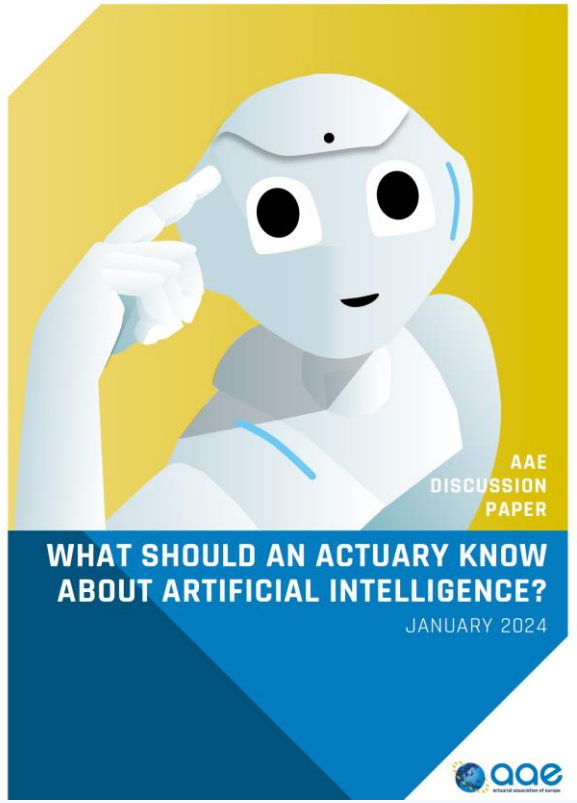
## Standards, guidelines:

- Actuarial Notes
- Standards of Actuarial Practice

# Artificial Intelligence and Data Science working group

**Strategic plan:**

- Focus on relevant AI and Data driven topics
- Ensure alignment with international stakeholders
- Support the work on AI done by other committees
- Engage with supranational institutions on AI and Data





**Contributors**:
Jonas Hirz, Esko Kivisaari, Philipp Miehe, Claudio Senatore, Bogdan Tautan, Francesco Toraldo

# European regulation on the topic


**Artificial Intelligence Act**

Digital Operational Resilience Act

Cybersecurity Resilience Act

Data Act

Data Governance Act

General Data Protection Regulations

Europe's digital principles:

- Democracy: Solidarity, Inclusion, People at center
- Rules: Legislation
- Cutting-edge technologies: Digital Twin, Digital Wallet, High-Performance Computing

# European regulation on the topic

## Horizontal regulation

Artificial Intelligence Act – 9th of December 2023 provisional agreement

- Categorizing AI systems, risk-based regulation framework
- Aims at safeguarding human oversight, introducing a fundamental rights assessment

| High Risk | Prohibited | General Purpose | Limited Risk |
|---|---|---|---|
| Technical feasible<br>Life & Health insurance<br>Creditworthiness<br>Education | Behavior manipulation<br>Scraping facial images<br>Emotion recognition<br>Biometric categorization<br>Social Scoring | Foundation models<br>LLMs<br>Generating computer code<br>Transparency obligations | Light transparency obligations |

- Technical documentation & Iterative risk-management process
- Aligning with the OECD definition (Bletchley agreement)

# European regulation on the topic

## Vertical regulation

- Singular, existent comprehensive legislative frameworks
- Solvency II Directive, Insurance Distribution Directive and soon e-Privacy Directive

Ethics Guidelines for Trustworthy AI (developed by HLEG)

| | |
|---|---|
| **Proportionality Principle** | Determine the governance measures required for insurer's specific AI applicability |
| **Fairness and non-discrimination** | Transparent, socially responsible applications of algorithms |
| **Transparency and explain ability** | XAI, or explainability of AI algorithms, what the algorithms do |
| **Human oversight** | Documenting the roles of those responsible of AI algorithms |
| **Data governance and record keeping** | Comply with data protection laws such as GDRP |
| **Robustness and performance** | Minimize potential to cause harm and have sound IT infrastructures |

# European regulation on the topic

## The role of the actuary

### Risks

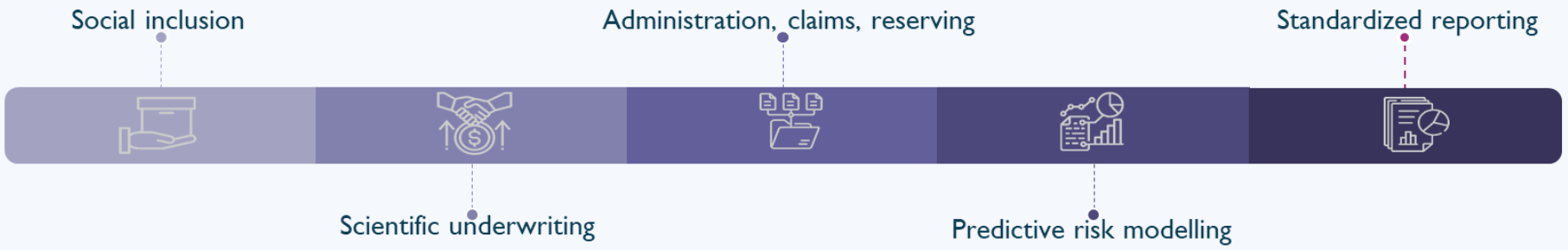
- Persuasive information
- Discrimination
- Data security and intellectual property
- Cybercrime

### Responsibilities

- Adapt a sound governance framework to navigate legal, ethical and technological risks
- Define roles and responsibilities within organizations
- Training around the topic of AI is crucial

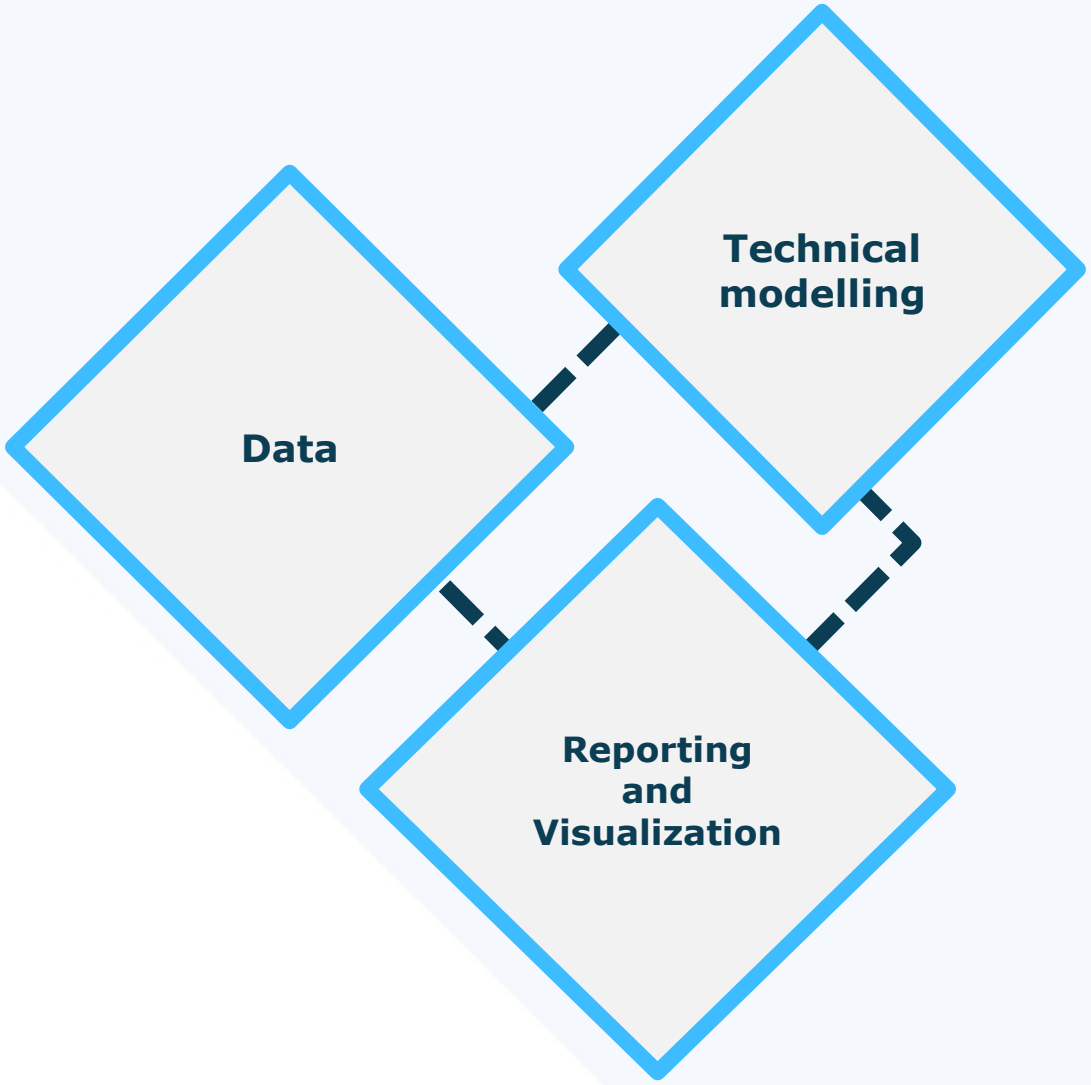
# Expanding actuarial domain knowledge

*" AI spans across a diverse array of applications, delving into every facet of the insurance value chain"*




- Actuaries are perfectly positioned: relevancy of business sense, data handling and modelling
- Extracting value from AI: narrow or general AI - decision making disciplines: ML, DL, NLP etc.
- Lifecycle management:
  - traditional model management & validation frameworks are well regulated, methodological
  - the complexity of AI systems need robust data management processes and IT infrastructures
  - secure AI systems: Design – Development – Deployment – Operation – Maintenance
- Adequate risk management is needed, build model iterations, in some cases adapt digital twins

# Expanding actuarial domain knowledge




- Expand proficiency
- Engage interdisciplinary
    - Data infrastructures, data management
    - Alternative data, synthetic data
    - DevOps: hardware and software
    - Imperative programming
    - Example: Convolutional Neural Network
    - Knowledge graphs
    - Automated reporting

# Expanding actuarial domain knowledge

- Important aspects already considered:
  - IAA – AAE – FMAs: Data & Systems category, neural networks, decision trees, data visualization
  - CPD guidelines

| Cognitive / Knowledge | 1. Remember | 2. Understand | 3. Apply | 4. Analyze | 5. Evaluate | 6. Create |
|---|---|---|---|---|---|---|
| A. Factual | A1 | A2 | A3 | A4 | A5 | A6 |
| B. Conceptual | B1 | B2 | B3 | B4 | B5 | B6 |
| C. Procedural | C1 | C2 | C3 | C4 | C5 | C6 |
| D. Metacognitive | D1 | D2 | D3 | D4 | D5 | D6 |

- Bloom's taxonomy: learning objectives denoting a cognitive process and the intended knowledge
- Tailoring courses is necessary
- Examples: Insurance Data Modelling B2 or C6
- Conduct activities ethically and foster an open dialogue with all stakeholders

# Conclusion

*Safeguarding responsible use of AI means being more technically oriented and broadening the scope of your activities as an actuary*

**Address AI appropriately:**

- Work interdisciplinary
- Governance framework
- Avoid bias and infringement
- Match data to business
- Develop new skills – ‘Fit and Proper’

**XAI:**

- Forget the Black Box concept:
  - Intelligibility vs
  - Auditability vs
  - Transparency vs
  - Explainability vs
  - Trustworthiness
- Ex: PDP, ICE, Shapley Additive exPlanations

# Thank you!

## Questions / Discussion

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# ACTUARIAL ASSOCIATION OF EUROPE

Silversquare North
Boulevard Roi Albert II 4  1000
Brussels  Belgium
www.actuary.eu

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