

# A Human Preference-aware Optimization System.

**T**he project aims to explore the consequences of digitization for employees in logistics areas. Companies gather vast amounts of data about processes and, with modern machine learning techniques, it is easy to derive process optimizations. However, AI-based process analysis does not just hold the promise of efficiency gains. It also allows employers to assess individual employees behavior and productivity.

It expands upon the overview of this topic developed in Ethical concerns regarding the loss of autonomy and a rising stress level at work emerge. In this project, the goal is to utilize AI in an ethical manner that respects fairness, transparency and explainability. The aim is to create guidelines and design rules for applying AI in human-centered processes considering the ethical perspective. The project is a collaboration between the Chair of Materials Handling, Material Flow and Logistics at the Department of Mechanical Engineering and the Chair for International Relations in the School of Governance.

In order to achieve these goals, the project conducted a preliminary study in 2020 using experts from the IEAI researcher group and similar chairs in mechanical engineering to investigate requirements and risks for the project. To formally describe the sample workplaces, a morphological box based on literature approaches was developed from this study and identified appropriate key performance indicators (KPIs) for measuring efficiency. This resulted in five indicators for each workplace.

Next, in order to design worker preference models, basic personalities are combined with logistics job profiles. To this end, in 2020 a study was conducted in cooperation with a manufacturing company, where each participant fulfilled a work description sheet and wore a device to measure heart rate variability for 24 hours.

**From this initial work, the team found that**

- ▷ transparency, fairness, data assessment, legal boundaries and technical safeguards are important requirements for an AI optimization system.
- ▷ for the optimization methodology, transparency, fairness, process improvement and dynamic adjustments were seen as requirements.
- ▷ first evaluations of smart wearables show that it is a very suitable way to measure job satisfaction for the project.
- ▷ many of the optimization problems encouraged in this research are similar to those existing in mathematics. However, initial analyses show that there are only a few approaches using AI and further research needed.

**Plans for 2021**

With the strong technical focus from 2020, the team plans to dive deeper into ethical considerations in 2021. Requirements, concerns and the state of knowledge in using AI as process optimization will be examined. The second focus will be on the data basis for AI optimization. With suitable hardware, initial studies on movement profiles and employee satisfaction with workplaces will be conducted. From the collected logistics data, an AI model is to be built. With the model, different assumptions and data input can be investigated to gain insights for a handbook. ●

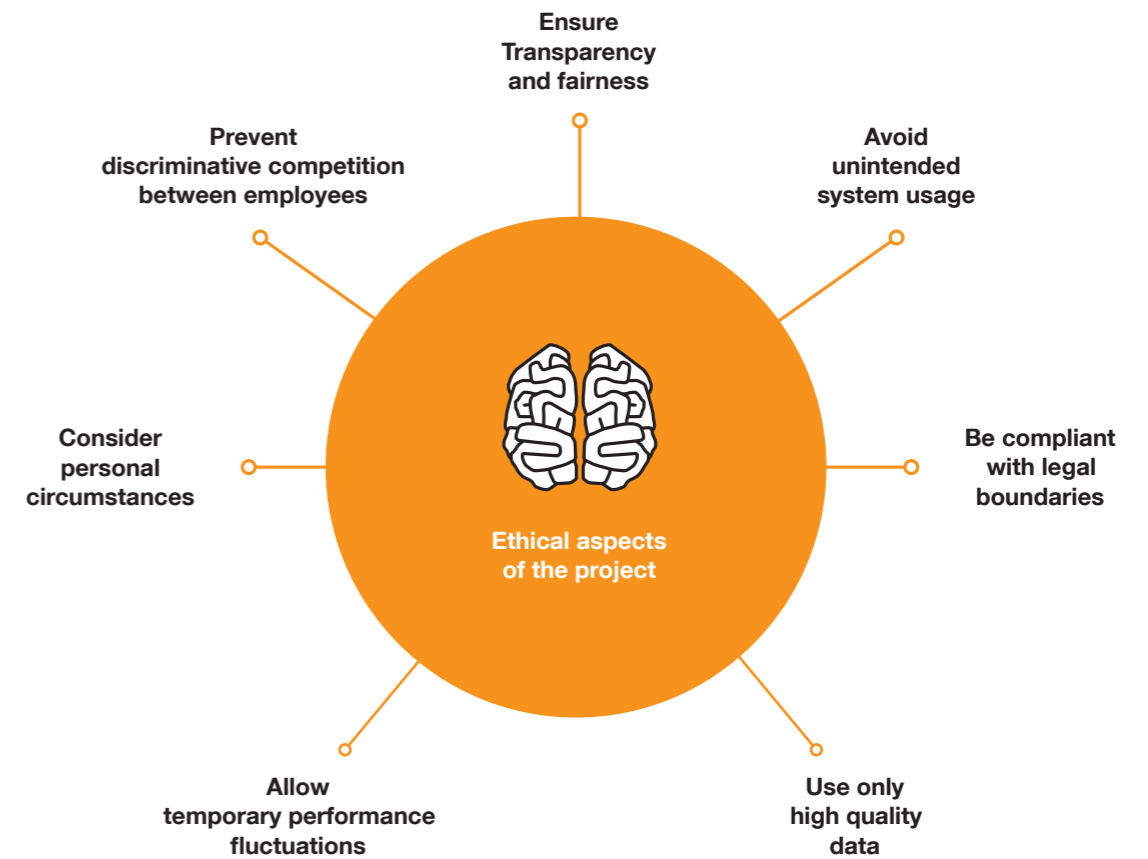
**2020 Papers and Project Highlights**

- ▷ Logistics process analysis and optimization methodology for a human preference-aware AI optimization system (Master's Thesis)
- ▷ Investigation to measure job satisfaction using fitness data from smart devices (Master's Thesis)
- ▷ Development of a personality test to improve the division of tasks in logistics (Semester's Thesis)

**2020 Conferences**

- ▷ The Responsible AI Forum (TRAIF) Preview 2020, November 2020

Ethical aspect using a decision-making AI in logistics



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