Dutch Prize for ICT Research 2014

M. Birna van Riemsdijk

M. (Maria) Birna van Riemsdijk (1978) studied computer science at Utrecht University where she obtained her doctorate in 2006 for research into rational software agents.

She is currently an assistant professor in the Interactive Intelligence group at Delft University of Technology. Her research lies in the intersection of theoretical computer science, artificial intelligence and human-machine interaction. She develops a 'Socially Adaptive Electronic Partner' (SAEP): a software concept that supports people in everyday life and that takes decisions which respect users' norms and values. She was awarded a Vidi grant for this research in 2014. In addition she leads several other projects such as the multidisciplinary ICT project SHINE and research within the COMMIT programme.

Van Riemsdijk organises various international ICT conferences and has been elected as board member of the agent technology organisation IFAAMAS. Furthermore, through VHTO she regularly participates in "speeddates" with high school students with a view to increasing the interest of girls in computer science.
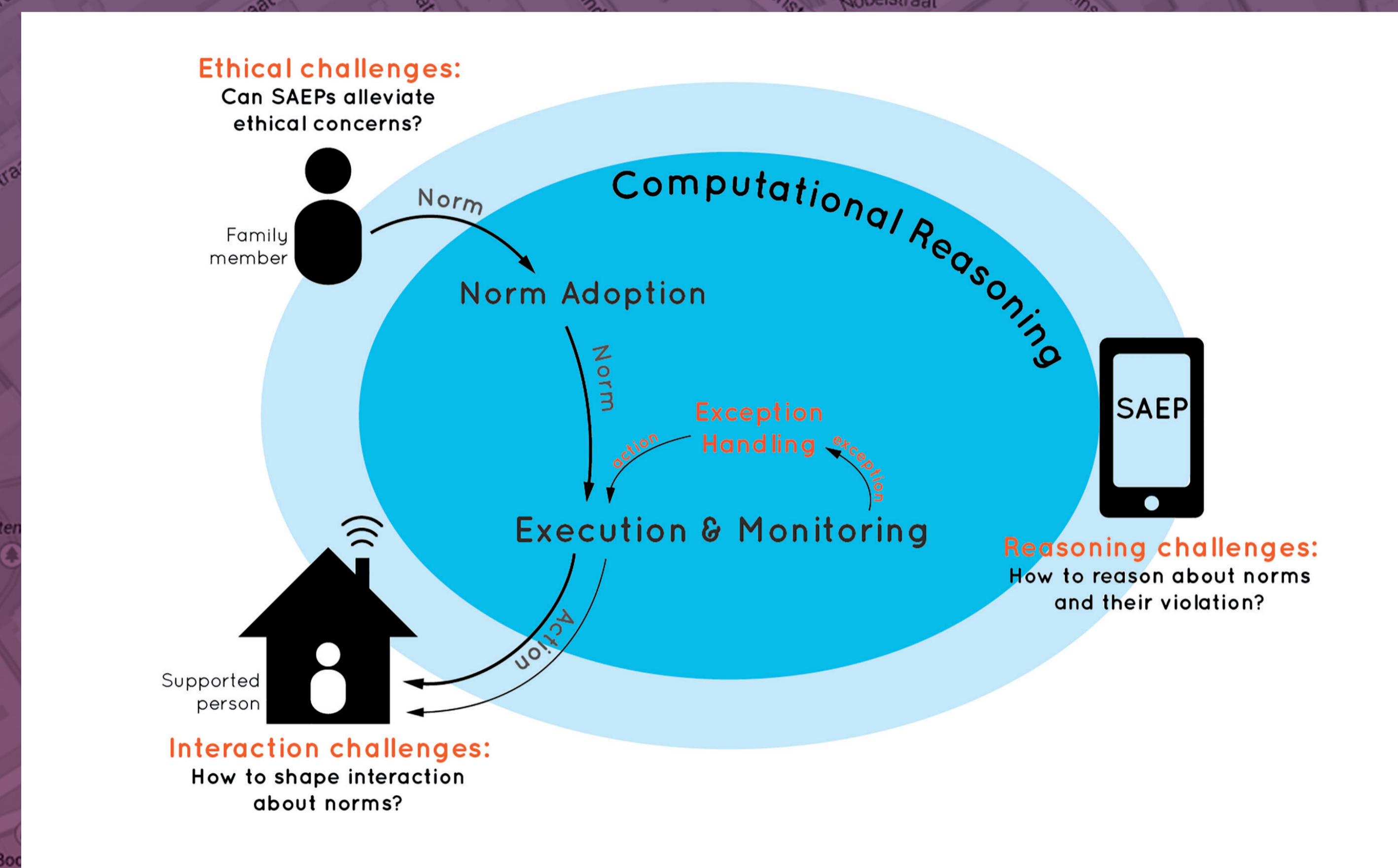
Reasoning about norms

In 2013, Birna van Riemsdijk published an article in which she proposed for the first time how you could think about 'norm compliance': the extent to which different norms are compatible with each other and the capabilities of a software agent, and how that ability affects the decisions such an agent can make.

That article laid the foundation for a new area of research. Many researchers had already thought about norms and how you could express these in software. That in itself is a considerable challenge that requires a good understanding of what somebody ultimately wants to achieve with such a norm. However, how agents should deal with changing norms and how possible problems in satisfying those norms could be detected before they occur had received less attention.
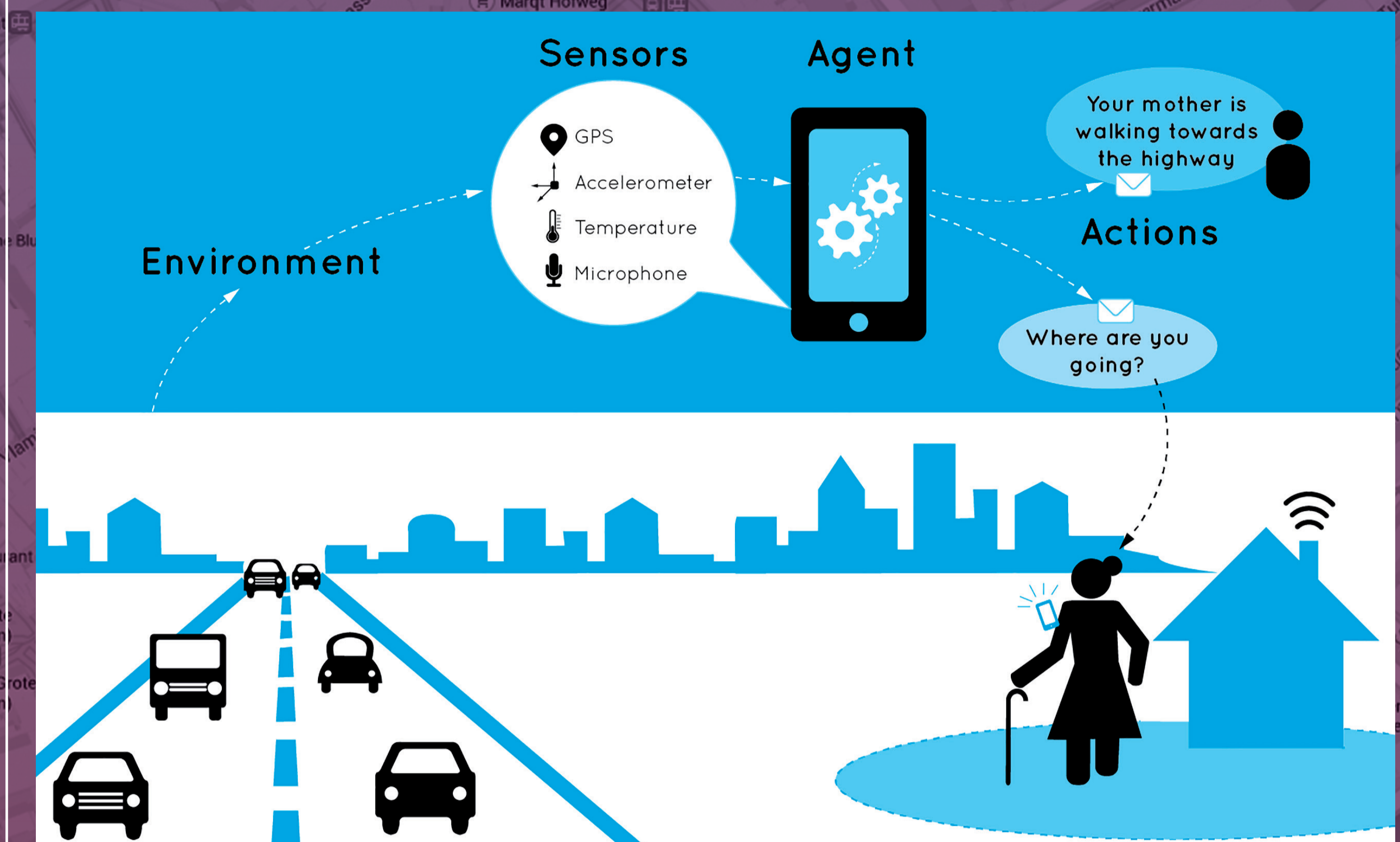
Furthermore a lot of research focused on abstract systems, whereas Van Riemsdijk takes tangible existing support systems as the starting point. 'Software is becoming increasingly important for our everyday lives. That software must therefore be able to support our entire social context and adapt to us,' she says firmly.

Ethical challenges: Can SAEPs alleviate ethical concerns?

Computational Reasoning

Norm Adoption

Execution & Monitoring

Exception Handling

SAEP

Reasoning challenges: How to reason about norms and their violation?

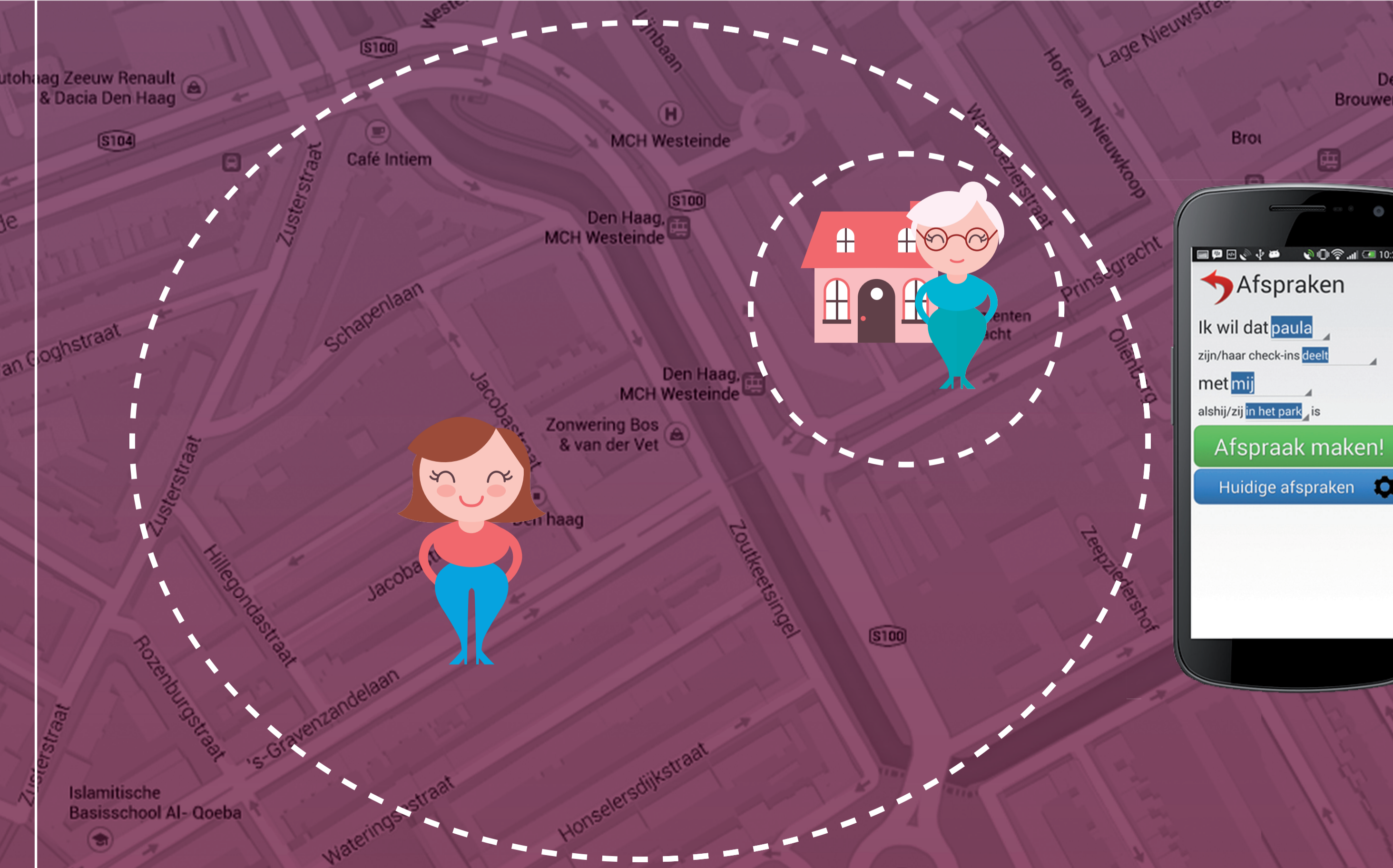Interaction challenges: How to shape interaction about norms?

Software agents

Artificial intelligence makes use of so-called software agents. These are computer programs that can independently take decisions by comparing various options with each other, reasoning about the best option and if necessary negotiating constraints. Software agents are already used in various places, for example in websites with a virtual assistant.

Based on the questions you pose, the agent reasons which information from an underlying database is the most relevant for you. In the future there will be a growing demand for software that can take autonomous decisions. Examples are robots and self-driving cars but also smart meters and even complete smart homes. Van Riemsdijk is convinced that these software agents can only be used successfully if they take human norms and values into account.

Sensors — GPS, Accelerometer, Temperature, Microphone

Agent

Your mother is walking towards the highway

Actions — Where are you going?

Environment

Technology for Humanity

'We should not adapt to the software but the software should adapt to us.' Under that motto Birna van Riemsdijk is working on intelligent software agents that take users' norms into account. Existing technologies that support people in their daily lives form the basis for this.

An example is geofencing, a technology that can put a virtual fence around a certain geographical area based on the user's GPS data. As soon as the user moves outside of that area an action occurs. This technology is used, for example, to inform parents when their child has arrived at school or to warn a family member if an Alzheimer's patient moves outside of a certain area.

A major disadvantage of current applications is their rigidity. They are only aimed at a specific functionality and do not take social aspects into account. In the example of the Alzheimer's patient, a daughter can receive a message as soon as her mother is more than one kilometre from home. But sometimes it does not matter if that boundary is crossed, for example if there are roadworks and the mother has to take a different route or if she goes shopping with her husband. If the software then sends the daughter a message it violates the privacy of the patient and her husband. However that is not deliberate. The designer of the software has to make choices that establish implicit norms, such as 'mother may never be further than one kilometre from the house without the daughter knowing that'.

Van Riemsdijk wants to make this software more flexible. Using information it has gathered about what is happening and what people find important – their norms and values – the software should be able to make the best choice. For example, if the mother has to take a detour and returns to the familiar environment several minutes later the software must be able to determine that in this case it does not need to warn the daughter. To realise this different people must be able to enter their norms. The software should then be capable of independently detecting if it can satisfy these norms. For example, if different norms conflict with each other the software must investigate whether a solution can be found that does satisfy the norms, for example by consulting with users. To assess the importance of different norms the software must ultimately be able to determine which value underlies the imposed norms. In the case of the Alzheimer's patient that is safety: if mother walks too far away she might get lost. But that risk is not present if her husband is with her. Then nobody needs to be warned. For a human being it is not difficult to draw this conclusion but for a software agent that is easier said than done.

Van Riemsdijk is developing generic concepts to make those software agents socially smarter. In developing these ideas she draws inspiration from how people handle different norms and the role of ethics in decision-making. She then tries to convert the concepts she distils from these observations into generic software that can be used in a wide range of applications.

Afspraken

Ik wil dat baula
zijn/haar check-ins saem
met mij
alshij/zij niet past ja

Afspraak maken!

Huidige afspraken