

**Aleksandr Kud**

CEO of SIMCORD LLC;

board member of the NGO “Research Center of Economic and Legal Solutions in the Area of Application of Distributed Ledger Technologies”

Kharkiv, Ukraine.

<https://orcid.org/0000-0001-5753-7421>

[Alexander.Kud@simcord.com](mailto:Alexander.Kud@simcord.com)

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## **METHODOLOGICAL APPROACH TO CREATING THE MECHANISM FOR MODERNIZING THE PUBLIC GOVERNANCE SYSTEM BASED ON DECENTRALIZED INFORMATION PLATFORMS**

**Abstract.** Based on the logic of creating a significant public value for modern society and methodology of the theory of governance and cybernetics, an original approach to creating the mechanism for modernizing the public governance system based on decentralized information platforms has been proposed. Its main idea lies in consistent description of the components of the potential modernization mechanism, building a combination of influence methods and “nudges”, developing own definition of the modernization mechanism using the provided example of forming a new and significant public value and, finally, recommendations for better control over and reliability of the modernized public governance system after implementing the modernization mechanism. From the theoretical standpoint, the provided example for creating a new and undisputed public value through substantiation of the approach to resolving the issue of “unnecessary people” in the 21st century, the proposed mechanism for modernizing the public governance system based on decentralized information platforms can be considered as another unorthodox step in public politics and state building. Due to the used tools and supplementary mechanisms, this modernization mechanism is capable of eliminating or narrowing the gap between the lower level of economic and cultural development and higher forms of political regime, which becomes possible due to valuable properties of decentralized information platforms to ensure transparency, democracy and difficulty of administrative abuse by authorities. The paper develops a methodological approach to creating the mechanism for modernizing the public governance system based on decentralized information platforms. The main proposed method for solving the issue of “unnecessary people” in the near future is the direct consequence of using a decentralized information platform — it is the easy creation of numerous micro-decentralized information platforms prepared by their users within the “parent” decentralized information platform and, therefore, increase in business activity in these numerous ecosystems of services and self-employment. From the practical standpoint, the majority of elements of the proposed modernization mechanism have already been implemented in practice and are being used now in the form of the ecosystem of the **Bitbon** System decentralized information platform of Ukrainian origin built from scratch.

**Keywords:** decentralized information platform, modernization mechanism, system elements, digital asset, public value, public governance system.

## INTRODUCTION

**Problem statement.** With increasing global spread of virtual assets and information platforms, it was only a matter of time before these two questions would arise: can society get the most out of them and learn to avoid significant risks, and how should the government treat these two phenomena of the 21st century? In this regard, the field of public governance is in the middle of probably the greatest number of interests and difficult social processes, and can no longer be managed in a manual autocratic mode. If that is the case, then the state and the public governance system with its governance technologies, processes, connections, variously subordinated objects must be properly prepared and updated. This is a practical demand for new scientific solutions — methodological solutions, not just advice and recommendations, which emerge every day and get forgotten just as quickly.

For now, leaving aside the phenomenon of virtual assets, the focus should be on information platforms, specifically on decentralized information platforms (hereinafter — DIPs) that bring both significant opportunities and challenges for public governance, law and economy. The new and difficult question cannot have a simple and convenient answer that everybody would be ready for.

**Analysis of the latest research and publications.** Extensive spread of digital technologies, specifically distributed ledger technology (blockchain), has created the demand for new scientific solutions — methodological solutions ([6], [9], [16], [36], [51]), not just advice and recommendations, which emerge every day and get forgotten just as quickly. Being based on the distributed ledger technology, decentralized information platforms [19] bring both significant advantages and challenges for public governance, law and economy. Since the new and difficult question cannot have a simple and convenient answer, the focus is on finding a new methodological approach to updating the public governance system [9], [26] using this new phenomenon, which attracts more and more interested people to the ecosystems of its own services — decentralized information platforms. The idea is that it will allow providing both society and government with a new approach to more sensible and rational, more democratic or probably meritocratic governance [40] due to operation with real and confirmed values [51] of humankind.

## AIM AND TASKS

**Aim of the research.** All above-mentioned materials and arguments allow stating the *aim of the research* — to propose a methodological approach to creating a new mechanism for modernizing the public governance system based on decentralized information platforms. This caused the emergence of a certain step-by-step logic of considering all the necessary mechanism elements, which in the end allowed for theoretical substantiation of the mentioned mechanism by providing the method for creating a new and significant public value.

According to this aim, the paper sets three **tasks**:

- 1) to describe the components of the potential modernization mechanism;
- 2) to build a combination of influence methods and “nudges” when attempting to create a new public value using decentralized information platforms;
- 3) to give own definition of the modernization mechanism.

## **THE THEORETICAL BACKGROUNDS**

This paper is based on several fairly new phenomena, which include decentralized information platforms and digital assets. The obtained research results were previously used as the basis for the paper “Comprehensive Classification of Virtual Assets” [20] dated 2021 that provides a multi-level analysis of virtual assets, based on which a particular set of properties determines its essential characteristics. Thus, a digital asset is a variation of tokenized asset, which, in turn, is a type of virtual asset of a distributed ledger [20]. Unique essential characteristics and properties of a digital asset make it the most promising tool for implementing the mechanism for modernizing the public governance system based on decentralized information platforms. There are a lot of papers that describe (sometimes freely) certain aspects of these phenomena of the 21st century. It should be noted that scientists and even practitioners in the field of digital business still understand them differently, and the phrase “digital assets”, despite its popularity and widespread distribution, still has significant differences in terms of its meaning when used by not only politicians and public figures, but also by scientists from most countries. Therefore, this paper is based on the best international scientific developments of scientists and results of the author’s own research. This paper is a logical continuation of a series of original papers dedicated to a digital asset as a type of tokenized asset and decentralized information platforms, which are regularly published worldwide.

The logic for creating the mechanism for modernizing the public governance system based on decentralized information platforms is linked to the creation of a significant public value for modern society and is proposed to be as follows:

1) step 1 — based on the typical elements of the public governance mechanism (Figure 1), to describe the *components of the potential modernization mechanism*, specifically its goal, formation principles, operation methods, main tools, key involved social institutions (formal and informal), supplementary mechanisms for regulation and independent organization of decentralized information platforms, three layers (levels) of creating the public value;

2) step 2 — to build a *combination of influence methods and “nudges”* (according to the behavioral nudge theory) when attempting to create a new public value using decentralized information platforms. In order to do that, an example will be provided on how to achieve a new significant public value for modern society in the 21st century using decentralized information platforms. Overall, with time this example for achieving a new public value can be implemented and established in society using Ukraine as an example in a not so distant future;

3) step 3 — to give *own definition* of the modernization mechanism guided by the provided example of creating a new and significant public value.

## Definition of key notions

Before describing the main points of the paper, key notions and special terms need to be defined:

- *information (digital) platforms* can be viewed as a kind of regulating environment and as an anonymous governance subject based on software code. It allows private developers, users and other people to interact, exchange data, services and applications, while governments that have implemented the provision of certain administrative services through information platforms may monitor processes more easily and facilitate the development of simple and innovative solutions and services;

- *the idea* of an information platform is to create a society [18] and then support it using digital services, while getting profit from reduced transaction costs through partially eliminated intermediaries as a managerial consequence [10, p. 278], as well as increase coverage and ensure adequate peer supervision by users and owners of such a platform (Figure 1);

- *decentralized information platform* means “a hardware and software complex, which consists of components and services, includes a distributed ledger token accounting system and allows its users to realize property and personal non-property relations through financial and management accounting of their property and personal non-property rights by means of digital assets” [20];

- *social institution* is a “historically or intentionally formed way of organizing activities of people, the existence of which is caused by the need of satisfying social, economic, political, cultural or other needs of society as a whole or its part” [13]. In the context of this paper, there are six separate social institutions: citizenship, state service, property, legislation, market and culture.

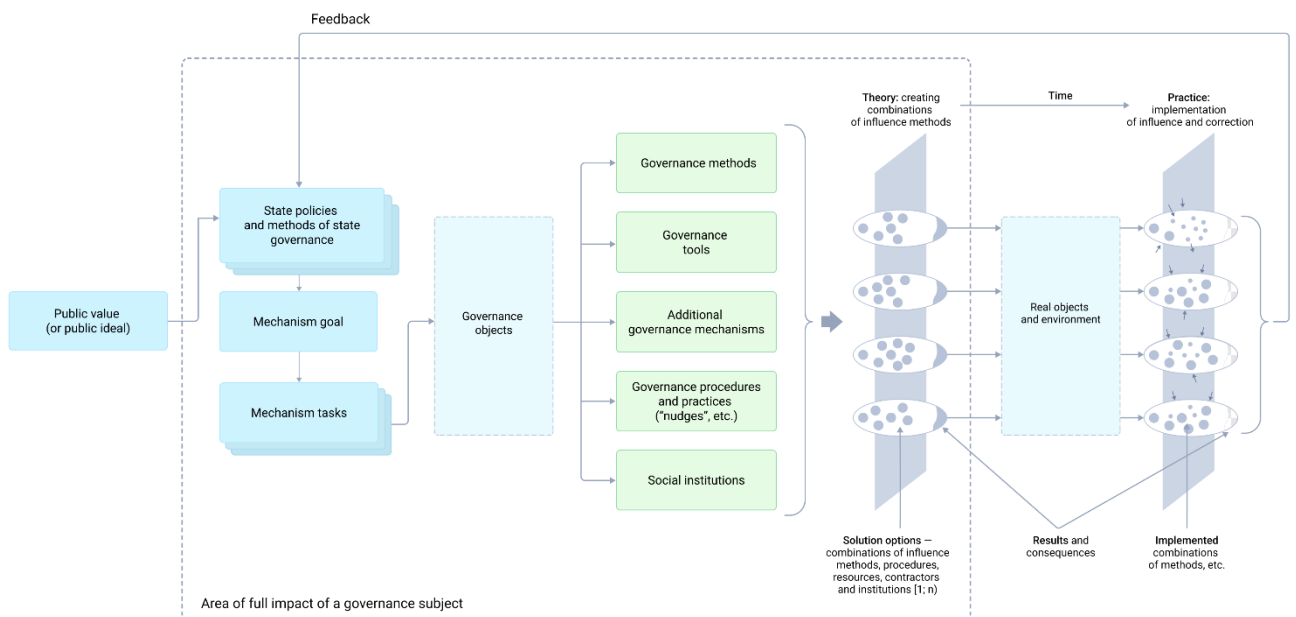
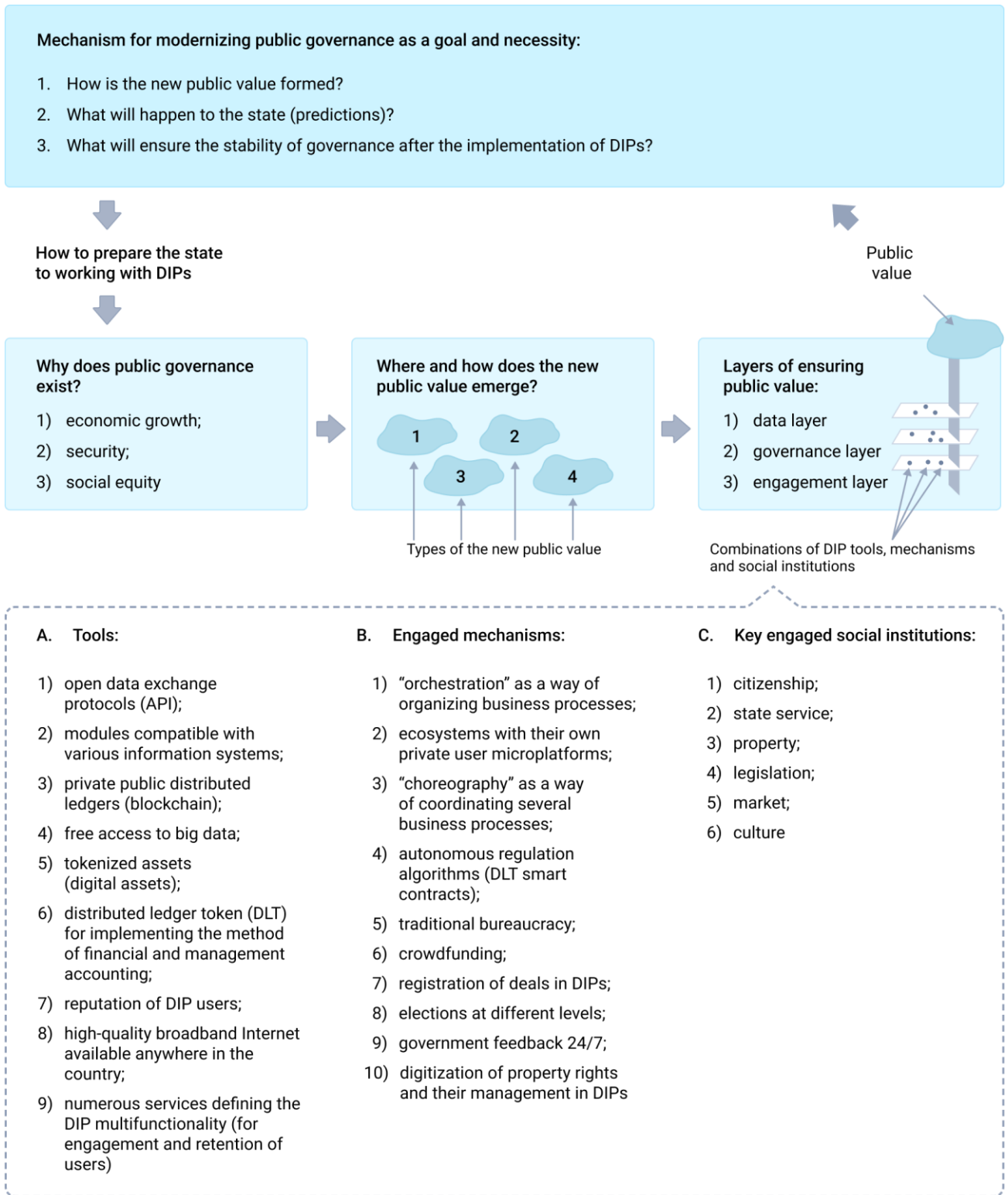


Figure 1. Typical elements of the public governance mechanism

\*Source: author’s development.

Therefore, the main focus is on why public governance exists. We should agree with the view of the authors of the World Development Report (2017) by the World Bank that “every society cares about freeing its members from the constant threat of violence (security), about promoting prosperity (economic growth), and about how such prosperity is shared (social equity). It also assumes that societies aspire to achieve these goals in environmentally sustainable ways” [6, p. 4]. This approach is consistent with “the transition from a dialogue based on ideology to the dialogue based on ideals that has transpired in the global development community over the past few decades” [6, p. 4]. Therefore, the emergence of a new public value for the state and public governance system due to the use of decentralized information platforms and the creation of the new modernization mechanism are related to the basic and desired ideals of security, economic growth and social equity (Figure 2).



*Figure 2. Research cycle of creating the mechanism for modernizing the public governance system based on DIPs*

\*Source: author's development.

Another, pragmatic, side of searching for the new way of substantiating a new public value using DIPs lies in the fact that in case of application of DIPs, no politician

or public figure in a democratic country will be able to deny it or ignore it for an extended period of time because such platforms ensure clear sense of social idea and possible feedback [22].

## **MATERIALS AND RESEARCH METHODS**

The paper uses a lot of methods of scientific research, but since it in a big way summarizes certain previous scientific developments made between 2018–2021, two relevant research methods should be pointed out: synthesis and induction, which became the main methods used in this research that almost entirely ensured the step-by-step development of the author’s logic of creating the modernization mechanism.

The factual basis of the research is ensured by the generalized experience in creating and developing a unique global digital ecosystem of services — **Bitbon** System decentralized information platform of Ukrainian origin, the creation of which the author is directly involved in. It is significantly different from other attempts of scientists and experts to provide proven recommendations for updating public governance, which are based only on polemic thinking and own subjective opinion without addressing a functioning object — a real decentralized information platform that covers over 30 countries and tens of thousands of individuals as its users. The principle of the **Bitbon** System decentralization envisages three aspects: legal, economic and technological decentralization, which allows specifying one of the basic characteristics of the **Bitbon** System as a decentralized information platform due to different directions and goals of the mentioned aspects.

## **RESULTS OF THE RESEARCH**

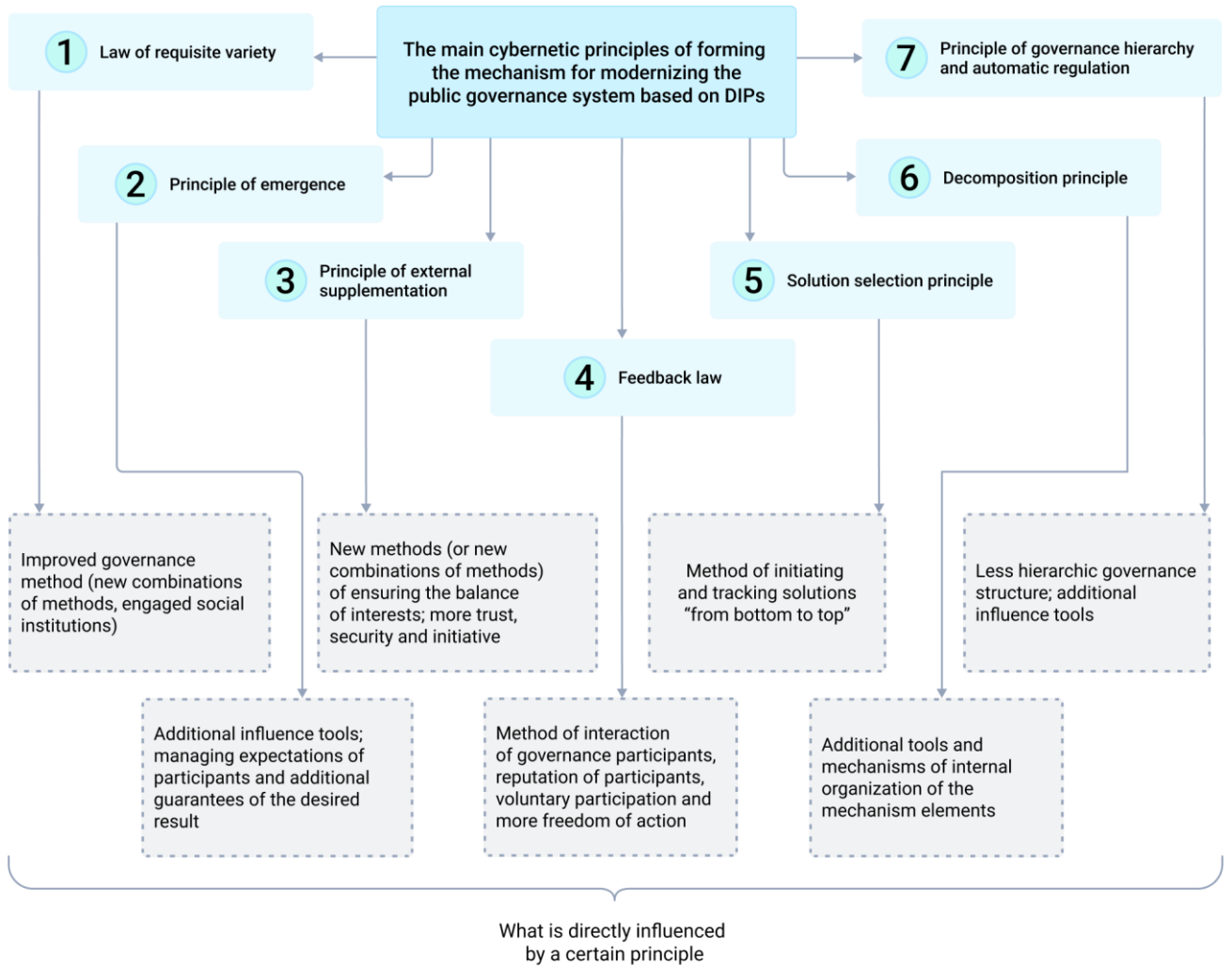
Thus, the author’s arguments will be presented below with a clear reference to the three-step logic of creating the mechanism for modernizing the public governance system based on decentralized information platforms outlined above in the paragraph “The theoretical backgrounds”.

### ***1. Step one: separating principles, methods, governance tools, mechanisms and appropriate social institutions***

Based on these three general ideals listed above [6, p. 4], we can define the *goal of the future mechanism* for modernizing the public governance system: to provide the existing public governance system with better properties to use historical capabilities of digital technologies, namely distributed ledger technology, for higher social equity, more sustainable economic growth and increased security of its citizens [23]. Such new and desired properties include higher flexibility and adaptability to the changing conditions of digital age, higher sensitivity to expectations of most citizens and higher responsibility for potential and adopted public governance solutions. Therefore, such innovations envision the search for and implementation of new organization solutions and hidden organization and institutional reserves of a state, and it must answer the question of how to prepare the state to use decentralized information platforms that are already a modern reality.

### *A. Principles of forming the modernization mechanism*

The next stage of the first step is to determine the *principles of forming the modernization mechanism*. Since the actual modernization process is controlled, discrete (intermittent) and not spontaneous with certain desired states and parameters [37], the process of controlling the modernization can be considered: a) a complete process without special separation of certain components and b) a process that falls under the principles of controlling complex dynamic systems and processes, which are cybernetic principles [11]. In order to further prove that cybernetic principles truly meet the conditions for updating the public governance system based on DIPs, it should be noted that “cybernetic governance is governance that... provides optimal solutions to various dynamic organization tasks, uses specific methods provided by cybernetics (feedback, self-regulation, self-organization, etc.) as well as widely uses mechanization and automation of governance based on the application of computational and controlling equipment and computer technologies” [11] (Figure 3).



*Figure 3. The main cybernetic principles of forming the mechanism for modernizing the public governance system based on DIPs*

\*Source: author’s development based on [11].

Therefore, cybernetic principles that are required and sufficient to cover the main objects, factors and system of connections between them should be considered the principles of forming the mechanism for modernizing the public governance system based on DIPs. Figure 3 provides seven main cybernetic principles and, in accordance with them, a short description of what is directly influenced by a certain principle. Table 1 lists the above-mentioned principles of forming the modernization mechanism and connections to the logic of decentralized governance implemented using a new public governance tool — DIP.

**Principles of forming the mechanism for modernizing the public governance system based on DIPs borrowed from cybernetics**

Name of the principle	General description of the principle	Connection to the logic of decentralized governance based on DIPs
Law of requisite variety	The variety of a complex system requires governance that, in turn, has a certain variety itself. In the end, governance is aimed at reducing the variety of states of the governed system, at reducing its inconsistency	The distributed ledger technology and products based on it (for example, DIPs) propose a new way of governing complex systems by adding (for example, during first integration of DIPs with centralized information platforms) or even replacing ineffective elements of the governance system with elements that have technologically confirmed status, change of hierarchy to decentralized order with consensus and data verification algorithms
Principle of emergence	The bigger the system and the bigger the difference between the sizes of a part and a whole, the higher the likelihood that the properties of the whole will be more different from the properties of the parts	DIP-based governance proposes to decrease drastic differences between realistic expectations and goals of various groups of users (for example, political and administrative elites and the rest of population) due to digital tools of ensuring higher trust (private public distributed ledgers, smart contracts) and responsibility (reputation and free access to big data)
Principle of external supplementation	Every governance system requires a “black box” — certain reserves that help compensate for unpredicted external and internal influences	Hidden reserves (“black box”) are contained in: 1) the distributed ledger technology itself and 2) extensive, independent, private initiative that gets more opportunities from freedom and trust provided by distributed ledger. DIPs allow realizing it and using it for the benefit
Feedback law	All organized systems are open and their cyclical nature is ensured only through direct connection and feedback	The feedback mechanism laid down in the distributed ledger technology and implemented in peer-to-peer methods of communication, storing and confirming reputation of DIP users, voluntary system of providing services in DIP-based ecosystems
Solution selection principle	A solution must be based on selecting one out of several options. If a solution is based on analysis of a single option, subjective governance takes place	DIP-based governance proposes a simple way of initiating alternative solutions, extensive participation in their discussions and, most importantly, ways of ensuring responsibility for quality of a solution as well as its approval and implementation (for example, by means of accounting of DIP participants’ reputation in distributed ledgers using digital assets, etc.)
Decomposition principle	The governed object can always be considered as a sum of relatively independent summands	DIP-based governance proposes decomposition of the whole public governance system by: a) using trusted private ledgers; b) simplifying circulation and accounting of resources through their tokenization; c) modularity
Principle of governance hierarchy and	The less variety there is in signals, the quicker the reaction — response to information. This principle	DIPs are a typical example of decreasing the hierarchy and decentralization. Within DIPs, public governance objects include: a) ecosystems with their own private user

Name of the principle	General description of the principle	Connection to the logic of decentralized governance based on DIPs
automatic regulation	directly indicates the need for maximum decentralization — self-regulation and self-organization of the system without connecting higher governance levels	microplatforms; b) modules integrated with centralized information platforms; c) new tools typical for DIPs (protocols, digital assets, private public distributed ledgers, etc.)

\*Source: author’s development based on [11].

### B. Governance methods appropriate for the new modernization mechanism

The next step is to determine the appropriate *governance methods*. As we know, “governance methods are ways and procedures of analyzing and evaluating governance situations, using legal and organizational forms of influence on the conscience and behavior of people in controlled social processes, relations and connections” [28, p. 18], which means that this method answers the question of “how?”, with the help of which methods governance is realized. In this regard, a number of methods can be used as an example, which would be appropriate for regular implementation in the future modernization mechanism (Table 2). However, it should be noted that when focusing on a new public value and certain hard to achieve ideals (in particular, guided by [6, p. 4]), the “methods” will have less relevance than “goals”, so “what?” is more important than “how?”. It means that, for example, economic governance and the relevant technocratic and economic methods that were in place in the concepts of the classic bureaucracy, “new public management” and partially in “good governance” do not push out political governance in a state: the emphasis is placed on “what?” rather than “how?”.

Table 2

### Governance methods that are appropriate when implementing the mechanism for modernizing the public governance system based on DIPs

Governance methods		Some examples or application of the method during modernization based on DIPs	Subject of the method application
Group of methods	Name of the method		
Universal	Persuasion	1) impersonal persuasion of a person to join a DIP due to extensive opportunities of services available in the DIP, simplicity and trust ensured technologically and impartially; 2) impersonal information and persuasion of citizens (propaganda) to obtain an electronic identity card; 3) raising awareness among the population	1) usually — developer of the DIP; 2) authorized public bodies and developers of the DIP using the relevant technological solutions; 3) same
	Stimulation	1) delegation of a part of state authority to non-governmental subjects — DIP users; 2) satisfaction of the desire of third-party natural persons or legal entities	1) government or parliament; 2) government and developers of the DIP

Governance methods		Some examples or application of the method during modernization based on DIPs	Subject of the method application
Group of methods	Name of the method		
		to freely use the services of information platforms, in particular DIPs	
	Coercion	Not identified	Not identified
Regulating	Organizational and administrative (disciplinary, legal, administrative)	<ol style="list-style-type: none"> <li>1) state control (or special supervision) over the adherence by private decentralized information platforms to requirements in terms of security and reliable data storage;</li> <li>2) definition of intended use of funds;</li> <li>3) tokenization of property and/or personal non-property rights;</li> <li>4) settlement of legal disputes through pre-trial arbitration;</li> <li>5) creation of protected digital records (certificates, open ledgers, agreements) that are stored and transferred online;</li> <li>6) tokenization of electoral processes of expressing one's will and public control over the activity of elected representatives</li> </ol>	<ol style="list-style-type: none"> <li>1) government;</li> <li>2) developer of the DIP or other legal entity according to the established procedure;</li> <li>3) developer of the DIP according to the established procedure;</li> <li>4) same;</li> <li>5) mutually — government, parliament and developer of the DIP</li> </ol>
Stimulating	Economic (salary, bonuses, benefits and incentives)	<ol style="list-style-type: none"> <li>1) financial and non-financial stimulation of interaction with citizens and service users with loyalty programs, e-payments, etc.;</li> <li>2) additional and stable sources of income for citizens and small businesses (by providing the entire and ready DIP infrastructure for their creation and legalization)</li> </ol>	DIP developer that developed the software code and general rules for using the DIP
	Social and psychological (motivation boosts, harmonization of personal goals with goals of companies or big organizations, formation of mutual values)	<ol style="list-style-type: none"> <li>1) management by a citizen being a DIP user of his/her personal reputation within the DIP (decent behavior with history of previous indecent actions and reports);</li> <li>2) improvement of the status and image of citizens to have access to certain services in the DIP;</li> <li>3) expansion of trust-based relations among service users through exchange of data in the DIP</li> </ol>	DIP developer that developed the software code and general rules for using the DIP

\*Source: author's development.

### *C. The main tools of the modernization mechanism*

Therefore, considering the above-mentioned importance of “what?” over “how?” and in accordance with Table 2, the following modernization mechanisms are proposed:

1) *ways of the governance method application* in case of DIP-based modernization that will allow emphasizing the “what?” (third column of Table 2). However, this may lead to certain new peculiarities due to application of decentralized information platforms in an extensive peer-to-peer network of users;

2) *tools of the modernization mechanism:*

- based on the distributed ledger technology, specifically private public distributed ledgers, tokenized assets (digital assets), distributed ledger token (DLT) for implementing the method of financial and management accounting, numerous services defining the DIP multifunctionality (for engagement and retention of users) (Table 3);

- not based on the distributed ledger technology, specifically high-quality broadband Internet available anywhere in the country (3G/4G/5G); open data exchange protocols (API); modules compatible with various information systems; free access to big data; reputation of DIP users (Table 3), which in combination also allow making a strong emphasis on “what?” instead of “how?”. It becomes possible due to the fact that using them together rather than separately, non-governmental users of the decentralized information platform are first and foremost governed by the principles of simplicity and reliability of operations, and that activates private initiative, increases activity of the platform users for at least personal interest (benefit) of the user, which is the foundation for maintaining the interest of a lot of participants of the entire system.

*Table 3*

**The main tools of the modernization mechanism that are appropriate for updating the public governance system based on DIPs**

Name of the tool	Essence and nature of the tool	What can the tool influence	How it manifests in DIPs	How it is used with other tools
1. Private public distributed ledgers	Private closed or private open public ledgers [8] with all known advantages and disadvantages of the distributed ledger technology	They influence the level of trust of the government to distributed ledger, which is proposed as the foundation of DIPs, to its access levels, etc.	As mandatory technologically protected accounting means and environment in the DIP. The type of the applied distributed ledger for its placement can impact the functional completeness of the ecosystem and even the DIP	They are always planned and used as a mandatory element of the DIP. The change in the type of the ledger [32] depends on the goals of its developer or owner. They are the foundation for tokenization (creation of digital assets) [17]
2. Tokenized assets (digital assets)	There are technological nature, economic and legal nature, information and applied nature [20] with established properties of the tool. The tool has a proven	They influence the creation of a proper legal regime for each of the specified types of virtual assets	They are a method of financial and management accounting of property that can be an independent object of legal relations. The DIP is an ideal	In order to use them, there needs to be a correct classification, which allows establishing a proper legal regime for each type of virtual assets

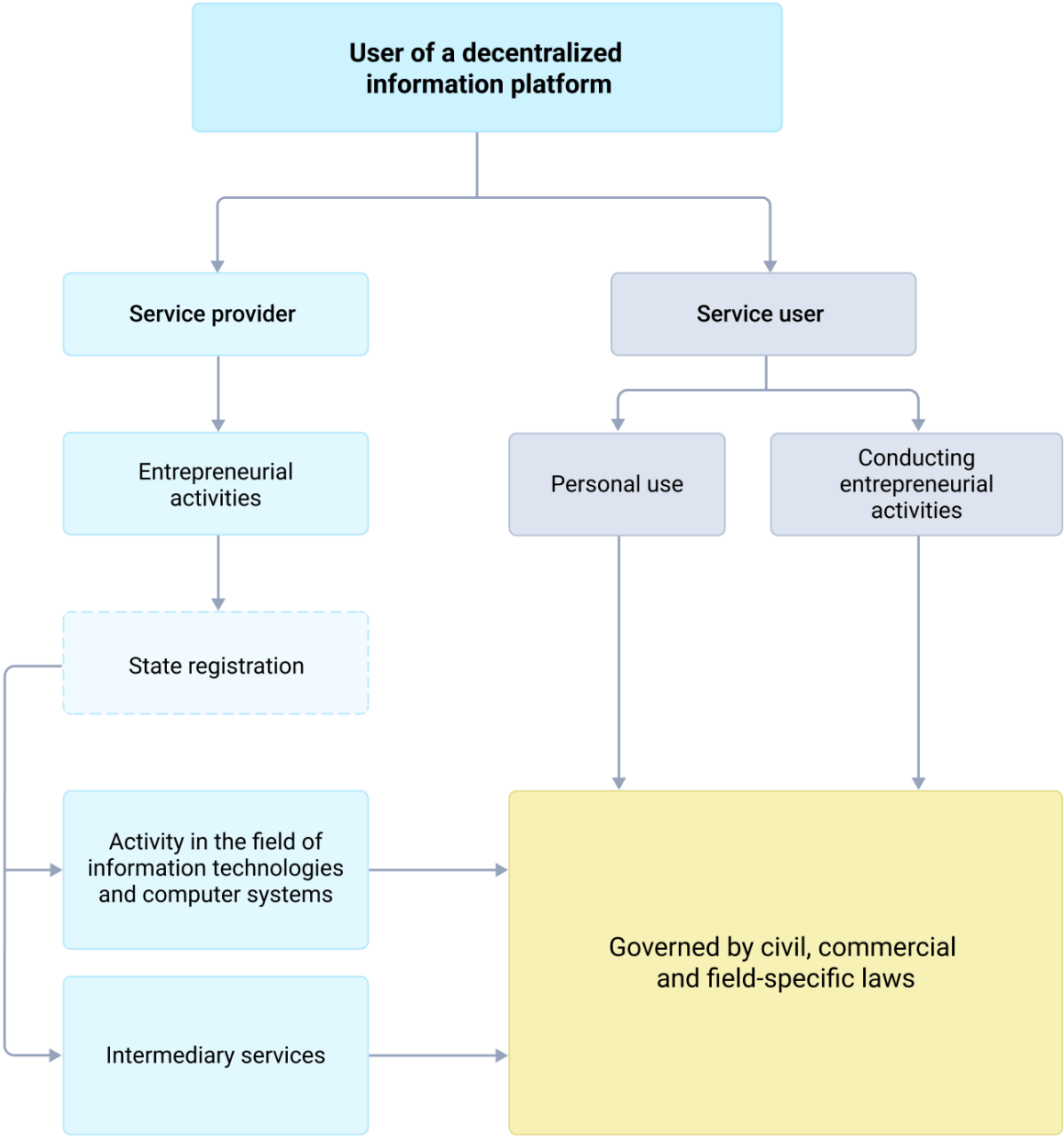
Name of the tool	Essence and nature of the tool	What can the tool influence	How it manifests in DIPs	How it is used with other tools
	legal connection to property		accounting system for such tools and property they are related to	
3. Distributed ledger token (DLT) for implementing the method of financial and management accounting	It is the main tool of a distributed ledger and one of the determining instruments of the distributed ledger technology and DIPs	DLT as a unique accounting object allows performing the accounting of any deals with property and personal non-property rights in a single trusted (due to distributed ledger) accounting system (in a DIP)	Users of the accounting system (distributed ledger) in the DIP can independently create digital assets	It can easily be used together with tokenized assets (digital assets) in public distributed ledgers; can easily be used as means of storing and confirming the reputation of DIP users and be an actionable and simple tool in all services within the DIP
4. Numerous services defining the DIP multi-functionality (for engagement and retention of users)	These are numerous services that: 1) are coordinated with open data exchange protocols (API); 2) comprise an ecosystem of services, and that creates a new added value and public value from DIPs	They directly influence the number of users, their loyalty to the ecosystem and the DIP as well as the position of the state and the DIP itself	An element of the ecosystem of services that has its own clear functionality and goal to create a new public benefit and value	They are a direct consequence of the application of the relevant open data exchange protocols (API) and the overall architecture of the ecosystem and the DIP

\*Source: author's development based on [20], [24], [46].

This approach has already been clearly proven with DIPs on private and public distributed ledgers, in particular with an established international decentralized information platform of Ukrainian origin — **Bitbon** System. For example, in the **Bitbon** System, the entire ecosystem of services is planned and aimed at achieving mutual benefit. Such benefit is synthesized out of benefit received by individual participants in the form of *a digital asset, i.e. “an information resource derivative of the right to a value and circulating in the distributed ledger in the form of a unique identifier”* [21]. The main mechanism of the **Bitbon** System is the implementation of a method for financial and management accounting of exchanging products and services using digital assets [15].

Special attention should be paid to who the users of DIPs are and how they are distributed within a DIP because such distribution confirms the legal status (even with rights and obligations) of such users at least in the decentralized information platform and creates new legal relations that are a significant argument in favor of increasing business activity of citizens and new circulation of property and personal non-property

rights in the state, which at the very least is important when considering employment and income. Thus, the participants in relations in the area of application of tokenized assets, in particular digital assets, can be defined as users of the decentralized information platform. Since such DIPs are a result of human activity, obviously, there are users that support their operation, and there are users whose actions are aimed at consuming the useful properties of DIPs. In that regard, the users of the decentralized information platform can be classified as “service providers” and “service users” [24] (Figure 4).



*Figure 4. Parties involved in social relations based on DIPs*

\*Source: author’s development based on [24], [43].

“The activity of service providers may be aimed at providing services to other users, which, essentially, causes the implementation of social relations in digital data accounting systems based on the distributed ledger technology with virtual assets... The activity of service providers is entrepreneurial and is defined as activity in the field of information technologies and computer systems or as intermediary services... In turn, other users of the digital data accounting system based on the distributed ledger technology (service users) employ such services for personal use as well as for entrepreneurial activity. Thus, the digital data accounting system based on the distributed ledger technology can be used as an environment for making deals, where parties are verified by the digital data accounting system (i.e. DIP) based on the distributed ledger, have accounts, and all actions are automatically recorded in this system. Such relations must be considered contractual and be regulated by civil and/or commercial law” [24].

#### *D. Supplementary mechanisms for regulation and self-organization*

The next stage of the first step is to determine the appropriate supplementary *mechanisms for regulation and self-organization of decentralized information platforms*. These ten proposed mechanisms, which were first mentioned in Figure 2, can be considered supplementary because they already exist within other processes (for example, elections and power struggle, organization of solutions, coordination and regulation of relations and technological processes, etc.), are fairly tested from the procedural point of view and can be used as elements for other processes and governance mechanisms.

Aside from these characteristics, the supplementary mechanisms are beneficial for the modernization of the public governance system because:

- 1) all of them already have the legal basis for their application in a certain capacity, which means that all of them are legal and permitted;
- 2) they either are the foundation for open procedures of public governance (for example, elections at different levels, traditional, Weber’s, bureaucracy) or they can easily be applied in the field of public law to the relevant objects or relations;
- 3) by their structure and morphology, they are already organized either through legislation, through open-source code or through public documents (rules) from their developers;
- 4) considering cybernetic principles 1–3 and 6 (see Figure 3), they all can use the existing properties of public governance or influence (alter) them aiming to, as stated above regarding the goal of the future mechanism for modernizing the public governance system, provide the existing public governance system with better properties to use historic capabilities of digital technologies.

Among the ten supplementary mechanisms listed in Figure 2, we can distinguish two groups according to the nature of their origin: a) mechanisms of information and technological nature and b) mechanisms of political and administrative nature. Such division makes it possible to more accurately compare these mechanisms to methods and tools of the modernization mechanism and combine them across three layers of

ensuring a new public value, which will be discussed a little later, and apply them together. Therefore:

a) mechanisms of information and technological nature: 1 — “orchestration” as a way of organizing business processes, 2 — ecosystems with their own private user microplatforms, 3 — “choreography” as a way of coordinating several business processes, 4 — autonomous regulation algorithms (DLT smart contracts), 6 — crowdfunding, 7 — registration of deals in DIPs, 9 — government feedback 24/7, 10 — digitization of property rights and their management in DIPs;

b) mechanisms of political and administrative nature: 4 — autonomous regulation algorithms (DLT smart contracts), 5 — traditional bureaucracy, 8 — elections at different levels, 9 — government feedback 24/7.

The division listed above has two mechanisms (4 and 9) that are present in both groups because:

firstly, Ukraine and other countries already have sufficient legal basis for their implementation not only as mechanisms of information and technological nature in modern digital environment (for example, smart contracts have been used by banks for a while for automatic payments from an account with previous agreement by the owner of this account);

secondly, they can be implemented in the modern digital environment using a digital asset. In this case, the digital asset will act as a secure method of expressing and ensuring trust of a voter to a public figure and public control over public voting, which has also not been technically difficult to implement for a while now.

Below is a short description of the ten above-mentioned supplementary mechanisms that can be used to create the mechanism for modernizing the public governance system.

1. “*Orchestration*”, as stated in [25], is a way of organizing business processes that can interact with external and internal web services and thus consistently create the technological and institutional configuration “Government as a Platform” (GaaP). Essentially, it is always a “background” mechanism for ensuring other processes.

2. Phenomenon of *ecosystems with their own private user microplatforms* is a new method of self-organization of DIP users and formation of own hierarchies and is a unique product of decentralized information platforms and, most likely, is not technically possible for centralized information platforms due to difficulty of creating own ecosystems within a single platform. By the nature of their organization, such ecosystems are more of a mechanism, rather than just a tool or method. Structurally, they fully correspond to the DIP operation principles [19], but are essentially an integral part of a higher-order DIP. By their origin, they are created within a bigger (technically — “parent”) ecosystem based on a decentralized information platform; technologically, ecosystems with their own private user microplatforms are organized using the same software and hardware complexes as the “parent” ecosystem and the DIP. A phenomenon, such as a micro-DIP, emerges due to the fact that the “parent” DIP, firstly, allows all identified users to create their own services and micro-communities and further support them using base services. Secondly, the users want to

and can create their own services and micro-communities in order to at least receive additional financial benefits or other benefits from servicing other users within their own small ecosystem and micro-DIPs, which relate to the “parent” one as a part and a whole. Due to the distributed ledger technology properties, it is technically impossible to create two absolutely identical ecosystems and micro-DIPs.

3. *“Choreography” as a way of coordinating several business processes* [25] is an organizational way of coordinating several business processes simultaneously through technological protocols of mutual operation in the form of requests and confirmations between different branches of business processes and small ecosystems of services, which are being coordinated and “orchestrated” [30]. Essentially, it is always a “background” mechanism for ensuring other processes.

4. *Autonomous regulation algorithms (DLT smart contracts)* are viewed as mechanisms of automatic or semi-automatic implementation of governance solutions in case of meeting certain conditions. A smart contract is a small computer program that ensures automatic or semi-automatic fulfillment of obligations according to the concluded contract (or algorithm) and performs two functions: either direct execution or supervision of execution (violation) of will agreed upon by the parties to the agreement (or regulatory act). They are based on public and corporate platforms based on the distributed ledger technology with unique set network parameters, access policy, which allows them to further expand the ability of using smart contracts. There are two parameters used to select cases for implementing smart contracts: a) there is a clear practical effect, and from this perspective there is a need to automate repeated relations, big agreements with a risk of not being paid; b) there is a technical ability to implement them when, for example, the fulfillment of the contract is related to objective and measurable parameters subject to tokenization.

5. *Traditional bureaucracy* is the foundation for the traditional public governance: officials clearly follow the rules and orders of their leadership, and their activity is based exclusively on their expertise and skills. As we all know, the basis for the classical (traditional) concept of public governance includes the developments of Woodrow Wilson and Max Weber’s theory of bureaucracy [26]. One of the properties of traditional bureaucracy is that the institutions of the public sector must ensure the services determined by voting of an average voter, not by supply and demand on the market; they have a clearly defined area of activity and goal [3], hierarchic structure and professional workers.

6. *Crowdfunding within a decentralized information platform* is a type of activity of a user of the decentralized information platform aimed at receiving additional benefit for participating in the implementation of the chosen business project in accordance with public rules and conditions of this business project. As of today, only one DIP in the world has laid down the elements in its architecture, which allow realizing crowdfunding with real, not speculative projects, with real value, and this DIP is the **Bitbon** System. Within this DIP, the crowdfunding process is defined as contributing, and the size of a profit directly depends on the number of special accounting units (digital assets) of a specific business project the platform user has [14].

Within the context of this paper, crowdfunding using DIP tools is considered as a supplementary mechanism because it provides a new way of solving the issue of voluntary participation of natural persons and legal entities in secure investment in real objects, covers property relations, creates new connections and dependencies between subjects and objects, and has a fairly complex organization system. As for modernizing the public governance system, this type of property management plays an important part in increasing the financial motivation of citizens to become users of a certain platform as well as in developing the ecosystem of services within the DIP or numerous private micro-DIPs.

7. *Registration of deals in DIPs* is a procedure of entering digital data into secure private or public databases based on the distributed ledger technology, which can be done manually, automatically or semi-automatically using smart contracts. Being a fairly simple administrative procedure, such registration, from the governance standpoint, may receive a higher status — the status of a mechanism. That is due to the fact that for the purposes of governance, the important part is not just simple entry of data, but also secure storage and high level of trust to such information, which creates more requirements to other supporting procedures (which technically means to the developer of the DIP and to the state that agrees to it) and to personal and social opinion on the future states of the object, the information on which is entered to DIP ledgers. In particular, it concerns the automatic change in a personal rating of an object in a DIP, rating of trust to an object in a DIP, legal status of an object or even the change in the legal regime for the object if a certain regulation of the current legislation, for example, criminal law, is related to it.

8. *Elections at different levels* are a process of selecting a person or a party by means of open or secret voting. Elections are one of the most popular forms of citizens' participation in social and political life, an important institution of operation of a political system and political regime, their legitimacy. From the public and administrative standpoint, elections are a mechanism of ensuring the rule of the people. In the context of this paper, elections are considered one of the main supplementary mechanisms because it is a complex method for solving a social problem or dispute, i.e. the main method for ensuring the legitimacy of state solutions and filling state positions. Currently, these matters make up a significant portion of the issue of public governance — lack of trust to the government formed by means of representative democracy, which is more of a government of elites, rather than people. This requires reconsideration of the currently existing views on the obligations of the state and a person and on the value of the institution of citizenship. One of the first steps towards it is the modernization of the public governance system based on DIPs.

9. *Government feedback 24/7* is a political and technological way of maintaining communication between citizens and officials with mutual ethicality, which will directly influence the level of mutual trust towards the official and, therefore, his/her disciplinary and political responsibility before voters. Over the past few decades, Ukraine and the majority of countries in the world have faced an increasing crisis in the feedback from the elected representatives, there is a rapid growth of populism and

political irresponsibility, which causes significant issues with trust to the government, state institutions and law. This results in the lower quality of public governance as a system. In the context of this paper, government feedback 24/7 is considered as a supplementary mechanism for the main modernization mechanism and is an important consequence of modernization. This consequence can be achieved thanks to new tools: individual unique digital assets for each voter in the decentralized digital data accounting system based on distributed ledger (i.e. a DIP), to which the majority of voters are connected and in which digital assets circulate and are accounted.

10. *Digitization of property rights and their management in DIPs* is a process as part of which users create decentralized information platforms of their digital assets [29]. As of today, only one DIP in the world has laid down the elements in its infrastructure, which allow performing the tokenization of property and personal non-property rights (tokenization of assets), and this DIP is the **Bitbon** System. However, this fact does not limit other decentralized information platforms or get in the way of them implementing tokenization of assets in any form. Each **Bitbon** System user who decided to create a digital asset can tokenize assets for convenient and secure management of rights to his/her property, in particular for equivalent exchange of such rights with other users of this system. Within the context of this paper, tokenization of existing assets is considered as a supplementary mechanism because it provides a new way of solving the issue of voluntary participation of natural persons and legal entities in secure management of rights to property and contributes to solving the issue of developing a modern and dynamic market of information resources, products and services based on the distributed ledger technology.

Table 4 below lists the properties of supplementary mechanisms that can be used to create the mechanism for modernizing the public governance system. Previous summaries are listed in the fourth column of this table and confirm that the ten proposed supplementary mechanisms procedurally and technologically ensure the improved ability of organizations of the public sector to respond to the expectations and needs of society. This is what any national practice of implementing the “Government as a Platform” with the famous slogan “do more with less” must be focused on.

Table 4

**Properties of supplementary mechanisms for regulation and self-organization of decentralized information platforms that can be used to create the mechanism for modernizing the public governance system**

Name of the supplementary mechanism	Key acting element in the mechanism	What may change in the public governance system due to the mechanism	Contribution to creation of a new public value
1. “Orchestration” as a way of organizing business processes	Algorithmically regulated order of execution of various web services (tasks) within a single ecosystem (continuity of operations)	Accessibility of trustworthy private public distributed ledgers. Tighter and more expansive integration with state centralized platforms (within GaaP)	It allows simultaneously covering numerous state, municipal and private ecosystems with their own ledgers and data sources, as a result — instant availability of verified data

Name of the supplementary mechanism	Key acting element in the mechanism	What may change in the public governance system due to the mechanism	Contribution to creation of a new public value
2. Ecosystems with their own private user microplatforms	Private initiative of a user of a DIP technologically based on distributed ledger	Drastic increase in the number of service (specifically public) providers and users. Use of new tools (for example, digital assets) during provision of services and circulation of products and services; increase in the number of available services (modularity)	New configurations of public services. Speed and sustainability of distribution of approved innovations through users of a DIP and micro-DIPs hierarchically connected to it. Lower production cost of services; more trust
3. “Choreography” as a way of coordinating several business processes	Based on artificial intelligence or an algorithmically regulated order of execution of various web services (tasks) within one or several ecosystems and platforms (continuity of operations)	Tighter and more expansive integration with state centralized platforms (within GaaP). Accessibility of trustworthy private public distributed ledgers	Due to decomposition and modularity, it will provide citizens with more opportunities for personal use of state and private digital infrastructures of services
4. Autonomous regulation algorithms (DLT smart contracts)	Automation of fulfilling obligations based on secure code	Decrease in the role of humans as administrators of processes and increase in their role in creation of processes and products (more creativity); a significant part of regulations can be used as algorithms and the process of regulation becomes machine-readable	The main value of smart contracts is the ability to make obligations fulfill automatically (self-fulfillment)
5. Traditional bureaucracy	Clear adherence to rules, orders and hierarchy	Following regulations and rules is partially moved from people to algorithms; significantly more focus on needs of citizens	It will at least ensure the order and coordination during long-lasting transition period to the decentralized governance model; the dependency on will and attitude of the counterparty decreases (harder to avoid payment, hide important facts, miss deadlines)
6. Crowdfunding	Private commercial initiative based on trust of numerous other users	Rapid development of economic methods of governance and stimulation; significant distribution of new data accounting systems; management of expectations of users and	Contributing to the creation (by creating new investment objects or making it easier to access them) of the global market (supply and demand) of information resources, products and services and,

Name of the supplementary mechanism	Key acting element in the mechanism	What may change in the public governance system due to the mechanism	Contribution to creation of a new public value
		guarantees of achieving the desired result; new combinations of modernization mechanism tools, etc.	therefore, new instruments of labor, skills and areas of expertise for millions of people
7. Registration of deals in DIPs	Irreversibility of records in public distributed ledgers	Regulation and economic governance methods; emergence of new combinations of tools (tokens, private public distributed ledgers, digital assets); increase in the role of law as social regulator; higher quality of feedback in the governance system, etc.	It ensures a significantly higher level of trust to data and its security; instant access to public data entered in the ledger
8. Elections at different levels	The highest political legitimacy of changes	Significant growth of accounting as a governance function; significant increase in the role and significance of the citizenship institution	Higher operational transparency and social trust even without changing the existing state models; additional protection of a citizen's rights and gained opportunities due to DIP tools
9. Government feedback 24/7	Political responsibility of an official	Procedures for feedback and tracking of an official's actions; change and distribution of certain regulation and stimulation governance methods	More conscious and active choice for citizens; significantly higher level of political responsibility for society, more trust between citizens and towards authorities; less tension, etc.
10. Digitization of property rights and their management in DIPs	Acquisition of additional benefit (in particular, economic benefit) by a citizen from having rights to a certain real asset represented in digital form	Significant development of economic governance methods; significant increase in the role of law and protected intellectual property in society; social demand for re-evaluation of assets; significant development of property relations and property right protection; significant changes in the format of labor markets (more self-employment and intellectual work); creation of new businesses, etc.	It contributes to the creation (by creating a new way of circulation and value) of the global market (supply and demand) of information resources, products and services and, therefore, new jobs, skills and areas of expertise for millions of people

\*Source: author's development.

### *E. Social institutions*

The next step is the generalization of influence of the main social institutions on the state of the public governance system. Taking into account own conclusions in previously published papers [25, pp. 65–66] and not sidetracking to substantiation of the emergence of social institutions, we can currently name six biggest and most influential social institutions that are used by the current public governance system and challenged by the practices of public governance with centralized platforms. They include the following social institutions: 1) citizenship; 2) state service; 3) property; 4) legislation; 5) market; 6) culture (Table 5).

*Table 5*

**The main social institutions, the influence of which began to change under pressure of digital transformations and implementation of platform-based governance**

Name of the social institution	Challenge for the system of public governance compared to the function of the social institution	The main methods and mechanisms of public governance currently used in response to the challenge for the public governance system
1. Citizenship	Weakening of legal connection and apathy of voters due to “closed off” governing elites (“rebirth of democracy institutions”)	<ul style="list-style-type: none"> <li>● methods of representative democracy: elections, government feedback, “social elevator”;</li> <li>● political, social and security guarantees for citizens;</li> <li>● creation of legal conditions for receiving citizenship</li> </ul>
2. State service	Functions of the state can be performed not only by professional workers, but also by algorithms of digital platforms	<ul style="list-style-type: none"> <li>● preparation of workers for public service, creation of bureaucratic organization structures;</li> <li>● established state governance technologies</li> </ul>
3. Property	Property that was previously recorded only in state ledgers creates legal derivatives of the right to a value that circulate in private public distributed ledgers	<ul style="list-style-type: none"> <li>● various legal jurisdictions;</li> <li>● insurance of property risks;</li> <li>● notaries;</li> <li>● keeping state data ledgers;</li> <li>● court arbitration to settle property disputes</li> </ul>
4. Legislation	Principle of the rule of law stops being the key element for regulating social relations in democratic countries	<ul style="list-style-type: none"> <li>● new government institutions and expansion of state apparatus;</li> <li>● public anti-corruption activity;</li> <li>● direct democracy through referendum;</li> <li>● political consensus of businesses and political elites</li> </ul>
5. Market	“The balance between public and private goods is unachievable: mass imbalance in favor of the market and imbalance of the market” [5, p. 228]	<ul style="list-style-type: none"> <li>● financial and credit policy;</li> <li>● political consensus of businesses and political elites;</li> <li>● international trade rules;</li> <li>● implementation of sector reforms that are not supported by the majority [5, pp. 194–195]</li> </ul>
6. Culture	Open society weakens traditional values as informal regulators	<ul style="list-style-type: none"> <li>● representative democracy;</li> <li>● increased effect of the principle of “protecting human rights” in the government, in particular empowerment of marginal groups and minorities</li> </ul>

\*Source: author's development considering [5], [40].

Considering the big layer of very complex social relations and socioeconomic issues that involve these six institutions, the attention is currently paid to the aspect of future changes in the public governance system due to comparison of possible responses of centralized and decentralized information platforms to the key challenges faced by the public governance system that emerge due to comparison of the public governance system with the main function of a certain social institution (Figure 5). In order to do that, there is a need to look at the results of comparing decentralized information platforms to other ways of providing public administration services in the form of a SLEPT analysis as well as consider the all-encompassing conclusions and synthesis of the leading scientists in the world — Report to the Club of Rome (2017) [5]. The Report to the Club of Rome is one of the most resonant and influential publications of recent years [27], which is ideologically based on the “full world” idea [36]. The goals of this report can be considered fairly idealistic, but they have already been pointed out by the intellectual elite, and together they may be the best representation of “what?” in the above-mentioned dilemma of “what? vs how?”. “Full world” is a world overfilled with goods, but with unclear prospects for future expansion of borders due to consumer attitude to all resources and knowledge that is almost ready to turn into the “empty world” [36].

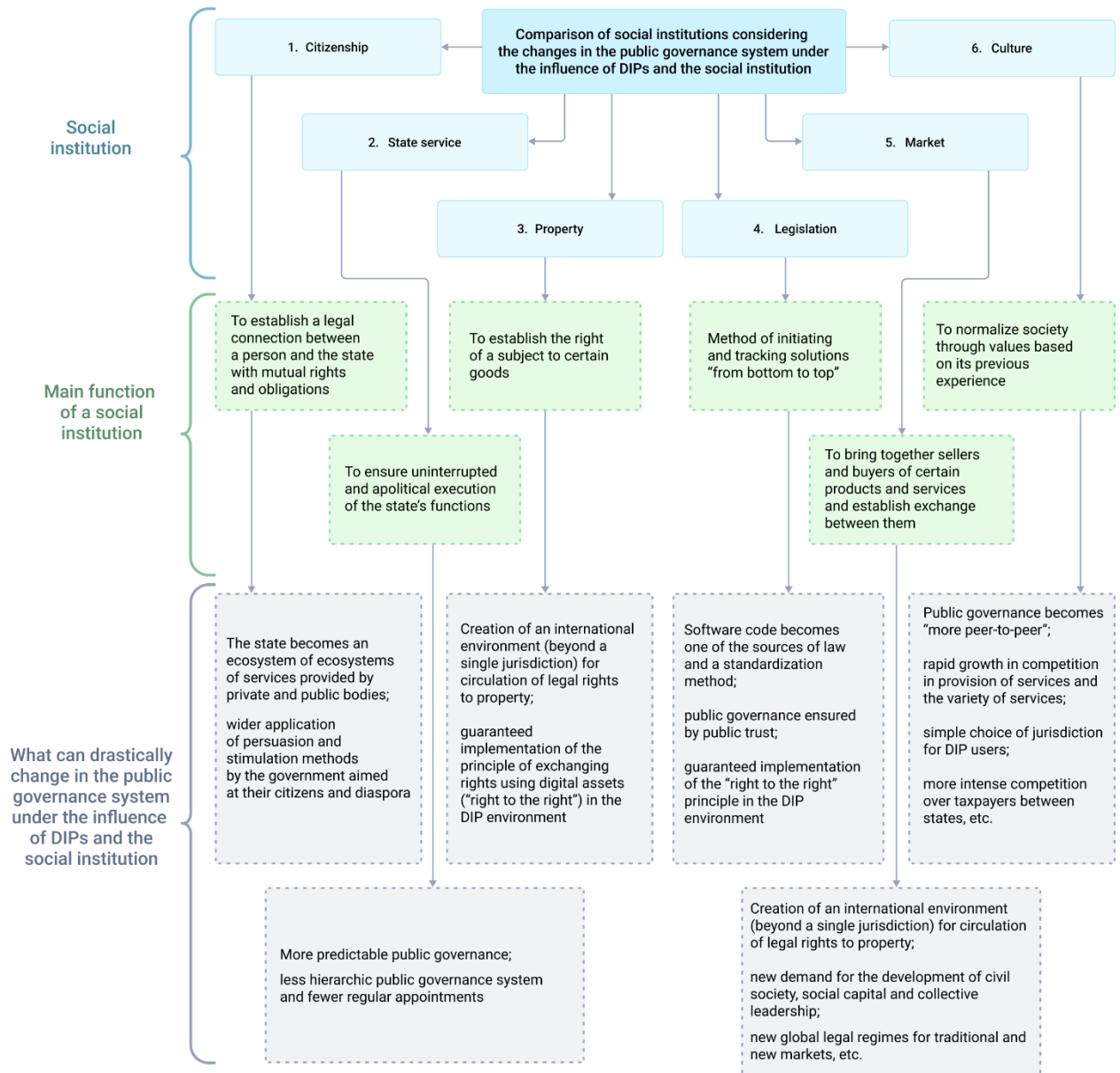


Figure 5. Comparison of separate social institutions with changes in the public governance system under the influence of DIPs and social institutions

\*Source: author's development.

#### F. Three levels of creating the public value

The generalizations regarding the use of social institutions listed in Figure 5 and Table 5 allow getting closer to the modernization mechanism due to controlled management of distribution of public value as shown in Figure 1. Thus, the original idea to provide potential “digital” answers proposed by both centralized and decentralized information platforms to the issues that exist in the public governance system, through the lens of six social institutions and, therefore, the creation of own mechanism for modernizing the public governance system, allows maintaining the deep and meaningful focus on “what? vs how?”. Therefore, there is a question: are social institutions hiding (or changing the emphasis) something important in modern relations

between a person and the state and, if it is so, what exactly is hidden (changed)? Three most important points can be distinguished that will also be taken into account in the future search for a new public value.

Firstly, it is the *place of a person in the modern system of social and economic relations within a state* [34], [38], [41], [45], [50]. An already wide term “full world” can be further expanded: its composition and ecological nature of relations will receive higher value if a method is found that would allow decreasing the dissonance between the classic economic dilemma (resource scarcity with increasing human needs) and values, beliefs, evaluation of the already existing people’s assets, giving them new life in a new form. Essentially, the important issue is to find how to present a new value on the old scale. In order to do that, there is a need to figure out how to eliminate the toxicity and get out of the dead end of traditional market relations that lead to more destructive economic crises, and achieve the balance of social relations. It is the most important task for new information technologies, scientists, state leaders and “providers” of digital solutions. In case of success, it will be a new step towards frugality and ecological nature of social relations, towards the “full world” built on respect to people and protection of their private and intellectual property. Modern digital technologies provide a solution for that. This concerns the new tools for confirming trust and human-centered state services built on distributed ledger. However, the consideration of this side of the modern economic dead end of traditional capitalism built on loan interest will contribute to eliminating confusion and indecisiveness of national elites and strengthen hope for more just public governance.

Secondly, the *freedom of a person and broad attitude towards freedom* is the next important missing link in relations between a person and the state, which is currently being reconsidered using digital technologies. The modern world is living at higher speeds. Modern people do not want to miss out on new opportunities (knowledge, travel, work, love, etc.) and they consciously and unconsciously acquire new social connections. Just like the world and public governance become “more peer-to-peer” (but not “flat” [9, p. 321]): previous hierarchies are broken, unnecessary intermediaries are slowly being eliminated, and people will be trying to save more on transaction expenses [4, pp. 8–10]. It means that the methods of public governance in the state, local communities and regions are subject to reconsideration. However, what can the modern digital technologies and the spirit of time add to these governance relations without ruining the moral foundation? Obviously, this is the new method of expressing freedom. And that is the second important missing link of this chain. It means more trust and verification of data, more convenience, more choice and less operational expenses. As unlikely as it may seem, the issue of “more freedom” simultaneously affects both the supranational level (because the emphasis on financial speculations has existed for a while) and the national level (because there is a significant regulation by governments) and even to the microlevel of each person (because there are too many invisible intermediaries even for the basic goods). Unfortunately, the existing methods for regulating socioeconomic relations are no longer able to lead nations and societies out of this dead end [16], [39], [51].

Objectively speaking, it has to be pointed out that, even though “digitalization is the slogan of the modern world” [51, p. 56], it, as before, is fairly secretive, unclear and even untrustworthy [35]. The modern world currently does not have that many “technoutopists” even among scientists and successful businessmen. In order to win over the minds and hearts of millions of educated people, digitalization needs to at least ensure storage and security of what has already been created. The digital world must be similar to the real one, and not substitute objects, values and costs of the real world, therefore further provoking both new scams and financial “bubbles” as well as the new demoralization of society and challenging all establishments, for example, by creating post-truth.

The third most important lost link of the chain of creating a new public value has been accurately worded in the public rally of the Club of Rome: “*Do not cling to old philosophies!*” [51]. Today, these words are as relevant as ever. The exit out of the “vicious circle” of traditional financial capitalism and social inequality today is closer than it has been in the past 50 years: technologies will provide the answer. Today the global and public demand for new methods of regulating the main issues is truly high.

At last, let us move to the last stage of the first step — the description of *layers of creating the public value*. Three layers (or levels) are proposed: 1) data layer; 2) governance layer and 3) engagement layer. Their emergence clearly correlates with all cybernetic principles (see Figure 3), but with a special emphasis on principles 1, 6 and 7 to ensure stability of the desired trajectory during modernization of the public governance system and sustainability of the desired changes in time (Table 6).

Table 6

**Three layers (levels) of creating the public value to be used in the modernization mechanism**

Name of the layer	Main objective of the layer	Main operations in the layer	Main governance task in the layer and methods of its completion
1. Data layer	To technologically ensure trust to information available to nearly all participants as well as its accounting	Collection and transfer of data on all operations (transactions, agreements, event protocols, etc.), integration of public electronic and private ledgers	To ensure integration of distributed databases (ledgers) and their secure storage. Methods: distributed ledger technology, free access to big data, algorithms, ledger system
2. Governance layer	To prepare the existing governance system based on traditional bureaucracy with elements of a centralized information platform for the new (modern) idea (or approach, behavior, product)	Provision of access rights and replication (copying) of data, administrative operations with rights to property; identification of a person and actions of a DIP subject; creation of “collaborative hierarchies” [9, p. 321]	To establish sustainable stimuli within the governance system. Methods: use of institutions of market, property, citizenship, state service, legislation; distributed ledger technology, ledger system

Name of the layer	Main objective of the layer	Main operations in the layer	Main governance task in the layer and methods of its completion
3. Engagement layer	To ensure sustainable further self-organization of the governance system and establish the positive attitude to the new idea (behavior, product) within it	Distribution of services in small ecosystems, creation of micro-DIPs, identification of a person and recording of actions of a person using a DLT	To change the environment to start automatic cognitive processes to achieve the desired result (“nudged behavior”). Methods: use of institutions of culture and property; distributed ledger technology, ledger system

\*Source: author’s development.

What are these layers (levels)?

Firstly, the main condition for the emergence of these three layers is the ability of the governance system to ensure its self-organization under pressure from digital transformations and accumulated state problems. This will be achieved due to the technological creation of the “environment of trust” (owing to the distributed ledger technology) and small “nudges” of DIP participants and citizens based on the modern theory of behavioral economy (by Nobel Prize winners Daniel Kahneman (2002 Nobel Prize), Richard Thaler [49] (2017 Nobel Prize) and Cass Sunstein [48]).

Secondly, these layers are essentially abstract environments, where numerous combinations of technological and public governance solutions are created and a certain agreement between participants is formed (see Figure 1). Such combinations consist of governance methods, tools, supplementary mechanisms (Table 7), but each combination must correspond to the main objective — to provide the existing public governance system with the best properties as specified above in the goal of the modernization mechanism.

*Table 7*

**Distribution of the main implementation mechanisms across three layers for creating the public value to be used in the modernization mechanism**

Name of the layer	Methods	Tools	Supplementary mechanisms of regulation and self-organization of decentralized information platforms
1. Data layer	State control over the adherence of DIPs to the requirements of information security; organizational and administrative	All ledgers as a joined system of ledgers (protected public and private ledgers); free access to big data; private public distributed ledgers; DLT; open data exchange protocols (API)	“Orchestration”, “choreography” between processes; traditional bureaucracy, registration of deals in DIPs

Name of the layer	Methods	Tools	Supplementary mechanisms of regulation and self-organization of decentralized information platforms
2. Governance layer	Benefits and incentives; agreements; organizational and administrative	Tokenized assets (digital assets); spread of trust-based relations; services available within DIPs; high-quality broadband Internet available anywhere in the country; open data exchange protocols (API); modules compatible with various information systems	“Orchestration”, “choreography” between processes; autonomous regulation algorithms (DLT smart contracts); traditional bureaucracy; DIP-based elections at different levels (direct democracy and services for will expression)
3. Engagement layer	Management by the user of his/her reputation; economic (bonuses, benefits, incentives); social and psychological with emphasis on “nudges” and creation of a reliable system of stimuli	Tokenized assets (digital assets); services available within DIPs; modules compatible with various information systems; reputation of DIP users	Ecosystems with their own private user microplatforms; crowdfunding; elections at different levels; government feedback 24/7; digitization of property rights and their management in DIPs

\*Source: author’s development.

Thirdly, figuratively speaking, these three proposed layers of creating the public value are a sort of a “bowl” where various “ingredients” of methods, tools, supplementary mechanisms, options and special behavioral procedures (“nudges”) are mixed, which is important for society developing social relations based on DIPs.

Nudge theory is a concept in the modern behavioral economy, political theory and behavioral sciences [47], which proposes positive reinforcement and indirect suggestions as methods of influencing behavior and decision-making by groups or individuals. This theory envisions “the ability to influence decision-making for groups and individuals using positive reinforcement and indirect instructions” [33]. “Nudges” stand out from other, more traditional methods of achieving compliance, such as education, legislation or law enforcement, but do not exclude them during application.

It is known that “nudges” increase the likelihood that a person will make the correct choice or behave a certain way, therefore changing the environment in a way that starts automatic cognitive processes, which contribute to achieving the desired result. This is because the behavior of a person does not always correspond to his/her intentions, so there is a difference between values and actions [44]. It is also widely known that people are not always rational: they often do things that do not meet their personal interests, even if they know that their actions are not in their interests [42]. For example, hungry people on a diet sometimes underestimate their ability to lose weight, and their intention to eat healthy food may be temporarily weakened until they are sated.

Why are “nudges” so important when new solutions are provided? Recognizing that “nudging” is not always the best practice from the ethical standpoint (for example,

by using proofs that are not always persuasive) and long-term changes in human behavior, it has to be noted that:

1) the actual practice of public governance and specifically public policy is already far from the ideals, for each it was formed, in particular in terms of human decency, conscious choice out of several options, accountability of government, rational consumption of mutual resources (in particular, public budgets);

2) the practice of “nudges” when implementing DIPs cannot be separated from legislation and education, which must also change, but that lies outside the subject of this research;

3) private individuals (citizens) at which third parties (organizers and owners of digital platforms) legally aim their influence and certain “nudges” become additional “catalysts” of changes in the actual public governance system, leading it out of the current “resting state” and directing it towards the changes desired by citizens. That, in turn, may also be the “nudge” for the entire governance system, which is conservative;

4) one system (public governance system) can be taken out of the “resting” state either by strong or by systematic actions of another system, which the first system cannot deny (cannot recognize it as legitimate or freely distance from it).

## ***2. Step two: creation of a new public value using decentralized information platforms and creation of the mechanism for modernizing the public governance system based on it***

Let us move on to the second step of creating the modernization mechanism — creation of the necessary *combination of influence methods and behavioral “nudges” in order to substantiate the attempt to create a new public value using DIPs.*

Below, there will be the original proposed induction and synthesis with a theoretical *example of creating a new public value in the form of a certain sequence of actions* using the combinations of tools, methods and supplementary mechanisms. Such new public value (Table 8) must be connected either to higher social equity, or to sustainable economic growth, or to higher security for its citizens, which corresponds to the overall goal of a state according to [6, p. 4]. As a result, it should further allow distinguishing the mechanism for modernizing the public governance system with clear characteristics based on the example of creating a new public value with one of the main responsibility areas of a state.

**Distinguishing the options of a new public value that can be achieved in the modernized public governance system using DIPs**

Why the state exists	Significant public value for the digital 21st century
1. Economic growth	No “unnecessary people”
2. Social equity	<ul style="list-style-type: none"> <li>● Increased trust within society;</li> <li>● implementation of the property right of citizens to state resources and to profit that their management will provide</li> </ul>
3. Security of citizens	Creation of the conditions under which citizens will want to protect their state

\*Source: author’s development.

As an example, let us consider the way of achieving the new public value “No unnecessary people” that is within the economic field and is connected to the existing global issue of poverty and increasing unemployment. “Unnecessary people” mean dozens and hundreds of millions of people in all countries of the world that: a) are almost excluded (now and in the next 20 years) from the processes of production and exchange of useful and paid goods due to the pandemic and loss of their jobs and/or non-conformance of their competencies and expertise with the growing demands of the information society; b) become a social “burden” on state and local budgets; c) spread social and political tension, crime, etc. Indeed, inevitable unemployment and layoffs of a portion of working people are widely recognized [1], [7] due to the pandemic and other ways of technological organization of processes — of both known and unknown technologies: such people lose decent jobs and means to live. Therefore, resolving the issue of such “unnecessary people” is truly relevant, and decentralized information platforms with the updated public governance system propose a new solution.

The main proposed method for solving the issue of “unnecessary people” in the near future is the direct consequence of using DIPs — it is the easy creation of numerous micro-DIPs prepared by their users (natural persons or legal entities) within the “parent” DIP and, therefore, increase in business activity in these numerous ecosystems of services and self-employment. Against the backdrop of the quickly growing social inequality and “intellectual inequality” [12] in the world, this method may become a “sponge” accumulating potential unemployed people similar to how retail markets in the early 1990s became a new workplace for tens of thousands of people who lost their jobs after the dissolution of the Soviet Union. The area covered by this tool depends on the level of connectivity and quality of Internet connection, widespread trust towards digital technologies and further inability of the existing political and financial systems of states and the world to solve accumulated complex societal and political issues of humankind related to overpopulation, finance and public debt.

A unique feature of the author’s idea is that a certain main method of solving the issue of “unnecessary people” is proposed (Table 9). Thus, the main “parent” international DIP creates numerous private micro-DIPs that:

- use the general hardware and software infrastructure of the “parent” DIP based on the distributed ledger technology and, in particular, secure private public distributed ledgers and tokenized assets;
- create and maintain their digital environment with circulating verified rights to tangible and intangible goods;
- help their owner or founder (natural person or legal entity) receive additional income or achieve self-employment within the DIP ecosystem.

*Table 9*

**Structure of the mechanism for modernizing the public governance system based on DIPs by ensuring the selected public value in economy: proposed combination of the key governance methods**

Governance method or feature	Description of the method or feature
Significant public value: No “unnecessary people”	
1. The main proposed way of solving the issue	The main “parent” international DIP can easily create numerous micro-DIPs that use secure private public distributed ledgers and can provide their owner (natural person or legal entity) with additional income from self-employment within the DIP ecosystem
2. Public and administrative tasks for implementation	<ul style="list-style-type: none"> <li>● to legally allow integration of private public distributed ledgers with state ledgers used in centralized information platforms;</li> <li>● to recognize the legal status of tokenized assets legally distinguishing them from crypto-assets (not backed by property) [20], [31];</li> <li>● to legalize the approach to management and financial accounting of operations, in particular for the purposes of taxation;</li> <li>● to prepare the state apparatus (workers, procedures, culture) to the changes introduced by digital technologies, first and foremost — information platforms, especially based on the distributed ledger technology, for example, DIPs</li> </ul>
3. Configuration of the platform that ensures the proposed method	Field-specific platform and its expansive modularity
4. Main methods	Micro-DIPs with their own small ecosystems; modules compatible with various information systems; tokenized assets (digital assets)
5. Engaged tools	All listed tools (see Table 3) based and not based on distributed ledger
6. Engaged governance methods	Incentives (bonuses and affiliate programs), business profit, salary; harmonization of goals with the goals of the system of the higher level, mutual values of living, etc.
7. Engaged supplementary mechanisms	“Orchestration”; ecosystems with their own private user microplatforms; “choreography” between processes; autonomous regulation algorithms (DLT smart contracts); crowdfunding (in the DIP environment using tokenized assets)

Governance method or feature	Description of the method or feature
	and fiat currency); registration of deals in DIPs; government feedback 24/7; digitization of property rights and their management in DIPs
8. Engaged social institutions	Property; legislation; market; culture
9. Behavioral procedures — “nudges”	<p>1) “nudging” of the governance object:</p> <ul style="list-style-type: none"> <li>● postgraduate courses of financial literacy and investment outside commercial banks, structure of the global financial system, features of information and applied economy;</li> <li>● public speeches and articles of the global “influencers”: intellectuals, top politicians and former top executives;</li> <li>● social engineering from the side of big and middle businesses and international organizations using DIPs;</li> </ul> <p>2) “nudging” of the public governance system:</p> <ul style="list-style-type: none"> <li>● creation and extensive information support of the first generation of micro-DIPs (as prototypes) in the currently existing DIPs that allow doing so;</li> <li>● spread of state digital currencies (CBDC) as a transition stage of digital transformations in the state and society, and state-regulated method of increasing trust to virtual assets, etc.</li> </ul>
10. Expected results	<ul style="list-style-type: none"> <li>● wider application of economic, social and psychological governance methods;</li> <li>● fall of crypto-assets (cryptocurrency “bubbles”);</li> <li>● decrease in the number and significance of traditional intermediaries in modern market relations;</li> <li>● provision of public services by public and private structures</li> </ul>
11. Expected changes in the existing model “government as a platform”	<ul style="list-style-type: none"> <li>● increase in the ability of the GaaP to mobilize state and private resources to set up various configurations of public services;</li> <li>● significant improvement of coordination within the system of public governance bodies and with authoritative private providers of information solutions;</li> <li>● higher likelihood of meeting various expectations and needs, and elimination of consequences of opportunist actions of third parties</li> </ul>
12. Consequences	<ul style="list-style-type: none"> <li>● distribution of the new tool for fighting poverty in the 21st century;</li> <li>● adults and the youth learn new professions of the 21st century;</li> <li>● significant changes in the sources of tax revenue;</li> <li>● decrease in the numbers within the state apparatus, increase in its accountability;</li> <li>● the state avoids social and political crises (hunger strikes, riots, wars over natural resources);</li> <li>● decrease in consumption of natural resources;</li> <li>● increase in significance of education, intellectual property and intellect, strengthening of meritocratic governance principles</li> </ul>
13. Task for preventing the loss of state sovereignty due to the influence of DIPs	<ul style="list-style-type: none"> <li>● to create the foundation for domestic and international policies regarding DIPs, specifically between authorities and analytical centers;</li> <li>● to make sure that no apparent or hidden actions of decentralized information platforms in the fields of macroeconomics and politics have any negative impact on national security and sovereignty (for example, by creating some sort of “cyber police in the field of digital platforms”);</li> <li>● to grow and invest in own (national) digital infrastructure, in particular in infrastructure-level platforms and in cybersecurity of storing ledgers</li> </ul>

\*Source: author’s development.

This mechanism distinguishes three main influence methods that, technologically, are fully based on the distributed ledger technology and together influence the public governance system (Figure 6):

- 1) supplementary mechanism “micro-DIPs with their own small ecosystems”;
- 2) “modules compatible with various information systems” tool;
- 3) “tokenized assets (digital assets)” tool (see Table 9).

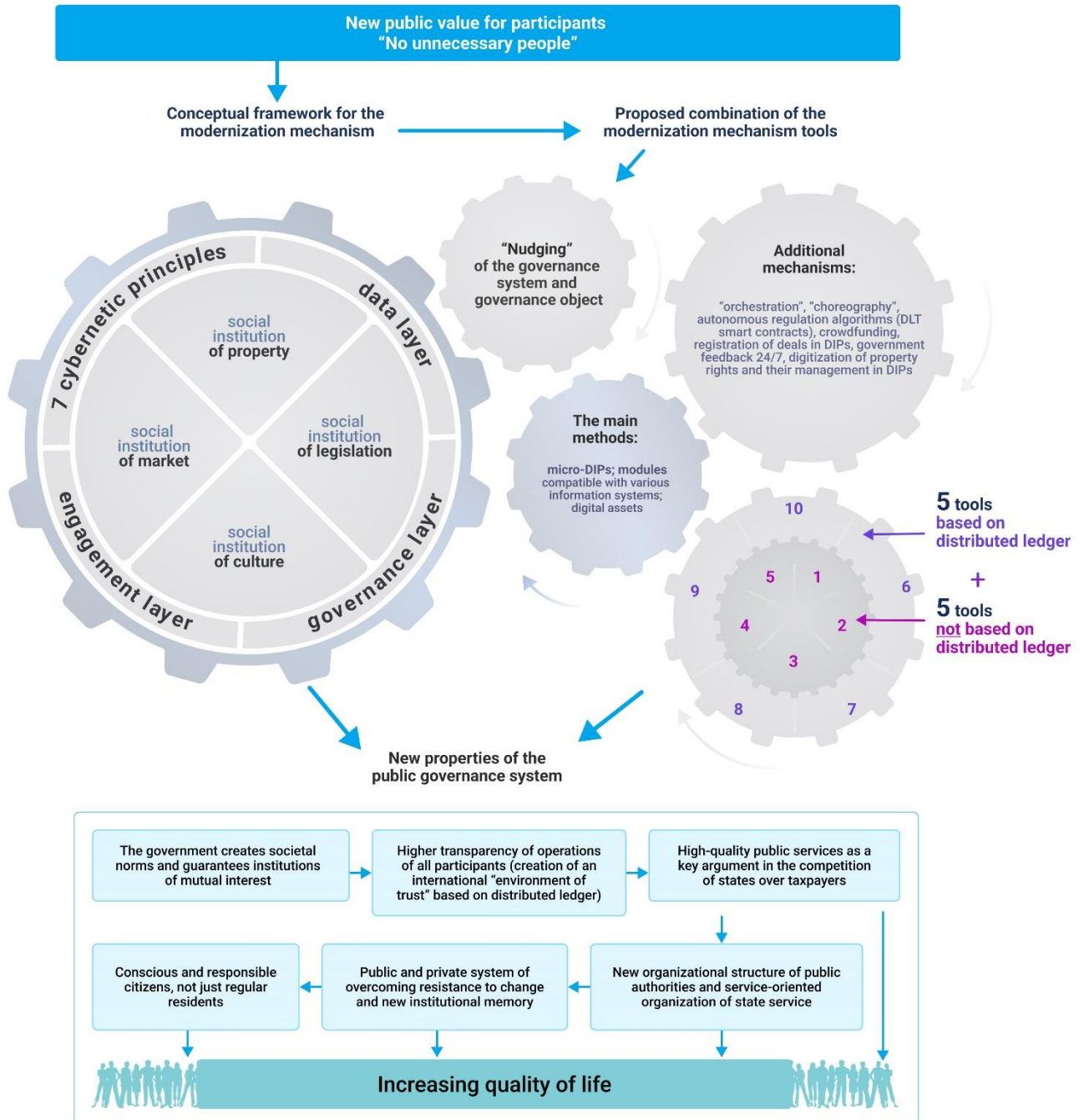


Figure 6. The proposed method of ensuring the selected public value in economy using DIPs

\*Source: author's development.

Therefore, the updated public governance system based on DIPs is a mandatory organizational environment and the core of the new method of solving the issue of “unnecessary people” (provided as an example). To that end, the mechanism for modernizing it with the updated structure must be launched in order to fully ensure the selected public value in economy (see Table 9).

### ***Discussion***

Let us demonstrate the timeliness of the emergence of this modernization mechanism to solve the issue of “unnecessary people” by creating the conditions for new professions and jobs within the decentralized information platform.

As we know, the emergence of new professions is always a consequence of evolution of the entire system of social relations and never happens quickly. Digitalization that is currently spreading in all activity areas quite rapidly and influences their development will determine the landscape of the skills of the future. When DIPs are used to update the public governance system, a digital “ecosystem of ecosystems” is created, which can provide dozens of new jobs of the 21st century. In particular, citing the Atlas of New Professions [2] developed in the Russian innovation center “Skolkovo” in 2020, a number of new professions can be distinguished that may be engaged in the ecosystems of services of the decentralized information platform as in the case of the **Bitbon** System of Ukrainian origin:

1) in IT — designer of digital services, privacy balancer, interface designer, cyber security technologist of smart environments, cyberspace investigator, IT evangelist;

2) in management — coordinator of community development programs, coordinator of production in distributed communities, cross-cultural communication manager, user community manager, facilitator, manager of human-machine teams;

3) in sports — healthy lifestyle adviser, online coach, sports analyst, esports coach (Table 10).

*Table 10*

### **List of expected new professions to be used in the environment of digital technologies and the ecosystem of the Bitbon System decentralized information platform of Ukrainian origin**

Profession	Description
<i>In IT</i>	
Designer of digital services	“A professional that designs digital offices (from cloud software for management, such as BaseCamp, to virtual spaces) for specific tasks of work groups. He/she determines the demands of users, finds the best solutions, creates the design and software”
Privacy balancer	“A specialist that finds the balance between maintaining confidentiality and practical benefit of the user from using his/her data. The less of the user’s data is available to third parties, the more difficult it is for developers to come up with a convenient solution that accounts for individual features of a customer”
Interface designer	“A specialist that develops and creates user-friendly, customizable and secure interfaces for equipment, hardware and software of various levels. An important

Profession	Description
	skill is to be able to create interfaces that are as convenient for the user as possible. This profession already exists and is in high demand. However, the development of the human-machine communication will mean the need for more such specialists, and their skills will adapt to solve new tasks”
Cyber security technologist of smart environments	“A specialist ensuring security in the lower levels of the information infrastructure that connect smart environments (i.e. in small local networks). It is expected that buildings and businesses will be separated from the Internet into a different segment connected to it through secure low level links”
Cyberspace investigator	“A specialist that investigates, searches for and processes information in the network. In particular, he/she can actively search for information using officially permitted cyber attacks on suspects. Essentially, cyberspace investigators are already actively working, but the demand for such specialists will only grow”
IT evangelist	“A specialist that interacts with end users of IT products and promotes new solutions in the groups that are skeptical about innovative technologies. He/she teaches people to use new software and services in order to narrow the digital gap within the population. Events aimed at teaching people digital literacy already take place but are generally voluntary. In the near future, it will become a real profession”
<i>In sports</i>	
Healthy lifestyle adviser	“A professional fitness coach... that not only develops workout programs, but helps with nutrition, analyses results of the customer’s activity based on data. Essentially, such specialists exist and work with people who can afford them, but in the future they will have more work opportunities using the data of wearable trackers”
Online coach	“A specialist that helps customers workout online. He/she comes up with sets of exercises, demonstrates them to the customer and watches if they are performed correctly using a web camera or wearables. Since such coaches can work from anywhere in the world, they will compete for customers and, therefore, they will be forced... to become media personalities...”
Sports analyst	“An analyst of big data on athletes’ results, their physical condition, ability to play on a certain position. Teams are already managed based on data, which allows for the most efficient combination of athletes on the field to achieve team results and combine the puzzle pieces in the most effective way...”
Esports coach	“Esports are becoming more and more similar to traditional sports and, therefore, the demand for highly qualified training grows. FIFA created its own virtual football championship for Xbox and PlayStation; some American universities have esports teams that are at the same level as traditional sports teams, and their participants can receive scholarships”
<i>In management</i>	
Coordinator of community development programs	“A specialist that organizes and maintains the dialogue between independent teams of developers coordinating long-term goals and the overall vision of the future while helping them determine the program of mutual investment in production and people. It is a new level of project management: in the future, managers will have to coordinate the work of project teams, the participants of which are in different countries”
Coordinator of production in distributed communities	“More and more productions will be set up as networks, where independent producers join the process of making the final product at various stages. This is why such processes will need professionals that would coordinate all aspects of order completion and organize the work of independent teams...”
Cross-cultural communication manager	“A specialist that supervises the circulation of documents of the company in foreign languages, monitors the key meanings (for example, when selecting marketing slogans), teaches co-workers to preserve meanings in foreign languages and unique cultural features when communicating with foreign partners. Cross-cultural

Profession	Description
	communication manager advises the management of the company regarding business activity in other countries...”
User community moderator	“A specialist that organizes online and offline user communities, supervises the dialogue with the developers of the company’s products, ensures their loyalty (for example, organizes contests)”
Facilitator	“A specialist that ensures successful group communication using various discussion tools. This profession already exists but will become more relevant because there will be more cross-field and cross-cultural teams...”
Manager of human-machine teams	“A specialist that gathers a team of people, software and robots with specific functionality in mind, teaches them to work together, distributes tasks and monitors their completion. In time, all managers will have to learn this skill, but for now, there will not be that many human-machine teams and they will be handled by specially trained managers”

\*Source: author’s development based on [2].

Not being limited by these three fields, the modern practice of creating numerous services that is already laid down in the **Bitbon System** decentralized information platform of Ukrainian origin and its entire ecosystem of services will allow identifying other new professions for other sectors of economy that can also be implemented in the **Bitbon System**.

This solution to the problem of “unnecessary people” allows emphasizing two important features proposed by DIPs:

firstly, unlike DIPs, no state centralized information platform, even theoretically (integrating third-party private modules), allows creating similar conditions for the emergence of such a variety of new professions, new jobs and, therefore, overcoming unemployment. At the same time, the best known international commercial platforms with market capitalization of tens of billions (such as the Polish OLX) or even hundreds of billions of dollars (such as American Amazon and Facebook) allow creating only a limited number of similar professions like online seller of own or somebody else’s product, online marketing specialist, call center operator, web designer, courier;

secondly, the solution of the issue of “unnecessary people” is a beneficial side-effect of implementation of a decentralized information platform. However, that may become one of its main strategic consequences for both the state and people in the 21st century.

Some of the above-mentioned supplementary mechanisms, social institutions and methods were not included in the list of selected methods to solve the issue of “unnecessary people” (see Figure 6), but they can be used in solving other issues of providing the new social benefit using decentralized information platforms: combination of methods, their influence and duration will be unique for each case (see Figure 3). However, obviously, nobody should expect that DIPs could become a universal “cure” for all issues of public governance and society.

Therefore, currently, two conclusions can be made regarding the modernization of the public governance system based on DIPs.

1. The provided example of creating a new public value that is and will be relevant for millions of participants in the 21st century illustrates that the use of DIPs in the public governance system allows moving the emphasis from “how?” to “what?” and keeping it that way by updating the entire system of relations in public governance, business and day-to-day life. Proper use of the new methods, supplementary mechanisms, procedures together with traditional social institutions theoretically allows emphasizing three problematic aspects that are often hidden in modern relations between a person and a state, specifically:

- a) the modern system of social and economic relations within a state is centered around people;
- b) freedom of people;
- c) diversion from the outdated practices and preferences (call of the Club of Rome “Do not cling to old philosophies!”).

2. Own definition of the *mechanism for modernizing the public governance system based on DIPs* is proposed, which should be understood as a comprehensive method of ensuring integral and strategic development of the public governance system, which is based on distributed ledger technologies, covers the infrastructure of services and community of independent users of a decentralized information platform and transforms the system of relations and governance technologies between subjects of law — persons of public and private law — towards the creation of an information environment of trust in operations between all engaged participants.

The final point with the definition of the modernization mechanism became the logical third step of this research that creates own methodological approach to creating the mechanism for modernizing the public governance system based on decentralized information platforms.

## **CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH**

1. The essence of the original approach to creating the mechanism for modernizing the public governance system based on decentralized information platforms consists in the step-by-step description of the components of the promising modernization mechanism (goal, seven creation principles, operation methods, nine main tools, six main engaged social institutions, ten supplementary mechanisms of regulation and self-organization of decentralized information platforms, three levels of creating the public value), creation of a combination of influence methods and “nudges” (according to the behavioral theory of nudges) and, finally, the development of own definition of the modernization mechanism with an example of creating a new and significant public value and recommendations for more controllability and reliability of the modernized public governance system after implementing the modernization mechanism.

2. The main proposed method for solving the issue of “unnecessary people” in the near future is the direct consequence of using a decentralized information platform — it is the easy creation of numerous micro-DIPs prepared by their users (natural persons or legal entities) within the “parent” DIP and, therefore, increase in

business activity in these numerous ecosystems of services and self-employment. Right now, there are a lot of legal, organizational, technological, cultural and ethical grounds for this type of employment to emerge in the coming years (2–3 years) and develop in the environment of established **Bitbon** System digital ecosystem of Ukrainian origin. And when it turns out this way, it will be a huge step towards digital transformation of not only social institutions, but several layers of social relations: of individuals between each other, with state and municipalities, private employers, etc. The scope of covering the population with this tool depends on the connectivity and quality of the Internet connection, widespread trust to digital technologies and further inability of the existing political and financial systems of states and the world to solve the built up social and political issues of humankind relating to overpopulation, finance and public debt.

3. From the theoretical standpoint, the provided example of creating a new and undisputed public value through substantiation of the approach to solving the issue of “unnecessary people” in the 21st century, the proposed modernization mechanism can be considered another unorthodox step in public politics and state building. Due to the used tools and supplementary mechanisms, this modernization mechanism is capable of eliminating or narrowing the gap between the lower level of economic and cultural development and higher forms of political regime, which becomes possible due to valuable properties of DIPs to ensure transparency, democracy and difficulty of administrative abuse by authorities [19].

4. From the practical standpoint, most elements of the proposed modernization mechanism have already been implemented in practice and are being used now in the form of the digital ecosystem of the **Bitbon** System decentralized information platform of Ukrainian origin built from scratch (2016 — now). The original approach to the creation of separate elements (specifically the related system of some tools and supplementary mechanisms) of the modernization mechanism is mentioned in Draft Law No. 4328 “On Tokenized Assets and Crypto-Assets” registered in the Verkhovna Rada of Ukraine on November 5, 2020.

**The prospects for further research** are connected, firstly, to the substantiation of the potential of decentralized information platforms as a new public governance tool to increase the public trust and conscious participation of citizens in public politics and democracy and, secondly, to the development of recommendations regarding the controllability of the public governance system of Ukraine and the overall field of public governance in case of implementation of the modernization mechanism proposed in this paper.

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