Building International University-Business Links

Symposium co-hosted by the British Council and British Embassy Tokyo

(Summary)

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Opening Remarks

Sir David Warren, British Ambassador to Japan, stated that this symposium provides an important opportunity to learn about knowledge collaboration in both countries. He noted that higher education institutions are facing increasing calls to deliver value. He also noted that science spending in the UK has been maintained at 4.6 billion pounds p.a., which is very encouraging in the face of the economic downtown. The International Comparative Performance of the UK Research Base 2011 report published by Elsevier stated that the UK is the clear leader among the eight research-intensive economies covered, with more productive research than any other economy. One new initiative that has been launched is the creation of a network of world-leading technology and innovation centres called Catapult Centres, focusing on specific technologies, three of which have already been launched, with the remaining three to be launched in the near future. The solid UK university base has faced radical changes both in terms of funding and increased pressure on research impact. Partnerships are important, and our experience is that the longest partnerships are the most effective, he stated. Sir David concluded his address by noting that the themes of this symposium are very important to us for the economic future of both countries.

Keynote Address 1 – Japan's 4th S&T Basic Plan

Dr. Masuo Aizawa explained that the dramatic rise of Asia and emerging economies had resulted in a power shift, and said that S&T innovation is key to addressing the grand challenges we face. In 2011, Japan faced two challenges: the Great East Japan Earthquake, the grand challenge of nature, and also the challenges of the nuclear power crisis. He noted that to address grand challenges requires integration across all disciplines, making effective use of breakthroughs in basic research and innovative technologies. He stated that this is the time to promote open innovation on the world stage. Mr. Aizawa noted that Japan is very proud of its position in S&T, with many Nobel Laureates from Japan and many breakthroughs in S&T, but also noted that competition is becoming increasingly fierce. He suggested that the priority should be put on human resources, but that there was a need to shift from being discipline-oriented to policy-oriented. The 4th S&T Basic Plan has earmarked 1% of public spending for S&T, amounting to around 25 trillion yen for five years. Strategic Innovations Systems are to be established including an S&T Innovation

Strategy Council, an Industry-University-Government Network, and an Open Innovation Platform. Other areas of focus include increasing international activities through S&T diplomacy, enhancing basic research, and fostering human resources. Finally, Mr. Aizawa described the programs in Japan to provide funding to world-class basic science and research initiatives.

Keynote Address 2 – Promoting Technology Transfer and Innovation

Dr. Michiharu Nakamura, President, Japan Science and Technology Agency noted that collaboration is key for the prosperity of both nations, under severe societal challenges. JST is working to facilitate S&T collaboration through promoting collaboration between universities and companies, and the history goes back to 1958, with successful outputs including GaN Blue LED, Bi-Based superconducting wire. JST has two types of funding schemes, with one supporting the creation of IP from the research results in academia, and the other creating innovation through a platform for dialogue among industry, academia, and government. JST arranges new technology presentation meetings every month where university researchers present their new technologies to industry, as well as public exhibitions to introduce seed technologies to the public, and these achieve matching ratios of up to around 30%. Dr. Nakamura then presented an overview of the research themes, and the strategic programs under which JST is encouraging these research themes.

Session 1 – Government Policy

Mr. Hideo Shindo, Academia-Industry Cooperation Division, METI presented the policies for University-Industry Collaboration in Japan, starting with the history of university-industry collaboration promotion policy over the past 15 years. He noted that in 1998 the Act on Promotion of Technology Transfer from University to Private Business Operators was passed, and the following year the Act on Special Measures for Industrial Revitalization was passed. The national universities underwent further changes with their incorporation in 2004, allowing greater freedom, and the amendment in 2006 of the Basic Act on Education. Regarding the current status of university-industry collaboration in Japan, Mr. Shindo noted that of the research spending by industry in Japan, the percentage flowing to academia is only around 1%, which is low compared with other countries. The average size of joint research is around 2 million yen, and comments from industry regarding Japanese universities cited rigid negotiation regarding licensing contracts, loose operational systems for protection of IP, and

complicated institutional structures. METI in collaboration with MEXT is aiming to complete a trial evaluation in order to visualize university-industry collaboration using diversified indices, which may lead to future consideration of organizational restructuring of TLOs and university IP offices.

Mr. Atsushi Hashizume, MEXT, explained the perspective of the universities in the support provided by MEXT. Following the 1st S&T Basic Plan in 1996, the TLO in 1998, and the Japanese Bayh-Dole Act in 1999, a reform of the national university system was conducted in 2004, and contribution to society was then added as one of the missions of national universities in the Fundamental Law of Education in 2006. There are 200 universities with industry collaboration offices, and there are 46 TLOs. MEXT is providing support for 67 universities. However, the licensing income of universities is extremely small. Collaboration is not the aim, but rather the transfer of outcomes to society. He reiterated that the strategy for innovation includes developing human resources for industry-university-government collaboration.

Ms. Alice Frost, HEFCE, stated that she had discovered already that Japan's policy trajectory is very similar to that in the UK. She outlined the different models for transfer offices, with the open science model, the licence model, and the innovation model, in which universities form part of the innovation ecosystem. She noted that there is a lot of knowledge which is not transferred by codified transfer methods such as published papers and patents. She noted that it was important to consider why parts of the value chain remain in your country, and presented a model which investigates the wider knowledge exchange activities between academia and industry. She explained that universities earn funding based on their performance which they are then allowed to use as they wish. HEFCE supports building capacity in leadership, strategy and institutional structures in universities. Ms. Frost closed by noting that teaching is now very focused on employability, and that this should provide a springboard to increased innovation.

Mr. Kevin Knappett, Head of Science & Innovation, British Embassy Tokyo, introduced a video that described knowledge transfer partnerships (KTPs) in the UK, giving examples of industries which have been enabled to compete in the marketplace through the KTPs. KTPs include an advisor who can maximize the partnership and resolve any issues between the parties involved. Over half of

the associates in KTPs register for higher degrees, and two-thirds are offered positions with the KTP company partner at the end of the program. The benefits of the access to the university networks around the world were also highlighted as a great benefit by industry partners. Mr. Knappett explained that for every 1 million pounds the government invests, a 4.25 million pound increase in annual profits was seen, with creation of 112 new jobs and training of company staff. Mr. Kevin Knappett also noted that the associates benefit through career progression, and the knowledge partner benefits through new research themes and publishing of high quality papers.

Dr. Malcolm Skingle explained the Lambert Research Collaboration Agreements, which were devised by the Lambert Working Group following the recommendation in the Lambert Review published in 2003 for boilerplate contracts to define the stakeholders interests in IP when starting a collaboration. The five model agreements cover a range from those where the IP is owned by academia to those where the IP is owned by industry, of which the most commonly used is where the industry partner owns the IP and the university partner has access to the IP for its research and teaching. Dr. Skingle pointed out that the Lambert Agreements have the benefit of having already been through several months of negotiations.

Q&A

Dr. David Secher comment that he was impressed with the events mentioned by Dr. Nakamura where matching of 10-30% is achieved, and asked what leads to the success of these events. Dr. Nakamura stated that matching ratio shows the industry interest, not the final percentage of technology transfer, but noted that the event is held every month with hundreds of participants from industry. He added that although the current performance in terms of investment in academic research from industry is not that high, as the interest from industry is very high there is great potential.

A participant from Hiroshima University asked Mr. Hashizume what he would have done differently five years ago when starting the programme of university-industry collaboration, with the benefit now of hindsight when reflecting on the outcomes. Mr. Hashizume stated that as it is a five year program, some are ending in 2012, and noted that the program sets out to promote self-sufficiency, meaning that government support will not continue with

funding, and that while it is only at the early stage, in terms of self-reliance the progress that has been achieved is mostly what was expected. The programme also develops models that can be shared and used in the future. Mr. Hashizume added that it is not the case that one model can be used in all universities, suggesting that university-industry collaboration could be smaller for regional universities, but he commented that perhaps information sharing on the differences in collaboration in each institution might have been done better.

Session 2 – Options for Collaboration

Prof. Eric Thomas noted that the UK Government's Innovation and Research Strategy rests on studies showing clearly that innovation is essential for economic growth, but that innovation is changing and needs an effective system where the actors collaborate directly and indirectly. The UK government is committed to funding a balance of both blue skies and applied research projects. Prof. Thomas noted that the costs of cutting edge research are now often too high for one company, and are usually international in nature. Prof. Thomas explained that there has been a significant transition, certainly within UK Universities, from technology transfer to strategic relationships, as technology transfer through licensing and spin out companies has not been that successful as either a generator of income or as the most efficient method of technology transfer. He noted however that it is more challenging to build long-term relationships with SMEs, due to their diversity. Finally, he stressed the importance of developing skilled workers, noting that industry frequently identifies the supply of skilled people as something that they value most from collaboration.

Prof. Tomonari Yashiro, Institute of Industrial Science, University of Tokyo, presented the history of the Institute of Industrial Science (IIS), which was formed in 1942. One example of industry-university collaboration to have come from the IIS is an experimental blast furnace plant created with a consortium of major steel firms since 1954. He presented several styles of collaboration, including creation of seeds through basic research in IIS, which are then shared with industry, and also a demand-led process where IIS works to address problems of business partners, which are often problems shared in common between several partners. He also introduced the NEXT (New Expertise Training) Program, which seeks to train people from industry to address future

challenges. He stated that key factors for success are long-term partners, with solution-oriented thinking, and site-based dialogue.

Prof. Stephen Holloway presented the HE-Business links, explaining that the Lambert Review had concluded that British business was not research intensive, and that research was concentrated in a narrow range of industrial sectors. He noted that collaborations arising from chance encounters could be successful but were usually not scalable. He outlined barriers such as the differences in perspective between academics and business, and also gave examples of opportunities, citing collaboration with Unilever in terms of sharing of resources. For the Japan-UK collaboration scheme, Prof. Holloway proposed that the title of Japan-UK Knowledge Exchange Network (JUKEN) might be worthy of consideration.

Prof. Koichi Hishida, Keio University, introduced Keio's system for industry-university collaboration and technology transfer, with support from the Headquarters for Research Coordination and Administration. He stated that Keio receives around 20 billion yen of research funding p.a. from external entities. He did note however that license revenue amounts to only around 50 million yen per year. Prof. Hishida presented several examples of successful technology transfer from Keio. He then asked whether IP offices can survive, noting that the expenses are much higher than license income. Prof. Hishida then outlined the three exit strategies for research for the benefit of society, including joint/commissioned research, licensing IP, and creating start-ups.

Prof. Mark Spearing, Pro Vice-Chancellor, University of Southampton, presented on TLOs. He noted that he had spent his career in three different institutions which were all very successful with working with industry, but with very different models. Southampton has been shown to be very successful in the UK in terms of creating spin out companies. MIT is very aggressive in its intellectual property protection, and a very strong TLO. Cambridge has one of the strictest IP policies in the UK, but more relaxed than MIT. The University of Southampton on the other hand only protects IP if there is a licensing or spin out opportunity. Some of the considerations he outlined are the long payback timescales, often of 20 years, and the rarity of big wins. Prof. Spearing presented Southampton's basis for creation of spin outs, with an aim for initial funding after around 18 months, and an overall time scale limit of around five years before exit. In order to be

successful, Prof. Spearing stated that there needs to be a combination of both academic interest and an enterprise culture.

Dr. Robert Kneller, University of Tokyo, noted that many of the presentations had stated that collaboration was seen as the goal, rather than licensing, but stated that there is a role for TLOs in monitoring this collaboration and ensuring that development obligations are created. He explained that prior to 2003 inventions in Japanese universities were generally transferred to companies and licensed by the companies, but noted that recently 75% of all university patent inventions have been joint patent applications, which give royalty-free usage rights to the industry partner with no development obligations. There are benefits to research from this approach, but the drawbacks include exploitation of the outcomes by large industry, and a negative impact on start-up companies. Dr. Kneller proposed that licenses should be limited to a specific field of use, so that the IP could be taken forward by others for other fields of use, rather than left unused, and suggested that TLO income should improve through these changes.

Mr. Quentin Compton-Bishop, Warwick Ventures Ltd., University of Warwick, presented the history of Warwick Ventures Ltd. (WVL), noting that it is dependent on university and HEIF funding, but has an important role in enhancing the university's reputation for research that generates economic and social impact, and as a centre of commercial expertise for the university. He noted that there is still more to do, as WVL currently only works with around 20% of the departments at Warwick University. He suggested that WVL has to provide a service to departments to help them understand the market needs, while building better links with industry to understand their needs. Challenges include increasing the number of license agreements together with better deals, while producing fewer stronger spinouts, and minimizing dilution of the holdings. He stated that profitability is a long-term clear ambition to steer the development of the organization.

Q&A

Dr. Secher pointed out that Dr. Kneller's observation that 61% of patents are shared results of industry collaboration vs. 6% in the UK could be viewed as better collaboration between industry and university in Japan. Dr. Kneller replied that looking into what has happened to the research is difficult, but noted that in interviews with start-ups and big companies, the intensity of the collaboration

with start-ups is much stronger, and that therefore pushing start-ups away from collaboration is unproductive.

Prof. Thomas, in wrapping up the session, commented that it was important not to expect to make tremendous sums of money through collaboration.

Session 3 – Successful University-Business Collaboration

Prof. Michael Worton, Vice-Provost (International), University College London noted that globalization was changing not only the way we do business, but also the way we think, and we need to be very aware of different mindsets as we work cross-culturally. He described the historic links between the UK and Japan, noting that there is a monument from 1863, when five Japanese men, the Choshu Five, went to England to investigate how the education system was organized there. The five also gained an understanding of British industry, which they brought back to Japan. It can be seen from this and other examples that the model of educational learning through industry has long been practiced. He noted that when distant minds come together, cherry trees blossom, and the cherry trees around UCL are a reminder each year of the influence of the Choshu Five.

Prof. Keisuke Makino, Vice President, Director of Office of Society-Academia Collaboration for Innovation (SACI), Kyoto University, sought to answer the question of what constitutes successful university-business collaboration. He noted that university-business collaboration has an important role in creating business that will provide employment for the younger generation. He stated that establishment of a collaboration policy is important, such as concentrating on core competence, downsizing organizational structure, outsourcing as much as possible to TLOs, ensuring development of human resources, providing legal function support, and promoting international inter-university networking. He noted that almost 19% of Kyoto University's financing comes from external sources, and concluded by stating that everything should be kept simple and well organized, as in the Schrödinger equation.

Prof. Spearing stated that industry wants to work with universities in order to find future employees, to gain access to technology, to leverage funding available from government, and to share risk. However, he also noted that there were factors against working with universities such as their lack of sense of urgency,

and their belief that industry has large amounts of funds. He noted that there are many more relationships with external organizations than research collaboration, which are all important to maintain a relationship. Technology and Innovation Centres, known as Catapult Centres, are one of the ways of bridging the innovation gap, but spin outs have also been a way to bridge this gap. As keys to success, he stated that there must be a clear focus on objectives, and the university must be involved in something that is central to the business of the industry partner, not peripheral. Prof. Spearing reiterated in closing that carrying out leading research, but in an entrepreneurial environment, should lead to successful wealth creation.

[*Breakout Groups*]

Breakout Group 1 – Engineering and Physical Sciences, Energy

Prof. Andrew Monkman, University of Durham, presented a case study of a collaboration between Durham and Sumitomo Electronics in the field of plastic electronics. The collaboration was established when Sumitomo researchers discovered a gap in their technology and learned from the scientific literature that scientists at Durham were working on this problem and had access to cutting-edge facilities that Sumitomo did not possess. Moreover, there was a market gap because there had been no major new lighting technology for around 75 years, but there was a pressing need to save energy and eliminate the use of mercury. Partway through the partnership, Sumitomo took over a research lab in the UK, and this made collaboration easier. Trust is an important issue, as Durham scientists are often required to work on a “black box”. However, cultural differences are not significant, as scientists worldwide share a common culture.

Prof. Toshihisa Ueda, Keio University, introduced the work of the Keio Leading Edge Laboratory of Science and Technology in promoting research collaborations with national foundations or industry. Since the foundation of this laboratory, there has been a growth in research with industry, patents and, in particular, patents from collaborative research with overseas companies. This shows that Japanese universities are now ready to collaborate with foreign companies. Prof. Ueda expressed an interest in sending PhD students to work at foreign companies.

Prof. Stephen Holloway explained the University of Liverpool's strategy of focussing on a limited number of research-intensive partnerships. He stated that exchanges of graduate students were one of the most effective methods of research collaboration, as they bring the institutions together, develop trust, as well as getting the research done. For example, Liverpool have a joint PhD agreement with RIKEN which works very well, sending high-quality students in both directions.

Mr Quentin Compton-Bishop of Warwick Ventures Ltd presented a case study from a former job working with a small spin-out company producing rollable tubes. A company invested in the idea without understanding the science behind it, which led to various problems because there was not sufficient scientific expertise to refine the initial product. Eventually, a partnership with researchers at the University of Cambridge was successful for a while in bringing in new technology. Mr Compton-Bishop stated that the key issues for a spin-out company were money and management.

Mr Koichi Ota introduced the process by which Toyoda Gosei Co., Ltd. moved from manufacturing rubber parts for cars, to manufacturing blue LEDs. They benefitted from a funding scheme for early-stage research run by JST under which the loan is only required to be returned if the technology is successfully brought to the commercialisation stage.

The subsequent discussion noted that all the above, successful examples were quite different, but that some common themes were the unique nature of the opportunity offered, serendipity, and a willingness to go out and meet potential partners. Working with a business or university overseas is particularly challenging, so the potential benefits must be correspondingly high.

Conducting science together across national boundaries is easy; challenges come from the management side. The UK expect speed (typically aiming for an agreement after two meetings), which means that companies tend not to work with Japanese universities.

Breakout Group 2 – Life Sciences

Following an opening to the session from Prof. Toshio Miyata of Tohoku University, Dr Malcolm Skingle, Director of Academic Liaison, Glaxo SmithKline (GSK) delivered a presentation on GSK's approach to industry-academia collaboration and personal views deduced from his various experiences. In his presentation, Dr Skingle discussed how University-Industry collaboration was increasing especially amongst industries seeking to externalise research. Further following a point raised by a member of the audience, he stressed that industries are always looking around for the best available technologies and are willing to cooperate with universities regardless of location.

Next, Prof. Miyata shared his views and thoughts on the current state of University-Industry collaboration in Japan. He especially focused on pharmaceutical development and how clinical trials in academia and through international collaboration may in the future overcome the so-called "drug-lag" issue. This issue is where medicine approved overseas may take a substantial amount of time to be marketed in another country. He also discussed bridging studies between JP-EU-US to reduce such lag through international coordination.

Mr Takuro Wakabayashi of ASTEC then introduced his unique view from a Seed/Venture investment company of such University-Industry collaboration and feasibilities of spin-offs. He stressed that it is crucial for researchers to think in the mind of those investing when considering the commercialisation of technology. At the same time he mentioned how a general understanding of a "quality start-up" is lacking and is necessary to generate sufficient funding through investments.

Following this, Dr Ichiro Aramori of Astellas Pharma provided an overview of Astellas' efforts toward University-Industry collaboration. One successful example presented was of the collaboration with Kyoto University. This is where Astellas has a facility within the campus, staffed by both personnel of Astellas and Kyoto University.

Finally, Prof. Koji Sode of Tokyo University of Agriculture and Technology presented an overview of the innovation structure of the institution. He presented a comprehensive introduction to the university's international consortium.

Active discussions focusing on bridging studies and possibilities of various clinical trials were held in the latter part of the session. Points raised related to the difficulties of directly bringing in results from overseas clinical trials and the drug-lag that this causes. Concern was expressed regarding the so-called "valley of death" which exists between research and commercialisation. Further, points were raised concerning the type of collaboration that Astellas Pharma and Kyoto University are conducting. Although such alliance serves as an example of University-Industry collaboration, it is a closed network between the two entities. A more open model for collaboration may be optimal.

Breakout Group 3 – Skills development of early career researchers

In this session chaired by Prof. Ella Richie of Newcastle University, case studies of how universities are working with industry and international institutional partners in order to develop programmes for early career researchers were presented by Prof. Ritchie, Prof. Judith Lamie of the University of Leeds, Prof. Yukiko Ishida of Nagoya University and Prof. Toru Asahi of Waseda University.

Prof. Ritchie stated that the objectives of the session were for participants to understand the support systems in the two countries, to discuss under what conditions each country could learn from the other, and to identify good practice examples in each country and look at the challenges of implementing them in the other country. Prof. Ritchie then explained that during the last decade in the UK, "Roberts money" has been available and there has also been a Concordat agreement implemented to help universities develop skills training programmes for doctoral students. The importance of providing diverse career options for researchers within and outside academia is increasingly recognised in the UK. Prof. Ritchie introduced some examples of programmes run in Europe and also at Newcastle University. One of the success factors of those programmes is the provision of opportunities for researchers to work in more interdisciplinary contexts so that they can prepare for a diverse range of professions.

Prof. Lamie introduced the University of Leeds's initiatives to provide skills training in international contexts. She focussed on the Worldwide University Network (WUN)'s programme for graduate education called "World Leading Graduate Education Programme" as a successful model of working and developing training together with international partners. Major components of

this programme include short term research visits, virtual seminars, summer schools and master-classes, and postgraduate e-journals. There are thus a number of ways of linking researchers internationally utilising the Worldwide University Network. There is a fund available for research collaborations between Leeds and a minimum of 2 international partners. Leeds has developed a programme with Oakland University, Nanjing University and Osaka University. The aim of participation in these programmes is to connect researchers who have similar ambitions internationally and potentially for them to find another form of funding for their research.

Prof. Asahi introduced the activities of Waseda's Doctoral Student Career Center as examples of practical training for PhD students. The main purpose of these programmes is to provide skills training which can be used when working in a business environment. Their curriculum areas cover "Innovation Leadership", "Innovation for Industry", and "Logical Communication". Waseda also provides English language programmes for students to train them in areas such as advanced technical presentations and communication skills. The university has developed a number of internship programmes in partnership with their industrial partners, both national and international. These programmes offer benefits for both students and industry because students are able to experience leading edge technology and host companies have the opportunity to hire talented researchers without recruitment costs and to gain a better understanding of Japanese research methods. Some of these internships have in fact led to employment in the past years. The roles of the coordinators, who have had substantial experience in industry, and also of the academics, who are producing leading research in international settings, are very important in developing these successful programmes.

Prof. Ishida introduced a summer programme called "Nagoya University Summer Intensive Program (NUSIP)" which was established in partnership with major Japanese automobile companies for graduate students of engineering. NUSIP covers cutting-edge contents which are not taught in an ordinary curriculum, including from an interdisciplinary perspective, and its lecturers are drawn both from industry and also from Nagoya University. The partner companies include Toyota, Denso, Honda, Nissan, Mitsubishi Motors, Toyota Central Research Lab., Mitsubishi Electronics. This programme has successfully recruited students from overseas, and Prof. Ishida stressed the importance of

creating an attractive and innovative programme together with industry partners in order to continue to attract students.

At the end of the session, there were group discussions on the following:
1) What does it mean to be a “global researcher”?
2) What are the skills sets required?
3) How important is the introduction of mobility programmes for researcher development?

Session 3 – Successful University-Business Collaboration and Cultural Differences in Approach – Breakout Groups Wrap Up

Prof. Worton noted that while there are many similarities in the systems between the two countries, there are some differences to discover, and it takes time to build the trust to truly understand the differences.

Group 1 – Engineering & Physical Sciences

Prof. Monkman reported that one of the issues that had come out in the discussion in the Group 1 Breakout Session was the difficulty for companies of finding out who is doing what in institutions worldwide, but pointed out that this can largely be done throughout the world now through a Google search. He noted that it is nevertheless necessary to do research and meet with the people to ensure that they will be a good partner. It was observed, however, that most current collaborations come from a one-to-one meeting. One idea in Liverpool to improve opportunities for collaboration is joint PhDs, where the person who has spent time abroad through the program can start collaborations. It was noted, however, that Japanese industry does not employ many PhDs.

Group 2 – Life Sciences

Dr. Skingle reported that in the Group 2 Breakout Session many good practice models from the UK and Japan had been presented. He noted that academic institutions in Japan have become much more interested in collaboration compared with 10 years ago. Both countries have noted a decline in clinical trials being done, as they are going to lower cost countries. There is an increase in open innovation, with more information being shared in order to get more back. There were opinions that industry should focus on clinical trials while academia focuses on target validation. There was some discussion about electronic patient records, regarding allowing mining of data by pharmaceutical companies while

maintaining privacy. Finally he noted that Tokyo University of Agriculture and Technology (TUAT) had stated that they receive 10% of their funding internationally, and are a leader in this respect.

Group 3 – Skills Development of Early Career Researchers

Prof. Ella Ritchie reported that the questions being looked in the Group 3 Breakout Session were what it means to be a global researcher, and whether mobility is critical to develop those skills, and also how useful cultural differences were as an explanatory variable in understanding the issues in different countries. It is important to look at whole systems in order to understand and explain differences, including the relationship between the state and universities, and between industry and universities. Sometimes there were similarities but on a different timescale, but there was a feeling in Japan that PhDs looking for a job had failed as academics and that Master's students were preferred. There was a discussion about multidisciplinarity, regarding the need for people who are conversant between disciplines. There was agreement that global challenges need people who think in a trans-disciplinary way. There was also agreement on requiring more language skills, flexibility and cross-cultural understanding.

Wrap Up

Prof. Worton stated that the discussions had shown the crucial role of knowledge of the other's culture and organizations. He observed that there is generally an assumption that in the same country we have the same norms, which is not true, and that within the same discipline we have the same norms, which is also not true. He stated that the session had identified some of the systems that we need to have in place, and the need for thinking about where to allocate investment. Prof. Worton concluded the first day by quoting Timothy Radcliffe, who stated that "universities should be places where we learn to speak with strangers," which Prof. Worton equated to the aim of the current symposium.

Day 2 - Wednesday 11 January 2012

Session 4 – Business Needs: What does business need from universities?

Ms. Sue Kinoshita, Director of UK Trade and Investment, British Embassy Tokyo, gave a presentation entitled “What UKTI can do for your collaborative work and R&D activities in the UK”. UKTI has two pillars of activities, one to aid UK companies to enter Japan, and the other to facilitate investment in UK companies by Japanese companies. There are 150 Japanese companies with R&D centres in the UK, and these are extremely active centres. There are about 50 members of staff, and 18 of these are in Invest UK in particular. Services UKTI can provide include access to a network of sector experts, experts in supporting investment, and news on Japanese companies in the UK.

Malcolm Skingle, Director of Academic Liaison, GSK, explained that even large companies such as GSK with 10,000 people involved in R&D cannot do everything themselves, and there is also no single university that can do everything, so it is necessary to take the best research from different places around the world. Countries also compete for inbound investment. The Structural Genomics Consortium is an open access public-private partnership, with laboratories in Oxford, Toronto and Stockholm. This consortium has solved around 400 protein structures. There are 13 funders, including the Wellcome Trust, several Canadian organizations, and several Swedish organizations, as well as pharmaceutical businesses. GSK puts its chemical probes in the public domain because of the scientific results that are achieved through access to complementary skills and technologies. In order to work well, this requires building trust, and sharing the risks and rewards.

Dr. Brian Taylor Slingsby, Eisai, gave a presentation on collaboration with academia at Eisai, explaining that conventional models of R&D are under pressure, with complex disease targets, resulting in needs for greater innovation which can be achieved through open innovation including collaborations with academia, partnerships, and consortia. The benefits include mitigation of risk and maximization of productivity. However, challenges include the different goals of academia and industry, and coming up with schemes for reward and incentives, such as milestone payments. He noted that mutual confidence is a key success factor, with mutual ownership and clear and open communication. He then presented examples of open innovation collaboration, presenting different models for ownership of IP, distribution rights, and clinical trials. He

stated that in terms of collaboration with Japanese universities for Japanese companies, the lack of language barrier and the location are benefits, but the downsides include additional time to conclude contracts and an unwillingness to take or share risks.

Dr. Geoff Wainwright, 2Bio Ltd., presented on “University-Business Interactions: Early-stage business needs”, first presenting the background of 2Bio as a global technology transfer and consultancy organization operating for over 10 years, with a mix of universities, investors and business. 2Bio specializes in early stage development risk. As businesses grow, their needs change, and the growth is fuelled by financing, people, and confidence. The business needs technology, including access to the inventors, people to run the business, and the right environment, including professional support. Universities are a great source of people, expertise and technologies, which coupled with experienced business management, investors and the right environment, can generate success.

Tony Ford, Oxford Instruments, explained that Oxford Instruments had been founded by Sir Martin Wood as the first spin out from Oxford University. Oxford Instruments is truly global, very decentralized, and with 90% of its business outside of the UK. When Martin Wood started the company following interest from visiting researchers in the instruments he made as an engineer at Oxford, he continued to work at Oxford University for the first 10 years, allowing him to continue to grow his network. Oxford Instruments continues to build its network through daily contact with academics and sponsorship of prizes. He noted that in addition to the IP, the knowhow on inventions is a critical factor, and the success of collaboration should be regarded as getting a product to the market. He noted however that in most universities the procurement process for joint research is very rigid and difficult, and needs to be made more flexible.

Dr. Yutaka Sata, Group Manager Technology Planning Division, Toshiba Corporation, gave a presentation on the “Expectation of Japanese Industry to UK Academia”. He noted that the areas for transforming the business structure of Toshiba include NAND flash memories, smart metering, renewable energy, healthcare, and fusion products and services for digital products. He outlined the research activities and output from Toshiba’s UK R&D labs such as quantum key distribution demonstration. Toshiba also runs a fellowship program to invite researchers to come to Japan. He stated that while there are positive areas of

Toshiba's R&D in the UK improvement is needed in certain areas. He stated that the work of UKTI is greatly appreciated, but he also stated that he wanted to promote the strength of Japanese industry, and enhance communication to create larger R&D plans.

Q&A

Prof. Monte Cassim, Ritsumeikan University commented on Mr. Ford's presentation, agreeing that there are compliance issues over purchases, and stating that he wished to take this up as an issue to pursue after the symposium. Mr. Ford said that researchers have come with a project where the risk is large, but the Japanese system probably would not allow that project to go ahead. On the other hand, as transactions use public money, they must be transparent.

Prof. Spearing asked how wide the companies looked in making strategic decisions on research centres, and how much depended on existing relationships built by the academics. Dr. Sata said that did not know about decision to start the Cambridge research group, but explained that now in forming research groups Toshiba looks at universities worldwide to find the best partner, not looking only for good professors and technology, but also considering the contract and regulation situation in each case. Dr. Slingsby stated that both of the relationships he had presented were more based on relationships rather than analytical process, because for consortia to really work they need champions, and to go to an organization and try to sell it to someone to become a champion is very difficult, and tends not to work. When starting from a relationship, he explained, the analysis is done at the contract stage, looking at what additionally might be needed. Prof. Worton commented that at UCL they had decided to bring Eisai people into the UCL buildings, taking space away from their own scientists, to create a very strong statement about the partnership with Eisai, pointing out the importance of institutional leadership.

Dr. Kneller noted that very few Japanese companies invite people from universities into their labs, and asked Toshiba for an evaluation of their program. Dr. Sata explained that the scheme is run jointly with the British Government, and explained the selection process. He stated that Toshiba also listens to the ideas of what the researchers want to study in their groups. He added that there have been examples of collaboration projects following on from the activities of the program. Dr. Slingsby stated that Eisai has a fellowship with the WHO, where

researchers experience clinical development in the company for 2-5 years, which is seen as a long-term investment in human capital for those countries.

A participant from the University of Bristol stated that one of his colleagues had spent time at Toshiba Kawasaki, and that this life experience had benefitted him for the rest of his life. He noted that the smart homes project relationship with Bristol City Council had been able to be mediated through UK academia as a social partner, not only as a technical partner. Dr. Sata stated that Toshiba very much appreciates these links with the UK to be able to conduct such a large project.

A participant asked how much autonomy the subsidiaries have in terms of developing their research agenda and collaboration relationships. Dr. Sata replied that there are several layers in Toshiba's research organizations, and the ideas of the UK teams are very much appreciated. One positive aspect of inviting professors to head research teams is to discover what technologies will be important in future Toshiba products. Dr. Slingsby stated that Eisai gives a certain amount of autonomy to research groups, but warned that ideas are cheap, noting that there are many hurdles regarding compliance and investment to clear which may need to be approved at corporate level depending on the size of the investment required.

Session 4 – Business Needs (continued)

Dr. Yutaka Kuwahara, President & CEO, GVIN Ltd., explained that he was responsible for the establishment of the Hitachi Cambridge Laboratory, stating that Hitachi established the Cambridge Laboratory for globalization. He noted that Industry can provide scientific instruments and supercomputers, as well as knowledge of handling IP and manufacturing capability, while universities can provide scientific knowledge chain, young and brilliant scientists, and the ability to speedily write and publish papers. He described how the collaboration had expanded over time as a result of successful innovations, but that it had started from a very small and tight-knit network. Dr. Kuwahara explained that IP would be shared equally, in principle on a 50-50 basis. Many of the scientists use their time at Hitachi Cambridge Lab as a stepping stone toward their future career.

Mr. Nozomi Takei, Rolls-Royce Japan, gave a presentation on Rolls-Royce research & technology. Rolls-Royce is known for automobiles, but this business

was sold off, and the main business is now in the power sector. Rolls-Royce has a research expenditure of 923 million pounds against 10.9 billion pounds of revenue. Rolls-Royce has a technology vision divided into 5 year, 10 year and 20 year timescales, ranging from improvement programs through to emerging technologies. He stated that the main reason for starting collaboration is due to pressure for development but also in order to generate new ideas. The collaboration also provides access to skilled resources, who would normally seek to join a Japanese company. He highlighted critical success factors as support of regional and local government, up front agreements on IP rights, and a customized approach for different countries and cultures. Finally he introduced Rolls-Royce's global research network and in particular the advanced manufacturing research centres in the UK.

Mr. Kan Ogata, Mitsubishi Heavy Industries, Ltd. presented on what industry needs from universities, explaining that research conducted with universities is not directly linked to product development, and MHI decides how to incorporate technologies into products. He noted that there is a gap between different ministries in charge of scientific technology budgets in Japan, as compared to the U.S. where the budgets are applied consistently from academia to commercialization. He presented examples of collaboration between industry, academia, and multiple government agencies. He noted that there may be problems due to patent discussions and therefore direct commercialization is difficult, but it is important to see how to apply technologies into products. Mr. Ogata stated that MHI does not yet have overseas centres, but does see the benefits of open innovation, and hope to promote further collaboration with business partners.

Q&A

A participant asked Mr. Takei to expand on the customization of approach that he had mentioned in his presentation. Mr. Takei explained that in one case repeated business trips had been unsuccessful in securing a collaboration, but after hiring someone locally for this purpose this had led to success in being able to start collaborative research.

Prof Spearing asked how important it is to have employees come in with international experience, or whether they can be trained within the organization to function in an international environment. Dr. Kuwahara stated that Hitachi had

announced recruitment of new employees on the Internet, and received a great response, even including people from the U.S. Mr. Ogata said that for MHI international experience is not that important, as long as they have the necessary communication skills and research skills. Dr. Sata stated that they are keen to have new employees from countries worldwide including emerging economies. What they want from researchers is talent in research. Dr. Slingsby said that international experience is not a requirement or major factor in hiring, but noted that there is a big difference between business trips and actually living in a country for several years. It is, he felt, the responsibility of the company to use their subsidiaries to facilitate the sharing of global mindset, not only from head office, but also from subsidiaries to head office.

Dr. Kneller asked Dr. Kuwahara if a researcher had a core technology and wished to form a company, what would be Hitachi's response. Dr. Kuwahara said that there have been three or four cases in which people have left Hitachi to start companies. Dr. Kneller asked if Hitachi would share IP. Dr. Kuwahara stated that Hitachi does not pursue the IP that closely if it is outside of Hitachi's business. Mr. Takei stated that the barriers to entry in Rolls-Royce's industry sector are high, but that if someone wants to form a business Rolls-Royce does not object provided it meets certain requirements. Mr. Ogata commented that there is not really the environment in Japan for venture companies.

Session 5 – Models for Collaboration

Prof. Toshihisa Ueda commented that the symposium had been very impressive, and stated that there would clearly be more opportunities for successful collaboration between Japan and the UK. There have been examples of collaboration between a university and company, but collaboration between universities will also be important, as the universities themselves will have partner companies, and this may provide access to international collaboration to smaller companies. As well as collaboration to address the problems of a specific business, there are also common shared problems, and addressing these can allow universities to contribute to society and create new businesses.

Prof. Holloway reviewed the findings of the two days, noting that there are examples of companies that are already working in the UK, which does not need any interference, but in terms of generating new collaboration encouraging collaboration between universities would be the best method. Funding is unlikely

to prove a problem, and development activities such as summer school programs, internships, and workshops could help to promote collaboration. An audit could identify universities to work together, which would then conduct seminars to investigate areas for collaboration. The paired universities could share industrial partners, increasing access to a higher number of industrial partners. Mobility opportunities need to be considered as part of this framework, including interdisciplinary summer schools.

Q&A

Prof. Holloway asked the value of PhD students, noting that sometimes they are welcomed, but in other cases they are considered too smart for the organization. Prof. Ueda noted that the career path is limited for PhDs, who mostly go into universities or national research institutes, but with the globalization of Japanese companies the PhDs should become more important in the future. However, Prof. Ueda noted that 70% of his PhDs go to industry, such as Hitachi and Toshiba R&D. A participant stated that the Japanese government has formed a committee to address the problem of employability of PhDs, and that the situation may improve in just a few years. Prof. Worton pointed out that only 1% of first year students go on to become academics, and that has led to consideration in the UK of the goal of creating PhDs. It was broadly felt by the participants that it would be interesting to see an analysis of the final destination of students in Japan. Dr. Sata stated that Japanese companies placed importance on company training programs, and noted that research themes of PhDs were traditionally chosen by professors in Japan, without the freedom that there is in the UK to make proposals or change direction. However, he noted that although the situation is now changing, many managers in the companies in Japan do not understand that these changes are taking place, and so the barriers remain. Prof. Holloway suggested that PhDs spending time in both Japan and the UK might improve their employability.

Prof. Worton noted that in the UK international experience is highly valued and he found it surprising that this is apparently not the case in Japan. He noted that the skills demanded by industry change regularly, but recently language skills have become more important. Basic language skills are important for ice-breaking, but also higher level language skills are important for a better understanding of deeper systems in the world. Prof. Worton asked if there is an organization in Japan that provides the same kind of information on what

industries are seeking from academia. Prof. Cassim stated that there are organizations that try to provide linking of industry and academia through consortia, but he felt that the problem comes back to where PhDs go, observing that even if PhDs go into industry, long-term they tend to end up back in academia. He added that many Japanese PhDs end up in the U.S. However, he stated that there have been no visible programs to promote PhDs working in industry in Japan.

Prof. Holloway asked if there were any opportunity for employees to return to university part time in Japan, or whether it was felt that everything should be done within the corporation. Prof. Ueda stated that it is common for company engineers to return to get a PhD, which can be done in around three years full-time, and noted that the 70% figure for PhDs going to companies includes these PhD students. Prof. Cassim added that there is a new trend for companies to enrol employees in a short term certificate program or Master's program as future leaders of the organization, on courses that have people from many countries and cultures, in order to give them some internationalization. He added that the personnel departments of companies are usually ahead of management in terms of internationalization, and line managers are now being sent to attend these courses to improve their abilities in this area.

Prof. Holloway wrapped up the final session by thanking the Embassy for the event as well as the British Council for maintaining the momentum of the discussions over many months.

Mr. Knappett brought the symposium to a close, thanking all the participants for their attendance and encouraging them to continue the networking activities and discussions after the symposium.