ROBOTHINGS, AWAKE!

Breaking News!
The SPARC partnership between private-sector robotics firms and the EU has been launched, aiming to out-invest the United States, Japan and South Korea. The deal was signed in December, but was properly launched and branded at the Automatica trade fair in Munich, Germany, last Tuesday. SPARC has significant funding until 2020: €700 million ($952 million) from the EU and €2.1 billion ($2.85 billion) from 180 private companies and research organizations, who have banded together under the umbrella of euRobotics.

Dirty, Dangerous & Dull
Today, robots are present in large numbers only in industry. But industry without robots is now almost inconceivable. They do everything covered by the three Ds: *dirty*, *dangerous* and *dull* work. Robots do it tirelessly, and function with unprecedented precision and often power, which is of major importance to the durability and quality of products: ranging from baby nutrition to cars. In that respect, robots are better than humans, just as all the other non-automated tools that we have invented: from the saw to the electric screwdriver and the pneumatic hammer.

This is where we observe a crucial difference from normal tools: production robots are a part of industrial automation. Mostly they can be found in cages or behind a fence on the floor. This has to change, is the idea. Intelligent machines that can learn independently, that are flexible and take their environment into account, must be able to collaborate organically with their human colleagues.

Industry 4.0
At present, traditional industrial robots are evolving into assistants to humans. In accordance with the vision of the Fourth Industrial Revolution, humans and intelligent machines will jointly perform production tasks in the future. Sensors, cameras and self-learning software will be indispensible to this process. The leitmotiv is that robots will have to adapt to humans, and not vice versa. In fact, this principle must be implemented to the extent that the new generation of intelligent industrial robots will learn from their human colleagues who simply demonstrate the necessary actions.

In 1961, General Motors deployed the very first industrial robot. The first Unimate model weighed 1.8 tons. More than 50 years later, in 2013, almost 162,000 robots were sold worldwide, and in 2015 more than 1.5 million robots will be in use. After 50 years of classical industrial robotization, we are now on the brink of 50 years of collaboration with service robots. It is expected that, between 2013 and 2016, around 95,000 new-generation robots will be sold, with a total value of some 14 billion dollars.

"Robot" = every reduction of human labor
The word *robot* has Czech origins: it was used in a science-fiction play in 1920, where it referred to human clones that were raised to work. In May 2014, Marieke Blom, chief economist of the ING Bank, stated that the term "robot" refers to every reduction of human labor, with all the corresponding digital technology. This harmonizes with the casual use of the word, as in *bots* and *robocop*. Bots are pieces of software with a certain goal, disseminated through digital networks. A robocop is a humanoid or android police super robot. In the latter case, the boundary between human and machine blurs and it is unclear as to which side possesses more intelligence.

Intelligent, Mechanical, Autonomous
Robots, intelligence, automata, reduction of human labor and mediation via tools, appliances, machines, industrial automation and office automation are widespread themes. In the MIT standard work *Introduction to AI Robotics* (487 pages), an intelligent robot is defined as a *mechanical creature that can function autonomously*: "Mechanical" refers to the fact that a robot is built, constructed; "creature" signifies that it seems as if a robot has its own motivation and decision-making processes; and "functioning autonomously" means that an intelligent robot – in line with the Industry 4.0 vision – can perceive and act, and perhaps even reason, in the foreseeable future. Altogether, this goes further than traditional automation, which is directed toward the predictable repetition of actions, even if they are now becoming increasingly complex.

Adding this all up, it is apparent that the term "robot" is rather vague. It is definitely the case that in robotic applications of varying nature, humans delegate certain sensory, mobile and intelligent qualities to machines. This is what the development of robotics is all about – regardless of whether or not they are humanoid or android. Delivering packages by means of drones, as Amazon has envisaged, is an example of an everyday service application.

Five Qualities and More
Introduction to AI Robotics emphasizes the following five qualities of intelligent robots: mobility (legs, arms, neck, wrists), perception (sight, hearing, small and touch), control via a digital central nervous system and a digital brain function, energy supply, and finally, communication via voice, gestures and hearing function. Unmanned vehicles on land, in the air and under water are important service applications outside the domain of industrial robots. But there are also modular robots under development, which can operate collectively, in swarms.

Currently, RoboEarth is building an internet for robots and, via Industrial IP Advantage, the Internet of Things will enter the realm of industry. This justifies the conclusion that intelligent robots and RoboThings will soon become a genuine force in society and will cooperate with humans – in whichever form they might manifest themselves in the future: as self-driving cars, as SwarmBots or as Baxter from the Rethink Robotics company.

The fourth stage of the Industrial Revolution is upon us due to the far-reaching integration, accelerated by the Internet of Things, of Operational Technology (OT) and Information Technology (IT). This creates completely new opportunities as a result of new combinations of mental, physical and mechanical work by integrating the internet, sensors and embedded systems.

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About Jaap Bloem
Jaap Bloem is in IT since the PC and now a Research Director at Sogeti/VINT. In his days at KPMG Consulting he co-founded the IT Trends Institute. Jaap was a publisher of IT books and editor in chief of IT magazines at Wolters Kluwer. Before coming to VINT, Jaap was the Marketing Executive for the Dutch Chapter of ISOC, the Internet Society. Jaap has co-authored many books and articles, and loves to develop and evangelize ground-breaking thought and insight together with colleagues and partners.

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