A BIG SCIENCE CENTRE IN SHANGHAI TO LEAD INNOVATION

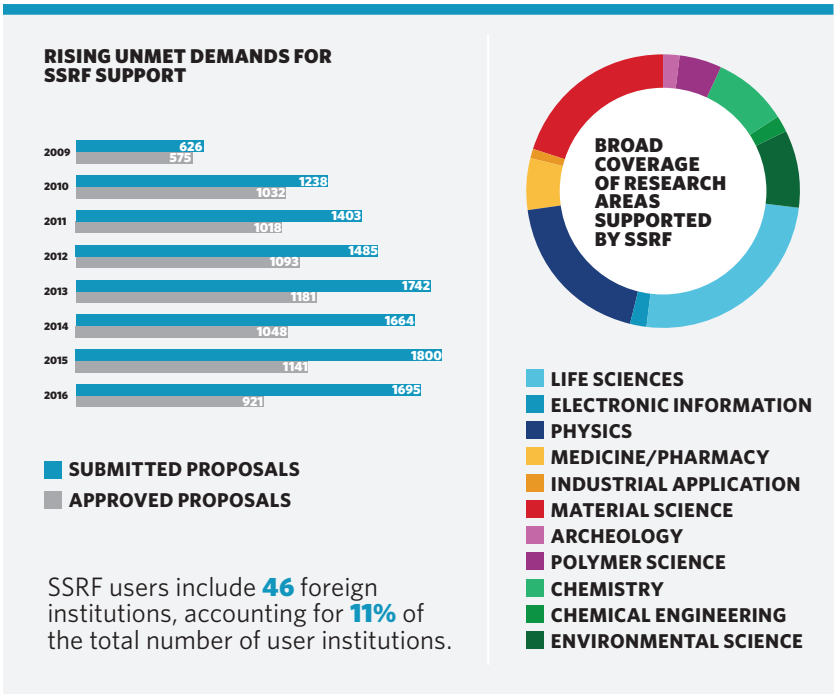
Shanghai's plans to construct a science and innovation centre are becoming a reality with the construction of the ZHANGJIANG COMPREHENSIVE NATIONAL SCIENCE CENTRE

Using X-rays generated from a synchrotron source, a group of Chinese scientists has developed a new imaging technology capable of creating high-resolution images of non-crystalline samples, which could find application in medical diagnosis. This research, published in Physical Review Letters in 2016, is just one recent example of the many studies that have been supported by the Shanghai Synchrotron Radiation Facility (SSRF).

Located on an 18-hectare campus in Zhangjiang Hi-Tech Park in Shanghai's Pudong district, the phase I of SSRF and its seven beamlines were constructed in 2004 with more than 1.4 billion RMB investment from the Chinese government. SSRF is a third-generation synchrotron light source and is China's largest light source facility. More than 15,000 scientists and engineers worldwide have used SSRF for their research since it opened for use in 2009.

Big science platforms like the SSRF are a major component of the infrastructure being developed for a comprehensive national science centre in Zhangjiang. According to Ziqi Shou, director general of the Shanghai Municipal Science and Technology Commission, construction of the Zhangjiang Comprehensive National Science Centre, which was approved by the state government in early 2016, is a core task for establishing a global science and technology innovation centre in Shanghai. The aim is to promote China's capacity to innovate in interdisciplinary fields and its overall research power by constructing world-class infrastructure for big science. "It provides a basic platform for implementing our innovation-driven development strategy and for building national innovation systems," says Shou.

The Shanghai Municipal Government has set goals of laying the framework for a comprehensive national science centre by 2020 and achieving global-impact research outcomes, which will drive regional socioeconomic development as well as science and technology innovation. Meeting these goals will entail forming a cluster of research institutions devoted to frontier science, which are supported by state-of-the-art research infrastructure, optimized organizational structure and management systems, and an open environment for innovation. Work is underway to construct a comprehensive laboratory as the base for scientific innovation, functional research and development (R&D) platforms for interdisciplinary collaboration and innovation, and a network for collaborative innovation that links research with the industrial chain. The national science centre will also initiate and coordinate large-scale international research projects



and national key projects.

As the site of one of China's first state-level high-tech zones, Zhangjiang has already gathered rich technological resources, including a cluster of high-tech enterprises, many of which are foreign funded and devoted to R&D. Zhangjiang is also becoming a base for basic research, having several platforms for big science, including the National Centre for Protein Science Shanghai and the Shanghai Supercomputer Centre.

Opened for use in mid-2014, the protein centre boasts to be the world's first comprehensive big science infrastructure in the life sciences. By October 2016, it had operated for more than 190,000 hours and scientists from more than 200 institutions worldwide had conducted over 1,300 research projects, leading to more than 80 publications in Science Citation Index journals.

Since the end of 2000, the high-performance computers at the supercomputer centre have been used by thousands of research teams, providing more than one billion CPU hours and completing around 5.7 million computing tasks.

The SSRF started its phase II construction in 2016 with the plan of adding 16 more world-class beamlines and 26 experimental stations. Currently, 14 experimental stations are operational at the SSRF, but the demand for them far exceeds the current capacity. "By the time phase II construction is complete, we should be able to serve more than 6,000 users each year with the complete and state-of-the-art experimental facilities," introduced Zhentang Zhao, director of SSRF and of the Shanghai Institute of Applied Physics, Chinese Academy of Sciences. "We can support an even broader range of research fields, including physics, chemistry, life sciences, materials, energy science and environmental science, as well as information technology, microelectronics and pharmaceutical industries."

"The point of propelling the construction of such big science infrastructure is to promote the development of cutting-edge science, including photonics, biomedical sciences, new energy, artificial intelligence, nanotechnology and computer science, by encouraging interdisciplinarity and to attract and serve talented researchers from around the world by fully displaying the functions of our facilities," says Shou. "We are glad that our efforts have seen some aggregation and scale effects."

The Zhangjiang Comprehensive National Science Centre also seeks to integrate all the quality research and educational resources in Shanghai and beyond by attracting top research institutions and universities from around the world to establish innovation platforms on site. One example is the Tsung-Dao Lee Institute, which was launched in late 2016. Administered by Shanghai Jiaotong University, the institute will harness the resources of Zhangjiang and focus on astronomy and cosmology, particle physics, and quantum technologies. As a test bed for innovation in research management systems, it will adopt best practices from world-renowned institutions to create a supportive environment for world-class scientists.

To make Zhangjiang a top attraction for talented researchers, the local government provides vigorous support with a series of complementary policies. A Zhangjiang science town is planned to ensure scientists receive excellent services and enjoy a supportive environment for research.

The ultimate goal of the innovation platforms is to boost research translation and drive technological innovation of industries. "To develop an innovation-driven economy, we are planning for functional platforms that are based on the entire industrial chain, targeting key technologies and key products," said Shou. "New models to manage the functional platforms are being explored, with novel financing mechanisms that integrate government and social investments and a new assessment system that ensures transparency and flexibility." ■