



# New Trends and Features of World S&T Development in the Next Decade

Hints of Higgs from the Large Hadron Collider. Credit: Maximilien Brice, CERN



# New Situation of World S&T Development

Having undergone a series of dramatic advances in science, technology and industry in the 20<sup>th</sup> century, S&T progress in today's world shows new features:

## 1. Breakthroughs in many fields and interdisciplinary synergy

Physical science is explored both in a more macroscopic and microscopic way and under extreme conditions. Life science is done more precisely, with an emphasis on regeneration and regulation. Information and information technology are employed to finely control matter and energy. As a result, there is great optimism that many fundamental difficulties in science will be resolved. In addition, the integration and convergence of different academic disciplines has continuously given rise to new growth points. A holistic approach has been the development direction and objective for disciplines such as earth system science and complex systems science.

## 2. Big data science as a new paradigm

Research in such fields as Internet technology, digital economy, supercomputing, environmental science and biomedicine has produced huge amounts of data, giving rise to the paradigm of big data. Compared with three conventional paradigms, namely, experimental science, theoretical analysis and computer simulation, the new paradigm features integration between computing technology and science and engineering fields for the acquisition, storage, management, in-depth analysis and visualization of large-scale datasets. New knowledge and rules could be discovered via data-intensive analysis, even without a model or hypothesis. Big data initiatives and platforms launched by advanced countries will likely bring about drastic changes to the organization mode of scientific research, and make closer integration between knowledge creation and application.

## 3. Focusing on major issues concerning sustainability

Humanity is facing a variety of urgent issues concerning sustainable development, such as energy, the environment, population and health, marine resource utilization and space development. Many of them are generic, complex issues that cross the boundaries of various disciplines. Solutions to these problems require scientific

breakthroughs and transformative technological changes. This constitutes a powerful driving force behind S&T innovation, leading S&T development and promoting synergic innovation and overlapping advances among many different disciplines. Meanwhile, it is ever more evident that science and technology are a mixed blessing. While benefiting society, technologies such as transgenesis, the Internet and nuclear power also pose ethical and social risks, have a profound impact on social governance mechanism and national security, and bring about a series of unconventional security problems.

## 4. Cultivating new economic growth points via S&T innovation

Recent years have seen advanced countries vying to launch programs to promote emerging industries and national competency. They make similar decisions when selecting emerging industries with strategic importance for priority development, including environmental protection, new materials, biology, medicine and health, Smart Earth and creative content. Intensified S&T investment and policy support are offered with more specific, timely and professional planning and action plans. Importance is attached to S&T innovation for job structure optimization, sustainability promotion and national competitiveness improvement.

## 5. Coordinated development of S&T forces in industry, government and academia

To address the crisis and gain the initiative, various nations are making, in line with their own development stages and demands, rational deployment and overall arrangement of S&T forces in the industrial sector, government and academia by establishing a national innovation system. As the main player for invention and S&T innovation, the S&T system in the industrial sector allocates resources in the light of demand and through the market mechanism, making direct contributions to economic growth. Driven by national and public interests, government S&T institutions implement national strategic programs or large science projects to build national S&T competency. S&T activities in academia, which are often performed out of curiosity or interest, continuously provide society with new knowledge and talents.

#### 6. Global competition and accelerated movement of S&T innovation resources

With their comprehensive advantages, developed countries have become the major benefiter of the global movement of S&T innovation resources. While S&T advanced nations continuously build up their high-tech barriers and strive to recruit the best young talents from around the world, emerging countries are

adopting various S&T policies and talent programs to more effectively participate in the global competition for S&T innovation resources. In addition, innovative transnational enterprises collect worldwide intelligence resources via new research and development modes. The future patterns of global movement and allocation of S&T innovation resources will have a profound impact on national competitiveness.