Decentralized Collaboration

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Abstract

Many people and all kinds of things will be linked to the Internet in the near future, resulting in innovation. Each component will act autonomously, and a new ecosystem will be built where relationships will change dynamically.

Keywords: Internet of Things, blockchain, API economy

1. Peer-to-peer society

The Internet, for which no centralized management mechanism exists, has changed the information distribution system via peer-to-peer networks, where users are interconnected on an equal basis. Organizational structures are being flattened and decentralized, and open systems are spreading throughout society at large.

2. Building a collaborative economy

All types of information are circulating on the Internet, which is used by more than 3.4 billion people in the world. Large amounts of knowledge and know-how are contained within online encyclopedias, which let anyone edit topics at will. In this collective intelligence approach, individual authors contribute knowledge from their specialty areas. Because inaccurate information is corrected over time, encyclopedias created in this way are comparable in accuracy to those edited by experts. Some believe that these encyclopedias offer detailed information that ordinary encyclopedias do not address.

Other examples for similar uses of collective intelligence include investigating the causes of illnesses and developing therapeutic methods based on various kinds of information provided by the patients, and participatory sensing where individuals' smartphones are used for monitoring the environment and acquiring data on traffic conditions. While ordinary sensors are more precise than participatory sensors, they are expensive, and thus, measurement locations are limited. Although sensors such as those in smartphones may be lower in precision, their ability to collect huge amounts of data over wide areas results in a low rate of overall errors. Participatory sensing is also used for purposes such as map information updates and urban planning.

To encourage open innovation, an increasing number of companies are utilizing crowdsourcing, which is the practice of soliciting the knowledge, know-how, services, and work from the general public. Its uses have expanded to include the development of new products and services, generation of problem-solving ideas, and the application of specialized expertise and skills. Professionals also use crowdsourcing to leverage their skills and expertise by identifying opportunities.

Crowdfunding is the practice of soliciting funds from the general public, enabling innovation by opening up new opportunities of funding startups. It diversifies financial risks and introduces a new decision-making mechanism for financing that enables even companies without collateral to raise funds if they win support for innovative ideas. A growing number of large companies as well as small businesses use crowdfunding for development of new products because they can derive benefits such as the improvement of ideas during the development stage and prediction of reactions via communication with the market.

3. Growth of the Internet of Things

The Internet of Things (IoT) has always existed as a concept, but not until recently has it started to become a reality. The addition of a sensor and a

communication feature makes it possible to convert various things to digital devices, including smartphones, information devices, and household appliances. This enables the devices to send data on any conditions or changes in the devices themselves or in the environments and for people to remotely monitor, manage, and control the devices. It has been predicted that by 2020, as many as 20 to 30 billion devices will have access to the Internet [1–3] and will be able to function in coordination with one another.

Autonomous problem avoidance and condition optimization delivered by artificial intelligence technology and big data analysis are also anticipated to become commonplace. Some examples include control of the demand for electricity by balancing and prioritizing the usage of home appliances, and collision avoidance of self-driving cars and drones by mutual communication.

In manufacturing, IoT brings an industry revolution called Industrie 4.0, or the Industrial Internet. Industrial Internet sensors are installed on parts and manufacturing machinery and linked to people (laborers), production plans, and processes to optimize the entire lifecycle of a product, including procurement, production, and post-shipment. It is now possible to change a production plan on a real-time basis in accordance with changes in the market, to replace a production process in response to a mechanical failure, and to improve operational efficiency by monitoring product conditions. This is giving rise to new business models aimed at increased profitability by optimizing machine operation. The entire supply chain including distribution can be coordinated, and plans are underway to detect a delay in the arrival of specific parts ahead of time in order to optimize the production plan that covers multiple factories.

4. Emergence of blockchain technology*1

Virtual currencies do not have an issuer such as a national government or central bank. Instead, reliability is ensured through the use of decentralized, distributed ledgers, and an ‘Internet of money’ is formed that circulates the values of such currencies. Not only can virtual currencies be used as a means of settlement in lieu of real currencies, they can also be used for managing and transferring rights and contracts in coordination with tangible and intangible assets. Because blockchain technology is highly transparent and immutable, it is gradually becoming used in the registration of real estate, distribution of copyrights, and management of medical information. Decentralized e-commerce and market forecasting, where there is no central management entity, are also starting to emerge. Usage in voting and notary services is also being sought.

A decentralized autonomous organization (DAO), where no centralized governing system exists, is operated autonomously according to predetermined rules. One characteristic of transactions in a blockchain is that they cannot be altered or canceled once they are recorded, and this may become a problematic issue. Nevertheless, DAOs can potentially be used for shared services, investment funds, and asset management. For example, Estonia has implemented a notary service for marriages, births, and contracts using e-Residency, which is used by foreign nationals. Identity document issuance, notary services, and other services offered by a virtual nation also have the potential for widespread use in the future as a means of verification without depending on a national government.

5. Rise of API economy*2

Services are increasingly integrated by virtue of inter-company coordination. Sharing information and systems leads to coordination that involves a wide

*1 Blockchain technology: The core technology for virtual currencies such as Bitcoin.

*2 API economy: A trend for a company to disclose (or create a platform for) its API (application programming interface)—a mechanism to call a software function—thereby making the coordination of information systems with other companies easier and creating new value and business.

variety of concerned parties, including those in different industries. This in turn leads to the creation of highly convenient new services and innovations. Examples include the coordination of flight information with airport transportation services and hotel reception, utilization of information obtained from automobiles for proposing insurance and maintenance services, and the process of searching for a house to purchase on a smartphone and applying for a home loan. Because services are automatically proposed based on individual situations, users do not have to spontaneously find services by themselves. This will lead to easy decision making for purchases. Contextual commerce integrates social media and payment services, enabling an on-the-spot purchase of a product a user wants. This type of commerce is changing consumers' purchasing behaviors.

6. Migration to a decentralized society

Although only some progressive organizations are currently practicing a decentralized approach, it is anticipated to spread widely as a system of value exchange that does not require an intermediary. Some systems and tasks that currently have centralized management are considered to be the best initial candidates for decentralized systems. These include those that do not have central managers, for example, systems for international payments and remittances, and the functions and tasks of government agencies suitable for outsourcing to the private sector. However, many tasks are not suitable for a decentralized system, including transactions of listed stocks, where situations may change instantaneously, and areas that require substantial decision making.

Government shutdowns of the Internet, including partial shutdowns, occurred as many as 56 times in 18 nations in 2016 [4]. In a truly open, decentralized society, even the government would not be able to shut down such services. An open, decentralized society is one with high transparency and no conflicts. At the same time, it is a society with no leader. The speed and spread of the migration to a decentralized society will likely depend on future system planning and the degree of societal acceptance.

References

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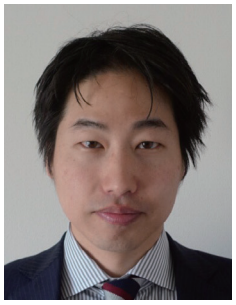

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