International Journal of Digital Strategy, Governance, and Business Transformation
Volume 11 • Issue 1

Digitalization of Lifecycle Management of Domestic Russian Tour Products Based on Problem-Oriented Digital Twins-Avatars, Supply Chain, 3D-Hybrid, Federated, and Coordinated Blockchain

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ABSTRACT

The article fits into a moment of operational uncertainty and theoretical redevelopment of the nature of tourism in a society marked by geopolitical turmoil and declining international security, as well as rapid changes at the global level, including the pandemic, which is currently posing new challenges for the sector. Today, it is more relevant and appropriate than ever to reflect on them, with the new, digital energy of blockchain technology, using a fundamental approach to digitalizing the decentralized lifecycle management of the domestic Russian tour product with problem-oriented digital twin avatars, supply chain, volumetric hybrid, and federated-consistent blockchain. The goal of the article is a theoretical study and practical implementation, in the form of basic models and software modules, of artificial intelligence algorithms in managing the life cycle of an internal Russian tour product, and the use of laboratory for digitalization and management, using multi-agent models of intelligent digital twins-avatars, is being created. The purpose of these studies is to solve a scientific problem.

KEYWORDS

3D-Hybrid and Federated-Consorted Blockchain, Based Problem-Oriented, Condition Monitoring, Digital Twins-Avatars, Digitalization, Domestic Tourist Product in Russia, Lifecycle Management, Supply Chain

INTRODUCTION

The article fits into a moment of operational uncertainty and theoretical redevelopment of the nature of tourism in a society marked by geopolitical turmoil and declining international security, as well as rapid changes at the global level, including the pandemic (COVID-19), which is currently posing new challenges for the sector. Today, it is more relevant and appropriate than ever to reflect on them, with the new, digital energy of blockchain technology, using a fundamental approach to digitalizing the decentralized lifecycle management of the domestic Russian tour product with problem-oriented digital twin avatars, supply chain, volumetric hybrid, and federated-consistent blockchain.

DOI: 10.4018/IJDSGBT.20210101.oa2

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The article's goal is the theoretical study and practical implementation, in the form of basic models and software modules, artificial intelligence algorithms in managing the life cycle of an internal Russian tour product. Why at the State Sochi University, using the scientific potential of the head and responsible executors of the project, the Laboratory for digitalization and management of tour products, using multi-agent models of intelligent digital twins-avatars, is being created, the purpose of these studies is to solve a scientific problem in terms of creating an integrated scientific and methodological approach to modeling and design of monitoring systems, diagnostics and management of distributed cyber-physical objects and processes in the network segments of the Industrial Internet of Things based on the convergence of engineering technologies, data mining and in-depth analysis of processes, predictive modeling and machine learning.

The research objectives are related to the development of new models, methods, and a set of tools for the digital transformation of monitoring, diagnostics, and management of distributed cyber-physical objects during the transition to the digital economy within the framework of the fourth industrial revolution (Industry 4.0). Design research results are needed to synthesize the architecture of a new generation of intelligent cyber-physical systems, which represent a multi-agent computing ecosystem. It is designed to provide decision support processes based on monitoring events and processes at distributed cyber-physical objects of the Russian tourism industry. In such systems, many cyber-physical objects receive a huge amount of sensory data that humans cannot process in real-time. There are currently no ready-made integrated solutions for modeling and designing distributed monitoring and control systems for cyber-physical objects. Despite advances in engineering and knowledge management, the use of this approach for the synthesis of cyber-physical monitoring and control systems is still poorly developed. Such systems work with various distributed cyber-physical objects, which are, in most cases, measuring devices with sensors that collect and accumulate sensor data for transmission to a processing center via a telecommunications network. Data analysis results are used for predictive modeling of the dynamics of the development of processes at cyber-physical objects and for making management decisions. Cyber-physical monitoring and control systems are needed to automate the decision-making process based on data mining.

The project's relevance is associated with the need to develop and develop new universal mechanisms for modeling and designing cyber-physical systems using new control technologies and in-depth analysis of processes at controlled objects of the Russian tour product. For in-depth analysis of processes, it is necessary to develop automated technologies for collecting, storing, and intelligent analysis of data obtained from controlled cyber-physical objects of the Russian tour product. The scientific novelty of design research consists in the creation of a new scientific and methodological approach to the modeling and design of cyber-physical systems for monitoring and controlling distributed objects and processes in the network segments of the Industrial Internet of Things, as well as the methodology for distributed monitoring, diagnostics and recovery of these systems during their operation.

The scientific and practical significance lies in creating new technologies and software, and tools for the synthesis of cyber-physical systems for monitoring and controlling distributed objects and processes on the Internet of Things. For in-depth analysis of processes, it is necessary to develop automated technologies for collecting, storing, and intelligent analysis of data obtained from controlled cyber-physical objects of the Russian tour product. The scientific novelty of design research consists in the creation of a new scientific and methodological approach to the modeling and design of cyber-physical systems for monitoring and controlling distributed objects and processes in the network segments of the Industrial Internet of Things, as well as the methodology for distributed monitoring, diagnostics and recovery of these systems during their operation. The scientific and practical significance lies in creating new technologies and software, and tools for the synthesis of cyber-physical systems for monitoring and controlling distributed objects and processes on the Internet of Things. A new generation cyber-physical monitoring and control system is implemented in the form of a hyper-converged component-based architecture of a reconfigurable ecosystem, which