



## New management technologies and digital business transformation.

### Новые управленческие технологии и цифровая трансформация бизнеса

### Nuevas tecnologías de gestión y transformación empresarial digital.

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#### Abstract

The article considers the main roles of information technologies in the company: auxiliary, restructuring, and digital transformation. The restructuring role of information technologies is characterized by the formation of the electronic economy, the consumer economy, the emergence of strategic alliances, value-added communities and meta-markets, and other forms of economic and business organization with appropriate management. Information technologies of digital transformation provided the creation of an economy in the form of a cyber-physical system instead of interaction between the virtual and real parts of the world, which took the form of a platform economy, digital enterprises, industry 4.0, and similar phenomena. As a result of the transformative effects of information technologies on companies and the business environment, management tasks and technologies changed. The article analyzes the evolution of changes in companies, business environment and management. We consider disruptive technologies such as blockchain, Big Data, knowledge management, Agile, Scrum, Teaming, design thinking and their impact on company management.

**Keywords:** Roles of information technologies in the company, digital transformation of companies, tasks and new management technologies.

#### Аннотация

В статье рассматриваются основные роли информационных технологий в деятельности компании: вспомогательная, реструктуризации и цифровой трансформации. Реструктурирующая роль информационных технологий характеризуется формированием электронной экономики, потребительской экономики, появлением стратегических альянсов, сообществ с добавленной стоимостью и мета-рынков, а также других форм организации экономики и бизнеса с соответствующим управлением. Информационные технологии цифровой трансформации обеспечили создание экономики в виде киберфизической системы взамен взаимодействия виртуальной и реальной частей мира, которое приняло форму платформенной экономики, цифровых предприятий, индустрии 4.0 и тому подобных явлений. В результате трансформационного воздействия информационных технологий на компании и бизнес-среду изменились задачи управления и технологии. В статье анализируется эволюция изменений в компаниях, бизнес-среде и менеджменте. Мы рассматриваем «подрывные» технологии, такие как блокчейн, Big Data, управление знаниями, Agile, Scrum, Teaming, дизайнерское мышление и их влияние на управление компаний.

**Ключевые слова:** роль информационных технологий в компании, цифровая трансформация компаний, задачи и новые технологии управления.

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El artículo considera los roles principales de las tecnologías de la información en la empresa: auxiliar, reestructuración y transformación digital. La función de reestructuración de las tecnologías de la información se caracteriza por la formación de la economía electrónica, la economía del consumidor, el surgimiento de alianzas estratégicas, comunidades de valor agregado y metamercados, y otras formas de organización económica y empresarial con una gestión adecuada. Las tecnologías de la información de la transformación digital proporcionaron la creación de una economía en forma de un sistema ciberfísico en lugar de la interacción entre las partes virtuales y reales del mundo, que tomó la forma de una economía de plataforma, empresas digitales, industria 4.0 y similares. fenómenos. Como resultado de los efectos transformadores de las tecnologías de la información en las empresas y el entorno empresarial, las tareas de gestión y las tecnologías cambiaron. El artículo analiza la evolución de los cambios en las empresas, el entorno empresarial y la gestión. Consideramos tecnologías disruptivas como blockchain, Big Data, gestión del conocimiento, Agile, Scrum, Teaming, pensamiento de diseño y su impacto en la gestión de la empresa.

**Palabras claves:** Roles de las tecnologías de la información en la empresa, transformación digital de empresas, tareas y nuevas tecnologías de gestión.

## Introduction

### The transformative impact of information technology on companies and management

The information nature of management is especially evident in modern conditions—a drastic reduction in the duration of business processes, business virtualization, real-time decision-making, and much more. The nature of management and the role of information technologies (it) and information systems (is) in companies of any form and sphere of business are changing.

In fact, at the moment we can observe the transformative impact of it and IP on companies and their management in three forms: it and IP play a supporting role, restructuring, and the role of digital transformation technologies. In the first case, it and IP, without changing the nature of employees' actions, strengthen them technologically, replacing part of their actions with the actions of technologies and systems. In practice, this means transforming the daily activities of employees (their routine loops) through automation and Informatization. The management system, in this case, makes it possible to calculate faster, speed up reporting, and improve decision-making. There are no fundamental changes in the company's strategy or business model.

The further development of it and the IP based on it creates a different role for them in terms of their impact on business restructuring. At this stage, companies' strategies and business models are being transformed. First, this was manifested in the emergence of the electronic economy, with its business models (B2B, B2C, C2C, G2C, etc.), in the further formation of the concepts of the information economy (Gates B., 1999), information economy (Castells M., 2001), knowledge economy, etc. new questions arose Before the management of companies: how to assess the potential of electronic business for a particular company; what factors and the nature of the problems determine the decision to enter or not enter e-Commerce; at what point to do it; as a result, change the strategy, business model, organizational structure of the company; in what sequence to make changes and how to get the maximum benefits from e-Commerce.

Along with changes in business models, there has been a change in perceptions of the required business models. There was a request for the formation of a business as a project implemented by a network of enterprises: a network enterprise (Castells M., 2001), a value-added community (Means, G. Schneider D., 2000), and meta-markets (Means, G. Schneider D., 2000). And to manage the development of value-added communities as an environment for implementing effective innovations, with shared services and supporting processes, with the transition from improving individual companies to optimizing the company network. Another form of business model transformation is the strategic alliances of companies that combine all the resources of these companies to optimize costs and results based on IP. This is especially evident in the emergence of strategic alliances among passenger airlines.

At the same stage, there was a change in business priorities – after the era of production and the era of quality, business was forced to recognize the formation of the consumer era. For the company's management, this meant moving from mass production to flexible production, with the production of products with unique properties in a mass

production environment, and ensuring the ability of manufacturers to combine individual customer preferences with an efficient production and planning system.

The emergence of a number of technologies that are commonly referred to as basic digital transformation technologies - the Internet, social networks and social resources, mobile devices, cloud computing, big Data Analytics, the Internet of Things, and then the formation and development of artificial intelligence and machine learning technologies, blockchain, digital counterpart, virtual and augmented reality, human-machine interaction, and so on - provided a transformative role for it and shaped the digital economy. In this economy, "as a production complex, a production system that creates products, services, provides life and convenience for people, the population, the so-called cyberphysical system acts in which there is an integral interaction between the virtual and real parts of the world" (Rifkin J., 2011). Features of this economy: digital enterprises, often with completely deserted value chains; "smart" automation (artificial intelligence technologies, machine learning solutions, and embedded solutions); flexible workforce (with the ability to solve special tasks, "fast learning", "ability to accelerate"); platform economy (platforms and ecosystems for organizations), connecting consumers to the development of new products at the earliest stage and accelerating feedback; and much more. New forms of implementation of the functions of States, organizations of industries and companies have emerged: smart power supply networks and grid energy; smart homes, districts, cities; shared consumption; productive economy; waste-free economy; integrated health care; etc.

At the moment, technologies in the field of data processing (artificial intelligence, foggy computing, supercomputer technologies, identification technologies, modeling, blockchain technologies, neural networks, etc.), communicating robots, additive technologies and additive manufacturing, and the Internet of things have formed the fourth industrial revolution. Currently, we are witnessing the continued development of the technological foundations and dominant technologies of "Industry 4.0". First of all, these are new automation based on computer-integrated systems, cyber-physical systems, M2M (machine – to-machine) communications technologies of the industrial Internet of things, new design principles (oriented services, modularity, parametric design, personalized products, etc.), interoperability and decentralization, virtualization, real-time data accumulation and analysis, etc.

The development and application of all these technologies has a powerful transformative effect on business: reducing the time from an idea to its implementation in the market; competition in the speed of changing business models; providing flexibility and creating unique products in mass production; switching to unpopulated production and mass introduction of robotic technologies; widespread use of cloud services; data analysis and evaluation based on Big Data technologies; creating a "maker economy" based on 3D printers; creating a Smart Factory; end-to-end automation and integration "from equipment to Ministry"; etc. all these together form a new industrial platform in the economy.

The processes described above, on the one hand, form a new image of management - using data and making decisions in real time, applying the results of big data analysis in management, building a business on the basis of digital ecosystems, and on the other - put forward qualitatively different management tasks at all levels of economic management. We are talking about new industrial structuring (new organizational forms, digital collaboration, digital integration of producers and consumers, etc.); formation of the appropriate infrastructure (management of suppliers of key production technologies, suppliers of infrastructure solutions and services (telecommunications and cloud services, data accumulation and analysis, etc.), promotion of industrial consumers); creation of a new type of digital production enterprises; formation of market mechanisms for encouraging innovation; solving problems of intellectual property management; etc.

Modern economic transformations need to assess the risks and consequences for society. It is obvious that changing technological patterns leads to the formation of a different social structure of society and this requires special research. Another significant challenge is the task of education-the formation of generations of "digital natives" of the new economy, combining managerial, engineering and other competencies with digital skills. Lack of qualified personnel is one of the significant risks. In addition, the new environment requires other concepts of human labor.

Changes in companies that occur and should occur in companies are strategic, not tactical. You need to ensure a continuous change management process, with a choice between a leadership strategy or a follow-the-leader strategy. These changes are manifested differently in companies of different sizes. In small and medium-sized businesses, the initiator of changes is the owner or Manager. In fact, the change agent is the project Manager. In a large business, you need to change the corporate culture and support the ability to change.

In fact the company's digital leadership includes three components:

- 1) strategy-digital business transformation;
- 2) organization – management of the company digital business;
- 3) innovation – strategic digital excellence.

With this in mind, digital transformation is a company's transition to a digital enterprise by changing the organization's strategy, business model, and culture. Implementation of IT and IP that expand the boundaries and capabilities of the company and allow you to form your own ecosystem (building your own ecosystem or fitting into existing ones). Management tasks are to ensure the company's digital transformation (defining and realizing the value of digital business transformation, creating a new business model, providing digital leadership in the company, training employees and searching for talent, and transforming the IT infrastructure into new tasks).

Sum up. The emergence and development of end-to-end technologies and accelerating globalization are radically changing approaches to value creation and destroying seemingly immutable economic laws. The world is going through a transition from an economy where demand creates supply to an economy where supply creates demand. The one who can make the best offer with the highest consumer value gets a win in the face of loyal consumers. Technologies allow you to personalize the offer as much as possible, taking into account the characteristics of individual consumption. Change is necessary for survival and growth. In parallel with the process of transformation of companies under the influence of IT and IP, management tasks changed. At present, we are seeing an increasing penetration and interweaving of digital technologies and management technologies. They enrich and complement each other, creating not only a "new" economy, but also a "new" management.

The question is, have new forms and technologies of management appeared to solve new problems? Are there disruptive technologies for management? We present a number of technologies that play a disruptive role for management and the emerging properties of management. Next, consider the impact of these technologies on the properties of management.

### **Blockchain-disruptive management technology**

Modern companies can be considered as systems built on information interaction with the environment - other companies, trade unions, the state and on information interaction of elements of the company itself (divisions). This means that companies in the course of their operations form networks for the exchange of information and assets (tangible or intangible resources). Companies document this interaction using various documents (for example, contracts) that are stored by the parties to the interaction and by intermediaries. The possibility of fraud, opacity, corruption, errors, high costs and risks, and much more – determine the vulnerability and inefficiency of such a system. A decentralized distributed database with a cryptographic key, built on blockchain technology, solves all these problems, because it allows you to get rid of intermediaries in agreements between companies and people.

The media hype around blockchain technology currently focuses on its financial applications, primarily in the field of cryptocurrencies (cryptocurrencies and ICOs themselves). But this is only one of the decentralized applications of the blockchain. Another decentralized application is DAOs-decentralized autonomous organizations-decentralized Autonomous organizations (a platform on the blockchain for deploying business as a closed decentralized solution for creating virtual enterprises with their own financial services).

Along with decentralized applications, private blockchain systems (various blockchain-based systems developed and supported by organizations to solve their tasks) and blockchain services (public services built on the blockchain) are being developed.

At the moment, it is possible to fix the construction of the blockchain economy. At the state level, this means reducing the importance of paper documents confirming the facts of committing any actions, creating various registers, increasing transparency and reducing the possibility of fraud, reducing the need for regulatory authorities, auditors, etc.

In business, Blockchain is a platform for effective organizational transformation models. In the financial sphere, the use of blockchain is a reaction to the complexity and increase in the scale of operations, high load and increase in

the number of failures. Blockchain allows you to get rid of centralization and intermediaries, reduce costs, and speed up processing. In other areas of business-digital identification, digital assets, smart contracts, a huge number of other applications. Surveys of companies show that the main benefits of the technology are expected to reduce operating costs (73% of respondents), reducing the time of calculations (69%), reducing risks (57%), increase the possibility of obtaining additional income (51%) (<https://fastsalts.com/sections/obzor/1503.html>).

Undoubtedly, the use of blockchain technology leads to the transformation of business strategy, business models and operations of companies. It forms a different management. At the same time, the emergence of blockchain technology was accompanied by the expectation of creating a new fair society and transparent business conditions without intermediaries, without risk, without fraud. This technology called for the choice of "public versus corporate", "self-regulating community "versus " centralization". However, blockchain is only a technology that should be needed by society and business. Its applicability is based on the network properties of organizations that use this technology, the need for a mechanism for reaching a consensus of network participants to confirm transactions, the ability to scale prototypes, the correct formulation of application goals, and so on.

### **Management and Big Data**

One of the most powerful in terms of impact on company management was the Big Data technology group. Big Data refers to a set of approaches, tools and methods for processing structured and unstructured data, characterized by a large volume and a significant variety, to obtain human-perceived results that are effective in the conditions of continuous growth of this data.

The emergence of an increasing number of data sources, the ability to store and process virtually unlimited amounts of data of any structure, as well as the development of data analysis methods and machine learning, predetermined the emergence of Big Data technologies, and later, Data-driven companies. What happened in the field of management in these data-oriented companies?

First, the transformation of the strategy: how to start working with big data, what specific problem in the company is related to big data, and how to solve it.

Second, the transformation of the company's business practices: Analytics - the main tool for managing the company; restructuring of business processes for Big Data; regulation of procedures for collecting, transmitting, storing and integrating data; investment in data accumulation, extracting information from accumulated data, creating special tools for Analytics; implementation of Analytics aimed at the future: "Why?", "Who?" and "what next?"; implementation of forecast scenarios and models; changing the decision-making process.

A significant step in the company's transformation is the selection of staff with analytical thinking, training in information analysis skills, and the formation of a special corporate culture (there is no authority authority, making decisions based on data analysis, cultivating research thinking, and data is the task of all employees).

Third, the implementation of changes in the organizational structure is the creation of departments that deal with Big Data.

It is not a trivial task of managing Data-driven companies to take into account and assess risks in the field of ethical problems of applying the results of big data analysis technologies.

### **Knowledge management and management**

The transformation of the commodity economy into the knowledge economy, when knowledge for most industries becomes a key competence and is a factor in the innovative development of organizations, has been realized. Knowledge in such an economic system acts as a resource, commodity, and capital. There are three driving forces in the knowledge economy: knowledge itself (intellectual capital) as a strategic factor; rapid and continuous changes in everything that create uncertainty for companies; and the globalization of all economic activities, leading to global competition and business interdependence.

The knowledge economy required a revision of the principles of building economic and managerial relations in organizations, which resulted in the formation of a new type of management – knowledge management. The initial positions of knowledge management are ideas that emphasize the special role of a person, his intelligence and knowledge. In such management, it is recognized that the organization's values are not only its assets, goods/services produced, but also the competence of employees, the degree of commitment of consumers, culture, know-how and other components of the concept of "intellectual capital". Note that in knowledge management, priority is given to knowledge, considered, on the one hand, as the most important type of resource, and on the other - as the most valuable end product of a modern organization. Therefore, management issues increasingly involve the management of intellectual capital and information.

An important condition for the transition to knowledge management is the infrastructure that companies must create, consisting of knowledge bases and data and knowledge repositories; data and text mining tools; document, content, and email management tools; external information flow management tools; team work tools; integrated knowledge management tools - knowledge management platforms and corporate knowledge portals; decision support tools-systems that support discussion groups, expert systems, and others.

### **Agile, Scrum and other innovations as new management technologies**

As a reaction to the transformation of companies and the business environment, a number of innovations have appeared and are being successfully applied, which can be attributed to new management technologies: Agile, Scrum, Teaming, and design thinking.

In February 2001, 17 programmers released an Agile Manifesto containing the basic principles of agile software development:

- 1) people and interaction are more important than processes and tools;
- 2) a working product is more important than comprehensive documentation;
- 3) cooperation with the customer is more important than agreeing on the terms of the contract;
- 4) being ready for change is more important than following the original plan.

The principles underlying the Agile approach have formed a new view of management, in which the customer's needs and ensuring its competitive advantage are paramount; encouraging changes; constant collaboration with the customer of motivated professionals in the right conditions; a working product is the main indicator of progress; constant attention to technical excellence and design quality; minimizing unnecessary work; self-organizing teams.

Scrum is a flexible method for developing a product in a complex, volatile, and uncertain environment. Main ideas of the method:

- 1) you need a person who has the most complete understanding of the product;
- 2) the project team must be Autonomous, and for this to include all the necessary specialists
- 3) team activities should be divided into short segments-sprints - with clear goals;
- 4) the team's activities must be constantly improved.

Teaming is an approach to organizing the activities of large groups of people based on the principle of psychological security and constant training in order to achieve increasingly complex and ambitious goals. It ensures coordination and collaboration without creating stable and inflexible organizational structures. This innovation in management arose in a situation where team work skills are even more relevant than before for survival in the era of digital transformation. It has become necessary to move away from hierarchical systems and Directive management style to open flat structures that allow, first, to reduce the gap between the adoption and implementation of innovations (this is the goal of the design thinking concept); second, to involve all team members in the development of the company; third, to eliminate the fear of mistakes and establish open competition from different points of view; and fourth, to coordinate actions for making common decisions (Edmondson C. Amy, 2013). The transition from “work teams” to “teaming” due to rapid change under the influence of technology, increasing uncertainty and complexity, speed decision task as a result of outsourcing, the instability of teams, and with constant experimentation and research. Often, the solution of such tasks is beyond the power of a single leader and there is a need for shared leadership. When the Manager gives instructions rather than controls, when he encourages flexibility rather than requiring compliance, then the organization

reaches a new level, thus laying a solid Foundation for more effective work and the success of the company as a whole. The slogan of teams in the era of digital transformation: "Change people... or change people".

### **Design thinking and a new look for the Manager**

Digital transformation can go in three directions:

- 1) changing the customer experience by better understanding the unique and individual experience of each customer,
- 2) automation/digitalization/reengineering of internal business processes,
- 3) changing the business model.

For the successful implementation of any of the directions, you can not do without design thinking – "a new approach to the design of innovative solutions focused on the person, based on the tools used by designers and used to integrate people's needs, technological capabilities and requirements for business success" (Brown, 2009). In fact, this is a new round of development of the concept of consumer orientation to create value together with the consumer laid down by K. K. Prahalad, M. S. Krishnan V. ramaswami (Pralhad C. K., Krishnan M. S., 2008), (Pralhad C. K., Ramaswamy V., 2004). Design thinking becomes popular when the speed of change introduced by end-to-end technologies has become so great that there is almost no time left for full-scale marketing research. Design thinking methods allow you to quickly understand the current situation, generate ideas for new products or modify existing ones, and conduct rapid prototyping and testing of proposed solutions with minimal costs.

Thus, if we want to follow existing patterns, we don't need design thinking. Design thinking is necessary to quickly create a unique product; that is, the antonym of the benchmarking method, i.e., the method of comparison with the best samples.

The first stage of design thinking is empathy. It is important to understand the real behavior of people, the reasons why they behave this way, and not otherwise, their motivation, worldview, and as a result, their values and needs. It is empathy that becomes the key to opening up opportunities, as it reveals consumer problems that require solutions. The following steps, if the consumer has been correctly understood, will lead to the promotion of creative ideas and finding possible solutions to be prototyped and tested.

Design thinking becomes a mandatory tool for a modern Manager when performing digital transformation as a way to quickly test hypotheses and find solutions to consumer problems.

### **Conclusion**

#### **Future: consequences of new management technologies**

At the present stage, information technologies have provided the peak of revolutionary changes in business and society. The new technological structure of the economy, based on cyber-physical systems in which people and robots will work at the same time, will lead to getting rid of routine and cheaper service operations, and optimizing business processes. Smart components will be added to most modern transactional systems (ERP-Enterprise Resource Planning), BPMS-Business Process Management Systems, EPM-Enterprise Project Management). A significant number of companies will use a full set of big data analysis and business intelligence tools in their decision-making process for any task, and above all, to improve the efficiency of the process of creating marketing offers and improving the customer experience. These technological opportunities at the company level will require changes in management technologies, and at the society level will lead to the formation of a new social structure and a different system of basic values.

We have the ability to anticipate how companies will change and how management will transform. And questions about how the structure of companies will change, how they work, how the roles of managers will change at different levels of the hierarchy, and whether hierarchical structures will still be in demand, have only tentative answers. But in a very short time we will get answers to these questions and time will show how correct decisions were made today.

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