



International Symposium and Workshop

TOWARD THE DEVELOPMENT OF AN R&D CLUSTER IN OKINAWA

October 6-7, 2010

Okinawa Institute of Science and Technology Promotion Corporation



The Okinawa Institute of Science and Technology

The Okinawa Institute of Science and Technology (OIST) is a new international university being established by the Japanese Government, in Okinawa, Japan.

Its mandate is to conduct world-class, cross-disciplinary research and education in science and technology. To accomplish this goal, OIST aims to become the first international university in Japan to recruit a majority of faculties and students from abroad and conduct research and instruction in English. In achieving its mandate, OIST also aims to contribute to the self-sustaining economic growth of Okinawa by encouraging entrepreneurship and enabling the development of clusters of R&D surrounding the university.



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Introduction

Innovation and entrepreneurship have a special role in contributing to economic growth and can be attributed to the success of leading, as well as the drivers of emerging, economies. While several Prefectures in Japan have enjoyed success in the development of innovative products and the expansion of leading companies, the Okinawa Prefecture has consistently ranked low in many economic indicators. Stimulating sustainable, economic growth in Okinawa will require a focus on building industrial capabilities in high-growth sectors.

On October 6-7, 2010, the Okinawa Institute of Science and Technology (OIST) hosted a symposium and workshop entitled ***“Towards the Development of an R&D Cluster in Okinawa”***. The goal of the meetings was to highlight the key challenges, barriers, and opportunities that Okinawa faces in developing a thriving research and development cluster based on science and technology, and the practical efforts needed to lay the foundation for innovation and

entrepreneurship to thrive. More than 170 attendees from academia, industry, and government agencies in Japan and abroad attended the public symposium and heard remarks from distinguished guests including Senior Vice Minister Yoshinori Suematsu, Okinawa Governor Hirokazu Nakaima, and U.S. Ambassador to Japan John Roos. Following the symposium, 33 global experts from various fields impacting economic development met for a 2-day workshop to dig more deeply into the issues.

The experts identified broad opportunities and challenges and issued 9 key recommendations that will lay the foundation for knowledge-based economic development in Okinawa. *The recommendations should be considered, not individually, but as parts of an interconnected national effort, one guided by a clear vision and implemented over the long-term with strong government, industry, academia, and public will and participation.*



Background

Compared to other Prefectures in Japan, Okinawa consistently ranks low in many economic indicators. It has the highest unemployment rate and the lowest gross income per capita in Japan (Table 1). Manufacturing, one of Japan's leading industries, makes up only 4% of Okinawa's GPP (Gross Prefectural Product), compared to a national average of 30%.

	Okinawa Prefecture	Pref, Rank	Japan
GDP (2008):	¥3.7 trillion	38	¥494 trillion
Population (2009):	1.3M	30	127.5M
Per Capita GDP (2008):	¥2.7M	46	¥3.8M
Gross Income per Capita (2008)	¥2.0M	47	¥2.8M
Population Density:	606 persons/km ²	9	343 persons/km ²
Population Growth Rate (2009):	0.45%	1	-0.14%
Life Expectancy (2005):	M-78.6; F-86.9	M-25; F-1	M-78.8; F-85.6
University enrollment (2009):	20,151	24	2.8M
Graduate enrollment (2009):	1,254	34	271,464
Labor Force (2009):	0.66M	32	66.17M
Unemployment Rate (2009):	7.5%	1	5.1%

Table 1: Statistical snapshot of Okinawa; Source: Okinawa Prefecture, CAO

Government policies and public support such as the Okinawa Promotion Plan have been initiated to boost the Prefecture's economic standing. Central components of these plans are aimed at catalyzing the development of clusters of research and development activity that take advantage of Okinawa's unique characteristics, including its subtropical environment and convenient location as a gateway to the East Asian region.



Toward the Development of an R&D Cluster in Okinawa: International Symposium

More than 170 representatives of academia, government, and industry from 6 countries around the world attended a symposium hosted by the Okinawa Institute of Science and Technology (OIST) to discuss developing Okinawa into a global center for research

and development in science and technology. In addition to this central theme, the symposium touched upon the role that OIST and other universities in Okinawa can play in catalyzing innovation and entrepreneurship.



Remarks:

Support for the aims of the symposium were given in special remarks made from 3 distinguished guests representing the Japan Central Government, the Okinawa Prefecture, and the United States Government.

Senior Vice Minister Yoshinori Suematsu presented a number of challenges to OIST, Okinawa, and Japan. He challenged the current generation of Okinawa to realize the potential of OIST in a way that past and future generations can be proud of. In light of Okinawa working to solve its issues with local U.S. military bases, the Senior Vice Minister challenged OIST to serve as a symbol for U.S.-Japan cooperation. Lastly, with the presence of the keynote speaker, the Chairman of SPRING Singapore Dr. Philip Yeo, a further challenge will be to see how much Asia, including Japan, can contribute to world research.



"OIST presents an opportunity and a challenge to the current generation of Okinawans to realize the potential in a way that past and future generations can be proud of." – Yoshinori Suematsu, Senior Vice Minister, Cabinet Office



"The wish of the Okinawa people is for OIST to benefit not only Okinawa but Japan, Asia, and the world at large." – Hirokazu Nakaima, Governor, Okinawa Prefecture

Okinawa Governor Hirokazu Nakaima provided a historical perspective to the founding of OIST in Article 83 and 84 of the Okinawa Promotion Act, which established OIST as a new international university for the benefit of Okinawa, one that would contribute on a global scale while also building strong local ties. The Governor believes that the university's future global success will be a strong source of pride for the people of Okinawa. Governor Nakaima concluded by committing the Okinawa Prefecture to work collaboratively with village and city governments to develop facilities around the university.



"Innovation and entrepreneurship are fundamental to ensuring economic growth and inclusive prosperity, not only in Okinawa, but around the globe. Cooperation across borders offers the promise of a better future for all of us." – John Roos, U.S. Ambassador to Japan

U.S. Ambassador to Japan John V. Roos visited OIST for the third time to lend his support to the idea of fostering innovation and entrepreneurship in Okinawa as a path towards sustainable economic growth. In his career in Silicon Valley, he observed how entrepreneurial firms applying pioneering technologies have the capacity to generate employment and raise the quality of life. In short, that innovation and entrepreneurship are fundamental to ensuring economic growth and inclusive prosperity, not only in Okinawa but around the globe. They touch upon important issues such as how new jobs are created. In sharing his thoughts on importance of entrepreneurship, Mr. Roos remarked:

"Thriving entrepreneurial business environments around the world share some fundamental characteristics, most common of which is the presence of strong institutions of higher education, particularly with leading programs in science and technology. Having a world-class facility such as OIST nearby is to have an asset that relatively few communities throughout the world are privileged to enjoy. Other features of thriving entrepreneurial ecosystems include: entrepreneurial spirit, risk-taking, employee incentives such as stock options, management expertise, strong corporate governance, a credible system of accounting, exit options for venture business (notably mergers, acquisitions or initial public offerings), drawing on diverse talents from around the world, and finally government policies that support all of the above."

In describing U.S. President Barak Obama's vision for the direction of innovation in the United States, Ambassador Roos noted that the United States and Japan share common interests in fostering innovation and entrepreneurship. He then concluded that the importance of the work at hand could not be greater for the future of Okinawa's economy and its potential future partners, and that cooperation across borders offers the promise of a better future for all.

Keynote Address:

Mr. Philip Yeo, Chairman of SPRING Singapore and Special Advisor for Economic Development, Singapore Prime Minister's Office

Mr. Yeo is widely credited with building Singapore into a biomedical research hub in Asia through his work at the Singapore Economic Development Board, leadership of the Agency for Science, Technology and Research (A*STAR), and chairmanship of SPRING Singapore. Mr. Yeo was invited to give a keynote address at the symposium to present the Singapore perspective in building its R&D cluster.

In his keynote address, "Singapore's Experience: Economic Development with Science and Technology", Philip Yeo first discussed Singapore's economic transformation through five stages of development:

1) the labor-intensive 1960s, largely fueled by the relatively low cost of the country's labor force; 2) the skill-intensive 1970s, made possible as workers became better educated; 3) the capital-intensive 1980s, with the promotion of high value-added and capital-intensive industries; 4) the technology-driven 1990s, when technology began to power the growth of Singapore's economy; 5) and the innovation-intensive current stage of the 21st century, when research and development (R&D) have become the engine of the country's economic development in such areas as biomedical sciences, electronics, chemicals and engineering. Mr. Yeo also described the building of Biopolis, a research and development hub opened in 2003 and dedicated to biomedical sciences, IT, and engineering. Biopolis represents one of Singapore's most significant investments to date to lay the foundation for research, innovation, and

entrepreneurship by clustering more than 2,000 researchers and staff of public and private institutions into a single R&D campus (**Figure 1**).



On developing new industrial sectors: "Never put all eggs into one cluster, and look ahead 10, 15, 20 years, not 5 years." – Philip Yeo, Special Advisor for Economic Development, Singapore Prime Minister's Office

On the human capital front, Mr. Yeo emphasized the importance of both bringing in the best minds from all over the world and nurturing young, local talent. The Singapore government initiated novel programs that included identifying promising young students from the Asia-Pacific region, supporting their entire undergraduate and graduate training at the best universities around the world, and providing them and their families full Singaporean citizenship, on the condition that they return to Singapore to work for 5 years after finishing their doctorates. He also emphasized the importance of sustaining economic development by strategically creating a new industrial sector every five years.

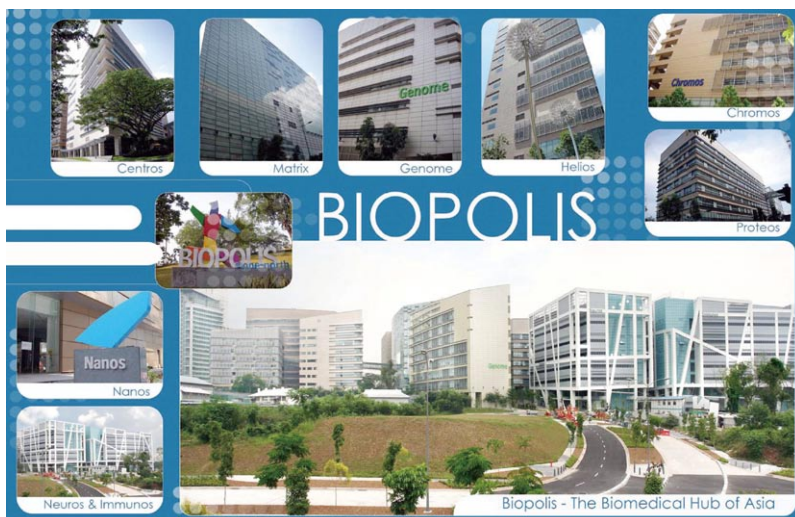


Figure 1. Biopolis R&D campus; Singapore's Key Development Strategies. Source: Philip Yeo, SPRING Singapore

Panel Discussion:

Moderator:

Mr. Mitsuru Miyata, Chief Editor-Medical of Nikkei BP, Japan

Panelists:

Dr. Hiroaki Kitano, Principal Investigator, OIST, Japan

Dr. Sass Somekh, President, Musea Ventures, U.S.A.

Mr. Toshiaki Taira, Chief Operating Officer, Okinawa Industry Promotion Public Corporation, Japan

Mr. Yoshiaki Tsukamoto, Executive Director, Bio Industry Association, Japan

Ms. Julie Meier Wright, President & CEO, San Diego Regional Economic Development Corporation, U.S.A.

A distinguished panel was convened to openly discuss issues related to R&D cluster development in Okinawa, including the role of universities such as OIST in catalyzing innovation and entrepreneurship. Panelists were chosen for their respective expertise in global entrepreneurship, knowledge of the local science and technology landscape, and economic development experience. The Moderator, Mr. Mitsuru Miyata, led the panelists in discussing 3 main topics:

- Okinawa's Current Status and Future Vision for the Development of an R&D Cluster
- Fostering Entrepreneurship in Okinawa
- The Role of the University in Catalyzing R&D Cluster Development in Okinawa

I Okinawa's Current Status and Future Vision for the Development of an R&D Cluster

Mr. Toshiaki Taira of the Okinawa Industry Promotion Public Corporation gave a presentation of Okinawa's current science and technology landscape. He also summarized the Okinawa Promotion Plan, Okinawa 21st Century Vision, and described the strengths and potential of Okinawa in science and technology.



"The challenge is how to develop new industries that will stimulate the economy of Okinawa. Through developing innovative knowledge-based industries, a value that integrates the natural environment of the islands as well as domestic and international interactions will be created." – Toshiaki Taira, Chief Operating Officer, Okinawa Industry Promotion Public Corporation, Japan

The current state of Okinawa's economy is one based on an urban economic structure, as its ratio of primary, secondary, and tertiary sectors are 2%, 12%, and 90%, respectively. Mr. Taira pointed to two misconceptions about Okinawa's economy: 1) that it is largely based on income attributed to the U.S. military, and 2) that it receives a disproportionate amount of subsidies from the central government. Of a GDP of ¥4T, only ¥150B is directly attributed to the income from U.S. military activities and this number is decreasing over time. Okinawa's per capita rate for subsidies from the central government ranks it 14th in the Prefecture, (not the

highest in Japan), and this is also decreasing over time. However, Okinawa's unemployment rate is the highest in Japan and its per capita income is the lowest. These statistics are guiding the Central and Prefectural governments' 4th revision of the Special Measures for the Promotion and Development of Okinawa, a law that was enacted upon the island's reversion to Japan in 1972. Now the **Okinawa Promotion Act**, along with the **Okinawa 21st Century Vision** which envisions an Okinawa 20 years from now, serves as Japan's strategic vision for supporting the development of Okinawa. The 21st Century Vision focuses on the development of industries in Okinawa that are rooted in its unique characteristics and culture, including tourism, health foods, agriculture/forestry/fisheries, Awamori, environmental sciences, IT, medicine, and life sciences/biotechnology. Okinawa also has some support systems in place to accommodate new ventures, including funding for start-ups and incubator and other specialized facilities. Mr. Taira concludes that Okinawa has outstanding strengths that make it a potentially strong center for research and development. In order to prosper, Okinawa will need to identify and focus development funds on building lasting industrial sectors that propel the economy going forward and Okinawa believes those sectors will be in the environmental sciences, tourism, IT, and biotechnology.



On building an innovation-driven economy: "Governments must get 'the beginning' right: seed the creation of new companies and have the staying power and flexibility to adapt policies, regulations, investments and incentives every year in order to stay globally competitive." –Julie Meier Wright, San Diego Regional Economic Development Corporation, USA

To share the experience of a cluster development effort with similar characteristics to Okinawa, Panelist Julie Meier Wright provided insight on San Diego, California. Ms. Wright is a leading figure in the development of the biotechnology industry in the San Diego region, having served as President of the San Diego Regional Economic Development Board for 15 years. Ms. Wright identified many similarities between San Diego and Okinawa, namely: similar climates and coastal location, strong tourism based economy, significant military presence, as well as similar airport constraints. Taking into account these assets and limitations, San Diego committed to transforming the economy into a knowledge-based economy based on science and technology and this commitment began 100 years ago with the establishment of the Scripps Institute for Oceanography. In her view, almost every economic transformation takes place with incentives, investments or regulation. For Okinawa, this could include creating special zones limited for science and research, supporting immigration policies that help to recruit the very best scientists, focusing funds to strengthen public institutions of higher education, and encouraging collaboration between academic, private, and governmental organizations. For OIST and other universities on the island, contributing to the economic transformation of Okinawa would entail a commitment to research excellence and a focus to be the best in certain scientific fields.

Panelist Yoshiaki Tsukamoto of the Bio Industry Association of Japan emphasized the importance of a sustained commitment from the Central and Prefectural governments in building Okinawa's R&D cluster. Looking at clusters developed around the world, most have required deep commitments by the government in the early stages, in terms of laying the foundation and infrastructure needed for new ventures to start and grow. Government at all levels must have a long-term commitment based on strong will, as clusters are not developed in the short term of 5-10 years.

The panelists also agreed that the lack of venture capital and other private investment in Japan limits new business formation. Panelist Sass Somekh of Musea Ventures, a venture firm with interests in the United States and Israel, presented data ranking Japan behind most OECD countries in venture capital activity as a percent of GDP (less than 0.1%). The top two countries, Israel and the United States, invested 0.7% and 0.35% respectively (**Figure 2**).

Increasing private investment in innovative start-ups is an important part of creating an environment for entrepreneurship to thrive. "New ventures, led by entrepreneurs and supported by venture capital," according to the U.S. Ambassador to Japan, Mr. John Roos, "are often the only actors capable of bringing innovative technologies to market."



"Okinawa is an important gateway to Asia. I expect that establishing an international institution like OIST here will trigger changes in the culture of the whole nation." – Yoshiaki Tsukamoto, Bio Industry Association of Japan

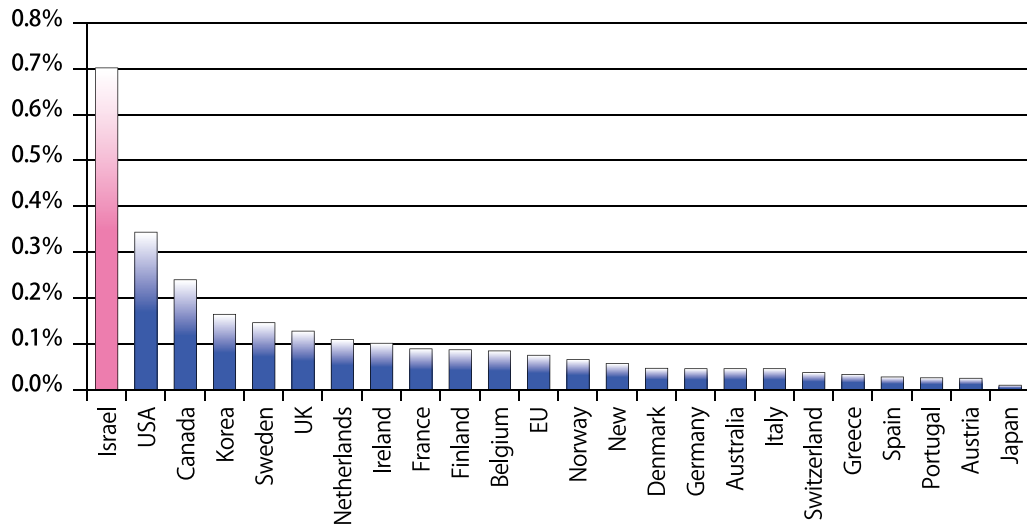


Figure 2. Venture Capital Activity as a percent of GDP. Source: OECD (1999-2004), IVC Research Center 2004

II Fostering Entrepreneurship in Okinawa

Strong industries cannot be built without entrepreneurs willing to take the risks inherent in creating new ventures and markets. Before becoming a venture capitalist, Panelist Sass Somekh led semi-conductor companies in Silicon Valley and, as a result, understands the key motivators of entrepreneurs. He noted that entrepreneurs are attracted by technology, sources of funding, and opportunities to make money and be successful. To build or attract entrepreneurs requires an understanding of the “ecosystem” needed to support entrepreneurship (Figure 3). The key ingredients of this ecosystem include:



“Entrepreneurs are attracted by technology, sources of funding, and opportunities to make money.” – Sass Somekh, Musea Ventures, USA and Israel

- **Infrastructure:** good universities; money available to start companies; experienced investors (those with the know-how to separate good investments from not so good ones)
- **Access to Markets:** access to customers; opportunities for mergers and acquisitions (public market); a path for the entrepreneur and new venture to make money
- **Entrepreneurs:** workforce with technical, marketing, and general management expertise
- **Strong culture of innovation:** risk-taking, a fast-paced, “driver”/aggressive mentality.

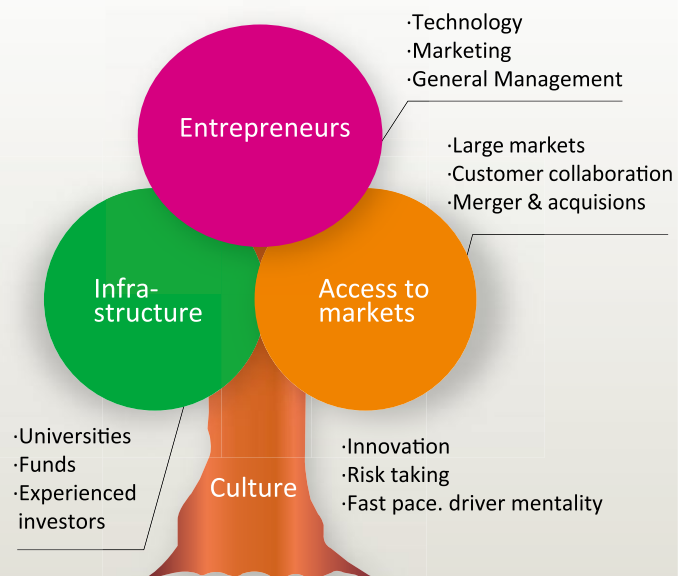


Figure 3. Entrepreneurial “Ecosystem”. Source: Sass Somekh, Musea Ventures

The ecosystem then becomes symbiotic, seeding and supporting each other, where one success leads to another and further builds the ecosystem.

Two examples of thriving entrepreneurial ecosystems include Israel and Silicon Valley. While Israel's ecosystem was largely built on technology developed during the course of defense research and on an abundance of trained engineers, Silicon Valley took advantage of its strong universities and the United States culture of immigration and ability of attract and retain the best talent from around the world. In the case of Israel, the Israeli government took direct measures to encourage entrepreneurship by providing matching funds to venture groups, creating state-funded incubators, providing seed funds to demonstrate ideas, and creating bilateral agreements with countries to collaborate jointly on R&D projects of mutual interest. Mr. Somekh concluded that Okinawa must identify its own "brand" for developing its entrepreneurial ecosystem. It can start by focusing on developing OIST into a world-class university and by leveraging both Okinawa's natural resources and the strength and resources of Corporate Japan to stimulate R&D.

Dr. Hiroaki Kitano, a Principal Investigator at OIST and

Scientist at Sony Labs, emphasized the importance of presenting a package of the incentives available in the region. For the entrepreneurs who are to startup a venture company, a reason why they should select Okinawa above other locations such as Abu Dhab, Tianjin and Silicon Valley will be necessary. Even if OIST succeeds in doing excellent research and providing human



"We must be aware of the reality that this is not easy, but I do think it is possible. I feel that having OIST as an extremely strong infrastructure will lead to a major breakthrough in Okinawa." –Hiroaki Kitano, Principal Investigator, OIST

resources, Okinawa will not be able to win the competition with OIST alone. In order to win the international competition, it is indispensable to develop, with collaboration across the whole region, a package that is superior to other regions in Japan and abroad.



III The Role of the University in Catalyzing R&D Cluster Development in Okinawa

Regarding the role universities play in R&D cluster development, each panelist was asked to provide final thoughts on how universities like OIST can contribute to the process of innovation and entrepreneurship.

Hiroaki Kitano:

OIST should become a graduate university where world-class research in science and technology will be conducted, where various experiments will be undertaken as a test-bed, and where high quality researchers, students and engineers will be fostered. Since projects that link between basic research and applied research are starting to develop, I believe that innovation can be delivered by increasing such projects.

Yoshiaki Tsukamoto:

OIST is known as an eminent research institution that was created in Japan probably more abroad than within Japan. OIST can leverage this international reputation to boost Okinawa as a hub to connect Japanese clusters to the rest of the world.

Sass Somekh:

The role of OIST in Okinawa is very important because universities are critical in developing clusters. Other important components include: military research as an origin of spin-off companies; big companies that people leave to start new companies. Okinawa has no military research and no major companies. The only thing that can exist at this point is OIST and the technologies that it will develop and bring to Okinawa.

Toshiaki Taira:

OIST was created through the Okinawa Promotion Act and must then promote the region of Okinawa. The public must advocate for OIST to be addressed as a matter of national policy instead of regional policy. National and local governments can then work together to ensure the region is ready for development. If Okinawa



"OIST should not be left alone. There are many things that must be done. Let's call in people, and build various infrastructures and support OIST toward its development."
 –Mitsuru Miyata, Chief Editor-Medical of Nikkei BP, Japan

is not prepared to leverage the good research coming from OIST, it will not have the desired impact. Okinawa must raise the level of businesses. Venture support funds and support services for business should be designed to produce this effect. Okinawa should continue to create system that will allow for communication and information exchange between government programs and universities so that the region can take on the development of a cluster in a collaborative manner.

Julie Meir Wright:

OIST is new and the single most important thing that needs to happen at this point is to be creative enough with the kinds of packages the university offers to recruit world-class researchers. Having research breakthroughs that are globally recognized will also be catalytic. New companies will come later. Building an innovation driven industry takes getting the "beginning" right, planting the seed to create companies and jobs and a sustainable economy. Governments need to have the staying power required for the long-term and also have the focus to reconsider the policies, regulations, investments, and incentives annually to adapt to the results of these efforts and make sure Okinawa remains competitive.



Toward the Development of an R&D Cluster in Okinawa: Workshop



The international symposium was followed by a two-day workshop, in which further discussions were held with the participants of 33 experts from Japan and abroad. In the first session, Dr. Kathryn Iyata-Arens, Assistant Professor of DePaul University (U.S.) and Dr. Kiyoyuki Shimizu, Director for Regional Collaboration of the National Institute of Advanced Industrial Science and Technology (Japan) made a general introduction to the whole group. Dr. Iyata-Arens is an expert in the area of R&D cluster development in Japan and North America. She explained the importance of geographical concentration of relevant institutions and companies by referring to the case of Kyoto, and introduced the method of developing an asset map that shows their locations to properly assess the resources available within the region. Dr. Shimizu presented the idea of stimulating a local economy with the collaboration between local universities and industry based on his past experience of being involved in economic development of Gifu Prefecture of Japan. In his view, local governments have to identify needs of local companies and encourage local universities to do their research and development based on such needs. Then the participants broke up into three groups to discuss topics such as; analyzing the current economy and future opportunities in Okinawa, viewing current status of entrepreneurial activities in Okinawa, and measures for human capital development. On the second day, two local entrepreneurs and two Principal Investigators of

OIST each made a presentation on the technology that they developed and plans of business as pilot cases in Okinawa, and lively discussion were held based on those presentations. With its unique history and geographic location, Okinawa has a great potential to become a very important gateway between Japan and the world, especially Asia-Pacific region and the global scientific community. This potential can be achieved only by developing a systematic strategy to attract entrepreneurs and researchers who will consider Okinawa as the best place to “work in Japan and vibe with the world.” Okinawa has a deep tradition of intercultural openness that is unique in Japan and necessary, even critical to attract and retain the best talents around Japan and the world, including not only prominent scientists, but also young researchers, students particularly in PhD programs, and entrepreneurs. This combination of intercultural openness and integration, as a Prefecture of Japan, to one of the largest economical area in the world is an objective strength. The relative underperformance of Okinawa in term of economic development can paradoxically become an opportunity for accelerated growth. S&T areas are not capital intensive and many examples have proven that it is possible to short-cut development stages and go straight from a laggard position to a pioneering one, by applying the best practices and experiences available. Many of the participants emphasize that Okinawa has a great potential to achieve such a success.

Recommendations from Participants of the Symposium and Workshop

The recommendations from the participants of the symposium and workshops, along with the key players involved in implementation, are presented in three parts based on the major challenges they aim to overcome: develop people, promote entrepreneurship and concentrate on relevant development opportunities

Key: Government (Central and/or Prefectural); University (OIST and other Okinawa universities); Private Sector (companies, investors, entrepreneurs)

CHALLENGE I:

Okinawa has limited high-skilled workers to meet the future demands of knowledge-based jobs in science and technology

SOLUTION: INVEST IN PEOPLE

Developing human capital is the cornerstone of building a knowledge-based economy. Support for education, training, and recruitment in science and technology is a prerequisite for a continuous supply of highly educated individuals who will contribute to building Okinawa's future industries.

RECOMMENDATION 1 Educate the young and train the local workforce in science and technology

Today's basic science education provides a foundation for tomorrow's innovative technologies. Improving the educational environment in Okinawa requires a commitment to policy and investment in support of STEM education (science, technology, engineering, and math), from high school through graduate school.

- 1.1 Establish an international Math-Science High School in partnership with a university: (Government, University)
- 1.2 Expand students' access to computers and improve teachers skill of using them in education (Government)
- 1.3 Identify and encourage sustainable education financing from both public and private sources (Government, University)
- 1.4 Foster faculty outreach programs to high schools (University)
- 1.5 Invest in broad-based English learning with the aim of connecting Okinawa to the region and the globe: improve programs to teach English throughout the Okinawa public school system; provide incentives to the private sector to offer English education to workers (Government, University, Private Sector)
- 1.6 To ensure access to higher education, regardless of ability to pay, full scholarships should be provided to qualified students to attend the best universities in Japan and abroad (Government)
- 1.7 Commit support for building OIST into a world-class university and improving the infrastructure and programs at existing Okinawa universities; foster international linkages by partnering with academic institutions in other Asian-Pacific countries (Government; University)
- 1.8 Expand income tax measures that encourage philanthropic donations to universities and research institutes to diversify funding (Government)

RECOMMENDATION 2 Recruit the best from around the world

To ensure that Okinawa universities including OIST and private enterprises have access to the world's best educators, scientists, engineers, and business leaders, they will need to rely on imported talent in the short-term. Measures should be taken to encourage recruitment of high skilled workers from abroad.

- 2.1 Offer flexible employment arrangements such as part-time, temporary, and rotating appointments to recruit the world's best researchers and educators (University, Private Sector)
- 2.2 Ease immigration restrictions to support efficient issuance of temporary or permanent residency for qualified workers (Government)
- 2.3 Provide assistance in integrating foreign families into Okinawa life: international education environment for children, regular and emergency healthcare with English speaking personnel, job placement services for spouses/partners, , and promote cultures and the arts etc. (Government)
- 2.4 Once the measures are taken, promote Okinawa internationally through an institutional campaign. (Government)

CHALLENGE II:

The culture of entrepreneurship (risk-taking, opening up new markets, creating new business models) in Okinawa/Japan is not well established

SOLUTION: PROMOTE ENTREPRENEURSHIP

Austrian economist Joseph Schumpeter defines an entrepreneur as a person who is willing and able to convert a new idea or invention into a successful innovation. To develop a R&D cluster, it is critical to create an environment or “ecosystem” allowing entrepreneurs to thrive. This environment has some basic characteristics: tolerant to disruptive technologies or ideas, outstanding infrastructure, culture of risk-taking, mentor/peer support, access to risk financing, and strong academic institutions. The government sector should identify the tangible factors that encourage entrepreneurship and establish policies and focus investment in areas that drive the development of its own unique entrepreneurial “ecosystem”. While entrepreneurial activities in Japan are not as vigorous as in other major countries, Okinawa can change the situation and provide a model for other regions in Japan by making every effort to create the ecosystem.

RECOMMENDATION 3

Invest in building entrepreneurs through education, training, mentorship, and global networking

Entrepreneurs need continuous training and mentoring in order to grow and succeed, in an open and supportive environment in which they have access to a global network of their peers. The experts urged Okinawa to be experimental in its efforts to build and attract entrepreneurs by becoming a test-bed for entrepreneurship education and development programs.

- 3.1. Include entrepreneurship training and mentoring in the curriculum of Okinawa universities and technical colleges, possibly earlier, in high schools, and in partnership with international business schools (University)
- 3.2. Establish 2 types of entrepreneurship programs: 1) “Entrepreneurship Training” Programs to support young entrepreneurs and business school students from abroad to visit Okinawa for training and internships, and 2) “Entrepreneur-in-Residence” Programs to support experienced global

- entrepreneurs to mentor academic researchers and young entrepreneurs in Okinawa (University)
- 3.3. Build real and virtual networks of local and global entrepreneurs, with mechanisms that allow for the open and rapid exchange information and the establishment of public-private partnerships within Japan and abroad (Government, University)



“There are pockets in Japan where risk-taking is thriving, but under the radar. Implicit in this is a drive to make change and empowering and rewarding results.” –Kathryn Iyata-Arens, Associate Professor, DePaul University, USA

RECOMMENDATION 4

Promote risk-taking as a necessary part of entrepreneurship and failure as a step for future success

Another characteristic attributed to the entrepreneur is a willingness to take risks and to operate in ventures that have some degree of uncertainty. While the perception of entrepreneurship as a career path is gradually changing in Japan, cultural and financial factors continue to limit its establishment as a noble and worthwhile endeavor. Measures must be taken to encourage and reward entrepreneurial risk-taking and remove the stigma associated with failure.

- 4.1 To increase awareness of the many paths that entrepreneurs can take in creating new ventures, a broad public relations campaign should be undertaken to promote the stories of local entrepreneurs and those from Okinawa who have found success as entrepreneurs outside of Okinawa including overseas. This public campaign should also include hosting global entrepreneurs in Okinawa through seminars and educational programs such as Entrepreneur-in-Residence Programs, Visiting Entrepreneur Programs, and Entrepreneurship Workshops and Seminars (Government, University, Private Sector)
- 4.2 To help remove the stigma and financial barriers associated in Japan with entrepreneurial failure, (often a step for future success), the government

should create a venture fund in a sufficient scale (e.g. ¥1.5B) to support repeated entrepreneurs, particularly those who have previously failed and start with a new project, and link them to entrepreneurial education programs described in Recommendation 3 (Government)

RECOMMENDATION 5

Provide a favorable commercial zone for Okinawa

Regulatory mechanisms can be powerful tools to encourage entrepreneurial activity. Reducing the barriers to new ventures, including for non Japanese investors, and granting favorable commercial status to Okinawa will promote entrepreneurial activity.

- 5.1 Streamline the regulatory environment for starting, operating, reporting, and closing new ventures, as these regulations particularly impact the ease in which new companies are created and prosper (Government)
- 5.2 Establish special economic zones (possibly extended to the entire main island) to attract entrepreneurs, investors, and their companies (Government)
- 5.3 Provide favorable tax treatment for emergent enterprises: waive corporate taxes for the first 10 years of new company operations and make tax measures for large companies taking risks by investment in venture firms (Government)
- 5.4 Provide significant tax incentives for established businesses to re-locate operations to Okinawa (Government)



“Angel investors support proof of concept. Venture groups provide guidance to commercialization. Private equity provides alternate routes to exit. Governments should seed and provide incentives for these types of groups to be established in Okinawa.” – Ganesh Kishore, CEO, Malaysia Life Sciences Capital Fund, Kuala Lumpur, Malaysia

RECOMMENDATION 6

Promote and expand the private investment sector

Entrepreneurs require broad access to risk financing. The government should recognize the conditions that encourage private investment in new ventures and establish objectives and promote programs that build risk capital.

- 6.1 Institute a non-punitive tax system on personal income and capital gain (Government)
- 6.2 To encourage longer time frames for investment in new companies, allow for zero capital gains tax for investments held for five or more years (Government)
- 6.3 Deregulate pension funds to allow their participation in venture funds (Government)
- 6.4 Establish several government-backed seed venture funds, with government investment as limited partners and be experimental in providing seed funding to catalyze many entrepreneurial activities at once (Government)
- 6.5 Provide tax incentives for Corporate Japan to locate R&D facilities in Okinawa, in industrial sectors aligned with research interests at Okinawa universities such as OIST (Government)
- 6.6 To increase the level of risk financing available to start-ups, provide incentives (matching funds, special tax measures) for the establishment of 3 types of private investment groups: Angel, Venture, and Private Equity (Government)

CHALLENGE III:

Although Okinawa has several strengths and potential opportunities, current R&D activities on the island are limited

SOLUTION: IDENTIFY AND CATALYZE THE DEVELOPMENT OF HIGH-GROWTH SECTORS OF RELEVANCE TO OKINAWA

Clusters are defined as geographic concentrations of interconnected companies and institutions in a particular field (Porter 1998). Okinawa has significant strengths that can be leveraged to create a successful R&D cluster: location, climate, marine resources, positive population growth, strong support from the central government, and a new international research university. Building on these strengths and on the current industrial base will require a focused, multi-pronged, long-term approach with policy and sustained investments from the government and private sector.

RECOMMENDATION 7

Invest in building new, high-growth sectors where Okinawa can have a competitive advantage

Building new sectors requires extensive knowledge of and capacity to meet market demand. Measures must be taken to prepare Okinawa for the creation and growth of new high-growth sectors, allowing the market and Okinawa's strengths, not the regulatory environment, to dictate the direction. Policy and funding commitment should be focused on building knowledge-based sectors at the interface of IT and life sciences, emphasizing services but without neglecting manufacturing, with the aim of building global competency. The sectors deemed to have strong potential include: *energy production, waste management technologies, mariculture, tropical medicine, medical tourism, and research instrumentation and tools such as devices, imaging, and bioinformatics*. In building these sectors, the government, private sector, and academia should work together to facilitate collaborative research and development opportunities, but the main drive must come from private sector. The ultimate success of an R&D cluster is its global competitiveness and economical sustainability.

- 7.1. Rent lab space at universities and research institutions to emergent businesses, providing new ventures with shared infrastructure and technology support. Plan and organize geographical concentration of expertise to create real clusters and encourage synergies (University, Government, private sector)
- 7.2. Establish privately-managed venture business incubators, in partnership with academia and industry, and structure them to maximize sustainability (Government)
- 7.3. Allocate funds specifically for collaborative research projects between academia and industry, focused on high-growth areas, and ease regulations where necessary to stimulate their development (Government)
- 7.4. Explore the role of the university as a driver of the market for products and services and help develop local companies that can competitively provide services to the university (Government)
- 7.5. Strengthen the functions to promote transferring new technology from universities to industry. Mechanisms to accomplish this objective include: structure the TLO of universities to enable the commercialization of intellectual property rather than become another barrier to it; search for global best practices in IP development and iden-

tify a set of metrics for innovation output; utilize Okinawa as an experimental test-bed for implementing novel intellectual property policies; perform a needs-based assessment of opportunities for Japan universities to provide shared IP that would benefit the local economy; and tap into Okinawan entrepreneurs to understand the range of resources and opportunities available locally (Government, University)

- 7.6. Universities should establish their own IP development and business innovation units and use them as test-beds for implementing novel IP policies. At the same time, local intellectual property law firms should strengthen their capabilities in international patent development practices (Government, University, Private Sector)

RECOMMENDATION 8

Expand viewpoint globally to access technologies, human resources, risk capital, and markets

To increase Okinawa's participation in the regional and global economy, Okinawa should expand its viewpoint and recognize the market opportunities and competition beyond its borders. Several measures should be undertaken with the goal of gaining access to global markets and building global partnerships.

- 8.1 The government and private sector should work together to explore global markets for locally produced goods and services (existing industry "hotspot"). Okinawa's location is ideal to serve as a hub for the development and export of health food, health supplements, and food testing and safety technologies, all of which can take advantage of the Okinawa long life and healthy living brand and Japan's global reputation for high safety standards. Okinawa should also leverage its information technology to build its global networks (Government, Private Sector), and activities related with exploitation of oceans.
- 8.2 Establish binational foundations (venture partnerships with other governments) to stimulate, promote, and fund industrial research and development of mutual benefit, (borrowing on the successful experience of Israel's BIRD Foundation) (Government)
- 8.3 To foster international linkages, undertake measures to reduce the high cost of inter-Japan and inter-Asia air travel by promoting regional competition (Government)

Box 2: The BIRD Foundation



The Israel- U.S. Binational Industrial Research and Development (BIRD) Foundation was established and jointly funded by the U.S. and Israeli governments in 1977 to generate mutually beneficial cooperation between the private sectors of the U.S. and Israel high tech industries, including start- ups and established organizations (<http://www.birdf.com>). BIRD provides both matchmaking services as well as covering up to 50 percent of project development and

product commercialization costs, without taking equity or charging fees for its services. Repayments are due only if commercial revenues are generated as a result of the projects funding. Since its inception, BIRD has funded over 800 projects resulting in products sales exceeding ¥660B. Both sides benefit by gaining access to technology, human resources, partners, and markets, in addition to lowering the risk in their joint endeavor.

RECOMMENDATION 9

Develop and widely communicate a Government strategic plan for economic development with science and technology

The Central government's "Okinawa Promotion Plan" and the Prefectural government's "Okinawa 21st Century Vision", includes a number of broad provisions for the advancement of science and technology and for creation of an R&D cluster. These provisions should be developed into a more focused science and technology strategic plan for Okinawa under a new promotion plan which is currently under discussion and will be effective in FY2012. This Recommendation ties Recommendations 1 through 8 together into a cohesive strategic vision, one that can serve as a benchmark for efforts made to create R&D cluster in the new Okinawa development policies and that can also guide and coordinate investments in Okinawa by both Central and Prefectural levels of government. The development of this strategic plan and the implementation of its objectives should be done in close cooperation with academia and the private sector. The strategic plan should:

- Assess challenges and opportunities, establish clear

objectives, and chart a course toward achieving them.

- Be creative, globally competitive, ambitious but achievable, contain concrete but measurable objectives and allow technologies and markets to compete to meet them.
- Be focused on the development of world-class research universities such as OIST, as economic development usually follows the accomplishments of world-class research; in turn, the vision for higher education should also be connected to the grander vision of Okinawa.
- Affirm the critical role of the private sector in defining the directions in which to invest resources.
- Bolster strategy implementation with long-term, sustained investments in building basic capabilities such as primary education and infrastructure.
- Be widely disseminated and communicated to promote and encourage public awareness and support.
- Be revisited and updated frequently (e.g. annually) to ensure that it remains globally competitive.

Conclusion

In the current global economic climate, spurring innovation has become a priority as governments worldwide look for long-term mechanisms to sustain and improve quality of life for its citizens. In Japan in particular, a decade-long economic stagnation has left its population with a sense of uncertainty about future job stability and prosperity. The Japanese government has implemented several measures to improve its economic climate and invest in high-growth areas, including high-tech and life sciences. This report, and the events on which it is based, does not analyze the success or failure of these national endeavors. It instead explores the basic requirements necessary to lay the foundation for innovation to occur in one Prefecture in Japan, Okinawa.

In many ways, Okinawa remains a special situation within Japan, both for its complex history and culture, and for its geopolitical importance. It is within this dynamism that the Okinawa Institute of Science and Technology (OIST) is being created. Anticipated as a world-class, international research institution of higher education, OIST is also seen as a beacon of the future of Okinawa and possibly, Japan. Hosting meetings, such as the R&D Cluster Symposium and Workshop, is a part of the inclusive dialogue needed to explore issues of spurring innovation in Okinawa and their relationship to the greater topic of economic development in Japan.

The participants of the first OIST R&D Cluster Symposium and Workshop identified broad

opportunities and challenges and issued practical recommendations deemed most likely to accelerate the pace of knowledge-based economic development in Okinawa. As some of the recommendations require longer-term commitment than others, the participants agreed that *success can only be achieved through a focused, sustained, and cooperative effort between government, academia, the private sector, entrepreneurs, investors, and the public.*

The topics and recommendations resulting from these events will be instructive to many constituencies: the Japanese entrepreneur and future entrepreneur as they seek the innovation ecosystem needed to best operate and succeed; the Japan Central and Okinawa Prefectural governments as they consider a range of policy issues and funding allocations for the medium and long term; the private investment community as it seeks opportunities to strengthen the local investment environment; and OIST and other universities in Okinawa as they consider their impact globally and within the local community.

Okinawa's transformation to becoming an innovative, knowledge-based economy based on science and technology will likely take 10 or more years and therefore requires a coordinated, long-term commitment by many parties, particularly the Central and Prefectural governments. Success or failure will depend on quality of implementation of a strategic plan and responses to specific challenges and opportunities inherent in the Okinawa situation.



Recommendations Chart

<p>Recommendation 1: Educate & Train</p>	<ul style="list-style-type: none"> ◆ Establish an international Math-Science High School in partnership with a university ◆ Expand students' access to computers and the Internet ◆ Foster faculty outreach to high schools ◆ Invest in broad-based English learning through education, incentives, and partnerships ◆ Provide full scholarships to qualified students from low-income families to attend universities in Japan and abroad ◆ Commit to building OIST into world-class university; improve infrastructure and programs at existing Okinawa universities; partner with other Asian academic institutions ◆ Devise income tax measures that encourage philanthropic donations to universities and research institutes
<p>Recommendation 2: Recruit Globally</p>	<ul style="list-style-type: none"> ◆ Ease immigration restrictions to support efficient issuance of temporary or permanent residency for qualified workers ◆ Offer flexible employment arrangements to recruit the world's best researchers and educators ◆ Provide assistance to integrate foreign families into Okinawa life: job placement, international schools, promotion of culture and arts ◆ Once the measures are taken, promote Okinawa internationally through an institutional campaign.
<p>Recommendation 3: Build Entrepreneurs</p>	<ul style="list-style-type: none"> ◆ Include entrepreneurship training and mentoring in the curriculum of Okinawa universities and high schools ◆ Establish Entrepreneurship Training and Entrepreneur-In-Residence Programs at universities ◆ Build real and virtual networks of local and global entrepreneurs
<p>Recommendation 4: Promote Risk-taking</p>	<ul style="list-style-type: none"> ◆ Undertake broad public awareness campaign to promote stories of local entrepreneurs and those who have found success overseas ◆ Create government seed venture fund for repeat entrepreneurs, particularly those who have previously tried and failed
<p>Recommendation 5: Commercial Zone</p>	<ul style="list-style-type: none"> ◆ Streamline regulatory environment for starting, operating, reporting, and closing new ventures ◆ Make all of Okinawa into a special economic zone to attract entrepreneurs, investors, and their companies ◆ Provide favorable tax treatment for emergent businesses: waive corporate taxes for the first 10 years of new company operations ◆ Provide significant tax-breaks for established businesses to re-locate operations to Okinawa
<p>Recommendation 6: Expand Private Investment Sector</p>	<ul style="list-style-type: none"> ◆ Institute non-punitive tax system based on global standards ◆ Allow for zero capital gains tax for investments held for 5 or more years ◆ Deregulate pension funds to allow their participation in venture funds ◆ Establish government-backed seed venture funds ◆ Provide incentives for Corporate Japan to locate R&D facilities in Okinawa ◆ Provide incentives to establish Angel, Venture, and Private Equity groups
<p>Recommendation 7: Build New Industrial Sectors</p>	<ul style="list-style-type: none"> ◆ Universities rent lab space to emergent businesses ◆ Establish privately-managed venture business incubators and structure them to maximize sustainability ◆ Allocate funds specifically for collaborative research projects between academia and industry; ease regulations where necessary ◆ Encourage local companies that can competitively provide services to the university ◆ Strengthen the role of the Okinawa TLO ◆ Universities to establish own IP development and business innovation units
<p>Recommendation 8: Expand Viewpoint Globally</p>	<ul style="list-style-type: none"> ◆ Aim for global markets for locally produced goods and services ◆ Establish binational foundations to stimulate, promote, and fund industrial R&D of mutual benefit ◆ Reduce the high cost of inter-Japan and inter-Asia air travel
<p>Recommendation 9: Develop S&T Strategic Plan</p>	<ul style="list-style-type: none"> ◆ Develop focused S&T strategic plan for Okinawa that guides investments by government and also serves as a benchmark

International R&D Cluster Symposium Participants

Mr. Mitsuru Miyata, Moderator Chief
Editor-Medical, Nikkei BP, Japan

Mr. Hirokazu Nakaima, Governor,
Okinawa Prefecture, Japan

Dr. Hiroaki Kitano, Principal
Investigator, OIST, Japan

Mr. John V. Roos, U.S. Ambassador to
Japan, U.S.A.

Dr. Sass Somekh, President, Musea
Ventures, U.S.A.

Mr. Yoshinori Suematsu, Senior Vice
Minister, Cabinet Office, Japan

Mr. Yoshiaki Tsukamoto, Executive
Director, Bio Industry Association,
Japan

Ms. Julie Meier Wright, President &
CEO, San Diego Regional Economic
Development Corporation, U.S.A.

Mr. Philip Yeo, Key Note speaker - Special
Advisor for Economic Development
(Singapore Prime Minister's Office), and
Chairman, of SPRING Singapore

Mr. Toshiaki Taira, Executive Director,
Okinawa Industry Promotion Public
Corporation, Japan

Introductions by

Dr. Jonathan Dorfan, President-Elect, OIST Graduate University, Japan

Dr. Robert Baughman, Vice-President, OIST, Japan

International R&D Cluster Workshop Participants

Contributions from the following global business, academic,
and government leaders provided valuable insights and knowledge.

Mr. Michael Alfant, President & CEO,
Fusion Systems, Japan

Dr. John Beck, Visiting Professor,
National University of Singapore

Dr. C. Jeffrey Char, President & CEO,
J-Seed Ventures, Japan

Dr. Yali Friedman, Founder,
thinkBiotech, U.S.A.

Dr. Philip Goelet, President & CEO,
Acidophil LLC, U.S.A.

Dr. Takashi Hirano, Program Director,
Okinawa Science & Technology
Promotion Center, Japan

Dr. Shuji Honjo, Managing Director,
Honjo International, Japan

Dr. Kathryn Iбата-Arens, Associate
Professor, DePaul University, U.S.A.

Mr. Akira Inoue, Sanji-yaku, Okinawa
Development Finance Corporation,
Japan

Dr. Richard Johnson, Senior Counsel,
Arnold & Porter, U.S.A.

Mr. Akihiko Kanamoto, President &
CEO, OP Bio Factory, Inc., Japan

Dr. Vesa Kanninen, Professor,
University of Helsinki, Finland

Dr. Tim Kane, Senior Fellow, Kauffman
Foundation, U.S.A.

Mr. Yoichi Kinjo, Director for Industry
Promotion, Okinawa Industry
Promotion Public Corporation, Japan

Mr. Wako Kinjo, President, Okinawa
Human Capital, Japan

Dr. Ganesh Kishore, CEO, Malaysia Life
Sciences Capital Fund

Dr. Robert Kneller, Professor, University
of Tokyo, Japan

Mr. Michael Korver, Co-Founding
Partner, Global Venture Capital, Japan

Dr. Ryo Kubota, Chairman, President &
CEO, Acucela, Inc., U.S.A.

Dr. Vladimir Likic, Head of
Bioinformatics, Bio21 Molecular Science
& Biotechnology Institute, Australia

Dr. Yasuhisa Nemoto, President,
HaploPharma, Inc., Japan

Mr. Ryuichi Matsuo, President & CEO,
Magna Design Net, Inc., Japan

Mr. Daiya Miyazato, Associate
Professor, University of the Ryukyus,
Japan

Dr. Tamaki Osumi, Professor, University
of the Ryukyus, Japan

Mr. Ilya Ponomarev, Member, State
Duma, Russia

Mr. Kiyoyuki Shimizu, Director for
Regional Collaboration, AIST, Japan

Dr. Jyuo-Min Shyu, President, Industrial
Technology Research Institute, Taiwan

Dr. Sass Somekh, Partner, Musea
Ventures, U.S.A.

Mr. Sivasundaram Suharnan, Chairman,
President & CEO, AXIOHELIX Co. Ltd.,
Japan

Mr. Toshiaki Taira, Executive Director,
Okinawa Industry Promotion Public
Corporation, Japan

Mr. Vivek Wadhwa, Senior Research
Associate, Harvard Law School

Ms. Julie Meier Wright, President &
CEO, San Diego Regional Economic
Development Corporation, U.S.A.

Mr. Philip Yeo, Special Advisor for
Economic Development (Singapore
Prime Minister's Office), Chairman,
SPRING Singapore



Resources

Statistics Bureau, Japan Ministry of Internal Affairs and Communications
Japan Ministry of Economy, Trade and Industry
Japan Ministry of Health, Labour and Welfare
Okinawa Prefectural Government
World Bank
United Nations
OECD
IVC Research Center

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1919-1 Tancha, Onna-son, Okinawa 904-0412, Japan
TEL: 098-966-8711 FAX: 098-966-2887
www.oist.jp



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