



World Premier International Research Center (WPI) Initiative General Comments on FY2007 WPI Project Progress by Program Committee

WPI Research Centers

In October 2007, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) selected five research center projects to be funded under the WPI Program. They are as follows:

Advanced Institute for Materials Research (AIMR), Tohoku University
Institute for the Physics and Mathematics of the Universe (IPMU), The University of Tokyo
Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University
Immunology Frontier Research Center (IFReC), Osaka University
International Center for Materials and Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS)

Purpose of program

To enhance the level of science and technology in Japan and continuously trigger innovation that serves as an engine for future growth, it will be necessary to boost the nation's basic research capabilities while strengthening its global competitiveness. To this end, Japan needs to create research centers in which world's finest brains gather, outstanding research results are generated, and talented young researchers are fostered. These centers should be highly innovative in both their concepts and practices, unfettered by conventional thinking.

Site visits and Follow-up Committee

Site visits were conducted on April 2008 under the concept that the project members' startup efforts should reflect an understanding of the WPI Program's principles and objectives, which is of particular importance to successfully implementing these highly challenging, long-term initiatives.

Following the site visits, the WPI Follow-up Committee was convened on May 20, 2008 in Tokyo to assess the initial implementation statuses of the WPI research center projects. The following are the main points which were discussed in the committee.

1. Globally visible centers

Each of the WPI research centers is conducting a very high level of research in their respective research areas. Exemplifying this are Dr. S. Akira, Director of IFReC, whose papers have been ranked "world most-cited," and Dr. S. Yamanaka, Principle Investigator (PI) of iCeMS, whose discovery of iPS cells was ranked second as a "Breakthrough of the year 2007" by *Science*.

Scientific evaluations of each project will be conducted from FY 2008 by working group members, who were appointed by Program Committee this year. Each working group comprises about 5-6 specialists in the subject field, half of whom should as a rule be overseas members.

Besides a high quality of scientific research, other conditions are also required of the WPI research centers. WPI projects are not mere vehicles for distributing large amounts of research funding; their aim is to create genuine top world-level research centers in Japan. WPI research centers are expected to be globally visible—highly appraised and reputed by world-leading experts and viewed by young investigators as a proud step in advancing their carrier paths. To this end, it is essential for the centers to achieve a global presence with which they can attract the world's top-level researchers.

Participation of top-level principal investigators (PIs) from around the world is an essential requisite for WPI research centers. For this purpose, the following target numbers were called for in the program application guidelines.

- At least 10-20 world-class PIs, at least 10-20% of whom are to be foreign researchers invited from abroad.
- At least 30% of the researchers to be from overseas, including those on short stays.
- A total of at least 200 staff members as a target, including young postdoctoral researchers, research support staffs, and administrative employees.

All WPI research centers have invited overseas PIs; however, their numbers and overall quality fall short of meeting the goal of creating a critical mass at this point. The centers are still searching for world-class PIs, which, not being an easy task, may in some cases take another few years. Considering the 10 year-term of the WPI Program, they should be more aggressive about inviting excellent young researchers with high future potential.

On the other hand, some apprehension was voiced by members of the Follow-up Committee with regard to over fettering the centers with numerical staffing quotas.

Some of the Japanese PIs continue to hold concurrent positions in their previous faculties. Not having freed themselves from teaching and administrative obligations, their ability to contribute to the WPI research center may be limited.

All five WPI centers launched their projects by holding an international symposium, via which they established within the global scientific community the presence of their WPI research projects.

The success of the WPI research projects will be dependent greatly upon the performance, in both areas of research and administration, of the center directors. Full-fledged support by host institutions and staff members will be indispensable so as not to exhaust the directors before achieving the goals of their WPI projects. At the same time, the bureaucratic burden placed on management, e.g. heavy volume of documents, should be kept to a minimum.

2. Research fields

The WPI Program operates on a principle of interdisciplinary research that can be expected to create breakthroughs or paradigm shifts in existing research disciplines. The Following-up Committee discussed the proposed research plans, their implementations and prospects. They are as follows: IPMU is fusing mathematics and physics in seeking an understanding of the origin of the universe. AIMR and MANA are working to fuse research areas that already exist in their host institutions, while iCeMS is conducting research characterized by mezo-space. IFRc is applying molecular imaging techniques to immunology.

For encouraging such fusion, it is important to provide an opportunity to communicate freely among those in diverse research fields and with diverse interests. IPMU's director has arranged an "afternoon tea time" to which all members are asked to join. In the new IPMU building, a space for communication is planned. In some other WPI centers, however, little or no communication among the young researchers was observed.

As these projects are in rapidly advancing interdisciplinary fields, both their research directions and strategies need to undergo frequent review while more effort needs to be made to fuse their diverse research fields. Each WPI center should consider what concrete measures it will need to take to realize this fusion.

3. Research environments

Research infrastructure, e.g. buildings, space, administrative and technical support, is essential to achieving the objectives of the WPI Program. All of the WPI research centers are in the process of moving to new facilities where the PIs can work together, thus facilitating, as mentioned above, communication and stimulating interdisciplinary collaboration among them. For this purpose, host institutions are investing large amounts of money.

The new building for IPMU will be completed next year. New facilities for IFRc and AIMR are under construction on the site of their original institutes. Offices for the PIs of MANA will be in a same building, though their experimental facilities are located separately on three campuses.

iCeMS plans to have three buildings, one of which will be used exclusively for CiRA (Center for induced pluripotent stem cell Research and Application). The Follow-up Committee indicated a need for a clearly defined relationship between iCeMS and CiRA.

At present as in the past, Japan's administration systems are carried out exclusively in the Japanese language, while administration people are generally not trained in English. The WPI Program, however, expects institutions to establish English as the primary language for work-related communication. All the WPI research centers are successfully making this change in their administrations by hiring English-speaking persons. Furthermore, four of the centers have employed persons with research experience as the head of their administrative office. Language support is being well arranged at MANA, where all information is provided bilingually. Grant applications are translated into Japanese by its administrative staff in cases when the grant program accepts

applications in Japanese only. The establishment of this bilingual system is in large part aided by NIMS's previous experience with the MEXT-grant ICYS (International Center for Young Scientists). In fact, 35% of MANA researchers are from overseas. IPMU is also exerting an all-out effort to invite and accept foreign researchers.

4. Administration

Establishing new administration systems is another mandated task of the WPI Program. Existing university administrative procedures and other bureaucratic obstacles need to be overcome. Newly implemented systems are expected to be more flexible and to include such components as strong leadership by the directors, top-down decision-making, and merit-based pay schemes. Good examples of progress in this direction are by Dr. H. Murayama, IPMU Director, who is working to create a streamlined administrative system for the center differing from that of the host institution, and AIMR which is establishing a strong top-down leadership system for the center managed by its four core members. Most of the centers have either adopted or plan to adopt merit-based incentive or payment schemes.

The host institutions place the WPI project within their most high-priority strategic initiatives. They are providing the research centers with strong financial support.

As a unique case, while being the president of Tohoku University, Dr. A. Inoue works as a PI, dedicating 30% of his time, in AIMR.

5. Fostering young scientists

As clearly stated in the application guidelines, it will be an important task to foster and train young investigators as the successors of these 10-year projects. While the WPI centers are to create an environment in which scientists can concentrate on their research, the program does not exclude students from joining the projects. Working with top-notch researchers will have a positive impact on young scientists, including graduate students. Host institutions need to facilitate the creation of close partnerships between their WPI centers and graduate schools. Being a non-university institution, it is of particular importance for MANA to establish good connections with universities in fostering young manpower and research vitality.

Postdoc positions are internationally recruited, for which a large number of applications have been sent out. However, finding and hiring outstanding postdoctoral researchers is not necessarily easy. MANA adopts a double-mentor, double-affiliation, double-discipline system for young scientists. IPMU encourages its postdocs to do research at overseas institutes for a certain period of time each year.

6. Conclusions

All five WPI centers are undoubtedly operating at a very high level in their respective research fields and have great potential to be world top-level institutes in the future. Although some improvements are still needed, these WPI centers have made every effort in establishing themselves as top-level research centers during this 6-month period. We look forward with great anticipation to their further efforts to attract top researchers

from both at home and abroad as they strive to create genuine top world-level research centers in Japan.

Among five WPI centers, we are particularly impressed with the activities of iCeMS and IPMU. iCeMS has attracted world-wide attention with the discovery of iPS cells by its PI, Dr. S. Yamanaka, which marked a major step forward in creating a globally visible research center, a primary aim of the WPI Program. IPMU is working to establish an entirely new institute under the strong leadership of its director, Dr. H. Murayama. The challenge undertaken by this group is truly remarkable as it promises to create a model that can be emulated by other WPI centers.

For detailed comments on the progress of each WPI center, please see the reports prepared for each of them.