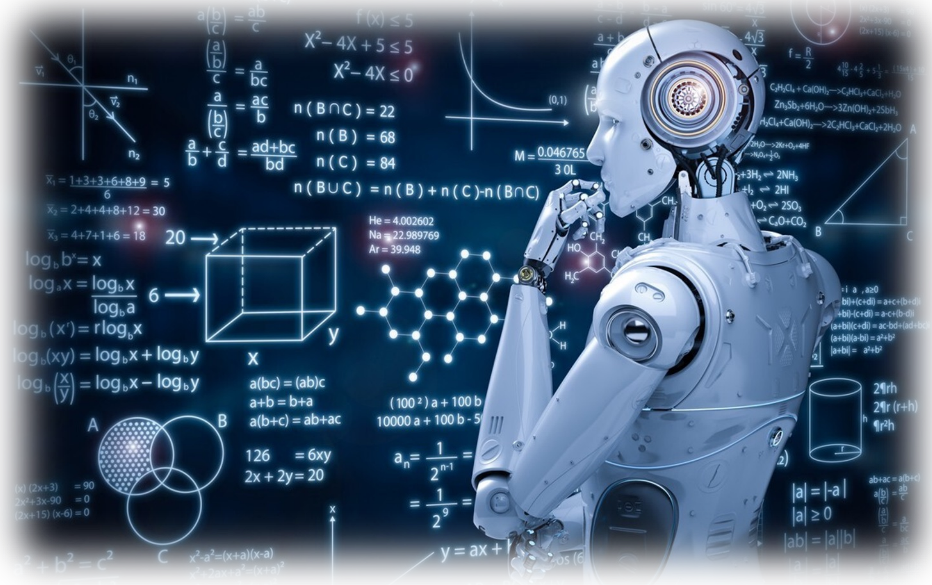

Seminar on
Artificial Intelligence I

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Oxford-Style Debates

- *prior debate:*
  - **form a team and decide the debate question** (in cooperation with the teacher)
  - **send two references per team** (web link, paper, etc.) one week before the debate
- *debate day (Monday):*
  - **introduction** of the topic by the moderator (5 minutes)
  - **initial anonymous voting** of audience (the result will be revealed after the discussion)
  - **opening remarks** (each speaker will have 2 minutes for the initial statement supporting his/her side; the order of sides is selected randomly at the beginning, speakers from both sides speak on a rota basis)
  - **intra-panel discussion** (between the speakers and the moderator with chance to react to the other side; 10-20 minutes)
  - **Q&A** (questions/comments from the audience with response from the speakers; 20-30 minutes)
  - **closing remarks** (each speaker will have 1 minute; the order is reverse to the opening order)
  - **final anonymous voting** of audience
  - **decision of the winner** (the side with the increase of number of votes wins)

Reading and reporting

- **Select** a paper to report (in cooperation with teacher)
  – could be own work from thesis etc.
- **Read** the paper (and understand it ;–)
  – maybe look around to understand the topic
- **Present** to others
  – 30 minutes presentation
  – evaluation of presentation

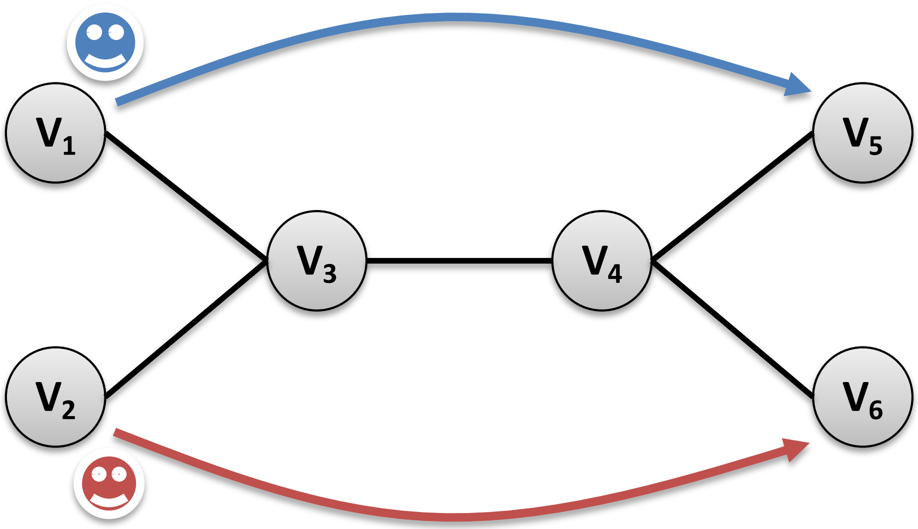
Seminar schedule

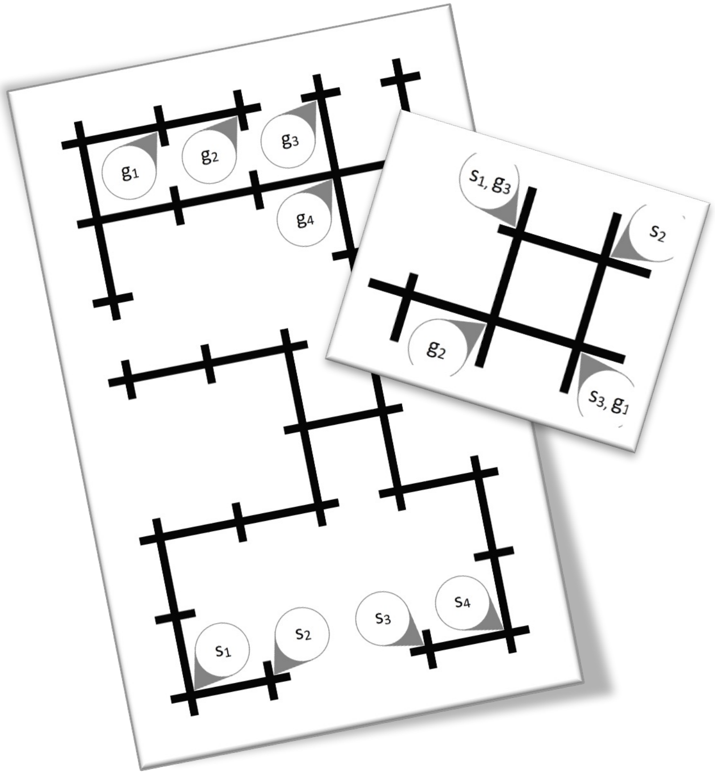
Date	Content
13.10. 2025	**Oxford Debate (4 students)**
20.10. 2025	**Oxford Debate (4 students)**
27.10. 2025	*Home preparation of talks*
03.11. 2023	*Home preparation of talks (Backup for Oxford Debate)*
10.11. 2025	*Home preparation of talks (Backup 2)*
17.11. 2025	**Cancelled!**
24.11. 2025	*Paper presentations (2x)*
01.12. 2025	*Paper presentations (2x)*
08.12. 2025	*Paper presentations (2x)*
15.12. 2025	*Paper presentations (2x)*
05.01. 2026	*Backup for paper presentations (2x)*

Credit requirements:

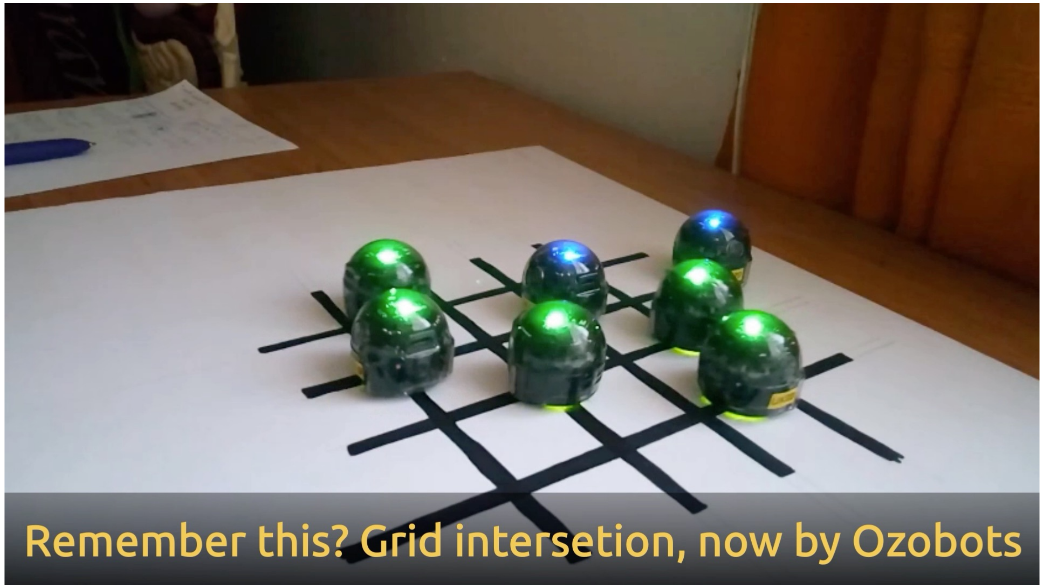
- Participation in (at least one) Oxford Debate
- Active participation in 8 seminars – including kick-off and today (one missed seminars can be substituted by a written report)

- an (undirected) **graph**
- a set of **agents**, each agent is assigned to two locations (nodes) in the graph (start, destination)
- agents can **move** (to a neighboring node) or **wait**
- find a **collision free path** for each agent





- Problem solving: transformation to SAT/CSP/ASP
- Plan execution on real robots
- Generating robust plans
- Applications:
  - Warehouses
  - Traffic junctions
  - Train scheduling
- Problem variants
  - Colored MAPF



Hierarchical planning is an approach to planning by task decomposition.

A **plan** – a sequence of actions – must adhere both to **causal dependencies** between activities and to the **decomposition structure**.

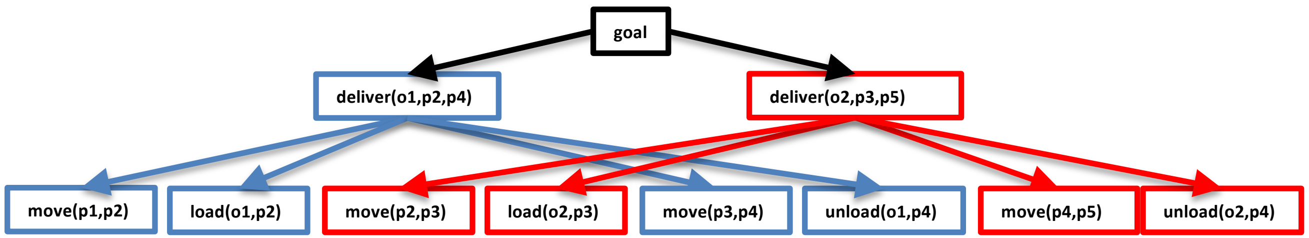
Grammar model:

$\mathbf{T \rightarrow T_1 \ldots T_k\ [C]}$

where C are decomposition constraints:

- $\mathbf{T_i < T_j}$: ordering of tasks
- **before(p,U)**: a precondition constraint
- **between(U,p,V)**: a prevailing constraint

deliver(Obj,From,To) →
$move_1$(X,From).
$load_2$(Obj,From).
$move_3$(Y,To).
$unload_4$(Obj,To)
[1<2, 2<3, 3<4, between(2,loaded(Obj),4]
goal →
$deliver_1$(o1,p2,p4).
$deliver_2$(o2,p3,p5).

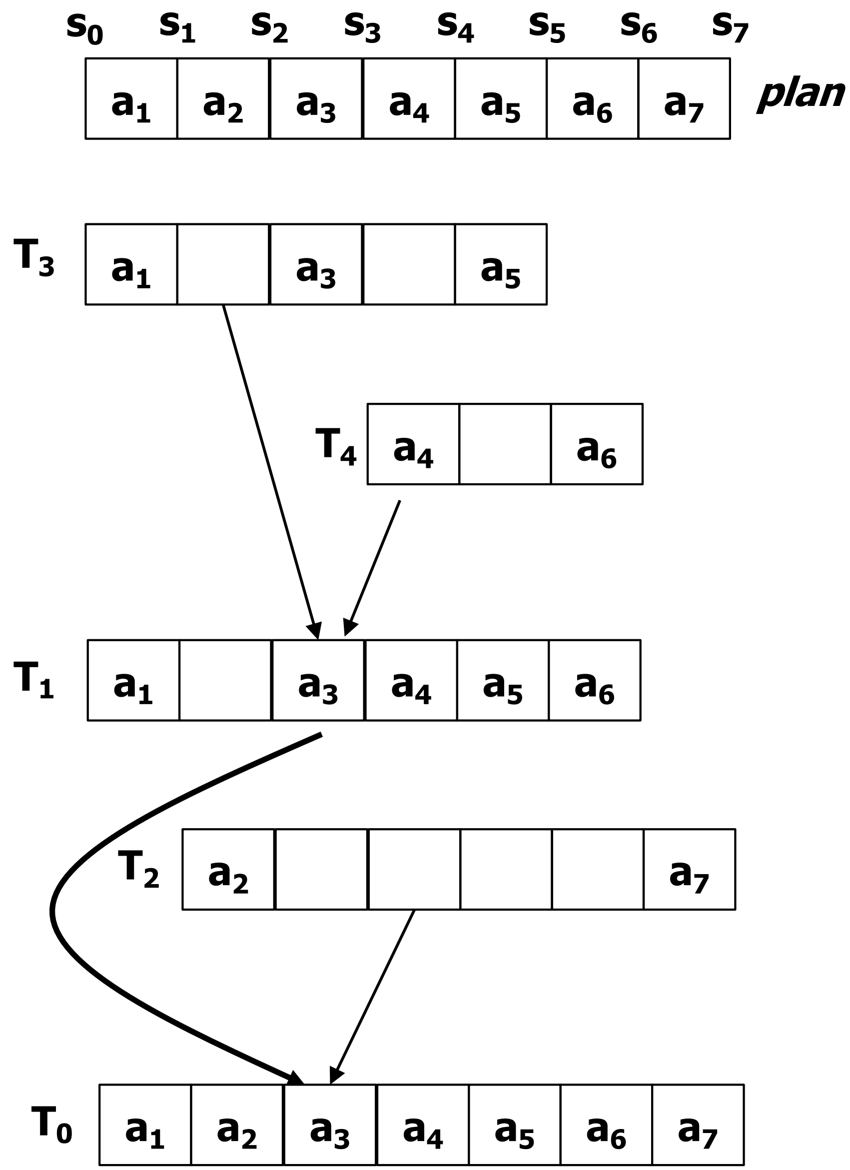


HTN: What do we do?

- Plan validation by parsing
- Plan correction
- Plan recognition

- Model correction
- Model construction

$T_0 \dashrightarrow T_1\,T_2$
$T_1 \dashrightarrow T_3\,T_4$
$T_2 \dashrightarrow a_2\,a_7$
$T_3 \dashrightarrow a_1\,a_3\,a_5$
$T_4 \dashrightarrow a_4\,a_6$



THE HYPER EXPERT COLLABORATIVE AI ASSISTANT

linkedin.com/peer-ai

@Peer_Ai

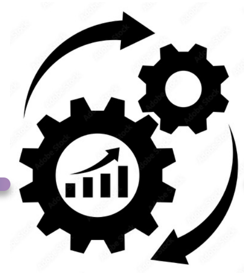
@PEER-AI

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101120406

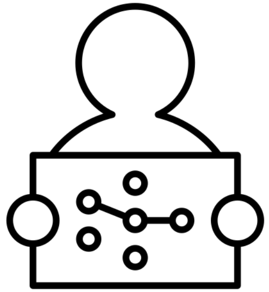
What are our objectives?

To develop human-centered AI assistant for sequential decision-making

Bi-directional communication between AI and users



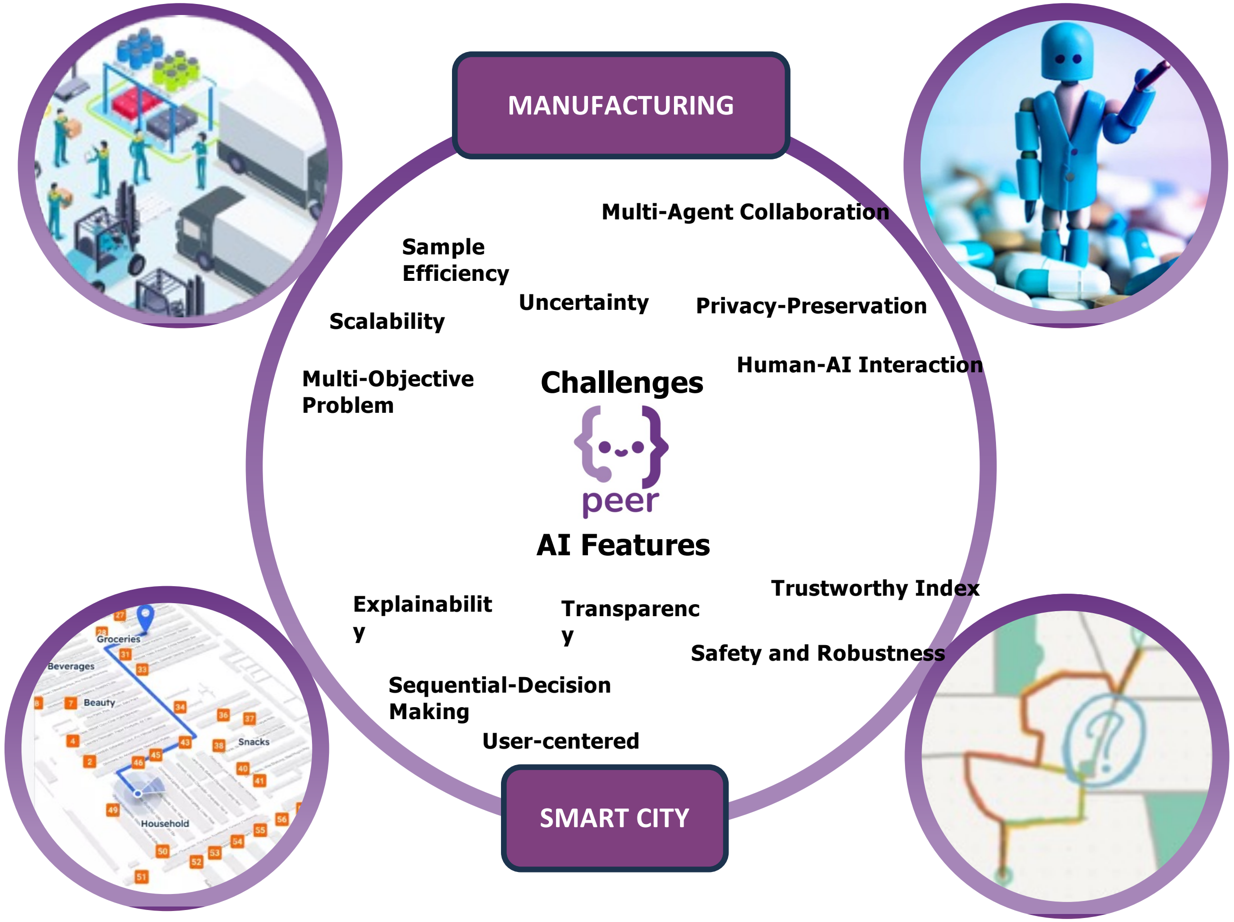
AI-assisted and human-centred optimization



Adaptive and Responsible AI

PEER will: Interactivity, understandability, Increase reliability and trustworthiness of AI solutions.

PEER focuses on manufacturing and daily life



Use cases | Smart City

UC1: Route Planning

During the PEER project, City of Amsterdam wants to develop a local personalized navigation app for people with reduced mobility using the accessibility map & data. The application should consider the different personal needs & requirements that users might have (preferences, sidewalk width, curbs, obstacles, etc.) and can propose an optimized route based on these.

WHY PEER?

- Inform citizens of the best routes regarding individual requirements
- Improve accessibility of the city
- Empowering people with reduced mobility

UC2: Shopping Guidance

The aim for the app within the PEER project is specifically about in-store navigation in the hyper supermarkets: MC Sonae would like to add functionalities to SIGA app that can help customers to find products in the store using preferred plans.

WHY PEER?

- Time-efficiency for clients.
- More efficient systems performance-wise (simpler, faster, robust) - more competitive.
- More understandable system compared to the current one.
- Optimize routes based on human preferences.

Use cases | Smart Manufacturing & Logistics

UC3: Drug Inspection

Proditec wants to design a self-learning AI system using anomaly detection algorithm for improved defects detection on a machine for pharmaceutical tablets or capsules.
The system will use AI to make the defects detection process simpler, faster, and more efficient, by increasing efficiency and performance but decreasing recipe setting time.

WHY PEER?

- Time-efficiency for clients.
- More efficient systems performance-wise (simpler, faster, robust) - more competitive.
- More understandable system compared to the current one.

UC4: Warehouse design

Datacation involves the operation of a large warehouse storing different chemical products, which must comply with stringent regulations regarding storage proximity and safety measures. The warehouse must efficiently manage the constant flow of trucks transporting these products, requiring (near) real-time decision making. Furthermore, due to this environmental dynamics, adaptive decision-making on product placement is highly required.

WHY PEER?

- Efficiently optimize multiple objectives such as the storage layout, cost, safety, customer satisfaction and labor efficiency;
- Include human-AI collaboration for the daily, ad hoc, decision-making considering product placement

Modular Architecture