Part I: Keyonte Speeches

Prof. Yuko Harayama (Chair)
Professor, Graduate School of Engineering,
Tohoku University

I will act as moderator for the Plenary Session and keynote speeches. In 2006, the Global Innovation Ecosystem concept was established, and since then the aim has been the dissemination of that new concept. In 2008, the goal is to translate that into action. Innovation is becoming a priority matter in terms of Japanese government policy, and it is time to put into practice this concept.

Keynote Speech I: Urgent Need for "Sustainability Development"

Motoyuki Suzuki
Chair, Central Environmental Council;
Special Programme Adviser, United Nations University;
Professor, the Open University of Japan

There is an urgent need for sustainability development, to which the GIES concept can make potential contributions.

The conventional term “sustainable development” was actually coined long before it was used in the 1987 World Commission on Environment and Development report. The term assumes perpetual growth, which is a misunderstanding. It is now crucial to understand the limits of capacity of the environment of the world and the earth. Thanks to the growth of science and technology, there has been a population explosion, accompanied by expanding energy utilization. Vision-driven innovation is now necessary; the post-Cold War unipolar structure of the global economy cannot be sustained going forward.

With the development of information technologies, distances have become ever shorter and information ever easier to exchange. There has been much interest in climate change matters since the 1980s, and we can now predict what will happen if CO2 concentrations keep increasing. What is required now is a paradigm shift, a creation of new social values. Faced with limited capacity, how can we accommodate and maintain magnified human activities? We need a paradigm shift away from the focus on GNP.

Science and technology should contribute to develop sustainable human societies within a finite capacity. That should be the goal, and innovation should aim to realize this. Historically, humans have made use of science and technology to create societies in order to overcome the difficulties posed by nature. We are now faced with the finiteness of environmental capacities: magnification and explosion of human activities has led to our current plight. Extension of the current level of activities will only lead to destruction. In particular, statistics on the population explosion, which is concentrated in developing countries, show that the world faces a major challenge going forward. Already factors such as the AIDS epidemic have led to downward revisions in population forecasts. We are beginning to outgrow environmental capacity.

Following the exponential growth of the post-war era and the Bubble period, Japan’s economy is now declining and the country is forced to aim for a soft landing. The innovation required of Japan is to seek the appropriate level of sustainability, which must take global conditions into account. We must identify a state of equilibrium, like the natural population thresholds on colonies of bacteria. Human beings, however, have an infinite appetite for economic growth; by the time the threshold has been reached it may be too late; the environment is destroyed, there is no energy, water or food, and countries have overextended themselves, as did many empires of the past.

Japan must move from the 20th century growth paradigm to a 21st century sustainability paradigm; services rather than manufacturing, maintenance and repair rather than construction of new roads. In the past, business has pursued profitability through labor productivity, but resource efficiency must be maximized. The linear model no longer has credibility. We need to clarify demand pulls depending on social needs for sustainability development.

In policy decisions, an integrated, holistic view is needed, using backcasting rather than projection. What resources do we have available, and what action should we take? For Japanese R&D, the climate emergency has become a major issue. We have committed to slashing global carbon emissions by 50% by 2050, which means more than 80% reduction in Japan itself, a drastic reduction, but humankind has survived with such low levels of emissions even in the recent past. We should consider how we can use solar, biomass, or other new natural energies to cut emissions; these new technologies alone may take us halfway to our goal.

Many people are unfamiliar with the GIES concept. An ecosystem is a unit of plants, animals and microbes, a functional unit consisting of all the living organisms in a given

area and all the non-living physical and other factors of the environment. In the natural ecosystem, solar energy is the driving force, producing nourishment for animals, which are then converted to heat by microorganisms. There are these two major kinds of interaction among organisms: symbiosis and antagonism. Biodiversity is of great importance to stabilizing the ecosystem.

What are the possible components of an innovation ecosystem, and what interaction do we envisage between them? By focusing on these things we can make the innovation ecosystem something significant. In this era, what we are seeing is an "ego-system," in which each person has an ego. Innovation for "ego-system" is what we are seeing these days. How best can we change that to innovation to cope with an eco-limit system?

Prof. Harayama
Historical events are still having great influence on the world today. Growth played an important and positive role in some ways, but also had serious negative aspects. The paradigm shift suggested by Prof. Suzuki will require not only government action, but also creation of new values in society to overcome the "ego-system."

Keynote Speech II: Competitiveness: Where America Stands

Charls (Chad) Clinton Evans
Vice President, Strategic Initiatives, Council on Competitiveness

I will speak on the topic of competition. A new global debate is emerging focused both on competitiveness and the emergence of new innovation economies around the world. However, past issues such as trade and budget deficits are beginning to re-emerge, as are new challenges and new opportunities, including the growth of new competitors such as China and India and the explosion of mega cities, which will have huge implications for the sustainability of society. There is a sense of insecurity pervading the global competitiveness dialogue. What will convey competitive advantage in a world characterized by change?

Over the past 15 years, the US was responsible for the majority of global growth, and despite the current signs of downturn in the US economy, most projections anticipate that that will persist. The key to the US' growth has been acceleration in productivity since the 1990s, driven by a few critical elements: mass deployment and utilization and adoption of information technology; a dynamic business environment; a flexible workforce and regulatory regime; and commercialization of long-term, cutting-edge research.

Today, emerging economies are both major exporters and major recipients of foreign direct investment, opening up to the global economy. On current growth trajectories, it is estimated that by 2039, the combined BRIC economies will be larger than the combined economies of the US, Japan, the UK, Germany, France and Italy. A key component behind this projected transformation is demographics, with populations in emerging economies growing as those in the largest developed economies shrink.

While skilled labor comprises a small percent of the workforce in these emerging economies, the sheer size of their populations, combined with the educational strategies that are being deployed in these countries will translate into huge potential for these societies. Among developed economies, the US in particular enjoys an intense yet flexible labor market, leading to great dynamism.

Emerging economies are already having a big impact on the global trading system and the global economy. In the 1980s, emerging markets were mainly seen as sources of resources, or low-quality manufactured goods and not involved in high technology exports. Today, developing economies are already among six of the top ten positions in terms of top-ten high-tech exporters. Many developed nations that were on the list in 1986 have dropped off by 2005, a trend which will likely continue.

The Council on Competitiveness sees five key challenges and opportunities that we think will drive competitiveness: innovation, entrepreneurship, regulation, education and energy. The first of the five key areas is innovation. A high national level of R&D investment boosts the stock of available knowledge, promotes the training of a science and engineering class, leads to commercial spin-offs and creates an innovation environment that is attractive for further investment. Innovation is not just about R&D investment; it is also about deployment and commercialization. The actual value for the iPod, for example, is linked to creativity, design, and services integration rather than simply manufacturing. There are diverse ways to create and capture value in the 21st-century innovation driven economy.

The second area is entrepreneurship, a critical driver of US economic development, job creation, productivity gains and innovation over the past 20 years due to three key factors: ready access to capital and state-of-the-art research; a culture that encourages risk-taking and investments; and a regulatory

structure that encourages firms to develop and also enables less productive firms to exit. The US leads all major industrial economies in the percent of the adult population engaged in high-expectation entrepreneurial activity. Trends for global entrepreneurship are rising, however. Ultimate success depends on a supportive business and regulatory environment, as well as access to risk capital.

The third key area is regulation. One factor in the US economy at the moment that increases the cost of entrepreneurial activity, and decrease access to talent is increasing regulatory controls posing higher hurdles to smaller businesses. Much regulation is quite necessary, and in fact can be a driver for innovation, but it is necessary to think creatively about how regulations are applied. In addition, healthcare costs are rising in the US, approaching 20% of GDP. There is also the frequency and high cost of legal action in the US, as well as immigration barriers.

The fourth key area is education. Over the past 50 years, the US has expanded educational attainment, boosting skills in the workforce and driving productivity growth. Nevertheless, wide gaps persist in the economy that are based upon race and ethnicity. Although there is significant per-student investment, the US lags in performance, a trend that has only been worsening over time. Today the majority of jobs in the US are classified as "skilled," meaning that they require a high school education or more; the need for incumbent training and reskilling is critical, but the US is already underperforming here. Additionally, most training accrues to those workers in large firms.

The fifth key area is energy. Increasing affluence and a growing population have led to a growing global demand for energy. This is especially true today in developing economies. Because of such high energy demand, at least in the US case, total energy imports account for nearly one-third of the merchandise trade deficit, and at least in the US case, population growth combined with increasing affluence will to continue to drive this energy demand. How can we address this issue?

First, countries are beginning to invest heavily in renewable and sustainable energy sources. In addition to new technology, energy efficiency also offers the single most important approach to meeting projected global growth demands. In this area the US is continually outperformed by other economies. The market size for renewable energies is expected to quadruple over the next decade.

The world's largest solar power producer today is Germany. Why has Germany attracted such investment? The answer lies in regulatory issues. Investing in bio fuels, wind energy and solar energy may prove successful in increasing economic competitiveness, while also leading to other opportunities: new jobs, new industry, and economic growth, and energy security.

The Council on Competitiveness will be spending 2008-2009 focusing on the intersection of environmental and sustainability concerns, concerns over our future energy security, and how do these link to future prosperity.

Prof. Harayama
Mr. Evans has shown that it is important to understand the place of one's economy in the world. Government policy will impact all areas, and coherence among sectors is key. Introducing the next speaker, The European Union faces the challenging task of aligning individual national policies and strategies with the EU strategies.

Keynote Speech III: State Aids in Europe: Lessons from the French National Innovation Agency

Jean-Philippe Touffu
Secretary General, Cournot Centre for Economic Studies

To explain the framework, which has been used to promote innovation inside the European Union, I will offer a critique of its microeconomic background that has been dominant for the past 50 years. Shortly after the Second World War, Europe came to a consensus that the market was the cornerstone of peaceful economies. Very little changed in the 40 years between the Treaty of Rome and the European Community Treaty of 1997, which both see state intervention rules as being prohibited. The trend of deregulation has not decreased, but it has been accompanied by a change in perspective: issues such as imperfect information, public goods or knowledge spill-overs among other social phenomena may prevent the market from reaching its optimal output. These are called "market failures", as the theory has named it.

According to the European Commission, Europe was losing ground in 2003, not because of an insufficient rate of capital accumulation, but for lack of innovation capability. More product market competition was meant to foster innovation, and thus productivity and growth. In the Schumpeter interpretation, innovation is closely linked to the rewards to innovators, and the appropriability of innovation output is a crucial issue. Rising competition, which is what is written here, is expected to decrease rents stemming from innovation, and

thus incentives to innovate.

In contrast, the view of competition that was chosen by the European framework was the neoclassical perspective that competition encourages innovation; economies innovate to keep their market power and fend off new potential entrants, while new entrants hope to capture the market position of these incumbents, eliminating them through new and better products. In a recent economic analysis of the relationship between competition and innovation, it was shown that the positive effects of regulation occur whatever the distance from the frontier level of innovation. This is not true. The effect of regulation is negative, the farther it is from the frontier, but it is insignificantor positive insignificant, when the technology gap decreases. This runs counter to what was promoted in the Lisbon Strategy.

Promoting competition is one thing; fostering incentives is another. In the past 20 years, more and more countries have adopted the Research and Development Tax Credit. Why? Most economists agree that market forces do not generate enough R&D, and that the target of this R&D is not optimal. There is a "bang for the buck" effect if the tax credit is based on the increase of the R&D expenditures in the firm, while it is very weak or non-existent if it only concerns the global volume of R&D expenditure.

In Europe there are very fundamental differences between countries, for instance in terms of labor nexus "markets" or financial systems. The Lisbon Strategy incorrectly assumed, however, that institutions and means of coordination were identical from one country to another. There is no one best institutional configuration, be it in Europe or anywhere else in the world, but there is no way to try and think that one best way should be promoted for all countries.

OECD countries can be compared according to the level of coordination of their institutions. Understanding both the variety of the institutions and their complementarity is the key point. It is regrettable that in most European countries such as France, there has been strong submission of scientific, administrative, industrial and domestic coordination principles to the market principle.

However, an economy can be coherent at some point in time, based on "competition", organised by company managers, positively coincides with the other social logic, as they were at stake in the United States under the Fordist era for instance. The market is not efficient per se, it is efficient because it is an institution, well-embedded with other institutions. That hypothesis goes against the dominant idea that markets are efficient because we are "substantially rational people," meaning there is an adequation between the goal and the means used to reach it. That hypothesis of rationality is incorrect. Mainstream economics has a consequential understanding of human actions, putting the goal first and then assuming to that goal, but this not how things happen

Is the notion of an ecosystem appropriate? Well, an ecosystem does not necessarily include human beings. Dr. Suzuki's presentation located the human species in the right place. There are dangers involved in importing a metaphor. The notion of ecosystems comes from the discipline of biology, in which the concept has a very long history and is not neutral. Ecosystems involve either abiotic or biotic components – living or non-living cells or actors. The neoclassical economy has nothing to say about the way abiotic or biotic components have to organize themselves. Evolutionary game theory addresses the coherence between Darwinism in terms of biology and Darwinism in terms of social sciences, and this is probably way today to tackle the ecosystem issue.

Prof. Harayama
Policies need to acknowledge the gaps between ideals and reality, and coherence between different policies is the important point. Establishment of social institutions to promote innovation is the challenge for other countries.

Keynote Speech IV: Addressing for Climate Change and Energy Issues of Gobal Steel Industry: From the Point of Technology Diffusion and Innovation

Akio Mimura
Vice Chairman, Nippon Keidanren;
Representative Director and President,
Nippon Steel Corporation

I will explain how global steel industry addresses climate change and energy issues through technology diffusion and innovation.

Environmental issues are not only about the environment; they are linked to economic growth and also linked to energy security. Earth faces the issue of global warming caused by anthropogenic emission of greenhouse gases. CO2 is emitted mainly by the use of fossil fuel, which is indispensable for economic activities. The key challenge is realizing both economic growth and environmental conservation. This can be done by focus on CO2 intensity, or emission per unit of energy

consumed. As of 2005, the iron and steel industry accounted for almost 10% of the entire energy consumption of Japan. Since the oil shocks, the industry has strived to save energy and recycle wastes as much as possible. Consequently, by 1990 a 20% energy reduction was realized, with the goal of an additional 10% by 2010.

The iron and steel industry uses three key measures to achieve this. One is realizing continuous processing and eliminating excess processes, which allowed the Japanese industry to make energy savings before other countries. The second is making use of the byproduct gases produced during processing, including the heat that is generated. This technology is being exported to other countries, such as China. Third, the industry is attempting to reuse waste generated, for example, by converting waste plastic to fuel and new plastic. One hundred percent recycling of waste plastic in the steel works has been achieved. As a result of these three strategies, Japan's steel mills have achieved world-leading energy intensity levels.

The next issue is ecologically friendly products. It takes more energy to manufacture eco-friendly products, but once they are in the consumer stage, they are more eco-friendly than conventional products. Thin, high strength steel sheets can be used for automobiles, meaning that the cars are lighter in weight and resulting in better fuel economy. Currently these high-strength steel sheets account for 40% of the sheets used for automobiles, but as sheets become stronger, there is a trade-off with formability. Through innovation, Nippon Steel has been able to overcome this difficulty to achieve integrated comprehensive technological capability and avoid significant environmental damage.

Japan's steel industry has excellent energy conservation technology that it would like to internationally transfer to make a major contribution to anti-global warming measures. Japan is already contributing through the Japan-China Steel Industry Advanced Technology Exchange Meeting and the International Iron and Steel Institute. Japan's steel industry also participates in the Asia-Pacific Partnership on Clean Development and Climate. We are promoting the international sectoral approach. Cooperation and a series of meetings with Chinese industry members have already led to deepened understanding in China. While there are sensitive technologies on each product's manufacturing, from the very first meeting it was declared that the Japan Iron and Steel Federation will share environment-related technology with China.

The Asia-Pacific Partnership framework is of great significance not only because the member countries account for 60% of the world's crude steel production, but also because the US, China, and India, large emitters of CO2 who have no restriction under the Kyoto Protocol, are members. The partnerships have already led to international field investigations and exchange missions.

The International Iron and Steel Institute issued a policy stating that the global sectoral approach is the best method for controlling climate change; that cap and trade policies worsen global carbon dioxide emissions because those people who make efforts are not rewarded; and that promotion of universal application of current best practices and development of breakthrough technology is needed in order to make significant reductions in CO2 emissions. The IISI has been very proactive in tackling the development of breakthrough technology, and the Japanese steel industry has been engaging in innovative pilot projects.

After the oil shocks of the 1970s, Japan strove to improve energy efficiency, so that today it enjoys the world's highest energy efficiency. Currently, under the Kyoto Protocol, several steel manufacturers have imposed restrictions on CO2 emissions, including Japanese companies. In the post-Kyoto framework, all the emitting countries must participate in order to ensure a level playing field for industry, and technology must be the core. Japanese industries must maintain the global top level of energy efficiency through technological development, and contribute to global-level anti-global warming measures through the transfer and spread of excellent technology and products.

International competition in the steel industry is fierce, but in the field of global warming, companies are successfully collaborating to promote various policies. With sufficient understanding by top management, it is possible to have both competition and collaboration.

standing by top management, it is possible to have both competition and collaboration.

Prof. Harayama
Energy and the environment are often considered negative externalities, but there must be the potential for positive feedback creation. Mr. Mimura's speech also discussed the sectoral approach, which is relevant to the coordination, or lack thereof, mentioned by Mr. Evans.