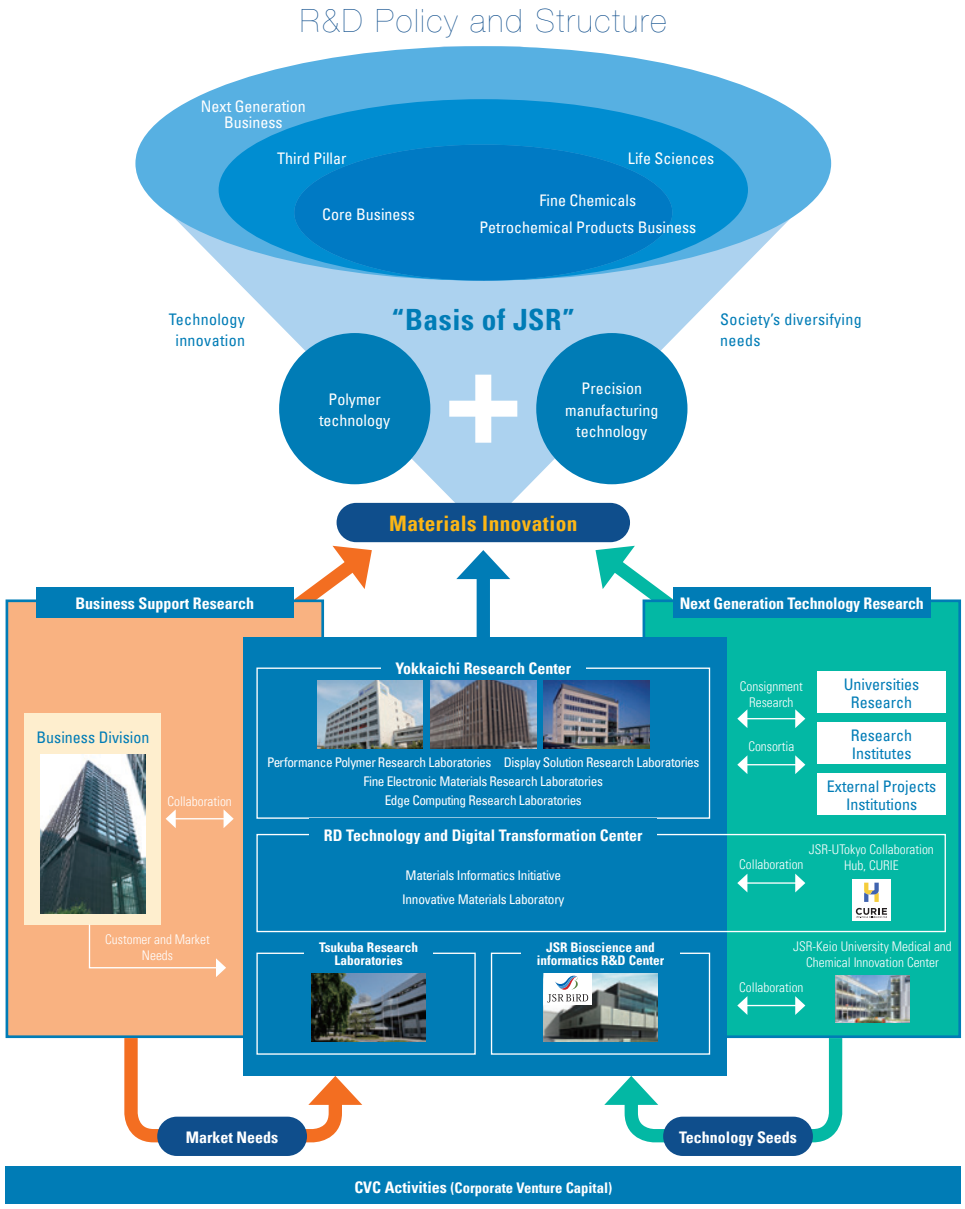
Evolving Technical Capabilities

R&D Policy and Structure



JSR Group is promoting R&D activities to prepare for rapidly changing social needs, such as changes stemming from digital transformation and growing interest in personalized medicine and healthy longevity. There are two primary missions in the research department: to conduct "business support research" in fields that are currently being developed and to conduct new or applied research in peripheral areas, including "next-generation technology research" such as seed research where future growth is expected.

In promoting business support research, we focus on supporting market, process and manufacturing development, and cooperation with the value chain within the Group, specifically manufacturing, sales, and logistics. Researchers will directly contact customers in order to dig into specific needs and promote the integration of R&D and business. In this way we will enhance our technical service capabilities in each country to build an ecosystem that can support our customers' businesses globally and in a timely manner.

Regarding next-generation technology research such as seed research, we are working on research and development that anticipates the potential needs of the market. In June 2020, we reorganized the R&D divisions and created "RD Technology and Digital Transformation Center" to accelerate transformation. Especially in new fields, we are promoting open innovation such as joint research with domestic and international academic research institutes. In addition to establishing the JSR-Keio University Medical and Chemical Innovation Center (JKiC) for life sciences, we have established JSR-UTokyo Collaboration Hub, CURIE in April 2020 with Department of Physics, Graduate School of Science, The University of Tokyo to promote research and development in the basic principles of science. In addition, as an open innovation base focused on next-generation medical treatment and materials informatics, we are in the process of constructing the "JSR Bioscience and informatics R&D Center (JSR BiRD)" in KING SKYFRONT, Tonomachi International Strategic Zone of Kawasaki City, Kanagawa Prefecture, which is planned to begin operation in July 2021.

Open Innovation

1. JKiC

The Company and Keio University have established a joint research building, JSR-Keio University Medical and Chemical Innovation Center (JKiC), positioned as a base for collaboration among industry, academia, and medicine. This kind of collaboration between a university medical school and a chemical materials manufacturer is the first of its kind in the world. Through close collaboration with researchers from Keio University's medical department and hospital, who are developing basic, through to clinical, medicine and medical care, and JSR chemical materials researchers, who are developing advanced materials and products positioned as a strategic business in the field of the life sciences, we will realize a wide range of needs and advanced ideas in the medical field, conduct research and create businesses that lead to the establishment and spread of new diagnosis and treatment techniques, and medical support technologies that support a society of health and longevity.

At JKiC, where medical viewpoints and knowledge of material development come together, we plan to provide various solutions in the fields of health and longevity research based on new types of diagnosis and treatment techniques, medical support technologies that use digital health and 3D printing, and genome analysis. While ensuring there is adequate space for promoting collaboration among industry, academia, and medicine, we will establish a department that matches medical needs with the seeds of technology, working on new innovations in Japan where the advances of age are among the highest in the world. By delving into a completely new concept of fusion between medicine and chemistry, we will create innovations and establish practical technologies that contribute to a world of health and longevity.

2. JSR-UTokyo Collaboration Hub, CURIE

JSR and Department of Physics, Graduate School of Science, The University of Tokyo (the Department) agreed on a comprehensive collaboration and announced the start of a joint research program on April 1, 2020. Under this collaboration, the Department will deepen its understanding of the functions of various materials that have become an essential part of society and uncover universal truths and open up new academic fields. The fusion of academia and industry will enable JSR to bring new high-performance materials to society. This unique comprehensive collaboration also includes a fellowship and is the first such endeavor for both parties in the more than 130-year history of the Department and the over 60-year history of JSR.

JSR-UTokyo Collaboration Hub, CURIE office was set up in the Faculty of Science Building No. 1 on the Hongo Campus to carry out joint research. The hub, which aims to create great achievements through research and development results that fuse physics and chemistry, is named after Marie Curie, who was awarded Nobel Prizes in both Physics and Chemistry. In addition, the name stands for qualities considered important in research and development: CURiosity, Intelligence, and Emotion.

The collaboration will promote joint research aimed at the fusion of chemistry-based practical science and physics. The JSR Fellowship, a grant-type fellowship for Ph.D. candidates, was also established to cultivate experts who will contribute to the advancement of science and industry through physics that is not limited to theory and experiments, but comprehensive in scope, which will become increasingly important in the future. This comprehensive collaboration will enable JSR to deepen its understanding of the functionalization of its products and advance the science-based development of products with highly differentiated performance by integrating physics and chemistry.

3. JSR BiRD

Construction of the JSR Bioscience and informatics R&D Center (JSR BiRD) began in November 2019 at KING SKYFRONT, an open innovation hub in Kawasaki City, with plans to start up operations in 2021. JSR BiRD will be positioned as a base for early social implementation of microbiota, particularly the formulation of viable intestinal flora, which have recently gained attention as both a cause of, and treatment for, various diseases. JSR has taken major steps to enhance its R&D capabilities and create new value through digital transformation, and JSR BiRD will serve as a platform for revitalizing the Company's informatics activities. In addition, JSR BiRD's laboratory facilities and offices will be open to a wide range of partners to support the creation and growth of new businesses.

Advanced simulation and data science　Materials informatics

1. Advanced Simulation Technology

IBM Q is the name of the quantum computer provided by IBM. The IBM Q Network is the world's largest network consisting of various private companies, universities, and public research institutions with the aim of utilizing quantum computers in different forms. JSR participates in the IBM Q Network as a member company of the IBM Q Network Hub at Keio University and also participates as an IBM Q Network Partner. The fastest practical application of quantum computers is expected to be simulations using high-precision quantum chemical calculations. When this technology is perfected it is expected to drastically reduce experimental trial and error testing, having an immeasurable impact on material development. JSR is working on the development and acquisition of quantum chemical calculation technology focused on actual materials through the IBM Q Hub, etc., and is also looking at applications for the tests. While it is expected to still be several years before a quantum computer is put into practical use, development of algorithms and the identification of major use cases are well underway.

IBM Q Network Hub at Keio University

2. Data Science

JSR is pushing forward with cross-organizational efforts in order to promote a digital transformation in R&D based on material informatics (MI).

In addition to various computer experiments and simulations, including first-principle calculation aimed at developing materials through cyberspace experiments as opposed to chemical experiments in the real world, we are working to establish underlying technologies such as advanced analytics, including machine learning. These technologies have been brought about by dramatic improvements in computer capabilities, but in the latter half of the 2020s, as more disruptive technologies, quantum computers and braintype chips become ever more powerful, we believe that completely different methods for developing materials will be available. In collaboration with Enthought, Inc., JSR has been working on the development of a data management system and various simulation technologies with an eye toward applications for actual product development. In the data management system, as a platform for data utilization such as machine learning, JSR has built a database of various materials and an automatic management tool for experimental results. By involving engineers with full knowledge of the current development process, in addition to placing importance on how easy the system will be to use in the workplace, we are expecting there to be a number of benefits including an evolution in the current development process. Through these efforts we will promote the development of data science with a business perspective and, not only improve efficiency, but also create real value for business.