

Report on Japanese Technology
Licensing Offices and R&D
Intellectual Property Right Issues

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Definitions: technology licensing office (TLO) and other actors

In Japan, the term “technology licensing office” or “technology licensing organization” (TLO) usually means the licensing and technology transfer organization of a university or a research institute. Usually the term is used of officially certified TLOs, but sometimes also non-certified licensing organizations are called TLOs.

The meaning of the term "technology licensing office" (TLO) is not taken very literally in Japan. Instead of simply concentrating on technology licensing, most Japanese TLOs have a wider scope of activities (or plans to start such activities): business incubation, university-industry liaison, cooperative research project coordination, information dissemination etc. Since some TLOs provide such support for new firms and collaborative R&D projects, it is sometimes hard to draw a line of what is a TLO and what is an incubator or a science park. In fact, the terms "TLO", "incubator" and "science park" are in some cases used interchangeably by the Japanese.

In a way, this seems to make sense because Japan has so far lacked many official innovation systems, such as licensing offices and incubators. Now that such systems are being built, it is reasonable that incubators should reside close to (or inside) TLOs, or technology licensing support functions should be included in incubators and science parks.

Science park is another term that has many kinds of connotations in Japan. A group of small non-scientific manufacturing firms located close together can call themselves a science park, and so can large high technology R&D consortiums. Such science parks may or may not have licensing or incubation activities, thus making it difficult to draw clear lines between Japanese TLOs, incubators and science parks.

For the purposes of this study, TLOs are defined as *those 24 technology licensing organizations that have received official TLO recognition from the Japanese state* (at the time of collecting this material the number was only 20), and whose task is to commercialize the results of public research. There are many other technology licensing organizations in Japan (for example subsidiaries of large conglomerates), and a couple of such technology licensing organizations are presented here for comparison with the official TLOs.

Incubators are defined as *those organizations that offer material AND immaterial (know-how) business support to new small and medium sized enterprises*. Organizations that call themselves incubators but offer no immaterial support are not considered here. Such organizations usually just provide rental offices and facilities without know-how support.

Science parks are here considered to be *large, organized and cooperative groups of science and technology researchers and laboratories, located within the same premises or very close together*. In order to qualify as a science park in this study, the group should have *extensive R&D activities*. A science park often also has incubation and licensing activities.

The situation in the past

After the Second World War, Japanese university professors and researchers have been autonomous and quite free to choose their research topics. The ideal academic professor was free from commercial or official control, and just contributed to the scientific community through independent research. By rules dating from 1977, intellectual property that was born out of university research belonged in most cases to the individual professor (in practice about 90% went to professors, while the Japanese state acquired ownership to about 10%) Little evaluation was done to assess the results or contribution of university research to society as a whole, and the Japanese state did not financially support university research to the extent it does today.

Despite the assumed independence of professors, in practice large firms formed personal and unofficial relations with them. Since the state did not provide large funds for research, the firms gave the professors "research grants" in exchange for research on desired subjects and access to skilled graduates. Public university professors could not easily make technology transfer contracts, since they were considered civil servants. Thus, many professors simply revealed their inventions to a large firm, who would then file for a patent in its own name.

According to many university officials interviewed for this study, the firms' access to new graduates was the most important side of the system. In the course of this study, one interviewee even said the unofficial research grant system was in essence a recruitment system for large Japanese firms.

The situation now

After the burst of the bubble economy in the 1990's, the Japanese economy has been unable to pick up its former speed again, and there are increasing concerns that the old style of doing business is not viable any more. Previously, Japanese industry used to take up foreign innovations, improve them and make them into superior products with which they could beat the original foreign ones. This is not good enough any more in the increasingly competitive and innovation-focused international marketplace. The Japanese are now trying to improve their innovation systems in order to be able to make original innovations of their own, and start new business.

The old unofficial university-industry relations are not adequate any more for the following reasons:

- University professors in general have not been active in patenting and utilizing their innovations for business. Their innovations and inventions have either not been patented at all, or the patents have been idle as many large firms have kept patents simply to prevent competitors from using them. In addition, national university professors have not been allowed to work simultaneously in universities and private firms, thus making academic entrepreneurship very difficult.

- Although large firms have been cooperating with university researchers, they do not seek and use Japanese university innovations actively enough. However, Japanese firms have been active in cooperation with US universities. There seems to be a "reverse Not-Invented-Here syndrome" as Japanese firms prefer foreign university innovations to domestic ones.

- In the old system, rights to innovations tend to go to a single firm (the one with which the professor has a personal relationship). This is perceived as unfair in view of the whole economy. There are several other firms that may claim access to the technology as well, especially if public funding is used for the research.

Also, the firm chosen privately by the professor on the basis of personal relations may not be objectively the best one to develop the technology successfully.

-Since the university-industry relationships have been mostly informal, there has been no good way to evaluate the system's effectiveness or to control the system.

-There has been no mechanism or tradition for entrepreneurs and smaller firms to acquire patents from academic research.

-In practice, about 10% of intellectual property rights from public research results go to the Japanese state. The state-owned intellectual property is under-utilized at the moment. For example, anecdotal evidence suggests that because of bureaucracy, entrepreneurs have had to go through many skilful maneuvers before to obtaining rights to state-owned patents.

All in all, the Japanese government thinks that the old system of university-industry relations is uneconomical and keeps a lot of commercial potential unused. Whatever the reasons, which have been preventing the efficient utilization of R&D results, now it is the time to overhaul the old system and bring in a new one.

Recent changes in the Japanese innovation system

In 1998, the Law for Promoting University-Industry Technology Transfer was passed in Japan. The law made possible the establishment of officially certified Technology Licensing Offices (TLOs). From 1998 onwards, 24 technology licensing offices (TLOs) have been granted official status by the Japanese state. The officially certified TLOs get state funding for up to five years. Most of these TLOs are located close to a university or a university-based science city, and the main task of the TLOs and the new legislation is to bring the fruits of academic research into the marketplace. Since the establishment of TLOs, there are now two practical ways of transferring research results from researchers to companies. One is the old way: unofficial and mostly undocumented exchange of knowledge and resources between companies and researchers. The other way is through TLOs. The way through TLOs is well documented, regulated and more transparent, and supposedly more beneficial to the country as a whole.

In 1999, the Industrial Revitalization Law was passed, partly modeled after the Bayh-Dole Act in the US. The Bayh-Dole Act removed bureaucratic barriers preventing cooperation between university research and private firms in the US, and has led to a substantial increase of technology transfers from universities to companies. The Japanese Industrial Revitalization Law has many provisions for revitalizing Japanese industries. One notable feature is that the law allows private firms to own intellectual property rights created through government funded research.

In 2000, the Industrial Technological Ability Strengthening Law was passed, allowing national university professors and other staff to hold a job in a private company while staying at the university.

In March 2001 there were 36 university staff (professors etc.) working part-time in licensee companies, 24 working as TLO staff and 8 as supervisors in companies (Sangyo Kiban Seibi Kikin, 2001, p.41-43).

A major change in the ownership of intellectual property rights is being discussed in expert circles in Japan: the right to decide on ownership of IP arising from national university research may be given wholly to the universities, instead of individual professors. Such a change would have a large impact on the technology transfer scene in Japan. For one thing, universities would be able to make coordinated decisions on the patenting, licensing and marketing of research results. The universities would no longer be dependent on the

individual decisions of researchers on whether to license through a TLO or go directly to companies. This would ease the operation and improve the chances of success for TLOs.

A related development is the proposed independent legal status for national universities. So far national universities have been government run organizations, without independent legal status of their own. If and when they are granted independent legal status, they will be more free to decide on many matters relating to education, research and industry cooperation. IP ownership determination is one area that is likely to be affected by the new status of the national universities, and they will have more freedom to decide on IP matters in the future. Private universities have an independent status already, and in their case setting up good IP management rules there is more a political than a legal issue. So far only a few private universities have set clear rules governing IP ownership issues.

Another related development is the liberalization of rules for national university-industry collaborative research projects. So far the rules have given private firms only limited rights to research results, and the process has been quite complex. Recent changes in IP rules give companies more freedom in the use of jointly owned IPR. The Ministry of Education is planning to streamline the system further and give private firms guarantees of exclusive ownership for IPR arising from such collaborative research. The new rules for collaborative research are being planned.

Issues of Intellectual Property Ownership

Who Gets Ownership of IPR?

The following cases are compiled from Japanese sources. It must be noted that some sources contradicted each other, and the rules seemed not to be clear to all actors involved. Therefore the following text should be read with some caution.

In principle, right after Japanese university research results are produced, they can be assigned to five different kinds of owners, depending on the situation:

1-The individual researchers.

When deciding on IPR ownership, the researcher is the starting point. In case the Japanese state or the university has no valid claim on the IPR, it will belong to the researcher (inventor). Ownership by inventor seems to be the most common case both in national and private universities. The preference for private ownership of research results is based on IPR rules from 1977. There is talk that the rules may be abolished, and IPR ownership at national universities may be given to the universities. Private universities will probably still retain the right to decide ownership questions by themselves.

2-The Japanese state.

Only inventions from national universities can be appropriated by the state, and only if at least one of the following conditions apply (the ownership decision is made by a university committee):

- Results of research whose aim is to produce practical applications of technology and for which special funds have been received from the government (cooperative, commissioned or otherwise state funded special research)

- Results of research whose obvious aim is to produce practical applications of technology and large

or very special state facilities have been used for research (particle colliders etc.)

3-A private firm or organization.

IPR from university research can be acquired by a private company by participating in cooperative research with a state institution (university etc.) or with a private university. In the case of a state institution The IPR will be divided among the company and the state in proportion to their research contribution (or according to the contract in the case of a private university). In the past, there have been many rules restricting a company's use of IPR jointly owned with the Japanese state, and this has diminished the attractiveness of national university-industry cooperative research for companies. However, new rules set by the Ministry of Education at the end of year 2000 now allow companies to freely utilize jointly owned IPR.

Besides cooperative research, IPR can be licensed to a firm by the owner of the IPR (i.e. the individual researcher, the state, or a TLO).

4-A private university.

Most private universities have not settled clear internal rules as to whom IPR should belong. In principle they could rule that all IPR belongs to the university, but for the time being the issue remains unsettled. Notable exceptions are Waseda and Ritsumeikan universities, who have ruled that IPR resulting from university research belongs to the university and not to individual researchers.

5-Technology licensing office.

IPR is either transferred to the TLO through free will by individual researchers (in national or private universities) or because research rules or contracts state so (in private universities or consortiums). Some TLOs make contracts with individual university researchers (private or public), in which researchers promise to disclose all their inventions to the TLO. In such cases the researchers have free choice whether to sign or not, but after having signed they will be bound, legally or by honor, to giving up their inventions to the TLO.

Differences of IP Rules in National and Private Universities

The IPR management complexities in Japanese national universities stem for a large part from the fact that national universities are considered state organs under the Ministry of Education. They are not legally independent organizations, and as such are not free to decide on many of their own matters, including IPR ownership. As national universities don't have an independent legal status yet, they cannot own intellectual property. Instead, patent application and licensing for national research have recently been handled only by Japan Technology and Science Corporation (JST). It seems that the highest quality of university research in Japan is conducted at national universities, so their question of ownership of intellectual property rights is very important.

Another main question is how national university TLOs (who as business organizations are not allowed to be part of the university organization but must be established separately) can solicit university researchers into giving their privately owned IPR to the TLO. Besides changing the national IPR rules, it seems to be very difficult to enforce such a system. However, talks are underway about changing the rules: the ownership of research results would shift from private individuals to the university itself.

In 1999, a total of 1,721 invention disclosures took place in Japanese national universities (FCRC, 2001, note: does not include disclosures at private universities). Of these, 284 were judged to belong to the state of Japan, while 1,437 were assigned to individual researchers. An IPR committee in each university decides whom the IPR should belong to in each individual case.

Private universities have no complex restrictions on IPR ownership. However, most private universities have not settled clear rules on how IPR arising from results of university research should be treated. At the moment, the situation seems to be that the IPR goes de facto to the researcher, who either applies for a patent, does nothing or hands the invention privately to a company. Two notable exceptions to this are Waseda University and Ritsumeikan University, whose rules state that research results automatically belong to the university (and therefore to the TLO that is affiliated to the university).

New government policies may soon turn the national universities into independent legal entities. This will have a major impact on how IPR is handled in national universities (and national universities have some of the best research facilities and resources in Japan). The basic deal is this: the universities will be on their own financially, which will create difficulties. At the same time the universities will be free to decide on how to overcome the difficulties and create a dynamo of university-industry technological cooperation.

Improvements to University Rules

Besides simply giving national universities more independence, there are several specific issues that should be resolved in order to create an efficient innovation and commercialization system (Sangyo Kiban Seibi Kikin, 2001, p. 65-66):

- Universities should be given more decision room on IPR ownership and usage, instead of declaring more IPR to be state-owned.
- Universities should be able to fund licensee companies.
- Universities should have the freedom and the funds to employ outside experts and form suitable teams.
- Universities should be given funds to manage patents, or to outsource the management of patents.
- TLO, liaison office, management and legal contract functions should be integrated into a dynamic whole.

The Japanese government is resolving these issues step by step, by giving out new instructions and decrees. The present situation of each of these reforms is beyond the scope of this study, but they are being discussed and changes are taking place. This coincides with Japan's reform of many governmental institutions and policies, and it will take some time before a coherent picture can be obtained.

Cooperative R&D with Japanese universities

High level research is being conducted at Japanese universities, and there are many possibilities for cooperation. One form of cooperation is exchange of scientific knowledge through international seminars, journals etc. as is being done in many fields of science around the world. Cooperative research is another option, and when cooperative research projects are conducted, questions of intellectual property rights arise.

The IPR issues are not very important when the research is in basic science, far removed from commercial applications and with little chance of producing patents. However, particularly if the research aims at producing technologies or knowledge that have business applications the question arises as to whom the research results should belong.

Japanese companies have been reluctant to do extensive cooperative research with Japanese universities, while at the same time collaborating with US universities. Two major reasons for this emerged during interviews. Firstly, there seems to be some kind of a “reverse Not-Invented-Here-syndrome”: Japanese companies have a tendency to value foreign (mostly US) innovations highly while disregarding domestic ones. Secondly, the regulations of cooperative research between companies and national research institutions (universities, research centers etc.) have been quite complex, and there have been limitations on the IP rights of the participating companies. There has been no explicit guarantee for participating firms that they would be able to own or freely use the results of cooperative research, without state interference or partial state ownership. This has discouraged firms from doing collaborative research with national universities. On the other hand, private universities have had the right to decide freely on IP rules for cooperative R&D, but few have set explicit rules so far. (The present rules for university IP ownership have been described in the previous chapters)

The government is now streamlining the whole Japanese innovation system, with the aim of removing inefficiencies and releasing underutilized potential. IPR rules for cooperative research are to be simplified, barriers to university-industry cooperation are to be lowered and entrepreneurship is to be promoted. If the reforms are implemented well, companies may soon be able to have collaborative research projects with universities without having to suffer from excessive bureaucracy or regulations that would restrict their ownership of IPR.

The reforms should make Japanese university R&D more accessible to foreigners as well. Unofficial technology transfer deals between Japanese researchers and Japanese firms are being frowned upon by the Japanese government, and TLOs provide an alternative route to licensing and technology transfer. Many TLOs are also willing to act as mediators for commissioned or cooperative research projects between universities and firms.

Japanese TLOs and some aspects of the innovation system are described in more detail in the following chapters.

Japanese TLOs

Official TLOs are those who have submitted their operation plans to the state and have been accepted. They are eligible for yearly state support up to 30 million Yen for up to five years (the maximum state support thus adds up to 150 million Yen).

Organizational characteristics

This study found three main organization types of Japanese TLOs: public (or national) university TLOs, private university TLOs and area based TLOs.

National universities are not legally independent entities in Japan, and as such cannot run a business as part of their organization. Therefore, national university TLOs are established as separate legal entities outside the universities. As separate organizations, they can't benefit directly from the university's funds and are thus in a tight economic situation.

Private universities have no such restrictions, and TLOs can be a part of the normal university organization. Also, private universities can distribute their funds to TLOs as they see fit.

Area based TLOs serve several universities, research centers etc. within a certain area. TLOs that exist outside a certain university can be established as consortiums, companies etc. However, it seems that so far it has been difficult for such TLOs to get official TLO status from the state.

Business philosophy

This study found three main types of TLOs: seed push type, need pull type and guided research type (corresponding to “technology push type, market pull type, technology consulting type” by the Japanese Ministry of Education, in Ilmavirta, 1998, p. 60-63)

The seed push type TLO receives information on innovations as far as the researchers agree to give them and invite the TLO to help. The TLO then evaluates the innovation, applies for a patent and finds a suitable licensee.

The need pull type TLO actively searches for new innovations and technologies (already existing seeds) that correspond to industry needs and may have business potential. The TLO then patents those technologies and markets them to industry. According to some Japanese literature a need pull (or market pull) type TLO should also initiate R&D projects on the basis of industry needs. However, it became clear during this study that not so many TLOs actually fulfill this function. Those TLOs that do are called “guided research TLOs” in this study.

The guided research type TLO takes a proactive stance: the starting point of research should be the needs of the industry, and those needs should be translated into R&D projects. The TLO can inform the research community of the needs of the industry, thus guiding research into more commercially profitable paths. The results of such guided research projects can then be licensed to the industry much more profitably and efficiently. At its extreme, a guided research system only initiates R&D projects that can fulfill an identified industry need, and other kind of R&D is not done.

Many Japanese TLOs are close to the seed push or need pull type at the moment, but many of them also see the importance of feedback from the industry to the research community (which is the most important function of a guided research type TLO). However, making university research totally dependent on industry needs is a political issue, touching such subjects as academic freedom, independence of universities as well as scientific validity of research. Therefore it may be difficult for university-affiliated TLOs to take a clear market-guiding-research stance even in the future. Other types of TLOs (for example TAMA TLO and its consortium) are free to give priority to industry needs.

During this study, it was not possible to measure the extent of seed push, need pull and research guidance activities in each of the TLOs. Therefore, some of the TLO Profiles and the profiles in the Appendix may have been classified as need pull types while in fact they may have research guidance activities as well.

Specific functions of TLOs

Japanese TLOs do not restrict themselves simply to outward licensing. They tend to see themselves as agents of intellectual property utilization in general, and many of them see themselves as business incubators and facilitators of commissioned or collaborative research.

The following main functions can be found in Japanese TLOs. Some of the activities are not very well developed yet, and not all of the functions exist in all of the TLOs.

- Obtaining intellectual property rights: locating innovations and applying for patents
- Outward licensing
- University-industry liaison activities (seminars for knowledge sharing, starting cooperative research projects etc.)
- Information system to evaluate needs for future research by the university and/or research institutions
- Business incubation: providing material and/or immaterial support for startup firms
- Bringing in funding for research
- Courses in entrepreneurship
- Technology consulting
- TLO's own projects (IPR research, research in cooperation with industry etc.)
- Informing society of the university's research

Cooperation between TLOs

Japanese TLOs have been born in different kinds of universities and business areas, and have been founded by different kinds of people without detailed central control. Therefore the TLOs have adopted somewhat different approaches.

The TLOs do have very similar goals and ideals of innovation and commercialization, but because of their different backgrounds and situations, concerted action is difficult. For example, a major national university TLO such as Casti at Tokyo University is less free to coordinate its activities as business requires, than for example TAMA TLO which is part of a private university-industry consortium. However, new university and IP legislation may change the situation of national universities soon.

Similarities of TLOs, incubators and science parks

Japanese TLOs, incubators and science parks all share many features. Besides licensing, some TLOs also give business advice to startup businesses and give feedback from industry to university researchers (incubation activities) as well as attract investors.

Incubators can help beginning firms in R&D and technology transfer issues (TLO activities) and in finding investors. Many TLOs say incubation activities are part of their menu, or an activity that should be developed in the future. The Japanese government has stated it wants over 1000 ventures to be created from universities in the next three years from 2001, and university TLOs are in a position to help realize this undertaking.

Science parks are usually larger entities that have more or less integrated R&D, technology transfer, incubation and other business activities on their premises. They are also connected with investors.

All in all, TLOs, incubators and science parks have many of the same functions. However, their scale and focus is different from each other. Science parks tend to be the largest undertakings, with strong business interests and large companies involved. Incubators deal with small businesses and are less focused on R&D. TLOs deal with academia, and strive to become the main interface between university research and the business community.

Challenges facing TLOs in Japan

Lack of human resources

Running a TLO effectively in Japan would seem to require the following qualities of the personnel:

-Experience and understanding of both real business and university research.

Such experience is rare in Japan for various reasons, the most important one being the custom of staying in one field until retirement. University people have not usually ventured into business or vice versa. It has been practically impossible to have a career in both fields simultaneously for various reasons.

-Specific knowledge of (international) patenting and technology transfer issues.

Patenting and technology transfer issues are often very industry-specific issues. For example, in pharmaceuticals inward and outward licensing are major business modes, while in some other industries licensing may play only a minor role. Accordingly, the patent and licensing advisors should ideally have specific knowledge of each industry. Such people are relatively rare.

-Clear vision of the TLOs role and the workings of Japan's innovation field.

The role of TLOs has not yet been clarified in Japan, and some TLOs don't seem to have a clear picture of what exactly they should be doing. Importing foreign experts is not a solution, because the situation is unique in Japan and American or European formulas are probably not directly applicable. Japanese TLO people have to be educated and a clear vision formed.

-English skills and international views.

English is not widely spoken even in university circles in Japan.

Official and documented university-industry cooperation is not very common in Japan (unofficial information exchange is). It will be a long leap to start explicitly documented international projects and there are few people with relevant international experience.

Industry's lack of interest in the results of public research

Even if an innovation has good business potential in theory, it may be hard for private firms to see it at first. In addition, firms may not want to buy patents for technologies that have not yet been developed far enough to be sellable products. The business potential of the innovation may be too unclear to warrant much attention from the industry.

The root of the problem lies in lacking coordination between industry and public research. For the most part, Japanese universities and public research institutes do not take industry needs very much into account when deciding on what to research. At present, the TLO system is quite push-oriented: TLOs are trying to push already existing research results or seeds onto the market.

In order to make the public research results more attractive to industry, the system should be more needs-oriented: the concrete needs of the industry should be taken more into account when deciding on what to research. Industry needs should be at least one guideline when deciding on the direction of research. If the industry can have a say in the direction of research, firms will be more interested and the universities will be able to produce research results with better business potential.

Researchers' lack of interest in business

University researchers may be more interested in the academic merits of research than the development of products for actual markets. Also, many universities don't have enough knowledge or funds to do extensive R&D for commercialization. Therefore, even potentially profitable patents may be left unsold.

Researchers' denial of support for TLOs

The law still gives the ownership of intellectual property mainly to individual researchers. The only way a TLO can acquire this intellectual property is by soliciting the researcher into giving the rights over to the TLO. In exchange, the TLO promises to apply for a patent, sell the patent and give the royalties to the researcher, all free of charge.

However, if the researcher declines, the TLO can do nothing. Well-established older Japanese professors tend to have very long and fruitful relationships with large firms behind them. In terms of Japanese culture, it would be very difficult for them to switch their loyalties from the firm to the TLO. They can't easily say no to the requests of a firm that has supported them over the years, and with which they may have personal relations. The university and state authorities try to convince the whole public research community of the value of an explicit and official technology transfer system, but the old unofficial university-industry ties are not easily broken, and the research results will still go to the industry through the unofficial channels for some time.

Therefore, it will take time before most or all the intellectual property of universities can be channeled through TLOs. The most probable people to give their research results to the TLOs are young researchers, who see the value of the TLO system and who have not yet formed close ties with the large Japanese firms.

IPR ownership and Royalty payments

The Japanese TLOs have (besides a few exceptions) so far been unable to achieve very profitable licensing contracts. Partly this is due to the fact that the offices are still just beginning their activities and do not have large patent portfolios yet.

However, large Japanese firms are in some cases also reluctant to pay royalties. Because the Japanese university-industry relations have been unofficial and uncontrolled for a long time, large firms have had a practically unlimited access to the inventions of those professors with whom they have had good personal relations. The firms are reluctant to pay separately for each technology, because in the past they just financed one professor's research and got practically all his results if they wished.

Financial problems

TLOs in public universities cannot receive money from the university (=state) funds, because they are separated from the university and deal directly with business.

TLOs in private universities can be funded by the universities as the university management sees fit.

Both types of TLO can receive five years of financial assistance from the Ministry of Economy, Trade and Industry (METI). The assistance is about 30,000,000 Yen per year (according to FCRC, 2001). After a five-year-period, no more assistance is given, and the TLOs should manage on their own. Many of the TLOs that were interviewed for this study said that lack of funds is one of their main concerns.

Lack of dynamism in the surrounding society

-University-industry cooperation has been discouraged in Japan since the 1960's political student protests. University research is supposed to be free from industry dominance. In fact, the lack of official channels for cooperation is one reason for the unofficial information exchange relationships of Japanese professors and industry. Society accepts open contractual university-industry cooperation better now, but it will take time to switch from the unofficial, undocumented cooperation system to an explicit, regulated one.

-Individual entrepreneurship is not highly valued in Japanese society. Rather, harmony and collective work is emphasized. The individual money making efforts of professors might not be very welcome by peers and by university society.

-People in Japan are generally so affluent that there is no dire need to make more money by becoming entrepreneurs. There is no strong sense individual ambition, and an entrepreneurial culture has not grown in the population despite economic recessions. In such surroundings it does not seem glorious to research in hope of licensing and commercial success. Rather, it could seem somewhat greedy or selfish to the Japanese.

-Large firms have not been active enough in commercializing university inventions. They may acquire patents for protective purposes and keep a large IPR portfolio unused (2/3 of unofficially transferred university inventions remains unused in Japanese companies, according to Kneller in Branscomb et.al.)

Incubation challenge

TLOs are organizations whose main purpose is to locate technological inventions, turn them legally into intellectual property by applying for patents, and then license them outward.

The licensee (receiver of the license) can be anyone willing to 1) pay for the license and 2) give a guarantee that the technology will be developed and commercialized (when the licensor requires such a guarantee).

For example in the US, licenses are often given to startup firms who will then develop the technological invention into a commercial product. Many of the Japanese TLOs (but not all) mention startups as important partners for licensing. The idea is to give promising technologies into the hands of enthusiastic entrepreneurs, who have the will and energy to take the risk and invest their money, time and skills in developing the technology.

Many of the Japanese TLOs see incubation activities as an important function that they want to develop. However, there is a lack of 1) popular interest in entrepreneurship 2) expert business advisors and 3) investors willing to risk their capital. The first step of the incubation activities should therefore be to address these issues.

In the beginning of 2001, only five startups had been established with substantial contribution from TLOs (Sangyo Kiban Seibi Kikin, 2001, p. 37).

Organizational boundaries and location

In some research facilities in the world, close physical location and thin organizational boundaries make communication in research activities easy. This is not usually the case in Japan, where university departments are quite independent and separate from each other, making interdisciplinary communication cumbersome. Such arrangements naturally inhibit communication and cooperation.

In Japanese private universities, TLOs can be located within the university organization and interact with the different departments with relative ease (provided that there are no other inhibiting factors)

In the case of public universities, TLOs cannot be part of the university organization as such. They must be established as separate legal entities, with their own accounts. Besides being legally separate entities, the TLOs also tend to be located outside the universities physically. It can be argued that the TLOs would be better in touch with actual research activities if they were located on the same premises and used the same cafeterias and leisure areas as researchers and professors.

The objective and methods of this study

The main objective of this study is to provide an overview of Japanese governmentally certified technology licensing offices. Basic data has been gathered on the Japanese university technology transfer system and the organization, activities and future plans of several TLOs. A couple of technology transfer organizations that are not certified by the Japanese government are also included (NTT-AT and REC R&D).

Most of the data was gathered through interviews with TLO managers and officials at the Japanese Ministry of Education. We also interviewed Japan Association of New Business Incubation Organizations (JANBO), Japan Entrepreneurs Association (JAE) and some science parks and incubators. They provided the background for understanding the environment where Japanese TLOs are functioning.

Sixteen TLOs or technology transfer organizations were interviewed, mostly around the Tokyo and Kinki (Osaka-Kyoto-Kobe) areas. Notably the islands of Shikoku, Kyushu and Hokkaido were left outside the study. The interviews were conducted mostly in Japanese. The interviews lasted from one to about three hours, depending on how much time the interviewee had and how much information they had for us. The Japanese Ministry of Education was interviewed twice for a general view of the university and science system, and technology licensing.

The TLO interviews were freely structured, while we always kept asking a few main questions that were based on general TLO literature and web sources. The questions became more refined during the first few TLO interviews as we acquired more insight. After a few interviews, the basic questions became set as the following, with alterations and more specific questions asked during some interviews.

List compiled and translated from the questions posed to Japanese TLOs, in Japanese.

- What are the main activities of your TLO?
- What kind of network activities do you have? What patterns of cooperation do you have with outsiders?
- What international activities do you have?
- How many people are there in your staff and what do they do? What competencies do they have?
- What results have you achieved so far? Please give examples.
- Please give us a list of your patents and patents pending.
- Where do you mostly license you patents to? (large companies, SMEs, startups?)
- What kind of business activities, consulting activities and/or investment activities do you have? What kinds of support functions or incubation activities do you have for venture businesses?
- Are there any startups or venture companies that have emerged from your activities?
- What are the sources of your patents? (Where do you acquire your patents from?)
- Please give us a list of world-class research fields, researchers and / or laboratories whom you serve.
- How large are the research budgets? How many researchers are there?
- Please list the international collaborative research projects that the researchers are involved in. How are the projects usually arranged?
- What kind of funding is available for international research cooperation?
- How are university seeds and industry needs matched?
- How is the commercial potential of inventions evaluated?

We gathered new data from the interviewees' narrative as they sought to answer our questions in detail. These data were carefully noted down and later placed within our initial TLO framework (acquired from general literature), thus constructing a more coherent and detailed picture of the individual TLOs and their environment in Japan. The interviews were an iterative process, with the first interviews providing material for more informed questions that could be asked during the later interviews. Not all of the gathered

information is included in this report. For example, detailed information on TLO and research budgets is not presented here (and not all TLOs provided such detailed information).

Because of the nature of the interviews, a bias was unavoidable. We tended to ask more questions during the first interviews, while missing some main points that only emerged during later interviews. During the later interviews, we tended to ask fewer but more focused questions on subjects that had emerged as important in the earlier interviews. This may have led to a bias in the TLO profiles, with some TLOs having been interviewed more thoroughly than others. However, the nature of the interviews has probably not significantly biased our overall picture of TLOs in Japan, as we gathered general knowledge and understanding of them and their environment.

The results of the individual TLO interviews were compared with each other, and some functions and features emerged that were common to most of the TLOs. These were compiled in the TLO mindmap profiles provided in the appendix. The mindmaps were sent to the respective TLOs for confirmation and corrected accordingly.

Information on the Japanese intellectual property rights system relating to R&D at universities and research institutes was gathered from literature, and during several of the interviews. Besides TLOs and the Ministry of Education, several Japanese and Finnish academic and professional people contributed to this study by giving ideas, opinions and suggestions concerning TLOs and the IPR system in Japan.

The main sources that have been used are listed at the end of this paper. Sources are mostly not identified in the main text. This study is the result of a practical fact-finding mission, based on interviews. The possibility of errors is acknowledged.

Results and implications for Finnish-Japanese cooperation

The goal of this study has been to collect information on Japan's innovation system, intellectual property rights and technology licensing offices, analyze the information, and create TLO profiles that will help in understanding how Japanese TLOs function. The following pages summarize some of the information gathered from literature and from the interviews. Japanese authorities and sixteen TLOs were interviewed. The reader should be aware that it was not possible to gather all information in detail during the interviews, and the results should be read with some caution.

Some system of creating and transferring meaningful innovations from universities to firms has been functioning in Japan for the most part of this century. The system has alternated between explicit university-industry cooperative research projects and informal, undocumented transfer. The choice of system may have depended on the mood of the society: whether close university-industry relations have been generally accepted or not.

The present trend in Japanese science and technology policy is away from informal technology transfers and towards an open, explicit and dynamically managed innovation system. There are many reasons for the new direction in policy, but the main one is that the Japanese economy needs all power it can muster in order to be able to recover from recession and create new innovations to compete on international markets. The old business and innovation structures in Japan are deemed insufficient to accomplish this task. The reasoning goes that a more open and more competitive system should produce better results.

The Japanese science and technology innovation system has many facets and a complex structure. Here only one part of the innovation system is under scrutiny: university research and university-industry relations, TLOs in particular.

The informal nature of Japanese university-industry relations in the 1970's and 1980's produced a flexible system whereby university researchers gave some companies free information and know-how and access to top students. In return, the researchers received money for further research in "donations" from the companies, and had access to the company's insights and scientific and technological knowledge. A documented, contractual system of cooperative or commissioned research did also exist, but the researchers and industries preferred to keep most of their relations personal and informal. Much fewer R&D projects and technology transfers were conducted through explicit legal contracts than through informal relations.

The informal system is flexible, and professors and companies seem to actually prefer it. However, the most influential opinion at present holds that the system is not productive enough. Companies acquire technologies and patent them "just in case", or in order to protect themselves and block competition. According to Kneller (in Branscomb et.al. 1999, p. 330) about two thirds of industry patents originating in universities are not developed further, commercialized or licensed onward. Also, because the system is not transparent, new technologies may not be transferred to the companies that have the best chances to develop them. Instead, they simply end up in a company with which a professor has good relations.

TLOs now provide an alternative path of technology transfer. Technology transfers from the 70's until now have been for the largest part non-transparent and private deals between Japanese players who know the field and the unwritten rules (with some notable exceptions, such as well-documented national research projects etc.) *The main point is that TLOs now provide a place where anyone, including foreigners who don't know Japan well, will have access to Japanese university innovations.* TLOs gather innovations from consenting faculty members, apply for patents, publish the information (to TLO members or the general public, depending on the particular TLO's system), and handle technology transfer and royalties. The old informal system did accomplish some of these functions, but the new system aims to find licensees that will be more committed. The licensees should actively develop and commercialize the licensed technologies, instead of keeping an idle patent portfolio. The aim is to fully utilize university research results in business by marketing technologies openly through TLOs and finding ideal licensees (as opposed to transferring technology to favorite companies free of charge).

The Japanese TLOs are not only patent sales offices. Many of them also want to develop some kinds of business incubation and cooperative research coordination functions, which would make them into multi-functional university-industry innovation agents. Many TLOs still lack clear vision and coordination, while others are more advanced in their thinking. At this point the TLOs are searching for best practices and new forms of university-industry cooperation. They have the mandate of the government and the attention of the Japanese business world.

TLOs could perhaps provide a new forum for Finnish-Japanese science and technology cooperation. The TLOs are open for suggestions and cooperation proposals at this point, and would probably welcome well-informed plans for collective action. Many TLOs not only provide licensing services but also help with cooperative research arrangements. Such arrangements have been possible also before, but the practices in different universities vary, and often simply depend on personal relations between Finnish and Japanese researchers. The TLOs provide a more or less uniform and open forum for technological cooperation and exchange in many universities. However, as often in Japan, personal relations are still very important, sometimes probably more important than the services TLOs can provide.

The TLO practices still vary, but it can be expected that when some of them succeed, others will imitate their successful strategies. It would now be a good time for the Finnish side to take the initiative and make a proposal for cooperation in some form or another. The more informed and detailed the draft plan, the better. If a detailed plan is turned down by the Japanese, it can still lead to further talks on some other track of cooperation. The scope of a cooperation proposal could range from a simple system of patent information exchange to establishing a major university-industry research and commercialization consortium between Finland and Japan.

When asked about the technological strengths of the laboratories where the TLOs derive their IPR from, almost all TLOs claimed that information technology and biotechnology are their strengths, or that these fields are the future focus of the TLO. A few TLOs mentioned also materials and machinery as fields of strength. The data is compiled from information acquired during interviews, and has not been statistically verified.

Most TLOs had sold under 20 licenses by summer 2001. Some had done no licensing, and had under ten patents in their portfolio. Notable exceptions were AIST with 12,000 patents and 1,100 licenses sold, NTT-AT with about 1,400 technology transfer successes and REC R&D with 935 patents acquired. It should be noted that AIST Innovations, NTT-AT and REC R&D all represent very large pools of R&D and their patenting and licensing activity numbers include many results from before the establishment of the present TLO system.

Six TLOs (38 %, of the calculation basis of 20 units in the summer of 2001) mentioned that spinoff companies had recently been born of their affiliated research institutes. It is not clear to what extent the TLOs had been involved in the spinoff process. Nihon University TLO Nubic had four cases, Tokyo University Casti had three with two more coming up, AIST had two or three, Kansai TLO had two, Tohoku TLO Niche had one and Waseda TLO had one. Notably, NTT-AT is not willing to give exclusive licenses. Although internal corporate venturing is possible, it may not be very feasible to start external venture businesses on NTT licenses.

Eleven TLOs (69 %) stated that they have their own or affiliated business support activities available for startup firms, or plans to start such activities. The business support activities were collectively called "incubation", although not all had physical office facilities for the startup firms. During the interviews, Waseda TLO, Nubic and Tohoku area incubator NICHe showed the strongest interest and plans for supporting startup companies. Nihon University's TLO Nubic expressed the strongest wish for academic entrepreneurship, stating that every student should have the ability to start a company at graduation. The Tsukuba area has a Venture Business Support Network and a Tsukuba Fund for ventures, but some experts suggested that the Tsukuba area has not been very successful in new business creation so far.

Two TLOs (Waseda and Tokyo Institute of Technology) stated that they mainly license to large firms, because the royalties are better. Tokyo University Casti has so far mainly licensed to large firms, but also to SMEs and startups. Three TLOs (Keio, Nubic and Tsukuba Liaison) explicitly stated their wish to license to startups and SMEs. Two TLOs (Chubu and Tohoku) said that licensing to large firms, SMEs or ventures are all possible. NTT-AT said that the main licensees are NTT's own providers. Seven TLOs did not specify preferences for licensees.

Future plans were discussed in some detail by many of the TLOs. Developing a system for university-industry cooperative research and startup business support were high on the list. Most TLOs also expressed their need to improve their general TLO activities.

Fourteen TLOs (88 %) exhibited quite strong interest in international cooperation. Three TLOs (AIST, Kansai TLO and NTT-AT) noted that they had already sold some licenses abroad. NTT-AT had started international licensing already in 1983. A couple of other TLOs may also have sold some licenses abroad, but this did not come up during the interviews. Seven TLOs (44 %) stressed the fact that they have a network of contacts abroad (others may also have networks, but did not elaborate on the subject). The networks are used for information gathering, technology evaluation and other such activities. The networks are often based on personal contacts of the TLO manager. Notably Waseda TLO, Hyogo TLO's parent NIRO, REC R&D's parent RIKEN and Nubic stressed the fact that they already have or are starting concrete cooperation beyond mere information exchange with foreign companies and other organizations. The Tohoku and Tsukuba University areas are also known for international activities, and the TLOs will probably be involved.

When asked about cooperation with Finland eleven TLOs (69 %) stated some forms of cooperation that could be done especially with Finland. Nine TLOs (56 %) showed interest in several forms of cooperation. The forms of cooperation that were mentioned either by us or by the TLO staff included information exchange, transferring Finnish TLO and incubation know-how to Japan, starting cooperative research projects, signing cooperation agreements, exchanging researchers and/or students, getting Finnish organizations to join Japanese TLOs as paying members and getting Finnish firms to establish R&D facilities in university campuses. TAMA TLO had especially a practical approach and mentioned that Finnish researchers or organizations would be welcome to join research projects. TAMA TLO also would welcome the contribution of Finnish sensor technology. Hyogo TLO's parent NIRO was interested in inviting foreign, possibly Finnish, students or researchers for short periods of time. Keio TLO showed interested in Finnish innovation-related know-how. Two TLOs stressed their interest in a single type of cooperation: Tokyo University Casti had a strong outward licensing approach and the manager stated that he would welcome Finnish firms or entrepreneurs to make Tokyo University patents into business. Tokyo Denki University TLO showed interest in starting cooperative research with Finnish universities.

In summary it could be pointed out that the following issues are among the most important ones to watch, when analyzing the situation of TLOs in Japan:

-How will the funding of national, public and private universities change? Which universities are in financial difficulties? And how much independence will national and other public universities get during the current reforms?

-How will the rules for IPR from national research institutes be changed? Will the state give up its ownership of IPR to TLOs, and to which TLOs? How will the TLOs handle the formerly nationally owned patents?

-How much independence the universities will have in practice when deciding on their R&D IPR issues? Will the universities own the IPR, or will the inventors still retain ownership under the new system? What national rules will stay in place and what new ones will be put in place?

-What kinds of IPR and business creation models will private universities adopt? (So far they have been mostly undecided.)

-How much independence will they have on starting new business? Will the organizations and the staff be allowed to be involved in for-profit businesses, startups etc, and to what extent? (For example, in China universities directly start, own and run businesses. In Japan it is not allowed.)

-How is the financial situation of TLOs developing? Are they making profitable licensing sales, and can a profit be seen in the near or far future? Which ones may not become profitable at all?

-Can the university research community produce R&D that industries will find interesting? Realistically thinking, can the R&D results be commercialized through startups? How will the gap between university R&D results and actual industry needs be bridged?

-How flexible will the new rules for university-industry collaboration be? Will the universities and industries take up the challenge and exploit the new flexibility? How soon can organizational inertia and old habits be overcome? Will the old "informal personal channels" of collaboration be abandoned?

-Will companies get 100% assurance that they will get ownership of IPR from university-industry collaborative research? Will the researching parties have 100% freedom to decide on the project contract? How will the freedom be curtailed? (So far companies have not had explicit assurance, the decision on ownership has been case-by-case.)

Japanese TLOs from the perspective of Finland-Japan cooperation

In the global scientific research community, personal relations as well as scientific prowess are very important for a researcher. Through personal references and networking one can access information and resources that may otherwise not be easily available.

Personal relations are *especially* important in the Japanese research community. Knowing an important person can often be the only key to sources of information and resources. Therefore, also when dealing with TLOs it is most important to know who is in charge and whether that person is interested in cooperation.

The relationship networks of the Japanese TLOs are also very important, since they are one major factor deciding the success or failure of the TLO. Since many Japanese TLOs have taken several tasks for themselves (intellectual property right creation, licensing, incubation, fund raising etc.) it is important to find out whether the TLOs have the relationship networks that can enable them to fulfill these various tasks. All these tasks require different kinds of networking:

- 1) Patent creation needs the support and consensus of the university researchers and professors so that rights will be transferred to the TLO in the first place, and some kind of technology evaluation network to help decide which technologies are valuable enough to be patented.
- 2) Incubation requires a business knowledge and know-how network to help entrepreneurs with their fledgling businesses, and to give vital introductions to the important players in the marketplace (For example, a respected veteran businessman can open the doors for a small startup just by giving a personal introduction to potential customers. Without an introduction, customers will be wary.)
- 3) Fund raising for research projects and new business creation requires that the TLO has a good working relationship with banks, venture capital firms, other firms that are willing to invest, business angels etc.

The strength of the TLOs research sources is an important factor ("how many laboratories give their results to the TLO") Also the willingness and ability to engage in international activities is an important criterion. The TLOs legal status, financial situation, personnel skills etc. may also play a role in Finnish-Japanese cooperation.

However, the most important thing is that the TLO has personnel (preferably a manager) who are enthusiastic and productive, are willing to cooperate internationally and have some understanding of business. Such people can open the gates for Finnish and Japanese technologies and Finnish-Japanese cooperation. Otherwise the gates won't be opened easily, if at all.

The following list covers the different characteristics of Japanese TLOs that emerged during our interviews:

What to assess when considering cooperation with Japanese TLOs (1)

After interviews of several Japanese TLOs, we concluded that the following aspects are important for describing the TLOs from a Finnish point of view.

- Whether the TLO has cooperative, internationally minded people
- TLO's network resources, strength of ties to the network players and the TLOs influence in the network
- Specific topics of interest in cooperation with Finland
- TLO's sources of intellectual property (number, type and quality of research)
- TLO's established activities (domestic and international)
- TLO's future activity plans (domestic and international)
- Organizational type of TLO

If a single TLO possessed all the possible functions and desirable resources, it would look more or less like this hypothetical example:

Basic classification

-Source of IPR / where the TLO is attached to:

- 1) private university OR
- 2) public (national) university OR
- 3) several universities within a certain area (public & private) OR
- 4) university-industry consortium (private) OR
- 5) public research institute

Whether the TLO is attached to a private or a public institution makes a very important difference. Public institutions are subject to many restrictive IP regulations, whereas private institutions are relatively free to decide on such matters. However, the restrictions on public institutions are being eased little by little.

-Seed push, need pull or guided research philosophy

- 1) *Seed push* TLOs wait for researchers to invite them to evaluate and patent innovations, and after that start looking for potential licensees.
- 2) *Need pull* TLOs gather knowledge about industry needs and actively look for inventions that will match the needs. The innovations are then patented and marketed to the industries that may need them.
- 3) *Guided research TLOs have an important difference from the other two types: they first find out what the industry needs are, and then suggest that such research be started. While the other two types look for inventions from research that has already been done, guided research TLOs initiate research based on industry needs. In the first two cases, the primus motor of research activity is the researcher, while in the last case it is the industry needs.* This is a decisive question on TLOs and commercialization of university research in Japan: how much should industry be able to dictate what universities research?

-TLO has a membership system OR serves all those who are interested

Some TLOs have very high membership fees, some have a membership system but no fees, and some have no membership system and are open to all. One of the reasons for membership fees is that TLOs simply need money to finance their operations. Another reason may be that they want companies to be committed to working with the TLO and for that reason register only paying members. TLOs that have no membership system take the opposite view: they wish that as many people as possible will be able to view the technologies they are offering. The membership fees may not be an obstacle for large corporations, but they may prevent participation by small firms and startups.

Staff

- Active, able, flexible and well-connected manager
- Large enough specialist staff
- All speak English and are willing and able to cooperate internationally

What to assess when considering cooperation with Japanese TLOs (2)

IPR issues

- Exclusive AND/OR non-exclusive licenses
- How are royalties distributed (do all participants get fair compensation, in order to secure commitment)

Activities

- Finding inventions and patenting
- Outward licensing
- Industry liaison (leading to cooperation in research)
- Bring in funds for university research (grants and commissioned R&D projects)
- Market research & info system to identify industry needs and evaluate existing technology (in case of a guided research type TLO, this is the main function that guides research)
- Incubation of firms
- Technology consulting
- Inform society of university's research
- Non-patent type IPR also handled
- System for evaluating and developing TLOs own activities

Network resources

- Intellectual property advisors from Japan Technomart
- Real access to university alumni, their goodwill and cooperation
- Venture network: incubators, entrepreneur associations, local authorities, firms, experts etc.
- Investors: VCs, banks, Business angels
- TLO advisor network or "TLO friends association" for providing advice and contacts with industry & other actors
- Cooperation with other TLOs and universities
- Relations with firms (TLO members and non-members)
- University-industry consortium for coordinating the whole innovation system

Intellectual property portfolio / sources of IPR

- One university AND/OR several other sources of research results
- The sources agree strongly with the TLO system and actively give their research results to the TLO
- The IPR sources have identifiable strengths in some or most fields of technology
- The research results are properly evaluated and filtered before applying for patents and marketing
- Comprehensive and productive feedback is provided to the researchers about licensing results, markets and industry needs (in the case of a guided research type TLO, this system is well developed)
- IPR is used for licensing and also for starting new venture companies

International stance

- Idea exchange with foreign actors
- Network abroad for evaluating technology, needs etc.
- Open for international cooperation and able to realize international licensing and/or R&D projects
- Experience in international licensing and R&D projects

Specific topics for cooperation with Finland

- Increasing idea exchange (Summer school? Seminars?)
- Open a technology "information pipeline" between Finland and Japan
- Make cooperation agreements between Finnish and Japanese players
- Start cooperative research projects
- Finnish researchers to Japan and vice versa, to join cooperative R&D projects
- Finnish players join TLOs as members, get information
- Internships for Finnish students in Japanese firms / laboratories
- Finnish TLO know-how to Japan
- Advise the Japanese on how to get start-ups moving in Japan
- Large Finnish firms' R&D activities etc. to Japan (to university campuses, research parks etc.)

TLO profiles

In the following short profiles of Japanese TLOs are given. The reader is advised to contrast the profiles with the full profile described above and with the model TLO profile in the appendix. The main TLOs in the vicinity of Tokyo and Osaka business hubs are described, while some of the more distant ones were left outside this study.

AIST TLO (AIST Innovations)

unit.aist.go.jp/collab/intelprop/tlo

TLO OF A MAJOR NATIONAL RESEARCH INSTITUTE

SEED PUSH & NEED PULL TYPE TLO

NO MEMBERSHIP SYSTEM (Information open to all)

AIST stands for National Institute of Advanced Industrial Science and Technology. The institute has numerous research centers around Japan in such fields as IT, biotechnology, smart structure research, materials, energy and environment, nanotechnology, chemistry, electronics, machinery etc. AIST has an impressive portfolio of 12,000 patents (including patents pending) that have resulted from previous research.

The research capability of AIST is impressive, and the institute would be an attractive partner for research projects or licensing. AIST has recently been reorganized, and the new management and project rules are clear and remarkably flexible, making collaborative research with AIST quite attractive. The TLO has liaison functions for collaborative and commissioned research, does technology consulting and gives assistance to start-up companies. When a company is started with AIST patents, 50 % of IPR go to the entrepreneur.

A large part of AIST research as well as the TLO are located in Tsukuba city. Besides AIST, Tsukuba city has a high concentration of other national and private research institutes, and Tsukuba University is located there, making Tsukuba an important research community in Japan.

The AIST restructuring has been done with the goal of creating a more effective innovation system (hence AIST is called “The New AIST”). The flexible project and management rules are especially interesting for a potential foreign partner, and if the reorganized AIST really works well, AIST is a good partner for cooperation. AIST has a very strong research potential and the TLO has largest existing number of patents of all the TLOs studied in this paper. The main question is how IPR will be handled in the future, since AIST is a national institute (and national patents have restrictive regulations).

Chubu TLO (inside Nagoya Industrial Science Research Institute, NISRI)

www.ctlo.org

AREA FOCUSED TLO OF A RESEARCH INSTITUTE AND A GROUP OF PRIVATE AND PUBLIC
UNIVERSITIES IN CHUBU AREA
SEED PUSH & NEED PULL & GUIDED RESEARCH ACTIVITIES
MEMBERSHIP SYSTEM

Chubu TLO is a part of Nagoya Industrial Science Research Institute NISRI. NISRI conducts its own research as well as arranges cooperative and commissioned research between university and industry. It seems that Chubu TLO licenses both patents originating from independent university research, as well as those arising from coordinated R&D projects between university and industry. NISRI arranges many events and meetings between university, industry and government people, as well as R&D trainee-ships for industrial researchers.

NISRI (and Chubu TLO) seem to have a comprehensive vision for coordinated university-industry action and have the capability to initiate R&D projects based on industry needs. However, their scale is not as large as for example NIRO and they don't seem to have experience of foreign cooperation.

The suitability of NISRI and Chubu TLO as a partner perhaps depends on the activity of the foreign side, since the TLO has no previous experience or a pressing need for foreign cooperation. The level and scale of NISRI and the universities' research is not studied in this paper.

Kansai TLO (located in Kyoto Research Park)

www.kansai-tlo.co.jp

AREA FOCUSED TLO, 38 PUBLIC AND PRIVATE UNIVERSITIES IN KANSAI REGION
SEED PUSH & NEED PULL ACTIVITIES (NO INFO GATHERED ON GUIDED RESEARCH)
MEMBERSHIP SYSTEM

Kansai TLO was Japan's first area based TLO, including several universities. Notably, Kansai TLO serves such high level universities as Kyoto University (which has produced the highest number of Japanese Nobel Prize winners), Ritsumeikan University, Kyoto Institute of Technology and Osaka University, as well as 34 others. Some of the important fields studied at the universities include nanotechnology, medical technology, biotechnology, regenerative tissue engineering and electronics.

Kansai TLO is located within Kyoto Research Park, on the same premises with ASTEM (Advanced Software Technology & Mechatronics Research Institute of Kyoto). Kyoto Research Park and Kansai TLO have good connections and reputation in Kyoto and the Kinki region. Kyoto is known for close connections between families and industrialists, and a small number of people decide most major business matters in the region. Many of these people are connected to Kyoto Research Park, and the having good relations with the park may give chances for other contacts in Kyoto.

During this study, Mr. Akira Yamada of Kansai TLO was extremely helpful in providing information about Kansai TLO and the Japanese TLO and IP system in general.

Kyoto Research Park has good network resources also outside Kyoto. For example, Tsukuba Liaison (Tsukuba University TLO) and Tsukuba Fund, as well as TLO Hyogo (in NIRO) have a connection with Kyoto Research Park.

Kansai TLO has sold some licenses abroad and some foreign firms are located in Kyoto Research Park. More cooperation in IT and semiconductor fields would be needed, but presently there is no cooperation with foreigners in these fields yet.

The TLO as such does not have extensive incubation activities, but Kyoto Research Park as well as Ritsumeikan University can offer some such services in the area.

In summary, Kyoto Research Park and Kansai TLO have the advantages of very good local and nation-wide connections, very high-level university research to draw upon and some experience in cooperation with foreigners. The park and TLO are quite free to decide research project rules and IPR matters (except when national universities are involved). They can make good research and business partners, provided that common interests and fields can be found.

Keio University TLO (Intellectual Property Center, IPC)

www.ipc.keio.ac.jp

PRIVATE UNIVERSITY TLO
SEED PUSH ACTIVITIES
NO MEMBERSHIP SYSTEM (IPR OPEN FOR BIDDING)

Keio University is one of the best private universities in Japan, with high level scientific and technological research as well as business education. The Intellectual Property Center (TLO) has been established inside the university organization. The TLO's aim is to handle all Keio IPR issues, including electronic media copyrights, technology patents etc. However, this study focuses only on technology innovation and transfer issues. According to IPC, Keio University's strengths in technology are in medical and engineering fields.

The TLO is open for all (there is no membership system).

The IPC Manager is Professor Keisuke Shimizu, an influential and respected academic person in Japan, also in the field of technology transfer. He is very open to international cooperation. Some of the specific topics that professor Shimizu showed interest in were as follows:

- How to get Finnish TLO know-how to Japan?
- Arrange a TLO summer school or seminar in Finland for Japanese TLO people?
- How to get start-up firms moving in Japan?
- Could Finnish firms establish research operations on Keio University campus?

Professor Shimizu also showed strong interest in new business creation from university patents. It is possible that an incubator will be built on Keio University's new K2 campus.

At present (spring 2001), IPC did not very actively seek inventions from Keio University's research. Mostly the TLO people would wait for a researcher's invitation to evaluate and license a technology. This is possibly in order not to antagonize professors who may not be interested in active licensing, or who may already have long standing informal relationships with companies (giving IPR to the companies in return for cooperation and research funds). Therefore, IPC can be classified as a seed push TLO.

According to Professor Shimizu, an information system will be needed to better identify research needs and evaluate existing technology. Professor Shimizu is aware of the need to integrate industry needs and university seeds to improve TLO functioning.

In summary, Keio University has many favorable aspects on its side: it is a private university, and thus free to decide on IPR rules for faculty and collaborative research projects. The level of Keio Research is high, and the university has experience of foreign contacts. The university is also known for its business education. The Intellectual Property Center is cooperative and interested in licensing as well as promoting collaborative research and new business creation. Given that the IPC has enough authority inside the university to influence research and IPR matters, a foreign partner should be able to find interesting ways of cooperation with Keio.

Meiji University TLO (Intellectual Property Center, IPC)

www.meiji.ac.jp/jigyoka/tlo.html

PRIVATE UNIVERSITY TLO
SEED PUSH & NEED PULL ACTIVITIES
MEMBERSHIP SYSTEM (FEE 30,000 YEN / YEAR)

Meiji University IPC was founded in 2001 and its functions are not very developed yet. Meiji University is a private university, and thus free to decide its own IPR rules for faculty and collaborative research. However, in summer 2001 binding rules on IPR had not been set yet. Meiji is one of Japan's famous private universities. According to the TLO staff, some of Meiji University's technological strengths are in biotechnology, electronics and physics. According to the TLO staff, Meiji University has cooperation at least with Tokyo Denki University and Nihon University (both of them have TLOs as well).

The TLO has just started, and does not seem very interested in foreign cooperation at the moment. One aspect that the TLO staff mentioned was developing the system for starting inter-faculty and/or industry-university collaborative research projects. However, their present focus is on Japan.

The TLO staff is working on developing the TLO in most of the typical fields that Japanese TLOs have adopted: outward licensing, liaison activities and collaborative research, university research funding and technology and business consulting. The TLO handles copyright and other IPR matters as well.

All in all, the TLO's attractiveness as a partner depends on Meiji University's research. The fields of scientific and technological research were not evaluated in this study.

NTT-AT (NTT Advanced Technologies, technology licensing organization of NTT)

www.ntt-at.com

TLO OF A MAJOR JAPANESE STATE CORPORATION
SEED PUSH ACTIVITIES ONLY
NO MEMBERSHIP SYSTEM (INFORMATION OPEN TO ALL)

NTT-AT is a subsidiary of the Japanese national telecommunications giant NTT Group. It does not have the state-approved status of “official TLO”. NTT-AT was chosen to be interviewed for this study in order to get an idea how technology licensing and transfer is done in the private sector in Japan. Most of Japan’s R&D spending is done in the private sector, and NTT is one of the major companies that conduct R&D. NTT-AT mostly divests technologies that are outside or not needed in NTT’s core businesses.

According to NTT-AT, NTT has 12 major research centers and conducts research in such fields as basic science, basic engineering, networks technology, comprehensive future networks, media and contents distribution high level applications, optical telecommunications, environmental problems and energy. NTT-AT’s sales are in such fields as networks, wireless and radio, software, image, voice and language, components, materials and LSI and other technologies.

NTT-AT claims to have had about 1,400 successful technology transfer over the years (the company began technology transfer business in 1977) and it had a sales volume of 46,000,000,000 Yen in the year 2000. In principle the company gives no exclusive licenses, thus effectively blocking many ventures and startups from starting new business on NTT patents. This probably stems from the fact that NTT is a state corporation, and IPR owned by the Japanese government is not supposed to be exclusive. NTT-AT’s representative stated that one of the company’s main functions is to license cheaply to NTT’s providers, thus enhancing their capabilities.

NTT-AT could be a partner for a major corporation who needs telecommunications and other technologies developed by NTT. However, NTT-AT does not decide on NTT’s cooperative research policies and can provide no access there. Also, the company does not attach much importance on entrepreneurship, although internal venturing and new business creation does take place. Therefore NTT-AT is not of much use for a prospective entrepreneur who would like to license a patent to start a venture business.

Nihon University TLO (Nihon University Business Incubation Center, NUBIC)

www.nubic.adm.nihon-u.ac.jp

PRIVATE UNIVERSITY TLO

**SEED PUSH & NEED PULL (& increasing attention is being paid to GUIDED RESEARCH)
MEMBERSHIP SYSTEM**

Nihon University has active relationships and networking activities with industry. There is a Venture Club, a contract with Daiwa Institute of Research (a think tank) and many university-industry cooperative research projects going on (43 in May 2001). The TLO's goal is to still improve the system of outside cooperation. According to TLO people, the university is strong in the medical, dental and genetic fields.

Mr. Yozo Maezawa is the TLO Secretary for Administration (TLO Manager). Mr. Maezawa's background is in English Literature. He has the advantage of good English skills, a flexible mind and interest in international cooperation. He stressed the importance of Nihon University's networking activities, which are also vital for TLO functioning.

Nihon University pays attention to business education and incubation. The TLO Manager said the goal is that students would be able to start a company right after graduation. The university arranges many seminars for IPR studies, venture business events and other happenings that bring people together.

In summary, Nihon University seems to be very active in networking, and it is open for international cooperation. Commercialization seems to be an important consideration in at least some of the university's research. The TLO has internationally minded staff. Nihon University as a private university is free to decide on IPR rules for licensing and research projects. Since there are numerous collaborative research projects going on, the university probably has decided on a set of rules for such projects. However, it is not known whether there are different rules that apply to foreign cooperation. The TLO itself can provide more detailed answers about licensing and research project procedures.

RIKEN TLO (RIKEN Expert Corps Research and Development Incorporated, REC R&D)

TLO OF A MAJOR NATIONAL RESEARCH INSTITUTE (NOT OFFICIALLY CERTIFIED TLO)
SEED PUSH & NEED PULL & GUIDED RESEARCH TYPE
MEMBERSHIP SYSTEM

REC R&D is the TLO of RIKEN, a major national science and technology research institute. RIKEN has numerous research centers in Wako city and around Japan. Some of RIKEN's especially strong research fields are brain science and genetics. Nanotechnology is also being developed.

REC R&D does not have the state-approved status of "official TLO". It has been recently founded by Professor Isao Endo and plans to become "a lubricant for industry-RIKEN cooperation". Professor Endo has extensive contacts in RIKEN and knows the institute's research very well. His aim is to integrate RIKEN R&D and commercialization of research results through research consortiums (R&D projects). In the REC R&D Scheme, RIKEN provides production, analysis, consulting and research services to industry, and acts as a research partner when needed.

As it stands, the TLO is in the hands of its founder, and much depends on his personal connections and ability to convince RIKEN researchers to give their inventions to the TLO for licensing. In fact, the Japanese government officially owns the IPR, and REC R&D can get a commission from introducing and selling patents to companies.

RIKEN has high level research and the research results are interesting. REC R&D seems a promising partner. It remains to be seen how well REC R&D will be able to conceive collaborative research projects based on industry needs, and how successful the outward licensing activity will be. It is important that RIKEN staff accepts REC R&D as a vehicle for licensing and research collaboration.

TAMA TLO (*Technology Advanced Metropolitan Area Technology Licensing Organization*)

www.tama-tlo.co.jp

TLO OF AN AREA BASED UNIVERSITY-INDUSTRY CONSORTIUM STRONG GUIDED RESEARCH SYSTEM MEMBERSHIP SYSTEM

Tama TLO is a special case: it has been founded as part of a university-industry R&D consortium (TAMA Industry Vitalization Association or simply TAMA Association). It covers a large area in the Tokyo Metropolitan district, with many firms and universities. One specific point of interest is that Tama TLO is strongly “guided research” -oriented. Research projects will be started by the TLO’s parent consortium only on the basis of industry needs. Whereas most Japanese university TLOs have to adjust to the fact that professors conduct independent research, TAMA Association can freely decide what research it conducts and what the business goals are. Research is done in three-year R&D projects based on industry needs. Finnish participants are very welcome in the projects. The projects are open and all members will have free access to the research results. Details of IPR procedures and rules for projects should be inquired about at the TLO.

Dr. Makoto Ibuka, the TLO Manager, has a long experience working in industry, and he is well aware of general industry needs in Japan. He is a dynamic and pragmatic figure with a vision for a guided research type TLO. Dr. Ibuka happens also to be an old university acquaintance of Mr. Toyoshima of TEKES Tokyo.

Tama TLO has access to 50 coordinators who have research and business experience. Tama TLO covers the intellectual property of 26 universities (the universities don’t have their own TLO), and has relations to 260 small and medium sized enterprises in the Tokyo area. Tama TLO has also some relations to banks and firms that may be willing to invest.

In summary, TAMA TLO seems to have one of the most dynamic visions of all the TLOs that were interviewed for this study. The priority for industry needs is likely to produce research results that can be commercialized in a more straightforward manner than typical independent university research. However, the actual strength and dynamism of the TAMA Association was not studied. The effective coordination of all the industry and university actors is very important in TAMA TLO’s case, and much depends on who is in charge of overall coordination of the consortium, and whether the coordinator has enough authority to oversee the fulfillment of the R&D tasks.

TLO Hyogo (inside New Industry Research Organization, NIRO)

tt.niro.or.jp

AREA BASED TLO CENTERED ON NIRO, WITH PUBLIC AND PRIVATE UNIVERSITIES
SEED PUSH & NEED PULL ACTIVITY, ALSO STRONG GUIDED RESEARCH SYSTEM
MEMBERSHIP SYSTEM (BUT FREE OF CHARGE)

NIRO has a vision of university-industry cooperation for creating new business. TLO Hyogo is located inside NIRO, and it handles IPR both from NIRO and from universities in the surrounding area. NIRO has a network in the Hyogo area, cooperation contracts with MIT and Cambridge, as well as with countries such as Turkey, Russia and Bulgaria.

NIRO conducts research in such fields as particle physics, tissue regeneration, medicine etc.

TLO Hyogo's function is to patent inventions, license them outward, find out industry needs and other information, and promote cooperative research. NIRO has also a TTC (Technology Transfer Center) whose task is to handle actual technology transfer, dispatch technology advisors to solve industry problems and create R&D projects when needed for further R&D and commercialization. NIRO's function to start special research projects to solve specific commercialization problems was dynamically articulated in NIRO's interview. Its approach is quite advanced among the Japanese TLOs and research institutes.

NIRO research institute handles the liaison function, explaining industry needs to researchers (who may or may not be willing to start research projects on the basis of the information). The research institute also arranges meetings for researchers and industry to facilitate information exchange. The institute decides on contracts for research projects.

NIRO seems to have all systems in place for successful TLO operation and technology transfer. It has a good network in place, and is capable of guiding research according to industry needs. However, as of summer 2001 only 23 patents had been applied for and 3 licenses had been sold. It remains to be seen how successful the licensing function will be. As a contact surface for Hyogo area research, NIRO and Hyogo TLO seem to be a good choice.

Tohoku TLO (Tohoku Technoarch) and NICHe (New Industry Creation Hatchery Center)

www.t-technoarch.co.jp

AREA BASED TLO, TOHOKU UNIVERSITY AND OTHERS IN THE AREA GUIDED RESEARCH TYPE MEMBERSHIP SYSTEM

Tohoku University has one of the highest scientific and technological levels of Japanese universities. It was chosen as no. 1 research university in Asia Pacific region by Asiaweek in 1999.

Tohoku Technoarch (TLO) and NICHe (New Industry Creation Hatchery Center www.niche.tohoku.ac.jp) together form a guided research type innovation system.

NICHe has extensive liaison activities, including SME research assistance, matching industries and universities, surveying of trends and needs, technology and patent information exchange forums, a database for matching seeds and needs etc. It has also a special section for industry creation, with professor level experts in 10 fields of science and technology.

Tohoku Technoarch seems to have similar functions, but it concentrates on patenting and outward licensing.

Tohoku University already has an agreement for cooperation with Helsinki University of Technology. There are also some Finnish business activities going on in the area, such as the Wellbeing Center project with Sendai city.

This cooperation could be deepened and more fields of cooperation opened up. Tohoku University has excellent research capabilities and the Technoarch-NICHe system is very well planned and quite dynamic. Tohoku Technoarch and NICHe are good partners for cooperation. However, as so often in Japan, personal relations can be more important than organizational contracts. The good relations with Tohoku University and the area should be nurtured and cooperation can probably be widened if more information is exchanged between the Finnish and the Japanese side.

Tokyo Denki University TLO (Center for Research Collaboration, CRC)

www.dendai.ac.jp/crc

PRIVATE UNIVERSITY TLO
SEED PUSH & NEED PULL & GUIDED RESEARCH ACTIVITIES
NO MEMBERSHIP SYSTEM (IPR OPEN FOR BIDDING)

Tokyo Denki University is a private technical university that focuses on electronics (denki=electronic appliance). According to the TLO people, Tokyo Denki University's strong fields of research are information technology, biomedical technology, medical electronics, life engineering, fiber optics, and superconductivity.

As the university is private, there are no obstacles to establishing the TLO as a part of the university's organization. As the TLO's name (Center for Research Collaboration) implies, technology licensing activities have been integrated into the liaison office that handles cooperative research projects. The TLO's information and patents are open for all potential licensees (i.e. there is no membership system).

The manager of CRC, Professor Seiichi Takeuchi, is a scientist who has strong interests in university-industry joint research. He showed interest in research cooperation with Helsinki University of Technology or some other Finnish center of research. He was also interested in starting a continuous information exchange system between his university and Finland.

CRC arranges seminars and other kinds of events for university researchers and industry people to meet. These meetings are important for information sharing and they are a way of matching industry needs and university seeds. In addition, CRC has 80 firms as information exchange members, and through them industry needs can be scanned. CRC also handles matters relating to research projects funding. CRC patents and licenses promising technologies that arise from Denki University's research. However, CRC sees its role larger than just licensing technology. It seems that the office sees itself as a facilitator of collaborative research rather than an outward licensing system.

It was not found out to what extent the Tokyo Denki University-industry collaborative research projects have yielded research results (patents) and through what route (contractual or informal technology transfer) they have been taken into use. It is up to CRC to explain the actual legal and contractual issues to potential partners. As a private university, Tokyo Denki is free to determine the IPR rules for research projects. The CRC is open for concrete suggestions from potential foreign partners.

Tokyo Denki University has some flexible and innovative courses, for example distance learning, night courses for working people and trainee-ships in companies for students. Trainee-ships have not been very common in Japan, and their existence is probably a sign of Tokyo Denki University's close relationship with industry.

In summary, Tokyo Denki University seems to have in place the arrangements for collaborative research projects, in addition to straightforward licensing functions. CRC also wishes to mediate such projects and is open for concrete suggestions. The university has experience of collaborative research. The extent, funding and level of Tokyo Denki University's research were not evaluated during this study.

Tokyo Institute of Technology TLO (part of Frontier Collaborative Research Center, FCRC)

www.fcrc.titech.ac.jp/top_page.htm (FCRC) homepage1.nifty.com/cpse (TLO)

NATIONAL UNIVERSITY TLO

SEED PUSH & NEED PULL & GUIDED RESEARCH ACTIVITIES

MEMBERSHIP SYSTEM AGAINST FEE

Tokyo Institute of Technology (TITECH) is one of the foremost technological universities in Japan. According to the TLO people, it is especially strong in the fields of optical telecommunication and material science. TITECH has long had good working relations with industry, and professors have conducted research that the industry has needed. As the case has been in Japan, most of this professor-company cooperation has been informal and undocumented, relying on personal relations and mutual trust.

The establishment of a TLO now gives an alternative route for university research results to reach companies. The new route is documented and has explicit rules as to what IPR belongs to whom and how monetary rewards are distributed. There are no rules that would force researchers to give their inventions to the TLO, and older TITECH professors are likely to go on with their informal arrangements with companies. In order not to antagonize the well-established professors, TITECH TLO is targeting younger researchers and is trying to make the research community more receptive to the new system of licensing.

Professor Isamu Shimizu, the TLO Manager, knows the practical problems of the Japanese university innovation system very well, and gave insightful comments that helped a lot in shaping this study. At the TLO, there is also Professor Hiroshi Fujiwara who has studied industrial policies in Germany and has visited Finland.

The TLO's plans are to create a better system for outside research cooperation, create new firms (an entrepreneurship course and a virtual business laboratory exist already), create a venture business network of incubators, entrepreneur associations etc. It should also be noted that the TLO has 71 companies as its cooperative network members to whom the TLO offers various services. Consequently, the business for the Technology Transfer is tightly combined with the Liaison Activity to the member companies.

In summary, TITECH is experienced in making collaborative research with industry. The problem is to change the system so that collaborative research will be open for bidding through the TLO and not only through informal personal relations that a professor may have. If and when researchers start to channel their inventions through the TLO, it will be possible to acquire patents and make suggestions for collaborative or commissioned research through the system. If the IPR rules and other systems are well established and favorable to foreign partners, TITECH should be a good partner for research.

Tokyo University TLO (CASTI, Center for Advanced Science and Technology Incubation)

www.casti.co.jp

NATIONAL UNIVERSITY TLO
SEED PUSH & NEED PULL ACTIVITIES
EXPENSIVE MEMBERSHIP (MEMBERSHIP GIVES PRIORITY ACCESS TO NEW PATENTS)

CASTI TLO was founded as a company outside Tokyo University (a national university) by some professors from the university. CASTI seems to be somewhat modeled after the MIT TLO in the United States, at least in the respect that it clearly focuses on outward licensing of technology. Incubation and other related activities are not emphasized very strongly at CASTI.

Mr. Yamamoto, The CEO of the TLO, is a successful businessman who speaks excellent English and has a wide contact network in the United States. It is unusual for a Japanese TLO to have a businessman as manager. It can be seen as a well considered move by the founding professors to have hired a business professional.

CASTI is one of the few TLOs in Japan who are making a profit. Its source of technology is the prestigious Tokyo University that has almost a mythical reputation for excellence among the Japanese. Tokyo University's reputation and the brand value it has in Japanese society may explain some of the success of CASTI. After all, doing business in Japan is a lot about personal connections, and Tokyo University graduates are the elite of Japan's business and government. Another, perhaps more important factor is that Tokyo University has received a lot of funding for research and it attracts high level talents. Licensees may wish to buy licenses for their present business designs, but also in order to make contacts with Tokyo University professors and laboratories. The most licensees so far have been large firms, since the royalties are likely be larger. However, Mr. Yamamoto said startups and SMEs are also welcome to buy licenses. CASTI is looking into the possibility of taking equity (firm shares) as a licensing payment, instead of money. This would make it easier for startups to approach CASTI.

"Doyukai" is a share holding organization of CASTI, with influential industry and university people as members. Doyukai acts as a mediator between industry and CASTI, and arranges meetings.

At present CASTI tries to license patents that result from previous research (seed push activity), and is looking for new inventions that may match industry needs (need pull activity). According to CEO Yamamoto, in the future CASTI will develop a feedback system from the industry to the researchers, thus leading towards a system where Tokyo University research is guided somewhat by industry feedback channeled through the TLO (guided research activity). However, developing a needs-guiding-research type of system does not seem to be high on CASTI's agenda at present. At present, industry feedback to researchers may be taking place through more private channels, but charting such activity is beyond the scope of this study.

CASTI has also plans to develop consulting and entrepreneur support activities.

CASTI and Tokyo University are certainly worthwhile partners for a foreign organization who is looking for technologies or university contacts in Japan. CASTI is the place to go for information about research and patents from Tokyo University. However, it is not clear whether CASTI could handle partner search and the

planning of cooperative research projects between foreigners and Tokyo University: at least it seems that an explicit and well-defined system is not established yet.

CEO Yamamoto stressed the outward licensing side of CASTI's activities, and Finnish customers are welcome to become paying CASTI members. Members will get firsthand information of new research results and patents (non-members will be given access only after no members show interest in buying licenses). Mr. Yamamoto stressed that resourceful Finnish entrepreneurs and students are very welcome to make CASTI technology into business by creating spin-off firms.

Tsukuba University TLO (Tsukuba Liaison)

www.tliaison.com

NATIONAL UNIVERSITY TLO

SEED PUSH & NEED PULL ACTIVITIES (some GUIDED RESEARCH activities)

MEMBERSHIP SYSTEM

Tsukuba University is located in Tsukuba City, a scientific community with over a hundred major research institutes. Another officially recognized TLO, AIST Innovations, is also located in Tsukuba.

The TLO is called Institute of Tsukuba Liaison Co Ltd (or simply Tsukuba Liaison). It covers research conducted at Tsukuba University, as well as some other North Kanto area universities. According to some Tsukuba University related people, engineering and medical science and technology are among the strong research fields in these universities. Tsukuba University has various cooperation agreements with about 20 countries.

Besides typical TLO functions, Tsukuba Liaison's specialty is that it provides support for startup companies through the Tsukuba Fund and the Tsukuba Venture Business Support Network. The existence of a special fund that can be used for creating venture business is quite special among Japanese TLOs. The usual case is that venture capital is a missing link between innovation and business creation that the TLO can't fix, because there is not enough free venture capital in Japan (or it is not interested in university spin-offs).

Tsukuba Liaison also advises on cooperative research, partner search and technology matters. In addition, the TLO conducts research on its own in the fields of SME promotion and market research.

Tsukuba University has high level research and it is located within a large scientific community. Information exchange and/or licensing with the university and TLO could well be worthwhile. So is cooperative research if there are synergies of science and technology between the partners. Tsukuba Liaison says it gives advice on cooperative research matters, but it is not clear who will handle the actual procedures. More detailed information should be available at the TLO.

However, Tsukuba Liaison and Tsukuba University are only a part of the whole Tsukuba scientific community, and there may well be other players that are also open for cooperation. The whole of Tsukuba community was not included in this study.

Waseda University TLO (Intellectual Property Center, IPC)

www.waseda.ac.jp/gakugai/index1.htm

PRIVATE UNIVERSITY TLO

SEED PUSH & NEED PULL ACTIVITIES (ALSO GUIDED RESEARCH ?)

NO MEMBERSHIP SYSTEM (INFORMATION OPEN TO ALL)

Waseda University is one of the best private universities in Japan. According to the TLO, its technological research strengths are in robotics, some genetics and some environmental technology. The university has an Advanced Research Institute for Science and Engineering that emphasizes cooperative research projects, across faculty, university etc. boundaries. The research and IPR guidelines for projects are quite clearly defined. R&D in Waseda is increasingly done on an inter-faculty or inter-university project basis, which is quite an advanced stance among Japanese universities.

Waseda emphasizes also incubation and new business creation. An incubator is in operation and an investment firm has been founded by Waseda professors to support business creation at Waseda.

Waseda TLO has contacts abroad, for example with NIH and Indiana University. There is also research cooperation with Joshi Idai medical university. The TLO people showed interest in cooperation with Finland, for example by opening a technology "information pipe" or "information window" between Finland and Japan.

Simply put, Waseda TLO could be an attractive partner for research and business. The university has high level research, has a clear system for R&D projects and already has experience with foreign cooperation. Waseda (a private university) is also one of the few universities in Japan that have a rule that makes it clear that inventions made at Waseda belong to the university (and not to the individual researchers). This secures a good IPR base for the TLO.

Sources

Frontier Collaborative Research Center FCRC at Tokyo Institute of Technology, *IP Policy Approach in Japan*, undated presentation material received in 2001

Ilmavirta, V. (ed), 1998, *The Challenge of Japan – How to Introduce your Innovations to the Japanese Markets?*, Publications of Otaniemi International Innovation Centre 1, Helsinki University of Technology

Kneller, R., *Intellectual Property Rights and University-Industry Technology Transfer in Japan*, in Branscomb, Kodama, Florida (eds.), 1999, *Industrializing Knowledge: University-Industry Linkages in Japan and the United States*, The MIT Press

Ministry of Economy, Trade and Industry (METI), web pages at www.meti.go.jp

Nihon Ritchi Center, 2001, *Chiiki platform jittai chosa*, Japan (Survey on the situation of area platforms)

Nihon Ritchi Center, 2001, *Shin jigyo shien katsudo suishin chosa hokokusho*, Japan (Report of a survey on promotion of new business support activities)

Nihon Technomart, 2001, *Kogyo shoyuken hyojun tekisuto: ryutsuhen*, Tokyo (Japan Technomart, Basic text on industrial property rights)

Nihon Technomart, 2001, *Tokkyo ryutsu gaidolain*, Japan (Japan Technomart, Guidelines for patent licensing)

Nikkan Kogyo newspaper, 27th July 2001, Article: *Kokuritsudai e no kenkyu itaku - Kigyo ni seika dokusenken, Monbusho ga sangaku renkei kyokasaku* (Commissioned research at national universities - exclusive ownership of research results to companies, Ministry of Education strengthens university-industry cooperation)

Sangyo Kiban Seibi Kikin, 2001, *Heisei 12 nendo TLO no genjou to kadai ni kansuru chousa houkokusho*, Japan (Industrial Structure Improvement Fund, TLO survey results for year 2000)

Sentan Gakusai Ryoiki Kenkyu Center, 2001, *Daigaku nado hatsu benchaa no genjo to kadai ni kansuru chosa kenkyu*, Tsukuba University (Tsukuba Advanced Research Alliance Center, Survey on the issues and present situation of venture businesses originating from universities etc)

Sentan Gakusai Ryoiki Kenkyu Center, 2001, *Daigaku no gijutsu shiizu itengata oyobi kigyo niizu shuppatsugata wo kumiawaseta fukugoteki gijutsu iten shisutemu no kochiku ni kansuru jisshoteki kenkyu*, Tsukuba University (Tsukuba Advanced Research Alliance Center, Empirical study on a combination system of university seeds type and industry needs type technology transfer)

Sentan Gakusai Ryoiki Kenkyu Center, 2001, *Daigaku to sangyokai no kenkyurenkei shisutemu to gijutsu iten ni kansuru jisshoteki kenkyu*, Tsukuba University (Tsukuba Advanced Research Alliance Center, Empirical study on university – industry collaboration system and technology transfer)

Interviews during spring-summer 2001:

Sixteen TLOs and technology transfer organizations

- TLOs at Japanese Private and Public Universities
- TLOs at Japanese Private and Public Research Institutes
- University-Industry Consortium TLO (TAMA TLO)

Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT)

Japan Association of New Business Incubation Organizations (JANBO)

Japan Entrepreneurs Association (JAE)

Science parks and incubators (Kanagawa Science Park, Kyoto Research Park, Kazusa Akademia Park, Sagamihara Incubation Center)

Appendix

The list of the 24 officially approved TLO's in Japan as of September 17, 2001

Officially approved TLOs already introduced in TLO report

-AIST Innovations

unit.aist.go.jp/collab/intelprop/tlo/index.htm

-Chubu TLO

www.nisri.moriyama.nagoya.jp

-Kansai TLO

www.kansai-tlo.co.jp

-Keio University Intellectual Property Center

www.ipc.keio.ac.jp

-Meiji University Intellectual Property Center

www.meiji.ac.jp/jigyoka/tlo.html

-Nihon University Business Incubation Center NUBIC

www.nubic.adm.nihon-u.ac.jp

-TAMA TLO

www.tama-tlo.co.jp

-TLO Hyogo

tt.niro.or.jp

-Tohoku Technoarch

www.t-technoarch.co.jp/index1.html

-Tokyo Denki University TLO

www.dendai.ac.jp/crc

-Tokyo Institute of Technology TLO

homepage1.nifty.com/cpse

-CASTI (Tokyo University TLO)

www.casti.co.jp

-Tsukuba Liaison

www.tliaison.com/index2.html

-Waseda University Intellectual Property center

www.waseda.ac.jp/gakugai

Officially approved TLOs not detailed in TLO report

-FPIS-TLO (TLO of the Foundation for the Promotion of Industrial Science)
www.iis.u-tokyo.ac.jp/shourei/fpis-tlo/index.html

-Hokkaido TLO (Area based TLO of Hokkaido area universities and other research organizations)
www.h-tlo.co.jp

-Kitakyushu Technocenter (Area based TLO of north Kyushu universities)
www.kitakyu-techno-ctr.co.jp/tlo

-Kumamoto TLO (TLO of the Kumamoto Technology and Industry Foundation)
www.kmt-ti.or.jp

-Osaka TLO (Area based TLO of several Osaka area universities)
www.osakatlo.mydome.jp

-Technonetwork Shikoku (Area based TLO of Shikoku area universities and polytechnic schools)
www.s-tlo.co.jp

-University Industry Partnership (Kyushu University TLO)
www.k-uip.co.jp

-Yamaguchi TLO
www.crc.yamaguchi-u.ac.jp/tlo

-Yamanashi TLO (TLO of Yamanashi University and Yamanashi Medical University)
www.yamanashi-tlo.co.jp

-Yokohama TLO
www.yokohamatlo.co.jp