

YOKOGAWA CORPORATE R&D STRATEGY FOR CONTINUOUS GROWTH

NAGASHIMA Akira *1

INTRODUCTION

Japan has a population of approximately 130 million people, 2.1% of the world population, and produces 13.6% of the global gross domestic product (GDP); however, Japan is now experiencing a falling birth rate and the fastest rate of population aging in the world. For Japan to sustain its vitality for years to come, it must maintain and enhance its global competitiveness in “manufacturing excellence (product manufacturing).” It is expected that its strong product manufacturing capacity will contribute to the benefit of mankind worldwide.

In terms of providing high-technology tools and the leading-edge basics necessary for industry, Yokogawa has been making consistent long-term efforts to supply products backed by state-of-the-art technology. The “manufacturing excellence (product manufacturing)” market, as we understand it, requires the early utilization of leading-edge technology and anticipates diversified changes over a 10- to 20-year time period.

Yokogawa's Corporate Research and Development Center (R&D Center) envisages the market 10 to 20 years hence, and its mission is to continually prepare for whatever that future market might be. As shown in Figure 1, Yokogawa defines, sets the direction for, and evaluates the research and development activities whether it meets three axes: 1) corporate philosophy and action guidelines, 2) business development rules and initiatives, and 3) market and technological trends.

This paper describes the basic strategies of the R&D Center for conducting sustainable research and development, rather than providing specific details.

RESEARCH AND DEVELOPMENT APPROACHES

There are two approaches to research and development. The first is the “deep-digging developmental” approach in which seeds for achieving competitive superiority are created through exploration of the themes, then developing the results into killer applications. The second is an “analysis-based solution” approach in which the future target market is widely analyzed in order to identify future needs, then create seeds to solve such needs.

The R&D Center has traditionally adopted the former approach, and the successful factor in this is to sublimate those seeds with competitive superiority into attractive devices, and let them become established. In contrast, as we enter the ubiquitous information era, if we are to utilize information technology, the latter approach becomes important. We have been enhancing ways of adopting this approach.

Device Development Strategy

Yokogawa actively develops devices related to instrumentation and control. We also purchase devices designed as general-purpose products from external sources, but have been developing ourselves the dedicated devices and precise packaging technologies that are required in order to make the highly accurate measurements that are expected of us. We are also expanding the measurement targets. Achieving a consistent long-term supply of such devices and technologies is the source of Yokogawa's competitive superiority. Fortunately, Yokogawa has an in-house market that enables it to develop a very small quantity of high value-added devices. This is our strength. The groups of devices on which we concentrate our efforts include the following: 1) mixed signal devices for ultrahigh-speed measurements, 2) MEMS devices as high-performance sensors, and 3) digital IPs that execute complex data processing at high speed. The MEMS technology has also been developed into research on bio-measurement and micro-reactors.

Furthermore, since the 21st century is the era of high-speed, large-volume communications, Yokogawa has, since the 1980s, been focusing on the research and development of compound

*1 Director, Chief Technology Officer
Executive Vice President of
Corporate Research and Development Headquarters



Figure 1 Three axial criteria of Research and Development

semiconductors, the basis of ultrahigh-speed optical and electronic technologies. The results have finally grown to a level that can contribute to business.

Information Technology Development Strategy

Information technology has been growing and expanding rapidly, and now everything depends on selecting and acquiring the technologies needed in the future at an early stage and establishing them as attractive components that can be re-used and shared. For this, it is critical that the future vision is shared and that the outcome is inherited between the R&D Center and the business division development teams.

Yokogawa is grasping the opportunities produced by the emerging ubiquitous information society, and intends to strategically enhance information technology in those areas the company excels at. Business information systems handle processing centered on databases, information processing in the field interfaces with the external environment, such as a production plant. This information processing is one of the areas most likely to evolve in the ubiquitous society.

While working towards this, we have built a mechanism in which the most common elements expected in future ubiquitous computing in the field, are researched and then developed into strategic components. Main activities are software research and development. To this end we have established a hardware studio, which enables the timely provision of various hardware required in the research and the expanding of researched and developed outcome into hardware modules.

The outcome is controlled as shared assets in a technology

pool in order to provide an environment which can be aggressively utilized spontaneously by the business division development teams. We not only provide the results in-house, but also disclose them if their global standardization is considered to have considerable benefits for customers.

INTELLECTUAL PROPERTY AND STANDARDIZATION STRATEGIES

Yokogawa's intellectual property strategy concentrates on defensive matters that prevent interference with the utilization of the latest technology in our area of interest, rather than achieving an exclusive competitive edge by adopting a pro-patent strategy. Taking a step further, we strive to accumulate intellectual property that can be used as future standards in the field. However, for new business areas, we aim to secure strategic intellectual property that has a competitive edge.

In contrast, assuming that it is within our target market, our customers expect products provided by multiple vendors to be interoperable and capable of being technically merged. As a consequence, we have been placed great importance on global standardization activities. We have participated in the Fieldbus Foundation, IPv6 promotion group, and other organizations, and have put our energy into the planning of specifications to the certification of interoperability and the development and provision of dedicated devices for the widespread use of such specifications and interoperability.

ENCOURAGING RESEARCH AND DEVELOPMENT MEMBERS

Whether excellent research and development results can be obtained in the mid- to long-term depends on the sustainable development of excellent research and development staff. Competitive research and development is only possible under a free development culture with developers coming together with strategic ideas, although this may appear to be inefficient in the short term. The R&D Center has been encouraging research and development staff by emphasizing the quality of the following actions, in addition to technical capabilities:

- (1) Always having an interest in social movements and technological trends, and being ready to appreciate new or beautiful items.
- (2) Possessing the self-confidence, courage, will, and capability to find problems and solve them.
- (3) Always thinking about the current situation in the relevant technical fields and markets, and their future directions.

Much of staff development relies on on-the-job training through research and development activities, but we also put great effort into education through assessment at various research and development stages. Moreover, we also conduct leadership development in parallel through technical management education.

At the same time, providing researchers and developers with a fair, attractive evaluation system helps produce excellent research and development staff. Last year, Yokogawa introduced a new evaluation system which assesses the capabilities of researchers and developers on the basis of a particular assignment as well as any added values that had been achieved, and we will continue to develop it further.

CORPORATE AGREED RESEARCH AND DEVELOPMENT

In order to achieve the R&D Center's mission, it is essential that top management and the R&D Center share the future vision and agree on sustainable investment for the mid- to long-term as well as a mid-term evaluation.

Yokogawa has reached an agreement through periodical development interviews by top management as well as aggressive information disclosure by the R&D Center. These disclosures are of: 1) the future vision, 2) the contents of research and development, and 3) investment information. Fortunately, top management, as well as business division managers, have achieved positive evaluations and investments.

In order to make corporate agreement sustainable, the R&D Center must understand the current situation within Yokogawa's business areas and make suggestions from a technical viewpoint on what each business area should be in the future. This is an important mission.

CONCLUSION

Japanese society will face many issues in 2007. Many engineers with rich experience, who have supported the high economic growth era of Japan, will start retiring in 2007, and this could cause a huge loss of their accumulated knowledge. However, from talking with young research and development engineers about the future of research and development, the author thinks it is optimistic. Although the actions of the young are different from their predecessors, the author believes that if you provide them with challenging opportunities then they will produce even greater outputs. ◆

