



# Towards Implementation of Ethical Issues into the Recommender Systems Design

Olga Levina  
Brandenburg-University of Applied Science  
Contact email: [levina\[at\]th-brandenburg.de](mailto:levina[at]th-brandenburg.de)



## Olga Levina



Olga received the diploma degree (Diplom, an equivalent of the Master's degree) in industrial engineering and management from Technical University of Berlin, Germany in 2007. She received her PhD in information systems from Technical University of Berlin in 2012. She was a PostDoc researcher and project manager at Technical University of Berlin until 2015 and at FZI Research Center for Computer Science in Berlin from 2016 until 2020.

Her research interests are focused on digital platforms digital transformation, business processes and ethical aspects of digital transformation.

She is currently professor for business process management at the Brandenburg University of Applied Science.



## Motivation

Machine learning-based systems (MLS) are increasingly found in our everyday lives

MLS are:

Socio-technical systems, since they are integrated into business context or human interaction

Information systems, since they are integrated into the business processes

Engineering artefacts, and thus a result of design decisions

MLS have an effect on the user (that interacts directly with the system) and the affected user (that is directly or indirectly affected by the MLS-based decision)

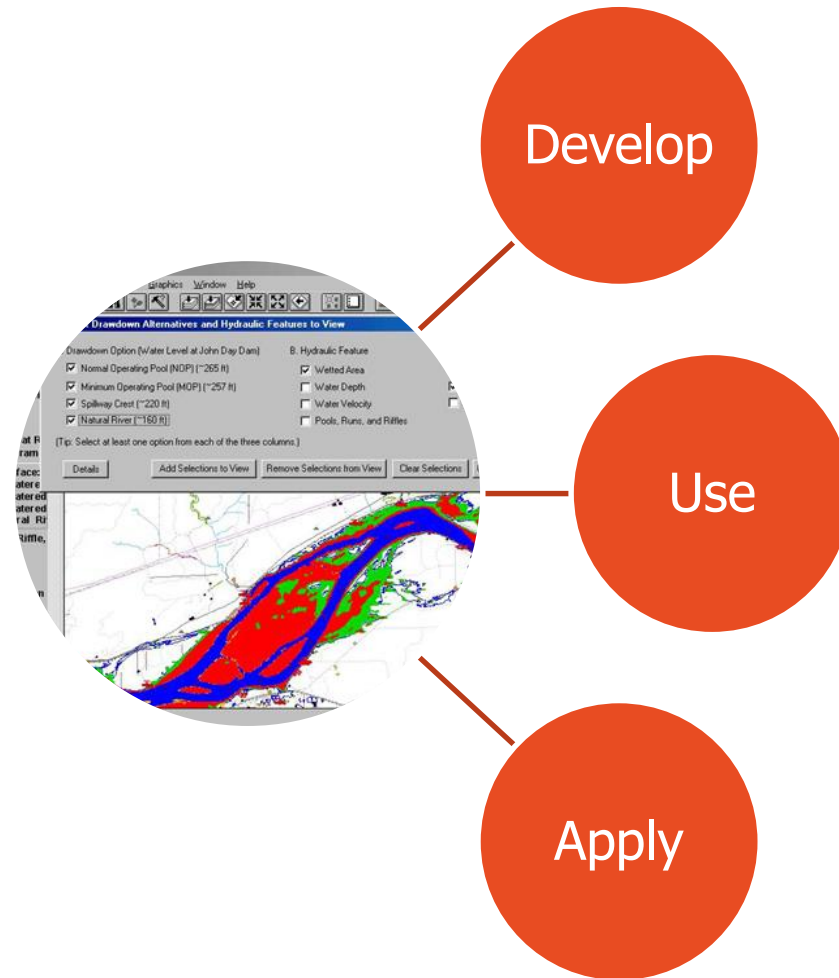
Research questions:

Where in the data processing stages do engineering decisions concerning user (behaviour) need to be made?

What are potential approaches that realize these decisions within the data processing?



## Interaction types with an MLS



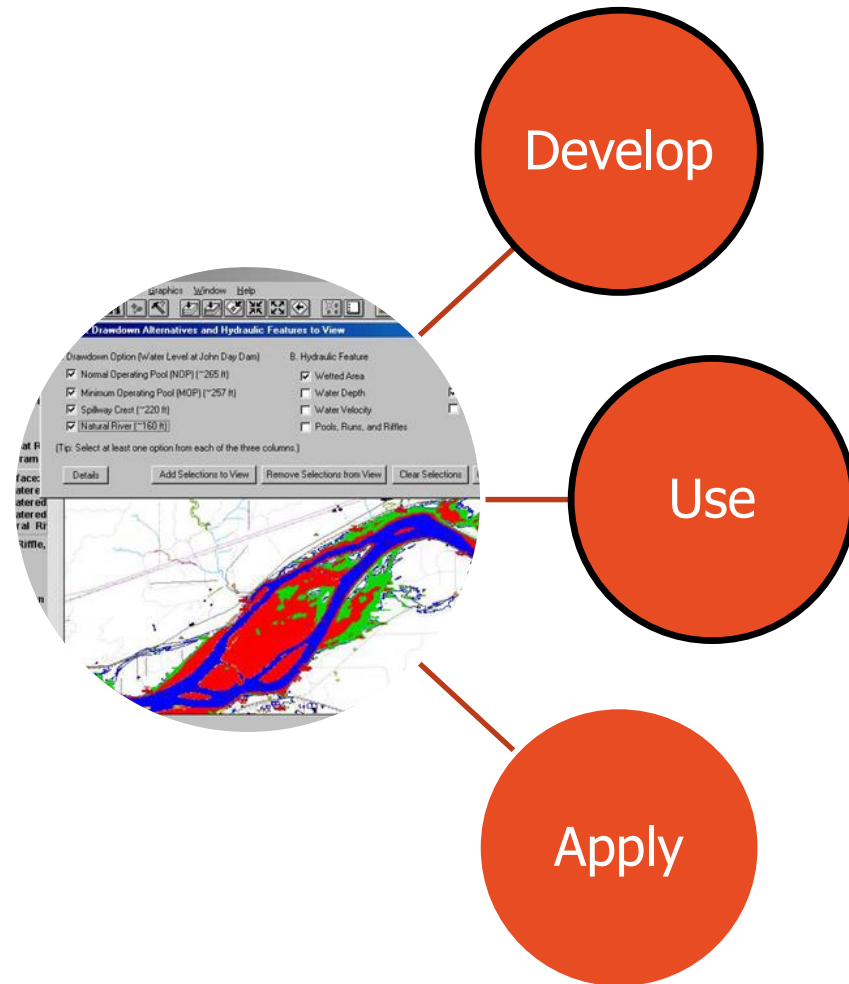
Develop

Use

Apply

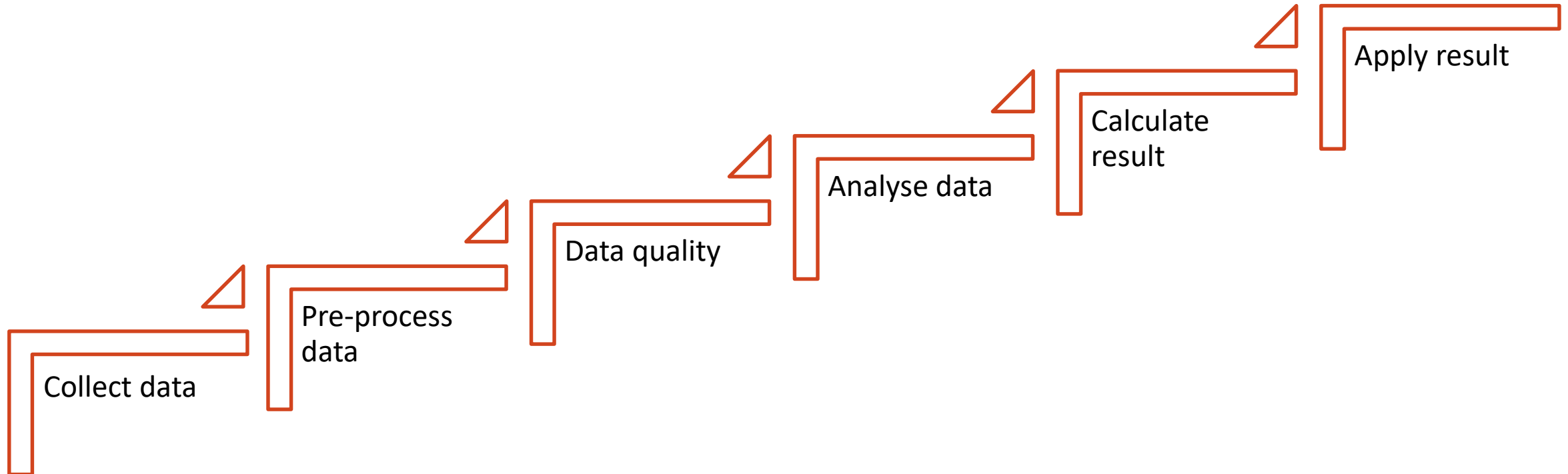


## Interaction types with an MLS





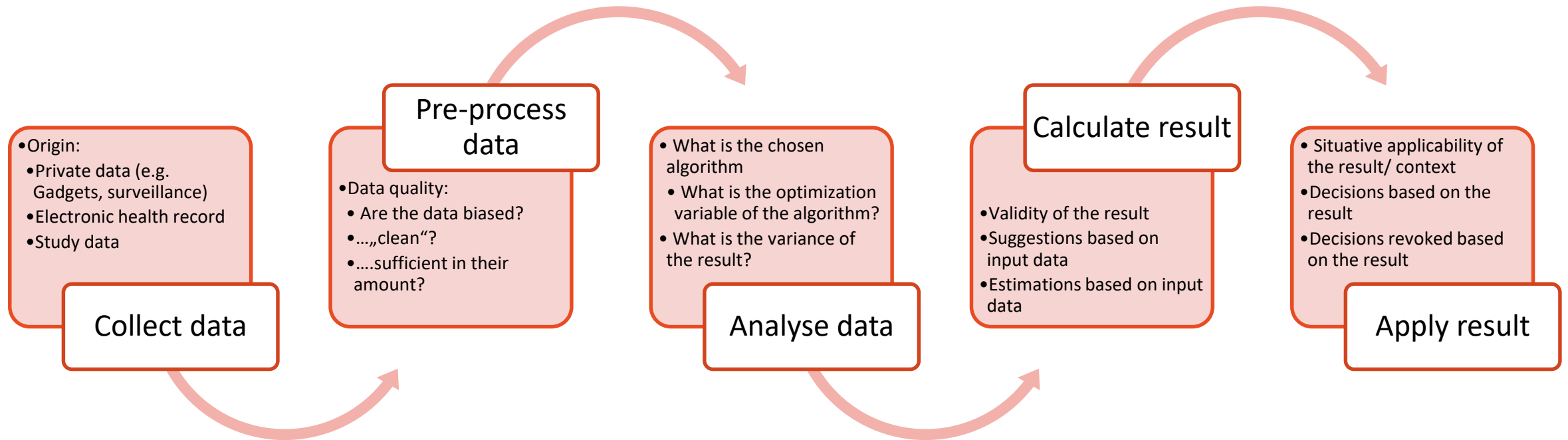
## Data Processing Phases



Adopted from: Shutt&O'Neill 2013



# Data Processing stages and potential ethical issues in recommender system context





# Solutions from the legal side: European Commission and AI regulation



## EU'S AI REGULATION: EUROPE PUTS FUNDAMENTAL RIGHTS AND VALUES FRONT AND CENTER

PRESS RELEASE – 21 April 2021

In its highly anticipated legislative proposal for AI, the European Commission today projected a clear message: fundamental rights and European values are at the core of Europe's approach to AI. Europe is basically saying: when it comes to this technology, 'anything goes' is no longer the norm. We will not allow everything, just because it can be done. And we don't just regulate bits and elements of the technology, we set EU wide rules that will resonate across the globe.

[Source: Allai.nl 2021](#)

## EU plan for risk-based AI rules to set fines as high as 4% of global turnover, per leaked draft



Natasha Lomas @riptari / 3:19 PM GMT+2 • April 14, 2021

Comment



[Source: techcrunch 2021](#)



TOP STORIES

NEWS

## EU unveils AI rules, seeking global standards

Brussels has announced tougher rules to regulate the rapidly expanding field of artificial intelligence. Aspiring to catch up with China and the US, the EU hopes the regulation dispels myths surrounding the technology.

[Source: DW 2021](#)





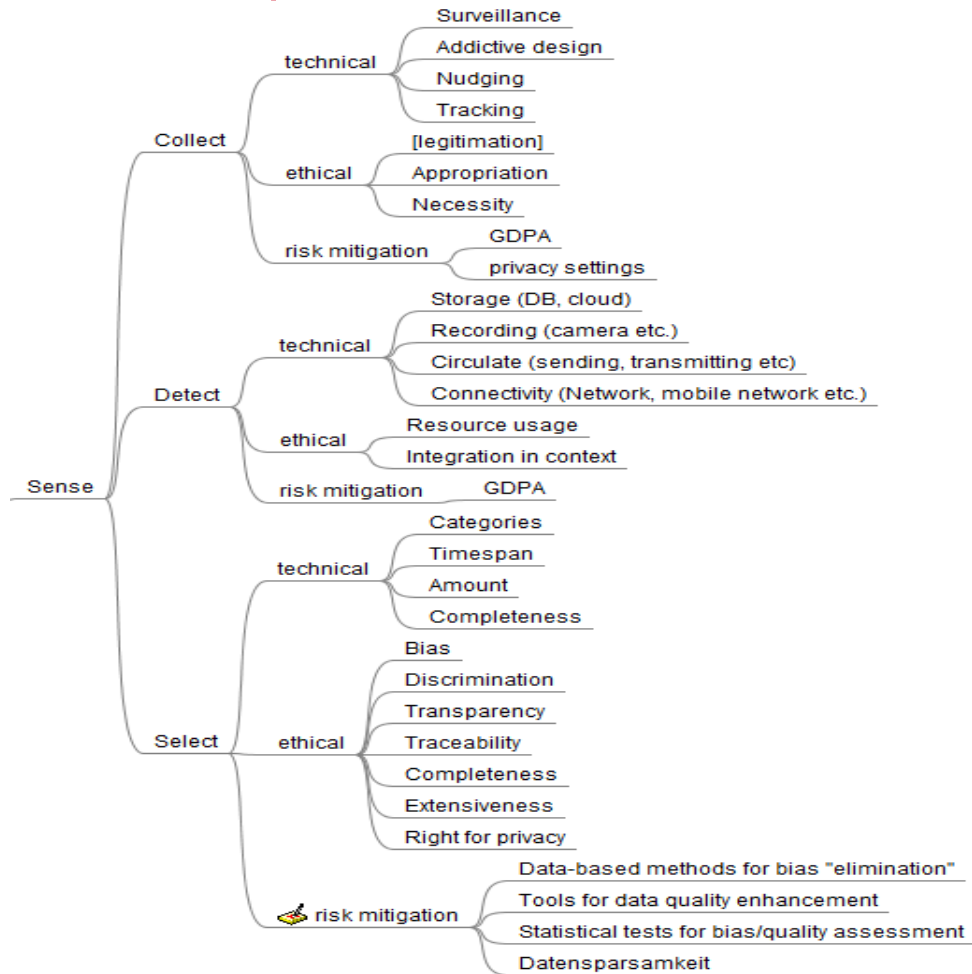
# ALTAI



European Commission 2020



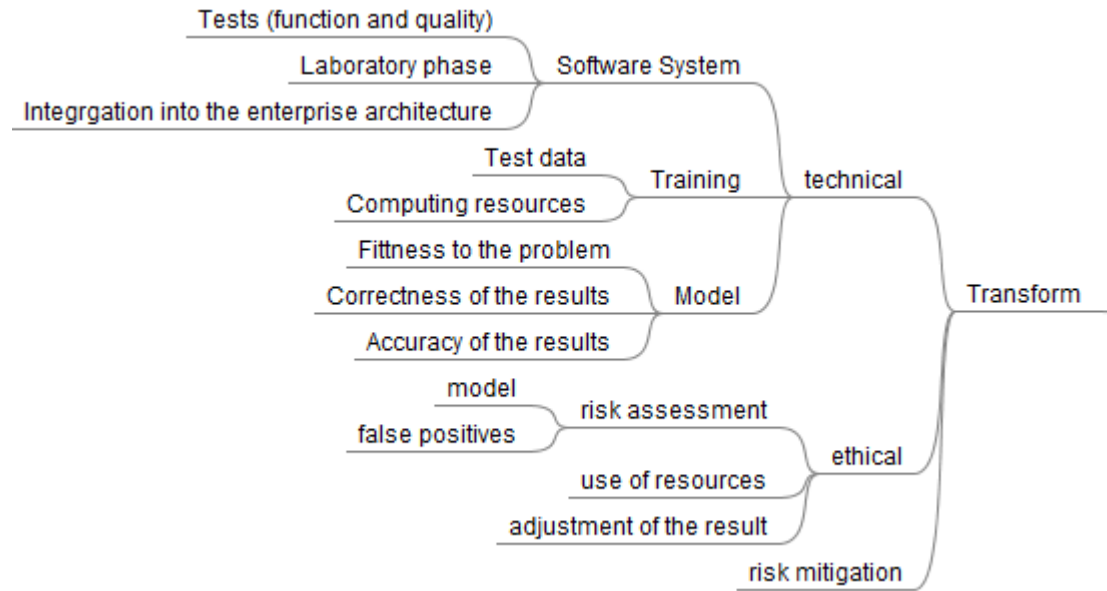
# Overview of some of the ethical issues during the data processing: sense phase based on ALTAI



Levina2020



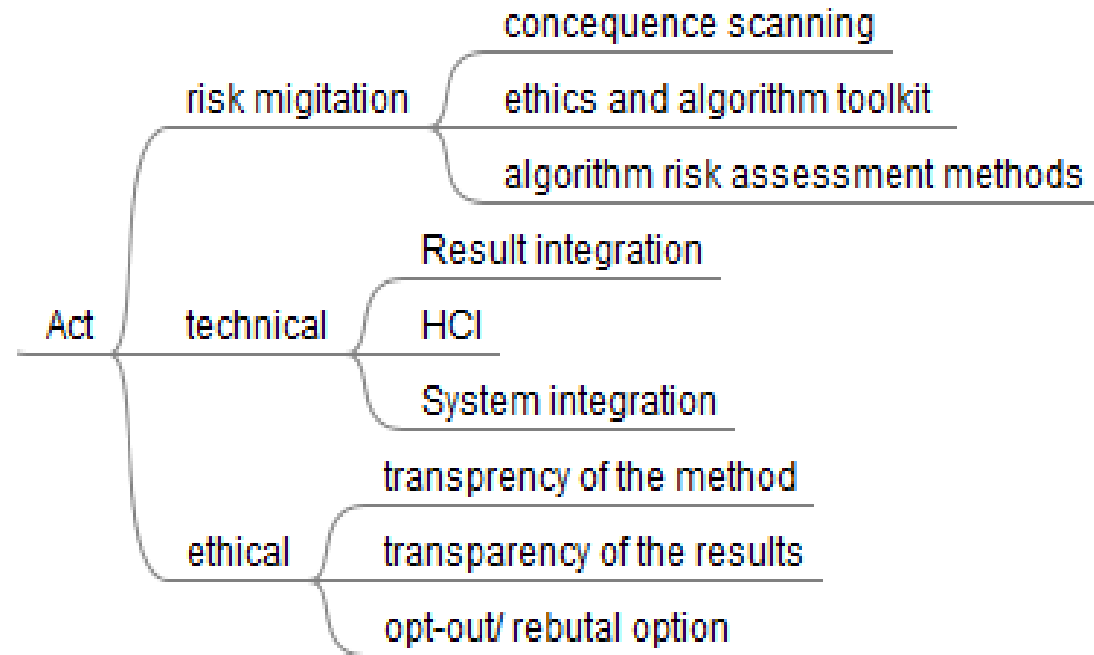
## Overview of some of the ethical issues during the data processing: transform phase based on ALTAI



Levina2020



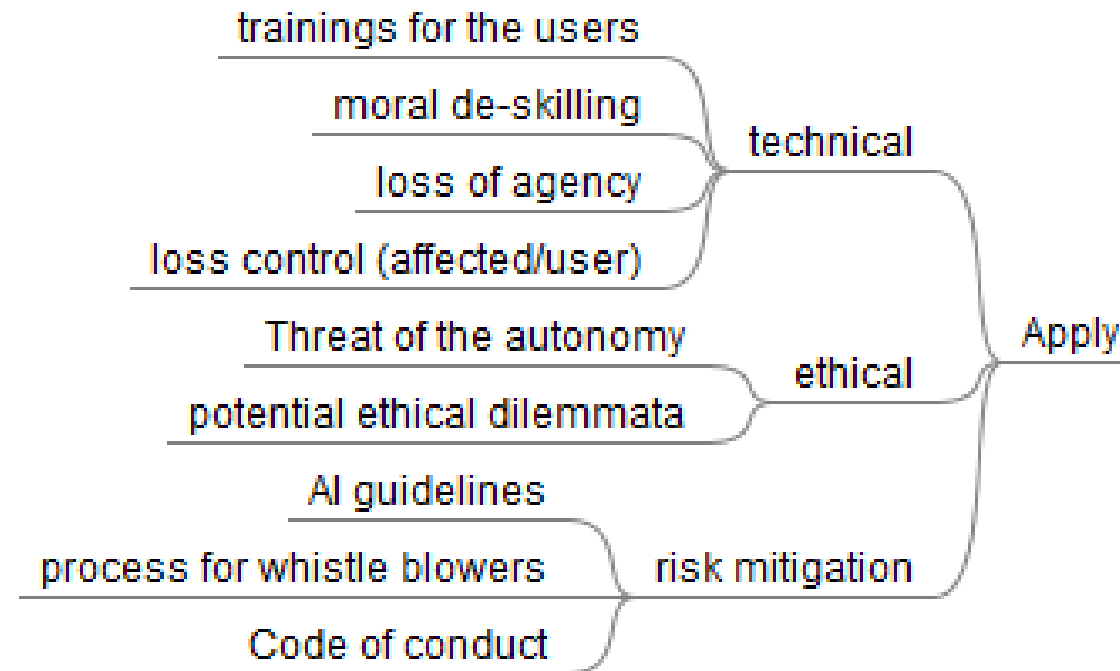
## Overview of some of the ethical issues during the data processing: act phase based on ALTAI



Levina2020



## Overview of some of the ethical issues during the data processing: apply phase based on ALTAI



Levina2020



## SOME ETHICAL ISSUES OF THE FOODAPP AND SUGGESTIONS FOR THEIR IMPLEMENTATION

Ethical issues	Suggestion for implementation
No explanation on the data storage	<p>System/UI: Include clear and transparent information for the user about the data storage, in e.g., in individual contracts or in general terms and conditions.</p> <p>System: Develop a concept for deletion routines if the purpose of the data processing is no longer applicable. Accordant selection of the storage location.</p>
No explanation on the purpose of data collection	<p>UI: Provide information, e.g., via mouse hover, about the purpose of the data collected in the field, as concrete as possible</p> <p>System: To collect data that are not essential for the provision of the service, provide opt-in options by asking the user directly, e.g., "Would you like to help us to improve our service by providing your automated location data?"</p>
Lack of an opt-out for specific data type collection	System/UI: Privacy friendly default settings, e.g., opt-in function for every data item collected instead of the implementation of the "required" fields.
Lack of the possibility to manually adjust the collected data	System: Possibility to add or correct data manually, e.g., to type the address for delivery. Establish a reporting system for customers if they wish to have data corrected.
The fact that stakeholders have access to the collected data by FoodApp	<p>Business: No data exchange between other stakeholders without agreements; user can be asked if s/he wants specific data to be shared for a specific purpose with the specific partner (a reimbursement could be offered)</p> <p>Implement an accordant opt-in or rewarding mechanisms for the user in the settings.</p>
Data life cycle is unclear for the user	<p>System: Describe the data life-cycle to the user, e.g., on the FAQ page.</p> <p>Integrate an automated deletion routines after the needed data are collected; inform the user about the routine in the FAQs, provide opt-ins for further data collection if needed; implement a reward system for additional data collection.</p>



## Dimensions of the realization of the ethical issues

### Business level:

- The ethical issue needs to be discussed and decided on the level of business model, business goal or business strategy
- Examples:
  - To minimize biased meal offers on the FoodApp, conduct user surveys regularly to access the developing trends or biases;
  - Conduct regular environment assessments, such as traffic jams frequency, to assess potential effects of individualized food delivery

### User Interface (UI):

- The ethical issue needs to be included into the visual design of the application
- Examples:
  - Provide a (mouse-over) explanation of the driver or restaurant rating system
  - Provide a weighting possibility for cuisine/delivery/etc. choices that are included in the recommendation algorithm

### System level:

- The ethical issue needs to be considered during the system design or the design of information system architecture
- Example:
  - Describe clearly in the FAQs the data and privacy policy including a clear opt-out from the specific features



## Summary and Outlook

Ethical issues in the context of a recommender systems have been identified

Ethical issues were aligned with the data process to indicate operational issues and solutions during the engineering process

Solutions on different levels, business, UI or system design, have been drafted

Evaluation of the suggested solution paths as well as the identification process are needed





## References

O. Levina, "A Research Commentary- Integrating Ethical Issues into the Data Process," in *WI2020 Community Tracks*, GITO Verlag, 2020, pp. 321–330.

O. Levina, "AI and ethics in medical research", [www.systembiologie.de](http://www.systembiologie.de), Dec. 2020, pp.8 (Levina 2020a)

European Commission 2020, "Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment | Shaping Europe's digital future," 2020. <https://ec.europa.eu/digital-single-market/en/news/assessment-list-trustworthy-artificial-intelligence-altai-self-assessment> (accessed June 07, 2021).

R. Schutt and C. O'Neil, *Doing Data Science- Straight Talk from the Frontline*. O'Reilly Media, 2013, p.51



**Fachhochschule  
Brandenburg**  
University of  
Applied Sciences  
**Fachbereich  
Wirtschaft**



Thank you!

Questions?

Olga Levina

[Levina\[at\]th-brandenburg.de](mailto:Levina[at]th-brandenburg.de)