Agents & Agentic AI in Project Management

Smarter Risk Management, Planning & Prediction for Engineering Teams

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ANIMP Sezione DIM (Digital & Innovation Management)
Serie di webinar: IA per l'Impiantistica

Welcome and introduction

We warmly welcome you!

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Agenda

1. The importance of AI in PM
2. AI technologies and applications
3. Agents & Characteristics
4. Advantages & Disadvantages Benefits & Requirements
5. Future developments

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1. The importance of AI in project management

From the outset, project management has been strongly influenced by technology

1. The importance of AI in Project Management

Facts, figures, and data

20 %
of companies **already use AI**

78 %
see AI as an **opportunity**

In Germany,
37 %
of companies **are already using AI** or discussing the approach

The importance of AI in Project Management

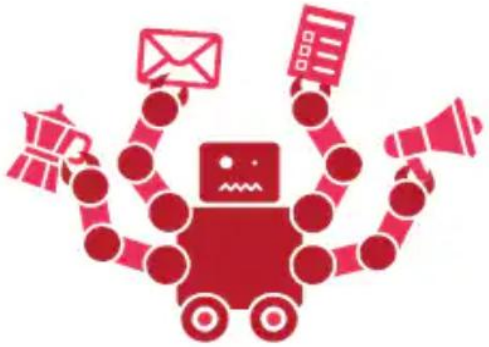
1. **Great interest in AI tools:** Project managers are particularly interested in AI applications for risk management, task automation, and data analysis.
2. **Varying levels of AI knowledge:** While enthusiasm for AI is high, there is also a significant knowledge gap. Many project managers feel they lack the understanding and skills to fully leverage AI in their work.
3. **Barriers to AI adoption:** The biggest challenges include
   - concerns about data privacy,
   - the cost of AI tools, and
   - uncertainty about return on investment (ROI).
   - **General:** Lack of support from leadership and a general resistance to change
4. **Future assumptions:** AI tools will be adopted within the next two years, provided they have access to adequate training, resources, and support.

Source: https://www.bitkom.org/sites/main/files/2024-10/241016-bitkom-charts-kuenstliche-intelligenz-final.pdf // As of: February 13, 2025 // n = 1,007
Source PM: Initial AI Survey 2024 Report of IPMA

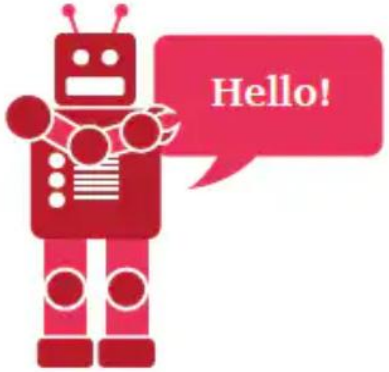
1. The importance of AI in project management

The evolution of AI use in project management is advancing rapidly

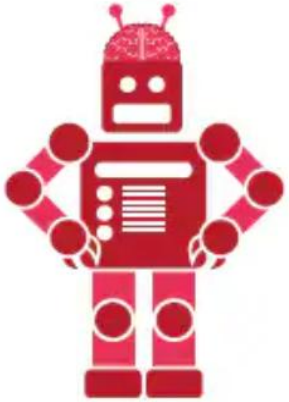
“In summary, we believe that AI will assist, not replace, project managers. As with every technology, AI alone will not guarantee success. However, deployed purposefully, AI can be a distinctive accelerator and game changer for project managers and thus help increase project success rates. The project managers who succeed will likely be those who manage to see beyond the bounds of 'human' imagination, and answer questions about how this technology can add value and drive positive change in project management and business transformations. This will ensure the strategic value of project management."



Integration & automation



Chatbot assistants



Machine learning-based project management

Autonomous project management

Source: https://www.pwc.ch/en/insights/risk/ai-will-transform-project-management-are-you-ready.html As of: September 6, 2018

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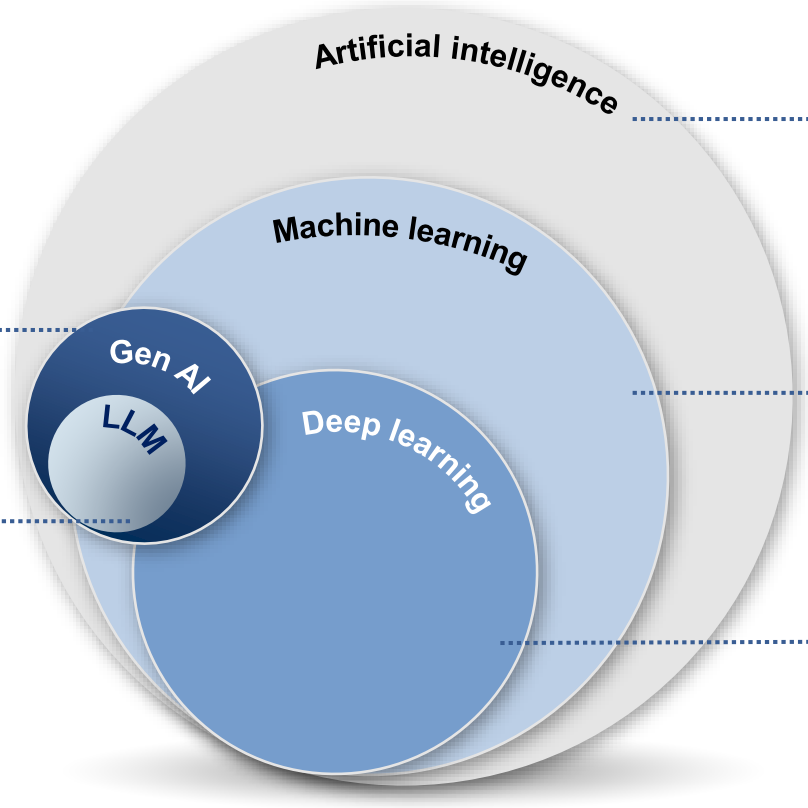
2. AI technologies and applications in project management

Classification of the term "artificial intelligence"

GenAI - A type of AI that can generate new content such as text, images, or music. For example, GPT-5

**) Gen AI is not based exclusively on deep learning (although most modern models are).*



LLM – A special type of generative AI that specializes in processing and generating text.
These models, such as GPT-5, are trained to create human-like text.

AI – The umbrella term for technologies that mimic human intelligence

Machine learning – A subfield of AI in which algorithms learn from data to make predictions or decisions.

Deep learning – A specialized form of machine learning that uses deep neural networks with many layers.

2. AI technologies and applications in project management

Applications of AI models in project management (1/3)

	Requirements & objectives	Project design	Scope of services and deliverables	Process and Deadlines	Organization, information, and documentation
Possible use cases	1. Automatic requirements analysis 2. Stakeholder requirements forecast	3. Project architecture optimization 4. Adaptive project strategy with AI	5. Automatic scope creation 6. AI-supported change evaluation	7. Intelligent scheduling 8. Predictive delay management	9. Automated documentation creation 10. Communication support
Technology	1. NLP with LLM (e.g., GPT) 2. Supervised learning	3. Simulation with LM / GenAI 4. Predictive analytics + LLM	5. Classification ML model 6. Rule-based AI + ML	7. ML with real-time data 8. Predictive ML	9. Generative AI (text, e.g., GPT) 10. LLM + rulesets
Prerequisites	1. Where does the data come from? Access to complete project documents, unstructured text data 2. Historical project and stakeholder data	3. Project structure data, clear target architecture 4. Internal/external influence data, continuous updating	5. Project archive, similar previous projects 6. Change requests documented, clearly defined scope	7. Historical schedules, ongoing sensor data 8. Integration of real-time sources (e.g., tools, sensors)	9. Project progress data, template structures 10. Stakeholder analysis, communication needs

2. AI technologies and applications in project management

Applications of AI models in project management (2/3)

	Quality	Costs and financing	Resources	Procurement	Planning and Control
Possible use cases	11. Preventive quality analysis	12. Cost forecasting 13. Budget optimization	14. Resource allocation 15. Capacity management	16. Supplier selection 17. Risk-based contract analysis	18. Dynamic AI-supported project planning 19. KPI monitoring
Technology	11. Anomaly detection with ML	12. Regression with ML 13. Adaptive control algorithms + ML	14. Matching algorithms with AI 15. Time series ML + analytics	16. Multi-criteria ML 17. NLP + risk scoring with Gen AI	18. Real-time optimization with ML 19. Monitoring + LLM
Requirements	11. Quality data from past projects, real-time monitoring	12. Historical cost and market data 13. Ongoing expense tracking, budget structure	14. Employee profiles, project requirements 15. Utilization data, current planning	16. Supplier scorecards, quotation data 17. Contracts in structured text form	18. Live tracking of tasks and progress 19. Defined KPIs, real-time data access

2. AI technologies and applications in project management

Applications of AI models in project management (3/3)

	Opportunities and risks	Stakeholders	Change and transformation	Project completion
Possible use cases	20. Risk identification and detection 21. Automatic risk assessment	22. Stakeholder analysis 23. Dynamic support for stakeholder communication	24. Change impact analysis	25. Lessons learned support 26. Final analysis
Technology	20. ML with risk register 21. Decision support with Gen AI	22. NLP + clustering (e.g., with LLM) 23. Personalization through LLM	24. Scenario simulation with ML	▪ Retrospective evaluation with Gen AI
Prerequisites	20. Risk history, ongoing project inputs 21. Risk catalog, decision criteria	22. Internal & external stakeholder data 23. Feedback analysis, CRM systems	24. Structured change data, dependency models	▪ Complete project histories and KPIs

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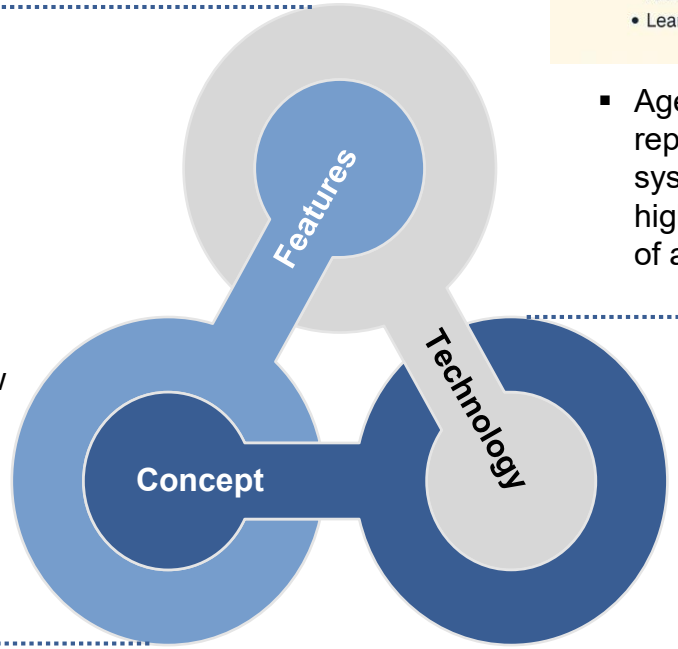
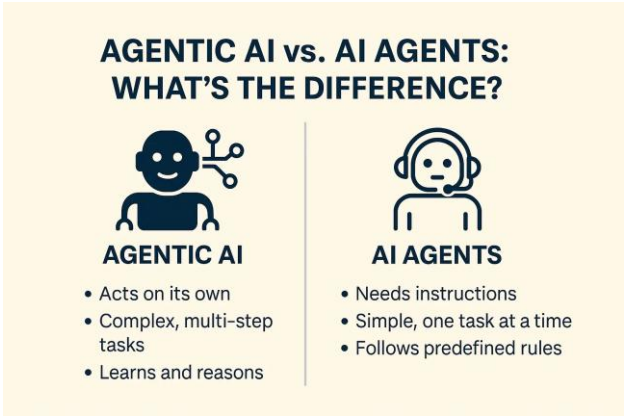
3. Agents & Characteristics

Big Picture Agents & Agentic AI

- **Autonomy** – Acts independently without constant user interaction
- **Goal-oriented** – Optimizing their actions towards a defined goal (e.g., meeting deadlines)
- **Perception** – Observe their environment, e.g., via API access to tools
- **Decision-making** – Makes decisions using AI methods
- **Learning** – Can improve through feedback or new data (when ML is integrated)
- **Communication** – Interact with other agents, systems, or users (e.g., via chatbot)





- Agentic AI = represents AI systems with a higher degree of autonomy
- Agent = Actor, representative
- Agency = The ability of actors to act consciously and independently

- Knowledge processing (LLM such as GPT-5)
- Task planning/execution (planner)
- API interaction (OpenAI Function Calling)
- Memory & context (vector databases)
- Observation & learning (feedback mechanisms)
- Integration

Agentic AI refers to autonomous AI systems that can make independent decisions and take actions to achieve goals with minimal human oversight.

These systems use reasoning, memory, and planning to adapt to changing conditions and complete complex, multi-step tasks, unlike traditional AI, which often follows predefined rules.

3. Agents & Characteristics

Overview of agents

	ChatGPT	Microsoft Copilot	PMI Infinity	PM Otto
Purpose/function	Assistant, idea generation, knowledge retrieval	Assistance in MS Project, Planner, Teams, etc.	Project co-pilot, planning, control, knowledge provision	Risk assessment, status analyses, decision support
Technological basis	LLM (GPT-5, etc.)	LLM (Microsoft + OpenAI) + MS Graph	LLM + PMI knowledge database	Machine learning
Integration	Web app, API, integrable via plugins	Microsoft 365 (Teams, Project, Planner, etc.)	PMI platform, API planned	API-enabled, PMO tools
Advantages	Versatile, open, always available	Contextual understanding in Microsoft environment	Quick access to PM knowledge, standards-based	Early warning system, strategic insights
Risks	No project context, data protection & hallucinations	Little transparency in decision-making	Dependence on the PMI framework, limited adaptability	Data quality critical

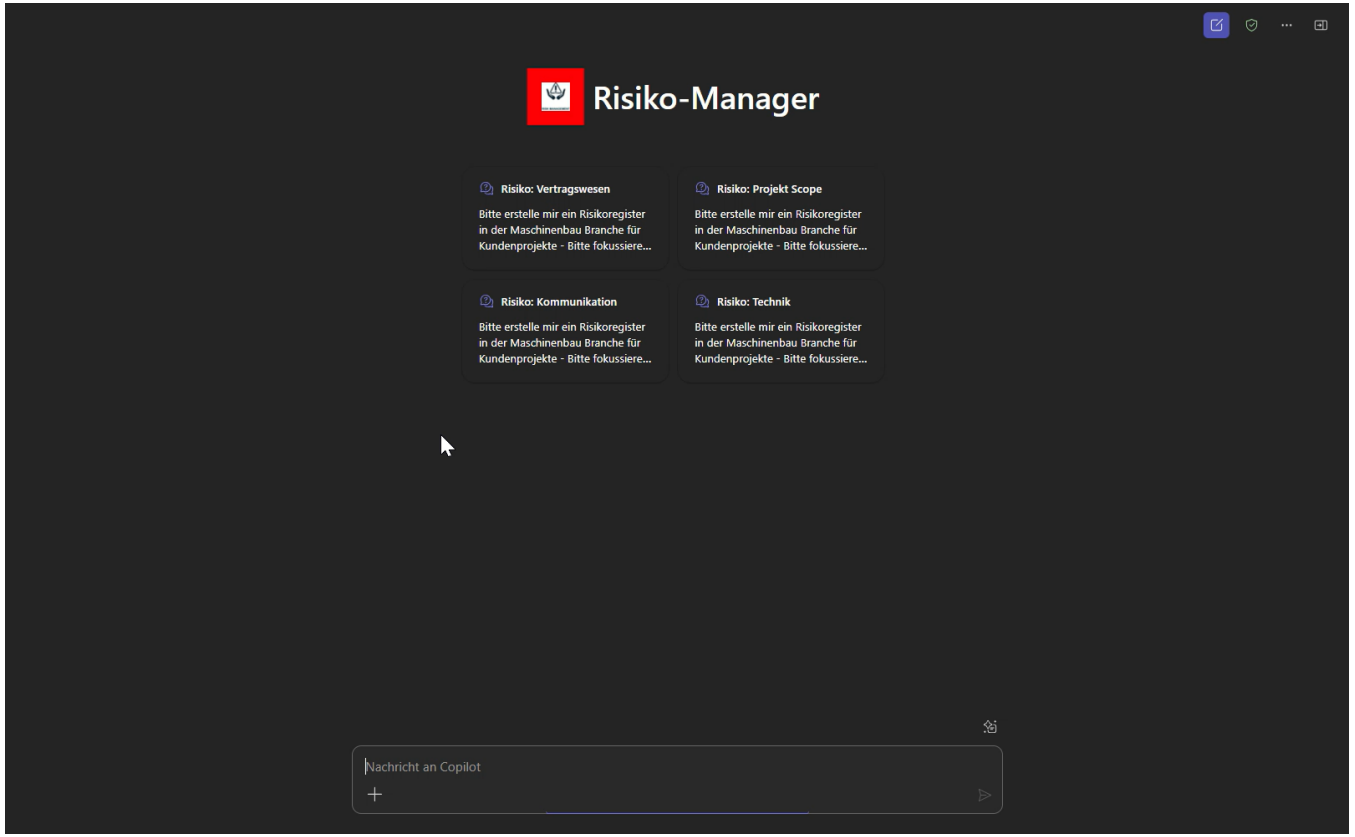
3. Agents & Characteristics

Exemplary agents in project management

PM agents as use cases	Task in PM	Exemplary tools
Meeting planning agent	Finds dates, sends invitations, generates agenda	ChatGPT plugin + Calendar API
Status report agent	Automatically creates reports from project status data	GPT + Jira API
Resource planning agent	Assigns tasks to employees based on skills and availability	GPT-4 + internal HR database
Project Planning CoPilot	Assists with project structuring, Gantt planning, and prioritization	ChatGPT Agent + MS Project API
Change Impact Agent	Analyzes the impact of changes on time, budget, and resources	GPT 4+ Project Structure Model
Stakeholder Communication Agent	Sends customized updates to various stakeholder groups	GPT-4 + Email API + CRM data
Task Forecasting Agent	Predicts completion dates and alerts you to delays	GPT-4 + Jira API
Documentation agent	Automatically creates logs, knowledge entries, manuals	GPT-4 + Confluence API
Risk management agent	Identifies risks from status data and suggests measures	GPT-4

3. Agents & Characteristics

Risk identification



Structure of the prompt:

- Role of AI
- Context of the task(s)
- Definition of the target group
- Describe the format requirements for the results
- Formulate the task description

3. Agentic AI in the Oil & Gas Industry

- **Predictive Analytics and Forecasting:** One of AI's most impactful uses in project management is harnessing predictive analytics to forecast project outcomes. Machine learning models can analyze historical project data (past schedules, budgets, performance metrics, etc.) and detect patterns that humans might miss, enabling more accurate predictions of future project performance. E.g., AI-driven predictive models are used to foresee schedule delays and cost overruns early in the project lifecycle. By training on thousands of prior projects, a predictive algorithm might identify subtle risk factors (such as optimistic activity durations or concurrent critical tasks) that correlate with missed deadlines.
- **Intelligent Scheduling and Planning:** AI-assisted scheduling uses algorithms, e.g., genetic algorithms, reinforcement learning, or constraint satisfaction algorithms for generating optimized project schedules automatically. These AI schedulers can consider a vast search space of possible task sequences and resource assignments, something impractical for humans to do manually. For instance, AI scheduling tools can quickly re-sequence work when constraints change (like a delivery delay or a resource becoming unavailable) to minimize the impact on the overall timeline.

Reference: Musaed Al-Thubaiti and Saeed S Al-Shahrani. Artificial Intelligence role in transforming project management. World Journal of Advanced Engineering Technology and Sciences, 2025, 16(01), pp. 180-193. https://doi.org/10.30574/wjaets.2025.16.1.1116.

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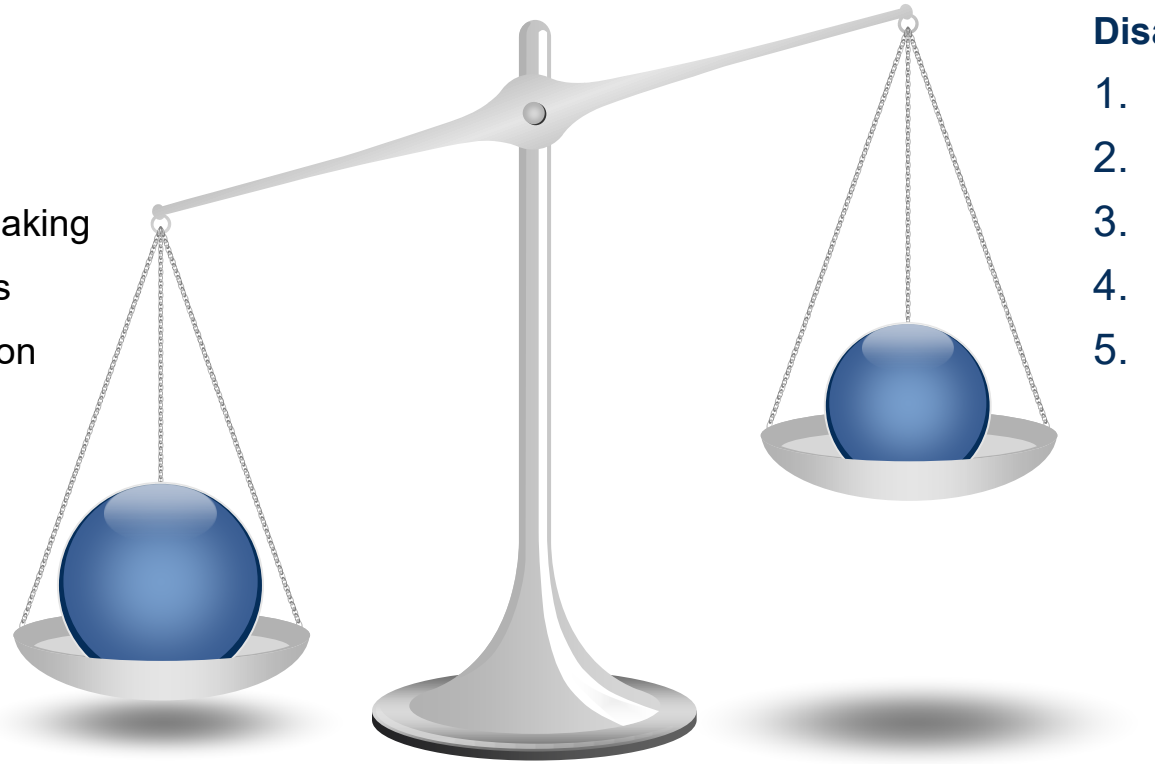
4. Advantages & disadvantages

Advantages and disadvantages of AI in project management

Advantages of AI

1. More efficient planning
2. Early risk detection
3. Better basis for decision-making
4. Automation of routine tasks
5. Personalized communication
6. Continuous monitoring



Disadvantages of AI

1. Lack of trust/acceptance
2. Complexity of integration
3. High data requirements
4. Lack of contextual intelligence
5. Legal risks

4. Creating the conditions for the use of AI through...

Strategy

- Strategy, clear goals, and vision for the future
- Impact on workflows & business processes
- IT strategy, infrastructure, and data management
- Pilot project(s) as a basis for implementation

Use cases

AI governance

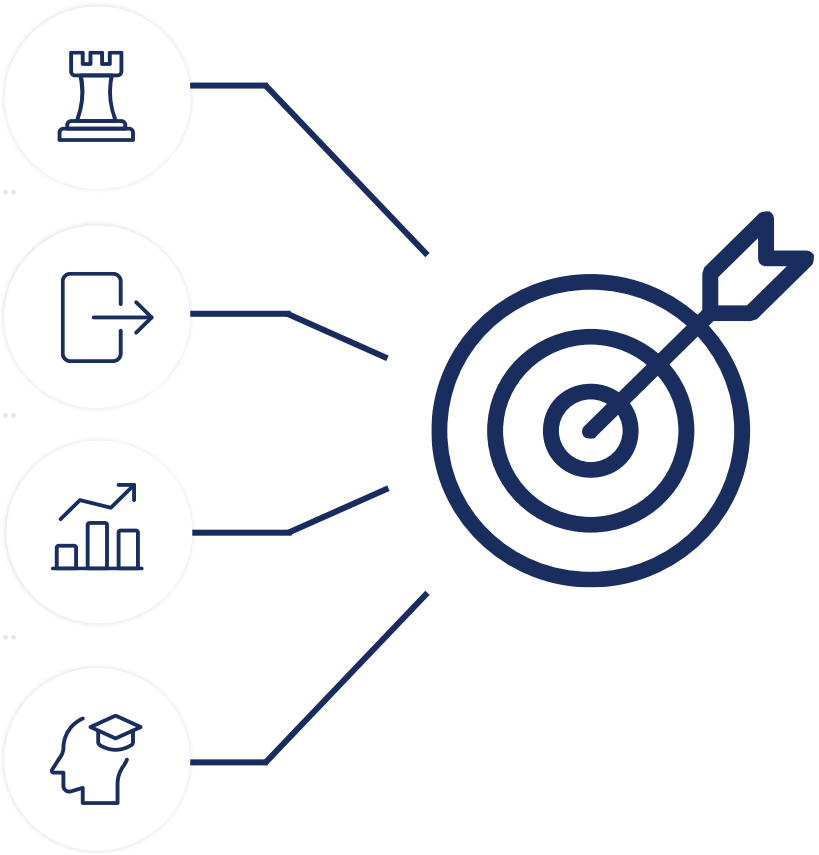
- Ethical use
- Transparency
- Data protection & data security
- Quality control & compliance

Change management at various levels (organization/project)

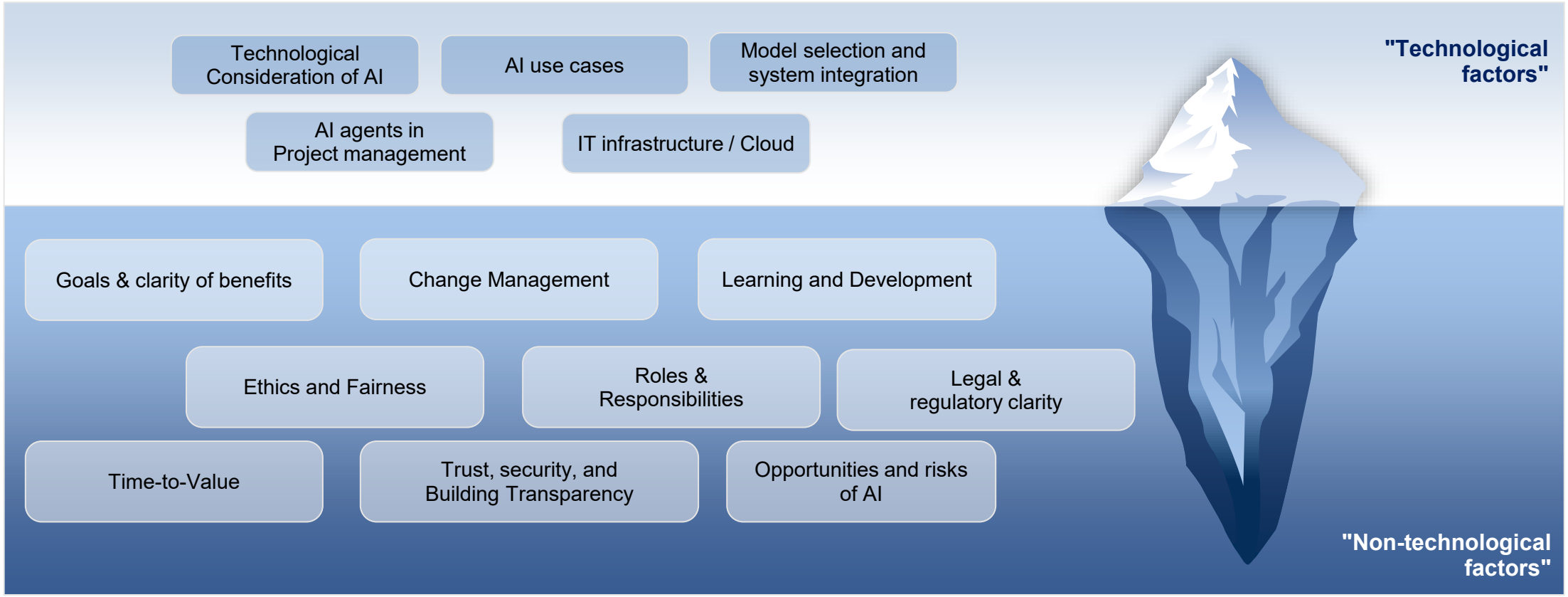
- Open and transparent communication
- Employee involvement
- Culture of learning and innovation
- Targeted training

Learning & development

- User training
- Personal behavior / soft skills
- On-the-job Recognizing benefits
- Technical training for further development



4. AI is not just a technological issue, but rather a "non-technological issue."



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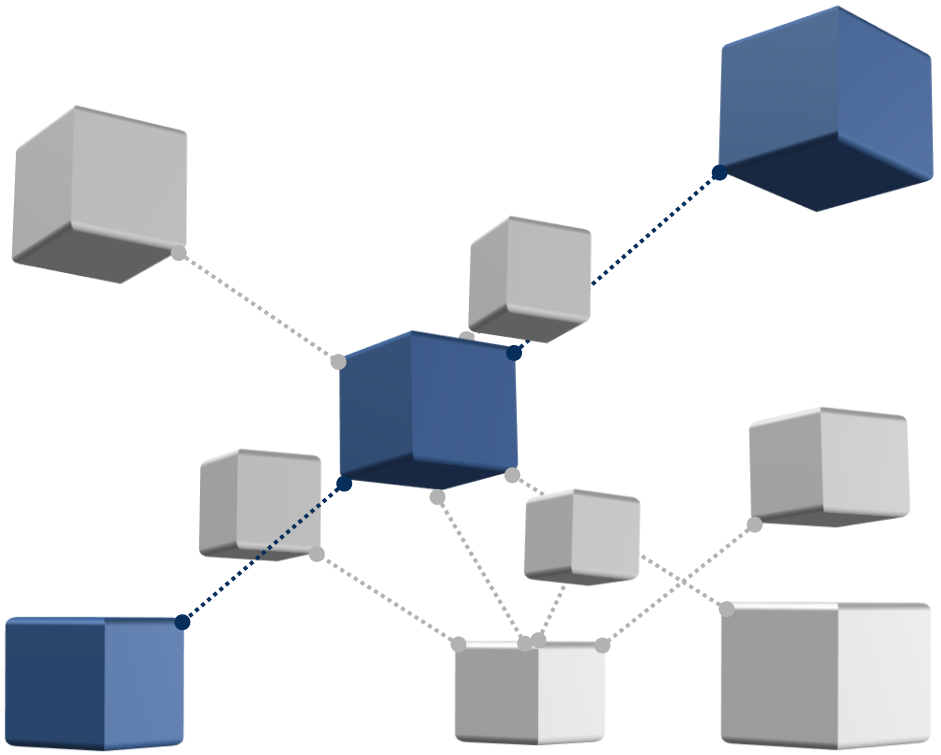
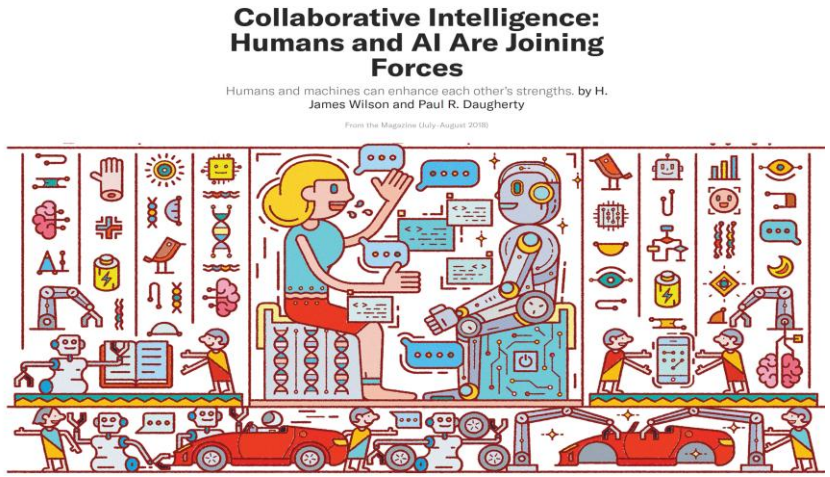
5. **Future developments**

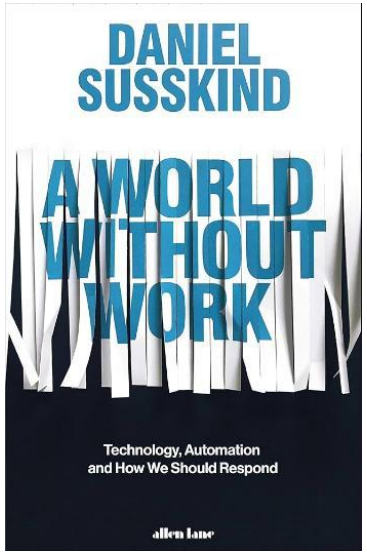
5. Future developments (1)

- GenAI is becoming increasingly powerful
- Increase in knowledge in the digital world
- Growing awareness of health and well-being
- Development of AI systems that are energy-efficient and environmentally friendly
- AI is increasingly being used in diagnostics, personalized medicine, and healthcare
- Connectivity: AI promotes digital networking and improves forms of communication and interaction
- Increasing discussion and measures regarding the ethical use and regulation of AI
- New Work: AI is changing work models and structures, promoting automation and new forms of work.

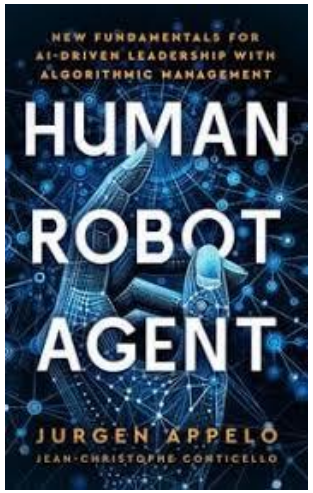


5. Future developments (2)

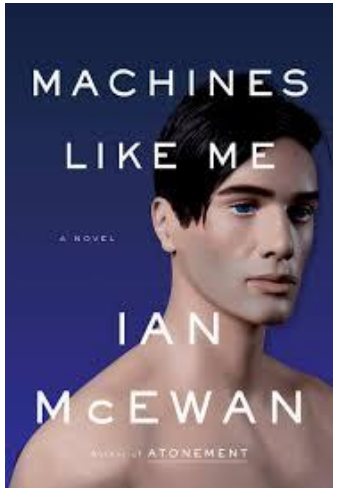




"Technological progress may make us wealthier than ever before, but how should we distribute this wealth when our traditional method—paying for work with wages—no longer works as well as it used to?"



"How can we ensure that the integration of intelligent machines into our lives and workplaces helps to expand and strengthen human potential rather than diminish or replace it? **One of the most important themes that emerges is the critical importance of maintaining a symbiotic balance between human and machine intelligence..."**



"Charlie and Miranda work together to create Adam's personality, and tensions arise when **Adam, equipped with advanced artificial intelligence, begins to display human-like emotions and behaviors**. The novel explores how Charlie and Miranda deal with their growing feelings for Adam and the complex ethical issues surrounding artificial intelligence. **The story raises critical questions about the nature of consciousness, free will, and the implications of creating beings with human-like desires**."

Energy for Success

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