Towards Practicable Machine Learning Development using AI Engineering Blueprints

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Purpose of the Research

- AI gains more relevance for small and medium sized enterprises (SMEs)
- SMEs face **organizational and technical bottlenecks** in the development of proprietary ML models
- **Research objective:** Provide a systematic, modular, and referenceable architecture - a set of AI Engineering **Blueprints** - to guide AI system development across the full lifecycle

"We want to guide organizations through the process of implementing AI in their systems."

Related Work

AI Engineering:

- Existing work highlight challenges in scaling and productionization (e.g. Bosch et al., 2020)
- Limited application of discussed principles (e.g. Grote and Bogner, 2023)

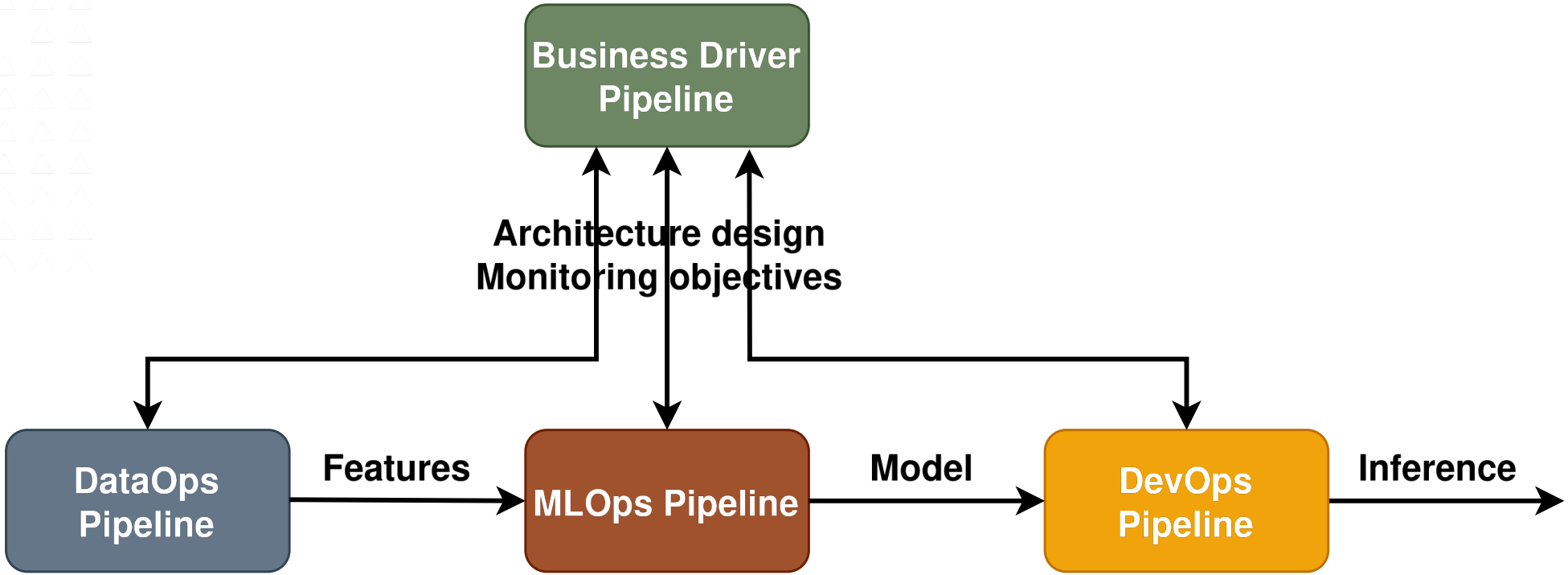
MLOps:

- Well-researched toolchains and components (e.g. Kreuzberger et al., 2023; Testi et al. 2022)
- Use-case based MLOps architectures and tools (e.g. Najafabadi et al., 2024)

AI Architecture:

- Architecture and design patterns for AI/ML applications (e.g. Sharma and Davuluri, 2019; Take et al., 2021)
- Reference architectures focus on specific use cases (e.g., edge/big data, Pääkkönen and Pakkala, 2020)

Guiding Blueprints Pipeline



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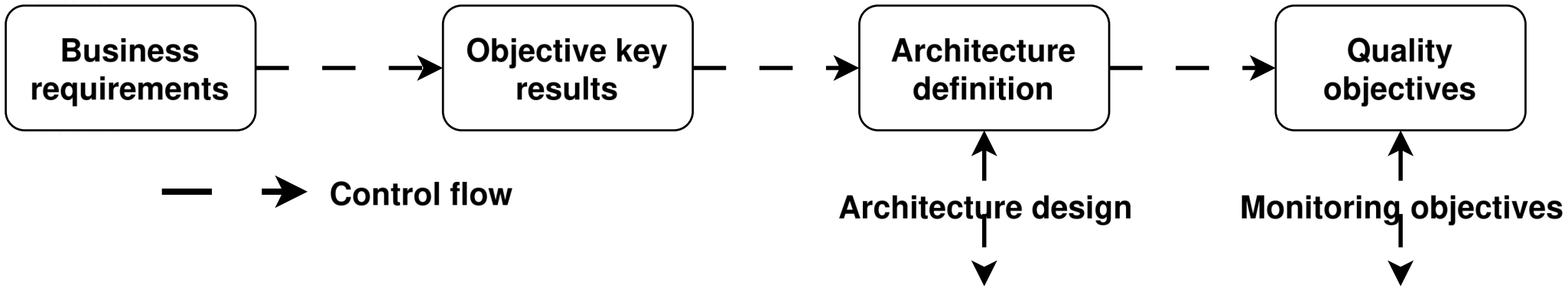
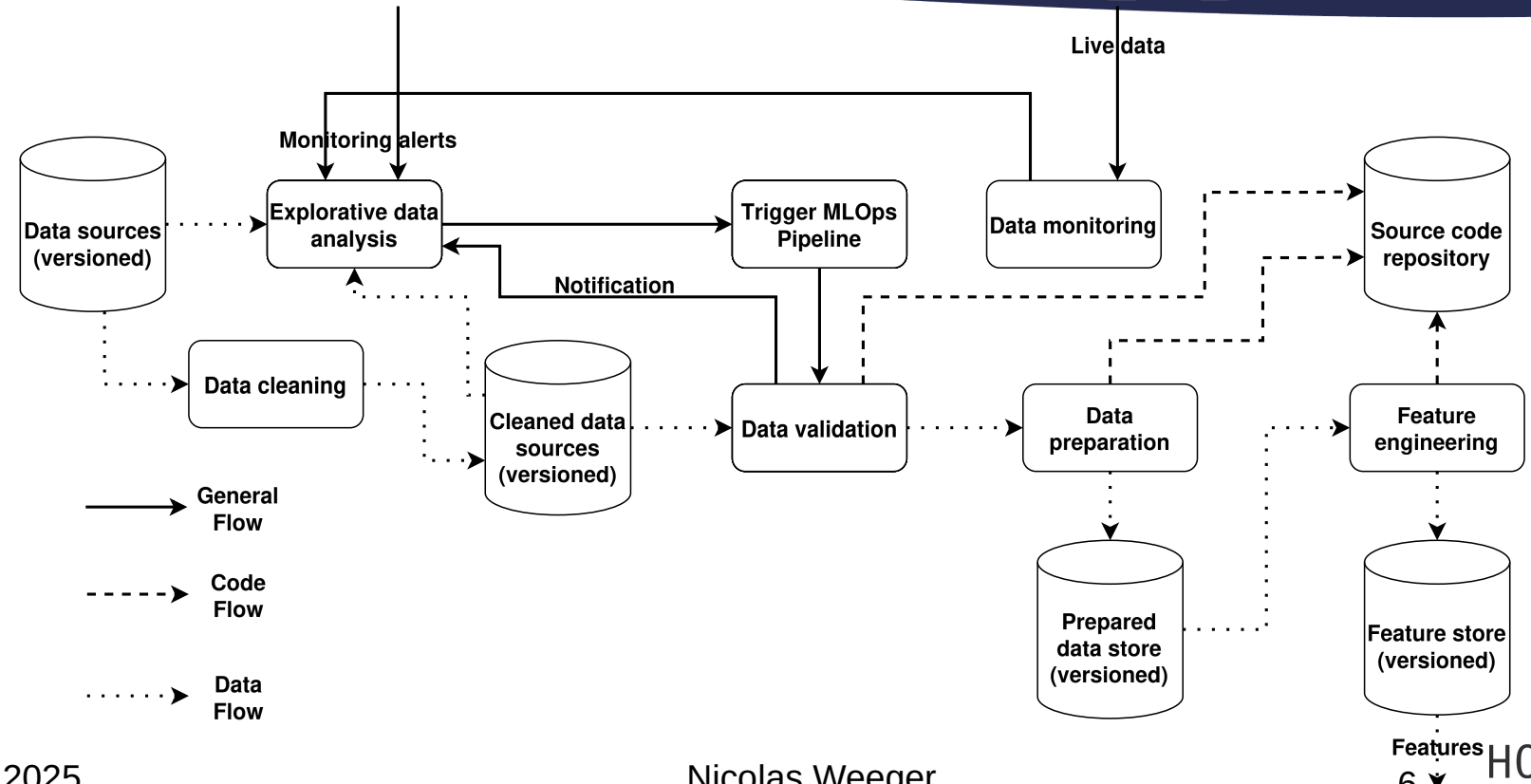
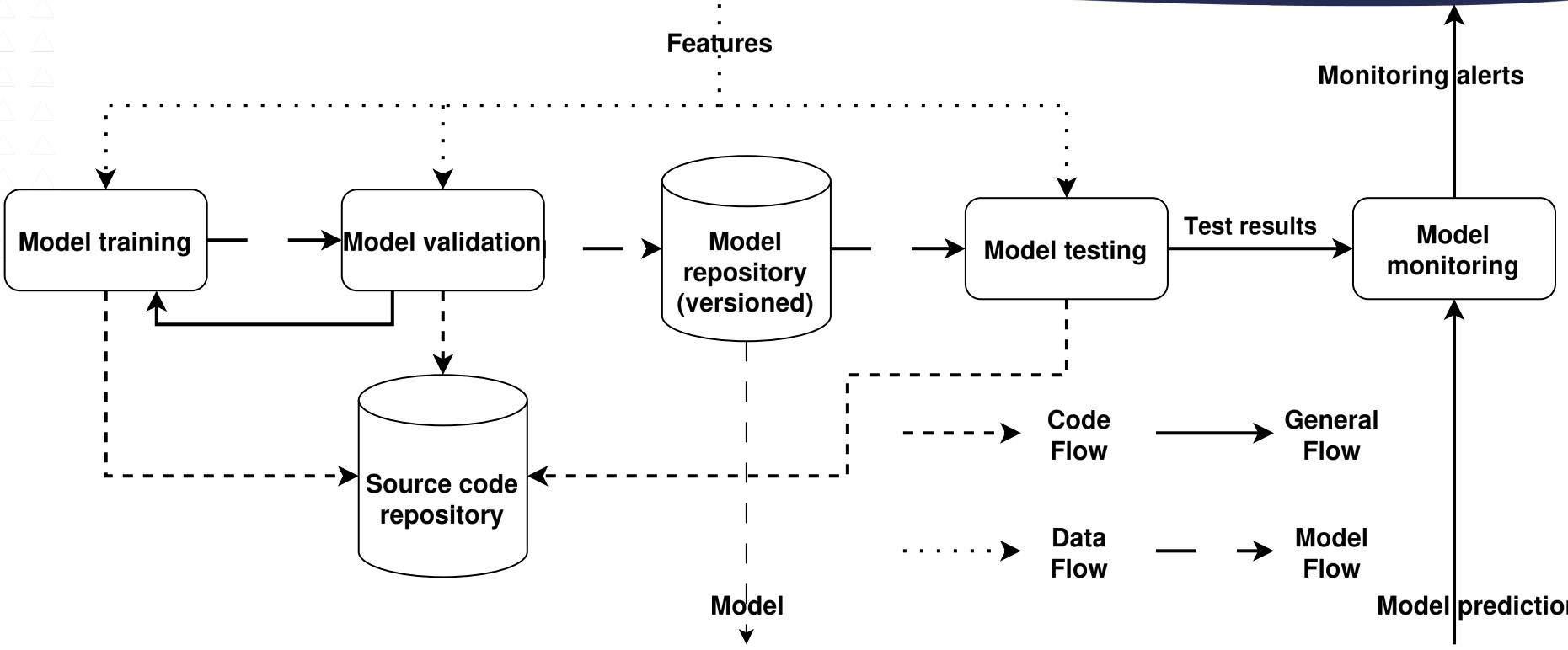
Business Driver Pipeline



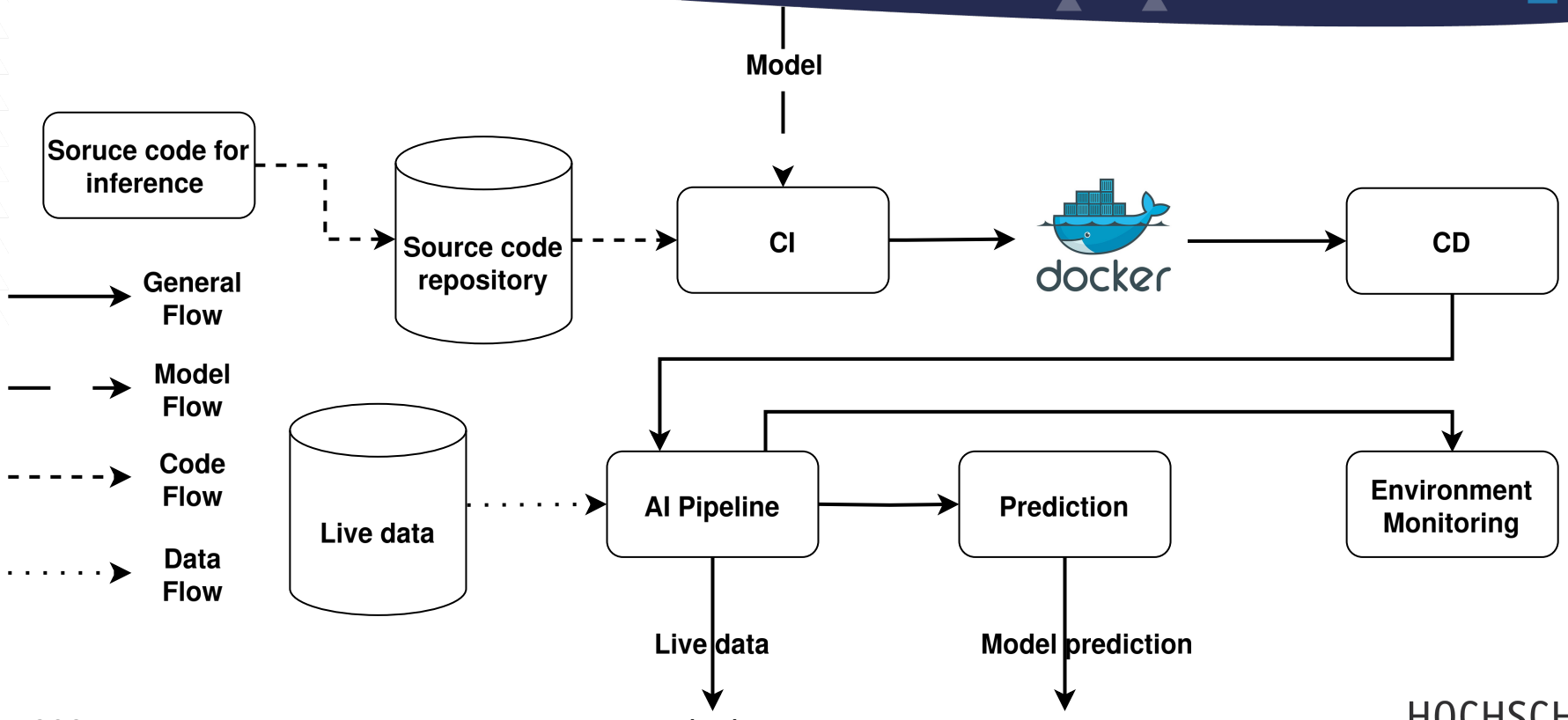
DataOps Pipeline



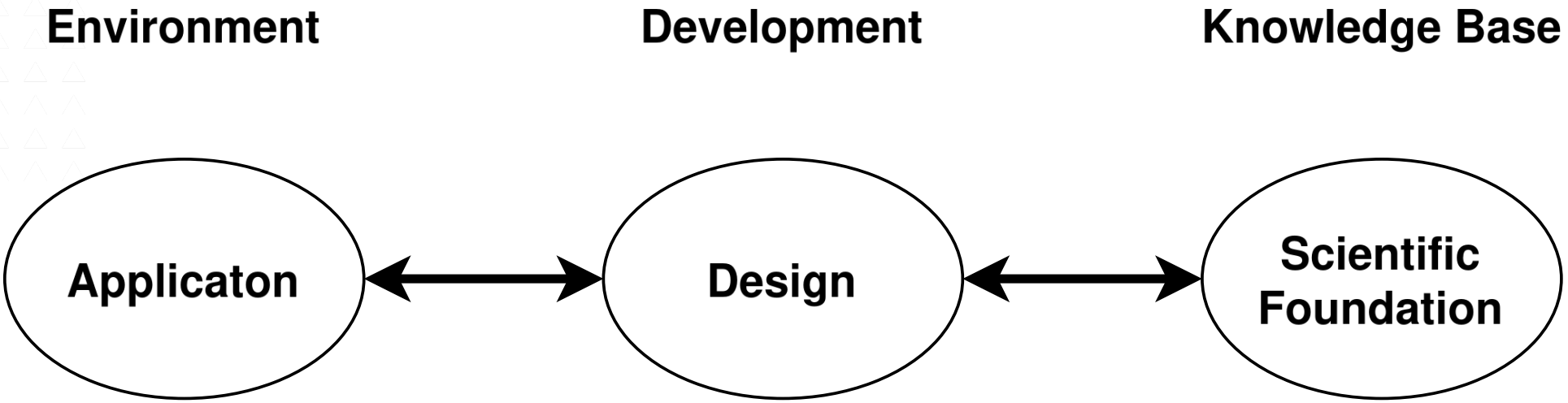
MLOps Pipeline



DevOps Pipeline



Design Science Research (DSR)



Conclusion

- **Blueprints** address the challenges of integrating ML models for SMEs
- Combination of **reference architectures** and **-applications, pipelines** and **tools**
- **Sufficiently generalized** for specific requirements of different types of AI and deployment scenarios

"Make everything as simple as possible, but not simpler“ – Albert Einstein

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Thank you for your attention!

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Questions?

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