

AI Ethics at SAP

Unit 1: Introduction to AI at SAP





Introduction to AI at SAP

Course overview and learning objectives

How does it work:

- Course consists of 5 units
- Course assignment
- Discussion forum

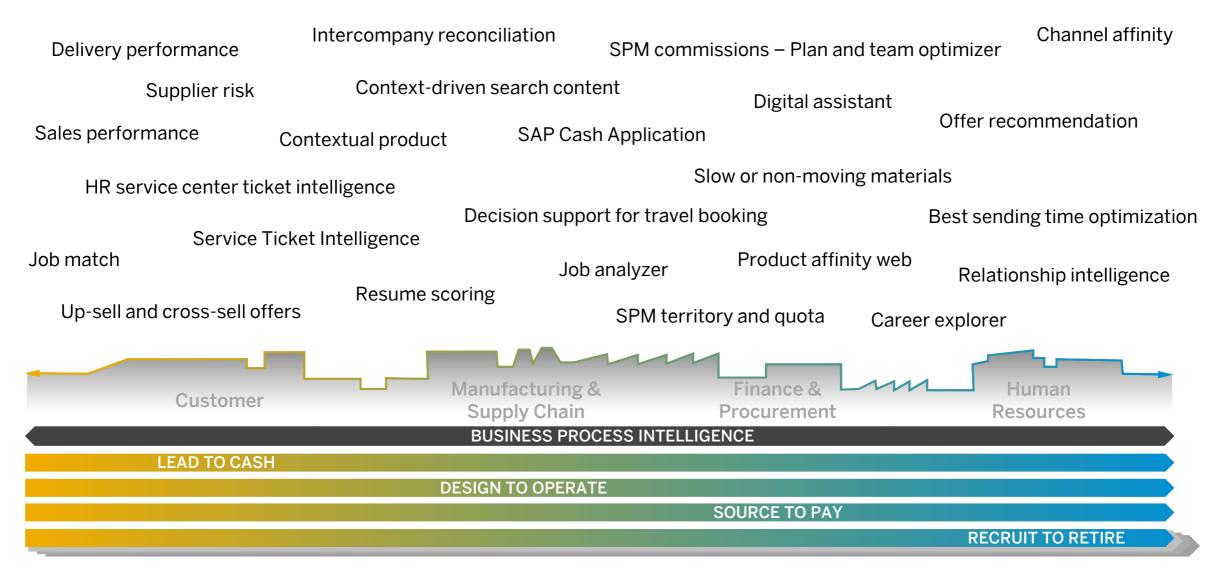
What you will learn:

- Why AI ethics is important and how it is applied at SAP
- How SAP's Global AI Ethics Policy steers AI development, deployment, use, and sales at SAP
- How SAP's Global AI Ethics Policy is integrated into SAP's AI development process
- How the risk of AI use cases is assessed at SAP





Sample AI in business processes supported by SAP software



^{*} Selection of available scenarios with embedded artificial intelligence

Use case: part identification on manufacturing floor

Parts Arrive



Machine part arrives for next steps in workflow Classify part as "PART_1729"



Classification

Part Matching



Match parts in the material master table to get accurate results

Manually or automatically categorize parts





Categorization

Solution Results







Accurate matching and categorization of parts



Business Challenge

- Machine parts are delivered to the shop floor
- Parts need to be manually segregated to subsequent tasks
- Leads to delays, errors



Solution

- Image Classification
- Train image classification model and deploy for inference
- Part Matching with Material Table
- Automatically predict parts and match with material master to ensure accurate results



Benefits and Value

- Minimize error-prone tasks on the manufacturing floor
- Provide faster machine part segregation with lower error rate
- Improve process efficiency

Use case: intelligent candidates' resume screening



different formats

Extract text and detect language automatically



Business Optical Character Recognition

Business Entity Recognition



Extract recruitingrelevant information Digital Assistant helps to review candidate and create job requisition



Digital Assistant

SAP Intelligent RPA







Schedule interview in HR system automatically



Business Challenge

- High volume of incoming resumes need to be scanned for relevant information
- Resumes might come in various formats
- Manual data entry into HR systems leads to errors and a high processing time

Solution

Business Optical Character Recognition:

 High accuracy in extraction of text from unstructured documents

Business Entity Recognition:

 Extract recruiting-relevant information from BOCR output and hand over to Digital Assistant



Benefits and Value

- Reduce the manual work
- Speed up the overall process
- Reduce extraction errors
- Focus on value-creation tasks

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AI Ethics at SAP

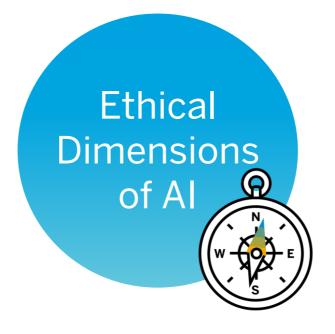
Unit 2: AI Ethics at SAP





Why do we need AI ethics?

Human dignity



Automated decisions

Fairness

Privacy

Transparency

SAP's Al ethics guiding principles (1/3): foundational principles

1. We are driven by our values.

We will remain true to our <u>Human Rights Commitment Statement</u>, the <u>UN Guiding Principles</u> on <u>Business and Human Rights</u>, laws, and widely accepted international norms. Our Al Ethics Steering Committee will serve to advise our teams on their specific use-cases.



2. We design for people.

We strive to create inclusive AI to empower and augment the talents of our diverse usership. We design our systems closely with users in a collaborative, multidisciplinary, and demographically diverse environment.



SAP's AI ethics guiding principles (2/3): core principles

3. We enable business beyond bias.

To prevent bias in our AI software, we gain a deep understanding of the business problems we are trying to solve, and the data quality this demands. We seek to increase the diversity and interdisciplinarity of our teams.



4. We strive for transparency and integrity in all that we do.

Our systems' input, capabilities, intended purpose, and limitations will be communicated clearly to our customers, and we provide means for oversight and control by customers and users.



5. We uphold quality and safety standards.

Our Al software undergoes thorough testing under real-world scenarios to firmly validate it is fit for purpose. We work closely with customers and users to uphold and improve our systems' quality, safety, reliability, and security.



6. We place data protection and privacy at our core.

Data protection and privacy are a corporate requirement and at the core of every product and service. We communicate clearly how, why, where, and when customer and anonymized user data is used in our Al software.



SAP's Al ethics guiding principles (3/3): relational principle

7. We engage with the wider societal challenges of Al.

While we have control, to a large extent, over the preceding areas, there are numerous emerging challenges that require a much broader discourse across industries, disciplines, borders, and cultural, philosophical, and religious traditions. We look forward to making SAP one of many active voices in these debates by engaging with our Al Ethics Advisory Panel and a wide range of partnerships and initiatives.



Governance

Provides updates on activities

Al Ethics Advisory Panel

SAP external experts with a public mandate from academia, politics, and industry

- Provides input on the guiding principles
- Advises on the operationalization of the guiding principles

Al Ethics Steering Committee

Senior leaders from design, data protection, corporate strategy, HR, sustainability, and legal with our Al researchers and operational specialists

- Develops and enforces our guiding principles
- Assesses high-risk use cases and provides guidance to use case owners

Provides guidance

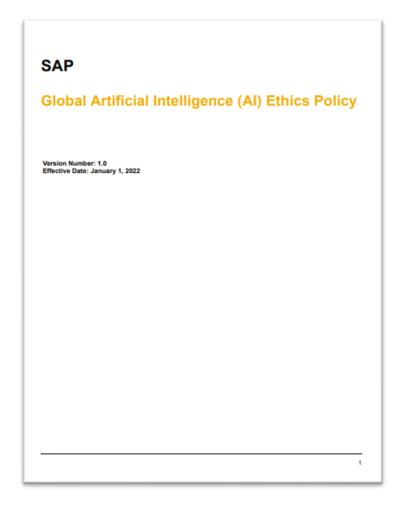
Provides updates on activities

Trustworthy Al Workstream

Group of interested SAP employees who want to engage with Trustworthy AI and build expertise

 Establishes the means to implement the necessary processes to ensure compliance in SAP's Al development

Al ethics policy: purpose and scope



Purpose

Serves to define the intent, expectations, and instruction for AI ethics at SAP globally.

Clarifies for employees how SAP's ethical guiding principles relate to and should be applied in their work.

Scope

Applies to SAP and its employees worldwide involved in the development, deployment, and sale of SAP-developed Al systems.

SAP shall endeavor to educate and advise customers and partners based on the principles in this policy.

Al ethics policy: framework

01. Human Agency and Oversight	Safeguarding human autonomy, particularly for automated decision-making
02. Addressing Bias and Discrimination	Patterns of marginalization, inequality, and discrimination must not be encoded into Al
03. Transparency and Explainability	Prioritizing both the transparency of the development process and an Al system's decisions

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AI Ethics at SAP

Unit 3: The 3 Pillars of SAP's Al Ethics Policy





Use case: intelligent candidates' resume screening



different formats

Extract text and detect language automatically



Business Optical Character Recognition

Business Entity Recognition



Extract recruitingrelevant information Digital Assistant helps to review candidate and create job requisition



Digital Assistant

SAP Intelligent RPA







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Business Challenge

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Solution

Business Optical Character Recognition:

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Benefits and Value

- Reduce the manual work
- Speed up the overall process
- Reduce extraction errors
- Focus on value-creation tasks

1. Human Agency and Oversight

Safeguarding human autonomy, particularly for automated decision-making.



1. Enable humans to overrule decisions of AI system

2. Choose appropriate governance

3. Avoid unintended behavior

Human Agency and Oversight

What the policy says

What to consider for intelligent candidates' resume screening

Avoid unintended behavior



The system must be tested extensively to make sure it behaves as intended, for example, to ensure it does not drop or elevate candidates automatically.

Choose appropriate governance



Users must be able to oversee the process, for example, by being allowed to inspect all candidate data and system decisions.

Enable humans to overrule decisions of AI system



Users must be able to override the AI system's decisions, for example, by setting up a job interview for a low scoring candidate.

2. Addressing Bias and Discrimination

Patterns of marginalization, inequality, and discrimination must not be encoded into Al.



1. Build fair and unbiased AI systems

2. Use inclusive data for training

3. Realize measures to detect bias

Addressing Bias and Discrimination

What the policy says

What to consider for intelligent candidates' resume screening

Use inclusive data for training



Al developers must make sure the training data is neither unrepresentative of marginalized groups, such as women or ethnic minorities, nor biased towards their qualification.

Build fair and unbiased Al systems



The Al system must not discriminate against candidates of a certain ethnicity, gender, religion, or age.

Realize measures to detect bias



Al developers must define fairness measures to test the algorithm against, for example, statistical parity, and track them during productive use, for example, by using monitoring tools.

3. Transparency and Explainability

Prioritizing both the transparency of the development process and an Al system's decisions.



1. Document data sets and the development processes

2. Document the AI system's capabilities and limitations

3. Provide transparency about AI-generated output

Transparency and Explainability

What the policy says

Document data sets and the development processes

Document the AI system's capabilities and limitations

Provide transparency about Al-generated output

What to consider for intelligent candidates' resume screening



The data sets (incl. data source, data distribution, known gaps etc.), related processes (incl. data formatting, sampling, data labelling etc.), and the algorithms applied must be documented.



All Al algorithms applied in the process must be explained to users and applicants in terms of their purpose, capabilities, and limitations in a non-technical language. They must be able to understand the role of Al in the application process.



Users must be able to obtain an explanation for the AI system's decisions, for example, why a certain candidate was accepted or rejected. This could be realized with a description of important factors next to the candidate's entry in the HR system.

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AI Ethics at SAP

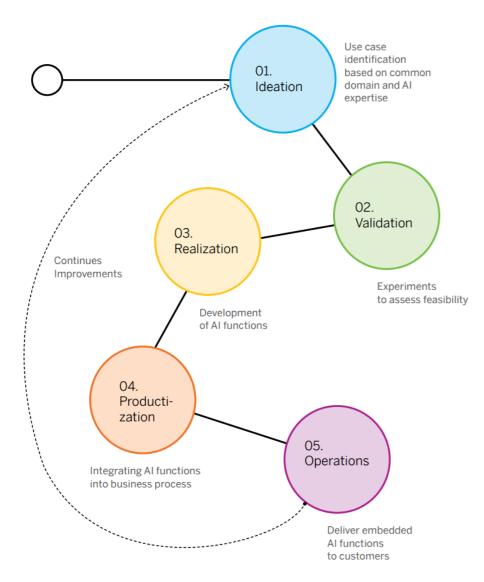
Unit 4: Operationalization of the AI Ethics Policy





Operationalization of the AI ethics policy

AI Factory process integration



The Al Factory process defines the **development**, **deployment**, **and operations of Al** within SAP. It consists of five stages and follows an iterative approach.

Throughout the Al Factory process, SAP employees involved in the process must be aware of the Al policy framework and follow its requirements.

Operationalization of the AI ethics policy

Stakeholders of AI Factory collaboration process (1/2)



Al Use Case Owner

Responsible for the coordination of the delivery of an Al-enabled product or feature end-to-end across all phases of the Al Factory process.



Al Engineer

Responsible for the design, implementation, and maintenance of Al functions of a product. Works according to specifications and project plans.



Al Data Scientist

Develops, implements, or applies Al methods to derive solutions to business problems that can be translated into Al functions.



Product Developer

Develops the business logic of a product or at least parts of it. This task includes the integration of the provided AI functions into the product context.

Operationalization of the AI ethics policy

Stakeholders of AI Factory collaboration process (2/2)



Designer

Provides the human-centered understanding of the product by developing a user need strategy including stakeholders, end users, and product roadmap. Conducts user research, user flows, usability evaluation, and UI screens, including voice response and conversational user interaction.



User Assistance Developer

Responsible for designing, developing, and maintaining User Assistance and training documentation. Collaborates with internal stakeholders to design UA technology and implements embedded help delivery mechanisms that improve how technical information is delivered to customers.



AI OPS Engineer

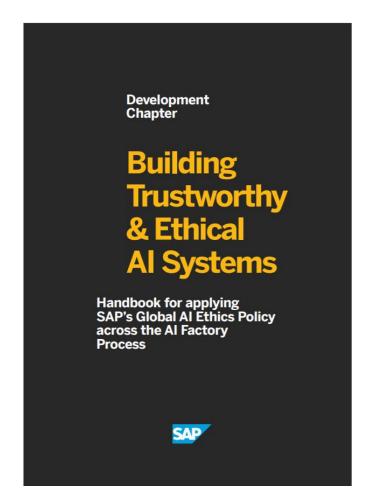
Operates the AI-enabled products or individual AI functions and manages lifecycle aspects like version updates.



Customer

Represents the user of the Al-enabled product. As users, they must be active in the enablement, validation, and operations phases.

Al ethics handbook





https://www.sap.com/products/artificial-intelligence/ai-ethics.html?pdf-asset=7211ee96-647e-0010-bca6-c68f7e60039b&page=1

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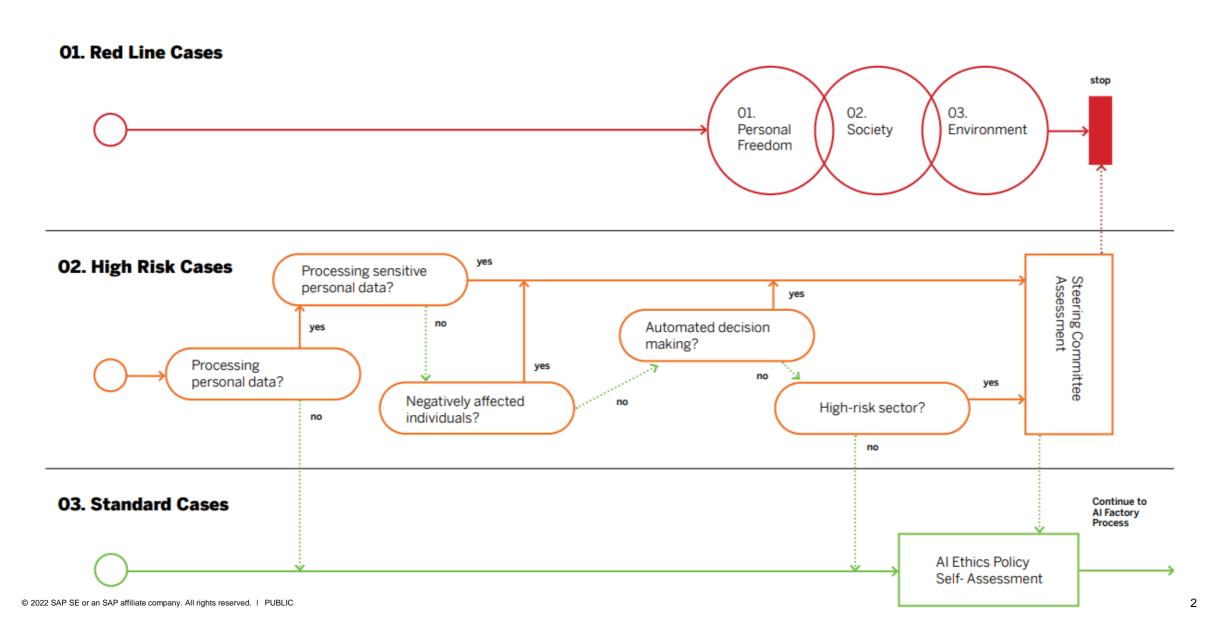
AI Ethics at SAP

Unit 5: Assessing the Risk of Al Use Cases





Overview



Red line cases

1. Personal Freedom

Human surveillance

Human surveillance that is utilized for targeting individuals or groups, either by biometrics, facial recognition, or other identifiable features, with the purpose of disregarding or abusing the rights of the individuals or groups.

Discrimination

Purposes which cause individuals or groups to be discriminated against or excluded from equal access to Al's benefits and opportunities to the wider population.

De-anonymization

De-anonymization of already anonymized data which may result in the identification of individuals or groups.

2. Society

Manipulation

For deception or unfair manipulation of individuals or groups via public forums, media, or moderation of other similar uses.

Undermine debate

Systems which undermine human debate or democratic electoral systems.

Harmful impacts

Intentionally harmful impacts on users and/or those directly and indirectly affected by the system.

3. Environment

Environmental harm

Al system development or deployment shall be conducted with minimum to no explicit damage to the environment.

If the use case touches any of these red lines, it violates the AI ethics policy and further development is prohibited.

High risk cases

1. Processing personal data

2. Processing protected personal data

3. Negatively affected individuals

4. Automated decision-making

5. High risk sector

Does the use case process any information relating to an identified or identifiable natural person for training purposes or during productive usage (excluding anonymized data and process of anonymizing)?

Does the use case include the processing of protected personal data ("special categories of personal data") like information on sexual orientation, religion, biometric data (including face imaging)?

Could the use case negatively affect the well-being (health and safety) of individuals or intrude on/restrict an individual's fundamental rights/freedom?

Does the use case exhibit fully or partially automated decision-making (including cases of no human intervention and of human supervision, but excluding recommender systems)?

Does the use case belong to one of the following sectors: employment/HR, healthcare, law enforcement?

If the answer is Yes to question 1 and at least one of the questions 2-5, steering committee approval is necessary.

High risk cases

Process for Use Case Owners:

- 1. Send an email to the Al Ethics Office with the use case details.
- 2. The AI Ethics Office will perform due diligence and will contact the use case owner/project manager with additional assets and recommendations.
- 3. The Al Ethics Office will include the use case in the upcoming steering committee meeting or will invite to an ad-hoc meeting. The use case owner will be invited to present the use case.
- 4. The steering committee will provide binding guidance on the use case, which will be captured in the meeting minutes for record-keeping.



Use Case Owner: Check risk Use Case Owner: Use case description Al Ethics Office: Due diligence Use Case Owner: Presentation of use case Steering Committee: Binding guidance

5

Assessing the risk of AI use cases

Standard cases

Process for Use Case Owners:

- 1. Check your use case for compliance with SAP's Global AI Ethics Policy.
- 2. Document details about applicable policy requirements and how they are implemented throughout the Al Factory process.
- 3. Save the use case details in a file you can access easily.



Use Case Owner: Check risk Use Case Owner: Check compliance

Use Case Owner: Document use case Use Case Owner: Save use case details

Assessing the risk of AI use cases

Key takeaways of the course

In this course, you have learned

- Why AI ethics is important and how it is applied at SAP
- How SAP's AI ethics policy steers AI development, deployment, use, and sale at SAP
- How SAP's AI ethics policy is integrated into SAP's AI development process
- How the risk of AI use cases is assessed at SAP



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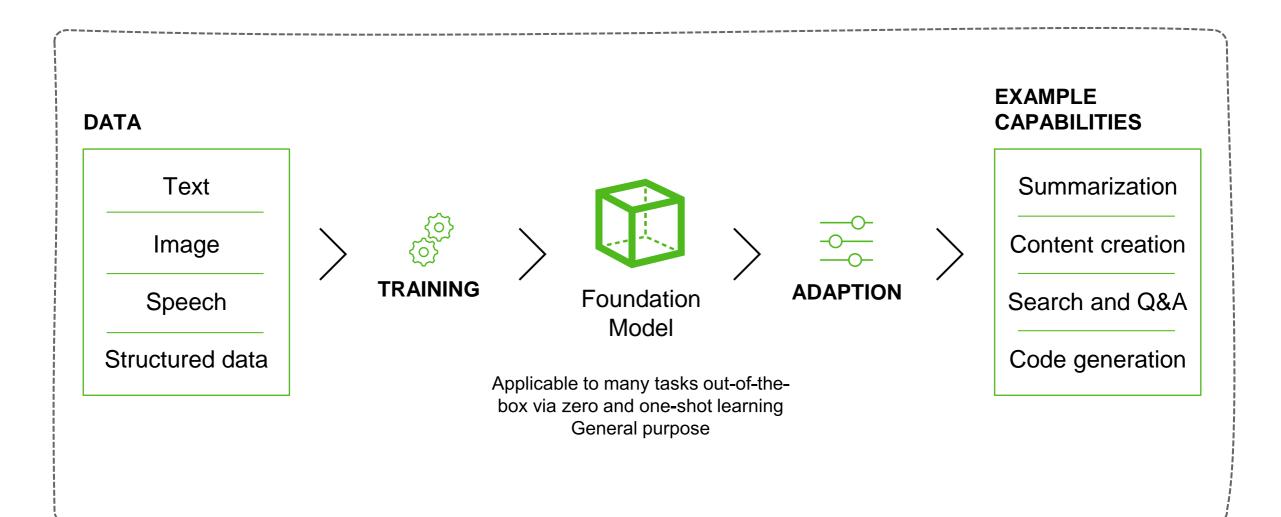
AI Ethics at SAP

Unit 6: The Ethics of Generative Al





Foundation models are a new approach to Al



The ethics of generative AI

Ethical risks of generative Al

Generative AI is associated with a range of risks, encompassing both general risks inherent to all AI systems and specific risks that are amplified in the context of generative AI.

The ethics of generative Al

Limitations and risks of foundation models

Technical limitations

- Numbers and math are hit and miss
- "Hallucinates" plausible-sounding but false answers
- Lack of AI metrics like accuracy and confidence score
- Challenging to keep information correct and updated

Example:

Who are the founders of SAP?

SAP was founded by five former IBM employees: Dietmar Hopp, Hasso Plattner, Hans-Dieter Schek, Hasso Plattner, and Hasso Plattner. They founded the company in 1972.

Non-technical risks

- Take information for granted and to be true
- Misuse of models for creating fake content
- Biases in output resulting from training data
- Legal frameworks, including IP and copyright, for generative AI uncertain

Example:



Caption: Living in the light with Ann Graham Lotz

Generated Image



Prompt: Ann Graham Lotz

Figure 1: Diffusion models memorize individual training examples and generate them at test time. **Left:** an image from Stable Diffusion's training set (licensed CC BY-SA 3.0, see [49]). **Right:** a Stable Diffusion generation when prompted with "Ann Graham Lotz". The reconstruction is nearly identical (ℓ_2 distance = 0.031).

The ethics of generative AI

Generative AI and SAP's Global AI Ethics Policy

Transparency and Explainability

Prioritizing both the transparency of the development process and an Al's decisions.

Information about training data and model architecture is often proprietary and not disclosed.

Addressing Bias and Discrimination

Patterns of marginalization, inequality, and discrimination must not be encoded into Al.

 Detecting bias in unstructured, potentially multimodal output of generative AI can be challenging.

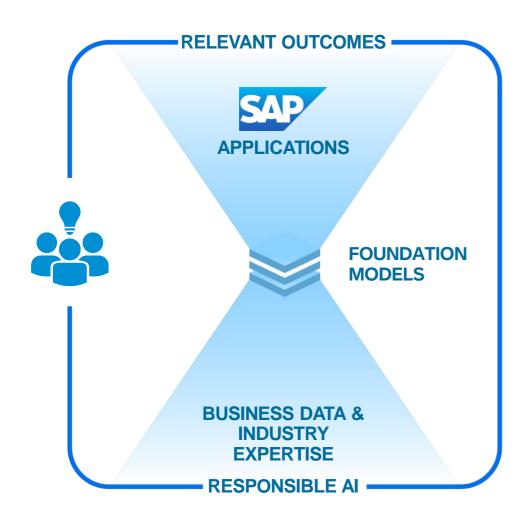
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Human Agency and Oversight

Safeguarding human autonomy, particularly for automated decision-making.

 Decision-making rationale exposed by generative AI might be sound, concise, and easily understandable, but not necessarily a good representation of the actual reasoning process.

Responsible AI: SAP's approach to generative AI



SAP combines the power of generative AI with the context of business data and business processes and applies fine-tuning and prompt engineering at scale.

SAP keeps humans in the loop responsibly to review and approve generated information.

SAP's use of generative Al follows the same principles as business Al and the same rigorous development and responsible Al review processes.

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