



## Development of A Dispatching System of Global Services for Super Metaverse Ecospheres Sky-earth Computing (I) Beyond Cloud Computing

Zongcheng Li\*

Research Lab of Interdisciplinary Science, Soochow University, China

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

Received: July 08, 2022

Published: September 27, 2022

© All rights are reserved by Zongcheng Li.

### Abstract

Every life has its own ecosystem, which is an interest-related system composed of all the factors directly and indirectly related to life. By the analysis and design of this series of articles, with cyber-life as the center, using big data platform, IOT, AI technology, as well as the sky-earth computing system engineering that we advocate to develop and implement, we integrate cyber-natural system and cyber-social system, and establish a super metaverse system (SMS) for the new civilized world. As the technical foundation of the hyper-cyber world system, the "sky-earth computing" (SEC) proposed in this series of research to develop is a hyper-cyber world computing mode that combines the traditional computing mode in various professional application fields with the modern computing mode in the field of information network technology (represented by distributed computing, grid computing, cloud computing and cluster computing). Here, "Sky (or Heaven)" metaphors the information world in the field of digital network technology, and "Earth" metaphors the real world in various professional application fields. We propose to provide a customized global-service dispatcher (GSD) and its enhanced version of the world-wise brain (WWB) with the user as the center and facing the ecosphere of this user in Internet of everything.

**Keywords:** Super Metaverse Ecosphere; Hyper-cyber world; Sky-earth Computing System Engineering; Global Resources Dispatcher; Sky-earth Computing Console

### Introduction

In our view, artificial intelligence (machine intelligence) is based on computing in the information world, and natural intelligence (human intelligence) is based on computing in the actual world. The modern computing (mode) after the emergence of computer belongs to artificial intelligence computing. The modes of such computing include centralized computing, distributed computing, grid computing, cloud computing, cluster computing, fog computing, edge computing computing, etc. In the analysis and design of this series of papers, it is necessary with the big data platform [7,8] (HDFS cluster, MapReduce/Tez/Spark), the Internet of Things [9-11] (sensors, RFID, GPS, infrared sensing) and artificial intelligence technology [12,13] (AlphaZero, generating antagonistic network GAN, new recursive cortical network, etc.), between

the information ecosphere and the actual ecosphere, between the information world computing and the actual world computing, to construct the intelligent integrating system, and the carry out data reconstruction system engineering, thus establish the computer-like system for the processing of big data.

In order to overcome the serious defects of information mechanism and promote the rationalization of resource allocation, we explore the connection between the information ecosphere and the real ecosphere, the computing of the information world (including the digital information world and the analog information world) and the computing of the real world (including the real physical world and the real psychological world), so as to establish an advanced wisdom computing with interactive and integrated syn-

ergy. This is a “Super Metaverse Computing” (SMC, or Hyper-cyber World Computing) mode that combines the traditional computing mode of various professional application fields with the modern computing mode of various info-network technology fields (represented by distributed computing, grid computing, cloud computing and cluster computing). It can be called “Sky-Earth computing” (SEC).

In traditional Chinese culture, “Sky” (or Heaven) and “Earth” are a pair of basic relative categories. Now, in the context supported by Internet, cloud computing and artificial intelligence technology, we can bring the category of “Sky-Earth” into a new system, metaphorizing the information world with “Sky” and the actual world with “Earth”. Artificial intelligence (machine intelligence) is based on computing in the information world, and natural intelligence (human intelligence) is based on computing in the actual world. By the analysis and design of this series of papers, it is necessary with the big data platform [7,8] (HDFS cluster, MapReduce/Tez/Spark), the Internet of Things [1-3] (sensors, RFID, GPS, infrared sensing) and artificial intelligence technology [9,10] (AlphaZero, generating antagonistic network GAN, new recursive cortical network, etc.), between the information ecosphere and the actual ecosphere, between the information world computing and the actual world computing, to construct the intelligent integrating system, to establish the computer-like system for the processing of big data.

The development of sky-earth computing technology and the organization of sky-earth computing system engineering are the new ideas of technology and industry development strategy first put forward by inventor Li Zongcheng in the world after 30 years of painstaking exploration, which can become the basic way to comprehensively improve system software, network software and application software. As early as 2011 and 2012, inventor li-zongcheng successively submitted 610 applications for the latest technological invention to the State Patent Office of China, which provided necessary core technology, key technology, basic technology, supporting technology and system integration technology for this comprehensive upgrade and development.

The sky-earth computing technology and sky-earth computing system engineering proposed in this series of studies to be vigorously developed, should take a user as their center, facing the su-

per metaverse ecosphere (SME) based on the interconnection of all things. A user’s all-interconnected ecosphere is defined here as the interaction system formed by all the factors that have direct and indirect contact with the user according to the complex relationship structure. Through the technology development of sky-earth computing system engineering, 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. The global service dispatcher to be developed should have at least three functions: unified standard measurement system, supply-demand intelligent docking system, and integrated dispatching center system. Through the development and implementation of Sky-Earth computing system engineering technology, let every user become the center of their own all-interconnected ecosphere (AIE)! Strive to achieve an ideal scene: with a sky-earth wisdom brain in hand, everything will be integrated and everyone will be accessible.

Facing the world, we sincerely invite advanced information technology enterprises, investment companies, universities and scientific research institutions from all over the world, to jointly form a strategic alliance of sky-earth computing system engineering enterprises, jointly organize and implement the cluster projects of emerging strategic leading industry, and vigorously carry out scientific-technologic development, engineering development and commercial development.

### A new way to rationalize information mechanism

In the implementation of sky-earth computing system engineering and super metaverse ecosphere system engineering proposed and discussed in this series of research, there is a very important purpose. It is to solve, from the key technical system and complex system engineering, a series of serious problems and disadvantages in individuals, groups, society and the whole world. These questions 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.

The problem of information mechanism is not a purely technical one, but a comprehensive and complex one involving society, economy, technology, politics, culture and tradition, etc. This is especially true for information networks including Internet, communication network and radio and television network. 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 the theocracy from the blind area of knowledge, the tyrancracy (might) from violence and the timocracy (gold right) from financial resources. The total root of all opposition, confrontation and conflict lies in the theocracy, tyrancracy and timocracy, and in the game, control and rule among theocracy, tyrancracy and timocracy. In the whole world of old civilization, 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 [11-14].

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.

Accompanied by a variety of abnormal social economy phenomena, the electronic commerce with the Internet shopping platform (online shopping) as the basic service has been developing very rapidly, the Internet and its big data technology have provided boosters (e.g., false hits, false ranking, scalping have made the pop-

ularity of fake and shoddy products on the online shopping platform, the online shops of fakes emerge in an endless stream, etc.) for the explosion and intensification of in various social and economic deformity phenomena, but also created the condition (e.g., using big data to intercept fake information, collaborative filtering algorithm of Amazon, the recommendation engine of Baifendian, online sorting and filtering, etc.) for the weakening and elimination of various social economic abnormal phenomena [15-17].

As we have seen, the modern information science, technology and means are not only changing the pattern of information industry, but also the growth mode and development trajectory of the world economy [18-20]. The software industry and information service industry will be more large-scale, centralized and sophisticated, and the terminal equipment will be more concise, rich, lightweight and personalized, and the ubiquitous calculation will become a reality. Full service operations affect all the aspects of the network, business, brand, services, terminals, tariffs and on so [19-21]. From a global perspective, the implementation of converged networks and technologies is the core capability of the whole business operation.

The rationalization of information resource allocation means the openness, transparency, fairness and rationality of information mechanism (rationalities of technology, economy, politics and society). Only the openness, transparency, fairness and rationality of information mechanism can guarantee the complete freedom and sufficiency of information flow and gradually eliminate the falsity, concealment, distortion and distortion of information, to promote the rationalization of all resource allocation.

The sky-earth computing proposed in this series of research to develop and build is essentially a global support system engineering for all kinds of users at all levels. A very important purpose of implementing the sky-earth computing system engineering is to try to solve, from the key technical system and complex system engineering, a series of serious problems and disadvantages in individuals, groups, society and the whole world. In the overall framework proposed in this series, through the new functional settings such as sky-earth establishment, configuration measurement, value measurement, supply-demand docking, dynamic analysis, fair trade-off, summary processing, comprehensive scheduling, coordination and control, the sky-earth operating system we are organizing and

developing can ensure the fair, reasonable and effective allocation of resources in the whole society as far as possible.

### As shown in Figure 1

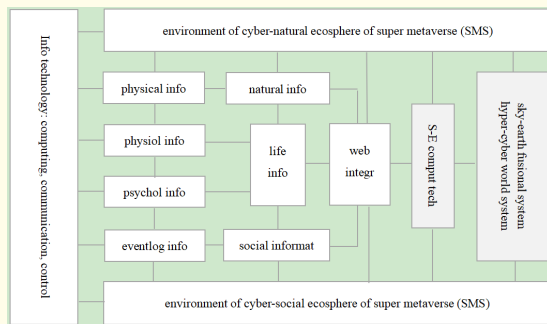
Sky-earth fusion system (SEF) is a world system supported by sky-earth computing technology, which can be regarded as a super metaverse sci-technology system, or hyper-cyber world systems (HCW), that is to say, a fusion of cyber-physical system (CPS-1), cyber-physiological system (CPS-2) and cyber-psychological system (CPS-3), cyber-eventreason system (CES), etc. It is a multi-dimensional complex system that uses sky-earth computing technology and its system engineering to combine computing, network and world environment (including physical environment, physiological environment, psychological environment and eventreason environment). Through the organic integration and deep cooperation of 3C (computation, communication and control) technology, it can realize the real-time perception, dynamic control and information service of large-scale engineering system in complex society. The super metaverse sci-technology based on sky-earth computing can carry out the integrated design of computing, communication with physical system, physiological system, psychological system and reasoning system, and realize the integration of various related systems, processes and elements more reliably, efficiently and cooperatively. Therefore, it has an important and wide application prospect.

The original idea of the development of Sky-Earth computing technology originated from the 610 patent applications submitted by professor Li Zongcheng of Suzhou University to the State Patent Office of the People's Republic of China from early November 2011 to may 2012 (see tables 1 - 4). 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. As a network technology support system of value chain systems engineering, the intelligent integrated network containing the Internet takes the following ten technologies as the key technology that Li Zongcheng submitted to the Intellectual Property Office in May 2012 :

- Item 601 --- logic positioning and compilation engine of intelligent-integrated computer network operating system
- Item 602 --- flow summary and balancing device of intelligent-integrated computer network operating system
- Item 603 --- value measure based on OS/IIC network and its docking equilibrium table
- Item 604 --- efficacy configurators based on OS/IIC network and its value measurement system
- Item 605 --- load balancing system of resource allocation based on value chain network technology platform
- Item 606 --- sky-earth control system for expanding the technologic basis of cloud computing and Internet of things
- Item 607 --- control system of intelligent integrated computer network based on sky-earth computing technology
- Item 608 --- control system of global docking equilibrium based on value-chain network technology platform
- Item 609 --- control system of intelligent integrated cluster based on value-chain network technology platform
- Item 610 --- control system of holo-synergic configuration based on value-chain network technology platform
- Item 601 201210156101.9
- Item 602 201210156064.1
- Item 603 201210156063.7
- Item 604 201210156062.2
- Item 605 201210156015.8
- Item 606 201210156061.8
- Item 607 201210156014.3
- Item 608 201210156013.9
- Item 609 201210156012.4
- Item 610 201210156011.X

### On super metaverse ecosphere with user as its center

Now, in order to break the monopoly of theocratic system, tyrannocratic system and timocratic system on information mechanism, and to make every user become the center of the all-interconnected ecosphere (AIE), we should and must go beyond modern information technology, beyond Internet of things, big data, cloud computing, artificial intelligence and other technology systems, and face each user (individual user, group user, whole users), around the ecospheres of various users at all levels, we use the technology, software, system, platform and Internet in the modern information field to develop and establish the global service dispatcher, which



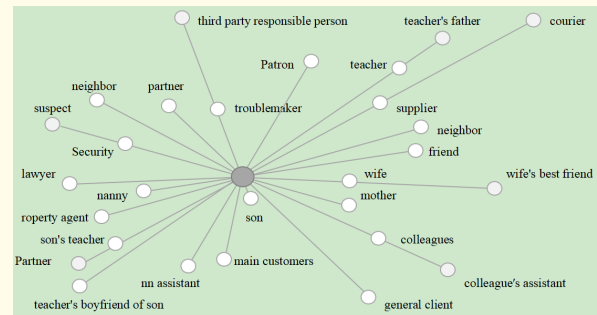
**Figure 1:** Super Metaverse System (SMS) based on sky-earth computing technology integrates cyber-physical sys (CPS-1), cyber-physiologic sys (cps-2), cyber-psychological sys (cps-3) and cyber-eventlogic sys (CES) into one.

integrates the technology, software, system, platform and Internet in various professional application fields Software, system, platform and Internet are connected to fully mobilize, configure and utilize global resources to serve every user.

For various new phenomena, new trends and new problems in international and domestic social economy in recent decades, the object and scope of research are included in the ecosphere system. The “ecosphere” is an ecological concept that has emerged in recent decades [22,23], which is closely related to the concept of the earth biosphere, but also has some differences [23-26]. In theory, an ecosphere refers to an indivisible natural group formed by the interaction between organisms and their living environment and between organisms through material circulation, energy flow and info-exchange in a certain time and space.

In this series of articles, the ecosphere of a life is defined as an interaction system with a life as the center formed by all the factors that have direct and indirect connection with the life in accordance with the complex relationship structure.

By this definition, every advanced life has its own ecosystem. The social ecosystem with a user as the center and composed of all stakeholders is shown in Figure 2: all stakeholders who have direct and indirect relationship with a user form an ecosphere in Internet of everything by various relationships. Here, the dark gray circle represents a user, the light gray circle represents the stakeholders



**Figure 2:** A social ecosystem with a user as the center and composed of all stakeholders.

Here, the dark gray circle represents a user, the light gray circle represents the stakeholders with direct relationship, the white circle represents the stakeholders with indirect relationship, and each arrow line represents the geographic location and distance between the user and the stakeholders.

with direct relationship, the white circle represents the stakeholders with indirect relationship, and each arrow line represents the geographic location and distance between the user and the stakeholders.

With the movement of the higher life in different time and space, the ecosphere will continue to move, and constantly change its various variables, structure and morphology, showing an extremely complex nonlinear dynamic system state. It can be supposed that a life as the center moves from the start point A to the end point D, passing through points B and C. At each point, with the life as the center, an ecosphere is naturally formed, which contains various direct and indirect influencing factors. Moreover, at different time and space points, the size of the ecosphere is different, that is to say, the influence scope of the ecosphere and the number and types of various direct and indirect influencing factors on it are different. In fact, the whole path from the start point A to the end point D can be regarded as a collection of countless space-time points 1, 2 and 3, which means that, In the whole path, with the passage of time and space, countless ecosphere systems with different sizes (that is, the influence scope of the ecosphere and the number and types of various direct and indirect influencing factors on it are different) constantly appear.



Furthermore, it can be seen that in the whole process of a life moving from the start point A to the end point D, the ecosphere centered on the life can actually be regarded as a complex nonlinear hydrodynamic system that constantly changes the influence scope and the number and types of various influencing factors with the movement of time and space points.

Every user, no matter individual users (individuals, families, groups, etc.) or group users (organizations, communities, enterprises, institutions, departments, urban and rural areas, regions, countries, transnational alliances, global organizations, etc.), is the center of sky-earth computing system engineering, in a self-centered ecosystem of everything-interconnection, that is, the center of design, R&D, organization, operation, cooperation, management, adjustment, detection and maintenance.

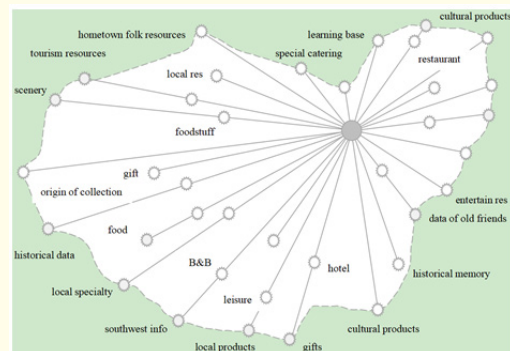
The ecosphere of each user (individual, group, whole) is an extremely complex ecosphere in Internet of everything, with extremely complex variables, structures and forms, here there are both natural and social processes; there are not only physical connection, biological connection and information connection, but also psychological connection, knowledge connection and social connection (economy, culture, science and technology, education, etc.).

In fact, the boundary of each ecosphere is often irregular, and the boundary of highly complex ecosphere in Internet of everything is especially mixed, unclear and irregular. As shown in Figure 3, there is an ecosphere with irregular, indistinct and non-simple boundaries. The ecosphere includes complex multiple physical, physiological, information, psychological and social connections. Here, the arrow line has great limitations. It can only represent the distance and direction in time and space, but it can not represent the multiple links between the center (advanced intelligent life, such as users) and the influencing factors at each time and space point.

Users have different connections with the influencing factors of different time and space points. The contents, time limit, types, closeness and frequency of contacts are different. For example, there are pure simple connections and complex multiple connections, long-term fixed connections and short-term accidental connections, very close connections and very loose connections, frequent connections and occasional connections, etc.

For example, in a complex ecosystem centered on a user, there are 11 direct factors and 15 indirect factors at different time and space points. The length of arrow line reflects the distance between users and influencing factors. If we number 26 spatiotemporal factors, and divide all kinds of connections into physical connection, biological connection, information connection, psychological connection and social connection, we can assume that:

- At spatiotemporal factor point 1, the user only has pure psychological connection with this factor point;
- At spatiotemporal factor point 2, the user has complex multiple connections with this factor point, including physical connection, biological connection, psychological connection and social connection;
- At spatiotemporal factor point 3, the user has informative and physical contact with the factor point;
- At spatiotemporal factor point 4, the user only has pure social contact with this factor point;
- At spatiotemporal factor point 5, the user has complex multiple connections with this factor point, including biological connection, information connection, psychological connection and social connection;
- And so on.



**Figure 3:** A user-centered ecosphere composed of all resource elements that have direct and indirect relationship with the user.

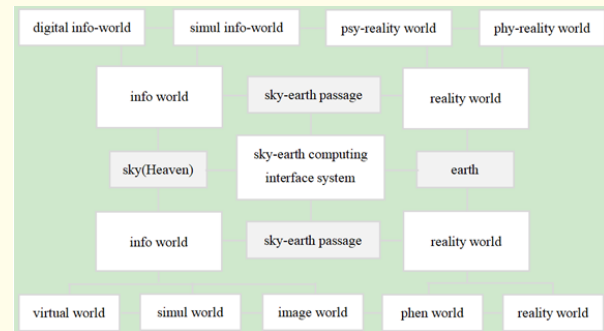
For all related resource elements in a certain spatiotemporal range, the dark gray circle represents a user, the white polygon represents the directly related elements, and the light gray polygon represents the indirectly related elements.

With the movement of the user in the complex space-time range (physical space-time, biological space-time, information space-time, psychological space-time, knowledge space-time, social space-time), the all-interconnected ecosphere will continue to move, and constantly change its various complex variables, complex structures and complex forms (physical form, biological form, information form, psychological form, knowledge form Social form) presents an extremely complex large-scale system state of nonlinear social dynamics.

All kinds of all-interconnected ecosphere at all levels can be applied to all activities of advanced intelligent life, such as production-supply-marketing integrated service system, vehicle-transportation system, medical-health care system, intelligent home and building, social networks and games, power and heat management system, office intelligent integrated service, data center, integrated intelligent service system of daily life, electric power and energy system or network, the large-scale advanced intelligent integrated service system in cities, regions, countries and the world, etc. The conception, design, R & D, organization, operation, management, cooperation, adjustment, detection and maintenance of this system are the complex large-scale system of dynamics processes integrated in the whole field of computer, software, platform, network and physical process, physiological process, psychological process and event-mechanism process.

How to connect the world of information (digital information and analog information) with the world of reality (physical reality and psychological reality) will be the key problem in transforming the old civilization world and creating a new civilization world, as shown in figure 4. In order to achieve the task of space and sky computing, the integration of the two worlds is the primary technology. In this regard, sensor network technology, Internet technology of things and electronic virtual technology are essential.

The sky-earth interface system and its channels enable users (individuals, organizations, and Society) to work with multi-channel programs in the physical world, the information world and the psychological world at the same time in their own world. 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 chang-



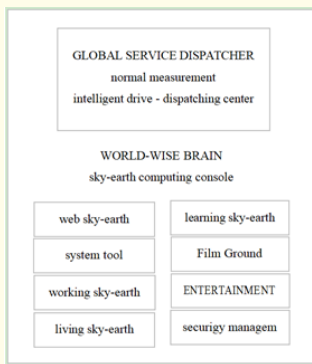
**Figure 4:** Conception of an interface system of sky-earth computing between info.world and realistic world.

ing 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.

MEMS is the abbreviation of micro electro mechanical systems. It is an integrated micro device system composed of micro sensors, micro actuators, signal processing and control circuits, communication interface and power supply. M2M is the abbreviation of machine to machine/man. It is a network application and service with intelligent interaction of machine terminal as the core. It will make the object intelligent control. M2M technology involves five important technical parts: machine, M2M hardware, communication network, middleware and application. The business model of M2M is in the ascendant at present, and its technical application schemes mainly include security monitoring, vending machine, goods tracking, M-logistic management, M-pos, M-monitoring, etc.

Through the technology development of sky-earth computing system engineering, a customized global service dispatcher (GSD) is provided for each user (individual, group, whole). As the main component of WWB, the global service scheduler should have at least three functional modules, as shown in figure 5.

- Unified normal measurement. This basic function is the computing technology of grand unified normalization, which can make a unified measurement of all kinds of resources across borders, domains and levels;



**Figure 5:** Global service dispatcher as main component of world smart brain.

- Advanced intelligent engine of supply-demand docking. This basic function is to provide customized menus for both supply and demand with the user's movement, and realize the intelligent docking of supply-demand matching as soon as possible through the supply-demand compiled search engine, so as to achieve the holo-synergic intelligent drive;
- Advanced intelligent-integrated dispatching system. This basic function is to form a dynamic sequence of ecosphere in the whole process according to the results of large-scale dynamic supply-demand intelligent docking, follow the user's mobile process in switching, and carry out mode conversion, so as to realize the support of global resources for the user.

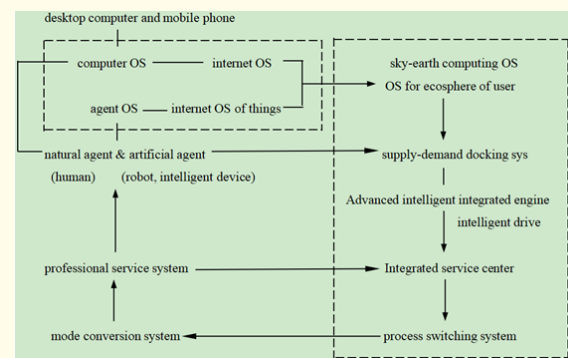
Furthermore, it can be seen that the whole process of real-time dynamic service in developing for the complex large-scale dynamic system of the all-interconnected ecosphere with the user as the center must be a complex synergic-auxiliary process involving different influence areas, different direct influence factors, different indirect influence factors, different influence regions, different influence departments and different professional fields in different paths, time periods and spatiotemporal points, which can be summed up as a highly complex, highly synergic and highly social auxiliary system engineering.

Sky-earth computing, which needs to be vigorously developed, is a kind of technology system for comprehensive utilization of various computers, software, information systems, information

platforms and Internet, which is oriented to various real networks (physical network, life network, financial network, event network), information networks (Internet, radio and television network, communication network) and mental networks (spiritual network, knowledge network).

### Wisdom-a

By the new development plan, the existing operating systems are generally divided into two aspects (categories), as shown in figure 6.



**Figure 6:** Conception of sky-earth computing operating system with each user as center.

The first category is the computer operating system for computers, PCs, tablets, mobile phones and computing centers, as well as the related Internet operating system (Web OS). Generally speaking, Internet operating system is a kind of virtual operating system based on browser. Users can operate applications on the Internet operating system through the browser. This application is not an ordinary application, but a network application. Web OS provides the operating system services for internet, including network resource addressing, global name space, remote execution program (executing server program on client), resource management, authentication and security.

The second category is the agent operating system for natural agent (human) and artificial agent (robot, intelligent device and intelligent instrument), and the related the Internet operating system of things (and thing-chain Internet operating system). The combination of the kernel and peripheral functional components



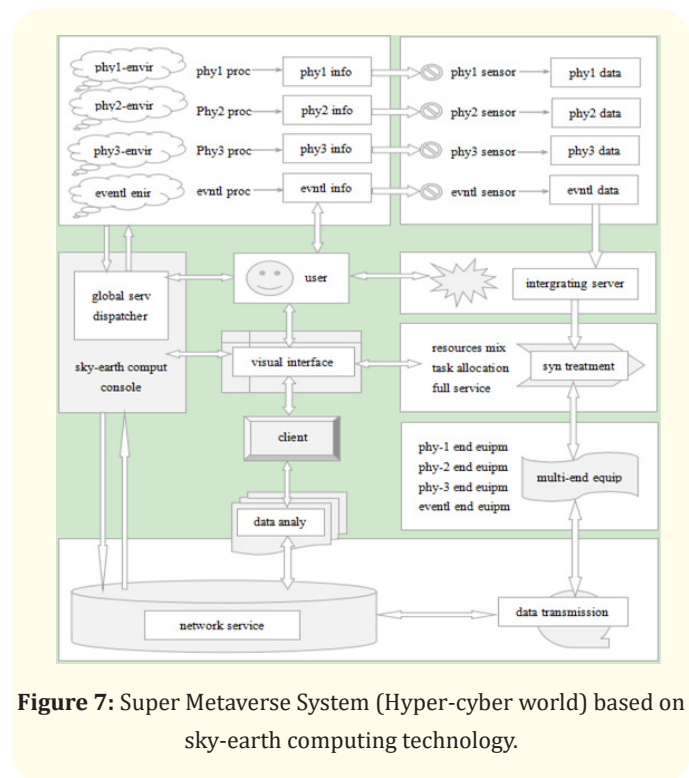
of IOT operating system can solve the connection requirements of IOT, such as supporting Ethernet, 3G/4G, Bluetooth, Wi-Fi, ZigBee, NFC, LiFi, NB-IoT, LoRa, etc. Typical open source IOT operating systems include: RT-Thread, LiteOS, Tizen, TinyOS, RIOT, Contiki, FreeRTOS, ApacheMynewt, Zephyr OS, Ubuntu Core, ARM mbed, AndroidThings, Yocto, Raspbian.

Now, with all kinds of users at all levels (individuals, groups, and the whole) as the center and facing the all-interconnected ecosphere of all kinds of users at all levels (individuals, groups, and the whole), we consider combining these two aspects (two categories) of operating systems according to the three functional requirements of unified standard measurement, intelligent docking drive, and integrated dispatching center, to develop and build the sky-earth computing operating system (SEC OS) for global service dispatcher and WWB (Sky-Earth computing console), and the operating system of the related Super Metaverse Ecosphere (OS/SME) in the interconnectin of all things.

The super metaverse system (SMS, hyper-cyber world system) based on sky-earth computing technology is as shown in figure 7. As a unity of computing process, physical process, physiological process, psycholog process and eventreason process, the super metaverse system (SMS, hyper-cyber world system) based on sky-earth computing is an advanced intelligent system integrating computing, communication and control into one. This system as the hyper cyberworld system realizes the interaction between the digital information technology process and the real world process through the human-computer interaction interface. It uses the network space to operate a sky-earth fusional ecosphere in a remote, reliable, real-time, safe and cooperative way. Here, there is a complex ecological chain in Internet of everything :

- Firstly, in the multi-environments including physical, physiologic, psycholog and eventlogic environments, there are multi-processes including physical, physiologic, psycholog and eventlogic processes, thus forming multi-informations including physical, physiological, psychological and eventlogic informations;
- Secondly, it is necessary to set up multi-sensors including physical, physiological, psychological and eventlogic sensors for cybertech users, who are the center of the ecosphere in Internet of everything, so as to obtain multi-data including physical, physiological, psychological and eventlogic data;

- Thirdly, for multi-processes, multi-information and multi-data, it is necessary to set up a comprehensive server in advanced intelligent comprehensive processing, so as to carry out resource combination, make task allocation and realize the whole process service. Therefore, it is necessary to set up multi-end devices including physical, physiologic, psychological and logical end devices, so as to facilitate data transmission;
- Fourthly, on the basis of intelligent comprehensive processing, network services are carried out to feed back the results of data analysis, so the visual interface is presented to customers through the client.

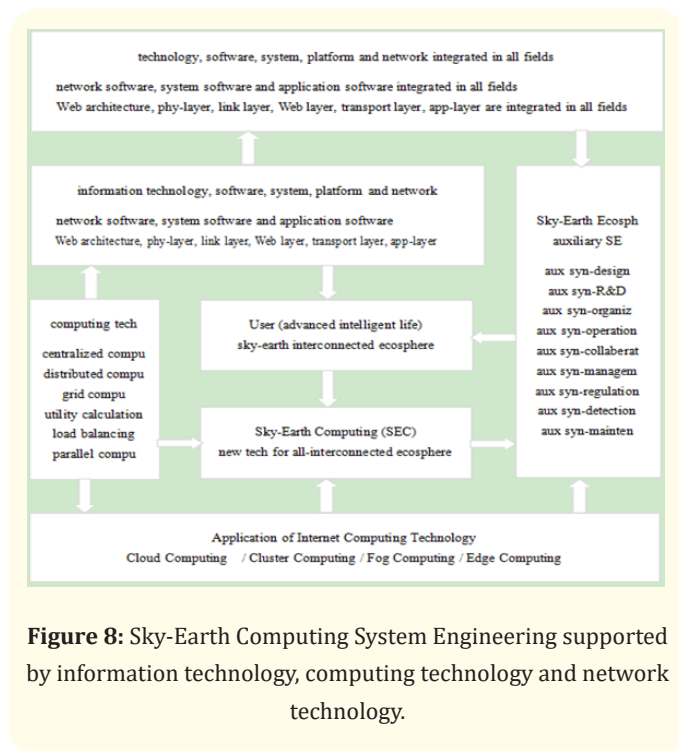


**Figure 7:** Super Metaverse System (Hyper-cyber world) based on sky-earth computing technology.

Under the analysis and design of this series, the super metaverse ecosphere system (SME/SEC) based on sky-earth computing includes the ubiquitous system engineering in the future, such as environment perception, embedded computing, network communication and network control, so that the physical system, physiological system, psychological system and eventlogic system have the functions of computing, communication, precise control, remote cooperation and autonomy. It focuses on the close integration

and coordination of computing resources with physical resources, physiological resources, psychological resources and eventlogic resources. It is mainly used in intelligent systems of various application scenarios, such as device interconnection, IOT sensing, smart home, robot, intelligent navigation, etc.

The sky-earth computing system engineering supported by info technology, computing technology and network technology is shown in figure 8.



**Figure 8:** Sky-Earth Computing System Engineering supported by information technology, computing technology and network technology.

As the basis of new technology development, we should use all kinds of modern information technology, software, system, platform and network (Internet, communication network, radio and television network) to develop, design and configure in comprehensive integration all kinds of technology, software, system, platform and network (energy network, logistics network, capital network, human resource network, knowledge network, social network) in all fields, all levels and all regions, etc), and form the comprehensive-integrated technology, software, system, platform, network, network architecture, link layer, network layer, transmission layer and application layer in the whole field, so as to establish a large-scale unified measurement technology system across fields,

levels and regions, and then establish a large-scale power engine for supply-demand docking.

On this basis, the intelligent dispatching center of integrated services is developed and established, so as to develop and establish process switching system and mode conversion system to schedule various resources of centralized computing, distributed computing, grid computing, utility computing, load balancing computing, parallel computing, cloud computing, cluster computing resources, fog computing and edge computing, etc.

In essence, sky-earth computing is not only limited to traditional and modern computing, but also particularly important. It is an auxiliary system engineering of the all-interconnected ecosphere centered on all kinds of users (advanced intelligent life) at all levels. Based on the comprehensive application of computer technologies such as distributed computing, utility computing, load balancing, parallel computing, network storage, hot backup, and virtualization, it is the aux-synergic designed, aux-synergic developed, aux-synergic organized, aux-synergic operated, aux-synergic managed, aux-synergic adjustment, aux-synergic detection, and aux-synergic maintenance the all-interconnected ecosphere of all kinds of users at all levels, that is, the aux-synergic dynamic process of a complex large-scale system integrated in full fields by computers, softwares, platforms, networks and physical processes, physiological processes, psychological processes, reasoning processes.

### Develop global service dispatcher for each user

The ultimate goal of the development of sky-earth computing technology is to establish a global support system for every user (individual user, group user and all users). in other words, to equip each user with a world-wise brain (WWB), let every user become the master of his life, the subject of his work, the leader of his entertainment and the protagonist of his social life, as shown in figure 9.

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 (SECC) 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.

As the main component of world-wise brain (WWB) or sky-earth computing console (SECC), global service dispatcher (GSD) consists of three basic components: (1) the technology foundation of big unified measurement across borders and domains, including the big unified measurement technology of weighted configuration and the big unified measurement technology of efficacy value; (2) the dynamical system of supply-demand docking in a large range, including supply-demand compiled input system and holosynergic intelligent engine; (3) the advanced intelligent-integrated dispatching system in whole field and full time, includes visual sky-earth door and World-Internet operating system. For each user, global service dispatcher is an intelligent-integrated dispatching center, through which the process switching system can be realized, and then the mode conversion system can be realized.

The ultimate ideal of the development of sky-earth computing technology is to strive to achieve the following vision:

- One machine in hand, global support you!
- One machine in hand, you are the master of your own world!



**Figure 9:** Basic application of Sky-Earth computing.  
SE ---- Sky-Earth ---- sky-earth computing

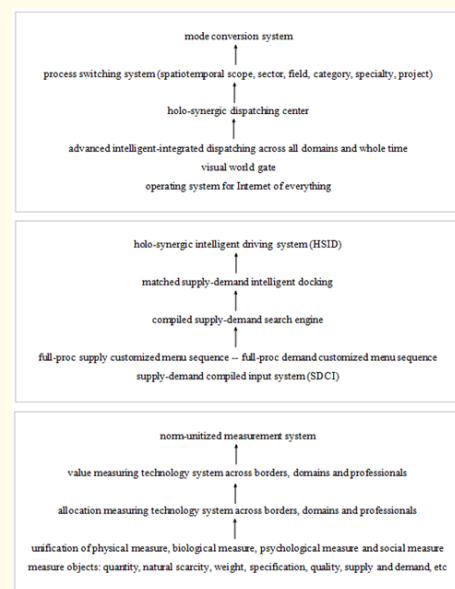
Here, “one machine” refers to a world-wise brain as the sky-earth computing console, or a global service dispatcher.

It can be said that users can become their own design center, R&D center, organization center, operation center, cooperation center, management center, regulation center, detection center and maint-center, by using global service dispatcher and sky-earth computing console (world-wise brain).

**As shown in figure 10:**

According to this series of research, the main functions of GSD should include at least the following three aspects :

- Unified normative measurement across borders, domains and levels. Dimensional norm/attribute synthesis/weight analysis/unified processing/configuration measurement/efficacy analysis/system synthesis/value measurement/whole process analysis/whole course processing
- Holo-synergic intelligent drive across borders, domains and levels compilation norm/supply-demand menu/menu sequence/compilation engine/matching analysis/Intelligent synthesis/docking engine/system drive/whole course docking/whole course analysis
- Holo-synergic dispatching center across borders, domains and levels dynamic goal/task set/specialty convergence classification-grading/tradeoff analysis/task assignment/synergic dispatching/process switching/mode conversion/intelligent synthesis/dynamic configuration/dynamic monitoring



**Figure 10:** Global service dispatcher with three functional modules.

By the development assumption of sky-earth computing technology proposed in this series of studies, global service dispatcher (GSD) is the main component of the world-wise brain (sky-earth computing console). In addition to the three functions of GSD, the world-wise brain should also have the following eight main functions:

[Internet sky-earth]

homepage browsing - offline browsing - bookmarking tools - dial time - mail processing

homepage making - webpage assistant - Website promotion - FTP tool - download tool

network sharing - search engine - remote monitoring - news reading - IP tools - file sharing

[system tools]

desktop tools - clip tools - switch timing - memory tools - disk tools

data backup - style theme - U disk tool - CD disk tool - data recovery - system others

[work sky-earth]

compression-decompression - file management - clock and calendar - e-reading - word processing

printing tools - translation - information management - miscellaneous tools - file repair

calculator class - industry software - programming tools - installation and production - compilation tools - spatiotemporal navigation

[life sky-earth]

map navigation - life services - diet health - financial management - social chat

network phone - image processing - animation production - image browsing - image management

3D production class - flash bar

[learning sky-earth]

foreign language learning - information reading - self study - examination system

astronomy geography - electronic classroom - arts and technology tools - excellent books

[film and television sky-earth]

video playback - audio playback - desktop production - media management - WINAMP area

media production - network TV - media on demand

[entertainment sky-earth]

Interesting software - game tools - simulators - puzzle games - online games - computer games

]safety management]

virus prevention - system security - network security - password management

If we say that the sky-earth computing console is an extension of the global service dispatcher, then the sky-earth computing worktop (SECW) to be vigorously developed is an extension of the sky-earth computing console.

Sky-earth computing worktop can be divided into large fixed worktop and portable mobile worktop.

For the 610 technical invention patent applications mentioned earlier in this article, please see Table 1 - Table 4. These 610 technological inventions jointly form a network technology support system of value chain systems engineering, involving 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.

The sky-earth management system proposed by inventor Li Zongcheng for expanding the technical foundation of cloud computing and Internet of things through a number of patent applications is to combine artificial intelligence operation system (AIS) and natural intelligence operation system (NIS) on the information interface between real physical space and electronic virtual space in a graphical operation mode for value chain. Then, the cognitive system and its computer network aux-technology (RS/CNT) is combined with the practice system and its computer network aux-technology (PS/CNT), so as to form a new control system.

The sky-earth computing proposed by inventor Li Zongcheng through many patent applications for invention is a systems engineering model of all-interconnected ecosphere which integrates logistics network, knowledge network and financial network on the platform of information network. It is not only for computer and information network, but also for logistics network, knowledge network and financial network; It not only involves the app-programs and processes of telecommunication network, radio- television network, Internet, sensor network, and Internet of things, but also involves the app-programs and processes of energy network,

Project No. Application No.	Project No. Application No.	Project No. Application No.
Item 001 201110346982.6	Item 002 201110346909.9	Item 003 201110346728.6
Item 004 201110346983.0	Item 005 201110346626.4	Item 006 201110346910.1
Item 007 201110346876.8	Item 008 201110346877.2	Item 009 201110346744.5
Item 010 201210062908.6	Item 011 201110346775.0	Item 012 201110346771.2
Item 013 201110346922.4	Item 014 201110347093.1	Item 015 201110347017.0
Item 016 201110347018.5	Item 017 201110347094.6	Item 018 201110347019.X
Item 019 201110346924.3	Item 020 201110347147.4	Item 021 201210062859.6
Item 022 201110348563.6	Item 023 201110346916.9	Item 024 201110334799.4
Item 025 201110337514.2	Item 026 201110335282.7	Item 027 201110334800.3
Item 028 201110335283.1	Item 029 201110335284.6	tem 030 201110335285.0
Item 031 201110335281.2	Item 032 201110335975.6	Item 033 201210062281.4
Item 034 201110346600.X	Item 035 201110335965.2	Item 036 201110335977.5
Item 037 201110337515.7	Item 038 201110335961.4	Item 039 201110335962.9
Item 040 201110338631.0	Item 041 201110348656.9	Item 042 201110348587.1
Item 043 201110348225.2	Item 044 201110348588.6	Item 045 201110348589.0
Item 046 201110348590.3	Item 047 201110348611.1	Item 048 201110348612.6
Item 049 201110348663.9	Item 050 201110348614.5	Item 051 201110348613.0
Item 052 201110348219.7	Item 053 201210062946.1	Item 054 201110348332.5
Item 055 201110348615.X	Item 056 201110348586.7	Item 057 201110348304.3
Item 058 201110348561.7	Item 059 201110348562.1	Item 060 201110348661.X
Item 061 201110347106.5	Item 062 201110347107.X	Item 063 201110346944.0
Item 064 201110347086.1	Item 065 201110346954.4	Item 066 201110346966.7
Item 067 201110347225.0	Item 068 201110346968.6	tem 069 201110346971.8
Item 070 201110347087.6	Item 071 201110347195.3	Item 072 201110347065.X
Item 073 201110347004.3	Item 074 201110347272.5	Item 075 201110347108.4
Item 076 201110346973.7	Item 077 201110346975.6	Item 078 201110347161.4
Item 079 201110346988.3	Item 080 201110346990.0	Item 081 201110349521.4
Item 082 201110335446.6	Item 083 201110338632.5	Item 084 201110335366.0
Item 085 201110335367.5	Item 086 201110335368.X	Item 087 201110338461.6
Item 088 201110335963.3	Item 089 201110335369.4	Item 090 201110335964.8
Item 091 201110336715.0	Item 092 201110335978.X	Item 093 201110335979.4
Item 094 201110335976.0	Item 095 201110336714.6	Item 096 201110335447.0
Item 097 201110338462.0	Item 098 201110335448.5	Item 099 201110335449.X
Item 100 201110338463.5	Item 101 201110347047.1	Item 102 201110346698.9
Item 103 201110346729.0	Item 104 201110346730.3	Item 105 201110347048.6
Item 106 201110346961.4	Item 107 201110346962.9	Item 108 201110346963.3
Item 109 201110347049.0	Item 110 201110347050.3	Item 111 201110346931.3
Item 112 201110347055.6	Item 113 201110346964.8	Item 114 201110346965.2
Item 115 201110347091.2	Item 116 201110346702.1	Item 117 201110346736.0
Item 118 201110347077.2	Item 119 201110346905.0	Item 120 201110347092.7
Item 121 201110336637.4	Item 122 201110336199.1	Item 123 201110336633.6
Item 124 201110336198.7	Item 125 201110336313.0	Item 126 201110336197.2
Item 127 201110336626.6	Item 128 201110336312.6	Item 129 201110336311.1
Item 130 201110336616.2	Item 131 201110336196.8	Item 132 201110336160.X
Item 133 201110336596.9	Item 134 201110336159.7	Item 135 201110336562.X

**Table 1:** Patent application catalogue of 610 technical inventions (technological system of sky-earth computing).  
(inventor and applicant: Li Zongcheng).



Project No. Application No.	Project No. Application No.	Project No. Application No.
Item 136 201110336546.0	Item 137 201110336158.2	Item 138 201110336157.8
Item 139 201110336156.3	Item 140 201110335645.7	Item 141 201110342396.4
Item 142 201110342341.3	Item 143 201110342370.X	Item 144 201110342369.7
Item 145 201110342368.2	Item 146 201110342270.7	Item 147 201110342363.X
Item 148 201110342362.5	Item 149 201110342269.4	Item 150 201110342367.8
Item 151 201110342652.X	Item 152 201110342268.X	Item 153 201110342366.3
Item 154 201110342435.0	Item 155 201110342651.5	Item 156 201110342310.8
Item 157 201110342155.X	Item 158 201110342361.0	Item 159 201110342267.5
Item 160 201110342154.5	Item 161 201110346929.6	Item 162 201110359852.6
Item 163 201110347054.1	Item 164 201110347043.3	Item 165 201110347095.0
Item 166 201110347042.9	Item 167 201110347159.7	Item 168 201110347041.4
Item 169 201110347020.2	Item 170 201110346952.5	Item 171 201110346927.7
Item 172 201110347053.7	Item 173 201110347157.8	Item 174 201110347156.3
Item 175 201110347052.2	Item 176 201110347051.8	Item 177 201110347149.3
Item 178 201110346935.1	Item 179 201110346934.7	Item 180 201110346926.2
Item 181 201110342266.0	Item 182 201110342290.4	Item 183 201110342278.3
Item 184 201110342247.8		
Item 185 201110342166.8	Item 186 201110342153.0	Item 187 201110342152.6
Item 188 201110342236.X	Item 189 201110342151.1	Item 190 201110342225.1
Item 191 201110342420.4	Item 192 201110342668.0	Item 193 201110342430.8
Item 194 201110342170.4	Item 195 201110342406.4	Item 196 201210062786.0
Item 197 201110342388.X	Item 198 201110344778.0	Item 199 201110342429.5
Item 200 201110342428.0	Item 201 201110342143.7	Item 202 201110341388.8
Item 203 201110342302.3	Item 204 201110341961.5	Item 205 201110341910.2
Item 206 201110342301.9	Item 207 201110341750.1	Item 208 201110341909.X
Item 209 201210062858.1	Item 210 201110348658.8	Item 211 201110342403.0
Item 212 201110342387.5	Item 213 201110342451.X	Item 214 201110342168.7
Item 215 201210062787.5	Item 216 201110342386.0	Item 217 201110342167.2
Item 218 201110342402.6	Item 219 201210064115.8	Item 220 201110342401.1
Item 221 201110346896.5	Item 222 201110346869.8	Item 223 201110346890.8
Item 224 201110346889.5	Item 225 201110346948.9	Item 226 201110346947.4
Item 227 201110346609.0	Item 228 201110346888.0	Item 229 201110349522.9
Item 230 201110346946.X	Item 231 201110346887.6	Item 232 201110346886.1
Item 233 201110346920.5	Item 234 201110346919.2	Item 235 201110346868.3
Item 236 201110346727.1	Item 237 201110346918.8	Item 238 201210062909.0
Item 239 201110346976.0	Item 240 201110346932.8	Item 241 201110349423.0
Item 242 201210062906.7	Item 243 201110346768.0	Item 244 201110345896.3
Item 245 201110341965.3	Item 246 201110342215.8	Item 247 201110342195.4
Item 248 201110342115.5	Item 249 201110341964.9	Item 250 201110341963.4
Item 251 201110342204.X	Item 252 201110342114.0	Item 253 201110342214.3
Item 254 201110342213.9	Item 255 201110342212.4	Item 256 201110342211.X
Item 257 201110341980.8	Item 258 201110342331.X	Item 259 201110342305.7
Item 260 201110341979.5	Item 261 201210062199.1	Item 262 201110336422.2
Item 263 201110335921.X	Item 264 201110335915.4	Item 265 201210062200.0
Item 266 201110336421.8	Item 267 201110335914.X	Item 268 201110336424.1

**Table 2:** Patent application catalogue of 610 technical inventions (technological system of sky-earth computing).  
(inventor and applicant: Li Zongcheng).

Project No. Application No.	Project No. Application No.	Project No. Application No.
Item 269 201110335913.5	Item 270 201110336370.9	Item 271 201110336369.6
Item 272 201110335912.0	Item 273 201110335911.6	Item 274 201110336368.1
Item 275 201110336470.1	Item 276 201110336240.5	Item 277 201110335653.1
Item 278 201110335652.7	Item 279 201110336239.2	Item 280 201110335651.2
Item 281 201110342176.1	Item 282 201110344777.6	Item 283 201110342028.X
Item 284 201110342332.4	Item 285 201110340670.4	Item 286 201110346772.7
Item 287 201110342027.5	Item 288 201110341747.X	Item 289 201110342026.0
Item 290 201110341746.5	Item 291 201110341748.4	Item 292 201110341700.3
Item 293 201110341749.9	Item 294 201110344750.7	Item 295 201110341693.7
Item 296 201110341699.4	Item 297 201110344749.4	Item 298 201110341692.2
Item 299 201110346168.4	Item 300 201110346169.9	Item 301 201110341389.2
Item 302 201110342304.2	Item 303 201110341978.0	Item 304 201110341977.6
Item 305 201110341976.1	Item 306 201110342303.8	Item 307 201110342427.6
Item 308 201210062788.X	Item 309 201110342667.6	Item 310 201110342405.X
Item 311 201110342666.1	Item 312 201110342404.5	Item 313 201110342470.2
Item 314 201110342365.9	Item 315 201110342454.3	Item 316 201110342655.3
Item 317 201110342169.1	Item 318 201110342364.4	Item 319 201110345899.7
Item 320 201110340814.6	Item 321 201110347090.8	Item 322 201110346917.3
Item 323 201210062129.6	Item 324 201210062907.1	Item 325 201110347011.3
Item 326 201110347257.0	Item 327 201110347088.0	Item 328 201110347089.5
Item 329 201110347256.6	Item 330 201110347259.X	Item 331 201110347241.X
Item 332 201110347243.9	Item 333 201110347002.4	Item 334 201110347222.7
Item 335 201110372571.4	Item 336 201110347062.6	Item 337 201110347064.5
Item 338 201110347063.0	Item 339 201210062947.6	Item 340 201110347245.8
Item 341 201110336367.7	Item 342 201110336366.2	Item 343 201110335720.X
Item 344 201110336293.7	Item 345 201110336295.6	Item 346 201110336294.1
Item 347 201110335716.3	Item 348 201110335718.2	Item 349 201110335717.8
Item 350 201110335719.7	Item 351 201110335698.9	Item 352 201110336292.2
Item 353 201110334798.X	Item 354 201110336291.8	Item 355 201110344746.0
Item 356 201110335697.4	Item 357 201110335504.5	Item 358 201110335696.X
Item 359 201110335700.2	Item 360 201110335655.0	Item 361 201110336088.0
Item 362 201110335572.1	Item 363 201110336017.0	Item 364 201110335574.0
Item 365 201110335571.7	Item 366 201110336086.1	Item 367 201110336020.2
Item 368 201110335505.X	Item 369 201110335503.0	Item 370 201110335573.6
Item 371 201110336087.6	Item 372 201110336016.6	Item 373 201210062856.2
Item 374 201110335601.4	Item 375 201110335575.5	Item 376 201110336019.X
Item 377 201110336018.5	Item 378 201110335370.7	Item 379 201110334625.8
Item 380 201110335654.6	Item 381 201110347100.8	Item 382 201110346897.X
Item 383 201110346899.9	Item 384 201110346949.3	Item 385 201110346880.4
Item 386 201110346950.6	Item 387 201110347098.4	Item 388 201110346981.1
Item 389 201110346980.7	Item 390 201110346281.2	Item 391 201110346240.3
Item 392 201210062857.7	Item 393 201110346284.6	Item 394 201110346907.X
Item 395 201110346769.5	Item 396 201110346770.8	Item 397 201110346996.8
Item 398 201110346898.4	Item 399 201110346908.4	Item 400 201110346900.8
Item 401 201110348217.8	Item 402 201110348279.9	Item 403 201110348214.4

**Table 3:** Patent application catalogue of 610 technical inventions (technological system of sky-earth computing).  
(inventor and applicant: Li Zongcheng).

Project No. Application No.	Project No. Application No.	Project No. Application No.
Item 404 201110348211.0	Item 405 201110348565.5	Item 406 201110348233.7
Item 407 201110348564.0	Item 408 201110348313.2	Item 409 201110348307.7
Item 410 201110348215.9	Item 411 201110348301.X	Item 412 201110348218.2
Item 413 201110348259.1	Item 414 201110348231.8	Item 415 201110348232.2
Item 416 201110348256.8	Item 417 201110348216.3	Item 418 201110348213.X
Item 419 201110348235.6	Item 420 201110348223.3	Item 421 201110336440.0
Item 422 201110336043.3	Item 423 201110336484.3	Item 424 201110336083.8
Item 425 201110336084.2	Item 426 201110336042.9	Item 427 201110336777.1
Item 428 201110345900.6	Item 429 201110336592.0	Item 430 201110336045.2
Item 431 201110336044.8	Item 432 201110335644.2	Item 433 201110336041.4
Item 434 201110336082.3	Item 435 201110336593.5	Item 436 201110336501.3
Item 437 201110336081.9	Item 438 201110336591.6	Item 439 201110336594.X
Item 440 201110336476.9	Item 441 201110336703.8	Item 442 201110336411.4
Item 443 201110336261.7	Item 444 201110336650.X	Item 445 201110336412.9
Item 446 201210078424.0	Item 447 201110336263.6	Item 448 201110336682.X
Item 449 201110336321.5	Item 450 201110336265.5	Item 451 201110336645.9
Item 452 201110336621.3	Item 453 201110336262.1	Item 454 201110336085.7
Item 455 201110336314.5	Item 456 201110336660.3	Item 457 201110336685.3
Item 458 201110336264.0	Item 459 201110336414.8	Item 460 201110336595.4
Item 461 201110347010.9	Item 462 201110346998.7	Item 463 201110346940.2
Item 464 201110346913.5	Item 465 201110346939.X	Item 466 201110346997.2
Item 467 201110347008.1	Item 468 201110347007.7	Item 469 201110346999.1
Item 470 201110347006.2	Item 471 201210062910.3	Item 472 201110346977.5
Item 473 201110346984.5	Item 474 201110347118.8	Item 475 201110346937.0
Item 476 201110347009.6	Item 477 201110346985.X	Item 478 201110347046.7
Item 479 201110346936.6	Item 480 201110346938.5	Item 481 201110336237.3
Item 482 201110335952.5	Item 483 201110335603.3	Item 484 201110336238.8
Item 485 201110335602.9	Item 486 201110336089.5	Item 487 201110336236.9
Item 488 201110335605.2	Item 489 201110335604.8	Item 490 201110336090.8
Item 491 201110335923.9	Item 492 201110335924.3	Item 493 201110335951.0
Item 494 201110336468.4	Item 495 201110336425.6	Item 496 201110336467.X
Item 497 201110336469.9	Item 498 201110336466.5	Item 499 201110335925.8
Item 500 201110335922.4	Item 501 201110345917.1	Item 502 201110336568.7
Item 503 201110336514.0	Item 504 201110335986.4	Item 505 201110345916.7
Item 506 201110336576.1	Item 507 201110336515.5	Item 508 201110335989.8
Item 509 201110335990.0	Item 510 201110336543.7	Item 511 201110335973.7
Item 512 201110345919.0	Item 513 201110336511.7	Item 514 201110335954.4
Item 515 201110346170.1	Item 516 201110336436.4	Item 517 201110336513.6
Item 518 201110335955.9	Item 519 201110335971.8	Item 520 201110336566.8
Item 521 201110347177.5	Item 522 201110347188.3	Item 523 201110347131.3
Item 524 201110347132.8	Item 525 201110347044.8	Item 526 201110347066.4
Item 527 201110347166.7	Item 528 201110347186.4	Item 529 201110347068.3
Item 530 201110347151.0	Item 531 201110347059.4	Item 532 201110347110.1
Item 533 201110347138.5	Item 534 201110347153.X	Item 535 201110347109.9
Item 536 201110347027.4	Item 537 201110347273.X	Item 538 201110346766.1

**Table 4:** Patent application catalogue of 610 technical inventions (technological system of sky-earth computing).  
(inventor and applicant: Li Zongcheng).

Project No. Application No.	Project No. Application No.	Project No. Application No.
Item 539 201110347056.0	Item 540 201110347070.0	Item 541 201110341390.5
Item 542 201210062790.7	Item 543 201110342112.1	Item 544 201110342113.6
Item 545 201110342089.6	Item 546 201210062789.4	Item 547 201110342335.8
Item 548 201110342192.0	Item 549 201110342111.7	Item 550 201110341962.X
Item 551 201110341695.6	Item 552 201110341908.5	Item 553 201110342029.4
Item 554 201110341906.6	Item 555 201110341694.1	Item 556 201110342030.7
Item 557 201110342333.9	Item 558 201110341907.0	Item 559 201110342178.0
Item 560 201110342334.3	Item 561 201110347194.9	Item 562 201110347191.5
Item 563 201110347078.7	Item 564 201110347096.5	Item 565 201110346941.7
Item 566 201110347160.X	Item 567 201110347045.2	Item 568 201110347193.4
Item 569 201110347061.1	Item 570 201110347158.2	Item 571 201110347128.1
Item 572 201110345918.6	Item 573 201110346757.2	Item 574 201110347016.6
Item 575 201110347126.2	Item 576 201110346979.4	Item 577 201110346978.X
Item 578 201110347146.X	Item 579 201110346915.4	Item 580 201110347000.5
Item 581 201110339050.9	Item 582 201110345920.3	Item 583 201110341697.5
Item 584 201110346767.6	Item 585 201110344748.X	Item 586 201110344776.1
Item 587 201110344747.5	Item 588 201110340815.0	Item 589 201110341696.0
Item 590 201110341691.8	Item 591 201110341698.X	Item 592 201110339049.6
Item 593 201110345910.X	Item 594 201110346166.5	Item 595 201110345909.7
Item 596 201110346773.1	Item 597 201110345898.2	Item 598 201110345908.2
Item 599 201110346167.X	Item 600 201110341311.0	Item 601 201210156101.9
Item 602 201210156064.1	Item 603 201210156063.7	Item 604 201210156062.2
Item 605 201210156015.8	Item 606 201210156061.8	Item 607 201210156014.3
Item 608 201210156013.9	Item 609 201210156012.4	Item 610 201210156011.X

**Table 5:** Patent application catalogue of 610 technical inventions (technological system of sky-earth computing).  
(inventor and applicant: Li Zongcheng).

logistics network, sneakernet, financial network and knowledge network.

The above a series of new technologies are interrelated and interdependent, and together constitute the key technology system of intelligent integrated network platform.

In the formation of Internet of everything, at the critical moment when the new civilization is preparing to break the ground in the chaos of the old civilization, the physical technology system (phy-T), information technology system (IT) and psychological technology system (psy-T) are combined to carry out the overall analysis and design. All these will not only bring about the major breakthroughs of technology, engineering and industry, but also bring about the major scientific breakthroughs of science, society and culture. However, the complexity and arduousness of this work far exceeds the simple analysis and design of IT system.

**From SEM to analysis of noum-correlation model**

For the noumenal society hidden behind the phenomenon, especially for the origin, paradigm and mode of the noumenal society, we should consider the analysis of structural equation model that began to be popular in the international academic circles (mainly in the field of modern statistical analysis) since 1990s. The structural equation model abbreviated as SEM, is the modern statistical methods (statistical methodology) based on the technique of statistical analysis, and it can be used to deal with complex multivariate data analysis and research. In general, the structural equation model is classified in the higher statistics, as a ring belonging to multivariate statistics (multivariate statistics).

In order to incorporate the multiple regression analysis, canonical correlation analysis (CCA), discriminant analysis, principal component analysis (PCA) and factor analysis, cluster analysis (CA), multiple scale method, path analysis, structural equation

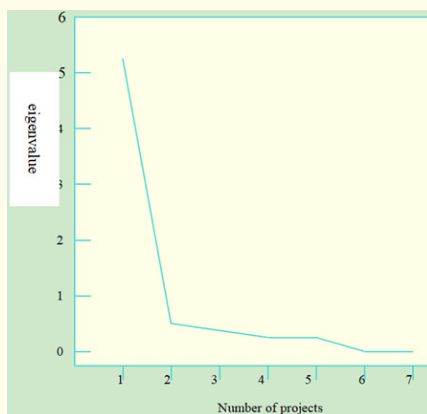




	Initial	Extraction
Project 1	1.000	0.760
Project 2	1.000	0.851
Project 3	1.000	0.599
Project 4	1.000	0.785
Project 5	1.000	0.830
Project 6	1.000	0.913
Project 7	1.000	0.592

**Table 8:** Common Factor Variance.

	Initial	Extraction
Project 1	1.000	0.767
Project 2	1.000	0.854
Project 3	1.000	0.813
Project 4	1.000	0.816
Project 5	1.000	0.855
Project 6	1.000	0.922
Project 7	1.000	0.871

**Table 9:** Common Factor Variance.**Figure 12:** Gravel Map for Comparison of Characteristic Value.

Is called the model of factor analysis. Because the model is carried out to the variables, each factor is orthogonal, it is also called the R type of orthogonal factor model. Its matrix form is:

$$x = AF + e, \quad \text{----- (4)}$$

Where

$$x = (x_1, x_2, \dots, x_p),$$

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1m} \\ a_{21} & a_{22} & \dots & a_{2m} \\ \dots & \dots & \dots & \dots \\ a_{p1} & a_{p2} & \dots & a_{pm} \end{pmatrix}, F = (F_1, F_2, \dots, F_m),$$

$$e = (e_1, e_2, \dots, e_p);$$

Here

$m < p$ ;

$\text{Cov}(F, e) = 0$ , that is  $F$  and  $e$  aren't related;

$D(F) = Im$ , that is  $F_1, F_2, \dots, F_m$  aren't related, and their variances are 1;  $D(e) = 0$ , that is  $e_1, e_2, \dots, e_p$  aren't related, and their variance are different.

$F$  is taken as the common factor or latent factor of  $x$ , matrix  $A$  is called the factor load matrix, and  $e$  is called the special factor of  $x$ .  $A = (a_{ij})$ ,  $a_{ij}$  is as factor loading. It can be proved mathematiccally that the factor load  $a_{ij}$  is the correlation coefficient between the  $i$ -th variable and the  $j$ -th factor, which reflects the importance of the  $i$ -th variable in the  $j$ -th factor.

In this model,  $F_1, F_2, \dots, F_m$  are the master factor or common factor, which is a common factor in the expression of various variables of primitive observation, and they are mutually independent variable of theory. The meaning of common factors must be combined with the practical significance of the specific problems.  $e_1, e_2, \dots, e_p$  are special factors, which are the specific factors of components  $x_i$  ( $i = 1, 2, \dots, p$ ) of vector  $x$ , the special factors are independent each other, the special factors and all the common factors are also independent each other. In this model, the element  $(a_{ij})$  in load matrix  $A$  is the factor load. Factor load  $a_{ij}$  is a covariance of  $x_i$  and  $F_j$ .

Project	Initial eigenvalue			Extraction square and loading			Rotating square and loading		
	Total	Variance %	Accum %	Total	Variance %	Accum %	Total	Variance %	Accum %
1	5.331	76.151	76.151	5.331	76.151	76.151	3.168	45.261	45.262
2	0.568	8.108	84.259	0.568	8.108	84.259	2.730	39.997	84.259
3	0.410	5.859	90.117						
4	0.278	3.976	94.094						
5	0.233	3.327	97.421						
6	0.107	1.531	98.951						
7	0.073	1.049	100.00						

**Table 10:** Total Variance of Explanation (Principal Project Analysis).

but also a correlation coefficient of  $x_i$  and  $F_j$ , which indicates the degree of  $x_i$  dependent  $F_j$ .  $a_{ij}$  can be regarded as the weight of the  $i$ -th variable in the  $j$ -th common factor; the greater the absolute value of  $a_{ij}$  ( $|a_{ij}| \in 1$ ) is, the greater it shows the dependency degree of  $x_i$  and  $F_j$  is, or the greater the load of common factor  $F_j$  for  $x_i$  is. In order to get the explanation on factor analysis, in factor load matrix  $A$  there are two statistics to be very important, that is, the variables commonality and the variance contribution of common factor.

The quadratic sum of the  $i$ -th row ( $i = 1, 2, \dots, p$ ) of elements in factor load matrix  $A$  is denoted as  $h_i$ , known as the commonality of variable  $x_i$ . It is the contribution of all the common factors to the variance of  $x_i$ , which reflects the influence of all the common factors on variable  $x_i$ . The greater  $h_i$  is, the greater it shows that the co-dependent degree of the  $i$ -th component  $x_i$  of  $x$  to each component  $F_1, F_2, \dots, F_m$  of  $F$  is. The quadratic sum of the  $j$ -th column ( $j = 1, 2, \dots, m$ ) of elements in factor load matrix  $A$  is denoted as  $g_j$ , known as the variance contribution of common factor  $F_j$  to  $x$ .  $g_j$  expresses the sum of variance of the  $j$ -th common factor  $F_j$  for each component  $x_i$  ( $i = 1, 2, \dots, p$ ) of  $x$ , it is an index to measure the relative importance of the common factor. The greater  $g_j$  is, the greater it shows the contribution of common factor  $F_j$  to  $x$ , or the greater the function and influence of  $F_j$  to  $x$  is. If all  $g_j$  ( $j = 1, 2, \dots, m$ ) in factor loading matrix  $A$  are calculated, which can be sorted by size, we can refine the common factor with the most influential power.

### Sky-earth computing for new civilized world

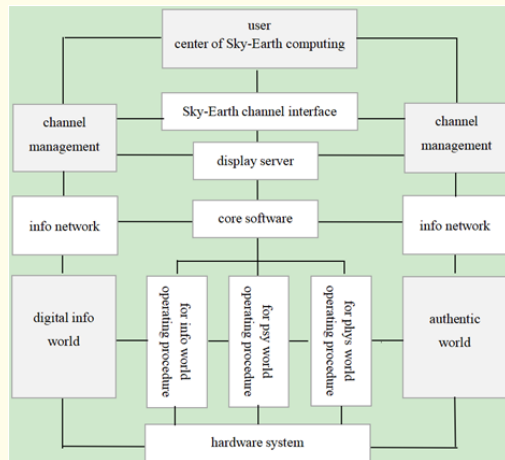
Now, let's realize the intelligent integration of socialization from the subject of computation, the object of computation, the technol-

ogy of computation, the organization of computation, the space of computation, the basis of computation, as well as the system, network and environment of computation, so that it is from activities, systems and network systems (complex technical network system and simple social network system) to transform all kinds of computing at all levels into the Internet system of everything and the complex social network system, and finally into the intelligent-integrating system engineering of socialization.

The sky-earth computing proposed to establish in this series of papers is a kind of computing which is different from traditional computing and modern computing. It makes full use of and comprehensively expands artificial intelligence, Internet of things and cloud computing, as shown in figure 13.

First of all, the difference between Sky-Earth computing and traditional and modern computing, lies in the different subject of computation. The subject of Sky-Earth computing is a special man-machine (human and computer, mobile phone, robot) agent, and in our view, man-machine agent is a typical intelligent-integration subject. Through single and many human-computer agents, we can turn every person, every group, every organization, every department, every region and every society into intelligent-integration subject. In addition to the rest time, every individual, every family, every organization, every community, every sector, every town, every region, every country, every international organization and every global organization, as a social intelligent computer system at all levels, carries out calculation (information processing and data analysis) all the time, and this kind of calculation (informa-

tion processing and data analysis) is often closely related to the life, work, leisure and other activities carried out by all kinds of subjects at all levels.



**Figure 13:** With Various Users at All Levels as the Computing Center, Sky-Earth Channel Interface between actual World and information world.

Secondly, the difference between Sky-Earth computing and traditional and modern computing, lies in the different objects of computation. In our view, everyone, every organization and every society has its own Sky and earth, and the various Sky-Earth at all levels are the various world at all levels, as well as the various ecosystem systems at all levels. The various Sky-Earth, worlds and ecosystems at all levels can be divided into two parts: the actual world (physical and psychological actual world) and the information world (digital and analog information world). Therefore, everyone, every organization and every society has their own Sky-Earth computing, and the various Sky-Earth computing are the various wisdom-fusing system engineering at all levels.

Thirdly, the difference between Sky-Earth computing and traditional and modern computing, lies in the difference in the different center of computation. 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 ecosystems at all levels. 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-world scenes and info-world scenes; or, physical, informational, psychological scenes; or, natural and social scenes), and then faces the various environments of users (actual and informational environment; or physical, informational, psychological environments; or natural and social environment).

The difference between Sky-Earth computing and traditional and modern computing, mainly lies in the different ways of computation. As shown in figure 14, the graphic interface system which establishes a connection channel between the inside and outside of the Sky-Earth (as the world-ecosystem system) of users (individuals, organizations and society), has become the component of Sky-Earth computing in the mobile ecosystem. The interface system of Sky-Earth channel supports the implementation of the Sky-Earth channel manager.

The Sky-Earth channel interface system enables the users (individuals, organizations, and society) of Sky-Earth computing system engineering to work with multi-channel programs in the physical world, the information world and the psychological world in their own Sky-Earth. The operation program of each channel runs in the user's own Sky-Earth channel, that is, in the graphic on the interface. 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 difference between Sky-Earth computing and traditional and modern computing, mainly lies in the different levels of computing. 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 for the Internet system of everything, and then become a complex social network system, and finally become a social intelligent-integrating system engineering.

As shown in figure 14: as an intelligent-integrating system engineering, Sky-Earth computing is not only a computation for the actual world, but also a computation for the info world. It combines the calculation of biological intelligence with that of artificial intelligence and that of social intelligence, so it has its own complex technical architecture. This complex advanced wisdom- technological system of intelligence, synergy and socialization includes the following four basic levels.

The overall level is the synergistic architecture for an intelligent integration. The synergy among physical computing, information computing and psychological computing can be divided into five aspects: synergistic interface, synergistic registration, synergistic search, synergistic access and synergistic process.



Figure 14: Architecture of Sky-Earth Computing Technical System.

The basic level is the Sky-Earth computer mechanism of advanced wisdom. We can establish a new computer system in the following aspects: application docking platform, supply-demand docking platform, fused measurement system, reasonable trade-off scheduling, load balancing disposal.

The management level is composed of synergistic function module of advanced wisdom. It includes the following aspects:

In addition, the technologies of Sky-Earth computing include: traditional computing technology, communication technology, information technology, electronic computing technology, network technology, big data technology, artificial intelligence technology, Internet of things technology, blockchain technology, game technology (game strategy), decision-making technology, coordination technology, social organization technology and system engineering technology.

The foundation and environment of Sky-Earth computing is also a complex system, involving the following aspects: Basic management; Network management; Space resources; Environmental resources.

Through the fourth industrial revolution led by the Internet of things, cloud computing and artificial intelligence, and through the new technological revolution and new industrial revolution led by intelligent integration, ecological interconnection and Sky-Earth computing, we can build a wisdom synergistic ecosphere between the information ecosphere and the actual ecosphere, and then between the information world computing and the actual world computing, so as to change the old civilized world and create a new civilized world.

### Conclusion

The sky-earth computing technology and sky-earth computing system engineering proposed in this series of studies to be vigorously developed, should take a user as their center, facing the super metaverse ecosphere (SME) based on the interconnection of all things. A user's all-interconnected ecosphere is defined here as the interaction system formed by all the factors that have direct and indirect contact with the user according to the complex relationship

structure. Through the technology development of sky-earth computing system engineering, a customized global service dispatcher (GSD) can be provided for each user (individual, group, whole).

By the analysis and design of this series of articles, with cyber-life as the center, using big data platform, IOT, AI technology, as well as the sky-earth computing system engineering that we advocate to develop and implement, we integrate cyber-natural system and cyber-social system, and establish a super metaverse system (SMS) for the new civilized world. As the technical foundation of the hyper-cyber world system, the "sky-earth computing" (SEC) proposed in this series of research to develop is a hyper-cyber world computing mode that combines the traditional computing mode in various professional application fields with the modern computing mode in the field of information network technology (represented by distributed computing, grid computing, cloud computing and cluster computing). Here, "Sky (or Heaven)" metaphors the information world in the field of digital network technology, and "Earth" metaphors the real world in various professional application fields. We propose to provide a customized global-service dispatcher (GSD) and its enhanced version of the world-wise brain (WWB) with the user as the center and facing the ecosphere of this user in Internet of everything.

### Acknowledgements

I would like to express my sincere gratitude to the domestic and foreign researchers, my colleagues and relatives. Without their enlightening instruction, impressive kindness and help, I could not have completed my work.

### Bibliography

1. J Höller, *et al.* "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence". Elsevier, (2014).
2. Farooq M U, *et al.* "A Critical Analysis on the Security Concerns of Internet of Things (IoT)". *International Journal of Computer Applications (IJCA)* 11 (2015).
3. Ersue M, *et al.* "Management of Networks with Constrained Devices: Use Cases". *IETF Internet Draft* 4 July (2014).
4. Zakas Nicholas C. "The Evolution of Web Development for Mobile Devices: Building Web sites that perform well on mobile devices remains a challenge". *Association for Computing Machinery* 17 February (2013).
5. Seaver N. "Captivating algorithms: Recommender systems as traps". *Journal of Material Culture* (2018): 1-2.
6. Grosman J. "Technical Report in the frame Pervasive and User Focused Biometrics Border Project (PROTECT)". *Ethical and Social Issues* (2018).
7. Helene Ratner and Evelyn Ruppert. "Producing and projecting data: Aesthetic practices of government data portals". *Big Data and Society*, July 8, (2019).
8. Allen Corey. "How Big Data Can Improve Healthcare". *UBC News*, January 8, (2015).
9. Tom Simonite. "2014 in Computing: Breakthroughs in Artificial Intelligence". *MIT Technology Review* 29 Dec (2014).
10. Katz Yarden. "Noam Chomsky on Where Artificial Intelligence Went Wrong". *The Atlantic*. 1 November (2012).
11. Algaze Guillermo. *The Uruk World System: The Dynamics of Expansion of Early Mesopotamian Civilization*, Second Edition, 2004; Wilkinson, David, *The Power Configuration Sequence of the Central World System, 1500-700 BCE*, (2001).
12. Crawford Sue ES and Elinor Ostrom. "A Grammar of Institutions". *American Political Science Review* 89.3 (1995): 582-600.
13. Edward R Deway and Og Mandino. "Cycles: the mysterious forces that trigger events" (1973).
14. Jensen Derrick. "Endgame: The Problem of Civilisation". Vol 1, Vol 2, Seven Stories Press, (2006).
15. Turchin P, *et al.* "History and Mathematics: Historical Dynamics and Development of Complex Societies". Moscow: Kom-Kniga (2007).
16. Harry F Dahms. "The Matrix Trilogy as Critical Theory of Alienation: Communicating a Message of Radical Transformation". *Transdisciplinary Journal of Emergence* 3.1 (2005): 108-124.



17. Lee Jay., *et al.* "Recent Advances and Trends of Cyber-Physical Systems and Big Data Analytics in Industrial Informatics". IEEE Int. Conference on Industrial Informatics (INDIN) (2014).
18. Dedić N and Stanier C. "Towards Differentiating Business Intelligence, Big Data, Data Analytics and Knowledge Discovery". 285. Berlin ; Heidelberg: Springer International Publishing.
19. Delone W H and Mclean ER. "Measuring e-commerce success: Applying the DeLone and McLean information systems success model". *International Journal of Electronic Commerce* 9.1 (2014): 31-47.
20. Perera Charith., *et al.* "The Emerging Internet of Things Marketplace From an Industrial Perspective: A Survey". Emerging Topics in Computing, IEEE Transactions on. PrePrint. 1 February (2015).
21. Qin Z., *et al.* "E-Commerce Strategy". Heidelberg: Springer Berlin Heidelberg, (2014).
22. Lucas H. "An ecological circle". *Australian Nurses Journal* 22.1 (1992): 22-23.
23. Blood D A. "An ecological study of California bighorn sheep *Ovis canadensis californiana* (Douglas) in southern British Columbia". University of British Columbia, (1961): 303-315.
24. Bonfil R., *et al.* "Distant water fleets : an ecological, economic and social assessment". Fisheries Centre, University of British Columbia, (1998).
25. Collette L K. "An ecological assessment of Russian olive in western Canada : predicted distribution across its invaded range and insect associations in southern BC". University of British Columbia, (2014): 76-83.
26. Dedić N and Stanier C. "Towards Differentiating Business Intelligence, Big Data, Data Analytics and Knowledge Discovery". Berlin; Heidelberg: Springer International Publishing, (2017): 285.