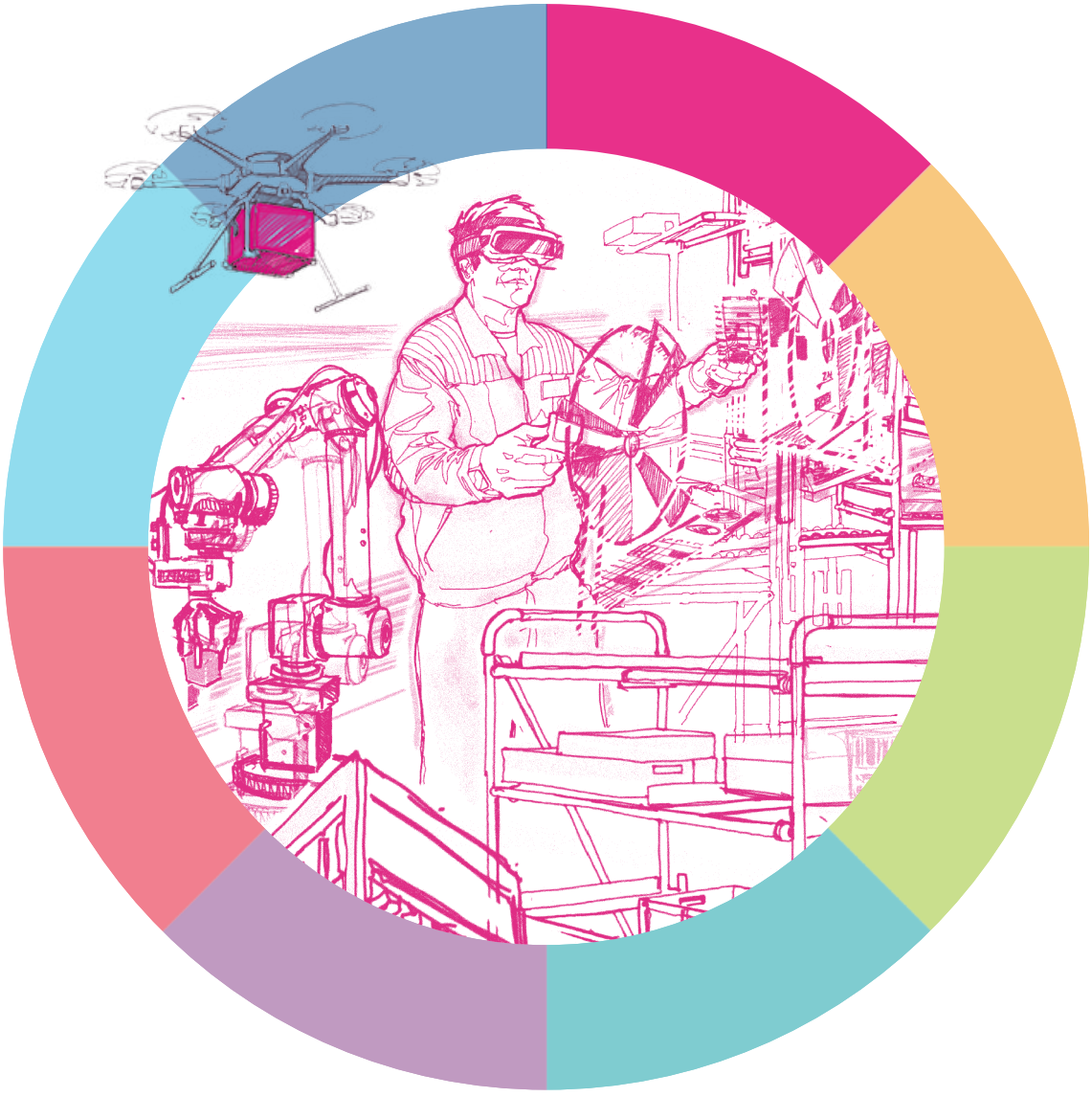
1 Welcome to the VUCA World



1 Welcome to the VUCA World

Everything that can be digitised will be digitised – a currently widespread saying. But one thing is clear: digital transformation is making its way into most companies and industries. In times of change, there is a lot of talk about the so-called VUCA world. VUCA stands for "volatility", "uncertainty", "complexity" and "ambiguity" – terms that perfectly describe our times. It is easy to see that every company faces these challenges. But in order to prepare for tomorrow's world, it is important to overcome the fear behind these words and recognise the opportunities behind the VUCA world. From automating operations to digitising processes, everything is possible.

Fig. 1: VUCA world at a glance
Source: Alexander Pinker, adapted from Transformation Magazine

We are experiencing fast developments in production, technology, communication and mobility. Start-ups and creative companies are fundamentally changing the previously known market, breaking new ground and completely reinventing traditional business models. In this environment, volatility, uncertainty, complexity and ambiguity are now almost normal, even in logistics. Some sources, even though everyone wants to hear this, even go so far as to call "VUCA" the new digital normal.

What is Artificial Intelligence?

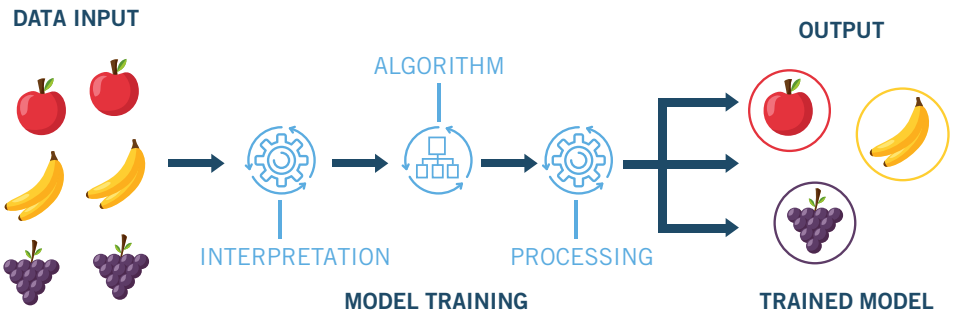
Artificial intelligence is a branch of computer technology that deals with teaching machines to "think". The field is strongly oriented towards classical human intelligence and interprets it by means of algorithms and data structures. The goal is to train AI models so that they can analyse, classify and interpret data and information. In logistics, for example, this means that AI should monitor warehouse processes and choose the most efficient and effective ways to improve operations.

Over time, the artificial intelligence should learn from new data and continuously improve itself and the entailing processes. This methodology of learning can be compared to teaching a small child the basics of the world.

Similar to a child, the AI initially knows nothing about everyday life and the associated processes. However, if you teach the child that the cooker top is very hot and it is better not to touch it, the child will begin to draw conclusions and also be careful of other heat sources outside the domestic kitchen. In the course of time, the child will become more and more knowledgeable about the different aspects of life and make independent conclusions – and so should the machine.

Fig. 5: How an artificial intelligence learns

Source: Alexander Pinker, adapted from Brimit



So, unlike traditional software, artificial intelligence is not programmed via code, but trained from examples. It is assigned a specific task and given permission to research and improve itself. A well-trained artificial intelligence finds out what the different aspects of the task are and asks questions when it is confronted with a situation that overwhelms it. The longer it learns and interacts, the better it becomes.

However, as the examples show, artificial intelligence is no silver bullet for each and every problem. Currently, AI is often deployed in areas that can fall back on given routines and recurring activities. AI cannot keep up with the human brain in many areas and is only able to imitate it in certain areas. A human's intuitive or creative decisions cannot yet be reconstructed by the machine, This limits it to a specific activity or field of expertise.

Machine Learning, Deep Learning and Neural Networks

When dealing with artificial intelligence in a business context, it is difficult to evade the terms machine learning, deep learning and neural networks. Let's therefore take a look at these technologies in the real world environment.

Fig. 6: The difference between artificial intelligence, machine learning and deep learning

Source: Alexander Pinker, adapted from KD Nuggets

Artificial Intelligence

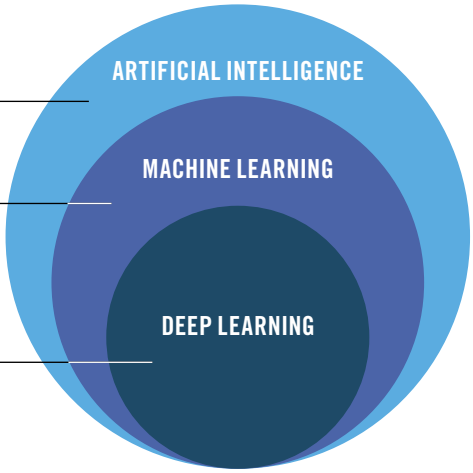
Technology allowing machines to mimic human behaviour

Machine Learning

Subcategory of AI, deploying statistical methods to optimise user experience

Deep Learning

Subcategory of machine learning processing information in neuronal networks



Machine Learning

As already described above, artificial intelligence learns by interpreting learned data and facts. In doing so, AI algorithms use patterns that they recognise in language, images or texts, for example. For companies, machine learning, i.e. the use of AI-driven pattern recognition, lends itself to analyse and interpret existing data on business processes, customers and finances.

tion, as in Terminator, but it is rather a tool that serves to fundamentally facilitate and optimise everyday business life.

To understand robotics, one must know its origins. It is a branch of engineering and natural science, which also includes the fields of mechanical engineering, computer science and electrical engineering. Robotics addresses design, programming and construction of robots that perform simple tasks for humans or that cooperate with humans. The robot is the unit that executes commands in the physical world and, by means of sensors and programming, is a valuable helper in everyday professional and private life.

Types of Robots

Industrial Robots

Fig. 9: Overview industrial robots Source: KUKA

The types of robots are diverse – the current innovation literature describes virtually everything from cobots to chatbots. But probably the best-known version are industrial robots. These are, simply put, programmable machines that are used especially in the machining and assembly of work pieces. They usually appear in the form of robot arms or grippers firmly associated with images from industrial halls. Hidden behind safety fences and barriers to protect employees, they perform actions on their own and take over specific process steps that are too dangerous or difficult for humans to carry out.

such as forklifts or tugger trains in the factory halls is also already being tested. An additional advantage here is the very fast refuelling in just a few minutes, compared to the charging cycles of electric vehicles today. However, as with LNG, the high costs for the filling station infrastructure are also a major hindering factor for hydrogen.

Fig. 28: E-highway in operation Source: Siemens/Scania

3.3 New Technologies and Trends Impacting Employees

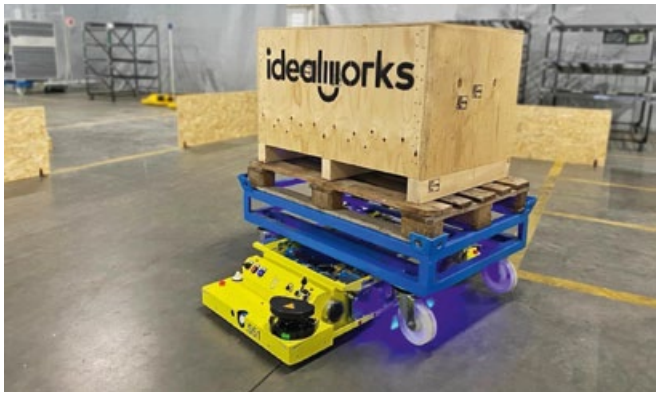
As technology changes at an ever faster pace, companies need to on-board their employees early and make them aware of digitalisation and the new challenges. In order for companies to remain competitive in the market, changes in processes, design and implementation are needed to realise the full potential of the immanent disruption.

The logistics processes of tomorrow will be faster, more autonomous and more flexible than has been the case so far. This unprecedented pace and the opportunities currently emerging will fundamentally change and revolutionise jobs as we know them today in the coming years.

Fig. 36: AMR in operation Source: Omron

But there are now also a large number of solutions for larger transport units, such as cage pallets or Euro-pallets. If the goods have to be placed directly on the floor in the factory hall, then fork lift trucks (see Agilox picture) are the obvious choice. The trend, however, continues to develop towards transporting goods on wheeled carriages allowing the goods to be moved manually at the destination, if necessary. This way, the layout of the factory hall remains flexible and it is possible to react very quickly to changes in production requirements. For this case, respective transport robots are also available, such as the iw.hub from idealworks GmbH, a subsidiary of BMW AG.

Fig. 37: AMR in use at idealworks GmbH Source: idealworks

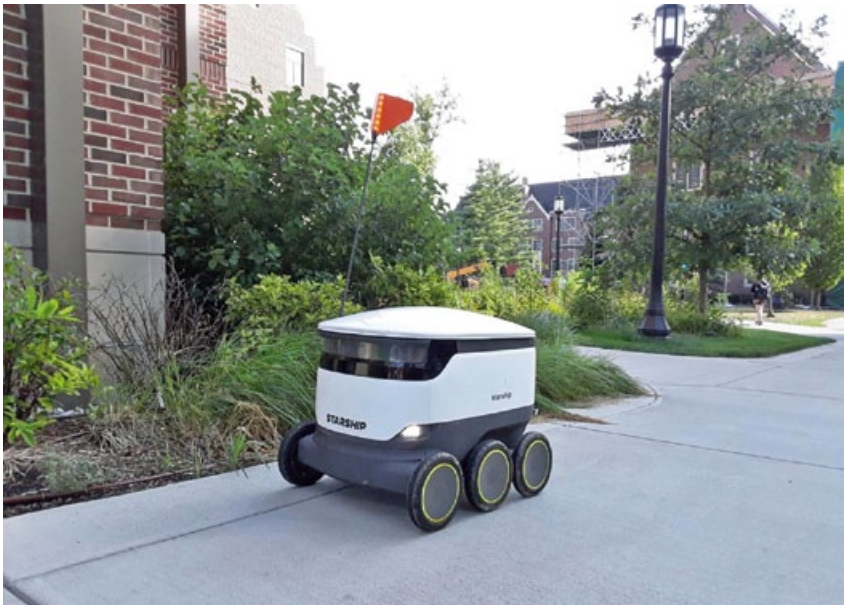


too space consuming and too expensive for this type of application. In addition, there are numerous other restrictions in the inner-city areas, which only play a subordinate role in logistics warehouses outside the city, such as noise, limited ceiling height or flexibility. After all, the warehouse may have to be relocated to another part of town as early as next month. Since individual products or customer-specific shopping baskets of goods are usually shipped from such micro-fulfilment locations, automated picking will play an enormous role in the future.

Last Mile Delivery

Today, deliveries to customers are usually made by bicycle or motor-cycle. In just a few years, it can be expected that deliveries will be primarily brought to the customer by delivery robots. Similar to transport robots in factories, these delivery robots will find their way to the customer independently or, if necessary, supported by a human operator via tele-operation. They can avoid humans and stop at obstacles or drive around them autonomously. Numerous companies are working hard and making great progress on the use of such vehicles. Numerous robots are already in use in test areas and on university campuses.

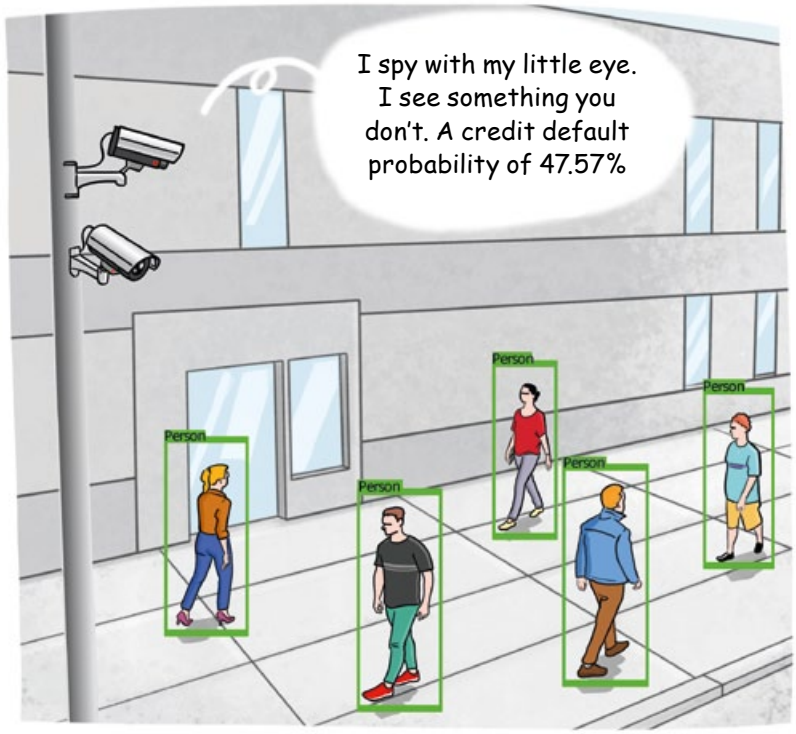
Fig. 56: Delivery robot Source: Starship Robotics



the personal use of the devices by individuals, as well as an increasing base of scientific studies and findings, the acceptance of mobile technology grew across the entire society.

But with the introduction of 5G, this will once again be put to the test and new experience must be made. One important element in the accompanying discourse is to create trust in a technology and this discourse should under no circumstances be restricted, circumvented or accelerated. The old African proverb applies here: "The grass does not grow faster if you pull it."

Fig. 58: When intelligent cameras get bored
Source: Christian Möller, Cloud Science



Moreover, unfortunately, any new technology can also be used for purposes that are not for the benefit of people. For example, drones used to deliver urgently needed medical drugs in remote regions may become combat drones for military purposes, and artificial intelligence may be used not only for the to detect cancer earls, but also for the mass surveillance of people. These ethical discussions must also be conducted in order to be