DeloitteStiftung

Initiative D21

DIGITAL FUTURE CHALLENGE

DFC #6 – Pfeifer & Langen

Pfeifer & Langen GmbH & Co. KG

USP Pfeifer & Langen: Pfeifer & Langen is one of Europe's leading sugar manufacturers. The family-owned company has 25 locations in nine European countries and produces a wide range of sugar specialties from sustainably grown sugar beets. Its long-standing customers include both the food industry and food retailers, where Diamant and Kölner Zucker brand products are sold. The company also produces animal feed from sugar beets and develops quality products for the non-food processing industry. The range comprises several hundred product specifications tailored to individual customer requirements. It ranges from granulated sugar in a wide variety of grain sizes to liquid sugar, powdered sugar, caramel sugar syrups, candy flour, organic sugar, gelling sugar, colorings, fondants, flavored sugars, and many other functional sugars. The strategic focus is on beet sugar. Pfeifer & Langen therefore primarily processes beets from the region where its production sites are located and supplies customers in its domestic markets in Europe. This regional focus is sustainable, reduces long transport routes, and also makes a statement in support of domestic agriculture, with which the company feels closely connected.

Employees: >2000

Industry: Food

Thematic focus of the use case

Robotics

TITLE OF THE USE CASE

Real-world AI in agriculture and manufacturing – paths to social acceptance

SHORT DESCRIPTION

Real World AI: What does it take for society to accept the “side effects” of machines, such as noise, traffic, etc., even when there are no longer any jobs associated with them?

#HASHTAGS

#AcceptanceOfAutonomousMachines #AutonomousAgriculture #RealWorldAI

Pfeifer & Langen

DESCRIPTION OF THE ORGANISATION

Pfeifer & Langen is a traditional food industry company with a history stretching back 155 years. Founded during the second industrial revolution, the company was an early adopter of new technologies that enabled it to produce sugar cost-effectively in Europe. By breeding domestic beets with higher sugar content and through continuous technological progress, production has become increasingly efficient over time – especially in terms of energy efficiency.Today, the company faces new challenges: climate change and its impact on agriculture, demographic change, and the need to consistently align agriculture and production with planetary boundaries in a sustainable manner. In this context, physical AI—regardless of its specific embodiment—plays a crucial role.

Since production facilities must be located close to the cultivation areas, Pfeifer & Langen operates 16 plants in Germany, Poland, and Ukraine. The plants are not only located near the fields, but often also in the surrounding villages—many of them have been in existence for over 150 years and have grown closely with the communities. The organization is also divided into national headquarters. At the same time, there is a central department that deals specifically with the opportunities and effects of digitalization. With a time horizon of ten years, it thinks ahead about which technologies and concepts need to be prepared today in order to unlock the benefits of digital solutions as quickly as possible. The project described here was initiated by the European headquarters.

VISION OF THE ORGANISATION

Building real-world AI along the entire value chain.

Using IoT, robotics, and AI to develop digital twins and autonomous systems that cover the entire chain from field to plate—to ensure sustainability, achieve resilience to climate and demographic change, and remain competitive and relevant through extreme efficiency. These digital models should be available to all sugar companies worldwide.

PROBLEM SETTING

Sustainable agriculture is one of the greatest challenges of our time. Crops must be continuously protected from weeds, pests, bacteria, and diseases. At the same time, they need a precise supply of nutrients. For thousands of years, this was done by hand. As a result, in pre-modern societies, over 80% of the population worked in agriculture. The industrial revolution brought mechanization, monocultures, and the massive use of artificial fertilizers and pesticides. This increased efficiency enormously—but at a high price: ecological damage, soil degradation, and dependence on chemical inputs.

This form of agriculture is not sustainable in the long term. The future therefore lies in high-precision agriculture that uses mechanical and chemical interventions minimally, in a targeted manner, and in a resource-efficient way. However, this can only be achieved if autonomous systems take over the work: robots that monitor plants individually, combat pests with pinpoint accuracy, and supply nutrients where they are actually needed. Without autonomy, there would be a risk of a step backwards in terms of enormous personnel requirements – a return to 80% agricultural labor is inconceivable.

The consequence: agriculture, logistics, and production will be dominated by autonomous machines in the future. They ensure efficiency and sustainability, but the "side effects" remain visible: noise, traffic, odors – only that it is no longer the neighbor sitting on the tractor or driving the truck or working in the factory, but a "real-world AI."

QUESTION AND TASK

What concept will enable a broad section of society to support this necessary change? What role must companies play, how can robots not only be designed but also contribute to acceptance themselves, and what political framework conditions are needed to achieve this goal?

What might an overall concept look like – and what contribution can the individual players make: from robot manufacturers and companies to local, state, and federal politicians to interest groups and private individuals?

ADDITIONAL BONUS QUESTION

Individuals participate in decision-making primarily through their work. However, if physical AI agents take over this work, the question arises as to how individuals' participation in decision-making can be organized in the future?