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Fun of Applying Transformative Research to Research Systems

By Prof.Masayuki Numao
The Institute of Scientific and Industrial Research, Osaka University

Influenced by my father, who was a technologist, from childhood and throughout my youth, I liked to improve upon the structure and mechanics of model airplanes and to assemble radios and wireless transceivers. At the same time, it was probably due to the influence of my grandmother, who was a teacher, and my mother, who loved studying, that I became more attracted to becoming a scientist than a technologist. As a master's student, I majored in artificial intelligence as related to information processing. After graduation, I, along with many of my classmates, sought employment in the corporate sector. Though, I ultimately decided to continue on and earn my doctorate. As my classmates could enjoy the use of abundant R&D budgets in advancing technological research, some of them tried to persuade me to change my decision. While anguishing over which way to go, my supervisory professor told me that funding for my doctoral research would be available under a Grant-in-Aid for Scientific Research from the following year. Looking back, it was this chance to participate in that research project under the Grant-in-Aid for Scientific Research on Priority Areas that tilted my decision. With the grant funds, our lab was able to purchase what was at that time an expensive computer system, a UNIX Work Station, with which I carried out a fruitful tenure of doctoral research.

That time was a heyday for artificial intelligence around the world. Corporations were energetically applying artificial intelligence to the development of expert systems. When introducing my work at a colloquium with corporate participants, I remember being a bit taken aback when asked what practical applications it had. My research then had no immediate application; rather it was purely basic in nature. When it later became apparent that expert systems were reaching their limits, companies dismantled their artificial intelligent departments one after another. Looking askance at such corporate trends, I was happy to be able to continue to use Grants-in-Aid to pursue basic research aimed at making genuine advances in artificial intelligence.

At this time when I was on the beneficiary side of Grants-in-Aid, I received an invitation in the summer of 2005 to serve as a program officer at JSPS' s Research Center for Science Systems. Artificial intelligence may be thought of as a transformative discipline, one embodying intellectual activity including scholarship. From this perspective, I was very interested in doing research on science systems. Unexpectedly, however, I was appointed a senior program officer at the Center. I accepted the appointment, though a bit rashly as I knew it would be difficult to make the time adjustments needed to execute the position's weighty responsibilities. Looking back over the past three years, I hope I haven't been of too much of an imposition on people in and outside the Center.

Implementing a grant program to advance science entails many facets including efforts to improve the screening system while optimizing the selection of its application examiners. From April 2007 through March 2009, I headed the Center's working group on Grants-in-Aid for Scientific Research. I'd like to use these pages to introduce the activities of that group.

In 2006, I had participated in a discussion on ways to improve the grant application documents. On this matter, I first came into direct contact with applicants themselves after becoming head of the working group: Many of them complained about the complexity of the application documents. The first thing that needed to be done in streamlining the screening process was to improve the application format.

As a technique for analyzing data using artificial intelligence, I had conducted research on data mining. We set about working to utilize this technology for analyzing application data under the Grants-in-Aid program. We devised data analysis and time-series analysis methods to compile both grant- and domain-related information and post them on the Center's webpage. Then, to identify conflicts of interest between examiners and applicants, it was necessary to make a thorough study of relationships within the research community. For this purpose, various analyses were being conducted on the coauthor relationship in research papers. Over and above that, the Center studied the relationship between the principal investigator and co-investigators in grant applications. This study has yielded information useful in selecting examiners, designing guidelines and implementing the screening process. I understand that at the National Science Foundation in the US specialists are used to conduct such analyses. At our Center, a researcher with doctoral degree is employed full-time as an analyst, who has now begun to perform even more detailed analyses.

Selecting application examiners is another important function of the Research Center for Science Systems. Choosing the most suitable examiners required us to improve the Center's database of examiner candidates. Every year, new candidates are added to the database. Reviews are conducted of all their screening results and used to identify examiners with substandard performance as evidenced for example by writing extremely sparse comments when doing document reviews. Poorly performing examiners are withdrawn from the database for a period of time. On the hand, a number of examiners who display model performance are officially recognized each year. In 2008, twenty-nine examiners were selected for such recognition.

We are carrying out active discussions on ways to internationalize the application screening system. It's been pointed out that the National Science Foundation and the European Research Council include foreigners among their examiners of applications written in English. As a first step in that direction, we are conducting a trial of using foreign examiners to evaluate the applicants' records of achievement from an overseas perspective along with the international standard of the target research.

There are people who say that more effective feedback of screening results is needed. At present, the Center does not have the manpower to ensure the quality of comments fed back to individual applicants in grant categories without hearings embedded in their screening process. As a positive step, however, consideration is being given to providing applicants feedback from a pre-established menu of comments. This will also pay dividends on the implementing side of the screening process, as it will provide impetus to periodically rethink the evaluation criteria. The Center plans to try out this system in the next fiscal year.

A long-time friend and colleague told me that he thought the grant category titled "Challenging Exploratory Research" to be strangely named. I explained that what the name embodies is an experiment to increase the number of research initiatives selected that challenge interesting albeit high-risk topics. That is, the evaluation criteria under this category has been designed in such a way as to allow selection even if all the examiners in the first-tier document review do not give an application passing grades. Determining whether or not this evaluation system is effective will have to wait for a future appraisal of its results.

Many issues remain for the working group to address in the future. One will be to design an effective procedure for conducting second-tier panel reviews for interdisciplinary and combined research project proposals. Each item in these proposals can be evaluated by individually selected examiners in the first-tier review; the question is how to select the second-tier panel examiners. We tend to think that it will be most effective to have the applicant choose fields with closely related specialists.

This essay, written subjectively by a retired senior program officer, has endeavored to introduce the activities and initiatives of the working group on Grants-in-Aid for Scientific Research. In the Research Center for Science Systems, there remain many issues to be addressed using a transformative approach. As the Center moves its programs forward in innovative ways, I'm sure its researchers and staffs will appreciate availing themselves of the wisdom and support of a wide community of scientists.