



HYBRID INTELLIGENCE – INTERVIEW FRANK VAN HARMELEN

Gravitation grant is powerful impulse for developing cooperation between humans and machine



“I know what you know, but I also know what you know what I know.”

Professor of Knowledge Representation & Reasoning Frank van Harmelen, coordinator of the Hybrid Intelligence project, talks about his field of expertise and the research proposal that can be carried out over the next ten years with 20 million euro granted by the Gravitation programme in a joint venture of six Dutch universities.

“**Are intelligent processes** essentially mathematical processes? If so, we can build a thinking computer. A fascinating thought. Because then maybe creative or emotional processes are also mathematical in the end. This is a disturbing idea for some people; it would mean that something that we feel differentiates us from everything else, namely our world of thought and our free will, could perhaps also be built into a machine.”

“**In order to design artificial intelligence**, you must first understand intelligence. For this reason, we - as computer scientists - work a lot with disciplines that have been working on intelligence for a long time, such as linguists, psychologists, neuroscientists and philosophers.”

“We’ve come a long way. We have computers that beat people in all kinds of areas, such as translating English into Chinese and vice versa, chess, Go, there are self-propelled cars and computers that can read radiological scans. In all these applications, however, the goal was to become just as intelligent or more intelligent than humans, so that you could eventually replace them. This is an undesirable outcome, both socially - because we want to have a reason to exist - and scientifically.”

“We are gradually discovering that the intelligence of computers is different from that of humans. A computer’s memory is perfect. And because of that, it is able to discover patterns in enormous datasets, which a human being would never be able to find. In the end, however, you need a human to judge whether the pattern is relevant. People have very different qualities. We can work together very well; we have a sense of subtle context information and we have something we call ‘Theory of Mind’: you can put yourself in someone else’s shoes. “I know what you know, but I also know what you know what I know.”

“Because human intelligence is so different from computer intelligence, it makes much more sense for people and machines to work together in teams, using the specific qualities of machine intelligence to increase our intelligence.



“We have an interdisciplinary team of leading scientists from six Dutch universities.”

Not a replacement, but a hybrid human-machine intelligence. For that to happen, computers need to learn new things. Computers need to learn to work together, to adapt to new insights and situations, they need to have a certain responsibility and they need to be able to explain what they are doing. The latter is really important, because computers now often do things that amaze us, and we can’t quite figure out how they got there.”

“Translating these characteristics into computers. This is what we will be doing with our grant over the next ten years. In ten years’ time, we

want to be the first research team to publish a scientific article with a computer as a full-fledged co-author. This means that the computer is involved in all steps of our research: literature research, the creation of a hypothesis, the design of experiments and the interpretation of the results up to a publication. It goes without saying that the computers we want to develop are capable of working with people in many more areas. “In hospitals, for example, or in classrooms.”

“Of course, we don’t do this alone. We have an interdisciplinary team of leading scientists from six Dutch universities. We have a researcher who specializes in the psychology of collaboration, for example. He has done some fantastic experiments to find out which group size is ideal for human collaboration. We want to do the same experiments with hybrid teams, involving linguists, cognitive psychologists, ethicists and experts in the field of social robotics. We will have established scientists on the team, as well as up-and-coming talent. And not unimportantly: at least one third of our team is female, which is a very good development in our field.