Report of the meeting of the International Advisory Board of NII
October 29, 2007

The International Advisory Board met on October 29, 2007 at the NII in Tokyo. At the end of the meeting, the IAB presented some observations and recommendations. This report is an elaboration of that presentation and has been approved by all members of the Board.

1. Progress with respect to previous meeting

Two members of the IAB (prof. Zadeh and prof. Van Oortmerssen) were also present during the meeting in June 2005. They observed that significant progress has been made during the past two years and complimented the institute and the general director. More specifically the following remarks are made with regard to the three recommendations made in 2005:

- *Sharpen the profile and strategy of the institute.* Good progress has been made, but the IAB encourages the management of NII to further clarify the strategy and positioning of the institute.

- *NII is encouraged to explore means to attract top students and post docs from abroad.* Clearly good progress has been made on this topic. There is a special programme with 40 visiting students per year. The Advisory Board recommends increasing the number further.

- *Increase co-operation with industry and not-for-profit organisations.* Some progress was made in this field, but the IAB did not fully understand the strategy with respect to co-operation with industry and apparently there are fiscal barriers which hinder financial participation of industry in research projects of NII. Nevertheless, the IAB encourages NII to strive for more interaction with industry and other organisations in society. This will serve as a source of inspiration for new research topics, give valuable feed-back to researchers during a project, and create value in society. In this respect, it is suggested to also look for co-operation outside the ICT industry, for instance with the car industry, on intelligent cars and intelligent traffic systems.

2. General observations

The IAB was much impressed by the great enthusiasm and ability of individual researchers.
Some high profile projects are clearly emerging, such as for example the Quantum Computing project, which could be world-beating eventually. Another positive development is the incubator where new projects are started. These are developments towards more mature portfolio management as was recommended by the previous Advisory Board in 2005.
Progress and drive can be observed in many small groups. The IAB got the impression, however, that all projects take place in small groups. The culture within NII does not seem to stimulate co-operation in larger teams, while this could really contribute to breakthroughs in spearhead projects.
The Board was very much impressed by SINET3, the ambitious project for the New Japanese Academic Backbone Network.

3. Strategic positioning

As mentioned before, the Board should like to encourage the management of NII to further sharpen the strategy of the institute. What are the strategic goals, and what is the added value of NII to the Japanese innovation system in general and the university systems more in particular? A clear answer is considered very important for the long term future of NII. Among the issues to be addressed are:
- is NII aiming at being primarily a national center of excellence or does it have international ambitions (the board conjectured the latter, but encourages NII to be explicit about this).
- the dual mission of NII: being both a center of excellence in ICT research as well as a “service institute” for supporting the national research with an e-science infrastructure, involving both hardware (backbone network) as well as content. The dual mission clearly provides opportunities for synergy, but at the same time could lead to ambiguity and conflicts between research- and operational requirements.

NII could have an agenda setting role, in defining the national priorities and focus of long term ICT research in Japan.

The Board recommends to define strategic goals as SMART (Specific, Measurable, Attainable, Realistic and Relevant, and Time-based) as possible and to implement a mechanism for monitoring the impact of research projects. Examples of criteria that could serve to measure impact include
- number of internationally refereed papers
- number of patents
- number of spin-off companies
- number of international projects
- number of visiting researchers and visiting professors (from abroad)
- number of projects with industry
- use of research results by the general public
- percentage of competitive or external funding

4. Research management

The Board complements the Managing Director with respect to his role in leading the research of the institute. The Board was impressed in particular by his knowledge of all the projects. The review interviews that he and the Deputy Director have with all research leaders on a regular basis are a valuable instrument and can be instrumental in scouting potential synergy between projects and stimulating co-operation. The Board suggests contemplating other complementary mechanisms or incentives to achieve co-operation. ICT research is more and more driven by demands from a variety of application fields, and such research very often requires a multidisciplinary approach. Interdisciplinarity cannot be achieved without co-operation of several researchers within larger groups.

The board got the impression that in choosing what research to do, NII leaves a great deal of freedom to individual researchers in choosing their research topics. If this is the intent, then this makes recruitment the crucial mechanism in research management: great emphasis is then placed on selection of expertise that fits the strategic research goals, as well as on recruitment of top-class researchers.

The Board congratulates the institute with the increasing success in attracting competitive funding. This is a positive development, since the competitive element stimulates research quality while growing income also enhances the volume of

research and therefore the Board encourages NII to strive for further increase of this type of funding.

With regard to the positioning of individual research projects, the Board saw that for some projects a clear competitive analysis was made. The board recommends a more systematic approach to this aspect: achieving world class requires knowledge of the competition in other parts of the world.
In addition, the Board would like to encourage further increase in international collaboration as a way to achieve international status. In this respect other models for external engagement and international visitors could be considered.

The Board recognises that NII has many different demands, inherent to the unique dual mission NII has: a combination of research and operational support. The unique potential synergy which can stimulate new breakthroughs in e-science is recognised by the board. Nevertheless the Board recommends separating the management and evaluation of the two activities as clearly as possible.

5. Research programme

With respect to the overall research programme, the Board recommends to make a strategic research plan which provides a coherent programme that relates all projects.

A selection of research projects was presented to the board. This leads to some general observations which are mentioned in section 2. With respect to a quality judgment of individual projects the Board suggests that the evalutation of the individual projects be carried out by (external) domain experts.

The Board was much impressed by the *Quantum Computing* project. This is a very challenging topic and the research that is carried out is of excellent quality.
BioCaster is a great project with challenging research questions (multi-lingual text mining) as well as social relevance. The *Global Health Monitor* holds the promise of significant impact, but the path towards reaching such impact was not clear to the Board.
I-explosion is addressing a huge emerging problem: that of handling immense quantities of information. The amount of information on the World Wide Web is growing exponentially, and this growth will further be enhanced by the intelligent sensor networks that are now being added to the internetwork infrastructure. It is a difficult task to extract useful information from an overload of data. It is recommended to investigate more practical cases, such as ITS (Intelligent Transportation Systems), where a lot of data will be created in the near future.
This recommendation can be extended to the more general case: introducing practical applications as examples and test cases in research projects can help to decrease the gap that exists between the academic research and society. Other examples of such applications besides ITS are ICT for the ageing society, public healthcare, education.
The *Cyber Science Infrastructure* is a valuable idea. The establishment of a common platform for many sciences and engineering disciplines, including knowledge, literature, computational methods etc. can be a significant contribution to intellectual progress. At this stage, concrete breakthroughs thanks to such e-science infrastructure are not yet obvious. Success stories are needed to really underline the need for this kind of research.
NetCommons is a very nice project with clear social contribution and the impressive number of users of the platform is evidence of high impact. Also, the user experience is used by the researchers to improve the platform. Such feedback loops are

important and should be built in all projects aiming at public good. The research challenges involved in this project were, however, not quite clear to the Board.

6. Possibilities for new research topics and technical focus

The board should like to suggest the following research topics for consideration.

Fundamental principles in informatics. Examples are:
- decision making based on incomplete or uncertain data;
- a framework for data fusion; quite a few approaches exist such as data mining, Kalman filtering, pattern recognition etc., but a framework suitable for general applications is still to be developed.

Performance analysis and application to complex systems.

7. Suggestions for the format of future Advisory Board meetings

The members of the Board enjoyed the meeting and got many impressions during the one-day meeting on October 29. There was, however, not enough time to fully appreciate the many projects that are going on at NII. Based on this experience, the Board would like to make the following suggestions for the format of future meetings.
- Make a clear description of the assignment of the Board: how would you like to be judged and what are the criteria that are most relevant for the mission and strategy of NII? Since the emphasis of the Advisory Board is on issues concerning positioning, strategy, research management, research programme and topics covered, the Board suggests that the evaluation of the individual projects be carried out by (external) domain experts.
- Provide the members of the board with up-front information (preferably in digital form) a month in advance of the meeting.
- Use a standard format for the presentation of information about projects/groups, e.g.
    - size of the team
    - targets
    - what is the impact of the research, what is the envisioned path to impact
    - co-operation within NII and with external partners
    - competition
- Provide a possibility for direct contact between board members and PhD students and young researchers in an informal setting, for instance during lunch.
- Poster sessions could be an efficient means of explaining projects.
- Extend the meeting to at least 1.5 days.
- Schedule a working dinner for the Board.

Members of the International Advisory Board

Prof. Michel Cosnard
Prof. Takeo Kanade
Dr. Michael A. Keller
Prof. Gerard van Oortmerssen
Prof. Wolfgang Wahlster
Prof. Bob Williamson
Prof. Lofti A. Zadeh
Prof. Yi Zhang