Co-creation of therapeutic treatment programmes

The use of innovative technology in therapeutic treatments – having autistic children interact with robots or using interactive exercise systems in post-stroke rehabilitation – is very promising. However, experts are required to programme the desired movements and exercises. The IOP WikiTherapy project at Eindhoven University of Technology will develop software platforms to enable therapists to develop their own treatment programmes, testing them in real life and creating an online community for therapists: WikiTherapist.

Therapists are optimistic about the possibilities of technological support for their treatments. ‘Think of people rehabilitating after a stroke,’ says project manager Panos Markopoulos of Eindhoven University of Technology. ‘They train different muscle groups while getting feedback from a physiotherapist. In such a labour-intensive process, exercise systems such as interactive game boards can really help. Sensors in the board interpret a patient’s movements, such as picking up a cup, while the game element encourages more frequent and intensive exercise.’

Win-win solution

‘Innovative technology also offers solutions in the treatment of autistic children,’ project co-applicant Emilia Barakova adds. ‘These children have problems with social interaction. Research shows that training children’s motor control (e.g., facial expressions and body language) early has a positive influence on their social behaviour. Children can practise by imitating a robot. And they really enjoy the robot’s predictability.’ While interactive technologies such as game boards and robots are promising, the programming of the exercises remains highly specialised work. Programming this kind of technologies is currently too complicated for therapists; and small specialised companies who have the necessary technical knowledge, lack the resources to access the specialised expertise of therapists. Nor are larger companies apt to set their sights on this field since the market is small.

The WikiTherapy researchers have found a win-win solution. By developing a software platform on top of the technology, they will make it easier for therapists to create exercise programmes themselves, without the help of experts. The project also involves an online community, WikiTherapist, which enables the exchange of experiences with and software for the exercises. Last but not least, the project will establish a pool of experience regarding this new co-creation approach.

Layered structure

Although the researchers will develop software for two different kinds of technology (a robot and an interactive game board), they hope certain components will be reusable. Markopoulos explains: ‘We use a layered structure, putting our software on top of the supplier’s programming interface. The top layer is for the specific therapeutic application, while the lower layer consists of reusable building blocks. We hope that these blocks will be so generic that we can also use them later in other domains, whether in healthcare or other areas.’ The result – the software for therapists – is essentially comparable to a spreadsheet. ‘Here, too, people simply indicate
what they want, without being aware that they are actually programming,’ Barakova says. ‘We want to achieve something similar: the therapist demonstrates a movement and the software generates the exercise.’ The two PhD students and the other researchers who are supposed to accomplish this will spend a lot of time at the participating companies and clinics. They will include medical and ethical issues in their research, and they will evaluate the use of therapy software, the development process and the experience gained.

Companies and clinics
Frank van der Borg of Philips Applied Technologies is chairman of the industrial user group. He says: ‘This project brings together very different kinds of organisations: small and large technology companies such as Serious Toys, TiViPE, Philips Research and Philips Applied Technologies, but also rehabilitation clinics and treatment centres for autism such as Adelante, Sint Maartenskliniek and Dr Leo Kannerhuis.’ Philips Applied Technologies is interested in the project because it combines robotics with therapeutic treatments. ‘We have developed a variety of robotic applications, particularly to support doctors. Now we want to look into the possibilities for care, alongside those for cure,’ Van der Borg explains. ‘We also like the aspect of co-creation. This is complex technology that needs to be “packaged” to make it suitable for therapists and patients. That’s when factors like appearance and an enjoyable interaction become very important.’

Subject:
Co-creation and exchange of technology-based therapeutic treatment programmes

Objective:
To develop software environments for specialised platforms that allow domain experts in healthcare to ‘program’ exercises on their own; a design method for the open development process approach; an online community for therapists, research centres and companies

Possible application:
Therapeutic treatment of autistic children and people in post-stroke rehabilitation; at a later stage, also for other domains such as education

Research period:
October 2009 - September 2013

Number of researchers:
Two PhD students, one postdoc, one junior researcher, one twaio

Research institutes:
Eindhoven University of Technology

Industry and healthcare institutions involved:
Adelante, ARC Cambridge, Dr. Leo Kannerhuis, Philips Applied Technologies, Philips Research, Serious Toys, Sint Maartenskliniek, TiViPE