Dialogveranstaltung KI im Mittelstand – Open Session

EU AI ACT und Normen: Schlüssel zur einer vertrauenswürdigen KI

Dr. Andreas Hauser (AIQURIS) & Dr. Wolfgang Hildesheim (IBM)

Ghost Musician Records

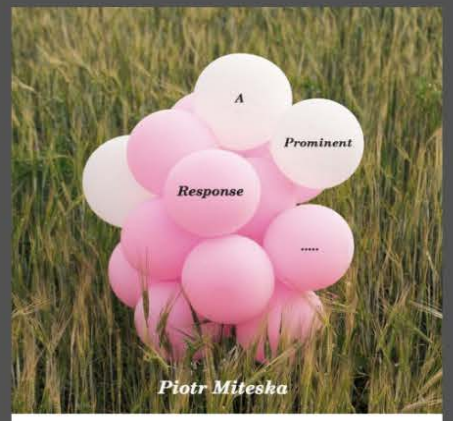
Music your ears won't believe is true.

DIN

Releases

Charles Bolt

Ana Olgica



Piotr Miteska

Sigimund

They Dream By Day

Charlie Key

1. The European AI Act

Goal is the acceleration of innovation & the mitigation of risk

Europäische KI Verordnung (“EU AI Act”) in 2024

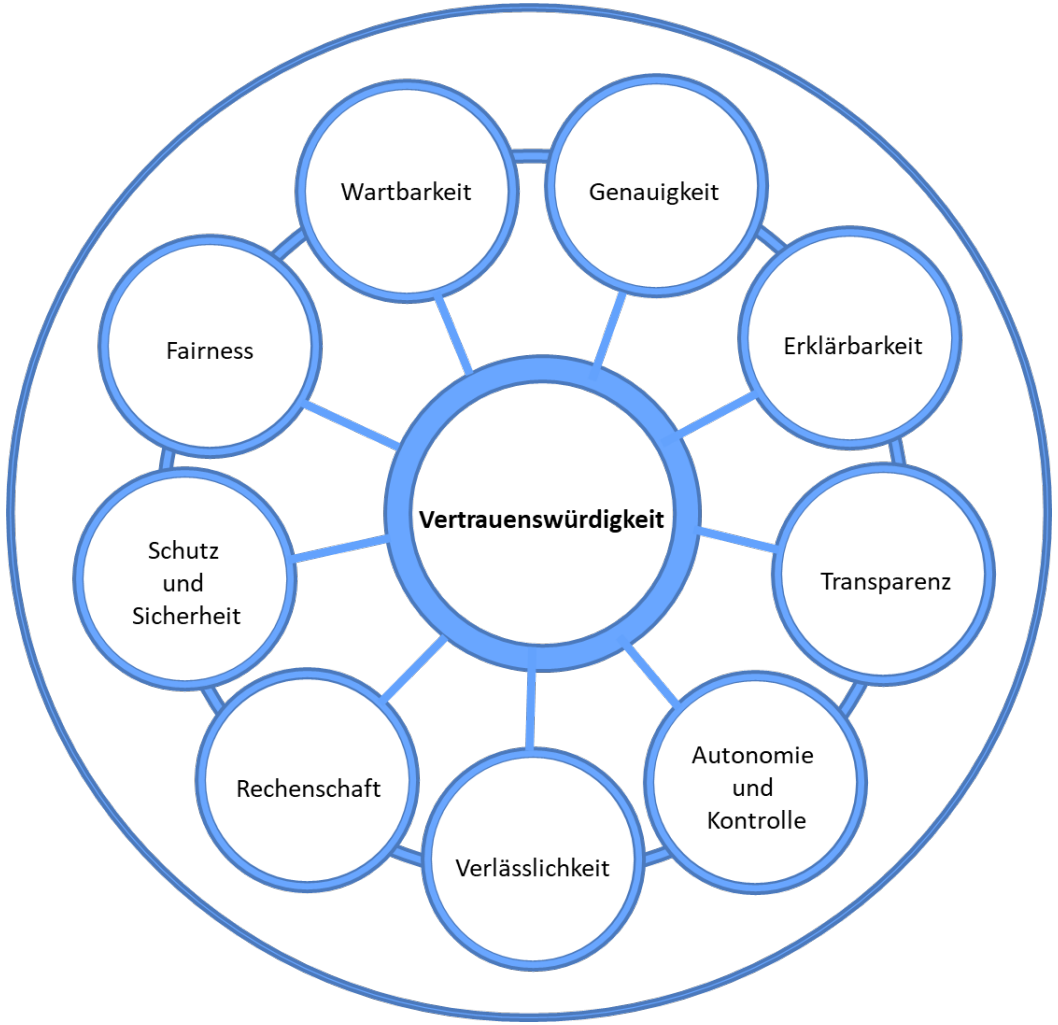
Regulierung auf der Basis von Risikoklassen

Vertrauenswürdigkeit von KI wird der Wettbewerbsvorteil der EU werden

Risikoklasse gemäß AI Act

- **Verbotene KI-Anwendungen**
- **Hochrisiko-KI-Systeme**
- **KI-Systeme mit bes. Transparenzpflichten**
- **Sonstige**

Erfolgsfaktor Testen & Zertifizieren



Food labelling as an example how to create trust

Conformity assessment (1/2)
Without and with notified bodies

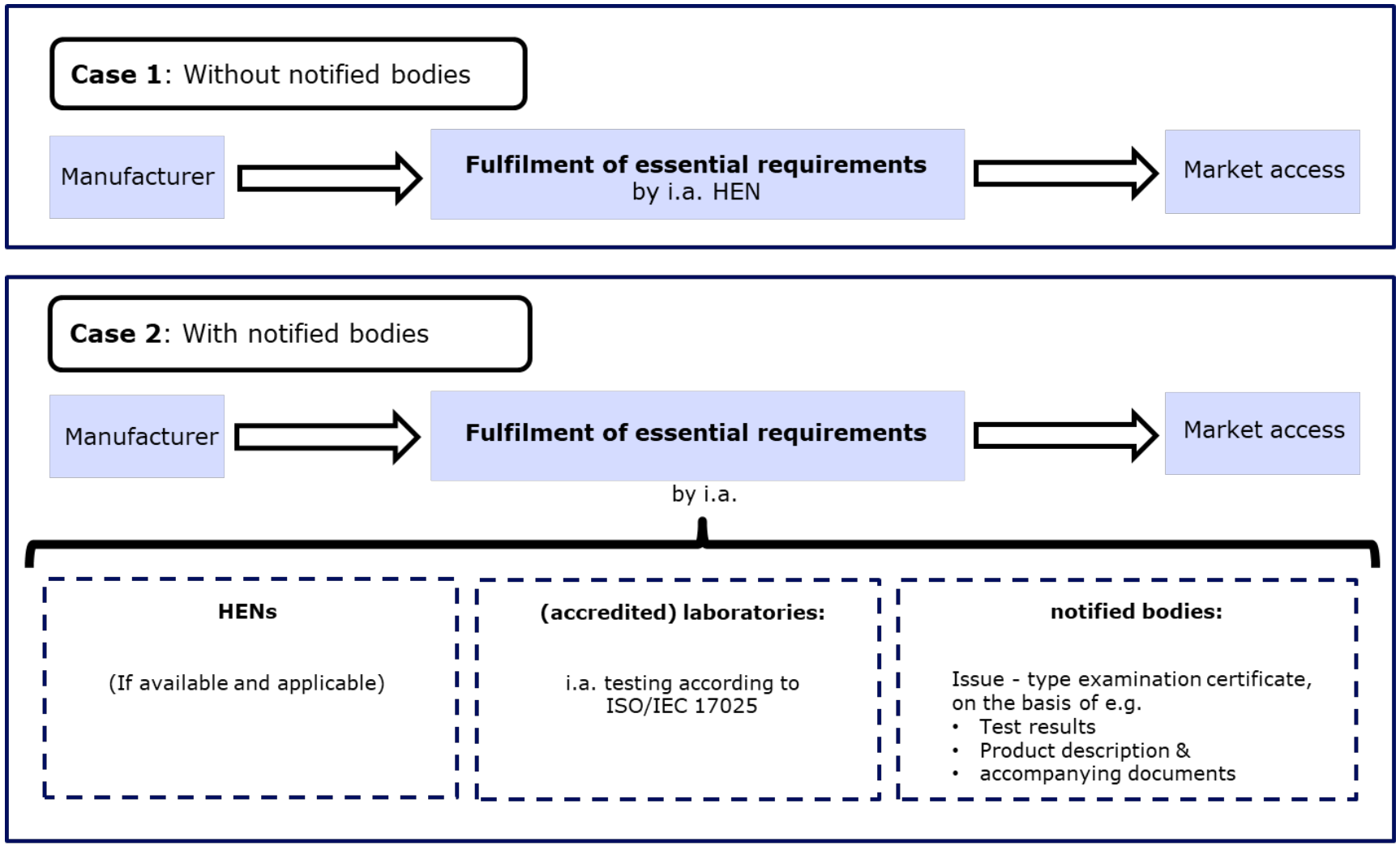


Figure 16.2: Conformity assessment without and with NoBos.

Conformity assessment and market surveillance

"step-by-step" requirements

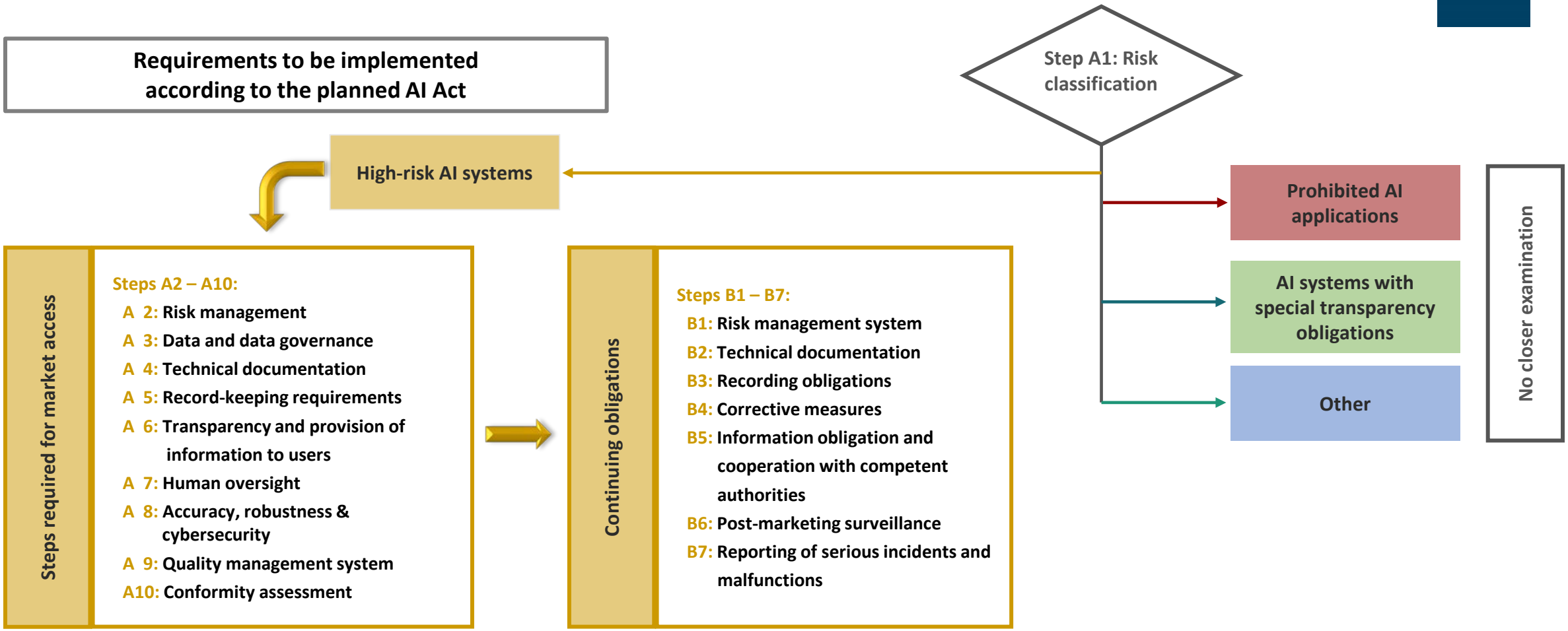
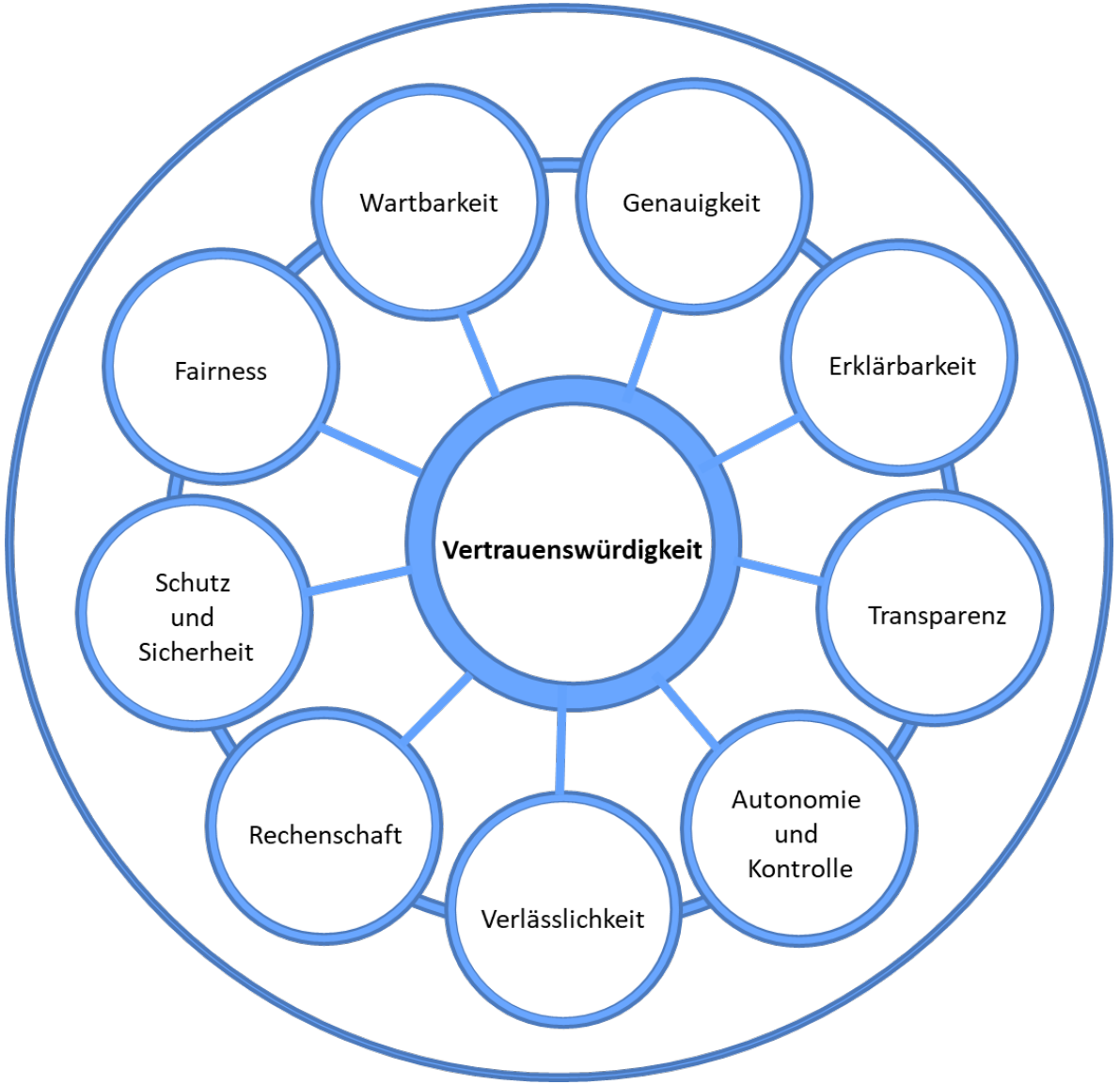


Figure 17.1: Step-to-step guide for implementing the requirements of the planned AI Act according to [1].

Vertrauenswürdigkeit von KI ist erfolgsentscheidend



Food labelling as an example how to create trust

Aktueller Kenntnisstand und Nutzung von KI

Kenntnisstand zum AI Act

- Hoch
- Mittel
- Gering

Reifegrad KI Anwendungen

- Hoch (im produktiven Betrieb)
- Mittel (in Vorbereitung)
- Gering/keine

→ In welchem Bereich/Branche?

Kompatibilität/Konformität Ihrer Prozesse mit dem AI Act

- Ja
- Nein
- unsicher

→ Weil, ggfs. Kommentar

2. AI labels, transparency & norms as competitive advantage

Example 1 - AI solution

AI in shipping (Fraunhofer CML)

Figures 2-5: Typical tasks and roles for the crew composition on a ship.

Methodenspektrum: Klassische KI

FELD	DISZIPLIN	METHODEN	BEISPIELE
KLASSISCHE KÜNSTLICHE INTELLIGENZ	Problemlösen	Direktes Problemlösen	Ableitungen
			Formeln
			Exakte Zuordnung zu bekannten Problemen
		Suchmethoden	Breitensuche
			Tiefensuche
			Bidirektionale Suche
			Simplex A*
			MiniMax
	Optimierung	Nicht-heuristisch	Branch & Bound
		Heuristisch & Meta-heuristisch	Gradientenabstiegsverfahren
			Evolutionäre Algorithmen
			Genetische Algorithmen/ Programmierung
			Schwarmintelligenz
			Simulated Annealing
		Stellvertreter-Optimierung	Stochastische Modellierung
			Bayes'sche Optimierung
		Hyperheuristisch & hybrid	Hyperheuristiken
			Memetische Algorithmen
	Planen & Planerkennung	Autonomes & Semiautonomes Planen	Steady State Search
			Planungsgraphen
			Hierarchisches Planen
			Nicht-deterministisches Planen
			Zeit- & Ressourcen-Planung
			Plan-Generierung
		Planerkennung	Abduktive Planerkennung
			Deduktive Planerkennung
			Bibliothek-basierte Planerkennung
			Synthese-Planerkennung
	Entscheiden	Singuläres Entscheiden	Entscheidungsnetzwerke
			Entscheidungstheoretische Expertensysteme
		Sequentielles Entscheiden	Spieltheorie
			Markov-Entscheidungsprozess

AI-assisted crew planning

Efficient crew planning is crucial for ship management companies aiming to op-timize the operation of their fleets both in terms of time and cost. Compliance with international regulations and effective fleet management necessitate a diverse crew with various roles and experiences. Additionally, factors such as border regu-lations, crew rotation, travel logistics, and required vacation times must be taken into account.
To address these complexities, an AI sys-tem is employed to strategically allocate ship crews across different time frames. By leveraging advanced algorithms and machine learning, this AI system stream-lines planning processes, ensuring both time as well as financial resources are optimized. The application aims for fostering well-being of crew members and facilitating effective time management for both ship utilization and crew vacations.

Focus on legislations/standards:
STCW convention, IMO: MSC.373(93), MSC.486(103), MSC.487(103);
SOLAS, Oil Polution Act.

Manufacturer: Fraunhofer Center for Maritime Logistics and Services CML

Application: Improving crew productivity while efficiently meeting crew needs

Capability	Method	Data
	1st step	
Process Knowledge > Factual > Procedural	**Machine Learning** > CNN	**Training Input:** Historic data of ship routes and crew scheduling. **Training Output:** Crew planning model (input for 2nd step) **Model Inference Output**: Rough crew plan
	2nd step	
Process Knowledge > Factual > Procedural	**Traditional AI** > Linear Optimization	**Model Input**: Rough crew plan **Model Output**: Optmized crew plan according to requirements (personal needs, legislation, …)

Data protection provisions:
Confidentiality, integrity and availability of crew, ship and business data are ensured as the application runs on site by the application owner, fulfilling legal requirements.

Risk: Very Low

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TRUSTWORTHY SCORE

Example 2 - AI solution

Building Recognition with AI: State Office for Geoinformation and Land Surveying of Lower Saxony (LGLN)

Recognition of buildings and outlines

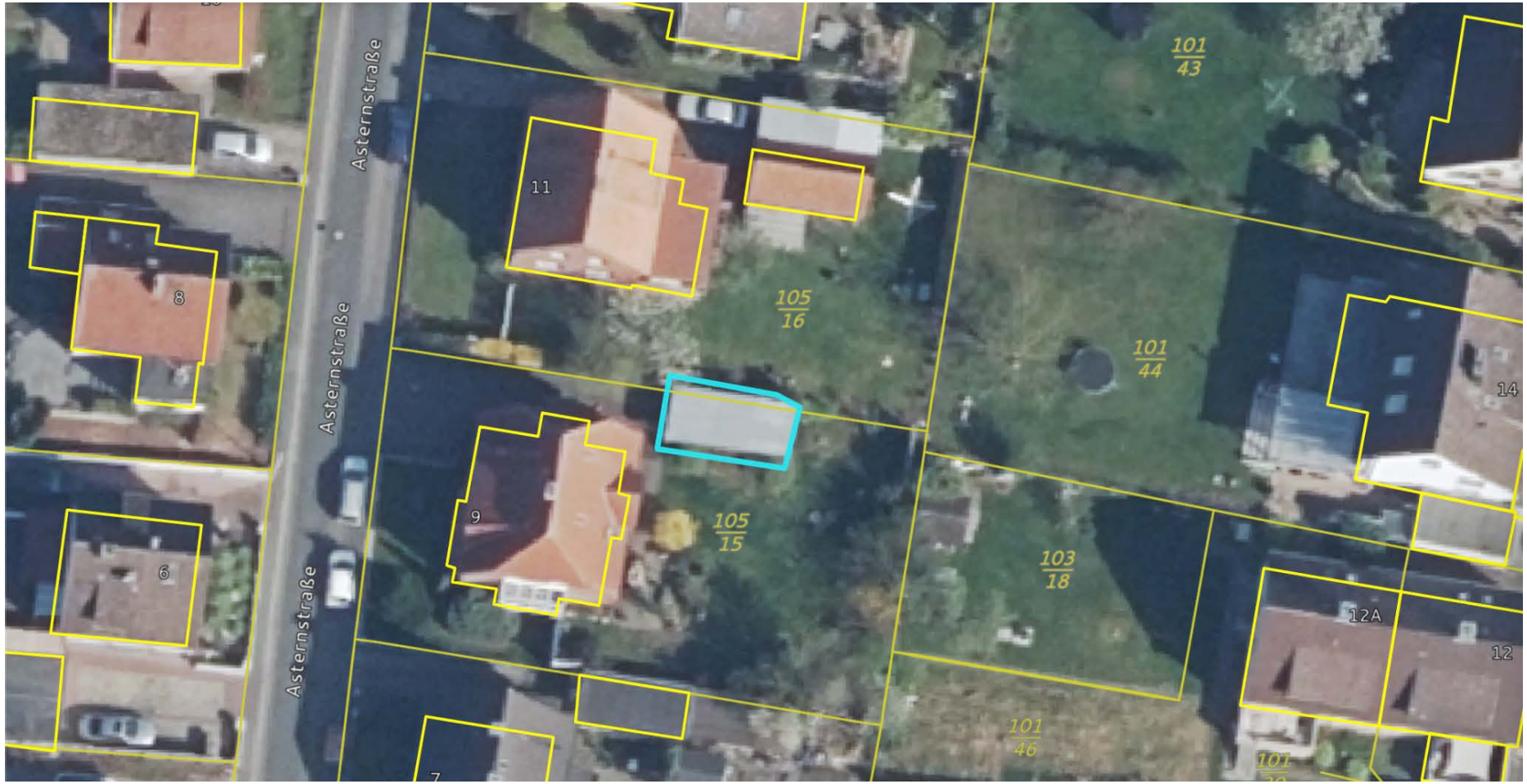

Figure 11.1: Use case for AI: Find the few missing buildings (here a garage in blue) in thebuildings (here garage in blue) in the mass data of the real estate cadastre(buildings and parcels in yellow).

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Automatic correction of the digital map

Figure 11.5: Automatic calculation to correct (green circles and arrows) the historical data (yellow) using the arrows) of the historical data (yellow) using object recognition (blue).

KI-Matrix: Methoden-Fähigkeiten

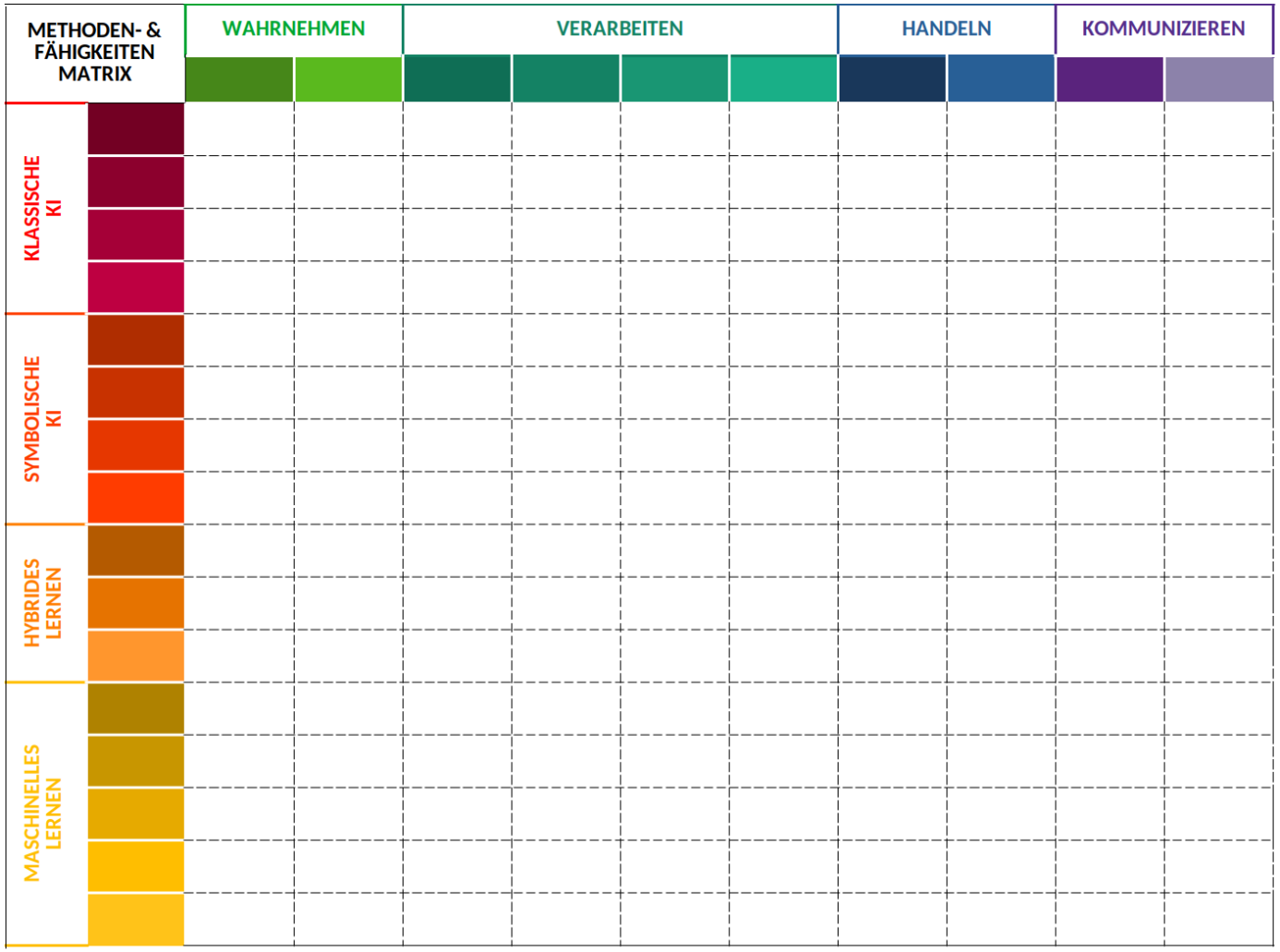


Figure 5.3: Two-dimensional representationof AI methods and AI capabilities.

AI Matrix: Methods-Capabilities-Criticality

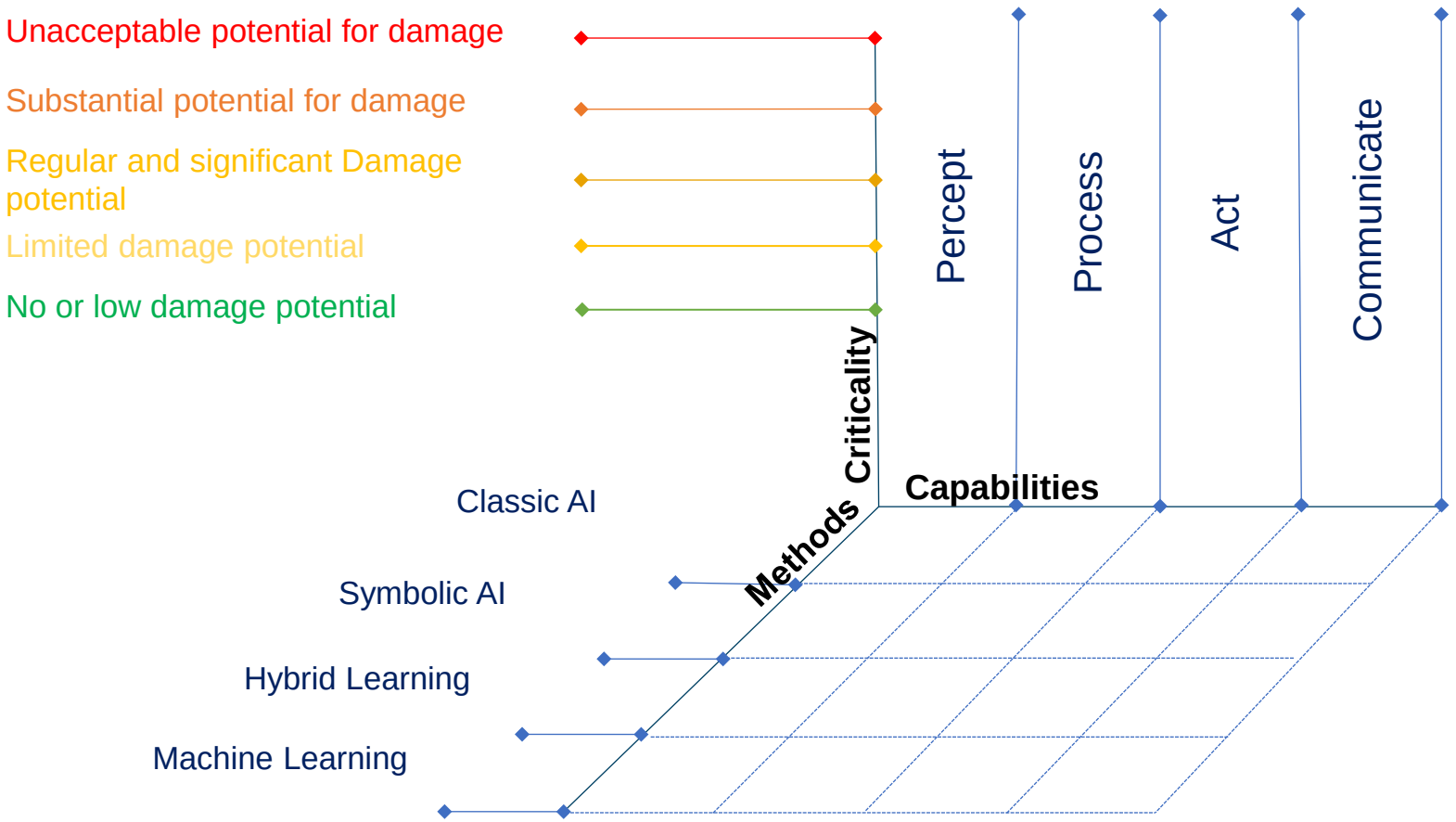


Figure 5.4: Three-dimensional representation of the AI=MC² taxonomy.

Artificial Intelligence

The AI model recognises objects on satellite images. The model is trained on building locations, building outlines, building types and other building properties.The satellite images are composed of different sensor data: optical images, lidar images.

DIN Standard 4711.4711
CE – AI Label V.0

Manufacturer: LGLN
Model version: V2.3 aus 2022

Application: Object recognition on aerial photographs

Capability	Method	Data
Percept >External >>See	**Machine Learning** >Supervised Learning >>Neural Network	**Training input:** known quality-checked satellite images (optical, infrared) and lidar data Operational data: unknown images
Process >Facts >>Select >>Verify	**Machine Learning** >Supervised Learning >>Neural Network	Building location ,+-xx cm, Building outline ,+- yy cm
Act		
Communicate		

Risk: Very Low

DIN

TRUSTWORTHY SCORE

2 – KI Anwendungen der Teilnehmenden

Was für (geplante) KI Anwendungen sind für Sie relevant?

Bild/Computer Vision

Text/Sprachmodelle

Zahlen/Daten/Vorhersagen

2 – Beispiele für Wettbewerbsvorteile durch AI lables und AI norms

Wie kann das Vertrauen der Kunden in ein Produkt/Service oder dessen Sicherheit zu erhöht werden?

Wie können Sie Vorteile/Wettbewerbsvorteile daraus ziehen?

Welche Herausforderungen können bei der Einführung von KI Labeln und Normen auftreten?

Welche Herausforderungen gab es bei ähnlichen Themen/Labeln?

3. AI Testing as success factor

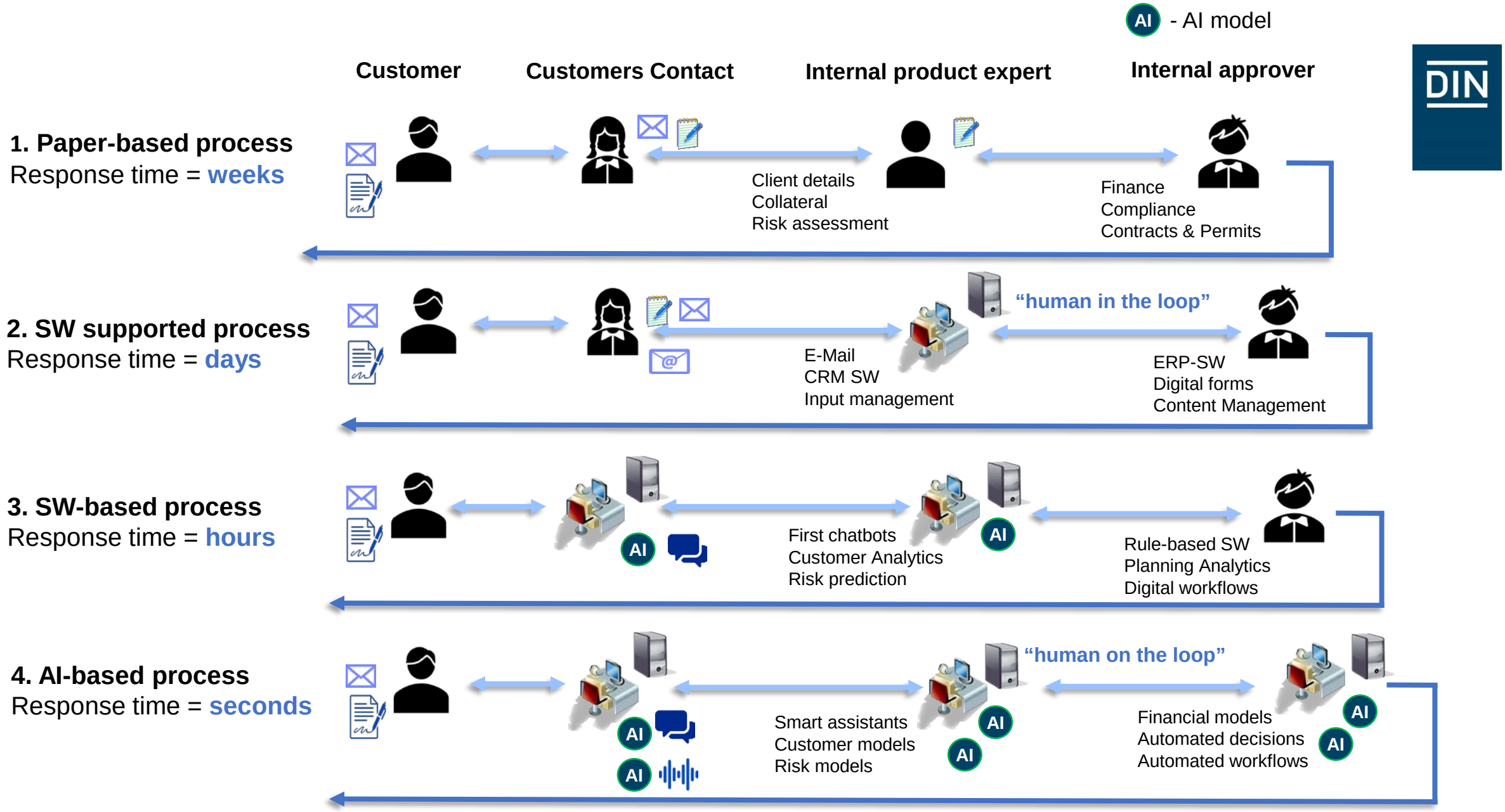


Figure 3.1: Example of a typical transformation process towards AI-supported automation: the bank use case "loan for homeowners".

Cycles: AI development and operation

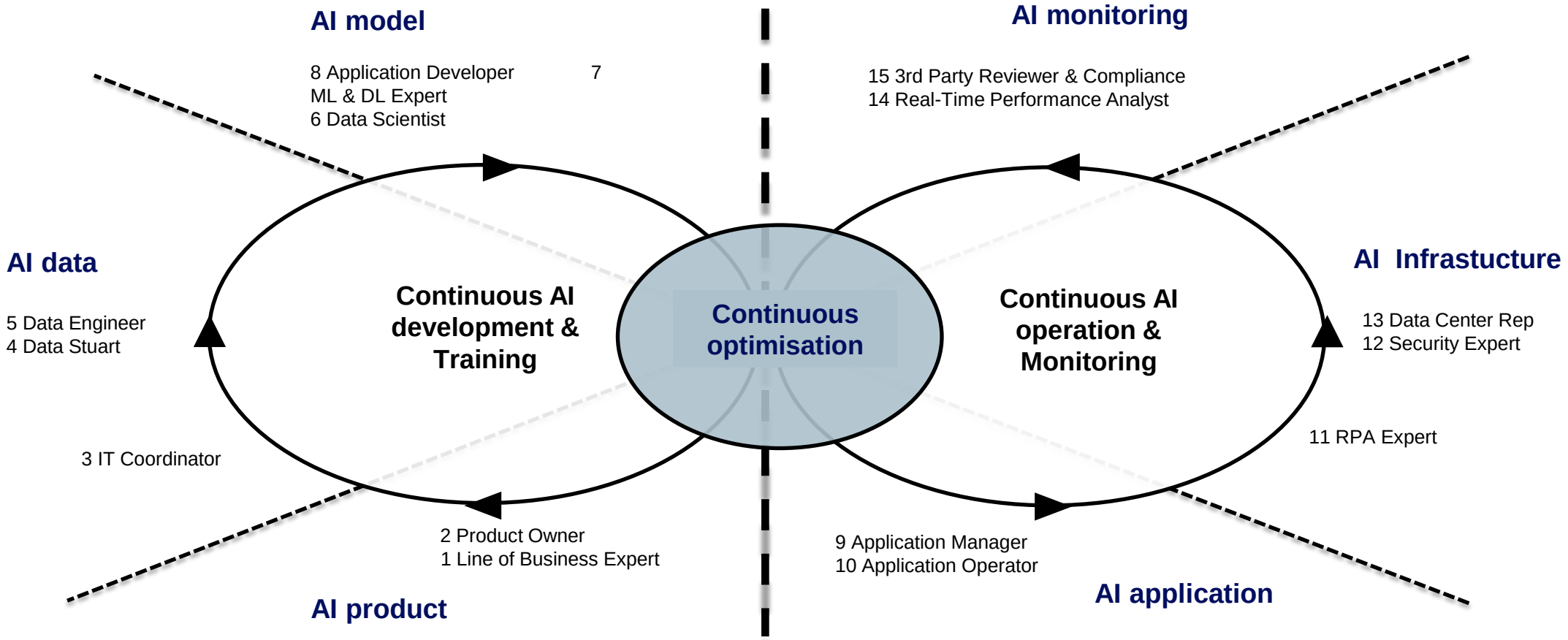
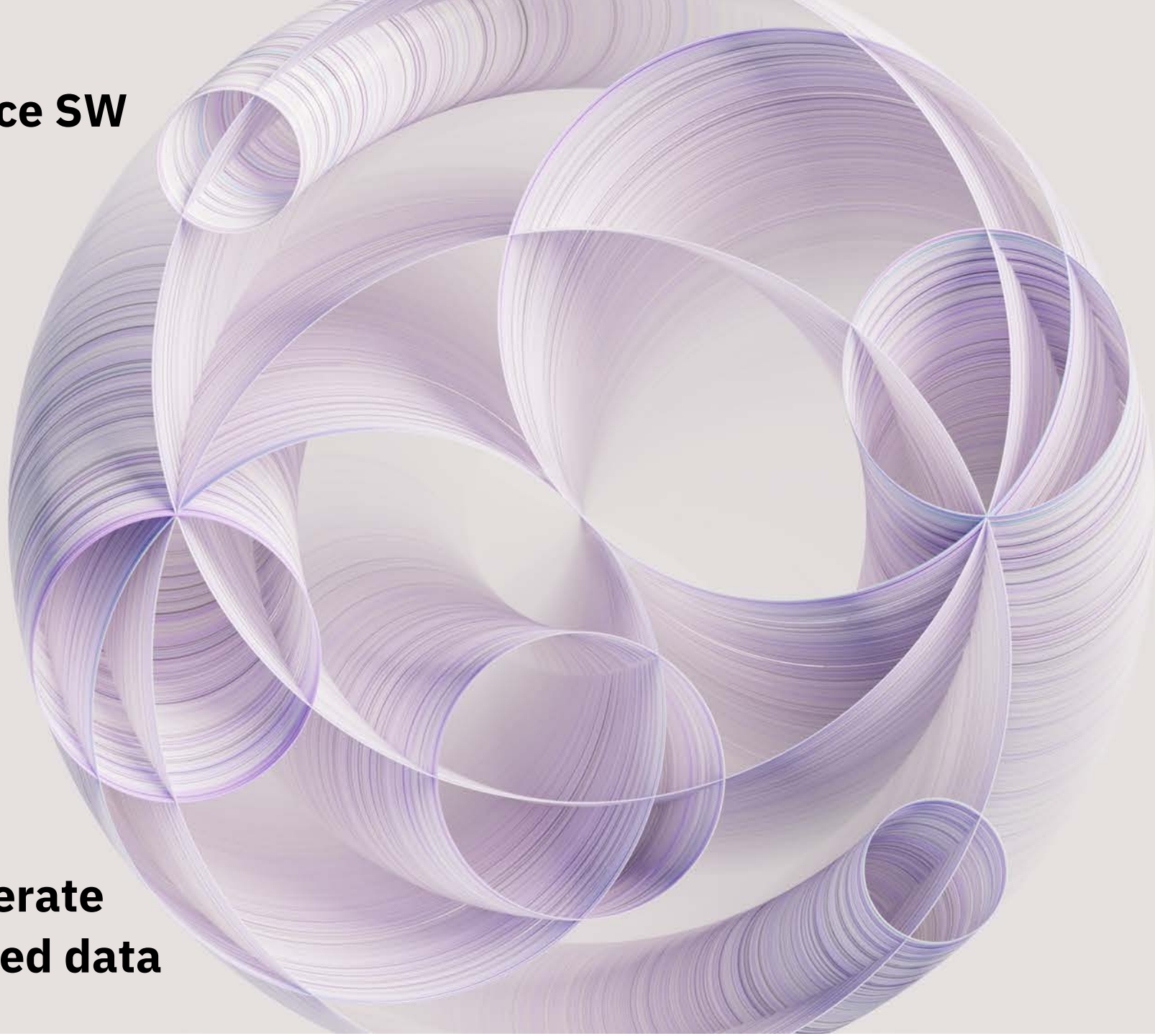


Figure 3.2: Life cycle of an AI application and relevant workflows.

IBM watsonx & open source SW

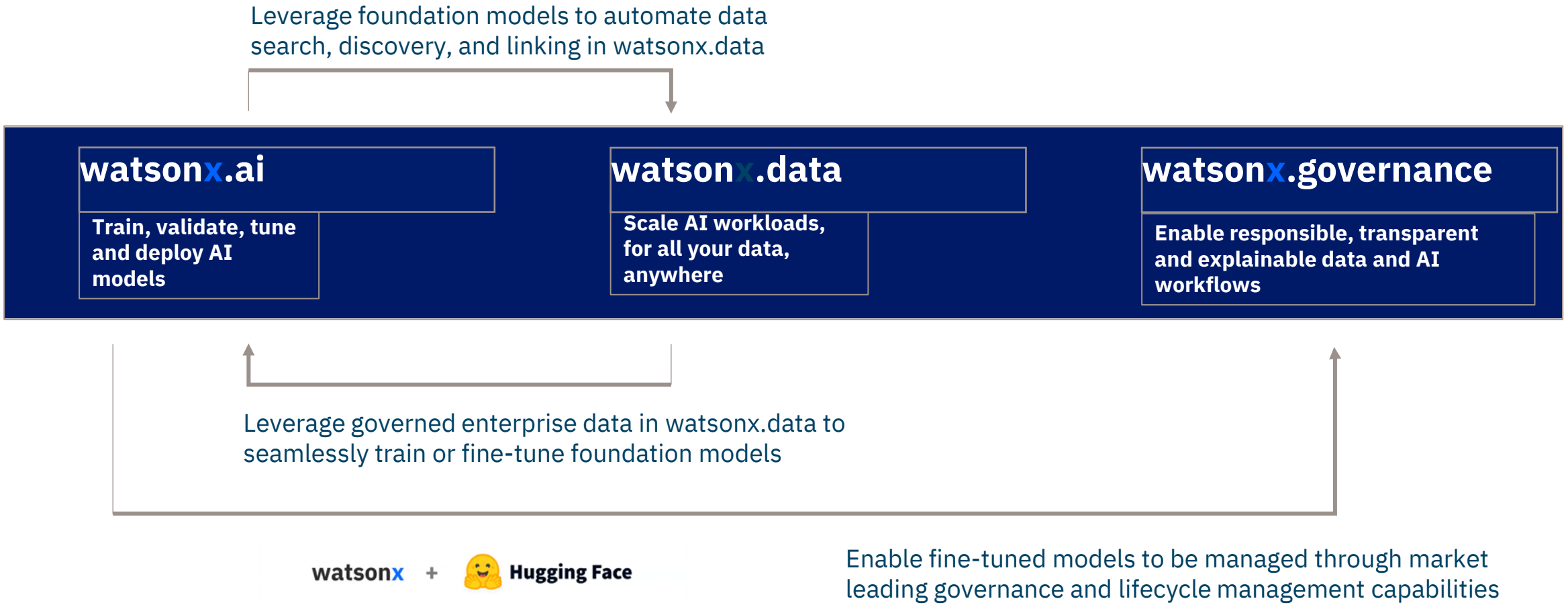
Elements of the platform



Scale, test & run
AI & Foundation Models
customize them and accelerate
the impact of AI with trusted data

Put AI to work with watsonx

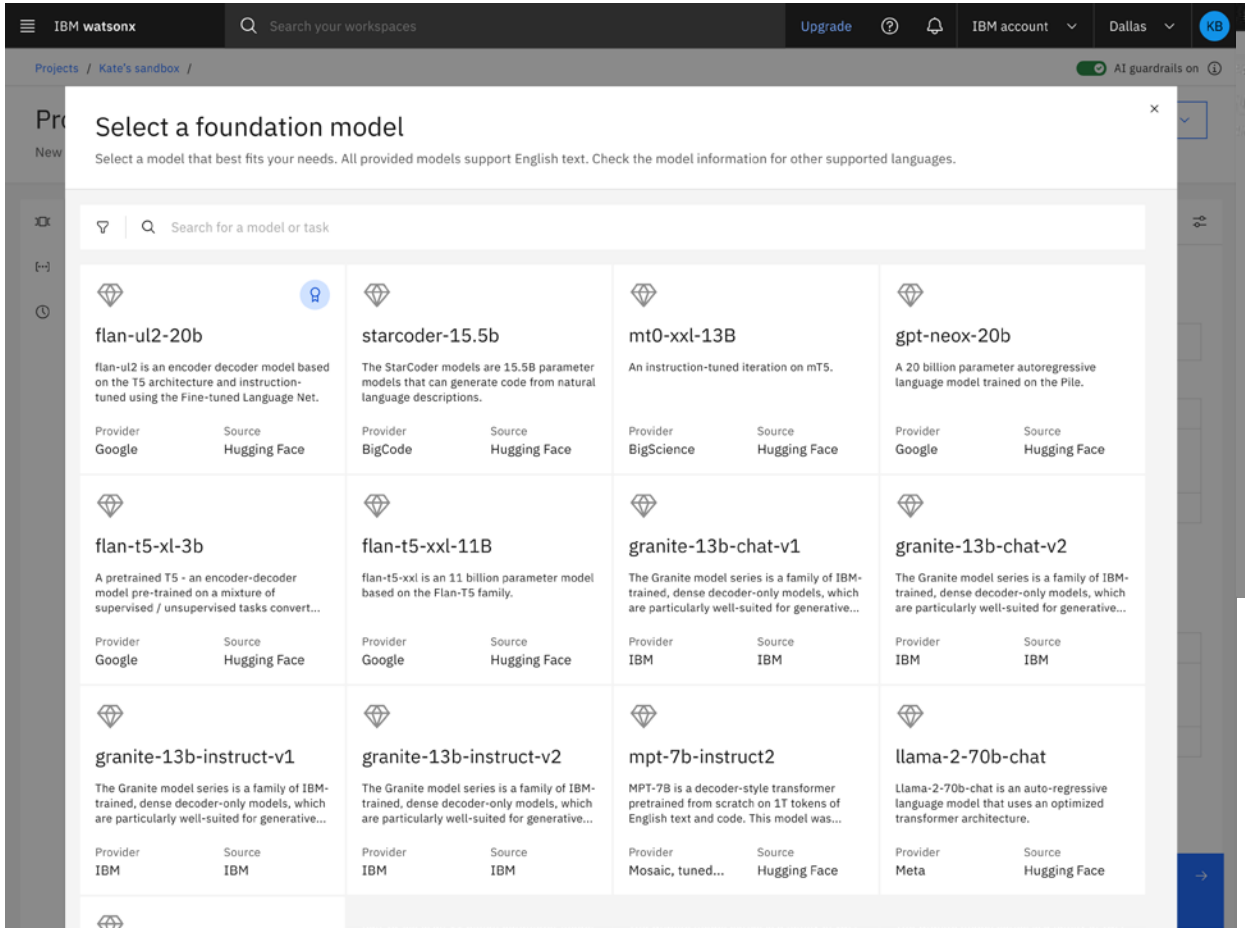
Scaling and accelerating the impact of AI – including FM`s - with trusted data.



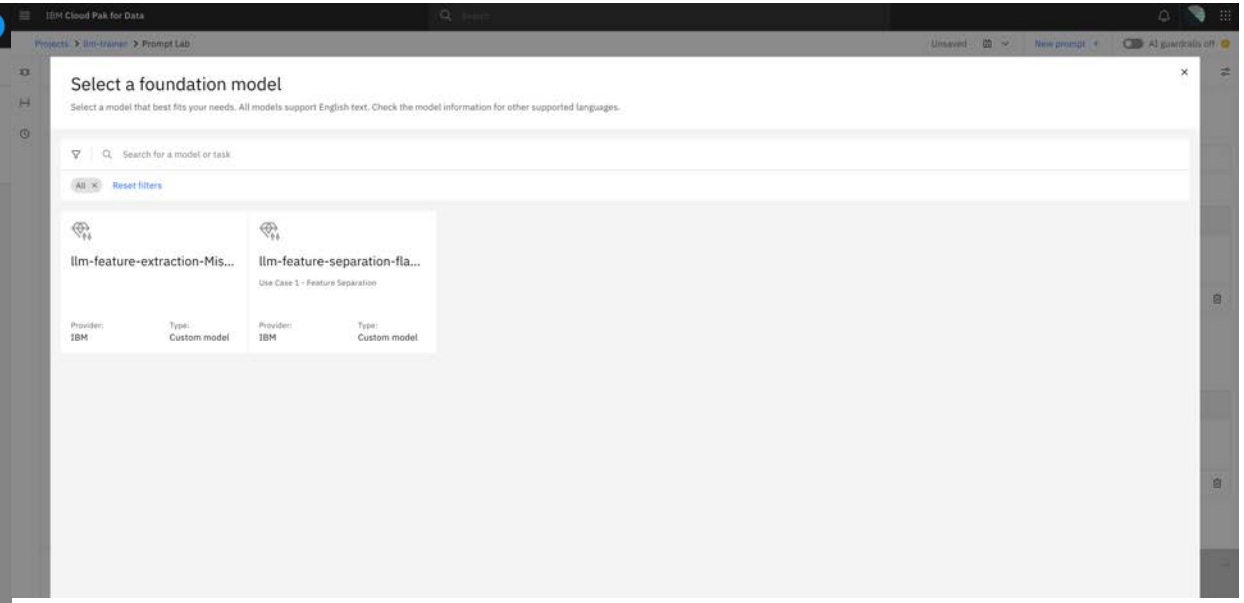
Watsonx.ai

building, training, validating, tuning and deploying AI models

Multi-model & Multi-Cloud



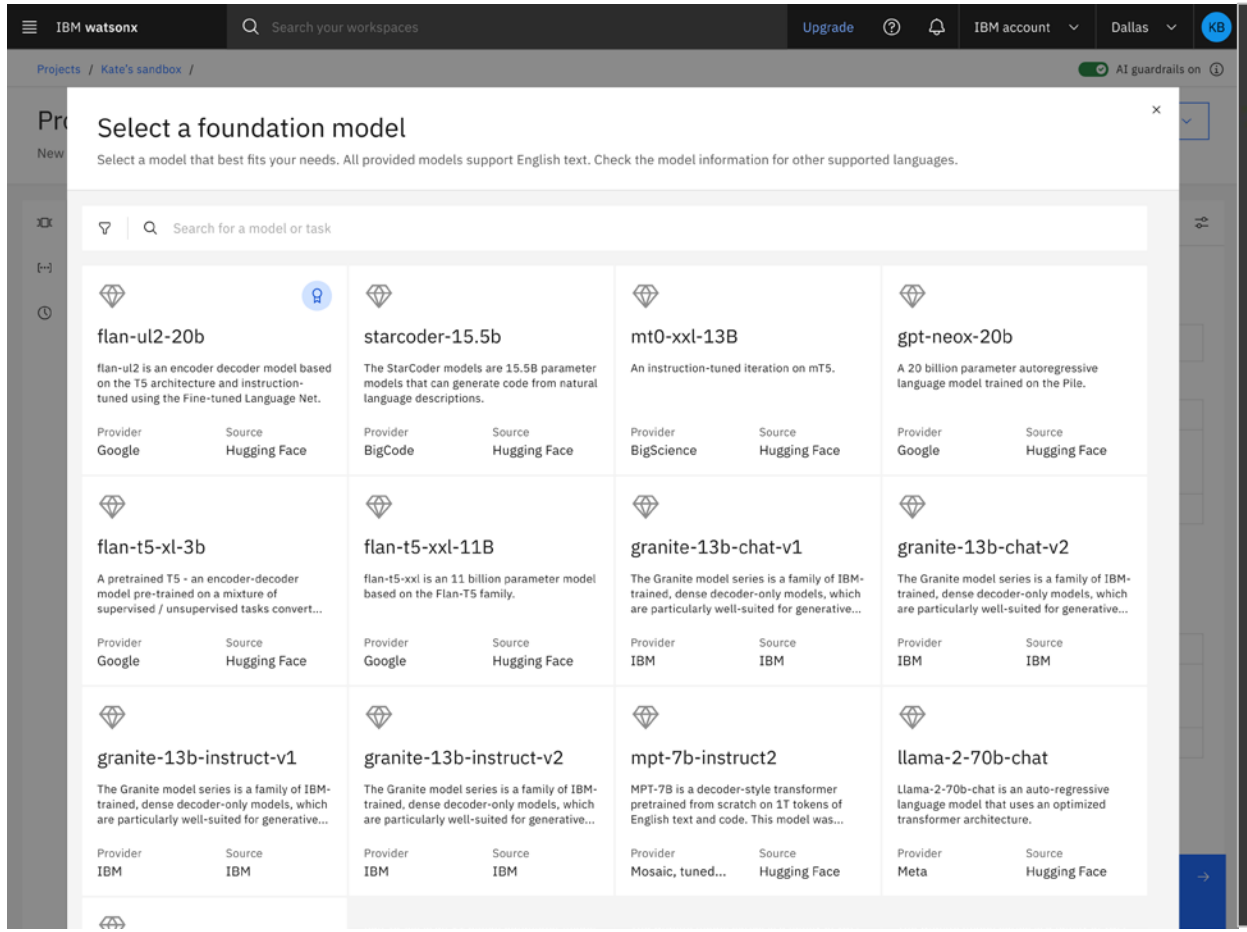
Own customized models & MLOps



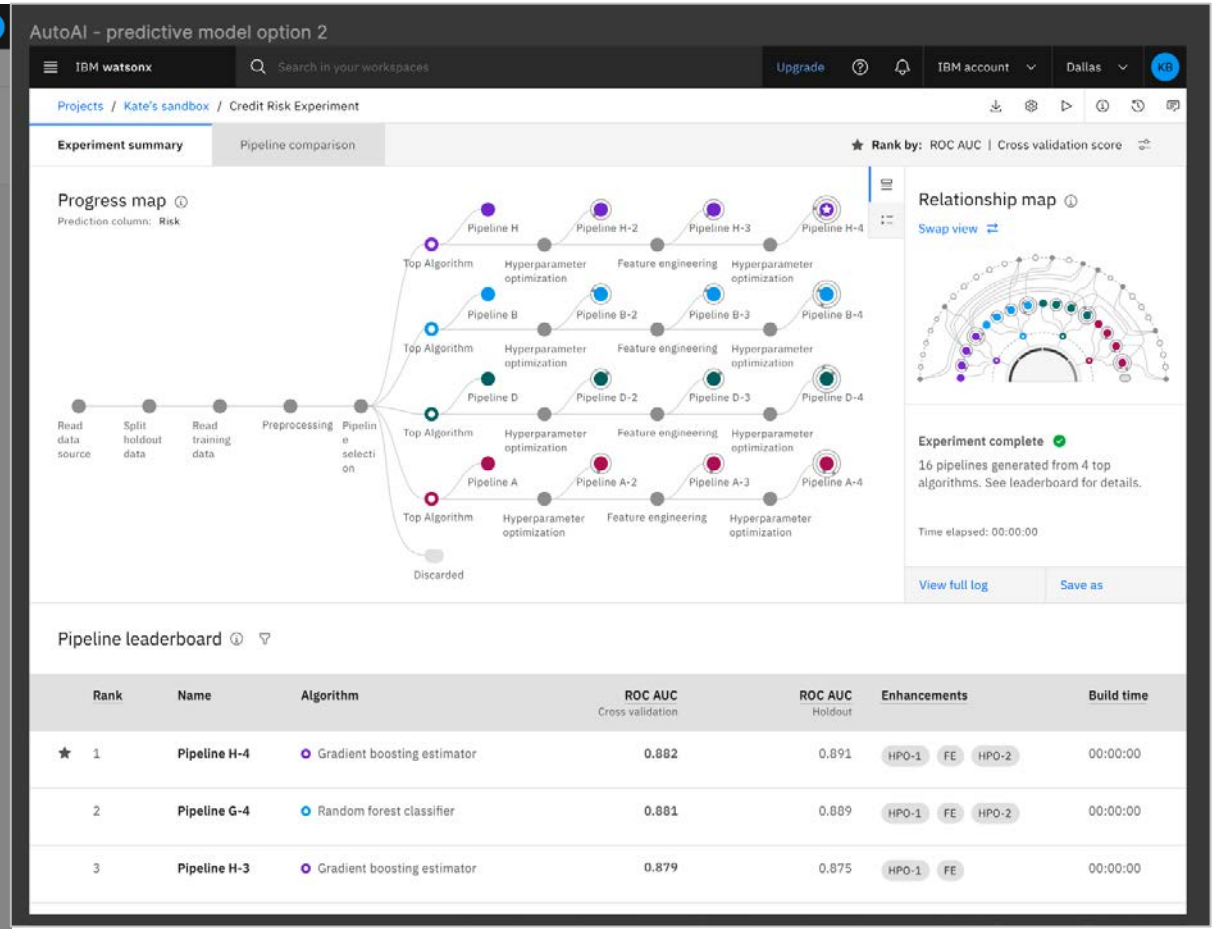
Watsonx.ai

building, training, validating, tuning and deploying AI models

Multi-model & Multi-Cloud



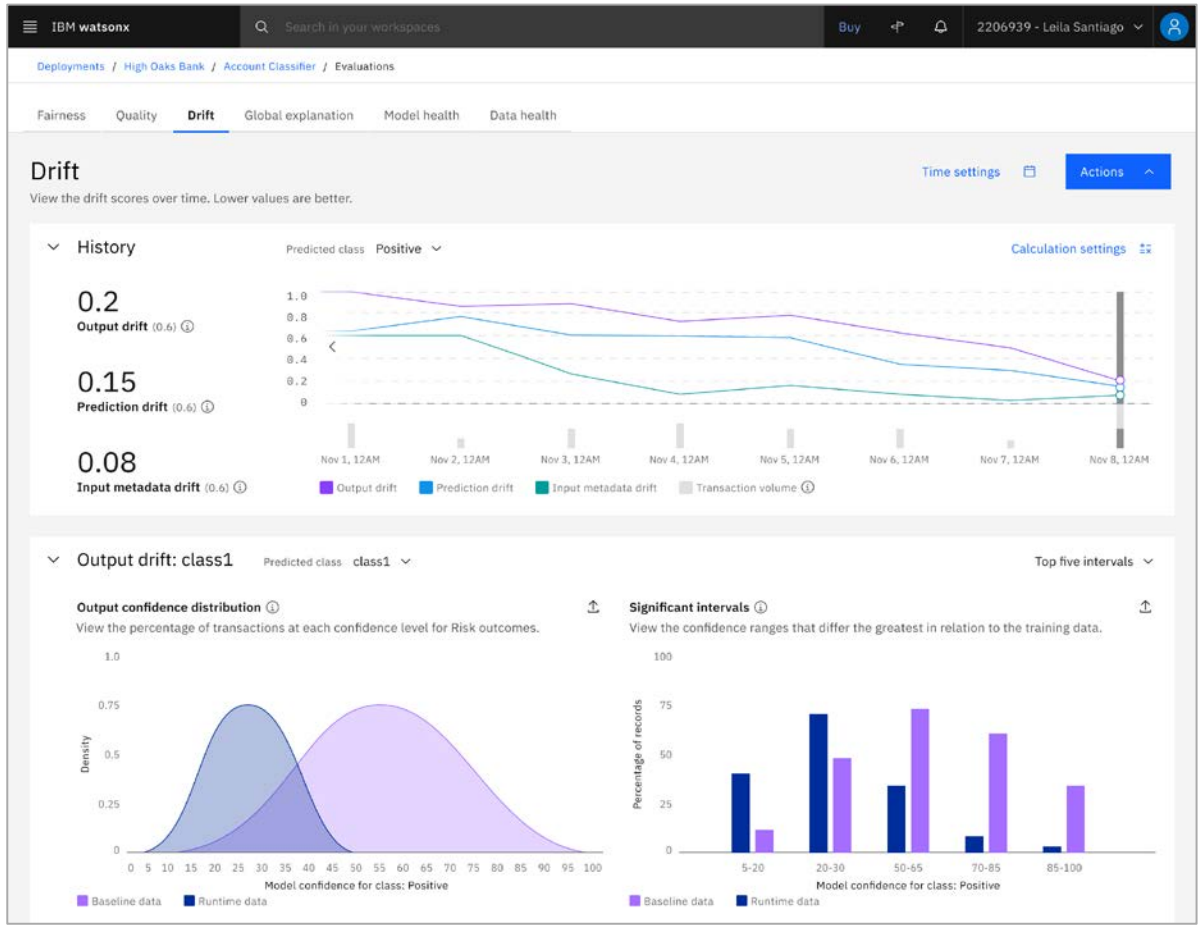
Data Science & MLOps



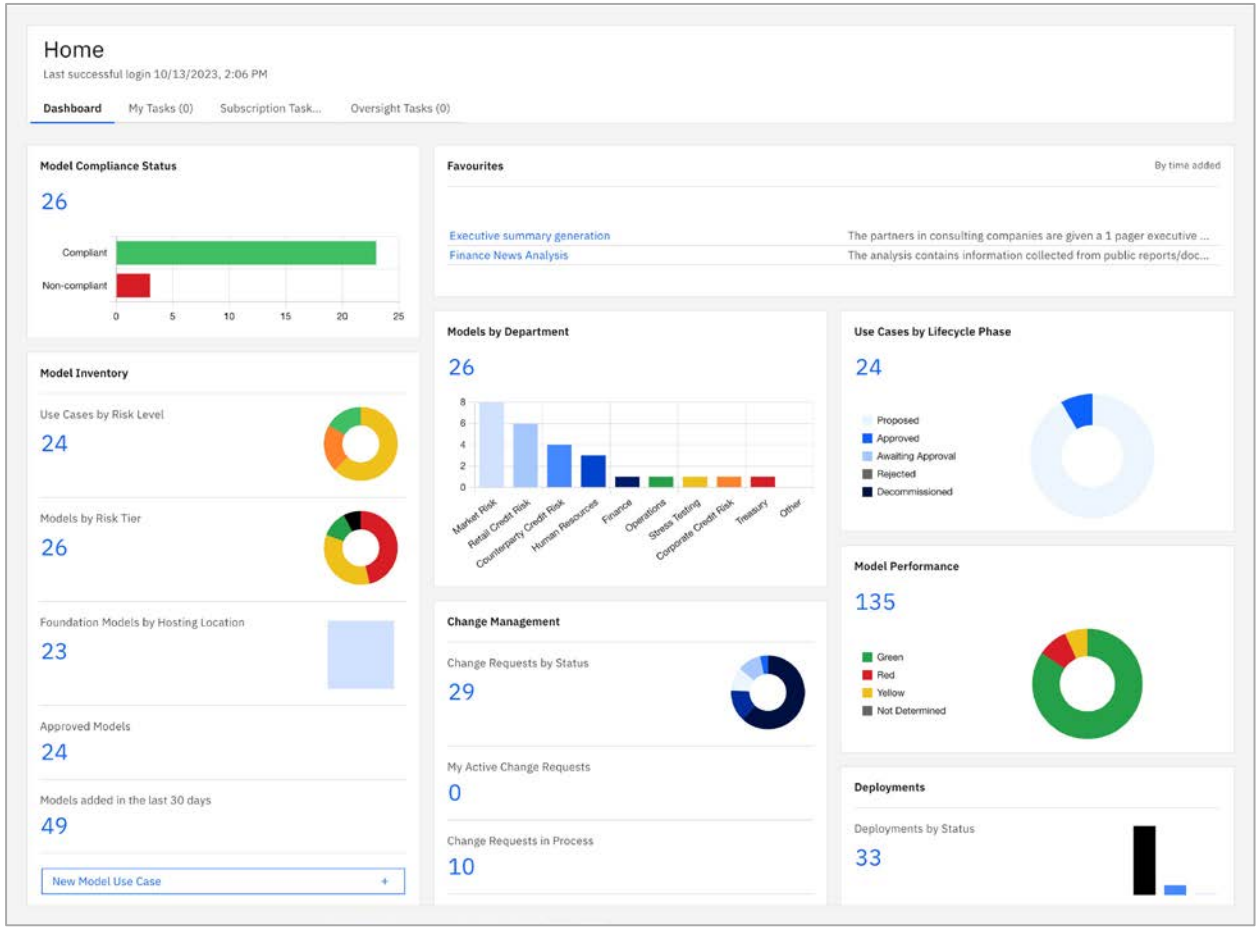
Watsonx.governance

controlling the performance of your models & AI governance via dashboards

Evaluation and monitoring



Manage risk and best practices



Important aspects of an AI ecosystem from any Organisation

Every societal partner should participate:

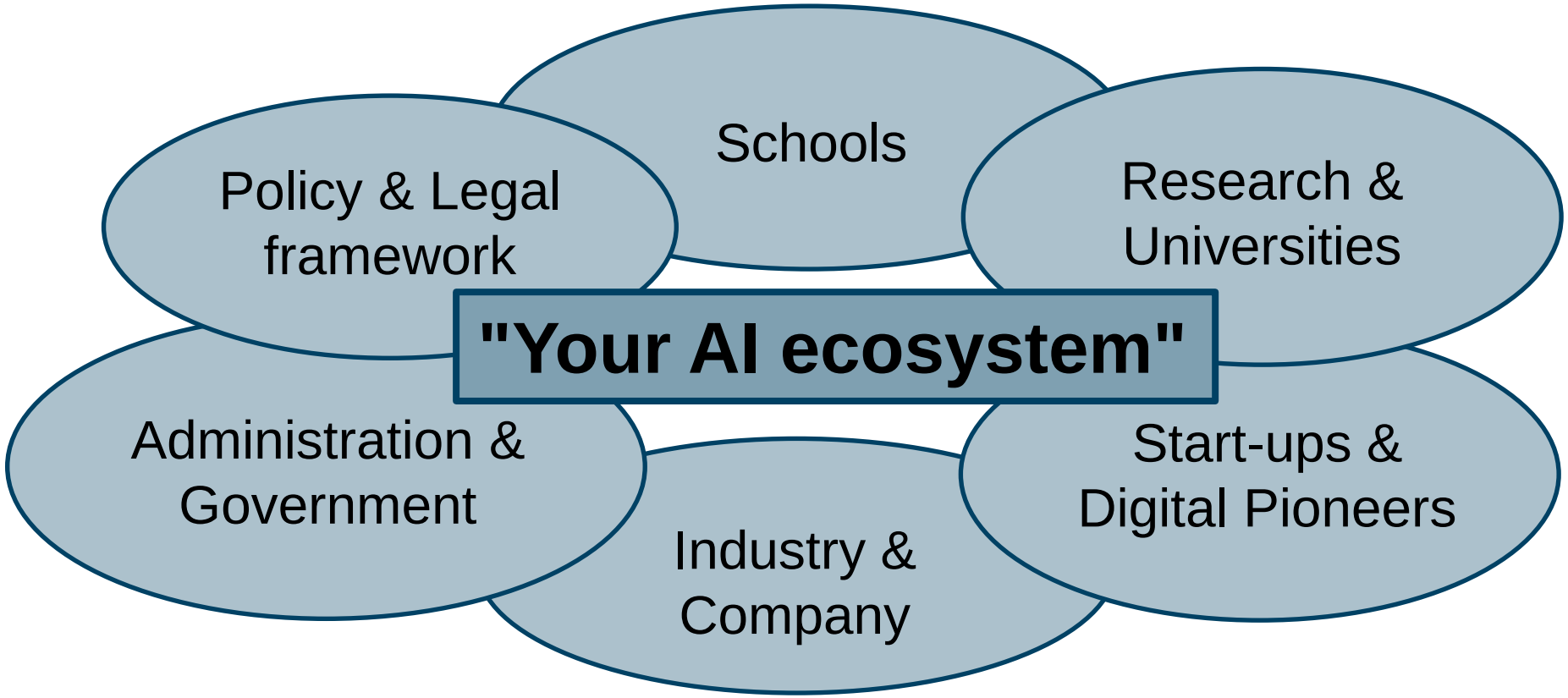


Figure 4.3: An AI ecosystem should involve every societal partner,that matters.

Hochrisikoanwendung & Testing

Wenn Sie eine High-Risk KI-Anwendung haben, wie testen Sie diese?

	Herausforderungen/Probleme	Chancen/Vorteile
Vor Betrieb		
Im Betrieb		
Nach Betrieb		

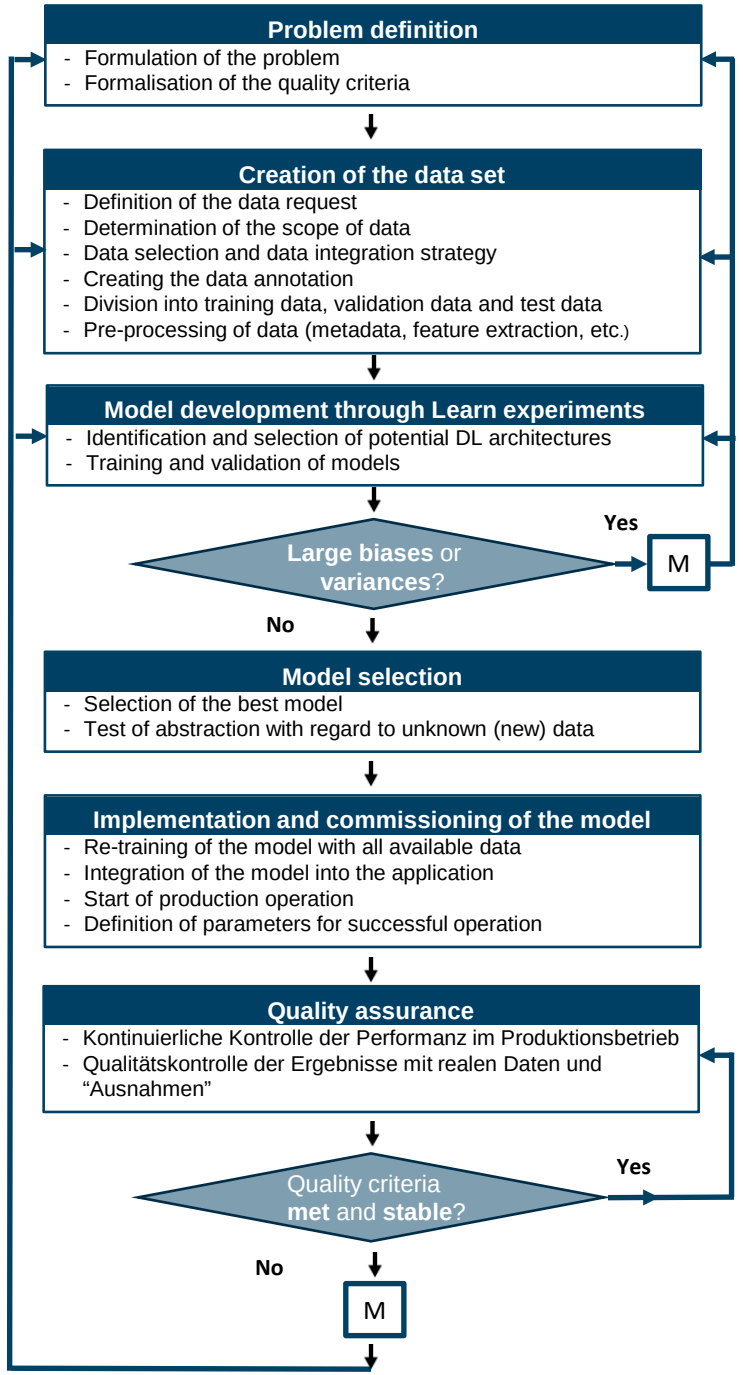
4. Example of Application of the EU-AI Act using AI norms to create advantage

Image recognition in medicine
Help with diagnosis

Figure 18.2: AI-assisted analysis of medical image data.

Image recognition in medicine
Help with diagnosis

Figure 18.3: Flow chart for the development of a deep learning systemof a deep learning systemaccording to **DIN SPEC 13266**.



M **Management decision**

Q **Regular quality assurance loop**

4 – KI Normen als Wettbewerbsvorteil

Was muss passieren, damit die Nutzung von KI-Normung Wettbewerbsvorteile bieten kann?

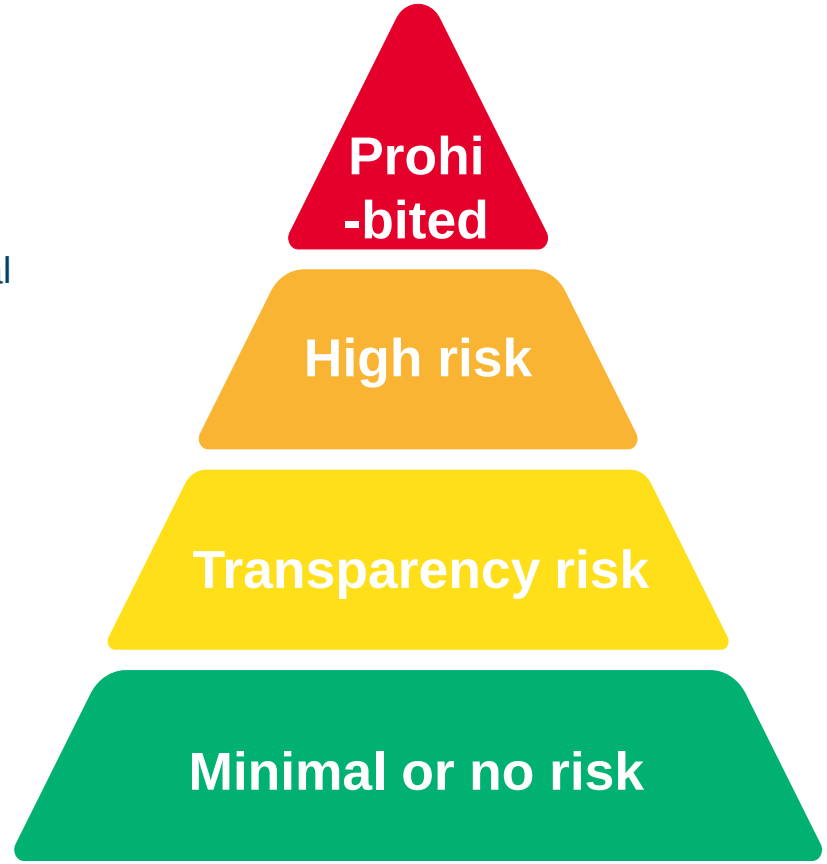
Welche offenen/ungelösten Fragen gibt es zum EU AI Act?

5. Implications of risk class according to the EU AI Act

Prohibited

Examples

- Systems that deploy subliminal techniques to manipulate users.
- AI systems used for social scoring by public authorities.
- AI systems used for real-time biometric identification in public spaces (with certain exceptions for law enforcement).



Due Diligence of the adopter/user

Adopters are not allowed to use or adopt these systems at all.

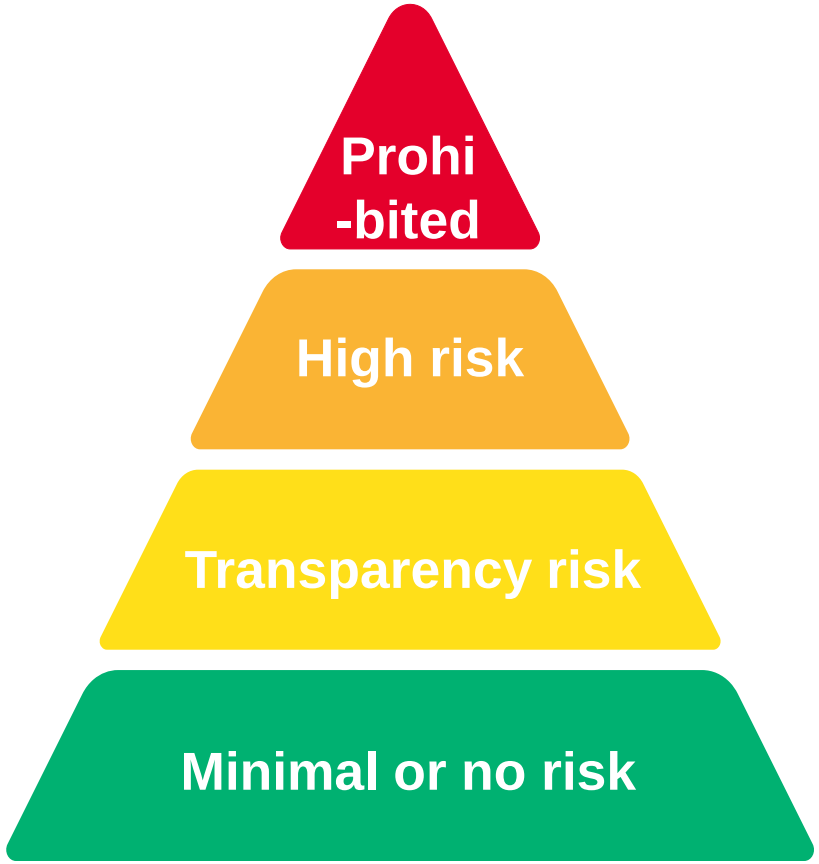
Any engagement with such systems is illegal under the AI Act.

Organisations must ensure that they do not inadvertently deploy prohibited systems by conducting thorough compliance checks.

High Risk

AI used in

- critical infrastructure
- Education
- Employment
- essential public and private services
- law enforcement
- biometric identification



Due Diligence of the adopter/user

Risk Management: Establish systems to assess and mitigate risks throughout the AI lifecycle.

Data Governance: Ensure high-quality, bias-free datasets and maintain data integrity.

Transparency & Documentation: Keep detailed records on the system's design, development, and compliance.

Human Oversight: Implement measures for human intervention and monitoring.

Post-Market Monitoring: Continuously monitor performance to ensure ongoing compliance.

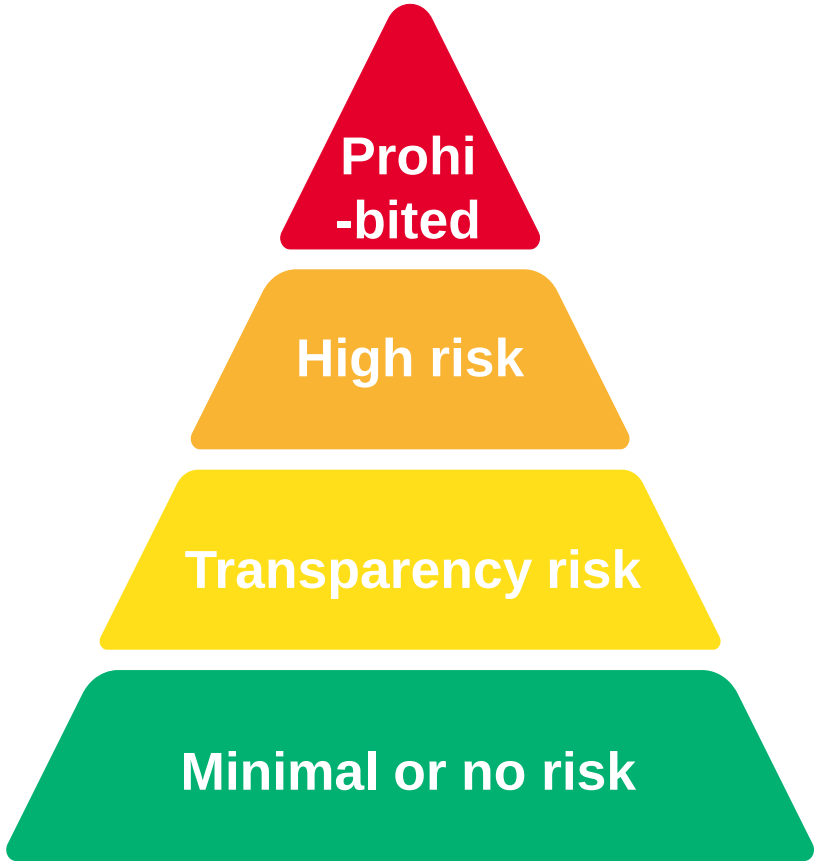
Notified Body Involvement:

- Conformity Assessment: Engage a notified body for independent audit and certification.
- Certification & Surveillance: Obtain certification and undergo ongoing compliance checks.

Transparency Risk

Examples

- AI chatbots or systems that interact with humans.
- Systems that generate deepfakes (unless they are clearly labeled).



Due Diligence of the adopter/user

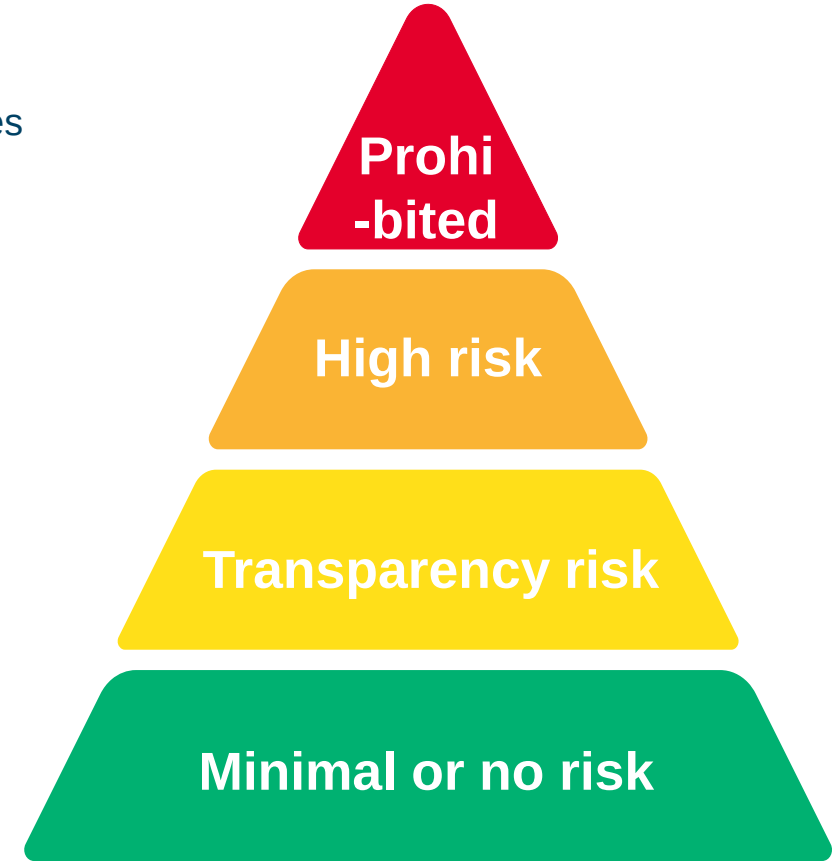
Transparency: Adopters must inform users when they are interacting with an AI system. For instance, a chatbot should explicitly state that it is AI-driven.

User Awareness: Ensure users understand that they are engaging with AI and provide necessary information for users to make informed decisions about the interaction.

Minimal or No Risk

Examples

- AI systems used in games or email filters.



Due Diligence of the adopter/user

Minimal Regulatory Obligation: No specific regulatory requirements or due diligence beyond general legal obligations (such as data protection under GDPR).

How to prepare for the EU AI Act

- Pledge to fully **embrace** the use of AI in the business.
- **Delegate sufficient authority** in regards to the management of the AI system.
- **Classify the risk level** of the AI system given its anticipated use.
- **Adhere** to all internal and external regulatory policies.
- Consider **specific risks** of the business aligned with AI application.
- Maintain **risk management** and **quality assurance** in an expanded manner.
- Focus on your competitive advantage provided by your AI systems
- Use conformity assessments and declarations to accelerate your EU GTM and sales.

KI managen und verstehen

Vertrauen durch Transparenz

https://www.beuth.de/de/themenseiten/ki