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## Holistic Assessment Method of Intelligent Technologies used in Production Processes

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### Abstract

The following article shows a method of assessment of intelligent technologies used in the production area that can be employed for a wide range of applications. The assessment uses a holistic approach and assumes a paradigm based on the balance between the economy, society, and environment. The proposed method is based on the idea of the integrated method (created by Prof. Marciniak) and controlling. The article contains a modification and a combination of these two approaches and shows the holistic assessment method dedicated for intelligent technologies. As a result, the new solution includes elements that were not included in classical methods. The proposed assessment has not yet been described in the literature.

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*Keywords:* intelligent technologies; holistic approach; integrated assessment method; controlling; technology evaluation

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### 1. Introduction

Many studies and scientific papers in the field of technology concern the selection, justification, implementation and evaluation. [1]. There is a variety of tools used for technologies evaluation: data envelopment analysis [2], strategic [3] and fuzzy models [4]. We can also use many other methods and tools, the analysis of which is presented in [5, 6]. On this basis, it can be concluded that the use of these models and methods for the evaluation of intelligent technologies in the production area has some limitations and does not fully take into account their specificity. Assessment of intelligent technology is a difficult task in terms of both content and methodology. In the literature, there are gaps in the concept of methodical evaluation of intelligent technology. This situation can be explained by

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complexity of the process and wide diversity of the technologies, as well as the fact that technologies under the concept of “smart” have been operating in the industry for relatively short time. Whatever the category of stakeholders is, assessment of intelligent technologies can be viewed in typical circumstances within the context of assessment of operations strategy [7]. It is therefore necessary to evaluate not only the legitimacy of the implementation of intelligent technologies, but also to be able to assess their functioning and effectiveness.

The article presents brief characteristics of intelligent technologies in the production area and describes the legitimacy to assess their holistic approach. The main purpose of this article is to present new holistic integrated method of evaluation, which has originally been addressed to evaluate the technical and organizational projects [8]. It allows the inclusion of “new economy” paradigms (including perspectives: economic, social and environmental) and also includes the aspect of sustainable development. For a detailed explanation of the proposed method, controlling was added as a supporting tool. Controlling provides continuous analysis of deviations from the established baseline and allows evaluation of intelligent technology along the phases of their design and use [9].

## 2. Characteristics of intelligent technologies in the manufacturing area

Manufacturers are recently facing more economic, environmental, social, competitive, policies, laws and technological challenges, than ever before. Only companies using advanced technological tools that are available to them, can count on to get the intelligence quotient they need to survive. Software and ICT solutions provide to: better and smarter decisions, complex strategies, fastest processes and proper design of shop floors [10].

In practice, smart technology is mostly about harnessing a combination of IT products – sensors, monitoring systems, automated controls, modelling and other decision-support applications – more intelligently [11]. Intelligent completions or popularly known as intelligent technologies, consist mainly of permanent sensors that are in charge of measuring and monitoring control devices responsible for regulation of the flow condition [12]. The main objectives of these technologies are primarily a reduction in resources and efforts associated with the intervention if there are production problems, as well as performance optimization with minimal interruption of production or injection [12].

The manufacturing industry is a great example to show and explain the importance of intelligent technologies. In this industry, technologies have created massive changes with origins as: the adoption of robotics and automation in manufacturing, the use of the new 3D printing, the development of intelligence of manufacturing machines and also the rise of warehousing automation [13], (Fig. 1).

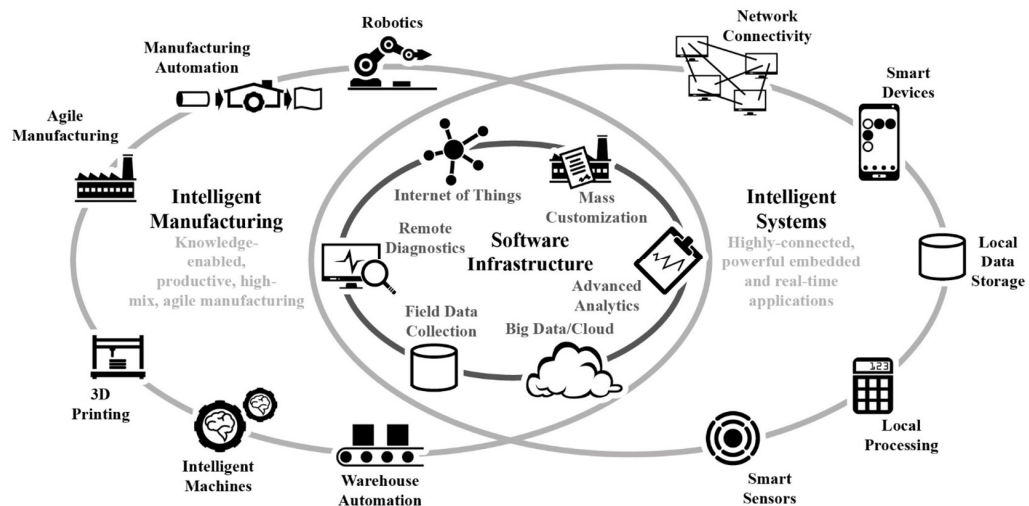


Fig. 1. The examples of intelligent technologies in the production area.

Source: [13].

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