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Research Article

Sunshine Network of New Civilized World in Sky-Earth Computing System Engineering - Sky-Earth Computing (III) Beyond Cloud Computing

Zongcheng Li[1]* and Dejia Li[2]

[1]*Research Lab of Transdisciplinary Science, Soochow University, China*

[2]*Institute of Law, Beijing Normal University, China*

***Corresponding Author:** Zongcheng Li, Research Lab of Transdisciplinary Science, Soochow University, China.

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Abstract

The problem of information mechanism is not a pure technical problem, but a comprehensive and complex problem involving society, economy, technology, politics, culture and tradition. Beyond the empirical analysis of new institutionalism, it can be seen that in the old civilized world for thousands of years which has brought ancient agricultural civilization, modern industrial civilization and modern sci-technological civilization, a myriad of things are basically controlled and dominated by the three major powers of the theocracy, tyrancracy (might) and timocracy (gold right). This series of studies proposed to vigorously develop Sky-Earth computing technology and vigorously carry out Sky-Earth computing system engineering. It takes the user as the center, faces the super metaverse ecosphere based on the interconnection of all things, from the key technical system and complex system engineering to really solve a series of serious problems and disadvantages in the individual, group, society and the global scope, to ensure the fair, reasonable and effective allocation of resources in the whole society as far as possible. Therefore, from the dynamic basis, rule composition, institutional framework, information structure, decision-making mechanism and other aspects, this paper determines the synergic-wise organization mode of Internet of everything, and puts forward the dimension of multiple analysis.

Keyword: New Civilization; Super Metaverse Ecosphere; Sky-earth Computing; Citizen Autonomy; Synergetic Organization

Introduction

From a large number of practical observation, literature and context thinking, we can see that the basic forces controlling the history and its track of the old civilized world for thousands of years are theocracy from the blind area of knowledge, tyrancracy (might) from violence and timocracy (gold right) from financial power [1-3]. The total root of all opposition, confrontation and conflict lies in theocracy, tyrancracy and timocracy. The game, control and rule among theocracy, tyrancracy and timocracy. In the whole old civilized world, the monopoly of information is mainly manifested as theocracy monopoly, tyrancracy monopoly and timocracy monopoly. The false, concealed, distorted and distorted information is an inevitable common phenomenon [5-7]. Therefore, it is necessary to build an intelligent-integrated system and carry out data reconstruction system engineering through big data platform [8,9] (HDFS cluster, MapReduce/Tez/Spark), Internet of things [10-12] (sensor, RFID, GPS, infrared sensor) and artificial intelligence technology [13,14] (AlphaZero, GAN, new recursive cortical network, etc.) between the information ecosystem in the field of network digital technology and the realistic ecosystem in various professional application fields, between the computing of the information world and the computing of the real world, so as to establish a computer-like system for big data processing.

Facing the new civilized world, with any higher life as the center, this series defines the ecosphere of a life as an interaction system formed by all the factors that have direct and indirect connections with the life in the complex relationship structure. According to this definition, every advanced life has its own ecosphere [15-19].

The sky-earth computing technology and the sky-earth computing system engineering proposed in this series of research to vigorously develop, take the user as the center, faces the super metaverse ecosphere based on the interconnection of all things, develop the key technology system, carry out the new system engineering, so as to truly solve a series of serious problems and disadvantages in the individual, group, society and the global scope. One of the basic aspects of the sky-earth computing technology development to be launched in this series of studies is to develop and produce the world-wise brain, and each world-wise brain is a sky-earth computing console serving users. This is a control system which serves every user in the whole process and takes the global service dispatcher (GSD) to be developed as the main component. Through this kind of development, a customized global service dispatcher (GSD) can be provided for each user (individual, group, whole). With the global service scheduler as the main component, we can further develop the world-wise brain (WWB) serving every user, and strive to achieve such an ideal scenario: with a sky-earth wisdom brain in hand, everything will be integrated and everyone will be accessible.

In the overall framework designed by this series, we can expect that sky-earth operating system for us to be organizing to develop can ensure the fair, reasonable and effective allocation of resources in the whole society as far as possible, through the sky-earth compiling, configuration measurement, value measurement, supply-demand docking, dynamic analysis, fairness trade-off, summary processing, comprehensive dispatching, coordinated control and other new functional settings. By the new analysis, in the sky-earth computing ecosphere, the synergistic organization structure and the organization mode vector are coupled. The movement of the synergic-org allocation is produced in the whole selection process of the members of a synergistic game organization, which is more flexible than the synergistic-organization model.

In this paper, human-machine (computer, mobile phone, robot) allocation node is given as the basic unit of intelligent integration, and a composite ecological configuration is established to represent the selection distribution of human-machine allocation nodes of various groups (or organizations) of the super metaverse ecosphere in Internet of everything. From the dynamic basis, rule composition, institutional framework, information structure, decision-making mechanism and other aspects, this paper determines the synergic-intelligent organizing mode in Internet of everything, and puts forward multiple analysis dimensions. This paper points out that the instant, real-time and whole process complex organization of the synergic-intelligent allocation system in Internet of everything is often a synergic-intelligent organization with multiple modes coexisting, interacting and exchanging.

Facing the Millennium call of all living beings on the earth, in order to replace theocracy with wisdom, defeat tyrancracy with justice, and control timocracy with creativity, we must vigorously implement the technology development, engineering development and commercial development of intelligent integrated network and its sky-earth computing, in order to create scientific-technological civilization, ecological civilization and wisdom civilization.

In order to vigorously implement the technological development, engineering development and commercial development of intelligent integrated network and its global computing, accelerate the development of emerging strategic-leading industrial cluster, and widely carry out value-chain system engineering and related comprehensive services worldwide, we take a series of major technological inventions as the core and a series of new science-technology systems as the basis. We sincerely invite the advanced information technology enterprises, investment companies, universities and scientific research institutions in the world, to jointly establish the strategic alliance enterprise of sky-earth computing system engineering, and to strengthen and enlarge as soon as possible and share the cooperation results.

Technical basis of civilization-rebuilt system

In fact, any life, no matter individual or group, no matter natural life or social life, no matter simple low-level life or complex high-level life, has its own ecosphere [15-19]. With any life (no matter individual, group or whole) as the center, all the elements directly and indirectly related to the life form an ecosphere according to a certain structure, which can be called the ecosphere.

As an advanced social-intelligent life, any individual, any organization and any society have their own complex ecosphere. For any advanced social-intelligent life, the complex ecosphere includes natural factors and social factors, or material factors, information factors, spiritual factors, or physical factors, physiologic factors and psychological factors.

The history, reality and future of mankind have put forward important and far-reaching topics to us, namely, surpassing the

conflicts of interests caused by sovereign countries, surpassing the differentiation of interests caused by capitals, surpassing the dislocation of interests caused by powers, centering on the various intelligent lifes at all levels, facing the complex ecosphere of the various intelligent lifes at all levels, and centering on the supply-demand docking relationship of the various intelligent lifes at all levels, so that the advanced intelligent-integrated engine and its fair-unified measurement technology platform are established to build a computing of super metaverses beyond cloud computing, and carry out the sky-earth computing system engineering. Between the digital information world and the complex real world, the advanced wise integration can be realized from the foundation, dynamic, resource elements, configuration system, ecological platform, network system and other levels.

The technology, system and engineering of sky-earth computing, which need to be fully developed, are with the various users at all levels as the center, oriented to all kinds of ecospheres at all levels, and to all kinds of ecospheres in Internet of everything, and then to dynamic interconnected ecospheres. For the non-migrating user who is static relative to the spatiotemporal point, the ecosphere in Internet of everything is a non-migrating ecosphere in Internet of everything. For the full-migrating user who is dynamic relative to the spatiotemporal point, the ecosphere in Internet of everything is the super metaverse ecosphere in the whole process of great migration.

The original idea of the development of sky-earth computing technology originated from the 610 patent applications submitted by Professor Li Zongcheng (retired recently) of Suzhou University to the State Patent Office of the People's Republic of China from early November 2011 to may 2012. These 610 technological inventions together form a network technology support system of value chain systems engineering, involving the projects such as the development of new technology cluster, related development of new industrial cluster and joint development of commercial, and then involving the projects of emerging strategic-leading industrial cluster that the researchers of this series first put forward in the world.

If we say that cloud computing is a new business operation mode, then the sky-earth computing that needs to be fully developed is a new integrated technology mode, super metaverse system engineering mode and intelligent business mode. The differences between sky-earth computing and cloud computing are shown in table 1.

Cloud computing	Sky-earth computing
property: new business op mode	property: new tech mode, engr mode, business mode
tech: no major tech brkth and innov	tech: new theory and tech sys (a series of tech invents)
center: computing center of IT company	center: user becomes a computing center various S-D computing centers at all levels are integrated
basis: original computing basis	basis: sys software, engr and org in sky-earth comp
core:	core: value measurement system
key:	key: compilation engine
service: compt serv, storage serv, info serv	service: S-D compt serv is intelligent-integrated serv. except compt, stor, info serv, there are also plann serv, analy serv, design serv, org serv, op serv, coord serv, manag serv, control serv, trading serv, integrated services
advantage: impr compt effic, impr stor effic improve information processing	advantage: impr comput effic, impr stor effic improve information processing In addition, there are the following advantages impr the efficiency of plann and analysis impr design effic, impr organizational effic impr operation effic, impr coordination effic impr management effic, impr control effic impr transaction effic and serv effic.
benefit: lower compt costs, lower stor costs reduce information cost	benefit: lower compt costs, lower stor costs reduce information cost benefit: lower compt costs, lower stor costs reduce information cost in addition, there are the following benefits reduce the cost of planning and analysis reduce design cost, reduce organization cost reduce the operation cost and coordination cost reduce the cost of management and control reduce transaction cost and service cost.

Table 1: Comparison between sky-earth computing and cloud computing.

Unlike cloud computing, which lacks major technological breakthroughs and innovations, sky-earth computing to be fully developed, has a brand-new theoretical and technological conception system (a series of technological inventions) at the beginning.

Unlike cloud computing, which centers on the computing of IT companies, the sky-earth computing to be fully developed, takes every user (individual user, group user, whole user) as the sky-earth computing center, and all kinds of sky-earth computing centers at all levels are integrated.

Unlike cloud computing, which is based on technology, software, system, platform and network (Internet, communication network, radio-television network) in the original information field, the sky-earth computing to be fully developed is based on the comprehensive integrated technology, software, system, platform, network, network architecture, link layer, network layer, transmission layer and application layer to be developed.

Unlike cloud computing, which lacks core technology, the core technology system of sky-earth computing to be fully developed, is based on the unified-norm measurement, supply-demand docking intelligent engine and global service dispatcher for the resource allocation across borders, domains and levels.

In the view of the author of this series, the sky-earth computing (technology, system and engineering) to be fully developed is an important technical service system of Civilization Rebuilding System Engineering (CRSE), and the sky-earth computing (technology, system and engineering) itself has a new technical foundation, as shown in figure 1.

The modeling technology system of the sky-earth interconnected ecosystem to be fully developed should at least include:

- Dynamic behavior of the system in the modeling of the sky-earth earth interconnected ecosystem
- Distributed and networked control of the earth sky-earth ecosystem
- Graphical modeling of control part of CPS (Petri net, UML, SysML, etc.)
- Sequential modeling, including finite state machine
- System decomposition and synchronization technology of the sky-earth interconnected ecosystem
- Modeling technology for the control part of the sky-earth interconnected ecosystem
- Modeling technology of the physical part (SEE-phy1) of the sky-earth interconnected ecosystem
- Modeling technology of the physiological part (SEE-phy2) of the sky-earth interconnected ecosystem
- Modeling technology of the psychological part (SEE-psy) of the sky-earth interconnected ecosystem
- Modeling technology of the event-logical part (SEE-e) of the sky-earth interconnected ecosystem

The analysis and verification method system of the super metaverse ecosphere to be fully developed should at least include:

- Analysis and control technique for the physical part (SME-phy1) of super metaverse ecosphere
- Analysis and control technique for the physiological part (SME-phy2) of super metaverse ecosphere
- Analysis and control technique for the psychological part (SME-psy) of super metaverse ecosphere
- Analysis and control technique for the management part (SME-event) of super metaverse ecosphere
- Analyze the certainty of the analysis and control technique for the super metaverse ecosphere.

Figure 1: Sky-Earth Computing tech and world-wise brain and value chain system engineering platform.

Verification and validation techniques, including formal verification methods.

The simulation technology of the Sky-Earth internet ecosphere to be fully developed should at least include:

- Performance evaluation
- Analyze the relationship between concurrency and order in the Sky-Earth internet ecosphere
- Optimization technique
- The security aspects of the Sky-Earth internet ecosphere, including cryptographic algorithms.

The application system of the Sky-Earth internet ecosphere to be fully developed should at least include:

- Smart power grid, power system, smart city, transportation, home area network, daily life integrated intelligent service system
- Mobile, wearable and implantable network physical systems and office intelligent integrated services
- Manufacturing, flexible manufacturing system, intelligent factory, industry 5.0, integrated service system of production, supply and marketing
- Large-scale advanced integrated intelligent service system for cites, regions, countries, global
- Reconfigurable control system (including distributed and integrated systems)
- Application of reconfigurable devices in CPS (FPGA, CPLD)
- Microprocessors in the Sky-Earth internet ecosphere (DSP, microcontroller).

At present, between digital computing and actual computing, HDFS architecture should be the main technology foundation of intelligent integration [20]. Hadoop is an platform of open source distributed computing with HDFS, Hadoop distributed file system and MapReduce (open source implementation) as its core. Spark supports scala, java, pathon and R language programming. Simple API design helps users to easily build parallel programs [20]. The whole architecture of Hadoop mainly implements the underlying support for distributed storage through HDFS, and carries out the program support for distributed parallel task processing through MR.

The master-slave (Master/Slave) structure model is used in HDFS. A HDFS cluster is composed of a NameNode and several DataNodes (multiple NameNodes have been configured in Hadoop 2.2 version, which is also a function implemented by some large companies by modifying Hadoop source code, and has been implemented in the latest version). NameNode serves as the primary server to manage the namespaces of file system and client access to files. DataNode manages stored data, and HDFS supports data in file form.

Internally, the file is divided into several data blocks, which are stored on a set of DataNode [20-22]. NameNode executes namespaces of file systems, such as opening, closing, renaming files or directories, and is also responsible for mapping data blocks to specific DataNodes. DataNode is responsible for the file system client reading and writing, and under the unified scheduling of NameNode to create, delete and copy the database. NameNode is the administrator of all HDFS metadata, and user data will never pass through NameNode.

Three roles are involved in figure 2: NameNode, DataNode, and Client. NameNode is the manager, DataNode is the file saver, and Client is the application that needs to acquire the distributed file system.

There are more and more big data frameworks of open source. First, list some commons [20,23]:

- File store: Hadoop HDFS, Tachyon, KFS
- Offline calculation: Hadoop MapReduce, Spark
- Stream and actual-time Computing: Storm, Spark Streaming, S4, Heron
- K-V, NOSQL database: HBase, Redis, MongoDB
- Resource management: YARN, Mesos
- Log collection: Flume, Scribe, Logstash, Kibana
- Message System: Kafka, StormMQ, ZeroMQ, RabbitMQ
- Query analysis: Hive, Impala, Pig, Presto, Phoenix, SparkSQL, Drill, Flink, Kylin, Druid
- Distributed coordination services: Zookeeper
- Cluster management and monitoring: Ambari, Ganglia, Nagios, Cloudera Manager
- Data mining and machine learning: Mahout, Spark MLLib

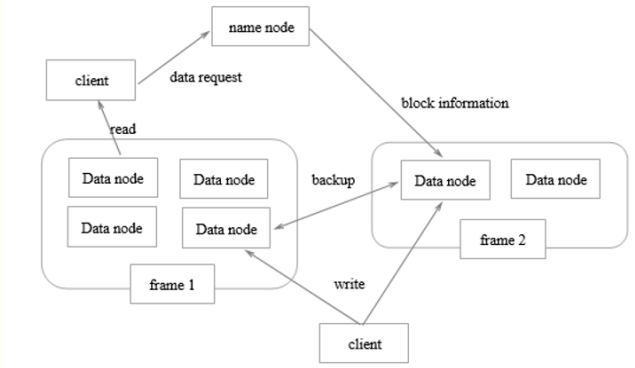

Figure 2: HDFS Architecture Diagram as the Foundation of Intelligent Integration Technology between Digital Computing and actual Computing.

Data synchronization: Sqoop.

Task Scheduling: Oozie.

There are more and more frameworks for SQL On Hadoop. According to popularity, the most commonly used frameworks are SparkSQL, Impala and Resto in turn. These frameworks are based on half or full memory and provide SQL interfaces to quickly query and analyze data on Hadoop. While impala has the same performance as presto, SparkSql is much worse.

Data acquisition and data exchange are also tasks. Some of these tasks are triggered on a regular basis, and some rely on other tasks to trigger. When hundreds of thousands of tasks need to be maintained and run on the platform, alone crontab is not enough, so a dispatching and monitoring system is needed to accomplish this task. Dispatching and monitoring system is the central system of the whole data platform, similar to AppMaster, which is responsible for assigning and monitoring tasks.

Between digital computing and actual computing, intelligent integration is inseparable from the task scheduling system Apache Oozie of open source. The other task scheduling systems ofopen sourc include Azkaban, light-task-scheduler, Zeus, etc.

Conversion from old civilized world to new civilized world

Now, let's return to some of the important issues and drawbacks raised in the first article of this series.

From the perspective of information, there have been a series of serious problems and disadvantages for thousands of years from communities, streets, villages and towns to enterprises, institutions and organizations, from cities, regions, regions to countries, transnational organizations and the whole world. These problems and disadvantages include: the falsity, one-sidedness, unreliability, insecurity and ineffectiveness of information; the closeness, irrationality, unreliability, insecurity and discontinuity of the system (resource allocation and its platform and network); the non autonomy, inequality, irrationality, insecurity and non mobility of subjects (individuals, group organizations, social organizations and global organizations) are analyzed; the unfairness, unfairness, irrationality, insecurity and ineffectiveness of society (organization); the dislocation, non interaction, separation, insecurity and deduction of the world (sky and earth); and so on.

In our internal and external world, the allocation of all resources is inseparable from the allocation of information resources. The rationalization of resource allocation, first of all, is the rationalization of information mechanism. If the information mechanism has defects, faults and obstacles, it will seriously affect the rational allocation of all resources. In the era of Internet of things, big data, cloud computing, artificial intelligence and other technologies emerging, information internet and Internet of everything are more and more closely intertwined. In this case, the rationalization of information mechanism is mainly reflected in the rationalization of information internet.

Beyond the empirical analysis of new institutionalism, we can see that [24-27]: the basic forces in the past thousands of years behind states and markets to control the history and its track of the old civilization world are the theocracy (divine rights) derived from the blind area of knowledge, the tyrancracy (mights) derived from violence and the timocracy (gold powers) derived from financial resources, so that the total scourge of all opposites, confrontations and conflicts lies in theocracies, tyrancracies and timocracies, and then in the game, manipulation and domination between theocracies, tyrancracies and timocracies.

By the expansion of faith, theocracy concentrates on the alienation of sovereignty. If you focus your life on other people's cognitive structure, you will fall into the trap of worshiping false

gods. No matter how good the idea is, this behavior still makes you deeply trapped in the framework of others' prejudices, because it respects others' past knowledge and ignores their immediate feelings. This is a doubt about yourself and the creator who can awaken you. Those who can not see God can only see idols. They see only the beauty of idols carved on stones and copper coins, but they do not see the beauty of life around them.

By the extension of organizing, the tyrancracy embodies the alienation of sovereignty. Just as the continuous progress of the past two thousand years has made the aristocracy——the rich and powerful rulers to bully the people into more and more sleepy situation, the evolution of this consciousness today, is also working exquisitely, so that the government's governance can not be too disjointed with the real needs of its people. The only source of the authority of the government and its rights is the will and spirit of the people. When a government loses contact with the people's mental pulsation, it must adjust its footsteps, otherwise it will be eliminated and renewed.

By the inflation of capital, timocracy embodies the alienation of sovereignty. The monetary system from money, due to the sustainability and maximization of profits, has led to the demand for short production of commodities so that periodic consumption can ensure the sustainability of profits, but this means that the durable and long life goods are the least profitable goods, as the enemy of the profits. Therefore, unless in particular, the enterprise will never produce a perfect product, and thus the world's garbage is growing, which leads to the concealment and non pervasive nature of the high-end technology.

Figure 3 shows that in modern and the present age, by representative democracy, partisan politics and capital games, the hierarch's sovereignty deducted into the deify-overlord's sovereignty (the adoration of the political strong man), the sovereignty of monarchies became the sovereignty of party-tyrants, and the sovereignty of gold lords deducted into the sovereignty of plutocrats (such as the financial magnate; plutocrat; tycoon) [1-5]. Finally, deify-overlord's sovereignty replaced people's sovereignty, and party-tyrant's sovereignty replaced state sovereignty and plutocrat's sovereignty replaced social sovereignty. In other words, the alienation of people's sovereignty is deify-overlord's sovereignty, the alienation of state sovereignty is part-tyrant's sovereignty, and the alienation of social sovereignty is plutocrat's sovereignty. In the old civilized world, the concept and problems of state sovereignty are not only in practice and in law always separated from the concepts and problems of human rights each other, in mutual conflicting and conflicting, but they are always in practice and in law incorporated into the each control range of the heirarch, monarchy and gold lord by theocracy, tyrancracy and timocracy, and then into the each control range of the deify-overlord, party-tyrant and the plutocrat, so as to make the state sovereignty into a tool for the domination of theocracy, tyrancracy and timocracy, and into the supreme political power to override all factors of freedom, autonomy and self-government.

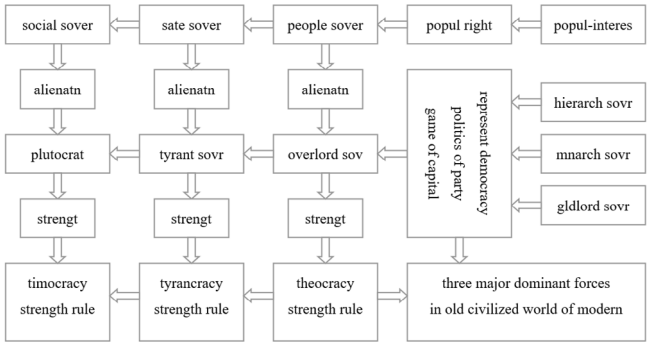

Figure 3: Three dominant Forces in Modern Civilization and Alienation of Sovereignty.

In hundreds of years, society, production, energy, war, and classes served money or capital [27-29]. It is not an exaggeration to say that money is the core structure of modern and present civilized society [1,27]. On the one hand, it promotes the development of civilization, on the one hand, also contributes to the retrogression of moral and spiritual civilization, and the retrogression of moral and spiritual civilization is aggravating various social problems. In the inflation of capital, timocracy embodies the alienation of sovereignty. In the contemporary world economy dominated by money and capital, under the theory, technology and empirical analysis of economics has gained great development, the problem of the measurement and analysis on utility, value and price is still not really solved, in the social economy there still exist at least five major abnormal phenomena which people have generally seen, i.e. : the distortion of price and distortion of value; the fictitious capital and excessive bubbles; the over issuance of currency and impracticable entity; the imbalance of measurement and unfair of disposition; the widespread loopholes and generalized monopoly.

All kinds of capitalism pursuing the law of jungle and all kinds of fake and shoddy socialism "selling dog-meat under the label of a sheep's head" are playing the roles of real villain and hypocrite respectively on the great stage of human history. Capitalism has gone through the stages of free competition, monopoly competition and globalization. However, socialism has never really been realized, but there have been all kinds of fake and shoddy socialism.

In China, through the Confucian culture, theocracy and tyrancracy are closely integrated. The original existence of Confucius and his Confucianism is fundamentally different from that of royal exalted Confucius and his Confucianism. The latter is the transformation and mutation of the former, and has long been a political tool for maintaining totalitarian rule.

The identity of the civilian population has undergone a long and slow transformation in the old civilized world: from the multitude of theocracy, the multitude of tyrancracy, the multitude of timocracy, to the people (dumb millions) manipulated by the deify-overlord, the people (dumb millions) manipulated by the party-tyrant and the people (dumb millions) manipulated by the plutocrat, and then to the national (countrymen) manipulated by the state sovereignty [24-29].

For the new civilized world to be created, we should establish and safeguard civil sovereignty through the revolution of civil autonomy. In the perspective of new civilization, citizens should be self-conscious, self-supporting, independent citizens under the contract of autonomous alliance.

The core strength of the new civilization should be the wisdom of scientific discovery, the wisdom of technological inventions, and the wisdom of knowledge innovation. The citizens of the new civilized world should be the great citizens with the wisdom of scientific discovery, the wisdom of technological inventions and the wisdom of knowledge innovation.

Sky-earth computing proposed in this series of research to develop and build is essentially a super metaverse system engineering for various users at all levels. A very important purpose of implementing the sky-earth computing system engineering is to try to solve a series of serious problems and disadvantages in individuals, groups, society and the whole world by the key technical system and complex system engineering. In the overall framework proposed in this series, through the new functional settings such as sky-earth regulation, configuration measurement, value measurement, supply-demand docking, dynamic analysis, fair trade-off, summary processing, comprehensive dispatching, coordination and control, the sky-earth operating system that we are organizing and developing can ensure the fair, reasonable and effective allocation of resources in the whole society as far as possible.

Through the development of sky-earth computing system engineering technology, let's break through the monopoly of theocracy system for information mechanism, the monopoly of tyrancracy system for information mechanism, and the monopoly of timocracy system for information mechanism. On this basis, through the development of sky-earth computing system engineering technology, let every user become the master of his life, let every user become the subject of his work, let every user become the leader of his entertainment, let every user become the protagonist of his social life.

To sum up, through the development of sky-earth computing system engineering technology, let every user become the center of their own all-interconnected ecosphere!

Sunshine-web system engineering with new computing

According to a large number of studies on social history and global history made by some scholars in the world, we can see that in the history of thousands of years, no matter in the social system within the sovereign entity or in the world system between the sovereign entities, there are hegemonic hierarchy structures [27-29], namely:

Center (dominant position) -- periphery (dependent position) -- edge (detached state).

As for the origin of value, neoclassical and modern economics have long been far away from classical economics, the essence of economy and the origin of economy. In a deformed world dominated by money, distorted price, fictitious economy, unbalanced measurement and full of loopholes, the law of value or axiom, as the basic fact repeatedly confirmed by thousands of years of human experience, has been constantly trampled and tampered with by theocracy, tyrancracy and timocracy.

In this series of papers, we propose and discuss the implementation of sky-earth computing system engineering. One of the most important purposes of this approach is to use the key

technology system and complex system engineering to truly solve a series of serious problems and drawbacks in the individual, group, society and global scope.

Now, in order to break the monopoly of theocracy system, tyrancracy system and timocracy system on information mechanism, and to make every user become the center of their own ecosphere in Internet of everything, we should and must transcend modern information technology, Internet of things, big data, cloud computing, AI and other technology systems, and face every individual, every family, every enterprise, every team, every enterprise, faces every community, every organization, every institution, every township, and then faces every city, every region, every country, every transnational organization, even the whole world. Around the personal ecosphere, family ecosphere, enterprise ecosphere, around the community ecosphere, organization ecosphere, around the urban ecosphere, regional ecosphere, national ecosphere, transnational organization ecosphere, and even around the whole global ecosphere, we use the technology, software, system, platform and Internet in the modern information field, to develop and establish the global service dispatcher, which integrates the technology, software, system, platform and Internet in various professional application fields, so as to fully mobilize, configure and utilize global resources to serve every user.

As the overall reformation, expansion and promotion of cloud computing, the sky-earth computing or composite-world computing proposed in this series is the computing science, technology and engineering for super metaverses with various users at all levels as the center, between the real physical world (and the entity world of materialization) and the derivative mental world (and the virtual world of electronics), or between the natural intelligent world (the world created by human brain, language, sense organs, light waves, gestures, etc.) and the artificial intelligent world (the world created by computers, notebooks, mobile phones, sensor, etc.), and then among the energy networks, material networks (Internet of things, sensor networks), informational Internet (computer Internet, telecommunications network, radio and television network), knowledge network and the mental network. It is in the use of various computing tools, modules, devices, platforms, networks and facilities, etc. to implement the unified scheduling (currently assisted by Oozie, Azkaban, light-task-scheduler, Zeus, etc.) [8-10], unified processing (currently assisted by SQL), unified computing (currently assisted by HDFS cluster and Spark, Storm, Heron, etc.) [11-14] and unified analysis of various data.

Different from traditional computing and modern computing, the sky-earth computing system engineering is to take each person, every organization and every society as the center, combine the natural intelligent computation based on manual computation with the artificial intelligence computation based on computer, and create the sky and earth of each person, organization and society through the expanding and reproducing Internet of everything, and the various sky-earth at all levels are the various world ecospheres at all levels.

The sky-earth computing is not only the sky-earth computing of everyone, but also the sky-earth computing of every organization, and even the sky-earth computing of the whole society. Taking users (individuals, organizations, and society) as the computing center, it faces the various application scenarios of users (the scenario is a system composed of objects, tools, facilities, platforms and resources, including actual scenes and informational scenes; or, physical scenes, informational scenes and psychological scenes; or, natural scenes and social scenes), and then faces the various environments of users (realistic existing environment and digital informational environment; or physical environment, informational environment, psychological environment; or natural environment and social environment).

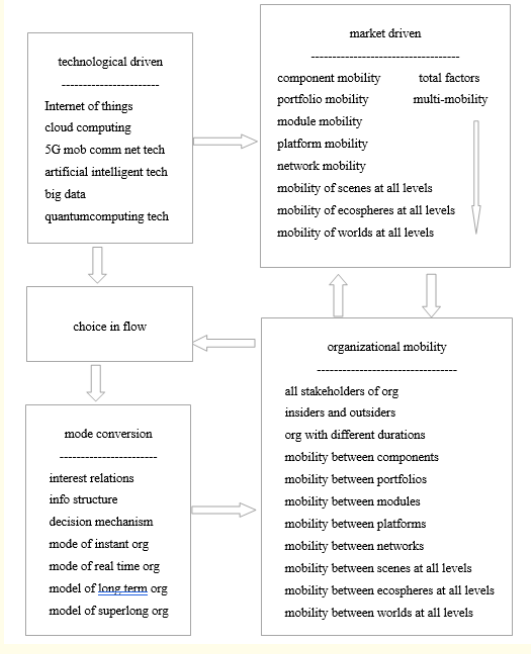

Figure 4: Analytic Framework of Basic Influencing Factors of Intelligent Integrated Organization of the Ecosphere with Internet of Things.

We consider linking technology driven with market driven, organizational flow with mode transformation in the ecosphere of various intelligent integration at all levels with the Internet of things, so as to form a basic cross-border and cross-level interaction system of all factors, whose conceptual framework system is shown in figure 4. The sky-earth channel interface system enables users (individuals, organizations, and society) to work with multi-channel programs in the physical world, the information world and the psychological world in their own world (sky-earth). The operation program of each channel runs in the user's own sky-earth channel, that is, in the graphics on the display screen. Most of the sky-earth channel systems allow channels to overlap, and provide users with standard operations to run, such as moving and changing the size of the visual gate, sending the visual gate to the foreground and background, or expanding or narrowing a sky-earth channel. The sky-earth channel interface system should have the network permeability ability of the interconnection of all things, and allow users to run the channel graphics application program on the remote machine.

As shown in figure 5: the sky-earth computing is not only the sky-earth computing of everyone, but also the sky-earth computing of every organization, and even the sky-earth computing of the whole society. Taking users (individuals, organizations, and society) as the computing center, it faces the various application scenarios of users (the scenario is a system composed of objects, tools, facilities, platforms and resources, including actual scenes and informational scenes; or, physical scenes, informational scenes and psychological scenes; or, natural scenes and social scenes), and then faces the various environments of users (realistic existing environment and digital informational environment; or physical environment, informational environment, psychological environment; or natural environment and social environment).

Based on the emerging Internet of everything (the great unified Internet that integrates energy network, material network, information network, knowledge network and mental network into one), the sky-earth computing (composite world computing) makes full use of the fifth generation of mobile Internet, big data, artificial intelligence, IOT, sensors and cloud computing, quantum computer and other technologies, tools and modes, incorporates the world's five major resources (energy resources, material resources, information resources, knowledge resources and spiritual resources) into a new unified measurement system of super metaverses, and then combines various natural intelligence tools (human brain, language, sense organs, light waves, gestures, etc.) with various artificial intelligent tools (computers, notebooks, mobile phones, sensors, etc.) to form an intelligent integrated technology (system), so as to implement the unified computing, unified analysis and unified processing of the various resources (including various networks, equipment, storage, technology, application tools, services, etc.) of energy network, physical network, information network, knowledge network and spiritual network in the ecosphere.

Here, organizational mobility is carried out in the cross-border and cross-level flow of all stakeholders of the organization, including "insiders" and "outsiders" in the traditional sense. The mobility of organization is the that of real-time, real-time, long-term and super long-term organization. It involves the mobility of the whole staff among components, combinations, modules, platforms, networks, various scenes at all levels, and various ecospheres at all levels, and various worlds at all levels.

In the overall framework designed by this series of research, we can expect that sky-earth computing operating system plays a particularly important role in the engineering technology system of sky-earth computing, that is, through the sky-earth compiling, configuration measurement, value measurement, supply-demand docking, dynamic analysis, fairness trade-off, summary processing, comprehensive scheduling, coordinated control and other new functional settings, sky-earth operating system can ensure the fair, reasonable and effective allocation of resources in the whole society as far as possible.

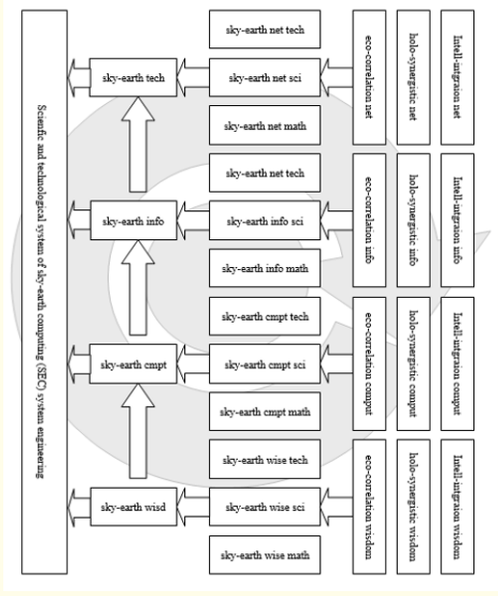

Figure 5: Scientific and Technological System of Sky-Earth Computing (SEC) System Engineering.

As shown in figure 6, the architecture of super metaverse ecosphere (hyper-cyber world system) can be analyzed and designed as follows: First, the center of the super metaverse ecosphere system needs to be determined. With the support of IT, modern network technology and the sky-earth computing technology advocated by this series of research, every cybertech user (individual cybertech user, group cybertech user and whole cybertech users) becomes the center of its own ecosphere in Internet of everything. This center should and must be the sky-earth ecologic center, integrated dispatching center, supply-demand docking center, service detection center, service control center and service evaluation center.

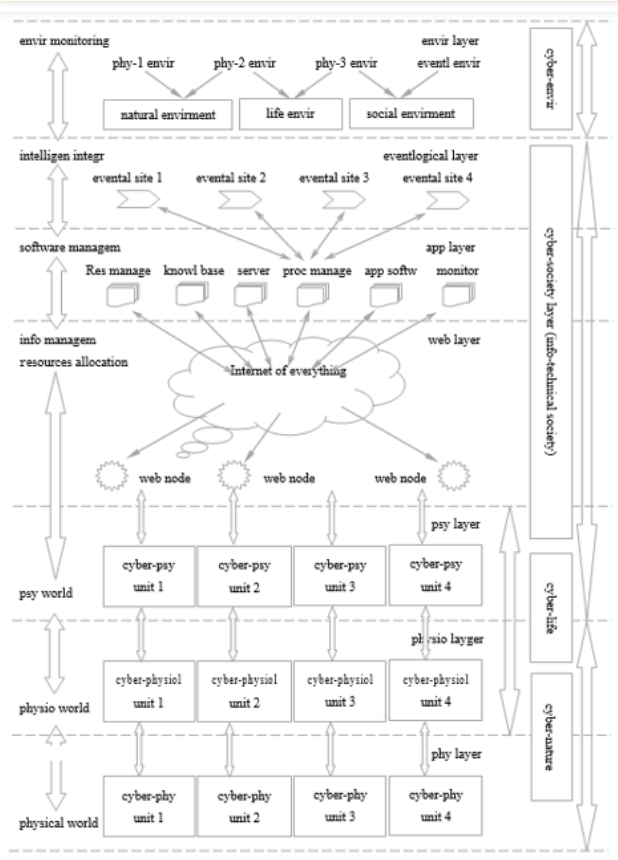

Figure 6: Super Metaverse Ecosphere Systems (SME) based on Sky-Earth Computing Technology.

Taking cybertech users as the center, we set up multi-sensor network, service execution network, user's multi end and interactive real-time network.

In general, the super metaverse ecosphere system can be regarded as a system with three-layer structure, including multi-perception layer, fusion network layer and synergic control layer. Furthermore, the super metaverse ecosphere (hyper-cyber world) can be regarded as a system with four layers: world environment layer, integrated dispatchng layer, service regulation layer and service execution layer.

For the super metaverse ecosphere system supported by IT, network technology and sky-earth computing system engineering, this series of research proposes to develop, design and build an architecture of six layer. As shown in figure 6, the system includes: life layer (psychological layer and physiological layer), physical layer, social layer (eventlogic layer), network layer, application layer and environment layer.

The multi-sensing layer consists of multi-sensors, multi-controllers and multi-collectors. Multi-sensors include physic sensor, physiologic sensor, psychologic sensor, eventlogic sensor; multi-controllers include physic controller, physiologic controller, psychologic controller, evebtlogic controller; multi-collectors include physical collector, physiological collector, psychological collector and eventlogical collector.

In the complex multi-environment, especially in the multi-environment with IT and modern network technology, there are complex multi-sensors, multi-information data and multi-servers, which need a lot of multi-processing and multi-terminal equipment.

For multi-sensing layer, the fusion of multi-sensors, the fusion of multi-controllers and the fusion of multi-collectors is very important. This kind of integration should and must be centered around the cybertech users' ecosphere in Internet of everything, with cyberspace users as the center.

In such a complex multi-environment, the perception of cybertech users is often a multi-perception system including physical perception, psychological perception, physiological perception and eventlogical perception.

For the converged network layer, the data transmission layer is a multiple data transmission system that not only faces the physical world connected with the info-world, but also the physical world, psychological world and eventlogical world connected

with info-world. Here, information is multiple information with physical info, physiologic info, psychological info and eventlogic information. Therefore, network service should and must be a high-level intelligent integrated service with the cybertech users as its center, and around the ecosphere of cybertech users in Internet of everything.

For the application control layer, the cognitive layer is a very complex multi-cognitive system. Data analysis is a complex big data analysis for multi-processes including physical process, physiologic process, psychological process and eventlogical process. Feedback is the complex feedback process for multi- processes including physical process, physiologic process, psychological process and eventlogical process through multi-terminal devices, multi-perception system and multi-transmission system. The process of feedback must involve the integration of physical client, physiologic client, psychological client and eventlogical client. The complex multi-information is fed back to the client through the visual interface.

Furthermore, we can expect that through the vigorous implementation of the sky-earth computing system engineering, intelligent integrated system engineering and earth-civilized system engineering proposed and discussed in this series of research, we can achieve the following goals and requirements in the individual, group, social and global scale :

- The authenticity, integrity, reliability, security and timeliness of information;
- The openness, complexity, reliability, security and dynamics of the system (resource allocation and its platform and network);
- The autonomy, self-governing, equality, rationality, security and mobility of subjects (individual, group organization, social organization, global organization);
- The justice, democracy, rationality, security and effectiveness of a society (organization);
- The hierarchy, interactivity, unity, security and deduction of the world (sky-earth); and so on.

Both traditional computing (mode) and modern computing (mode) are just activities and systems. As modern computing, grid computing, cloud computing, fog computing and edge computing are all just the network system of information technology, while the sky-earth computing advocated in this series of articles is the complex resources-allocating system of super metaverses for the Internet system of everything, and then become a complex social network system, and finally become a social intelligent- integrating system engineering. Sky-earth computing is not only a new technical system, but also a new industrial system. More importantly, it is a synergy-disposing mode of the new civilization world, involving the technical support system, intelligent integration system, social organization system and ecological synergistic system of the new civilization world. The sky-earth computing system engineering will not only bring new technological revolution, new engineering revolution and new industrial revolution, but also new scientific revolution, new social revolution and new cultural revolution.

Design basis of web organization in new civilized world

In the framework of ontological dynamics (ODF/WES) established in this series of papers for the grand unified study of inter- discipline on the world ecosphere and its economic ecosphere, based on the axiom system of the dynamic system of world ecospheres set in this series, we can take all kinds of citizen's autonomy alliance (commonwealth) at all levels as the complex autonomous system of self-adaptive, self-learning, self-organizing governance, and as a complex system of generalized life and its organization. So that the analytical base of the dynamic system of citizen- autonomous ecospheres is put forward as follows can be established:

As an autonomous system of complexity with self-adaptive, self-learning and self-organizing governance, the citizen-autonomous commonwealth should be designed and constructed as a disposal subject of high-level intelligent with complex target systems, and has a complex dynamic basis (in addition to biological energy composition, it also involves property rights, benefits distribution structures, etc.), advanced intelligent organization (and socialized complex forms of organization) and complex decision-making structures; the intellectual disposal way of the citizen- autonomous commonwealth involves the approaches, tools, means, equipment, technical systems, methods, procedures, as well as tactics and strategies of disposals, etc., and the resources-disposing load of the citizen-autonomous commonwealth, includes the disposal loads of natural resources, social resources and life resources, or includes the disposal loads of material resources, information resources, value resources, human resources, and so on. The citizen-

autonomous commonwealth (alliance) is an intelligent disposal subject capable of engaging in the practical activities and cognitive activities in a large range of autonomy and integrating these two activities. The advanced intelligent life information has more abundant content than the general life information, and has a more advanced form. In a variety of complex environments, the citizen-autonomous commonwealth is not only strong in adaptability, but also strong in development and surpassing.

No matter for the citizen-autonomous alliance of micro-organization, or for the citizen- autonomous alliance of macro-organization, or for the citizen-autonomous alliance of global organization, there are the proportion, constitution, structure and combination of citizens' rights and interests.

Under the condition of the disposition of citizen autonomy, let z_i be the amount of resources representing the i-th kind of citizens' interest, and c_i be the weighted disposal strength of the i-th kind of resource, then the proportion $c_i z_i / c_j z_j$ should be the proportion of citizens' interests;

- The constitution $w_i = \frac{c_i z_i}{\sum_{j=1}^{N} c_j z_j}$ should be the constitution of citizens' interests
- The structure (w_1, w_2, ⋯, w_n) should be the structure of citizens' interests;
- The combination $x = (x_1, x_2, \cdots, x_N) = (c_1 z_1, c_2 z_2, \cdots, c_N z_N)$ should be the combination of citizens' interests.

The proportion, constitution, structure and combination of citizens' interests determine the proportion, constitution, structure and combination of citizens' human rights, and then determine the proportion, constitution, structure and combination of citizens' sovereignty.

Further, the dynamic system of citizen-autonomous disposal and the structure (and its modes) of citizens' right-interest are interrelated, interacting and mutually determined. Therefore, according to the equilibrium, quasi equilibrium, non equilibrium, and away-equilibrium of the citizen- autonomous dynamic system and the equilibrium, quasi equilibrium, non equilibrium and away-equilibrium of the citizen-autonomous system effect, we can judge the rationality (feasibility and effectiveness) of the structure of citizens' rights and interests, as shown in figure 7.

According to the equilibrium relationship in the dynamic effect of citizens' rights and interests, the combination and structure of citizens' rights and interests:

- Feasible and effective; feasible but ineffective;
- Infeasible but effective; infeasible and ineffective.

F1) The dynamic basis for judging the rationality of the citizens' right-interest structures.

Between the function $F_{sd}(t)$ and load $C_{sd}(t)$ of citizens' disposal, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive force can be determined:

$$|F_{sd}(X,t \mid x_1, x_2, \cdots, x_N) - C_{sd}(X,t \mid x_1, x_2, \cdots, x_N)| = 0$$

This shows that the function $F_{sd}(t)$ and load $C_{sd}(t)$ of citizens' disposal achieve equilibrium.

Based on this criterion, we can judge that the structure $x = (x_1, x_2, \cdots, x_N)$ of citizens' rights and interests is feasible;

$$|F_{sd}(X,t \mid x_1, x_2, \cdots, x_N) - C_{sd}(X,t \mid x_1, x_2, \cdots, x_N)| < \xi_{FC}$$ (ξ_{FC} is any small amount)

This shows that the function $F_{sd}(t)$ and load $C_{sd}(t)$ of citizens' disposal achieve qusi-equilibrium.

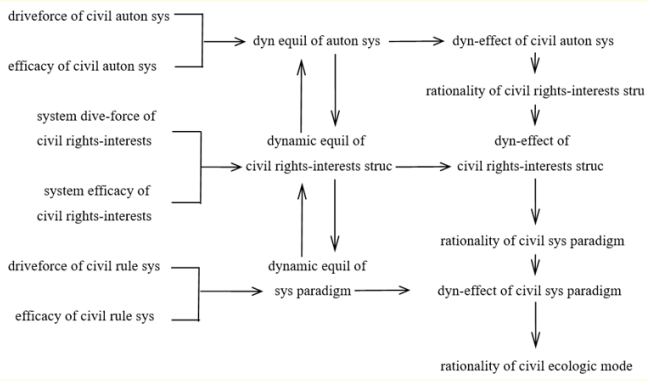

Figure 7: Basic relationship framework of civil autonomy system dynamics.

Based on this criterion, we can judge that the structure $x = (x_1, x_2, \cdots, x_N)$ of citizens' rights and interests is nearly feasible;

$$|F_{sd}(X,t \mid x_1, x_2, \cdots, x_N) - C_{sd}(X,t \mid x_1, x_2, \cdots, x_N)| >$$ (ζ_{FC} isn't a small amount)

This shows that the function $F_{sd}(t)$ and load $C_{sd}(t)$ of citizens' disposal achieve non-equilibrium.

Based on this criterion, we can judge that the structure $x=(x_1,x_2,\cdots,x_N)$ of citizens' rights and interests is infeasible;

$|F_{sd}(X,t|x_1,x_2,\cdots,x_N)-C_{sd}(X,t|x_1,x_2,\cdots,x_N)|>>(\zeta_{FC}$ isn't a small amount)

This shows that the function $F_{sd}(t)$ and load $C_{sd}(t)$ of citizens' disposal achieve away-equilibrium.

Based on this criterion, we can judge that the structure $x=(x_1,x_2,\cdots,x_N)$ of citizens' rights and interests is completely infeasible.

Between the disposal efficiency $E_{sd}(t)$ and disposal consumption $H_{sd}(t)$ of a citizens' autonomous system, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive effect can be determined:

$$|E_{sd}(X,t|x_1,x_2,\cdots,x_N)-H_{sd}(X,t|x_1,x_2,\cdots,x_N)|=0$$

This shows that the disposal efficiency $E_{sd}(t)$ and disposal consumption $H_{sd}(t)$ of a citizens' autonomous system achieve equilibrium.

Discriminant basis	Discriminant result
Force is equilibrium, effect is equilibrium	C-RIS is feasible and effective
Force is equilibrium, effect is quasi-equilibrium	C-RIS is feasible and nearly effective
Force is equilibrium, effect is non-equilibrium	C-RIS is feasible, but ineffective
Force is equilibrium, effect is away-equilibrium	C-RIS is feasible, but completely ineffective
Force is quasi-equilibrium, effect is equilibrium	C-RIS is nearly feasible and effective
Force is quasi-equilibrium, effect is quasi-equilibrium	C-RIS is nearly feasible and nearly effective
Force is quasi-equilibrium, effect is non-equilibrium	C-RIS is nearly feasible, but ineffective
Force is quasi-equilibrium, effect is away-equilibrium	C-RIS is nearly feasible, but completely ineffective
Force is non-equilibrium, effect is equilibrium	C-RIS is infeasible, but effective
Force is non-equilibrium, effect is quasi-equilibrium	C-RIS is infeasible, but nearly effective
Force is non-equilibrium, effect is non-equilibrium	C-RIS is infeasible and nearly effective
Force is non-equilibrium, effect is away-equilibrium	C-RIS is infeasible and completely ineffective
Force is away-equilibrium, effect is equilibrium	C-RIS is completely infeasible, but effective
Force is away-equilibrium, effect is quasi-equilibrium	C-RIS is completely infeasible, but nearly effective
Force is away-equilibrium, effect is non-equilibrium	C-RIS is completely infeasible and ineffective
Force is away-equilibrium, effect is away-equilibrium	C-RIS is completely infeasible and compt ineffective

Table 2: Discriminant Basis for the Rationality of Citizens' Right-Interest Structure.

Based on this criterion, we can judge that the structure $x=(x_1,x_2,\cdots,x_N)$ of citizens' rights and interests is effective;

$|E_{sd}(X,t|x_1,x_2,\cdots,x_N)-H_{sd}(X,t|x_1,x_2,\cdots,x_N)|<\xi_{EH}(\xi_{EH}$ is any small amount)

This shows that the disposal efficiency $E_{sd}(t)$ and disposal consumption $H_{sd}(t)$ of a citizens' autonomous system achieve quasi-equilibrium.

Based on this criterion, we can judge that the structure $x=(x_1,x_2,\cdots,x_N)$ of citizens' rights and interests is nearly effective;

$|E_{sd}(X,t|x_1,x_2,\cdots,x_N)-H_{sd}(X,t|x_1,x_2,\cdots,x_N)|>\zeta_{EH}$ (ζ_{EH} isn't a small amount)

This shows that the disposal efficiency $E_{sd}(t)$ and disposal consumption $H_{sd}(t)$ of a citizens' autonomous system achieve non-equilibrium.

Based on this criterion, we can judge that the structure $x=(x_1,x_2,\cdots,x_N)$ of citizens' rights and interests is ineffective;

$|E_{sd}(X,t|x_1,x_2,\cdots,x_N)-H_{sd}(X,t|x_1,x_2,\cdots,x_N)|>>\zeta_{EH}$ (ζ_{EH} isn't a small amount)

This shows that the disposal efficiency $E_{sd}(t)$ and disposal consumption $H_{sd}(t)$ of a citizens' autonomous system achieve away-equilibrium.

Based on this criterion, we can judge that the structure $x=(x_1,x_2,\cdots,x_N)$ of citizens' rights and interests is nearly ineffective.

F2) The dynamic basis for judging the rationality of the structure type (pattern) of citizen autonomous rule.

In the analysis and design established in this series, the rule system of citizen autonomy is centered on the citizens' right-interest and its structure, including the autonomous rule system with the citizens' interest as the core, the autonomous rule system with the citizens' human rights as the core and the autonomous rule system with the citizens' sovereignty as the core.

The institutional system as a part of the rule system of citizen autonomy, is centered on the citizens' right-interest and its structure, including the autonomous institutional system with the citizens' interest as the core, the autonomous institutional system with the citizens' human rights as the core and the autonomous institutional system with the citizens' sovereignty as the core.

Further, the dynamic system of citizens' right-interest structure and the rule structure (and its patterns) of citizen autonomy are interrelated, interacting and mutually determined. Therefore, according to the equilibrium, quasi equilibrium, non equilibrium, and away-equilibrium of the motive force of citizens' right-interest structures and the equilibrium, quasi equilibrium, non equilibrium and away-equilibrium of the system effect of citizens' right-interest structures, we can judge the rationality (feasibility and effectiveness) of the rule structure of citizen autonomies.

According to the equilibrium relationship in the dynamic effect of citizens' right-interest structures, the combination and structure of citizen-autonomous rules have four basic states:

- Feasible and effective; feasible but ineffective;
- Infeasible but effective; infeasible and ineffective.

Between the function $F_{RI}(t)$ and load $C_{RI}(t)$ of citizens' right-interest systems, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive force can be determined:

$$|F_{RI}(X,t|x_1,x_2,\cdots,x_N)-C_{RI}(X,t|x_1,x_2,\cdots,x_N)|=0$$

This shows that the function $F_{RI}(t)$ and load $C_{RI}(t)$ of a citizens' right-interest system achieve equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is feasible;

$|F_{RI}(X,t|x_1,x_2,\cdots,x_N)-C_{RI}(X,t|x_1,x_2,\cdots,x_N)|<\xi_{FC}$ (ξ_{FC} is any small amount)

This shows that the function $F_{RI}(t)$ and load $C_{RI}(t)$ of a citizens' right-interest system achieve quasi-equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is nearly feasible;

$|F_{RI}(X,t|x_1,x_2,\cdots,x_N)-C_{RI}(X,t|x_1,x_2,\cdots,x_N)|>\xi_{FC}$ (ζ_{FC} isn't a small amount)

This shows that the function $F_{RI}(t)$ and load $C_{RI}(t)$ of a citizens' right-interest system achieve non-equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is infeasible;

$|F_{RI}(X,t|x_1,x_2,\cdots,x_N)-C_{RI}(X,t|x_1,x_2,\cdots,x_N)|>>\xi_{FC}$ (ζ_{FC} isn't a small amount)

This shows that the function $F_{RI}(t)$ and load $C_{RI}(t)$ of a citizens' right-interest system achieve away-equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is completely infeasible.

Discriminant basis	Discriminant result
Force is equilibrium, effect is equilibrium	C-RS is feasible and effective
Force is equilibrium, effect is quasi-equilibrium	C-RS is feasible and nearly effective
Force is equilibrium, effect is non-equilibrium	C-RS is feasible, but ineffective
Force is equilibrium, effect is away-equilibrium	C-RS is feasible, but completely ineffective
Force is quasi-equilibrium, effect is equilibrium	C-RS is nearly feasible and effective
Force is quasi-equilibrium, effect is quasi-equilibrium	C-RS is nearly feasible and nearly effective
Force is quasi-equilibrium, effect is non-equilibrium	C-RS is nearly feasible, but ineffective

Force is quasi-equilibrium, effect is away-equilibrium	C-RS is nearly feasible, but completely ineffective
Force is non-equilibrium, effect is equilibrium	C-RS is infeasible, but effective
Force is non-equilibrium, effect is quasi-equilibrium	C-RS is infeasible, but nearly effective
Force is non-equilibrium, effect is non-equilibrium	C-RS is infeasible and nearly effective
Force is non-equilibrium, effect is away-equilibrium	C-RS is infeasible and completely ineffective
Force is away-equilibrium, effect is equilibrium	C-RS is completely infeasible, but effective
Force is away-equilibrium, effect is quasi-equilibrium	C-RS is completely infeasible, but nearly effective
Force is away-equilibrium, effect is non-equilibrium	C-RS is completely infeasible and ineffective
Force is away-equilibrium, effect is away-equilibrium	C-RS is completely infeasible, completely ineffective

Table 3: Discriminant Basis for the Rationality of Citizen-Autonomous Rule Structure.

Between the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizens' right-interest system, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive effect can be determined:

$$|E_{RI}(X,t|x_1,x_2,\cdots,x_N)-H_{RI}(X,t|x_1,x_2,\cdots,x_N)|=0$$

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizens' right-interest system achieve equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is effective;

$|E_{RI}(X,t|x_1,x_2,\cdots,x_N)-H_{RI}(X,t|x_1,x_2,\cdots,x_N)|<\xi_{EH}$ (ξ_{EH} is any small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizens' right-interest system achieve quasi-equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is nearly effective;

$|E_{RI}(X,t|x_1,x_2,\cdots,x_N)-H_{RI}(X,t|x_1,x_2,\cdots,x_N)|>\zeta_{EH}$ (ζ_{EH} isn't a small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizens' right-interest system achieve non-equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is ineffective;

$|E_{RI}(X,t|x_1,x_2,\cdots,x_N)-H_{RI}(X,t|x_1,x_2,\cdots,x_N)|>>\zeta_{EH}$ (ζ_{EH} isn't a small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizens' right-interest system achieve away-equilibrium.

Based on this criterion, we can judge that the rule structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is completely ineffective.

F3) The dynamic basis for judging the rationality of the game organization (pattern) of citizen autonomies.

In the analysis and design established in this series, the game system of citizen autonomies is centered on the citizens' right-interest and its structure, including the game system of citizen autonomies with the citizens' interest as the core, the game system of citizen autonomies with the citizens' human rights as the core and the game system of citizen autonomies with the citizens' sovereignty as the core.

The institutional game system as a part of the game system of citizen autonomies, is centered on the citizens' right-interest and its structure, including the institutional game system with the citizens' interest as the core, the institutional game system with the citizens' human rights as the core and the institutional game system with the citizens' sovereignty as the core.

Further, the dynamic system of citizen-autonomous rules and the game organization (and its patterns) of citizen autonomy are interrelated, interacting and mutually determined. Therefore, according to the equilibrium, quasi equilibrium, non equilibrium, and away-equilibrium of the motive force of citizen-autonomous rules and the equilibrium, quasi equilibrium, non equilibrium and away- equilibrium of the system effect of citizen-autonomous rules, we can judge the rationality (feasibility and effectiveness) of the citizen-autonomous game.

According to the equilibrium relationship in the dynamic effect of citizen-autonomous rules, the combination and structure of citizen-autonomous games have four basic states:

- Feasible and effective; feasible but ineffective;
- Infeasible but effective; infeasible and ineffective.

Between the function $F_{RL}(t)$ and load $C_{RL}(t)$ of citizen-autonomous rules, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive force can be determined:

$$|F_{RL}(X,t|x_1,x_2,\cdots,x_N)-C_{RL}(X,t|x_1,x_2,\cdots,x_N)|=0$$

This shows that the function $F_{RL}(t)$ and load $C_{RL}(t)$ of a citizen-autonomous rule system achieve equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is feasible;

$|F_{RL}(X,t|x_1,x_2,\cdots,x_N)-C_{RL}(X,t|x_1,x_2,\cdots,x_N)|<\xi_{FC}$ (ξ_{FC} is any small amount)

This shows that the function $F_{RL}(t)$ and load $C_{RL}(t)$ of a citizen-autonomous rule system achieve quasi-equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is nearly feasible;

$|F_{RL}(X,t|x_1,x_2,\cdots,x_N)-C_{RL}(X,t|x_1,x_2,\cdots,x_N)|>\zeta_{FC}$ (ζ_{FC} isn't a small amount)

This shows that the function $F_{RL}(t)$ and load $C_{RL}(t)$ of a citizen-autonomous rule system achieve non-equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is infeasible;

$|F_{RL}(X,t|x_1,x_2,\cdots,x_N)-C_{RL}(X,t|x_1,x_2,\cdots,x_N)|>>\zeta_{FC}$ (ζ_{FC} isn't a small amount)

This shows that the function $F_{RL}(t)$ and load $C_{RL}(t)$ of a citizen-autonomous rule system achieve away-equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is completely infeasible.

Between the efficiency $E_{RL}(t)$ and consumption $H_{RL}(t)$ of a citizen-autonomous rule system, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive effect can be determined:

$$|E_{RL}(X,t|x_1,x_2,\cdots,x_N)-H_{RL}(X,t|x_1,x_2,\cdots,x_N)|=0$$

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous rule system achieve equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is effective;

$|E_{RL}(X,t|x_1,x_2,\cdots,x_N)-H_{RL}(X,t|x_1,x_2,\cdots,x_N)|<\xi_{EH}$ (ξ_{EH} is any small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous rule system achieve quasi-equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is nearly effective;

$|E_{RL}(X,t|x_1,x_2,\cdots,x_N)-H_{RL}(X,t|x_1,x_2,\cdots,x_N)|>\zeta_{EH}$ (ζ_{EH} isn't a small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous rule system achieve non-equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is ineffective;

$|E_{RL}(X,t|x_1,x_2,\cdots,x_N)-H_{RL}(X,t|x_1,x_2,\cdots,x_N)|>>\zeta_{EH}$ (ζ_{EH} isn't a small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous rule system achieve away-equilibrium.

Based on this criterion, we can judge that the game $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is completely ineffective.

F4) The dynamic basis for judging the rationality of the ecological structure type (pattern) of citizen autonomies.

In the analysis and design established in this series, the ecological system of citizen autonomies is centered on the citizens' right-interest and its structure, including the ecological system of citizen autonomies with the citizens' interest as the core, the ecological system of citizen autonomies with the citizens' human rights as the core and the ecological system of citizen autonomies with the citizens' sovereignty as the core.

The power-ecological system as a part of the ecosphere of citizen autonomies, is centered on the citizens' right-interest and its structure, including the power-ecological system with the citizens' interest as the core, the power-ecological system with the citizens' human rights as the core and the power-ecological system with the citizens' sovereignty as the core.

Further, the dynamic system of citizen-autonomous games and the ecological structure (and its patterns) of citizen autonomy are interrelated, interacting and mutually determined. Therefore, according to the equilibrium, quasi equilibrium, non equilibrium, and away-equilibrium of the motive force of citizen-autonomous games and the equilibrium, quasi equilibrium, non equilibrium and away- equilibrium of the system effect of citizen-autonomous games, we can judge the rationality (feasibility and effectiveness) of the citizen-autonomous ecosphere.

According to the equilibrium relationship in the dynamic effect of citizen-autonomous games, the combination and structure of citizen-autonomous ecospheres have four basic states:

- Feasible and effective; feasible but ineffective;
- Infeasible but effective; infeasible and ineffective.

Between the function $F_{GS}(t)$ and load $C_{GS}(t)$ of citizen-autonomous games, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive force can be determined:

$$|F_{GS}(X,t|x_1,x_2,\cdots,x_N)-C_{GS}(X,t|x_1,x_2,\cdots,x_N)|=0$$

This shows that the function $F_{GS}(t)$ and load $C_{GS}(t)$ of a citizen-autonomous game achieve equilibrium.

Based on this criterion, we can judge that the ecosphere $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is feasible;

$|F_{GS}(X,t|x_1,x_2,\cdots,x_N)-C_{GS}(X,t|x_1,x_2,\cdots,x_N)|<\xi_{FC}$ (ξ_{FC} is any small amount)

This shows that the function $F_{GS}(t)$ and load $C_{GS}(t)$ of a citizen-autonomous game achieve quasi-equilibrium.

Discriminant basis	Discriminant result
Force is equilibrium, effect is equilibrium	C-ES is feasible and effective
Force is equilibrium, effect is quasi-equilibrium	C-ES is feasible and nearly effective
Force is equilibrium, effect is non-equilibrium	C-ES is feasible, but ineffective
Force is equilibrium, effect is away-equilibrium	C-ES is feasible, but completely ineffective
Force is quasi-equilibrium, effect is equilibrium	C-ES is nearly feasible and effective
Force is quasi-equilibrium, effect is quasi-equilibrium	C-ES is nearly feasible and nearly effective
Force is quasi-equilibrium, effect is non-equilibrium	C-ES is nearly feasible, but ineffective
Force is quasi-equilibrium, effect is away-equilibrium	C-ES is nearly feasible, but completely ineffective
Force is non-equilibrium, effect is equilibrium	C-ES is infeasible, but effective
Force is non-equilibrium, effect is quasi-equilibrium	C-ES is infeasible, but nearly effective
Force is non-equilibrium, effect is non-equilibrium	C-ES is infeasible and nearly effective
Force is non-equilibrium, effect is away-equilibrium	C-ES is infeasible and completely ineffective
Force is away-equilibrium, effect is equilibrium	C-ES is completely infeasible, but effective
Force is away-equilibrium, effect is quasi-equilibrium	C-ES is completely infeasible, but nearly effective
Force is away-equilibrium, effect is non-equilibrium	C-ES is completely infeasible and ineffective
Force is away-equilibrium, effect is away-equilibrium	C-ES is completely infeasible, completely ineffective

Table 4: Discriminant Basis for the Rationality of Citizen-Autonomous Ecospheres.

Based on this criterion, we can judge that the ecosphere $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is nearly feasible;

$|F_{GS}(X,t|x_1,x_2,\cdots,x_N)-C_{GS}(X,t|x_1,x_2,\cdots,x_N)|>\zeta_{FC}$ (ζ_{FC} isn't a small amount)

This shows that the function $F_{GS}(t)$ and load $C_{GS}(t)$ of a citizen-autonomous game achieve non-equilibrium.

Based on this criterion, we can judge that the ecosphere $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is infeasible;

$|F_{GS}(X,t|x_1,x_2,\cdots,x_N)-C_{GS}(X,t|x_1,x_2,\cdots,x_N)|>>\zeta_{FC}$ (ζ_{FC} isn't a small amount)

This shows that the function $F_{GS}(t)$ and load $C_{GS}(t)$ of a citizen-autonomous game achieve away-equilibrium.

Based on this criterion, we can judge that the ecosphere $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is completely infeasible.

Between the efficiency $E_{GS}(t)$ and consumption $H_{GS}(t)$ of a citizen-autonomous game, the equilibrium, quasi equilibrium, disequilibrium and away-equilibrium of the following motive effect can be determined:

$$|E_{GS}(X,t|x_1,x_2,\cdots,x_N)-H_{GS}(X,t|x_1,x_2,\cdots,x_N)|=0$$

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous game achieve equilibrium.

Based on this criterion, we can judge that the ecological structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is effective;

$|E_{GS}(X,t|x_1,x_2,\cdots,x_N)-H_{GS}(X,t|x_1,x_2,\cdots,x_N)|<\xi_{EH}$ (ξ_{EH} is any small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous game achieve qusi-equilibrium.

Based on this criterion, we can judge that the ecological structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is nearly effective;

$|E_{GS}(X,t|x_1,x_2,\cdots,x_N)-H_{GS}(X,t|x_1,x_2,\cdots,x_N)|>\zeta_{EH}$ (ζ_{EH} isn't a small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous game achieve non-equilibrium.

Based on this criterion, we can judge that the ecological structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is ineffective;

$|E_{GS}(X,t|x_1,x_2,\cdots,x_N)-H_{GS}(X,t|x_1,x_2,\cdots,x_N)|>>\zeta_{EH}$,$\zeta_{EH}$ isn't a small amount)

This shows that the efficiency $E_{RI}(t)$ and consumption $H_{RI}(t)$ of a citizen-autonomous game achieve away-equilibrium.

Based on this criterion, we can judge that the ecological structure $x=(x_1,x_2,\cdots,x_N)$ of citizen autonomies is completely ineffective.

Mode analysis of synergistic organization with SEC

Now, we discuss the classification of the basic modes of intelligent-integrated organization (IIO) from the aspects of interest relationship, rule structure, institutional framework, information structure and decision-making mechanism, as shown in tables 5 -- table 9.

In the analysis and design of this series of articles, the following measurements are proposed.

Competitiveness of organizations

In view of the relevant ratios (weighting and adding up): the height, difficulty and novelty (overall evaluation coefficient) of organizational task objectives, the number of candidates divided by the number of organizations required, the average level of the main aspects of the staffs divided by the social average level, the difficulty factor of organizational entry threshold, the differences of personnel, and so on.

These aspects are weighted and aggregated to obtain the measurement results of competitiveness.

Restriction of the system

In view of the relevant ratios (giving weight and adding up): the completeness of the system (the number of formed system terms divided by the total number of required system terms), the strictness of requirements (including the scope, number, depth of inspection), the strength of constraints (including the strength of punishment), and so on. These aspects are weighted and aggregated to obtain restrictive measurement results.

Consistency of interests

The interests are divided into four categories (giving weight and adding up): A, B, C and D. In each type of interest, the number of people with the same interests is divided by the total number of organizations, so that the measurement results of this kind of interest consistency are obtained. The four categories are weighted and summed up, so that the consistency measurement results are obtained.

Concentration of decision-making

In an organization, the proportion of the total disposal amount of resources for 1% or 10% of the people to control with the excise of their power in the total amount of resources owned by the organization. For industry organizations, the industry concentration ratio refers to the total market share of the top N largest enterprises in the relevant market of the industry. For example, CR 4 refers to the four largest firms that have the relevant market share. We can expand the industry concentration rate to the concentration rate of the general organization, and the calculation formula can be written as follows:

$$CR_n=\sum_{i=1}^{n}S_i$$ * MERGEFORMAT

Here, S_i is the share of the allocation power of the i-th decision maker in an organization, and n is the total number of all the basic members (or "insiders" in the traditional sense) of the organization.

In addition, we can use the Hirschman index to measure the concentration of organizations.

Mode Type	Interest relation	Rule composition	Institutional Framework	Information Structure	Decision Mechanism
Mode 1	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 2	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 3	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 4	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 5	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 6	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 7	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 8	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 9	0.85 - 1.00	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 10	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 11	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 12	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 13	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 14	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 15	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 16	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 17	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 18	0.85 - 1.00	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25
Mode 19	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 20	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 21	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 22	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 23	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 24	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 25	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 26	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 27	0.85 - 1.00	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 28	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 29	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 30	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 31	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 32	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 33	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 34	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 35	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 36	0.85 - 1.00	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25

Table 5: Classification of Basic Modes of Intelligent-Integratied Organizations (A).

Mode Type	Interest Relation	Rule Composition	Institutional Framework	Information Structure	Decision Mechanism
Mode 37	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 38	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 39	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 40	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 41	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 42	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 43	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 44	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 45	0.85 - 1.00	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 46	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 47	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 48	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 49	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 50	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 51	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 52	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 53	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 54	0.85 - 1.00	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25
Mode 55	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 56	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 57	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 58	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 59	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 60	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 61	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 62	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 63	0.00 - 0.15	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 64	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 65	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 66	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 67	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 68	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 69	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 70	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 71	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 72	0.00 - 0.15	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25

Table 6: Classification of Basic Modes of Intelligent-Integrated Organizations (B).

Mode Type	Interest Relation	Rule Composition	Institutional Framework	Information Structure	Decision Mechanism
Mode 73	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 74	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 75	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 76	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 77	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 78	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 79	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 80	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 81	0.00 - 0.15	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 82	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 83	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 84	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 85	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 86	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 87	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 88	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 89	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 90	0.00 - 0.15	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25
Mode 91	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 92	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 93	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 94	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 95	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 96	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 97	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 98	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 99	0.00 - 0.15	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 100	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 101	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 102	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 103	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 104	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 105	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 106	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 107	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 108	0.00 - 0.15	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25

Table 7: Classification of Basic Modes of Intelligent-Integrated Organizations (C).

Mode Type	Interest Relation	Rule Composition	Institutional Framework	Information Structure	Decision Mechanism
Mode 109	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 110	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 111	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 112	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 113	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 114	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 115	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 116	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 117	0.45 - 0.55	0.85 - 1.00	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 118	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 119	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 120	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 121	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 122	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 123	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 124	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 125	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 126	0.45 - 0.55	0.85 - 1.00	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25
Mode 127	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 128	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 129	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 130	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 131	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 132	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 133	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 134	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 135	0.45 - 0.55	0.00 - 0.15	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 136	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 137	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 138	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 139	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 140	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 141	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 142	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 143	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 144	0.45 - 0.55	0.00 - 0.15	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25

Table 8: Classification of Basic Modes of Intelligent-Integrated Organizations (D).

Mode Type	Interest Relation	Rule Composition	Institutional Framework	Information Structure	Decision Mechanism
Mode 145	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.85 - 1.00
Mode 146	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.45 - 0.55
Mode 147	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.85 - 1.00	0.00 - 0.25
Mode 148	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.85 - 1.00
Mode 149	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.45 - 0.55
Mode 150	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.45 - 0.55	0.00 - 0.25
Mode 151	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.85 - 1.00
Mode 152	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.45 - 0.55
Mode 153	0.45 - 0.55	0.45 - 0.55	0.75 - 1.00	0.00 - 0.25	0.00 - 0.25
Mode 154	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.85 - 1.00
Mode 155	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.45 - 0.55
Mode 156	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.85 - 1.00	0.00 - 0.25
Mode 157	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.85 - 1.00
Mode 158	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.45 - 0.55
Mode 159	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.45 - 0.55	0.00 - 0.25
Mode 160	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.85 - 1.00
Mode 161	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.45 - 0.55
Mode 162	0.45 - 0.55	0.45 - 0.55	0.00 - 0.25	0.00 - 0.25	0.00 - 0.25

Table 9: Classification of Basic Modes of Intelligent-Integrated Organizations (E).

Herfindahl-Hirschman Index (HHI, hereinafter referred to as the Hirschman Index) is based on the total number and size distribution of enterprises in the industry, that is, the sum of adding it up after averaging the market share of all enterprises in the relevant market. With the advantages of absolute method and relative method in mathematics, the Hirschman Index has become an ideal measure of market concentration. It can measure the impact of market share on market concentration, and it has become an important administrative standard for the government to review mergers and acquisitions of enterprises.

We can extend the Herchmann index to the concentration rate of the general organization, and its calculation formula can be written as follows:

$$HHI = \sum_{i=1}^{N} (X_i / X)^2 = \sum_{i=1}^{N} S_i^2$$

* MERGEFORMAT

In addition, we can use Lorentz curve, Gini coefficient, inverse index and entropy index, etc. to measure concentration.

Verticality of information communication

The ratio of information quantity dominated by vertical communication to the total amount of information owned by an organization can be used to measure the verticality or longitudinality of information communication.

For wisdom-synergistic organizations, we can give a set of two-dimensional analysis:

- Concentration and cooperation, or decentralization and competitiveness;
- Democracy and consistency, or autocracy and conflict;
- Freedom and verticality, or restriction and horizontality;
- Concentration and democracy, or decentralization and autocracy.

By this set of two-dimensional analysis, we can set up an analysis space for organizational modes, as shown in figure 8, and figure 9.

For new organizations based on big data, artificial intelligence technology and the Internet of everything, we propose two analytical

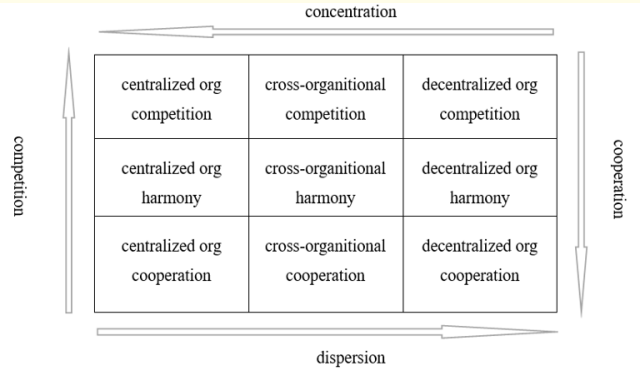

Figure 8: Classification of Complex Organization Modes with 2-Dimensional Analysis.

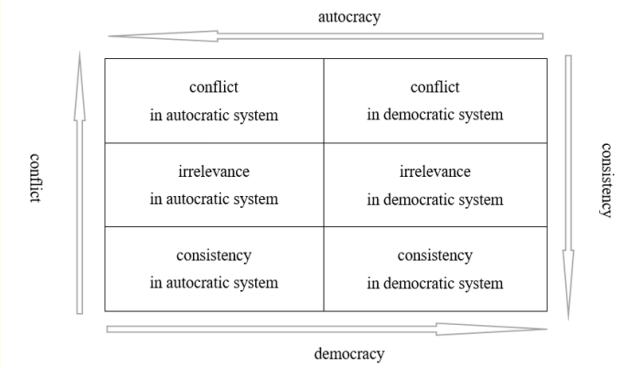

Figure 9: Classification of Complex Organization Modes with 2-Dimensional Analysis.

dimensions: organizational concentration and game cooperation (or organizational dispersion and game competitiveness). The basic sub-models of complex organizing modes are divided into nine types, namely:

- Centralized organization-cooperation (sub-mode l)
- Centralized organization-mixregulation (sub-mode lI)
- Centralized organization-competition (sub-mode lII)
- Intersected organization-cooperation (sub-mode lV)
- Intersected organization-mixregulation (sub-mode V)
- Intersected organization-competition (sub-mode Vl)
- Decentralized organization-cooperation (sub-mode VIl)
- Decentralized organization-mixregulation (sub-mode VIIl)
- Decentralized organization-competition (sub-mode lX)

In the perspective of internal synergy and external synergy, we can further subdivide the main sub-modes of complex organizational modes.

Figure 10: Nine sub-modes included in holo-synergistic mode of complex organizations.

Each small dot in the graph denotes a sub-mode, in which the gray dot denotes the dominant sub-mode.

The dominant grey dots denote the competitive game mode of centralized organizations.

The circle dot in the upper right corner denotes the cooperative game mode of decentralized organizations.

Conclusion

In the overall framework designed by this series, we can expect that sky-earth operating system for us to be organizing to develop can ensure the fair, reasonable and effective allocation of resources in the whole society as far as possible, through the sky-earth compiling, configuration measurement, value measurement, supply-demand docking, dynamic analysis, fairness trade-off, summary processing, comprehensive dispatching, coordinated control and other new functional settings. By the new analysis, in the sky-earth computing ecosphere, the synergistic organization structure and the organization mode vector are coupled. The movement of the synergic-org allocation is produced in the whole selection process of the members of a synergistic game organization, which is more flexible than the synergistic-organization model.

Sky-Earth Computing, which needs to be vigorously developed, is a kind of super metaverse technology system with comprehensive application of various computers, softwares, information systems,

information platforms and Internet supported by information technology such as computers, the Internet, cloud computing, big data, artificial intelligence, etc., which is oriented to all kinds of real networks (physical networks, life networks, financial networks, social networks), information networks (Internet, radio and television networks, communication networks), mental networks (spiritual networks, knowledge networks).

If cloud computing is a new business operation mode, then the Sky-Earth Computing proposed in this series of studies that needs to be fully developed is a new integrated technology mode, super metaverse system engineering mode and intelligent business mode.

This series of studies proposed to vigorously develop Sky-Earth computing technology and vigorously carry out Sky-Earth computing system engineering. It takes the user as the center, faces the super metaverse ecosphere based on the interconnection of all things, from the key technical system and complex system engineering to really solve a series of serious problems and disadvantages in the individual, group, society and the global scope, to ensure the fair, reasonable and effective allocation of resources in the whole society as far as possible. Therefore, from the dynamic basis, rule composition, institutional framework, information structure, decision-making mechanism and other aspects, this paper determines the synergic-wise organization mode of Internet of everything, and puts forward the dimension of multiple analysis.

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