GDI GOTTLIEB DUTTWEILER INSTITUTE
ECONOMIC AND SOCIAL STUDIES

ROBOTICS AND DISABILITIES

How assistive technologies will improve life

Jakub Samochowiec, Angela Schmidt

Cerebral
Swiss Foundation for Children with Cerebral Palsy

Imprint

Authors
Jakub Samochowiec, Angela Schmidt

Guest Author
Prof. Dr. Bertolt Meyer

Editor
Irène Dietschi

Illustrations
Alain Schibli
www.biggerthannewyork.com

Layout
Joppe Berlin

GDI Research Board
David Bosshart, Karin Frick, Daniela Tenger, Alain Egli, Karin Stieger

Knowledge Partner
Prof. Dr. Robert Riener,
Sensory-Motor System Lab, ETH Zürich
Paraplegic Center, University medical center Balgrist

Publisher
GDI Gottlieb Duttweiler Institute
Langhaldenstrasse 21
CH-8803 Rüschlikon / Zürich
Telefon +41 44 724 61 11
www.gdi.ch

On behalf of
Swiss Foundation for Children with Cerebral Palsy
Erlachstrasse 14
CH-3012 Bern
www.cerebral.ch

Contents

Summary

What does "disabled" mean? The United Nations defines disability as a discrepancy that arises between personal abilities on the one hand and the demands of the environment and society on the other. Disabilities therefore always manifest themselves in a context. In order to reduce or even eliminate a disability completely, a start can be made both with the individual as well as the context, i.e., society and the environment.

Technical progress has profound effects on individuals, the environment and society. Thus, technical innovation also changes the meaning of disability – whether this is done by simple walking aids such as a stick, by ramps on buildings or by audible signals at traffic lights.

Nowadays, it is robotics and digital innovations that make life easier and ensure that all people – with or without disabilities – participate in the world. We are no longer talking about walking aids, but about assistance robots, exoskeletons and intelligent prostheses, but also new technologies such as retina implants or virtual reality. And on the horizon, new ideas have emerged that put all previous innovations in the shade: ideas we would have banished to the realm of science fiction yesterday. The present study discusses this development and its societal implications.

The first part presents an overview of current technologies which support the individual in compensating for weaknesses of a physical or psychological nature. Examples: assistance robots, which help with getting out of bed, or providing minor assistance; smart houses that automate numerous tasks around the household; exoskeletons, which put handicapped people who cannot walk back on their feet; robotic prostheses that replace the functions and appearance of missing body parts; retina implants that help the blind regain their eyesight – or at least promise this. A particularly exciting development is what are called brain interfaces. This means the concept of controlling machines, for example an exoskeleton, by thoughts. The thought is measured by a kind of helmet or a chip directly in the brain. And researchers are already thinking about nanorobots, which are introduced into the brain at any place in order to interact with the nerve cells. These are dreams of the future, but huge potential is being attributed to them.

The second part discusses how environmental barriers can be broken down by technology. Here, the concept of "accessibility" does not refer so much to public places without thresholds or disabled toilets, but is much broader. It assumes that analogue information will be digitised to an ever greater extent and technologies will become independent. Examples are self-driving cars or trams travelling in cities; drones distributing the mail; machines that clean the streets autonomously; devices that recognise images – especially faces – and speech, and much more. Although such innovations have not been developed primarily for people with disabilities, they may specifically help them to improve their participation. For a machine to help a human being to manage its environment, the machine has to orient itself in this environment first.

The third part examines the question of how technological innovations affect social demands and expectations. While robotics and other aids help the individual to meet the expectations of society and the environment, at the same time technical innovations also increase these expec-

tations – they change what is "normal" in society. Just because there are such aids, it does not mean that everyone can use them. The reasons for this are: lack of knowledge about technical possibilities, lack of technical support in the environment and high individual costs. Eliminating these barriers, giving people with disabilities easier access to technological aids, leads to more independence and thus to greater inclusion within society. Many "aids" have become actual enhancement tools, especially in sport: carbon prostheses spur long jumpers on to dream achievements, racing wheelchairs allow record times in the marathon. In view of such results, transhumanists even expect that man and machine will merge in the next evolutionary step. Many find such images scary. It is possible that people who at one time would have been pitied would suddenly be perceived as menacing. In both cases, inclusion is lacking.

Can people with disabilities be required to use certain technical aids? What should people with disabilities demand from society, what are exaggerated claims? Rapid technical development keeps society and individuals in constant motion, which is why clear ethical orientation guides are difficult to grasp. It seems clear that technical aids have the potential to make the lives of people with disabilities and their families easier. However, this potential must be used properly.

Publisher:
GDI Gottlieb Duttweiler Institute
Langhaldenstrasse 21
CH-8803 Rüschlikon / Zürich
Telefon +41 44 724 61 11
info@gdi.ch
www.gdi.ch

Knowledge Partner
ETH zürich

Financing Partner
ACCENTUS