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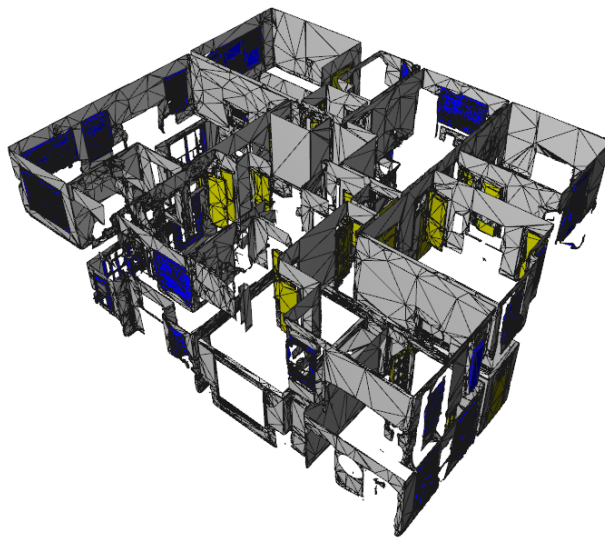(Text: Segoe UI, Regular, Text: 9pt, Line Spacing: 12pt, Justified, last line centered)

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Humanity-Centered Production – a Spotlight on Future Productivity

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Abstract. The effects of unexpected global events, such as the COVID-19 pandemic, the Russian-Ukrainian war and the energy crisis, on industrial production processes are immanent and demand a transformation of behavior. In industrial development, the change from Industry 4.0 to a new stage is taking place. The transformation known as Industry 5.0 emphasizes close collaboration between humans and machines and pursues a human-centric, sustainable and resilient approach. The focus is on the concept of Humanity-Centered Production (HCP), which takes into account not only individual human needs, but also the entire ecosystem and long-term effects. In contrast to the human-centered approach, HCP expands the focus to the whole of humanity and the environment. The principles of HCP include a systemic view of production systems, a long-term perspective and community involvement. HCP also aims to achieve five of the 17 UN Sustainable Development Goals, particularly in the areas of education, decent work, responsible consumption and innovation. The integration of cognitive, ergonomic and social aspects into production systems is intended to promote the competitiveness and sustainability of future production landscapes.

Keywords: Humanity-centered Production; Digital Transformation; Sustainable Ecosystem.

1 Introduction

Unexpected events have challenged production processes in recent years, such as the COVID-19 pandemic, the Russian-Ukrainian war and the energy crisis. In addition to the social impact, these events have also disrupted the traditional industrial production system [1]. Industry 4.0 requires adaptability to changing conditions. The digital and sustainable transformation is leading to a new approach: Industry 5.0. This new phase emphasizes greater collaboration between humans and machines and takes a more coordinated approach than Industry 4.0. With a human-centric strategy, Industry 5.0 aims for greater sustainability and resilience [3, 4]. While Industry 4.0 focuses on networking through cyber-physical systems, Industry 5.0 emphasizes the relationship between humans and machines (see Fig. 1).

In Industry 5.0, where complex industrial processes are susceptible to disruption due to the use of modern technologies such as AI, big data analytics and IoT, resilience is essential. The term goes beyond simply enduring difficulties and also emphasizes increased performance and flexibility in the face of setbacks. The need for resilience has been highlighted by the unexpected events described, which implies that organizations must develop systems that can withstand disruption and recover quickly. Resilience is mainly attributed to flexibility and inherent redundancy that enable systems to overcome disruptions or failures.
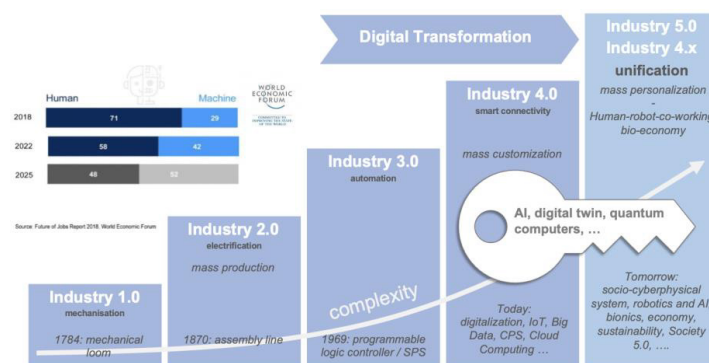

Fig. 1. The path to Industry 5.0 [3]

To prevent and successfully respond to disruptions in the Industry 5.0 scenario, organizations must proactively strengthen their resilience through techniques such as modular production systems, flexible manufacturing facilities and risk management procedures, including cybersecurity measures as well as social interactions to consider the workforce and society. The emphasis on resilience and sustainability is not just a buzzword in Industry 5.0, but a key design principle. The awareness of the essential role that people play in this technological environment is what characterizes Industry 5.0. A special synergy is created when people and machines work together. Humans are adaptable, can solve problems and make subtle decisions. This human-machine collaboration promotes sustainable

operations by reducing the need for ongoing maintenance and ensuring consistent production. Because human workers can quickly adapt to changing circumstances and deal with unforeseen problems, Industry 5.0 places a strong emphasis on the human element as a means of developing resilience. In Industry 5.0, a holistic strategy that utilizes the capabilities of humans and robots proves essential to achieving sustainability and resilience [9].

This new paradigm shift favors less technology through the use of social con-tent. It will increase productivity as part of a global concept known as Humanity-Centered Production (HCP).

2 Differentiation of terms

How does the term „humanity-centered" differ from „human-centered"? Don't the terms „human" and „humanity" have similar meanings?

The meaning of these terms cannot be derived solely from the words them-selves; the context must be taken into account. The first use of the term „human-centered" appeared in the early 1980s and at that time focused primarily on the individual person, for whom the optimization of production processes was intended [8].
This approach has many merits and is still the prevailing paradigm today. Three decades later, however, we have developed a heightened sensitivity to bias against social groups and are increasingly concerned about the impact that humans have on the environment. The term „Humanity-Centered" emphasizes the rights of all humanity and addresses the entire ecosystem (the term ecosystem encompasses all living things and the Earth's environment). The HCP focuses on the question of how production systems can be tailored to people's needs, skills and experien-ces. This also includes the question of what social participation could look like in new working environments. It is also about how people can be actively involved in production processes through new concepts and supported by technical and data-driven tools.

3 Basic approach

„If we produce for humanity, we must not stop at the individual. We must consider our entire global environment in a sustainable way: all living beings, the quality of soil, water and air. The loss of species. The changes in the climate. We are an integral part of the ‚earth' system, where changes in one component can affect all other components."

The HCP embraces the fundamentals of current holistic, lean production strategies and technological capabilities, but expands them to explicitly consider all living things, the ecosystem and the long-term impacts in the future.

In the dynamically developing field of technology, people's tendency to accept technological advances is not solely motivated by the benefits they offer [7, 2]. Acceptance is often determined by social use and therefore implies loo-king beyond the limits of use. Technology must be used under the conditions of the general public without harming it.
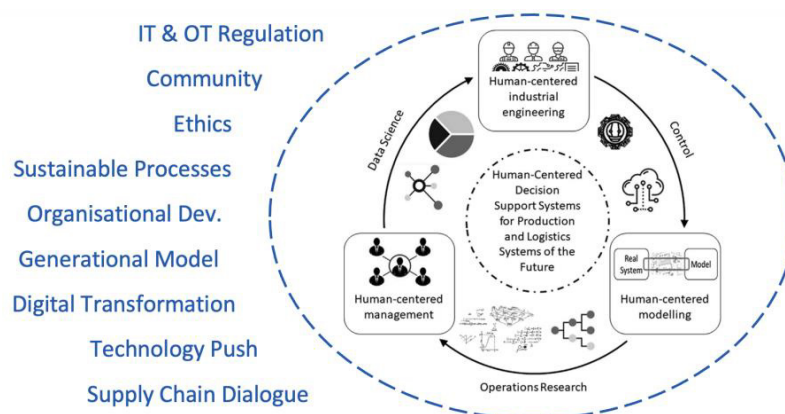

Fig. 2. Humanity-centered production approach

Based on Norman [5], five principles for dealing with industrial processes are defined:
1. Tackle problems at the root, not just the current problem (which is often a symptom rather than a cause).
2. Focus on the entire ecosystem of humans, all living beings and the physical environment.