1. Background & Aim

- Al need common sense to achieve more **human-like** conversations, decision and actions¹.
- Tacit knowledge (common sense): the knowledge we rely on to navigate concrete, everyday situations.
- **Crowdsourcing**: collection of abundant information from the crowd (for machine learning training).

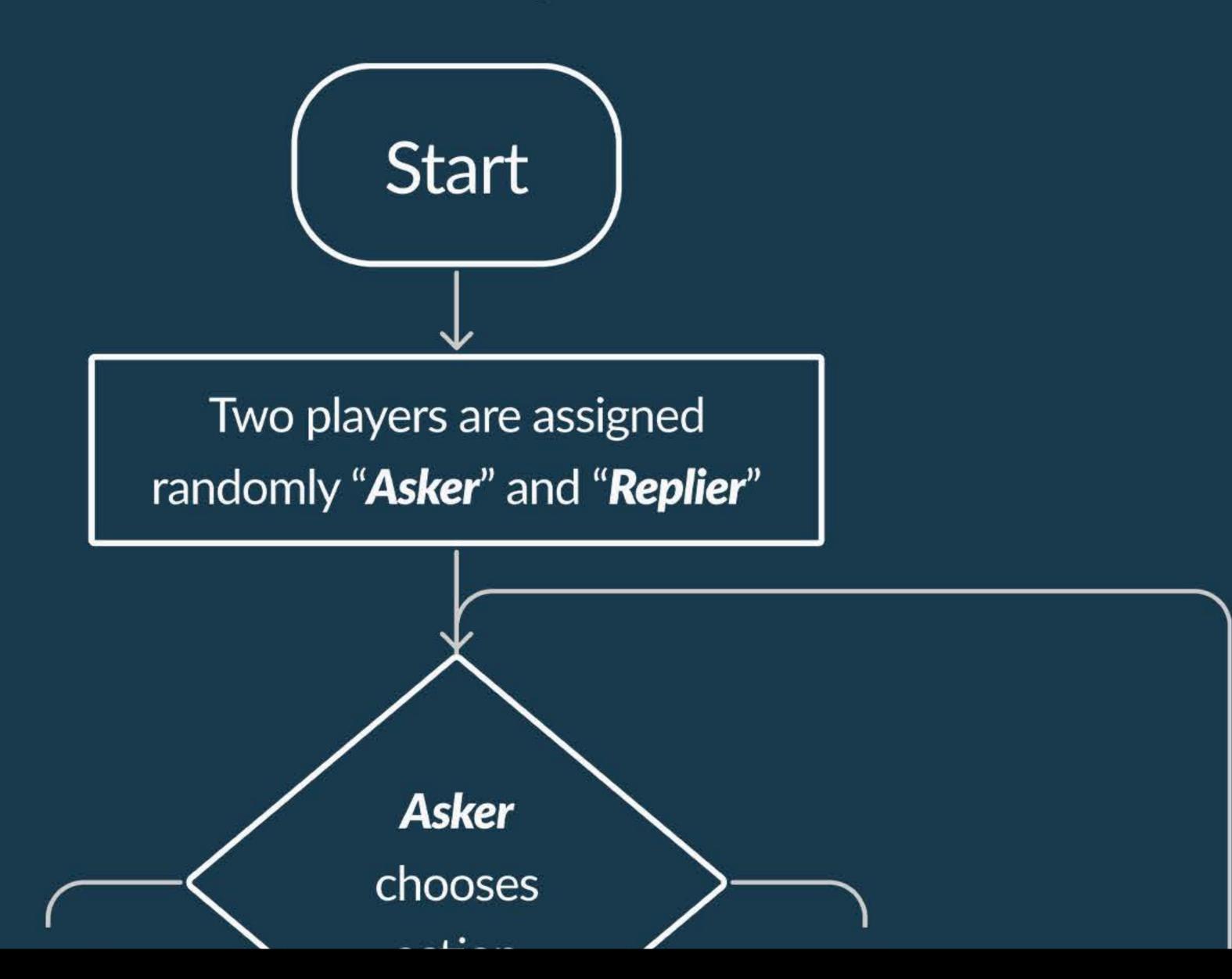
RQ: How to best design and implement a multiplayer game for discriminative tacit knowledge elicitation using photos?

- 1. Develop a **GWAP** (Game With A Purpose)²: games that while being fun collect valuable data as a side effect.
- 2. Use *gamification* techniques to make the collection of human abilities entertaining and engaging.
- 3. Evaluate such a game in terms of data collection efficiency, accuracy and user engagement.

2. Game architecture

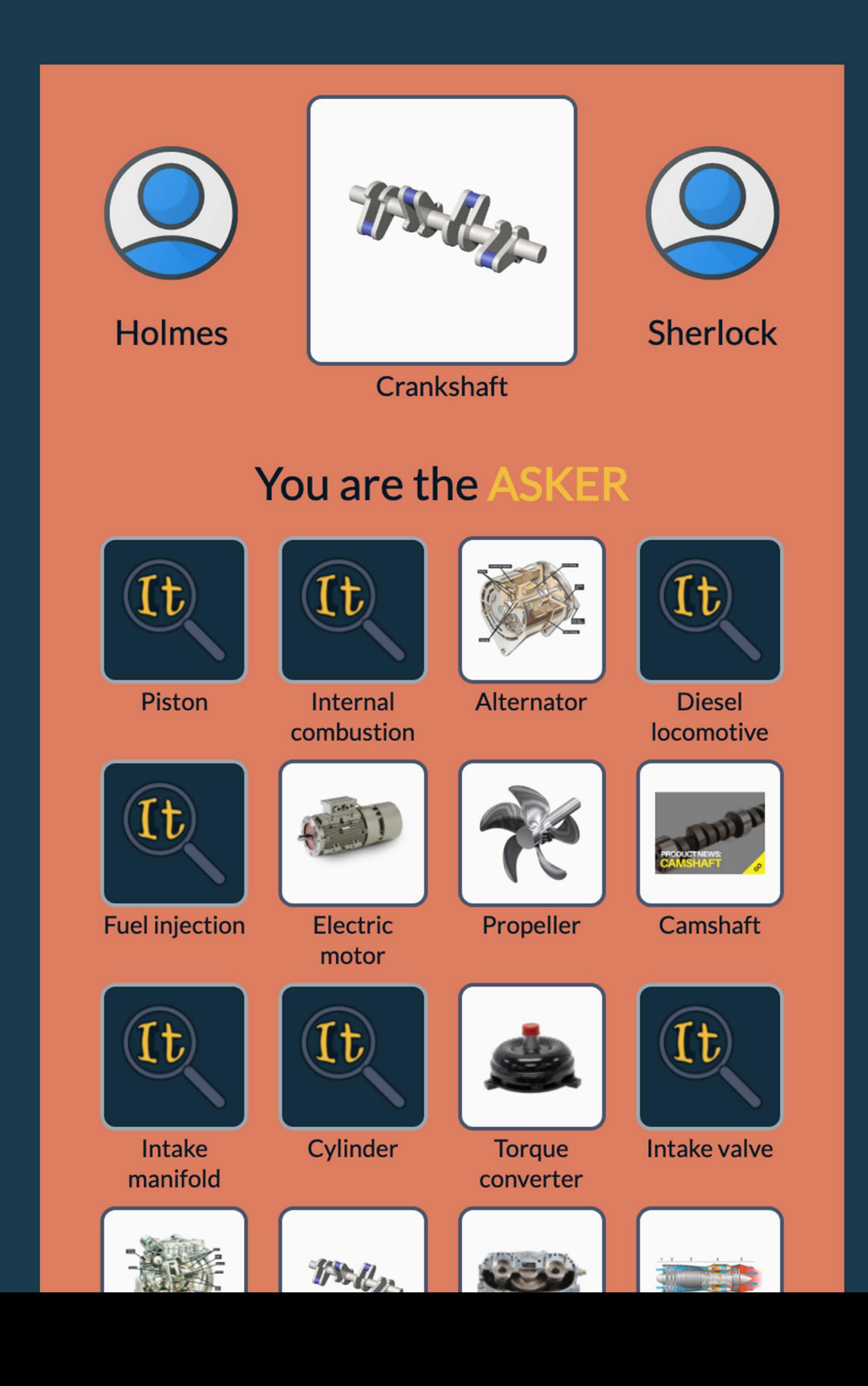
FindItOut is a *multiplayer game* played by two players, who take turns being the "Asker" and "Replier".

- Players see a board containing *pictures* of objects, one of these is assigned to each player as their *IT card*.
- Each player's main goal is to guess the other player's **IT card** by asking questions in turn.
- These questions provide insight into various types of tacit knowledge about each object.





A Crowdsourcing Discriminative Tacit Knowledge Elicitation Multiplayer Game Using Pictures



3. Results

Collected knowledge:

<Relation, Object, Target, Result, Weight>

• Relation: one of

| Explicit question | | | |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Is your object a(n) | ? | | |
| Does your object have a(n) | ? | | |
| Is your object(prop | perty)? | | |
| Can your object be used for | ? | | |
| Can your object | _? | | |
| Is your object made of | ? | | |
| Is your object part of (a) | ? | | |
| Can your object be found at | ? | | |
| | Is your object a(n) Does your object have a(n) Is your object (prop Can your object be used for Can your object Is your object made of Is your object part of (a) | | |

- Object: object in the card
- Target: free text inserted by Asker
- Result: True if relation applies positively else False
- Weight: confidence of this assertion

E.g.: <HasA, rotary engine, moving parts, True, M>

| From | To | Action | Knowledge | Weight |
|-------|-------|-----------|-------------------|--------|
| Uncov | Uncov | Unchanged | R(C,T)=A | Medium |
| Uncov | Cov | Flipped | $R(C,T) = \neg A$ | Medium |
| Cov | Uncov | Unflipped | R(C,T)=A | High |
| Cov | Cov | Unchanged | R(C,T) = False | Low |

Fig. 3: Conversion table from player actions to knowledge. R = Relation, C = Concept, T = Target, A = Answer

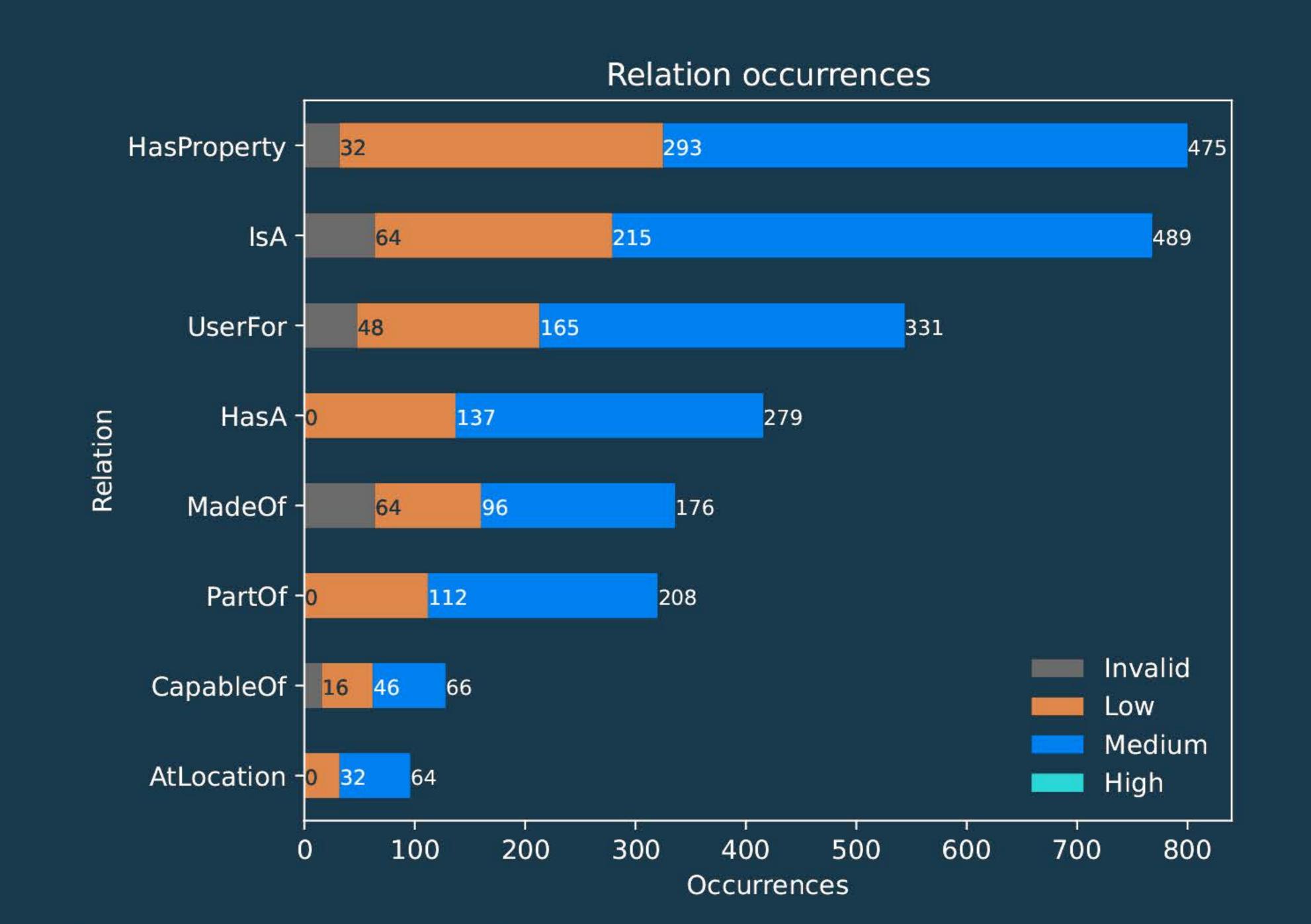


Fig. 4: Occurences of each relation type and weight. 3408 total assertions collected in 36 game sessions.

Evaluation:

- Efficiency: 10.45 assertions/minute with 2 players
- Accuracy: 90~95% accurate from random sampling
- Engagement: 71.5% score