

# Lecture

## Message from the President:

### Structuring the IEICE as a Crucible of Innovation

Ken-ichi SATO

#### 1. Introduction

The Institute of Electronics, Information and Communication Engineers (IEICE) covers industrial fields that constitute of major national economic and social significance as well as an important scientific area that is expected to develop and advance future technologies. The research and engineering areas addressed by the institute continue to create various forms of new value through collaboration with other industrial fields such as machinery, aviation, medicine and agriculture, and with various services. However, the institute is faced with a number of challenges, including the need to respond to rapid paradigm shifts that are taking place in the electronics, information and communication industries; a decline in the institute's appeal to the younger generation; and intensification of global competition resulting from those same advances in ICT. If the IEICE is to meet these challenges and continue to be a world leader, it must constantly exert itself and innovate. It was a great honor for me to be elected president of this institute, which boasts a long tradition, and I feel a deep sense of responsibility toward the role. Today, I want to share with you my thoughts about our current status, the issues we face, and how we should go about resolving those issues.

#### 2. Changes in the environment surrounding the IEICE

##### 2.1 Current status of the IEICE

Founded in 1917 as the Institute of Telegraph and Telephone Engineers, the IEICE will celebrate its 100th anniversary next year. With a membership of approximately 30,000 at the end of fiscal year 2015 (March 2016), the institute is one of the largest engineering societies in Japan. Although it has enjoyed tremendous development, driven by the advances in Japan's electronics, information and communication industries, the IEICE's membership roll has shrunk in recent years (Fig. 1). This is a pressing issue that we must address.



This institute is a crucible of knowledge which is entrusted with the important role of working with the industry to grow and develop emerging technologies. With a view to achieving further development of the institute, let us examine the challenges that it is currently faced with and seek the directions it should take in the years to come.

As shown in Fig. 1, within the overall decrease in IEICE membership, the decline in the number of industry members is noteworthy. The institute's current predicament, and especially the declining membership roll, is not solely attributable to factors within its control. Because the IEICE is a part of the society at large, we need to analyze the problem from the macroscopic perspective in relation to the relevant Japanese industries.

##### 2.2 Current status of Japan's electronic, information and communication industries

It is projected that Japan's productive population (persons aged 15 to 64) will decrease by 14 million from 2010 through 2030.

If we look at the seven years from 2007 through 2014, for example, the productive population shrunk by about 6.4% (Fig.2)[1]. In contrast, as shown in Fig. 1, over the same period the IEICE membership decreased by 15% on average, with a 26% decrease in industry membership and a 9% decline in membership by universities and schools. These figures far exceed the percentage of decrease in the productive population. It is notable that the number of people working in the information industry in Japan began to increase in 2004 (Fig. 3). However, if we focus on the areas most closely related to IEICE members, namely (9) research, (6) information and communication-related industries, (2) broadcasting industry and (1) telecommunications industry, we find that the number of employees in those fields fell during the 2007-2014 period by about 12% (The data for 2013 and 2014 have been calculated through extrapolation from the trend from 2007 through 2012).

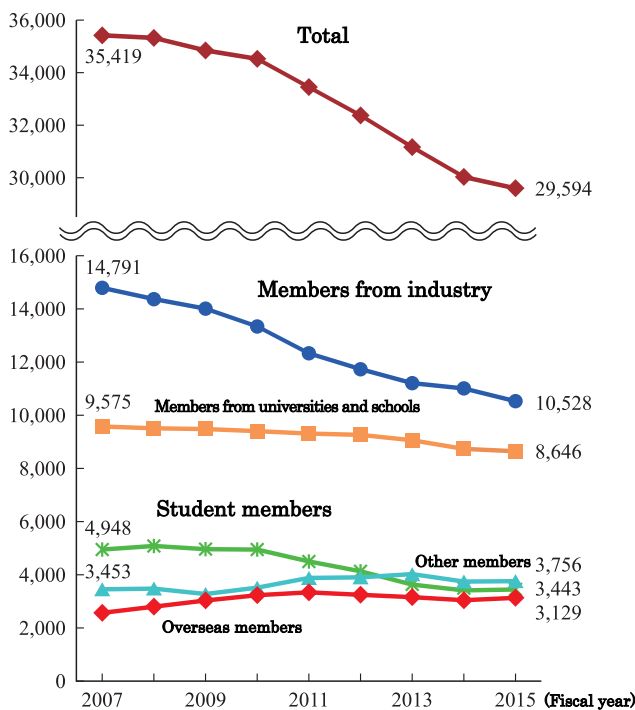


Fig. 1 Change in IEICE membership

Since the areas listed in Fig.3 do not cover all the areas of interest to the IEICE, the above simple comparison may not be accurate. Nevertheless, we can deduce that the decline in IEICE membership proportionally exceeds the decrease in the number of workers in the industries related to the IEICE. In particular, the decrease in industry membership is striking and poses a serious problem for the institute.

Next, let us look at the changes in Japan's electronics industry. The domestic production trend and a breakdown thereof are shown in Fig. 4, together with the export and import values for electronics industry products. Domestic production declined dramatically in the wake of the Lehman Brothers shock in 2008. Since 2007, export 2013, imports were exceeding exports. This deterioration in the trade balance can be attributed to the reduction of Japan's competitive edge and relocation of production plants to other countries. As shown in Fig.5 [2], the amount of investment in overseas plants plunged temporarily after the Lehman collapse but has since been rising to far surpass the amount of investment in domestic plants. This indicates that corporations have shifted their profit-making strategy from focusing on domestic production and exporting to expanding international production. This has brought about a hollowing-out of Japanese industry, which has led to workforce reductions in the domestic electronics, information and communication industries. For the IEICE, offshore relocation of manufacturing plants means that it is important to expand the institute's presence, particularly in Asia, as part of its globalization efforts. Overseas IEICE membership grew steadily up to around the year 2010 (Fig. 1). Although it has declined somewhat since then, the plunge has not been as marked as that of domestic membership. Overseas members are an important and promising group to which we must strive to reach out.

### 2.3 Global electronics, information and communication industries and the role of the IEICE

A variety of causes for the stagnation of Japan's electronics, information and communication industries have been noted, both in symposia[3] held at IEICE general conferences and in IEICE journals [4][5]. The major ones are progress in commoditization of products and the industry's failure to respond to this trend. These are not unique to Japan.

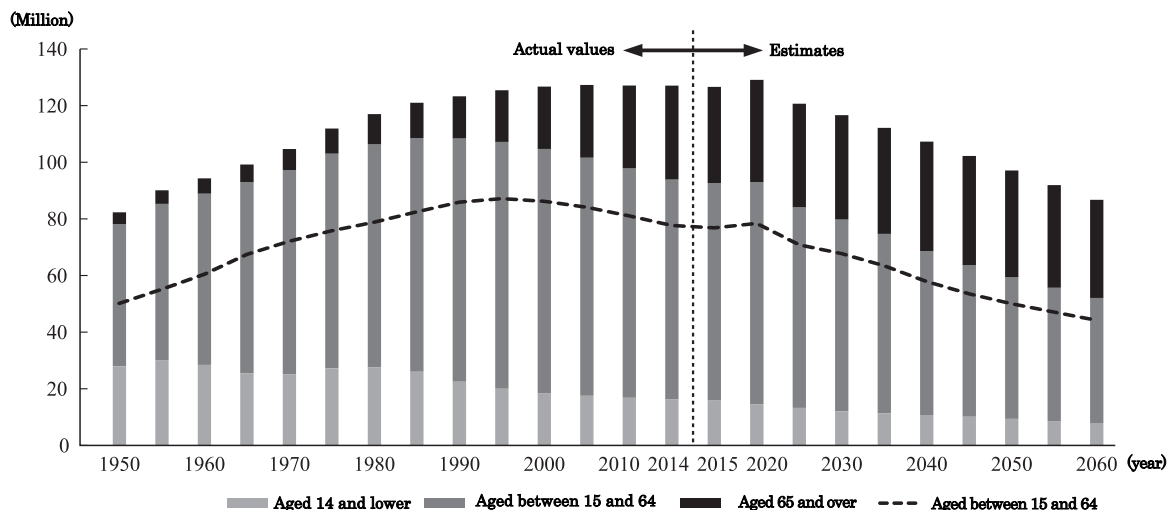


Fig. 2 Changes in the demography of Japan

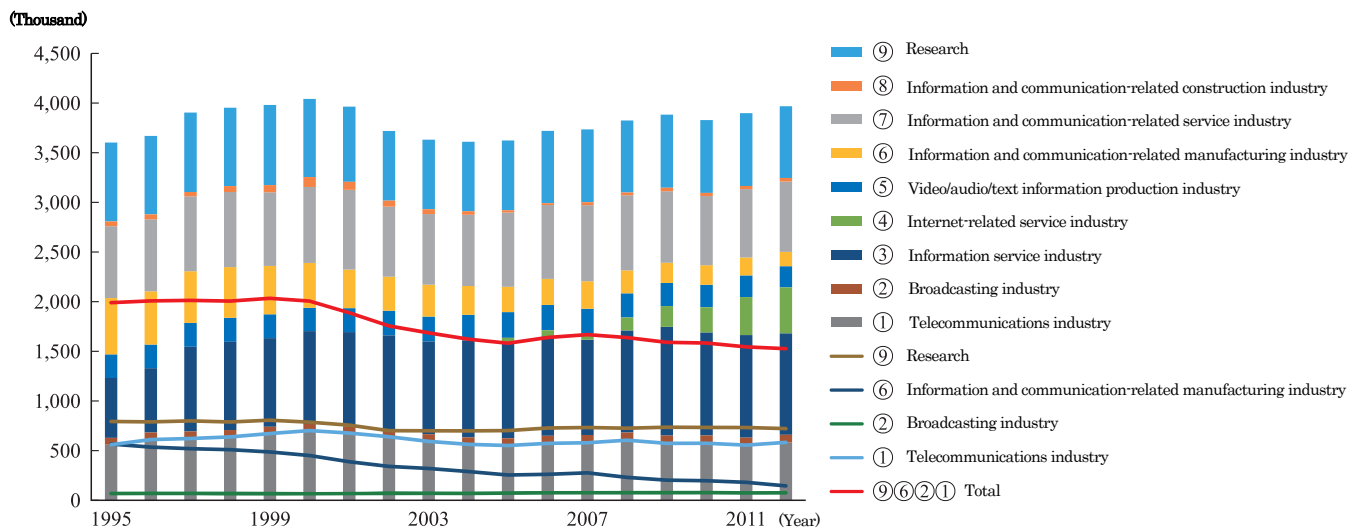


Fig. 3 Changes in the number of employees in the information industry in Japan (source: “Research Report on Economic Analysis of ICT” by the Global ICT Bureau, Ministry of Internal Affairs and Communications (March 2014))

In fact, Japan was once in the converse position, threatening the then developed countries with its low-priced products [6]. The domestic industry’s failure to respond to commoditization has been attributed to its reticence to shed its traditional emphasis on quality, particularly in the area of semiconductors [4], and its failure to create new value [5].

Let us look at the global ICT market in light of the above. Changes in the annual growth rate of sales and profits of various industries from 2006 through 2011 are shown in Fig. 6. One industry that recorded a high growth rate in profitability is the IT service industry. Most leading companies in this industry have taken advantage of commoditization of the technologies that they use. Specifically,

they have been successful because they have made the most of commoditization of communications bandwidths and processing power and because they create new value by developing new architecture or software.

The statuses of Internet service providers (ISPs) and content service providers (CSPs) are shown schematically in Fig. 7. ISPs have achieved progress in fiber-optic communication [7] and wireless communication technologies, in collaboration with vendors. Their endeavor stems from the fact that bandwidth expansion reduces the cost of their telecommunications services and increases their profits. CSPs, for their part, have increased their profits through developing new architecture or software making the best use of advances in bandwidth availability and computing power [8] and have thereby created innovative services and huge profit.

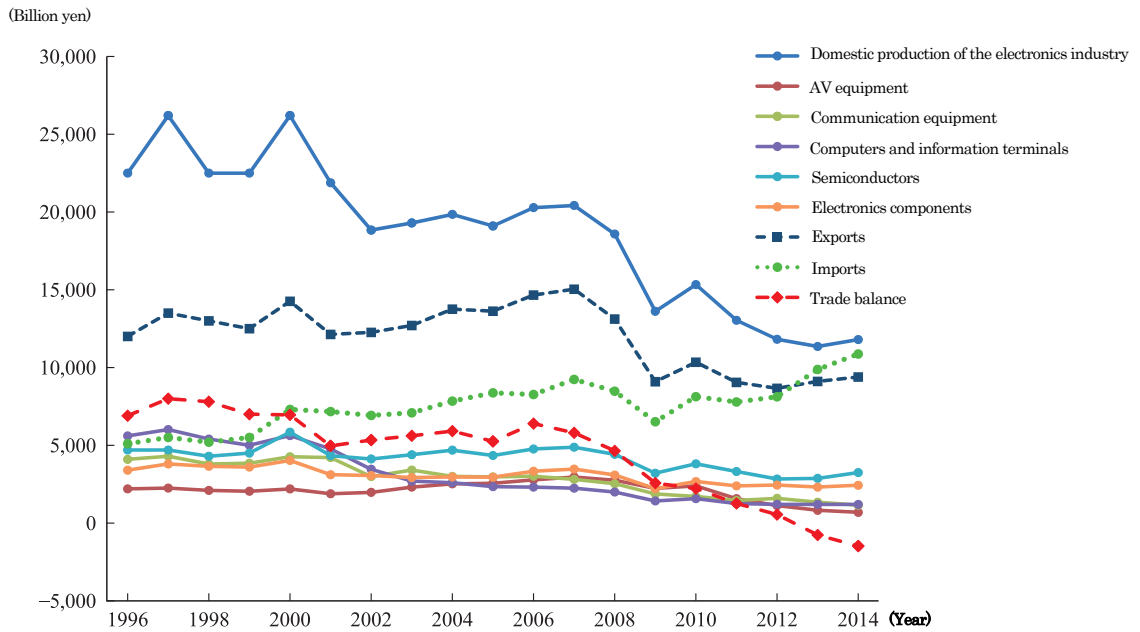


Fig. 4 Changes in the amounts of domestic production, exports and imports of Japan's electronics industry (source: JEITA, "Production, Export and Import of Japan's Electronics Industry"; Ministry of Economy, Trade and Industry, "Statistical Survey of Production"; and Ministry of Finance, "Foreign Trade Statistics")

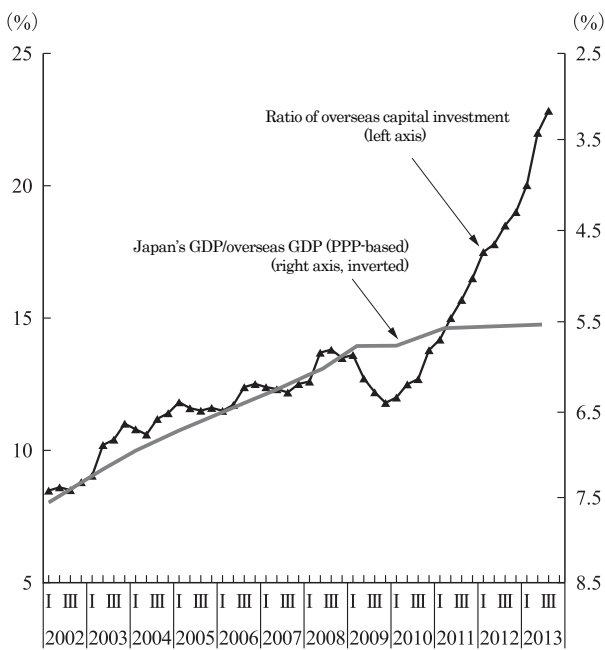


Fig. 5 Changes in the proportion of overseas capital investment

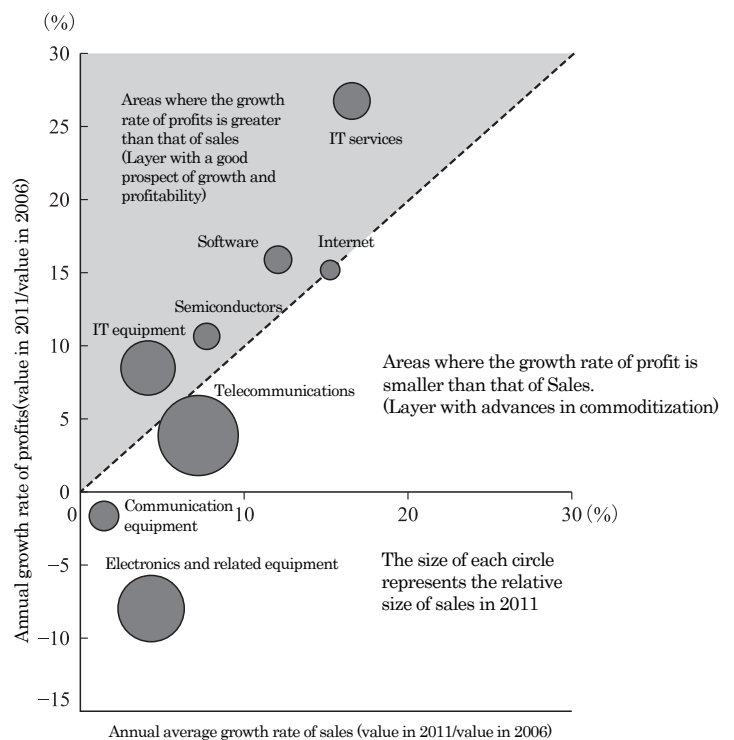


Fig. 6 Changes in the amounts of sales and profits

These are just a few examples. In today's business environment it is possible to reap substantial profits through integration of developments that are unique to individual industries (e.g., bandwidth and computing power) and create new value based on these. A case in point is automated driving technology, a hot topic at the moment. This has created new value by integrating technologies that have been independently developed in different industries, such as machinery, electricity and telecommunications.

As a forum for researchers and engineers across a broad industrial spectrum, from theoretical basics to hardware and software, the IEICE has high potential for driving such integration and leading efforts to create new value. The institute needs to strengthen its activities for technology integration (including activities across different IEICE societies and also across different engineering societies) in order to create new value.

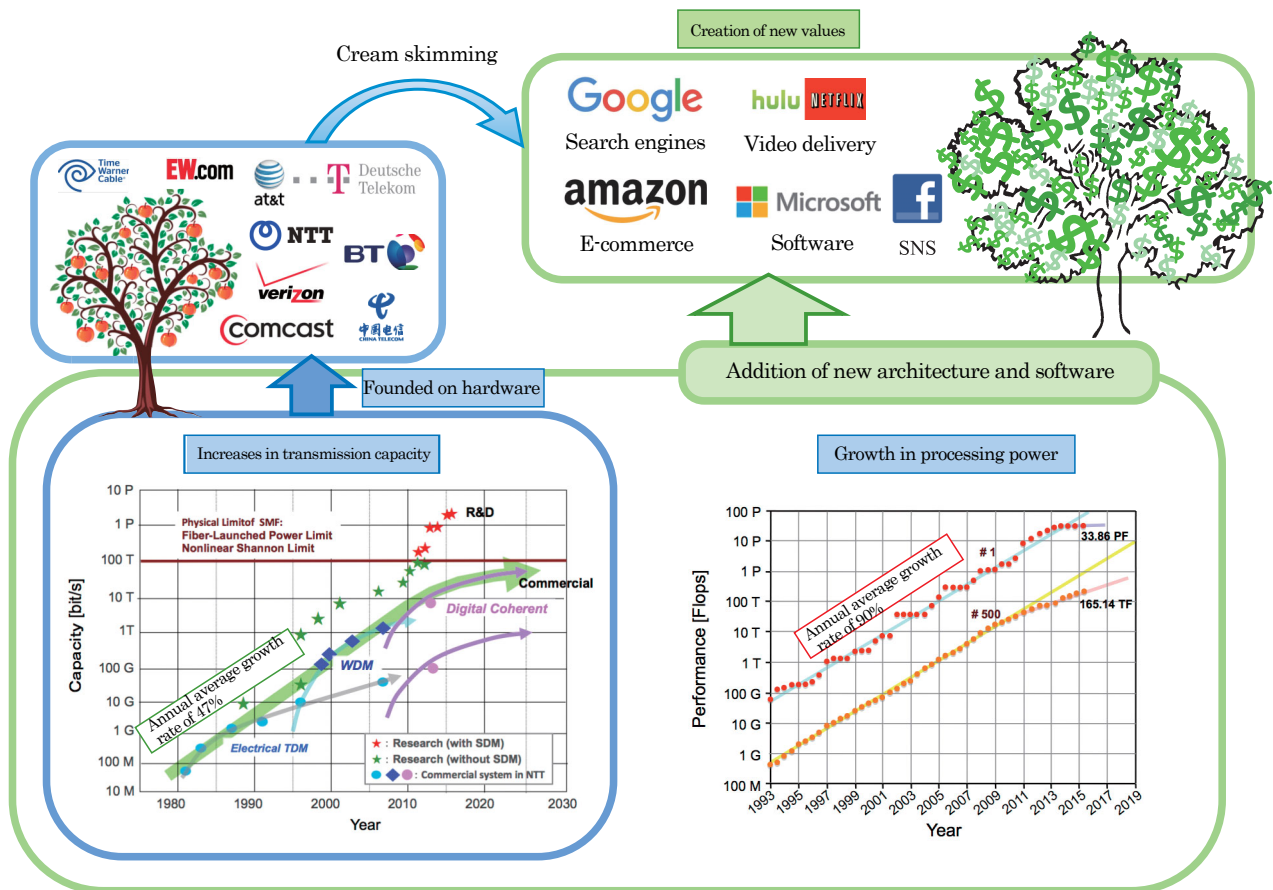


Fig. 7 Statuses of Internet service providers (ISPs) and content service providers (CSPs)

As I will mention in section 3.5, a first step in that direction would be offering special programs (planned by the conference program committee) that encompass multiple IEICE societies in general conferences or society conferences. It will be necessary to further expand this approach by going beyond the confines of the IEICE.

Coming back to Fig. 7, we can say that the ISPs, which are making significant profits, regard bandwidths and computer power as cost items and, therefore, do not make substantial investments in those areas. With the increasing commoditization of bandwidths, CSPs have shifted their investment focus from research and development, which used to be closely tied to profitability, to initiatives that will take them closer to lucrative ISPs, resulting in a decline in development of core hardware technologies. However, today there are signs of saturation in the trend of ever-increasing bandwidths made possible by advances in fiber-optic communications and in that of ever-increasing computing power made possible by advances in LSI (Moore's Law). In light of this, the IEICE's role in identifying and developing technological breakthroughs that can provide the basis for new value creation is growing its importance.

### 3. How to develop the IEICE

Thus far, I have reviewed the status of the institute, the environment surrounding it, and the issues it is faced with. Right now, both individual IEICE societies and committees across the different societies are taking measures to further develop the IEICE in light of the above-mentioned situation. Next, I want to describe new schemes that have been implemented over the last 12 months and several operational measures that the IEICE should take in coming years.

#### 3.1 Taking prompt action on IEICE operation

Operation of the institute is supported by the dedicated headquarters office and the activities of various committees which are run by volunteers. Since the term of office of each member of the board of directors, the decision-making body that sets the direction for the institute, is only two years and the duties allocated in the second year in the office change from those for the first year, continuation of ongoing studies and timely decision-making have not been handled efficiently. This problem has been addressed by the Directors' Duties Study Task Force, which is headed by the former president. Specifically, the task force has modified the method of electing vice-presidents and the allocation of duties to them in order to facilitate activity continuity and timely action.



The mission of the Planning Committee has been redefined as analyzing the institute's future from a long-term perspective and developing necessary strategies. The committee has therefore been renamed the Strategic Planning Committee and it will start work under that mission definition from the beginning of this fiscal year.

### **3.2 Improving financial standing**

As I mentioned in 2.1, we urgently need to improve the financial standing of the IEICE. Membership has been declining since the year 2000, causing a serious financial pinch, particularly in the last few years. The institute's expenses have been exceeding its revenues since 2012. There is an urgent need to boost revenues and lower costs. Because of a change in the relevant national regulations, the IEICE was transformed in April 2012 from an incorporated association (public-interest corporation) to a general incorporated association (transferred corporation up to March 2028). One financial implication is that we are required to spend its public-interest assets for public-interest purposes within the period during which it is a transferred corporation. Subsequently, in order to ensure stable continuity of the institute, it should set aside a certain amount of assets in the "no-strings-attached" category. If we are to ensure further development of the institute, it is also necessary to update or expand various IEICE management systems. This will entail substantial investment and maintenance costs. In 2015, a Finance Committee was established with a brief to monitor the institute's overall financial standing and to formulate a financial plan for the future. Specifically, the committee is conducting a factor analysis for financial improvement and studying necessary financial policies based on the findings of the Financial Task Force, which carried out a review in 2013. In the first year of its study, the committee reviewed past financial activities and their impacts, projected future financial standing, and identified new measures that could be taken to reduce expenditures and increase revenues. In the current fiscal year, the committee will expand these efforts.

### **3.3 Increasing industry membership**

As shown in Fig. 1, the decline in the number of members from industries is particularly noteworthy. It is important to enhance the institute's value for this membership category. To implement this effort from an organizational perspective, it was decided to change the method of electing vice-presidents on the occasion of changing allocation of duties to vice-presidents, as mentioned in 3.1. Specifically, the conventional process of electing one vice-president from the Tokyo area and another from elsewhere was abolished. One vice-president is assigned the duty of strengthening scientific activities while the other is entrusted with strengthening the institute's operation and organization. If possible, the latter should be elected from among industry members. It is hoped that this will encourage industries to further commit to IEICE operation and will lead to incorporation of measures for enhancing the institute's value for industry members into the operation of the IEICE.

### **3.4 Promoting globalization**

As mentioned in 2.1, Japanese enterprises are increasingly locating their plants overseas. Therefore, it is becoming important to promote globalization of the institute's activities. The institute should work more closely with the 12 international sections in Asia and elsewhere, and should carry out its activities (including seminars and other initiatives), where appropriate, in collaboration with Japanese enterprises located near the venues, thereby encouraging local researchers and engineers to join the IEICE and strengthening collaboration with local enterprises.

The most important service the institute offers for overseas members is publication of English-language version of "Transactions.

” Whilst some IEICE societies already publish open-access journals, the institute has yet to tackle the important issue of allowing open access to its English-language “Transactions,” which are the key transactions of the institute. The Transactions Open Access Study Task Force is already hard at work on this issue. In light of the IEICE’s financial status, it is necessary to give careful thought to this issue because open access means losing the revenue stream of license fees for access to transactions. The ongoing study assumes that open access to at least some parts of “Transactions” will be initiated in the next fiscal year at the earliest. A request for globalization of the editorial committee of the English-language “Transactions” was voiced at a meeting for exchanging views with international sections, which is held at every annual IEICE general conference. It is important to study this request. In addition, it is necessary to increase the proportion of English-language sessions at general conferences.

### 3.5 Improving services to individual members

The decline in the number of student members is also a cause for concern. It is important to strengthen services aimed at these candidates for full membership. Already, activities are underway to enhance IEICE general conferences and society conferences, the two important categories of institute events. One outcome from these activities is establishment of a Program Committee for IEICE general conferences, as of 2016 [9]. This makes it possible to swiftly plan and implement new programs. The 2016 General Conference saw an increase in the number of presentations, which had been on the decline since 2002. The new committee is expected to further vitalize future conferences. A questionnaire survey conducted with participants in the 2016 General Conference [10] asked what they thought were areas for improvement in the general conference format and content. The top three issues identified by respondents, excluding those related to geography, were: (1) They hoped that the conference would provide opportunities for facilitating job hunting, a subject in which students are keenly interested, by, for example, holding company information sessions or inviting personnel section staff from enterprises. (2) Too many sessions were run in parallel with the results that participants were not able to attend all of the sessions that they were interested in and that the number of attendees for each session was small. (3) The presentation times were too short and the length of print material for each presentation was only one page, preventing presentations from being fully informative. Based on these survey findings, it is planned to hold industry-academia collaborative forums in the 2017 General Conference, enabling undergraduate and graduate students to mingle with researchers and engineers from the electronics, information and communication industries and interactively discuss the present and future of a specific technical or industrial area. Corporations are hoping that such forums will provide important opportunities to get young people interested in some fields of electronics, information and communication.

## 4. Conclusions

For the IEICE to continue developing, it must keep evolving. In fulfilling this development, the institute faces several challenges: taking measures to promote globalization; strengthening its role as a fount of knowledge for the world; reinforcing measures to prevent personnel from relevant industries leaving the institute; reducing the burden on the members who participate in its activities, strengthening IT support to facilitate various activities, and simplifying certain procedures. Given the institute’s current financial standing, it is necessary to strike a balance between the above-mentioned measures and funding. I sincerely request the collaboration and support of all members.

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