brikka.

BSc Thesis in AI Manufacturing Intelligence

Project: AIMI

Date: 2026-04-21

Thesis 1: Organizational Capabilities and New Roles in AI-Supported Decision-Making

Level: BSc thesis | Period: Fall 2026 | Reviewer: Didem Gürdür Broo | Supervisor: Erik Simu

Theme: Explore what organizational capabilities and new roles are needed to use and administer a decision-support system in manufacturing.

Background
AIMI is not only a technology project. It also changes how decisions are prepared, validated, and owned in manufacturing. When AI-supported decision systems are introduced, organizations may need new responsibilities around trust, validation, data stewardship, model oversight, and everyday use in operations.

Suggested research questions
- What user roles and admin roles are needed around an AI-supported decision system?
- Which responsibilities should remain with humans, which can be system-supported?
- What new capabilities are needed in areas such as validation, data stewardship, governance, and continuous improvement?

Suggested methods
- Literature review on AI-supported decision-making and organizational change
- Interviews or workshops with stakeholders from industry and Brikka
- Role mapping and capability analysis
- Development of a proposed future operating model

Expected outcome
A role map and capability framework, including suggested responsibilities for users, supervisors, and system administrators, as well as recommendations for how the organization could prepare for adoption.

Suitable student profile
Students interested in industrial engineering, information systems, digital transformation, operations management, or human-AI collaboration.

Thesis 2: Knowledge Graph Foundation for Manufacturing Decision Support

Level: BSc thesis | Period: Fall 2026 | Reviewer: Didem Gürdür Broo | Supervisor: Erik Simu

Theme: Design an initial knowledge-graph foundation for one selected production flow, including relevant entities, relationships, and data sources.

Background

A central idea in AIMI is to represent a production system as a connected structure rather than as isolated datasets. A knowledge graph can connect processes, machines, materials, events, products, and decisions in a way that supports analysis and AI-based reasoning across system boundaries.

Suggested research questions

- Which entities and relationships are most important to represent in an graph model?
- Which production questions should the model support from the beginning?
- What data sources are most relevant for building an initial graph-based representation?
- How can the first ontology or graph structure be scoped so it is useful but manageable?

Suggested methods

- Review of graph-based modeling approaches for industrial systems
- Mapping of selected production data sources
- Conceptual modeling or ontology design
- Simple prototype, schema, or example queries to illustrate usefulness

Expected outcome

An initial ontology or graph model for a production flow, together with a clear description of the data sources and decision situations it should support. The result should help AIMI move from fragmented data toward a shared production representation.

Suitable student profile

Students interested in AI, data engineering, knowledge graphs, information modeling, computer science, or industrial analytics.

Thesis 3: User Experience, Explainability, and Trust in AI-Supported Production Decisions

Level: BSc thesis | Period: Fall 2026 | Reviewer: Didem Gürdür Broo | Supervisor: Erik Simu

Theme: Explore how AIMI-like decision support should be presented so that industrial users can understand, trust, and act on the results.

Background
AIMI is intended to support real operational and tactical decisions, not only backend analytics. This means users must be able to ask meaningful questions, understand the system's reasoning, and trust the resulting decision support. Explainability and usability are therefore central design requirements.

Suggested research questions
• What kinds of questions should users be able to ask in a question-driven decision interface?
• What explanations do users need in order to trust AI-supported recommendations or analyses?
• How should traceability, confidence, and context be shown to support decisions?
• What interface concepts are most useful for different user groups in production?

Suggested methods
• Literature review on explainable AI and decision-support UX
• Interviews or workshops with potential users
• Wireframes, low-fidelity prototypes, or interaction concepts
• Evaluation of concepts through user feedback or comparative testing

Expected outcome
A set of user-interface and explainability principles for AIMI, supported by concrete design concepts or prototypes. The work should clarify how trust and actionability can be improved in industrial decision support.

Suitable student profile
Students interested in UX, human-computer interaction, design, cognitive systems, industrial engineering, or applied AI.

Thesis 4: Scalable and Domain-Specialized AI for Manufacturing

Level: BSc thesis | Period: Fall 2026 | Reviewer: Didem Gürdür Broo | Supervisor: Erik Simu

Theme: Explore architectural patterns that support scalable, on-prem, and domain-specialized AI for manufacturing decision support.

Background
From Brikka's perspective, AIMI is not only about one pilot use case. It is also about building a scalable product and architecture for manufacturing intelligence. This includes support for on-prem or hybrid deployment, reusable components, and specialization on top of large foundation models.

Suggested research questions
• What makes an AIMI-like solution scalable across use cases, user groups, or sites?
• Which parts of the architecture should be generic, and which should be manufacturing- or site-specific?
• What are the main trade-offs between cloud, hybrid, and on-prem deployment models?
• How can large language models be adapted to manufacturing without building a full model from scratch?

Suggested methods
• Review of architecture patterns for industrial AI systems
• Comparison of on-prem, hybrid, and cloud deployment options
• Analysis of reuse and specialization patterns for AI components
• Conceptual framework or reference architecture for Brikka's future direction

Expected outcome
A structured architectural perspective on how AIMI-like solutions can scale, operate in industrial environments, and evolve toward more domain-specialized AI. The result should be useful both for product strategy and technical planning.

Suitable student profile
Students interested in software architecture, machine learning systems, industrial AI, data platforms, or product-oriented engineering.