Innovative Approach to Updating the Digital Platform Ecosystem

Alexander Zatsarinnyy [1][0000-0003-0227-688X] and Alexander P. Shabanov [1][0000-0003-1204-9787]

[1] Federal Research Center "Computer Science and Control" of the Russian Academy of Sciences, Vavilova st. 44-2, 119333 Moscow, Russia
apshabanov@mail.ru

Abstract. The research relates to the problem of creating digital platform ecosystems in relation to the development directions of the national program "Digital economy". The object of research is a database of configuration management in the ecosystem of an interdisciplinary digital platform created for research and development in the direction of development of new production technologies. The scientific task of the research presented in the article is to find a methodological approach to ensuring interoperability with a new business entity - an organizational system of production, scientific, educational, financial, innovative or other profile introduced into the ecosystem of the digital platform. A new method is proposed for generating project scenarios in the configuration management database to ensure interoperability with the new organizational system. The method is developed based on the results of an analysis of the experience of using it concepts for managing it services - IT Service Management, data processing and transformation - Information Centric Network, data transmission - Intent-Based Networking. The scientific novelty of the method is to provide automatic generation of records about the configuration elements of a new business entity in the database of the digital platform ecosystem. The practical significance of the research is to reduce the time needed to build up the competencies and resources of the digital platform ecosystem by introducing new organizational systems.

Keywords: organizational system, ecosystem, digital platform, interoperability, database, project scenario.

1 The production of a task

The development of the digital economy is characterized by the following levels [1, p. 2]:

- markets, sectors of the economy and spheres of activity in which specific economic entities interact – organizational systems-suppliers and consumers of goods, works and services;
- platforms and technologies where competencies are formed for the development of markets, economic sectors and spheres of activity;

- an environment that creates conditions for the development of platforms and technologies and for the effective interaction of market participants, economic sectors, spheres of activity and that covers regulatory regulation, information infrastructure, personnel and information security.

The research relates to the solution of the scientific problem of economic development in the direction of "new production technologies" based on the creation of ecosystems of digital software platforms [1, p. 3].

Conditions for conducting research:

- based on the digital platform, an ecosystem of economic entities is organized, which includes industrial enterprises, innovation centers, scientific institutions, educational organizations and other organizational systems that work towards the development of new production technologies. Platform support of business entities is carried out taking into account the boundary conditions of stable functioning of computing resources of the digital platform [2];
- the digital platform ensures the interoperability of information systems of business entities when performing these works [3];
- the configuration management database in the digital platform ecosystem is designed, implemented and operates in accordance with the IT Service Management concept [4] and is hosted in the digital platform information infrastructure.

The article uses the following terms and definitions related to digital platforms that meet the above conditions:

- "new production technologies" refers to a complex set of multidisciplinary knowledge, advanced knowledge-intensive technologies and systems of intellectual know-how formed on the basis of the results of fundamental and applied scientific research [5];
- "ecosystem" refers to a modern network form of business organization with a goal of automating all new business processes [6];
- "a digital platform" is a complex organizational and technical complex that includes a competence center that concentrates knowledge in a specific subject area, a high-performance data center, and storage libraries of services that are implemented on this platform and supported by the competence center [7];
- "interoperability" refers to "the ability of two or more information systems or components to exchange information and use information obtained as a result of exchange" [8].

The object of research is a database of configuration management in the ecosystem of a digital platform.

In accordance with the Glossary [9] used in projects on the concept of IT Service Management, this article uses the following definitions that relate to the object of this study:

- a configuration management database (CMDB) is a database used to store configuration records throughout their lifecycle. The configuration management system supports one or more information system configuration management databases, and each database stores attributes of configuration items and associations with other configuration items;
- a configuration management system (CMS) is a set of tools, data, and information used to support the management of service assets and configurations. The CMS is part of the overall service knowledge management system and includes tools for collecting, storing, managing, updating, analyzing, and reporting data about all configuration elements and their relationships. The CMS can also contain information about incidents, problems, known errors, changes, and releases. The CMS is supported by service asset and configuration management and is used by all it service management processes;
- a configuration record is a record that contains information about a configuration item. Each configuration record documents the lifecycle of an individual configuration item. Configuration records are stored in the configuration management database and are maintained as part of the configuration management system;
- a configuration item (CI) is any component or other service asset that needs to be managed to provide an IT service. Information about each configuration item is recorded as a configuration record in the configuration management system. This record is maintained throughout its lifecycle using the service asset and configuration management processes. These typically include it services, hardware, software, buildings, people, and official documentation such as process documentation and service level agreements (SLAs);
- IT service is based on the use of information technologies and provides support for business processes. Role functions, processes, and technologies are assigned to perform an IT service, and it must be defined in the service level agreement.

The research is related to the solution of the scientific and applied task of introducing a new business entity (a new organizational system) into the ecosystem of the digital platform.

The goal of this research is to develop a new method for generating project scenarios in the configuration management database to ensure interoperability with a new business entity being introduced into the digital platform ecosystem. The Russian Foundation for basic research (projects 18-29-03091 and 18-29-03100) supports this research.

2 Methods and models for developing project scenarios

2.1 Analysis of the practice of applying the concept of IT Service Management

Because of the analysis of information about the practice of applying the concept of IT Service Management in organizational systems of various industries [4], the following logical cause-and-effect sequence of properties of the configuration management database is revealed:

- configuration management databases are electronic models of information infrastructures in existing organizational systems. The basic unit in these models is the configuration record;
- the corresponding configuration records are copied during automatic reproduction of process functions and processing, conversion, transfer, etc. operations are performed on them, which are determined by the logic of performing these functions;
- each configuration record of a process, it service, technical and software product, attribute, connection, and other entities that affect the performance of organizational systems can be represented as a project scenario that has already been implemented in the electronic model of the organizational information infrastructure of the configuration record system;
- electronic models of information infrastructures – their composition and internal structural relationships are subject to changes in accordance with changes directly in the information infrastructures of organizational systems;
- access to the configuration management database and to work with configuration records is granted to configuration management processes, changes, incidents, problems, and others, according to the set permissions.

It is obvious that these properties apply to the object under study – the configuration management database in the digital platform ecosystem, and to the processes reproduced in the digital platform ecosystem as a whole. Therefore, the configuration management database is essentially a universal component that can methodically ensure the functioning of organizational systems in digital platform ecosystems, regardless of their number and types of organizational systems' activities.
The analysis of the experience of using other information concepts and technologies in information systems is carried out:

- Information Centric Network and Intent-Based Networking [10];
- known methods and models for collecting, processing, displaying and archiving information about monitoring or management objects [11];
- building machine learning algorithms in power systems [12] and in Internet of things platforms [13];
- Knowledge representations [14] and other technologies used in big data processing, artificial intelligence, cognitive forecasting, and so on.

Because of the analysis, the possibility of applying these concepts and technologies to automate processes that are reproduced in the ecosystem of an interdisciplinary digital platform in the direction of developing new production technologies was determined.

2.2 Analyses of innovative developments and intellectual property objects

The analysis of known research and development (R & d), start-UPS and intellectual property, which precedes the technical and work projects towards the development of "new production technologies" identified the following factors a fairly wide spread of projects dedicated to highly intelligent digital technologies in this area.

1. A wide range of technological areas in which R & D is implemented includes: robotic systems, complexes and objects; virtual and augmented reality; artificial intelligence and big data; video analytics; blockchain; industrial Internet of things and wearable devices, 3D printing, etc. The scope of such R & D includes all key business areas, for example, "Gazprom Neft Corporation" – from exploration and production to Finance and HR [15].
2. The Scale of industry coverage of innovative digital platforms, which is illustrated, for example, by the works [16-20] and startups listed in table 1.

Table 1. Examples of innovative digital platforms

Title	Purpose
IQS is a platform for interaction between citizens, government and Business. Portal "Decide together".	Performs automation of geoinformation management processes based on processing incoming information messages.
(http://d-russia.ru/v-yaroslavle-zapustili-interaktivnyj-portal-reshaem-vmeste.html)	
TEKO is a distributed processing platform. TEKO company.	Provides information support for cash and non-cash payment acceptance processes using distributed Ledger technologies.
(http://sk.ru/news/b/pressreleases/archive/2018/03/14/novym-rezidentom-skolkovo-stala-kompaniya-_1c20_teko_1d20_--razrabotchik-raspredelennoy-platezhnoy-platformy.aspx)	
Hardware and software platform for automation of production of enterprises of precision and medium engineering. "Industrial Internet of things».	Provides information support for integration processes of non-standard equipment and related operating systems processes in a single technological chain of operations.
(https://www.osp.ru/iz/rusnet/articles/13050649)	

3. The availability of patent information support of activities of the organizational system (method, systems, centers), a brief description of which is given in table 2.

Table 2. Examples of patents to support organizational processes (methods, systems, centers)

Title	Purpose
1. Method of supporting operation of organizational system.	This improves the efficiency of information support by automatically executing scenarios for evaluating the performance of configuration elements and automatically managing they based on the completed evaluation.
(https://new.fips.ru/Archive/PAT/2014FULL/2014.11.10/DOC/RUNWC2/000/000/002/532/723/DOCUMENT.PDF)	
2. System of situationally analytical centers of organizational system, model.	The efficiency of the decision support process is improved by automated development of scenarios for solving problem situations.

Title	Purpose
(https://new.fips.ru/Archive/PAT/2014FULL/2014.11.20/DOC/RUNWC2/000/000/002/533/090/DOCUMENT.PDF)	
3. Organizational systems management system, model.	It improves the reliability of management scenarios when preventing threats to organizational systems at various levels of the hierarchy.
(https://new.fips.ru/Archive4/PAT/2016FULL/2016.08.27/DOC/RUNWC1/000/000/002/595/335/DOCUMENT.PDF)	
4. Management Center of Organizational system, model.	It reduces the number of problem situations and reduces the time to resolve them, if they have already occurred, by centrally developing scenarios for solving problem situations.
(https://new.fips.ru/Archive/PAT/2013FULL/2013.04.27/DOC/RUNWU1/000/000/000/127/493/DOCUMENT.PDF)	
5. Monitoring Center for sustainability information systems, model.	Extend the management functionality by automatically generating, saving, displaying, and transmitting incident scenarios to their intended destination.
(https://new.fips.ru/Archive/PAT/2013FULL/2013.07.10/DOC/RUNWU1/000/000/000/130/109/DOCUMENT.PDF)	
6. Stability of information systems support center, model.	Extend management functionality by automatically generating, saving, displaying, and transmitting problem scenarios to their intended destination.
(https://new.fips.ru/Archive/PAT/2013FULL/2013.09.10/DOC/RUNWU1/000/000/000/132/227/DOCUMENT.PDF)	

The informational nature of business process support that is inherent in these methods, systems and centers (table 2) allowed us to apply it service management processes in accordance with the concept of IT Service Management to prove their industrial feasibility. Information about these processes is provided in the patent descriptions (table 2).

A special case of information support is ensuring the interoperability of management systems, information systems. Summary of patents for interoperability (methods, system, devices) are shown in the table 3.

Table 3. Examples of patents for interoperability (methods, system, devices)

Title	Purpose
1. Method of transmission of control commands.	Interoperability is achieved by converting data about the control command team to data about its

Title	Purpose
	function and converting it back to the no in other codes.
(https://www1.fips.ru/ofpstorage/Doc/IZPM/RUNWC1/000/000/002/631/147/ИЗ-02631147-00001/document.pdf)	
2. Integrated control system.	This system implements the method of information transmission (point 1).
(https://www1.fips.ru/ofpstorage/Doc/IZPM/RUNWC1/000/000/002/630/393/ИЗ-02630393-00001/document.pdf)	
3. Method of information transmission.	Interoperability is provided on the transmitting side by converting data about the information to data about its destination, on the receiving side by reverse conversion, but in other codes.
(https://www1.fips.ru/ofpstorage/Doc/IZPM/RUNWC1/000/000/002/618/366/ИЗ-02618366-00001/document.pdf)	
4. Control device.	Interoperability is provided for remote object management, regardless of whether the data codes for the control command match the data codes in the objects.
(https://www1.fips.ru/ofpstorage/Doc/IZPM/RUNWU1/000/000/000/167/247/ПМ-00167247-00001/document.pdf)	
5. Complex of information interaction.	This complex implements the method of information transmission (point 3).
(https://new.fips.ru/Archive4/PAT/2016FULL/2016.03.10/DOC/RUNWU1/000/000/000/160/257/DOCUMENT.PDF)	
6. Data transmitter.	This transmitter implements the operations of method of transmission of control commands (point 1) on the transmitting side.
(https://new.fips.ru/Archive4/PAT/2016FULL/2016.11.10/DOC/RUNWU1/000/000/000/165/924/DOCUMENT.PDF)	
7. Data receiver.	This receiver implements the operations of method of transmission of control commands (point 1) on the receiving side.
(https://new.fips.ru/Archive4/PAT/2016FULL/2016.11.10/DOC/RUNWU1/000/000/000/165/993/DOCUMENT.PDF)	

Based on the results of the analysis of innovative solutions – digital platforms (table 1), methods, systems, centers and device (table 2 and table 3), we can note the following:

- the source of data used in the corresponding collection, processing, conversion, and transmit-receive processes is the configuration management databases or their analogues;

- the objects used in process execution, including project scenarios, are configuration items that are described in configuration management databases as configuration records;
- processes for ensuring interoperability in methods and models, in essence, can be classified as processes that use configuration records – project scenarios about configuration elements of interacting control systems, information systems.

3 Formal interoperability model in the configuration management database

Based on the results of the analysis of innovative methods and models with the development of project scenarios, and taking into account the assumption that the configuration record is represented as a project scenario, a formal model for describing the interoperability segment in the configuration management database of the digital platform ecosystem is developed. When developing the model, the possibilities of well-known methodological approaches were taken into account, including:

- transferring integrated indicators to the data center for accumulation in a multidimensional storage for data mining and knowledge acquisition [21];
- creating a knowledge base that describes the behavior of a complex system [22];
- data encoding in commands for controlling actions of unmanned vehicles and other robotic systems, objects [23];
- resource management of hybrid high-performance computing clusters when they perform applied tasks from various fields of science and technology [24].

The database interoperability model has the following levels.

The first level is the system level, in which

$$S = \{S_1, S_2 \dots S_N\} \quad (1)$$

is a set of configuration records about configuration elements S_1, S_2 ... S_N represent organizational systems, where N is the number of organizational systems in the ecosystem of the digital platform.

With each of the subsets S_1, S_2 ... S_N correlates the configuration elements of the internal information infrastructure and the configuration elements of the external environment – data transmission networks, engineering structures, etc. When you place configuration records of these elements in the configuration management database, the digital platform ecosystem converts them to exclude duplicate records. These are usually records about elements of the external environment.

The second level is individual, in which

$$V = \{V_1, V_2 \dots V_M\} \quad (2)$$

is a set of configuration records about subsets V_1, V_2 ... V_M configuration elements, each of which represents a class of objects for ensuring interoperability in the digital platform ecosystem, where M is the number of classes.

Taking into account the factor of heterogeneity of hardware and software products in information systems, as an example for clarity, we will distinguish the following classes of objects to ensure interoperability:

- a class of objects for ensuring the interoperability of information systems that differ in component indexing systems (V_1);
- a class of objects for ensuring the interoperability of information systems that have differences in the program codes of components (V_2);
- a class of objects for ensuring the interoperability of information systems that have differences in data encoding systems (V_3);
- a class of objects for ensuring the interoperability of information systems that differ in information encryption systems (V_4).

So, virtually reducing the number of classes in the set (2), we get

$$V = \{V_1, V_2, V_3, V_4\}. \quad (3)$$

The third level is the object level, where

$$V_1 = \{V_{11}, V_{12} \ldots V_{1M1}\} \quad (4)$$

it is a subset of configuration records about configuration elements that represent objects for ensuring interoperability by class V_1, where $M1$ is the number of objects in this class;

$$V_2 = \{V_{21}, V_{22} \ldots V_{2M2}\} \quad (5)$$

it is a subset of configuration records about configuration elements that represent objects for ensuring interoperability by class V_2, where $M2$ is the number of objects in this class;

$$V_3 = \{V_{31}, V_{32} \ldots V_{3M3}\} \quad (6)$$

it is a subset of configuration records about configuration elements that represent objects for ensuring interoperability by class V_3, where $M3$ is the number of objects in this class;

$$V_4 = \{V_{41}, V_{42} \ldots V_{4M4}\} \quad (7)$$

it is a subset of configuration records about configuration elements that represent objects for ensuring interoperability by class V_4, where $M4$ is the number of objects in this class.

Configuration records in sets (4) – (7) are disjoint. Configuration records are entered into the configuration management database of the digital platform ecosystem.

A set of the third level

$$U_{DPE} = \{U_{OS}, U_{DP}\} \quad (8)$$

it is a set of non-repeating configuration records about U_{OS} configuration elements used for reproducing organizational system processes from the ecosystem and about U_{DP} configuration elements used for reproducing digital platform processes.

Thus, the configuration management database of the digital platform ecosystem contains non-repeating configuration records from sets (3) and (8). These records are used for reproducing processes for ensuring interoperability between information infrastructures of organizational systems from the ecosystem.

When a new organizational system is introduced into the ecosystem, the formal model of interoperability in the configuration management database of the digital platform ecosystem should be extended by placing new configuration records about the configuration elements of this organizational system in the configuration management database.
This property of the model is fundamentally important for operations to update the ecosystem of the digital platform by entering a new S_{N+1} organizational system into it, while ensuring interoperability with other S_1, S_2 ... S_N organizational systems.

4 Method for generating project scenario data in the configuration management database

The structure of the description of the interoperability model in the configuration management database and the project nature of the digital platform ecosystem updating activity allow us to make the following assumption: within the framework of the ecosystem-updating project, the term "***project scenario***" is identical to the term "configuration record». This condition was used when developing the method for generating project scenario data in the configuration management database.
The purpose of this method is to reduce the time for conducting innovative projects to introduce new organizational systems – economic entities-into the ecosystem of the digital platform.

The method uses the following data:

- project scenarios – configuration records from sets (3) and (8) already hosted in the digital platform ecosystem configuration management database;
- project scenarios that are planned to be placed in the same database for managing the configuration of the digital platform ecosystem.

Additional restrictions are accepted:

- configuration records of the new organizational system exist and are located in its configuration management database;
- all the tools that are needed to use these records in an ecosystem update project are available;
- for example, well-known process automation software applications can be used as working tools in this project: Change Management, Configuration Management, Release Management, Configuration Administration, Capacity Management и другие в соответствии с концепцией IT Service Management.
- the executors of this project can be providers of leading global or domestic vendors of IT Service Management software products, for example, a fairly complete list of them is presented in [4].

Fig. 1 shows, as an example, the Change Management Process diagram, which is licensed by BMC Software, Inc. in 2007.

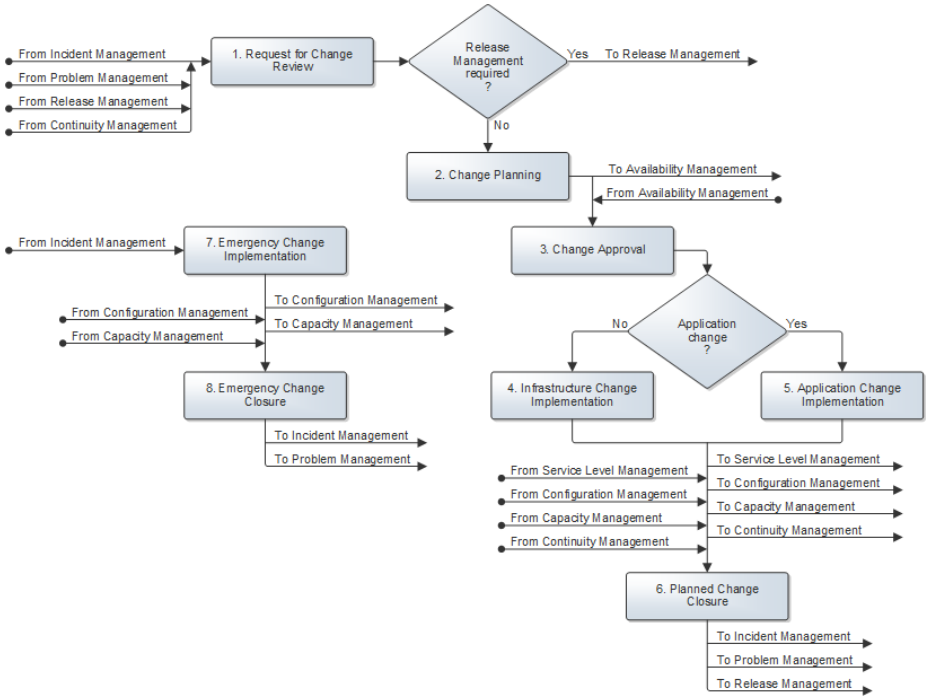

Fig. 1. Block diagram of the Change Management Process

The Change Management Process (see Fig. 1) consists of eight procedures and has inputs and outputs for receiving development management from other processes and transmitting the necessary information to these processes.
The method for generating data about the project scenario in the configuration management database is characterized by the fact that it contains stages at which the following operations are performed for each new project scenario:

- accept and store data on the project scenarios of the digital platform ecosystem and data on the project scenarios of the new organizational system;
- perform a comparative analysis of data on the project scenario in turn with data on the project scenarios of the digital platform ecosystem;
- check the condition that the compared data is identical;
- if the condition is not met, generate and store data about the project scenario of the new organizational system as data that is recorded in the digital platform ecosystem configuration management database, and transmit this data to the project office for execution;
- if the condition is met, a decision is made to link the comparable project scenario of the digital platform ecosystem to the new organizational system.

Fig. 2 shows the scheme of the model for generating data on the project inventory. The peculiarity of this scheme is to refine the structure of project scenarios to their

elements, which is due to the intention to show the complexity of the structure of configuration records in real databases.

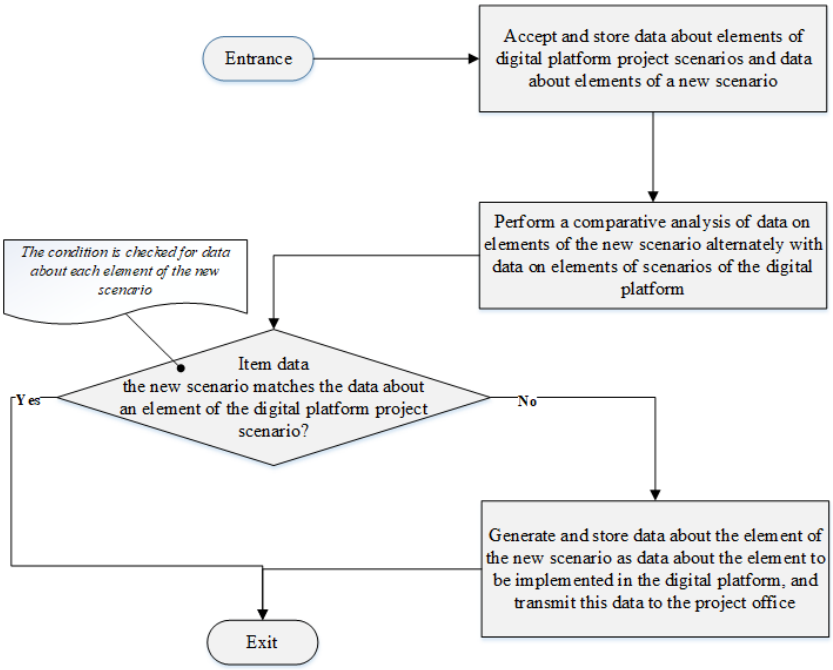

Fig. 2. Model for generating data about the project scenario

The novelty of this method is to provide automatic generation of configuration records about the configuration elements of a new business entity in the database of the digital platform ecosystem. The practical significance of its applicability is due to the shortened terms of work on building the competencies and resources of the digital platform ecosystem in the field of ensuring interoperability in the digital platform ecosystem.

5 Conclusion

The article deals with topical issues of solving the problem of economic development based on the creation of digital platform ecosystems in the direction of the development of new production technologies. This problem is considered in relation to the directions of development of the national program "Digital economy".
The article examines the solution of the scientific problem of finding a methodological approach to ensuring interoperability with a new business entity – an organizational system of production, scientific, educational, financial, innovative or other profile introduced into the ecosystem of the digital platform.

The object of research is a configuration management database in the ecosystem of a digital platform, classified as an interdisciplinary one intended for information support of research and industrial development.
The subject area is computing complexes and computer networks in the ecosystem of a digital platform with devices for processing and transmitting data with an impact on the order of data arrangement and on their content, which reproduce the processes of filling the control object with configuration records about the configuration elements of new economic entities.
Based on the results of the analysis of experience in the application of concepts and technologies for managing it services – IT Service Management, data processing and transformation – Information Centric Network, data transmission – Intent-Based Networking, a method for forming project scenarios in the configuration management database to ensure interoperability with the new organizational system is developed and presented in the article.
The scientific novelty of the method is to provide automatic generation of records about the configuration elements of a new business entity in the configuration management database of the digital platform ecosystem.
The practical significance of the research is to reduce the time needed to build up the competencies and resources of the digital platform ecosystem by introducing new organizational systems.

Acknowledgments. The research is partially supported by the Russian Foundation for Basic Research, projects 18-29-03091, 18-29-03100.

References

1. The program "Digital Economy of the Russian Federation". (2017) - URL: http://static.government.ru/media/files/9gFM4FHj4PsB79I5v7yLVuPgu4bvR7M0.pdf
2. Zatsarinnyy, A.A., Shabanov, A.P.: Methods of Computer Simulation Based on Shared Digital Platform. CEUR Workshop Proceedings 2426: 17-23 (2019)
3. Zatsarinnyy, A.A., Shabanov, A.P.: Model of a Prospective Digital Platform to Consolidate the Resources of Economic Activity in the Digital Economy. Procedia Computer Science Proceedings of the 13th International Symposium "Intelligent Systems", INTELS 2018, pp. 552-557 (2019) DOI: 10.1016/j.procs.2019.02.092
4. Zimin, K.: Results of the all-Russian research IT Service Management 2019. Information Management. (2020) - URL: http://www.itsmforum.ru/upload/medialibrary/559/5593dd51c871d46d2f6c1362fe3026bf.pdf
5. New manufacturing technologies. (2019) - URL: https://digitech.ac.gov.ru/technologies/new_manufacturing_technologies/
6. Information technologies. Industrial automation systems and integration. Interoperability. Basic principles. Russian Federation National Standard. (2013) https://dokipedia.ru/document/5169367
7. Zatsarinnyy, A.A., Kisilev, E.V., Kozlov, S.V., Kolin, K.K.: The information space of Russia's digital economy. Conceptual frameworks and problems of formation. Moscow: Voskhod-A 236, ISBN: 978-5-93055-449-6 (2018)

8. Kuznetsova, S., Markova, V.: The Problems of Formation a Business Ecosystem based on a Digital Platform: Using the Example of 1C Company Platform. Innovations, 2 (232): 55-60 (2018)
9. ITIL® Glossary of Terms English v.1.0. AXELOS Limited [Electronic resource]. (2011) - URL: https://www.axelos.com/corporate/media/files/glossaries/itil_2011_glossary_gb-v1-0.pdf
10. Jia, Z., Wang, J., Chen, X., Sheng, Y., Zheng, K.: An SDN-based measurement scheme to build delay database for time-sensitive network scheduling. International Journal of Innovative Computing, Information and Control, 4 (15), 1271-1286 (August 2019) DOI: 10.24507/ijicic.15.04.1271
11. Elhady, A., El-bakry, H., Elfetouh, A.: Comprehensive Risk Identification Model for SCADA Systems. Security and Communication Networks, 3914283 (2019). DOI: 10.1155/2019/3914283
12. Yin, L., Gao, Q., Zhao, L., Zhang, B., Wang, T., Li, S., Liu, H.: A review of machine learning for new generation SMART dispatch in power systems. Engineering application of artificial intelligence, 88, 103372 (February 2020). DOI: 10.1016/j.engappai.2019.103372
13. Mahdavinejadab, M., Rezvan, M., Adibi, P., Sheathe, A., Barekatain M., Barnaghi, P.: Machine learning for internet of things data analysis: a survey. Digital Communications and Networks, 3 (4), 161-175 (August 2018). DOI: 10.1016/j.dcan.2017.10.002
14. Dos Santos, P., Travassos, G.: Scientific Knowledge Engineering: a conceptual delineation and overview of the state of the art. The knowledge engineering review, 2 (31), 167-199 (Mart 2016). DOI: https://doi.org/10.1017/S0269888916000011
15. Alekseev, A.: In the flow of innovation. Sibirskay neft, 5 (172), 60-65 (June 2020)
16. Ognivtsev, S.B., The Concept of a Digital Platform for the Agro-Industrial Complex. International Agricultural Journal, 2 (362), pp. 16-22 (2018)
17. Grigoryev, M.N., Maksimtsev, I. A., Uvarov, S. A.: Digital Platform as a Resource for Improving the Competitiveness of Supply Chains. Izvestiâ Sankt-Peterburgskogo gosudarstvennogo èkonomiceskogo universiteta, 2 (110), pp. 7-11 (2018)
18. Maksimtsev, I.A.: Digital Platform and Digital Finance: Problems and Prospects of Development. Izvestiâ Sankt-Peterburgskogo gosudarstvennogo èkonomiceskogo universiteta, 1 (109), pp. 7-9 (2018)
19. Potapov, D.V.: About Creation of a Digital Platform for Interaction during the Pre-Trial Proceedings of a Supervising Prosecutor and a Preliminary Investigation Body. Trudy Akademii upravleniia MVD Russia, 1 (45), pp. 85-89 (2018)
20. Korovin, I.S., Tkachenko, M.G.: Software & Hardware Platform for Digital Oilfield System Organization. Neftianoe khoziaistvo, 1, pp. 84-87 (2017)
21. Parygin, D.S., Finogeev, A.G., Kamaev, V.A., Finogeev, A.A., Gnedkova, E.P., Tyukov, I. A.: A convergent model for distributed processing of Big Sensor Data in urban engineering networks. POP Conf. Series: Journal of Physics: Conf. Series 803 012112 doi:10.1088/1742-6596/803/1/012112 2016 (2017)
22. Ledeneva, T.M., Sergienko, M.A., Tichomirova, E.A.: Formation of the knowledge base on the basis of identification of typical states of complex system. Proceedings of VSU, Series: Systems analysis and information technologies, 1, pp. 140-153 DOI: 10.17308/sait.2020.1/2629 (2020)
23. Kozlov, S.V., Shabanov, A.P., Kubankov, A.N.: Innovations in control systems of actions of robotic objects in the field of emergency response. 2019 Wave Electronics and its Application in Information and Telecommunication Systems (WECONF 2019), pp. 8840139. DOI: 10.1109 / WECONF.2019.8840139 (2019)

24. Volovich, K.I., Denisov, S.A., Shabanov, A.P., Malkovsky S.I.: Aspects of the assessment of the quality of loading hybrid high-performance computing cluster. CEUR Workshop Proceedings ITHPC 2019 - Short Paper Proceedings of the 5th International Conference on Information Technologies and High-Performance Computing: 7-11 (2019)

The authors express their gratitude to the reviewers for their objective comments and specific recommendations. Working on them made it possible to improve the structure of the article and the quality of the material presented in it on the study of the problem of creating digital platform ecosystems in the direction of developing new production technologies. We hope that the new version of the article will be useful to our colleagues who are working in this direction.