Without Actuaries, AI is Just a Meaningless Buzzword

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Data Science & Data Ethics
e-Conference by EAA

29/30 June 2020

WHAT WILL THE FUTURE BRING? WILL MACHINES DO ALL THE WORK?

Source: Maxiphoto / Getty Images

ALIBABA DISRUPTED CHINESE MARKET

China's Ant Financial amasses 50 million users, mostly low-income, in new health plan *

* Critical Illness product covers 100 health conditions

Reuters, 12. April 2019

- **A great success…**
- Within 9 days after launching, 10m people have subscribed to the product, and till now more than 100m.
- More than 60 % of their customers had never before considered to buy a CI cover.

… with a very simple product.

- Customers of Ant Financial under 60 with more than 650 "Sesame Credit Points" can purchase the product without any further underwriting.
- Premiums are calculated bi-weekly based on past claims incurred plus 8% admin cost loading, without any further acquisition costs.

WHAT MAKES ALIBABA SUCCESSFUL?

THE CUSTOMERS SIMPLY LOVE THE COMPANY!

Process beats individualisation

- Standardized benefit triggers in line with market standard, even sum insured is fixed based on the attained age of the insured
- Any adaption of product design is valid immediately for whole inforce portfolio; i.e. Covid-19 inclusion in January 2020
- Onboarding, U/W and Claims processes fully digitalized

Key benefits

- Smooth digital processes
- High interest alignment with customers through product design increases trust:
  - Customers accept that their data is collected – also personal and medical data!
  - Based on that Alibaba can regularly improve the customer experience

A positive customer experience is key for success!

ALIBABA IS CREATING VALUE …

… BASED ON DATA AND HIGH FREQUENCY ANALYSIS

Customer contact
- Product design
- Marketing
- Sales
- Customer service

- High willingness to share data
- Link with external data
- Automated ETL process (extract, transform, load)

Integrated data
- Clear data strategy
- Thorough data model

4 V's of Big Data:
- Volume
- Velocity
- Variety
- Veracity

Machine Learning
- Statistical models
- Artificial intelligence

- Quick adaption of customer needs
- Personal situation is reflected
- Marketing and services adapt to changing needs

4 V's of Big Data are key:

- Volume: The data set should be huge – millions of events
- Velocity: Frequency of data processing should be high – daily or weekly
- Variety: A heterogeneous data set is key – to be able to predict
- Veracity: High quality of data – even with all the legacy systems

HOW CAN THIS WORK FOR EUROPEAN LIFE INSURERS?

Source: Maxiphoto / Getty Images

EXAMPLE 1: IMPLICIT DISCRIMINATION

DISCRIMINATING PRICING FOR CERTAIN GROUPS OF PERSONS

Example

MO COMPARE Motorists fork out £1,000 more to insure their cars if their name is Mohammed

Top firms such as Admiral and Marks & Spencers have been dragged into an insurance race row after giving far lower quotes for drivers with traditionally English names like John

Source: https://www.thesun.co.uk/motors/5393978/insurance-race-row-john-mohammed/

Problem

- "The Sun" reported that motor insurers in UK had up to 69% higher prices for individuals called Mohammed instead of John (everything else being the same)
- The name was implicitly used by an AI algorithm to differentiate prices – discriminating against the ethnic origin

EU Charter of Fundamental Rights is clear on Equality!

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EXAMPLE 1: IMPLICIT DISCRIMINATION

AVOIDANCE OF AN UNFAIR BIAS

Data Ethics applied

Charter of fundamental rights of the EU:

Any discrimination based on any ground such as sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited

Source: Charter of fundamental rights of the EU, Article 21 (1)

Source: European Commission, Ethics Guidelines for Trustworthy AI, p21f

Solution

- Test stability of process and results on changing input and parameters
- Monitor behaviour of model during training and deployment
- Use statistical tests for critical parameters as, e.g., those of fundamental rights
- Implement governance for testing by divers teams and set-up “bug bounties”

Critical parameters and features need to be closely monitored

EXAMPLE 2: LACKING ACCOUNTABILITY

BIASED DECISIONS DERIVED BY AI ALGORITHMS

Example

Amazon scraps secret AI recruiting tool that showed bias against women

Source: https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G

Technology & Ideas

Amazon's Gender-Biased Algorithm Is Not Alone

They're everywhere, but nobody wants to know about it.

Source: https://www.bloomberg.com/opinion/articles/2018-10-16/amazon-s-gender-biased-algorithm-is-not-alone

Problem

- 2014 Amazon applied mechanized search for top talents in applications
- As training data from the previous 10 years was biased by a male dominance in tech industry, so were the results
- Amazon stopped the program 2015, but other companies still use similar technology and do not yet question its results

Accuracy and explainability of AI algorithms has to be secured!

EXAMPLE 2: LACKING ACCOUNTABILITY

STOP THE BELIEF IN BLACK BOX ALGORITHMS

Data Ethics applied

- Identifying, assessing, documenting and minimising potential negative impacts of AI systems is crucial
- Auditability of AI systems needs to be secured
- Decision-makers must be accountable for trade-offs when implementing such AI systems

Source: European Commission, Ethics Guidelines for Trustworthy AI, p19f

Solution

- Validation and testing of an AI system and its performance as early and as close as possible
- Long-term target: develop Explainable AI
- Implement AI governance framework (e.g. red teaming, algorithmic impact assessments or ethics panel)

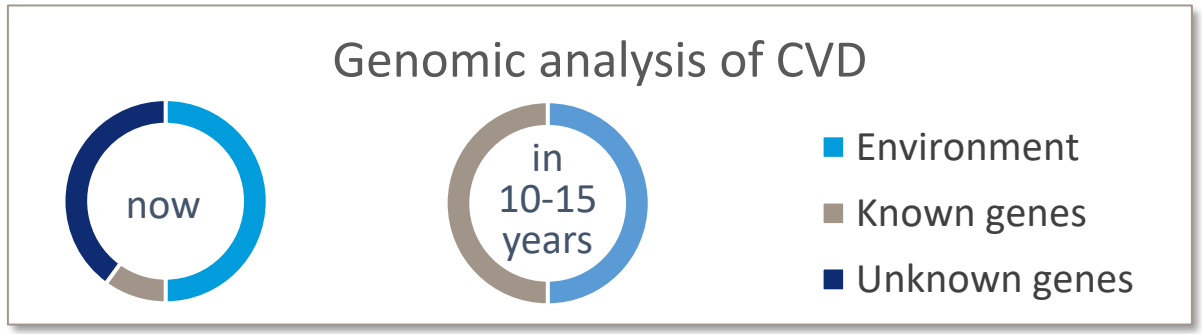
Ownership for development, deployment and use of AI systems crucial!

EXAMPLE 3: SOCIAL RESPONSIBILITY OF LIFE INSURANCE

REDUCED ACCESSIBILITY FOR A PRODUCT

Example

Direct to Consumer Tests (DTC) are becoming cheaper and more publically accessible



Source: Shutterstock, MunichRe

Problem

- Use of genomic data would enable fair prices for certain groups but in parallel also restrict accessibility for others
- To avoid discrimination access on such data is sometimes limited for insurers
- Potential anti-selection by information asymmetry between insurer and insured has to be considered, e.g., in higher prices or exclusions

Big data and AI should increase the availability of cover, not reduce it!

EXAMPLE 3: SOCIAL RESPONSIBILITY OF LIFE INSURANCE

ACCESSIBILITY AND UNIVERSAL DESIGN OF PRODUCT

Data Ethics applied

- AI systems should consider "Universal Design" principles
- Product design should allow all people to use AI products or services
- Especially age, gender, abilities or characteristics of an individual cannot limit access to a product or service

Source: European Commission, Ethics Guidelines for Trustworthy AI, p18f

Solution

- Allow for a fair pricing and accessibility when differentiation of certain parameters is not possible for legal or ethical reasons
- If information asymmetry with very material differences in the price leads to relevant anti-selection, the regulator has to ensure other solutions, e.g., obligatory covers

Industry and governments need to solve this topic jointly

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RISKS ASSOCIATED WITH AI AND THEIR CONSEQUENCES

Performance Risks
- Risk of errors
- Risk of instability

Ethical Risks
- Risk of bias & discrimination
- Risk of non-transparency

Security Risks
- Adversarial attacks
- Privacy risks
- Open source software and 3rd vendor risks

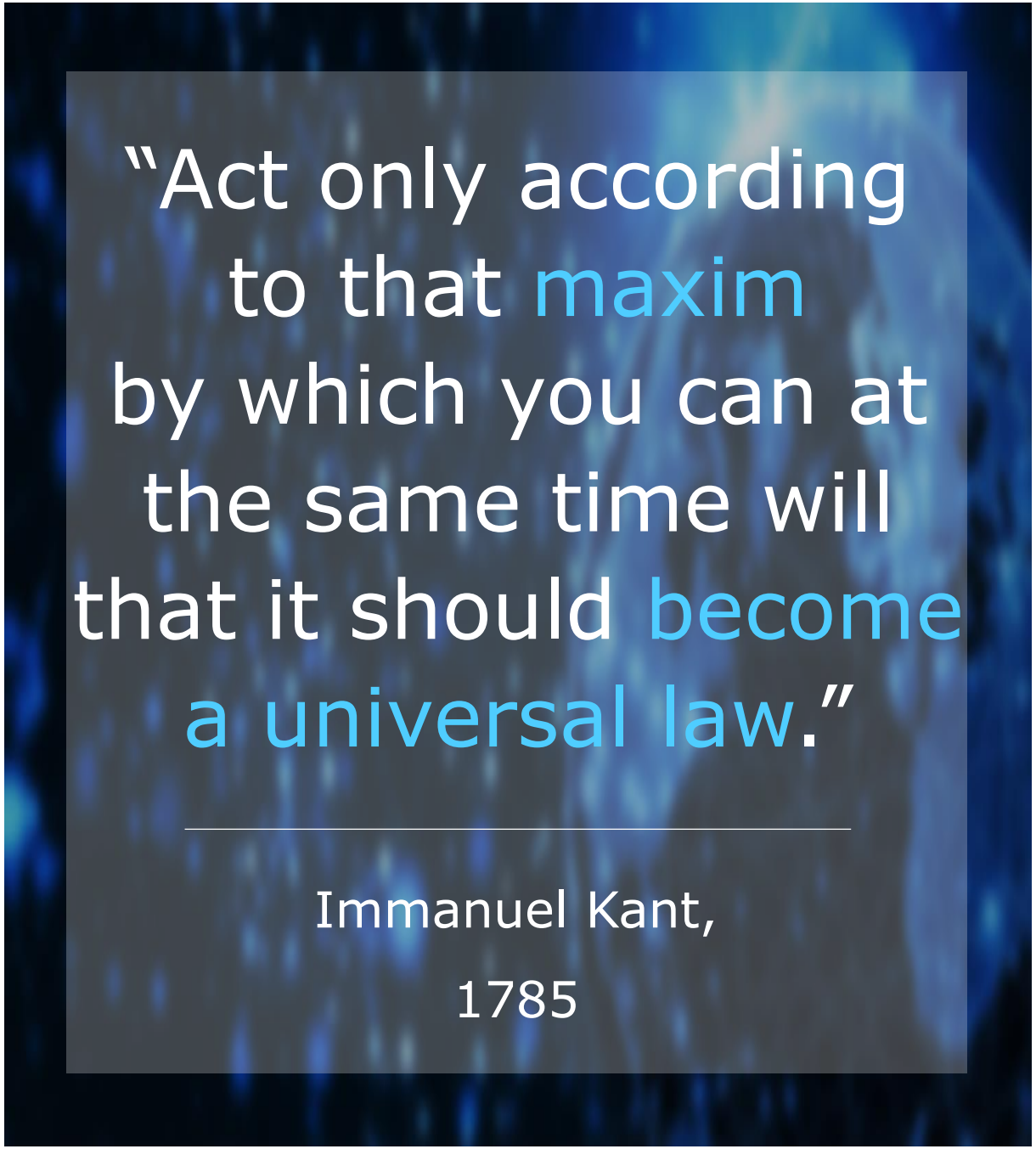
Control Risks
- Risk of inappropriate feedback
- Risk of inconsistency with the system's specification (AI out of control)

Consequences

Individuals	Companies
Physical and mental health	Financial condition
Privacy and reputation	Non-financial performance
Financial condition	Legal compliance
Equality and fair treatment	Reputational integrity

THE ETHICS OF USING DATA

LET'S ASK AN EXPERT:



Source: Maxiphoto / Getty Images

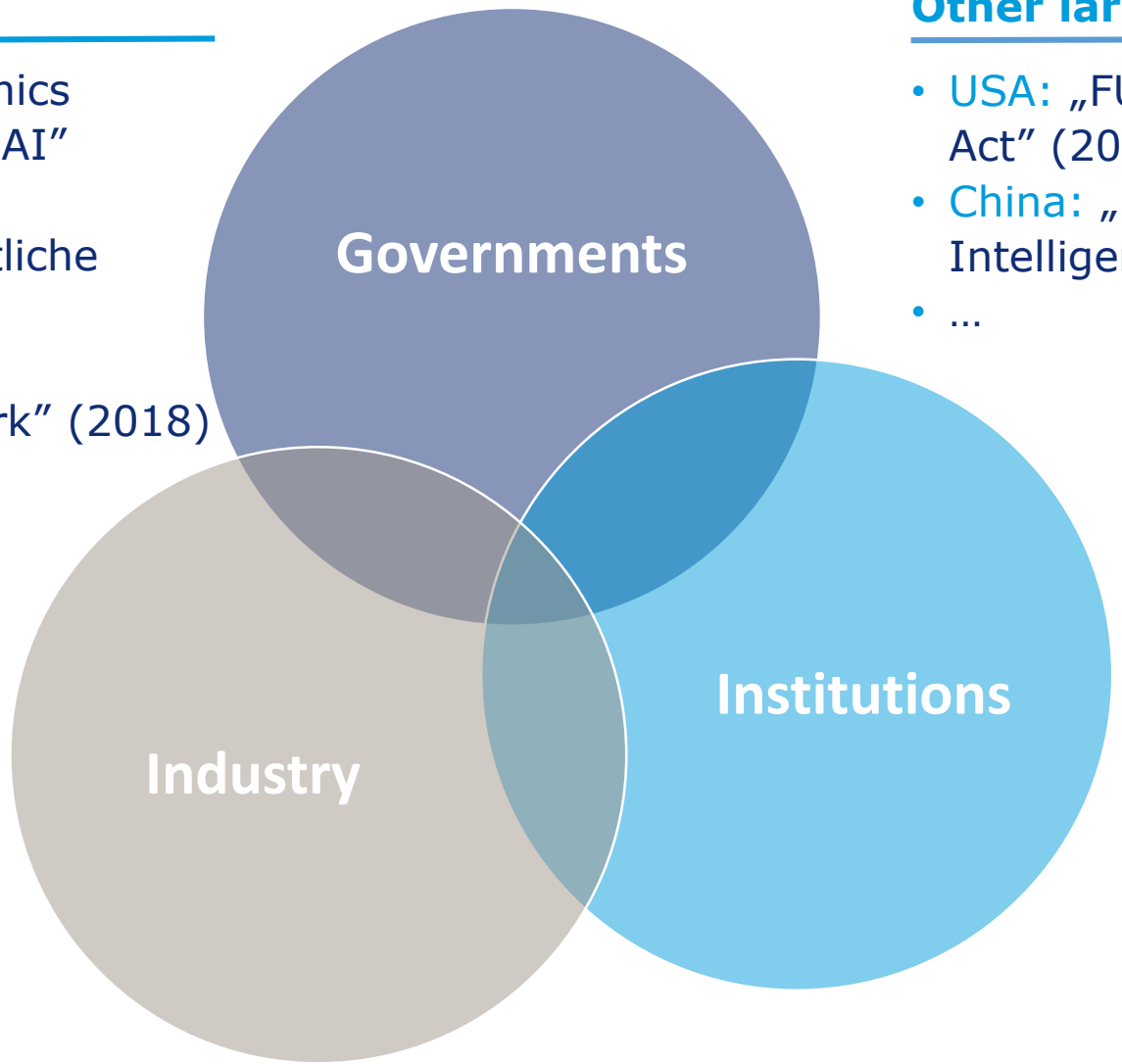
STATES, INSTITUTIONS AND THE INDUSTRY HAVE TAKEN UP THE TOPIC RESPONSIBLE AI

Europe

- European commission: "Ethics Guidelines for Trustworthy AI" (2019)
- Germany: "Strategie Künstliche Intelligenz der Bundesregierung"´(2018)
- UK: "Data Ethics Framework" (2018)
- …

Industry

- Google: „Responsible AI Practices" (2018), „AI Ethics Board" (2014)
- Microsoft: „Fairness Accountability Transparency and Ethics group" FATE (2017)
- …



Other large state actors

- USA: „FUTURE of Artificial Intelligence Act" (2017)
- China: „New Generation Artificial Intelligence Development Plan" (2017)
- …

Institutions

- Academic in origin: Ethics in Artificial Intelligence Initiative, AI4ALL, AI Ethics Lab (2015/17/18)
- Industry sponsored: Partnership on AI (2016), Open AI (2015)
- …

Source: applied AI's "Landscape of ethical use of AI"

ETHICS GUIDELINE FOR TRUSTWORTHY AI

*A EUROPEAN FRAMEWORK FOR SETTING UP **ETHICAL AI SYSTEMS***

Three Components of a system of "Trustworthy AI" …

lawful

Complying with all applicable laws and regulation

ethical

Ensuring adherence to ethical principles and values

robust

Both from a technical and **social perspective**

… and seven key requirements for its realisation

- **Human agency and oversight**
- Technical robustness and safety
- Privacy and data governance
- **Transparency**
- **Diversity, non-discrimination and fairness**
- **Social and environmental wellbeing**
- **Accountability**

Source: European Commission, Ethics Guidelines for Trustworthy AI, p8

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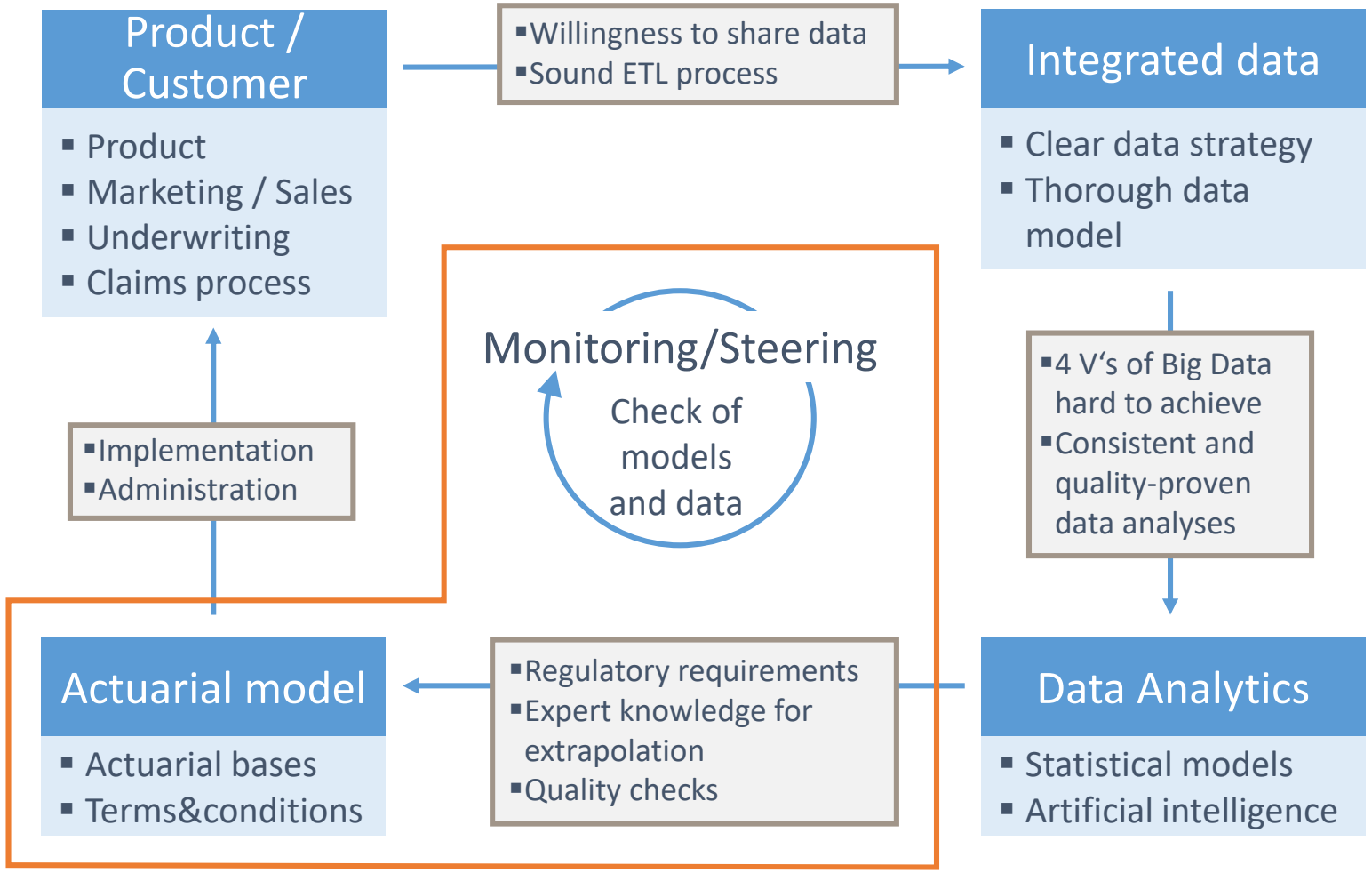


Actuaries will play a major role in this new data-driven business model for insurers.

Actuaries will be needed in particular for

- the interpretation of the results,
- potentially needed extrapolation of data and
- checks of data, assumptions and models.

Actuaries and Risk Managers are key to control bots and AI

HOW TO START – IS IT AN EVOLUTION OR A REVOLUTION …?

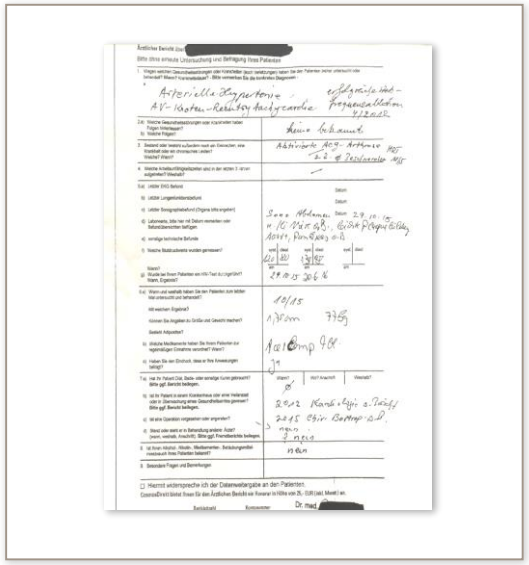
Source: Maxiphoto / Getty Images

PROCESS EXAMPLE: MIRA DIGITAL SUITE

AUTOMATED AND PARTLY PREDICTIVE UNDERWRITING PROCESS

Traditional process

45 minutes

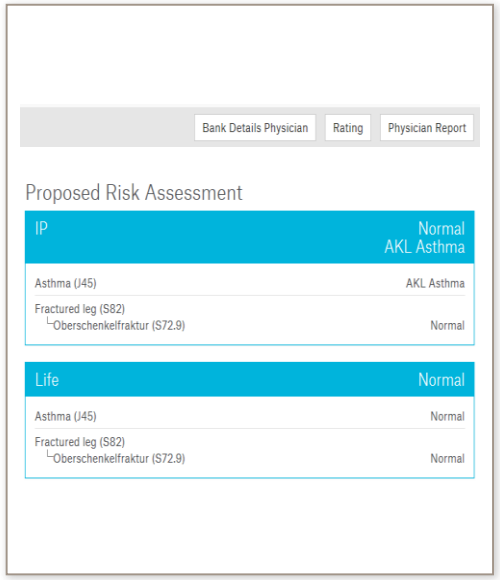


- Unstructured data
- Relevant information missing
- But a lot of irrelevant information

Digital process

5 minutes

Reduces to less, if answers can be prefilled based on external data



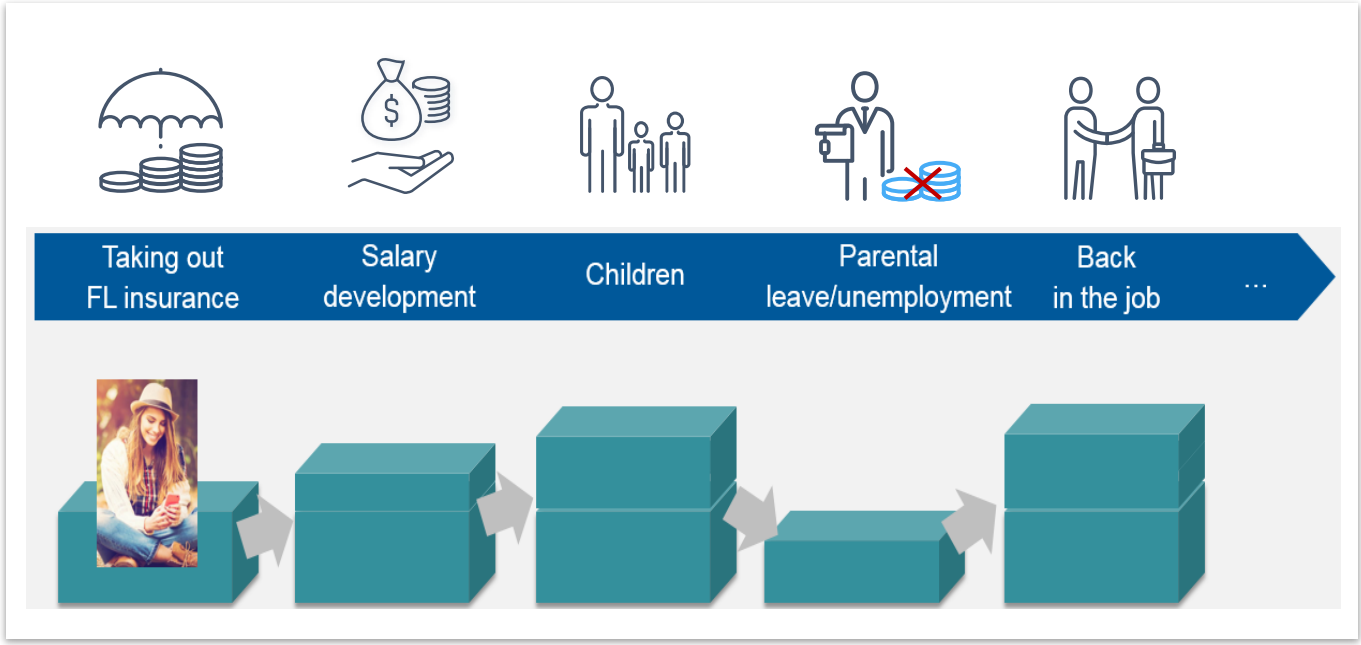
- Use data prefill
- Predict suggestion for a decision
- Expert still needed to validate results

PRODUCT EXAMPLE: FLEXIBLE LIFE SOLUTION

EMPLOYEE PROTECTION THAT CAN BE ADJUSTED AT ANY TIME

My work situation is so uncertain that I do not know where I will be in a year's time.

Any protection has to be able to flexibly adjust to my life.



How will the customer benefit?

I cover my occupation, have very reasonable premiums to begin with, and can adjust the level at any time to my current situation.

What are the core elements?

- DI insurance calculated on a one-year basis
- Customer interface for straightforward adjustment
- Highly flexible supplementary insurance
- Options to adjust to current salary
- Flexible payout options

MACHINES WILL DO ALL THE WORK? BUT ACTUARIES WILL CONTROL THEM

Source: Maxiphoto / Getty Images

I’m looking forward to your questions

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As an active member in the German Actuarial Association (DAV) Dr. Frank Schiller is member of the executive board and chairman of the Enterprise Risk Management Committee. In the Actuarial Association of Europa (AAE) he is Vice Chair of the Risk Management Committee. Since 2010 he is tutor of the CERA program for the DAV and AAE for module B "Classification and Modeling Risks". He is also co-founder of the qx-club in Zurich and is organizing the regular meetings.

He was born 21 November 1972, studied Mathematics and Physics and finished his Ph.D. in 2002. Since 2004 Frank is a certified Actuary (DAV) and since 2013 Certified Enterprise Risk Actuary (CERA).

ABOUT ME

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