Towards an active predictive relation by reconceptualizing a vacuum robot

A study on the transparency and acceptance of the predictive behaviors of vacuum robot

With the development of Artificial intelligence and Machine learning capabilities, the connected objects are extended with the predictive capabilities and the character of things is changed to "things that predict" (Smit, 2019). If a connected device is able to embrace a predictive system that not only profiles for scripted behavior but could also use the knowledge co-created by all the other similar devices and their users that encounter similar situations, the predictions can be generated based on that. In this case, a new type of interplay between humans and things called "predictive relation" is created.
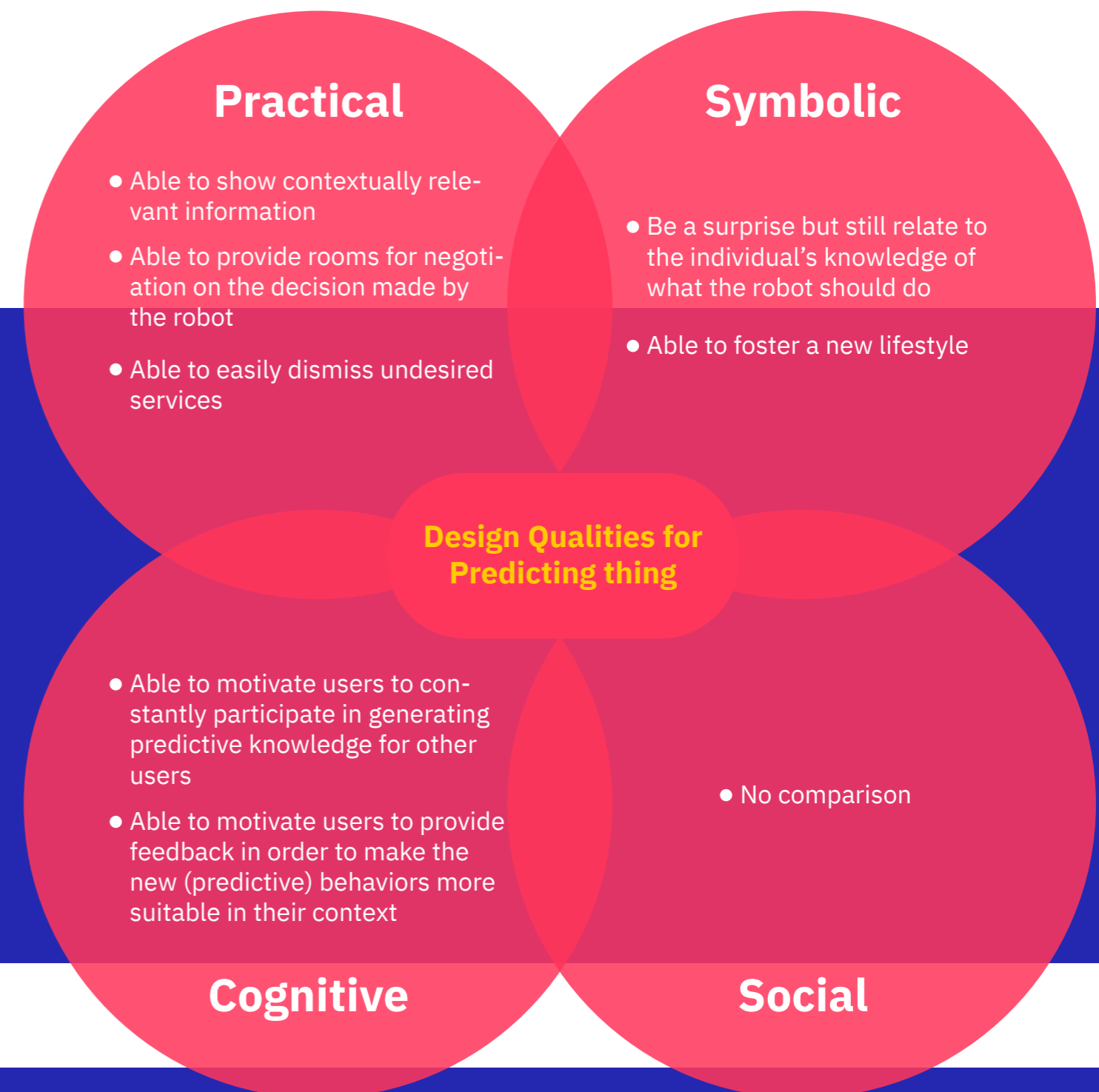
> ## How to design transparent and acceptable predictive relations for the things that predict?

The purpose of this project is to explore the predictive relations and study the transparency and the acceptance of the predictive behavior. In answering the initial research question, this project proposed 2 propositions for transparency and acceptance respectively by combining the insights generated from the case study of XiaoMi's vacuum robot and the creative session of envisioning the working of predicting vacuum robots. The 2 propositions are evaluated through the method of 'Wizard-of-oz' and proved valid by combining the results of quantitative and qualitative research.

Acceptance

Proposition: The domestication qualities indicate how the predictive knowledge of the vacuum robot is being implemented and accepted in our life.

Based on the domestication theory (Søraa et al., 2021; Berker, 2005; Lie and Sørensen, 1996), this project also identifies and verifies the design qualities for the acceptance of the predicting vacuum robot. 8 qualities are divided into 4 dimensions and summarized as follows:

Practical
- Able to show contextually relevant information
- Able to provide rooms for negotiation on the decision made by the robot
- Able to easily dismiss undesired services

Symbolic
- Be a surprise but still relate to the individual's knowledge of what the robot should do
- Able to foster a new lifestyle

Design Qualities for Predicting thing

Cognitive
- Able to motivate users to constantly participate in generating predictive knowledge for other users
- Able to motivate users to provide feedback in order to make the new (predictive) behaviors more suitable in their context

Social
- No comparison

Loop of co-performance in individual circumstances

Transparency

Proposition: The loop of co-performance in the proposed wireframe, will result in the changing autonomy level and help to increase the understandability and trust of the predictive behavior.

This project proposes a wireframe of generating predictive behavior, indicating how the predictive knowledge is being developed. The proposed wireframe also indicates a loop of co-performance where humans and robots will learn and adapt the behavior of each other and the labor distribution between humans and robots will be dynamically changed throughout the interplay. Also, since the interplay reveals the learning process, the reasoning and the generating process of the predictive behavior can be explained in the loop of co-performance, and thus enhance the transparency of predictive behavior.
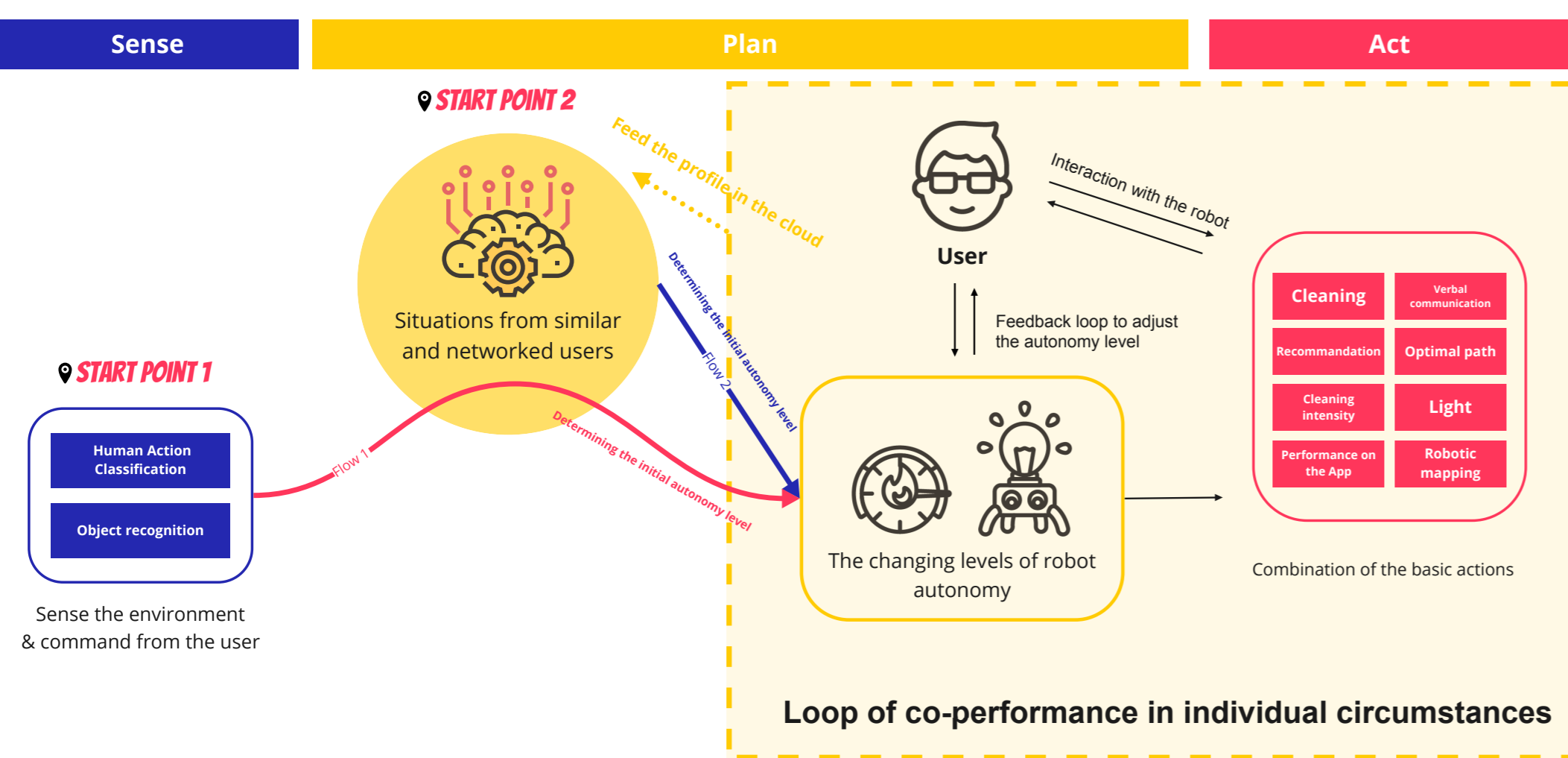
Designers as facilitators of human-robot collaboration

This project takes designing a guidebook as one of the ways to clarify the idea and integrates the main results of the project into the guidebook to facilitate the collaboration between humans and predicting robots.

The working of a predicting vacuum robot

Human's roles in the collaboration
Tips for human to work with the predicting vacuum robot

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Design for Interaction (Master Variant for Engineers)

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