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Digital Transformation in Industry


Digital Twins and New Business Models


 Springer

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Preface

Drivers and Effects of Digital Transformation in Industry

The rapid development of information technology has led to limitless possibilities for collecting, processing and analyzing big data, which has changed approaches to managing production processes. The reasons for such changes lie in the need for fast and precise product modeling in conditions when the demand for customized products has increased significantly. In just a short period of time, the concept of digital twins has grown from an abstract theoretical idea into a mature technology that is widely used in a vast variety of industrial sectors.

We can confidently say that today digital design and digital twins are becoming drivers of digital transformation in industry. The effectiveness of digital doubles has been proven by world leaders. It is widely recognized that digital twins lead to significant effects throughout the product life cycle: design, production, after-sales service and disposal.

The digital twin is a system of interconnected digital models of a product and production processes, and the parameters of these models can be controlled completely in a virtual environment. The effectiveness of digital modeling is ensured by the thousands of virtual and full-scale physical tests. The digital twins “are learned” during operation, and it becomes “smarter.” This process is accompanied by the replenishment of databases, datasets of decisions and knowledge, which ultimately leads to the creation of technologically related solutions and changes the production paradigm.

The 3rd Annual International Scientific Conference “Digital Transformation in Industry: Trends, Management, Strategies” (DTI2021) held in Russia (Ekaterinburg) on October 29 was devoted to digital design and modeling in industry, analysis of technological trends and economic effects of digital twins of equipment, technological processes and industrial products.

Traditionally, the conference aimed to assess the trends and prospects of digital transformation in industry and industrial markets, as well as to substantiate

successful digital strategies. Every year, industrial enterprises and executive authorities, researchers in the field of economic, technical and engineering sciences take part in the discussion platform of the conference. *This book presents the best scientific studies of the conference. What conclusions did the conference give us?*

Firstly, we have seen that digital transformation is deepening. The authors consider the economic efficiency of digital twins, their role in the development of industrial sectors and value chains. The articles note that enterprises that use digital twins adapt faster to rapidly changing trends and events, increase their productivity and begin to manage resources more efficiently. And this directly affects their competitiveness. The scientific discussion has shown that it is possible to create a digital twin not only of production processes and products, but also of social and economic systems.

Secondly, the scientific studies of authors have shown that digital transformation in different industries is characterized by some common trends, but at the same time, each industry proceeds in its own way. This concerns technological features, labor productivity, industry risks and necessary investments. In the articles, you will see the features of digital transformation in metallurgy, energy, aviation sector, refrigeration and air conditioning sector, wood-furniture sector, etc.

Thirdly, in the book, you will find articles on the ecosystem approach to digital transformation. These are, first of all, digital ecosystems in industry, including such elements as manufacturing enterprises, suppliers, dealers, research centers, universities, associations, etc. In addition, the articles will focus on digital platforms in the industry. The ecosystem approach to digital platforms relies on autonomous agents who contribute to the value of the digital platform.

Fourthly, authors note significant regional peculiarities in the digital transformation in industry. The articles study the experience of the European Union, in general, and Italy, Germany and Portugal, in particular. The authors highlight the process, resource and institutional features in these countries. The Russian experience of digital transformation in industry is widely represented. You can also see an article dedicated to digital twins for the development of territories.

Fifthly, the authors of this book claim that not only technologies and production are being transformed, but also business models. You can find articles on the use of artificial intelligence in process management, an innovation business model for sustainable development, strategies for digital transformation by financial and industrial groups and SMEs. The authors also focus on human resources for Industry 4.0, personnel competencies and successful teams in the digital environment.

The articles are an integral structure that characterizes the main trends of digital transformation in industry. The book will be interesting for researchers, entrepreneurs and policymakers.

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About This Book

The book offers a selection of the best papers presented at the Annual International Scientific Conference “Digital Transformation in Industry: Trends, Management, Strategies” (DTI2021), held by the Institute of Economics of the Ural Branch of the Russian Academy of Sciences (Ekaterinburg, Russia) on October 29, 2021.

The focus of the conference in 2021 is on digital design and modeling in industry, as well as the analysis of technological trends and economic effects following the introduction of digital twins of equipment, technological processes and industrial products. The aim of the topics discussed is to create an idea of introduction mechanisms for digitization processes and specify successful strategies of digital transformation in all sectors of industrial enterprises. The experience of developed and developing economies, as well as of small and large enterprises in implementing IT and other technological innovations, is scrutinized.

Among the topics covered in the book are the perception of Industry 4.0 basic technologies and the extent to which they affect digitalization processes, modeling the procedure and structural links between digitalization components and its factorial influence on the entire industrial sector, as well as industrial enterprises and regions and exploring the practice of using digital twins in the energy, metallurgical, aviation and other industrial sectors, etc.

These topics will be of great interest to academics, researchers and practitioners.

Headliners

- Gives insights into the latest research in the digital economy
- Presented new trends in the development of digital twins and new business models
- Gathers valued experience in implementing IT and technological innovation in industrial production

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Dr. Victoria Akberdina is Deputy Director of the Institute of Economics of the Ural Branch of the Russian Academy of Sciences. She heads the Department of Regional Industrial Policy and Economic Security. She performs fundamental and applied research on the problems of industrial policy formation, forecasting methodology and modeling the evolution of the economic and technological development of industrial complexes and conducts research on the structural proportions of economic development. The issues of digital transformation of the industry have become a focus in her publications in recent years. She is also Author of the computer program “Digital transformation of Regional industry.” She is Author of more than 150 scientific papers, and more than 20 scientific projects have been implemented under her leadership over the past 5 years. Since 2015, she has been Full Member of the International Academy of Sciences of Ecology, Human Security and Nature (MANEB) in the section “Economics and Law.” In 2019, she was awarded the title of Corresponding Member of the Russian Academy of Sciences.

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