The dilemma of automation

The more the machines learn to perform our tasks, the more we humans lose the ability to substitute for them

by Elena Comelli

When Dorothy meets the Tin Man in the Wizard of Oz, the two can communicate, even if the robot is blocked by rust and speaks with difficulty. Today the question has become much more complicated. As we move forward towards singularity and the machines always think better, our ability to interact and communicate has definitely worsened.

The role of humans in automated systems moves as the level of machine autonomy increases, thanks to advances in machine learning and cognitive computing. In these systems, human operators now assume a monitoring role rather than an active control role, such as in self-driving cars, in airplanes or in automated production systems. A shift that can lead to serious difficulties, when it is necessary to intervene quickly to correct the actions decided by the machine in emergency situations or more simply when you want to regain control of the situation. «In order to adapt to modified roles, new types of interactions are required for man-computers, which allow an intuitive and fluid dialogue between humans and automated systems», explains Paolo Pretto, head of research on the human factor of virtual vehicle, international research center on the future of the car and the railways, based in Graz, Austria. Pretto, which comes from the Max Planck Institute for Biological Cybernetics, is developing methods and tools that will enable designers and engineers to create the advanced automation interfaces needed to put humans at ease in their relationship with cars in the automotive industry and in the automotive industry 4.0.

"Advances in artificial intelligence and computer learning are altering the boundaries between men and machines, but in this evolution we must not overlook the point of view of humans, who have limited memory and movement capabilities, but at the same time a great adaptability to changes. A 3-year-old is able to perform certain tasks better than a machine, in which there is a need to keep an eye on many different situations and perceive how they change, "Pretto reasons. The goal of "human centered research" is to put the human being at the center, in order to adapt the machines to our needs and not vice versa, to allow us an easy exchange with the automated systems that are increasingly our indispensable helpers in many contexts, from the domestic to the factory, through mobility.

"In designing machines, we often pay more attention to economic factors than to the characteristics and abilities of human beings who have to manage them," Pretto points out. This results in difficult-to-use systems that pose security problems and end up being unsold. The recent setbacks in the spread of self-driving cars, following a series of accidents, teach. Research focused on the human factor indicates, for example, that the role of simple monitoring can cause considerable difficulties in concentration and a strong tendency to distract. More often, humans respond more slowly when they are not in control, or even do not understand what the machine is doing at the moment. In aviation it has been shown that the increasing use of automation can lead to a loss of manual piloting skills and dangerous misunderstandings between the car and the driver. It is the dilemma of automation: the better it works and the more likely it is that humans will not be able to take over manually if necessary. In essence, the performance of automation and the performance of human interaction are inversely proportional. As a result, the development of a good man-machine relationship has become a critical point for the adoption of automation and its success. «The challenge is to design an interface capable of providing sufficient information to the human operator unaware of what is happening and at the same time to induce a quick response, avoiding

information overload, which can block an effective reaction», reasons Pretto . In the crash of the Asiana 214 flight, which crashed in 2013 and landed in San Francisco, poor man-machine communication was the central problem. The point, therefore, is to thoroughly investigate the mental processes underlying human-machine interaction and integrate them into the realization of the interface: technological research and neuroscience should collaborate from the early design stages and optimize the assignment of functions together to the machine and to human operators.

This helps prevent a series of problems, such as the need for human operators to correct what automation cannot do or create systems that fail due to unrealistic expectations of the human operator. The principle, in theory, is simple, but implementation is much more difficult, because it requires the collaboration between technicians and human behavior scholars, which are based on different knowledge, experience and objectives. "There are few centers where you can find a common language and develop methods and tools to achieve this result," says Pretto, who joined the Virtual Vehicle team precisely because the Austrian center is very interested in the enhancement of the human factor in the human-machine interaction. A central point in the development of the automation of the future.