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# AUTOMATION OF TECHNOLOGICAL PROCESSES AND THE IMPORTANCE OF THE TECHNOLOGICAL SYSTEM IN THE FUTURE OF INDUSTRIAL ENTERPRISES

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**Abstract:**
Many initiatives and technologies are working in the Republic of Uzbekistan to introduce modern plants of the future based on technological processes of managing the activities of industrial enterprises. One consensus is that there should be a classic hierarchical automation system design. The operating system is aligned with support for technology and data functions. It includes technology related processes within the same network infrastructure. To achieve the goal of IT/OT convergence evolutionary transition is preferred in process automation. Difficulties during training the transition is mainly due to the traditional automation architecture, and the main problem is this it will be necessary to distinguish between current and future network architectures. To solve problems, in this article, we describe a desired future scenario for process automation and traffic enforcement. The measured traffic is further analyzed, which reveals shows representative transport characteristics in process automation. Finally, the main challenges and the future directions of system architecture for future factories will consist of improving the quality of the presented, developing the operating system of the technological system based on modern information technologies.

**Keywords:** Industrial networks, automation of technological processes, IT/OT convergence, operating system

## Introduction

In the Republic of Uzbekistan, the digitalization of the technological industry is expected to increase in the future by connecting advanced and powerful technologies such as cloud computing and machine learning in the management of technological processes and production efficiency is increasing. In response to the intended impact of the new integration several initiatives such as technologies in automation systems, Industry 4.0, Industrial Cyber-physical systems and industrial IoT systems have been formed to respond. Lack of technologies and we mention several technological processes that cause their needs. Also, research on bridging

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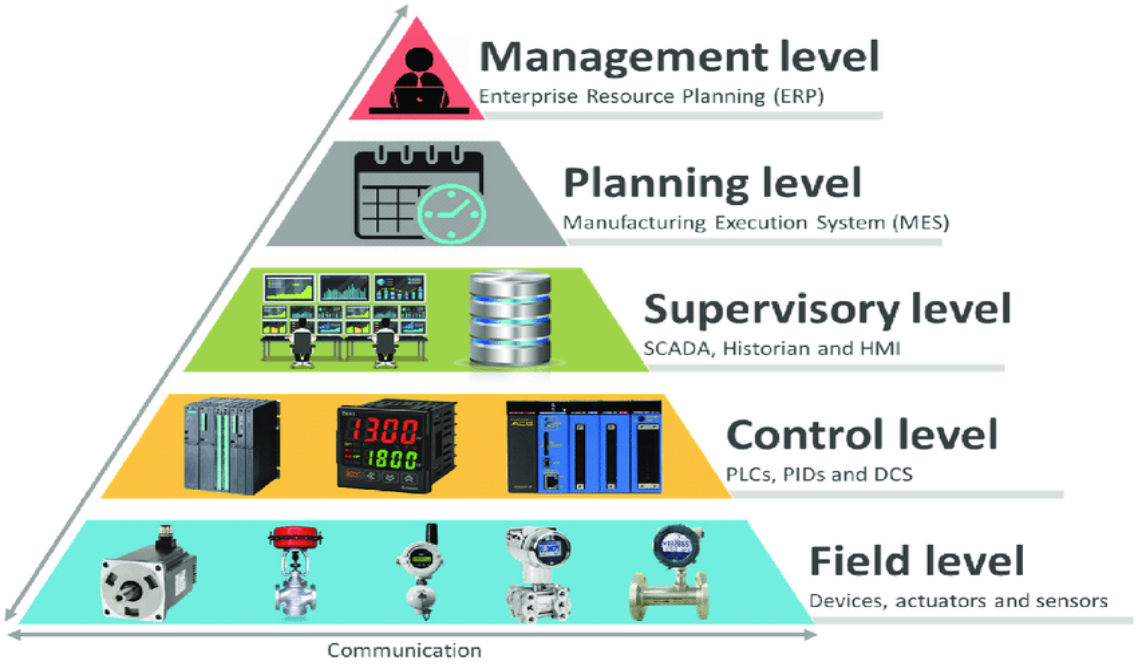
the big gap Improvements are planned in terms of interoperability. In order to obtain the results we expect in the control of technological processes, it is necessary to assume that any information can be easily accessed from any place, regardless of living in Information. As the technology (IT) or operational technology (OT) systems improve, the performance indicators of the technological performance scheme begin to increase. That is why it is the most important reducing or even eliminating boundaries between IT and OT subsystems to make way will depend on a high level of automation for innovation, new products and services. However, the possibilities are limited with the existing traditional architecture, the automation pyramid. The automation pyramid shown in Picture 1 is typically shown an example of today's architecture in existing industrial automation devices is shown. This architecture has been widely adopted, developed and implemented over the past 30 years. formed through hierarchical, diverse, and domain-specific communication structures. This implies. It is based on the presence of a large installed base that cannot easily replace automation systems and network infrastructures with the latest technologies in one maintenance service. For the technological system increase the likelihood of profit and adaptation in an established base, for example, brown-field it will be useful to introduce the installation step by step.




Picture 1. The automation pyramid of a typical industrial plant.

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Because the traditional automation pyramid serves its purpose of safety, fail-safe blocking and enforcing traffic types to dedicated levels to meet requirements availability, deterministic behavior and high throughput, such as new integration achieving high-level functionality has been showing difficult results. New functionality that requires (new) factory data creates certain difficulties. This is mainly due to networks the lowest levels have real-time requirements and to guarantee deterministic behavior, otherwise unrestricted traffic is usually not allowed or even possible. In fact, customers are looking to increase the operation and efficiency by reducing downtime, ensuring best-of-breed interoperability and opportunities for increased flexibility and portability should be created. That could translate to a few more falls single-purpose networks that transfer separate protocols into one general-purpose network can accommodate both IT and OS traffic on the same infrastructure. However, this imposes new challenges and ways of working in the deployment of converged networks. Especially Priorities, Quality of Service Levels as well as Avoidance Congested links should be carefully considered because all traffic classes and traffic types in order to have sustainable production, all requirements must coexist while meeting the sum total plant this task can be difficult even in a green field scenario where the latest technologies are available can be installed and run without previous systems imposing restrictions. In a networked system scenario, this is even more difficult, as one may not know what the traffic is availability and where or how close to the network's capacity ceiling it is. It has real traffic the performance of actual installations will guide the greenfield scenario research and network are important in field scenarios. By providing common network performance, it by unlocking the bottleneck, new services and business opportunities could be launched, information and leasing, such as mobile operators and maintenance personnel it will be necessary to access relevant information from the converged network.

**Management of technological processes and production network**

In this study, we focused only on the production network of cardboard machines and we have limited our technological control to server and network traffic management shown in Picture. 1. A production network in a technology operating system uses a hot standby mode. This method, if there is a primary network, the secondary (backup) network is activated paths fail. Three marshaling rooms in different locations and a series of switches provides a communication backbone for two carton machines throughout the plant. It is worth mentioning that we cover

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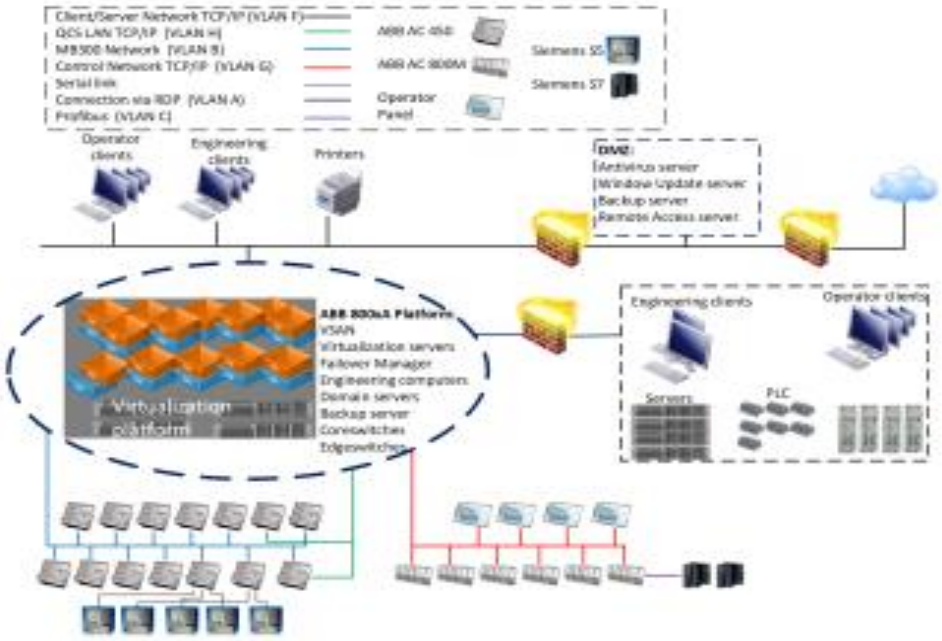
only a small part of the total OS network consists of five different control systems of different manufacturers and generations, 40 operators and engineering stations connected to the server network and 30 process controllers and PLC in different virtual local area networks (VLANs). A network topology consisting of several controllers is depicted in Picture 2 network VLAN and one server network VLAN (client/server VLAN). Server network A VLAN is connected to the IT network through a firewall. For privacy, we replace it enter the actual VLAN ID values in letters and they are shown in letters in this section.




Picture 2. Schematic representation of the network topology of one of the cardboard machines in the technological system.

Key technology drivers that will enable the future industrial network (a) This is seen in the implementation of three main areas of deterministic communication infrastructure, (b) edge/fog computing and (c) security. Expected to be solved according to deterministic communication infrastructures to the IEEE Time Sensitive Network (TSN) standard under development standardization. TSN is working to provide an innovative network solution for closed-loop control systems that support mixed traffic in critical applications such as transportation. (automotive / automotive networks, rail and autonomous vehicles), traffic management, power implemented under the control of utility automation and industrial distributed control systems. Another technology cloud/edge computing that drives cloud computing capabilities storage, computing and networking to the network edge.

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Fog computing is it a leading architecture enabler that supports low latency, low power consumption, high power reliability and location awareness of the aforementioned importance attached to applications. Safety is another important facility that will ensure industrial automation in the future. In traditional industries, the main safety issue is usually related to security definition, where the main goal is to protect people and machines from the consequences system faults must be eliminated. By integrating information technology into industrial control systems, protection against cyberattacks has become the main design goal of Industrial, improved through IoT systems.

## Conclusions

There is a growing need to bridge the gap between IT and OT networks the processing industry to make the next leap in productivity and innovation. Our practical work is the first step to ensure the characteristics of the OT in a typical plant of process automation aimed at inspiring more research and standardization work in traffic and IT/OT convergence for process automation. Due to the variety of process automation scenarios as well as basic network topology, applications, and communication protocols when used, more practical studies are needed to reveal the comprehensive transport characteristics in process automation. TSN is one of the promising technologies aimed at destroying networks. However, many challenges are needed to deploy TSN in large production facilities must be decided in advance. In particular, further research in the areas of performance engineering, security, automatic tool support, traffic modeling and profiling, and online monitoring necessary. In addition, it is very important to maintain its performance and characteristics distributed real-time systems needed to automate processes. We apply for more research efforts to obtain engineering guidelines for the brownfield, incl network performance analysis because it is the basis for adding other functions and ultimately integrates IT and OT systems.

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