



# Artificial intelligence as solution to complex problems

Smart ICT systems are key in the answer to complex societal problems. In the five-year Interactive Collaborative Information Systems (ICIS) project completed at the beginning of this year, TNO worked with universities and industry on innovations that help unravel complex issues. The main result of ICIS lies perhaps in the international reputation enjoyed by the Netherlands as a knowledge network in the field of artificial intelligence.

'Artificial intelligence is a crucial technology, for both TNO and the Netherlands. Electronically and mechanically we are very capable. What it now comes down to is laying smart connections between people, networks and machines, evaluating the information and acting. New systems make it possible to more quickly make the right decision in a complex situation. This is essential given that people are unable to process the huge amounts of sensor data without the aid of the computer,' explain TNO researchers Professor Rob Meijer and Martijn Neef.

## TREASURE CHEST OF KNOWLEDGE AND APPLICATIONS

ICIS has generated a treasure chest of new knowledge and applications: sixty projects dealing with the social domains of safety, mobility and care have produced twenty PhDs and almost five hundred scientific publications. TNO played a major role in the project and coordinated part of the scientific work.

'We live in a networked world that demands smart solutions to enable people and machines

to cooperate better and thus generate better decisions. Hence the reason why ICIS involved researchers from a wide range of disciplines, from human factors and social sciences to artificial intelligence and informatics systems. ICIS has tackled many issues over the past few years.'

An example. Each day a total of five thousand trains driven by a thousand train drivers depart from 29 railway stations. Quite a tricky job of intelligent planning, especially since disruptions may occur at unexpected moments and locations. Every change in the planning confuses that planning. 'ICIS developed an application for the Dutch Railways whereby *agents* – smart, self-learning computer programs – simulated train drivers in a virtual world. The *agents* consider the wishes of both the driver and the organisation. This is a good example of how artificial intelligence can help tackle complex issues,' say the TNO researchers.

## NEW WAY OF THINKING

Separate from the tens of projects with tangible results, Neef and Meijer regard a big plus from

ICIS being how the very diverse parties got together to demonstrate how complex issues could be tackled and the role artificial intelligence can play in this.

'The fire brigade, *Rijkswaterstaat*, a university medical centre, ProRail, the Netherlands Forensic Institute, multinationals and many other large organisations have come to a new way of thinking through ICIS. They appreciate just the fact that the researchers understand the complexity of their work. Intelligent systems are now imprinted on the industry and government retina. The ICIS project has been formally completed but the *community*, the network, will remain active. The business world still has to make the leap of faith. An inevitable step since a future without intelligent systems is inconceivable.'

The researchers believe TNO has a role to play in facilitating the application of artificial intelligence as well as helping the market build smart components for a complex of collaborating technologies by catering for the underlying intelligence. 'ICIS enables us to develop a vision of the greater whole in which humans and technology work together smartly and thus enhance each other.'

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