

## Embracing informationization 3.0—an era of computing intelligence\*

Information, after materials and energy, is viewed as the third strategic resource in human societies. Information technology and its applications, i.e., informationization, have broadly and profoundly impacted society. The history of informationization underwent two major waves and currently, we are in the beginning of the third major wave.

The first major wave of informationization, i.e., informationization 1.0, started with the adoption of personal computers (PCs) in the 1980s. From the first digital computer born in the 1940s until the mid-1990s, the beginning of wide informationization could be attributed to PC applications. In this stage of informationization 1.0, the performance of computer hardware and software was increasingly boosted, with the hardware's size, energy consumption, and price rapidly diminishing over time. After the 1980s, the IBM PC had an open architecture and PCs achieved wide popularity. Information technology enabled the office digitization and computer information management to gradually replace the manual processing of paper media. For the first time, society witnessed the major impact made by such a major wave of informationization.

Around the mid-1990s, with the Internet being adopted commercially on a large scale and with the emergence and popularity of Internet applications, the second major wave of informationization, i.e., informationization 2.0, took place. Information technology, for approximately 20 years of informationization 2.0 (from the mid-1990s until recently), witnessed rapid development, and the Internet and its extensions greatly expanded the depth and breadth of informationization. Especially in recent years, in the trinity of the human-cyber-physical world, various types of digitized entities continuously interconnected and interacted, exhibiting the power of “interconnection”. The Internet has profoundly changed industry and society. Many industrial sectors have been tremendously and even disruptively impacted. In addition to disrupting many traditional industrial sectors, the Internet has cultivated new industrial sectors, such as Industry 4.0, autonomous driving, and the sharing economy. The cause of these impacts stems from the rapid growth of the total amount of information on the Internet and the tremendous expansion of the breadth and speed of information dissemination. The Internet has become an essential part of individuals' lives and has become very important to public infrastructure.

At present, the third major wave of informationization, i.e., informationization 3.0, is emerging. In particular, the big data phenomenon has emerged with the diversity of data types and an exponential growth in scale of data accumulated from heterogeneous data sources. This phenomenon stems from the low cost and pervasiveness of information technology applications, the broad interconnection of the human-cyber-physical world with broadband mobility and the Internet, and the large-scale aggregation of data enabled by cloud computing. Informationization 3.0, along with the big data phenomenon, is opening a new age of intelligence, featuring deep mining and analysis based on the fusion of data. Thanks to the powerful computing power and massive data, the current data-driven AI achieves great success. However, behind both the past rule-based AI and the current data-driven AI, computing is the driving force for logical deduction and data processing and analysis. In essence, it is an era of computing

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intelligence. In recent years, various successful cases of big data applications have incentivized a tremendous demand for extracting information/knowledge from data and then guiding practice. Currently, an industrial ecosystem for big data is being formed, involving layers of infrastructure supports, analytics technologies, and domain applications along with workflow steps for data acquisition, cleaning, organization/storage, processing/analysis, and application. Big data has resulted in a large upsurge in investments in informationization.

During the last informationization 2.0 and in the present phase of informationization 3.0, China has been playing an increasingly important role. On one hand, Chinese scientists have made significant contributions to IT R&D. On the other hand, in the Internet era, China has become a frontier for IT applications, leading to many new application modes worldwide. In China, the Internet was started in 1994 and in 2008, for the first time, China became the top Internet user worldwide by surpassing the number of Internet users in the United States. In 2011, the mobile Internet era began when the number of mobile Internet users in China surpassed the number of computer Internet users in China for the first time. In recent years, industries in China have also been impacted by various Internet companies in China. For example, WeChat and other mobile instant messaging apps have challenged the traditional telecommunications industry, whereas Alibaba and other e-commerce platforms have disrupted the traditional retail industry. Since March 2015, the Chinese government has proposed the Internet+ strategy to emphasize the integration of information technology into other traditional industries, upgrading the entire industry chain.

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In the present and upcoming informationization 3.0, *SCIENCE CHINA Information Sciences* will face greater challenges in recording the new R&D advances in the new era. It is my great honor to be appointed as the new Editor-in-Chief. A new Editorial Board has also been formed, which will be in charge of the operation of the journal for the following five years. I would like to express my sincere appreciation to all the members and the entire staff of the editorial office. I look forward to working with all of you to bring *SCIENCE CHINA Information Sciences* to another level of excellence and impact.



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