



**Compete.**

Council on  
Competitiveness

# CTO Conversations

Chief Technology Officer Peer-to-Peer Meeting and Plenary Panel,  
6-7 October 2013, Kyoto, Japan

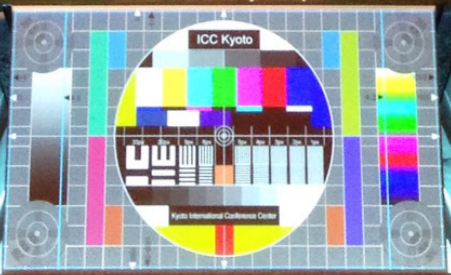


# CTO Conversations

Chief Technology Officer Peer-to-Peer Meeting and Plenary Panel,  
6-7 October 2013, Kyoto, Japan



**S S** Science and Technology in Society forum  
**T** Tenth Annual Meeting 2013  
October 6-8, 2013, Kyoto, Japan



## Table of Contents

Chief Technology Officer Peer-to-Peer Meeting, STS <i>forum</i> , 6 October 2013	4
Chief Technology Officer Plenary Panel, STS <i>forum</i> , 7 October 2013	14
Conclusion	20

# Chief Technology Officer Peer-to-Peer Meeting

*STS forum*  
6 October 2013  
Grand Prince Hotel  
Kyoto, Rose Room

## **CO-CHAIRS**

Dr. Ray O. Johnson  
Senior Vice President and Chief Technology Officer  
Lockheed Martin Corporation

Dr. Shigeru Azuhata  
Representative Executive Officer  
Executive Vice President and Executive Officer  
Hitachi, Ltd.

## **PARTICIPANTS**

Dr. Koichi Abe  
Senior Vice President  
Toray Industries Inc.

Dr. Yves Bamberger  
Scientific Advisor of the Chairman and Chief  
Executive Officer  
Électricité de France (EDF)

Dr. Geneviève Berger  
Chief Research and Development Officer  
Unilever NV

Mr. Bertrand Bonvin  
Senior Vice President Research & Development  
Philip Morris International Inc.

Dr. Katsumi Emura  
Senior Vice President, Central Research  
Laboratories  
NEC Corporation

Dr. Patrick Ennis  
Global Head of Technology  
Intellectual Ventures

Dr. Martha Crawford-Heitzmann  
Senior Executive Vice President, Research and  
Innovation  
Areva Group

Dr. Mehmood Khan  
Chief Executive Officer of Global Nutrition Group  
and  
Chief Scientific Officer  
PepsiCo Inc.

Dr. Takeshi Kimura  
Member of the Board & Corporate Vice President  
Ajinomoto Co., Inc.

Dr. Haruyoshi Kumura  
Fellow  
Nissan Motor Co., Ltd.

Dr. Richard Parker  
Director of Research & Technology  
Rolls-Royce Plc.

Mr. Koji Omi  
Founder and Chairman  
STS *forum*

Dr. JP Rangaswami  
Chief Scientist  
Salesforce.com, Inc.

Dr. Akihisa Sekiguchi  
Vice President & General Manager, SPE Marketing  
Tokyo Electron Limited

Dr. Akira Sudo  
Corporate Executive Vice President  
Toshiba Corporation

Dr. Kazuhiko Tsutsumi  
Executive Officer, Vice President, Corporate  
Research and Development  
Mitsubishi Electric Corporation

Dr. Tomonobu Uchida  
Senior Vice President and Executive Director  
JX Nippon Oil & Energy Corporation

Dr. Shun-ichiro Uchimura  
Vice President & CTO  
Hitachi Chemical Co., Ltd.

Dr. Hisao Urata  
Executive Officer  
Mitsubishi Chemical Holdings Corporation

Dr. Yuji Watanabe  
Adviser  
Komatsu, Ltd.

Dr. Tim Whitley  
Managing Director Research & Innovation and  
Austral Park  
British Telecommunications Plc.

# Opening

Mr. Koji Omi and Dr. Ray O. Johnson

## Mr. Koji Omi

Omi-san, former Finance Minister and Minister of State for Science and Technology Policy and founder and chairman of the Science and Technology in Society forum (STS *forum*), opened the first-ever “CTO Peer-to-Peer” meeting. He greeted the two dozen researchers and technology leaders from industry, academia, and laboratories from the United States, Europe and Japan.

He noted the purpose of this inaugural meeting was to move beyond a conversation and discussion of pressing science and technology problems, to an exploration of the deep, long-term relationship of technology—and chief technologists—to the future of humankind. Omi-san reflected that, in many ways, the CTO is the key, critical “contact point” between business, academia and policymakers—ultimately decisive for the future of society.

## Dr. Ray O. Johnson, Senior Vice President and Chief Technology Officer, Lockheed Martin Corporation

Dr. Johnson kicked off the conversation, thanking Omi-san for his vision and leadership—and noting his own deep engagement in STS *forum* over the past 5 years, due in large part to resonance with Omi-san’s concepts around the positive and negative characteristics of and outcomes from technology.

And the CTO is particularly positioned and capable to address these “lights and shadows”—as well as the changing nature of science, technology and innovation:

1. Poised to define, articulate and act in an age of growing complexity.
2. Situated to deal with the increasing rapidity of technology development and diffusion.
3. Able to position strategically firms and organizations in an era of global competitive leveling

Dr. Johnson also brought to the fore of this first-ever “peer-to-peer” CTO session at the STS *forum* the concept of the “CTO impedance match”—the relationship of the CTO’s role to that of the core business strategy of firms. Today’s—and the future’s—most successful CTOs need to be top technologists, simultaneously equipped with a deep and broad understanding of engineering, production and manufacturing.

Joined by Shigeru Azuhata, Representative Executive Officer, Executive Vice President and Executive Officer, Hitachi, Ltd.—who expressed his pleasure to co-chair this conversation, as a platform for networking and exchange of thought—Dr. Johnson opened the session, asking the gathered CTOs to introduce themselves and share reasons they chose to participate in this “community building” conversation, as well as how they interface with their companies’ broader leadership.



*CTO Peer-to-Peer Meeting, co-chaired by Dr. Ray O. Johnson, Senior Vice President and Chief Technology Officer, Lockheed Martin Corporation, and Dr. Shigeru Azuhata, Representative Officer, Executive Vice President and Executive Officer, Hitachi, Ltd.*

# CTO Peer-to-Peer Bio-Sketches

## **Koichi Abe, Toray Industries**

Responsible for all R&D global for Toray Industries, where great importance is placed on research and development (R&D) activities—with a US\$600 million annual R&D budget, and 3500 R&D employees engaged worldwide.

## **Yves Bamberger, Électricité de France**

Dr. Bamberger serves as a direct advisor to the EDF Chairman—explicitly making the link between science and technology to the business opportunities facing the firm.

## **Geneviève Berger, Unilever**

Dr. Berger, trained as physicist and medical doctor—with experience across academia, international scientific organizations and industry—has spanned many domains that now inform her role at Unilever. This role, also, is a type of innovation: the first time Unilever has appointed an “R&D type” to the board, initially as a non-executive member, but now an executive member.

## **Bertrand Bonvin, Philip Morris International**

Mr. Bonvin is a mechanical engineer by training, who now leads a multi-disciplinary group of 500 scientists committed to developing an alternative to the cigarette, and reducing harm to a wider audience.

## **Martha Crawford Heitzman, Areva Group**

Dr. Heitzman, with a background in chemical engineering among other disciplines, leads the major research activities for the vertically integrated nuclear cycle at Areva—building and servicing reactors, as well as taking care of downstream/spent fuel (uranium recycling). She also leads a team with a major set of activities around renewables—offshore wind, fuel cells, biomass, concentrated solar, etc. Major foci for her: safety, performance and innovation.

## **Katsumi Emura, NEC Corporation**

Dr. Emura leads NEC's information/communications/telecom research efforts across 5 global locations, employing more than 1000 researchers. The major focus of this team is to solve a range of complex global issues through the deployment and use of ICT technologies. In this space, the work demands a need to collaborate with many companies and other stakeholders in an ecosystem.

## **Patrick Ennis, Intellectual Ventures**

Dr. Ennis sets the investment and technological direction of his company—spending half of his time in Asia, half in the United States, overseeing a US\$6 billion open innovation network of small and large firms (that is beginning to expand to Israel and the EU).

**Mehmood Khan, PepsiCo Inc.**

Dr. Khan, an endocrinologist with deep expertise in the pharmaceutical industry (former president of R&D for Takeda), reports directly to the chairman and CEO of PepsiCo, and is responsible for the firm's total, global research and development efforts—which span beyond the beverage industry (in fact, PepsiCo has a bigger food than beverage business).

**Takeshi Kimura, Ajinomoto**

Dr. Kimura, who has had experience at the National Institutes of Health in the United States, focuses on leading Ajinomoto's ingredients R&D, quality, and health and wellness business lines.

**Haruyoshi Kumura, Nissan Motor Co.**

Dr. Kumura sees his primary role at Nissan as one of “technology intelligence”—he spends a great deal of time and effort examining and exploring global tech opportunities outside of the company's lab walls.

**Richard Parker, Rolls-Royce**

Dr. Parker, with a background in physics and research on lasers, today functions more as an engineer than a scientist, overseeing the development and deployment power systems for land, sea and air applications. With US\$1.5 billion invested annually in R&D, Rolls-Royce does not have a corporate research center. The firm has chosen a different strategy, investing in and researching alongside universities and national laboratories.

**Akihisa Sekiguchi, Tokyo Electron**

Dr. Sekiguchi, a U.S.-educated plasma physicist doctor and MBA, outlined the consensus-based, R&D and technology process at Tokyo Electron. He also noted the impending merger with Applied Materials.

**Akira Sudo, Toshiba**

Dr. Sudo, responsible for R&D and engineering for Toshiba, leads research for the production of many kinds of products—from semiconductors to nuclear power plants.

**Kazukiho Tsutumi, Mitsubishi**

With Mitsubishi for 30 years—and engaging across a range of product lines and business sectors—has a strong interest in global greening.

**Tomonobu Uchida, JX Nippon Oil & Energy Company**

A specialist in applied chemistry, Dr. Uchida has worked in many roles at JX Nippon—a merger of Nippon Oil and Japan Energy to form Japan's largest oil company—from process engineer to designing/building chemical plants; and, he is now responsible for R&D, environment, and safety and quality assurance.

**Shun-ichiro Uchimurea, Hitachi Chemical Co., Ltd.**

Dr. Uchimurea—a chemist with background in polymers—is responsible for R&D and the life science business for Hitachi Chemical Co., Ltd., reporting to Azuhata-san.

**Hisao Urata, Mitsubishi Chemical Holdings Company**

Dr. Urata, responsible for R&D and IP for the holding company and its 4 businesses—covering performance products, healthcare products, industrial materials—oversees a great number of R&D activities. The focus of the R&D efforts—which take place solely in Japan—is on: sustainability, health and comfort.

**Yuji Watanabe, Komatsu**

Dr. Watanabe, a former laser lithography manufacturing company CEO, is now an advisor to Komatsu—with a particular focus on supporting COCN (Council on Competitiveness Nippon) and Japanese industrial competitiveness.

**Tim Whitley, BT**

Reporting to the chief information officer, Dr. Whitley leads the firm's global R&D, engineering and innovation activities. One of the oldest telecommunications companies in the world, founded in 1837, BT is present in 160 countries.

# Roundtable Discussion

After short, self-introductions, **Dr. Johnson** opened up the peer-to-peer discussion with a series of comments to spur conversation around the table:

1. Long-term, high-risk, high-payoff research is declining. In this reality, what is the role of government and the public sector? In this environment, will we be able to see a project develop today along the lines of the Apollo program? Is any government in the world willing—or able—to take on these types of challenges and opportunities?
2. In this “Ian Bremmer G-Zero” environment, financial challenges and risks are drivers for more collaboration—but there appears to be a leadership vacuum.
3. In this increasingly diffuse, and at the same time more competitive and collaborative situation, nations around the world continue to focus increasingly on innovation as the engine for prosperity. And yet there are real demographic and capacity issues—with Dr. Johnson worrying about the motivation (and numbers) of young citizens entering high school and college with a focus on science, technology, engineering and mathematics. The capacity challenge puts at risk the likelihood and robustness of a future generation of innovators and entrepreneurs.
4. In addition to the numbers, the other great issue—particularly in light of the rapid creation and diffusion of technology—is that of diversity. As the innovation pace quickens, as new markets open around the world, and as the overall funding and scientific environment encourages/necessitates collaboration, the need for diversity of thought and interdisciplinarity grows. But is the world prepared for this?
5. And as the complexity of the grand challenges and opportunities facing the world mounts, what does it “mean” to be a technologist or engineer today? What is the role of traditional specialization versus a “systems engineering” approach to solving grand challenges?
6. In this context, and for the discussion, what is the role of the CTO in driving innovation and in meeting broad societal goals of sustainability and prosperity?

The following conversation focused on this last point—defining the role of today’s CTO. Some common themes emerged:

**Dr. Azuhata** emphasized 3 basic roles for today’s CTO: generating new technologies and products; proposing a technology strategy in alignment with a firm’s overarching management strategy; and, driving the positive feedback loop between a firm’s technology directors and the corporation’s management strategy.

**Dr. Abe** elaborated upon this further, noting he manages Toray’s advanced materials (e.g., carbon fiber for Boeing 777) R&D activities along three axes: integrating all of the firm’s R&D capabilities and communicating clearly these capabilities (and the ensuing challenges and opportunities) with Toray’s top management; managing the long-term, technological pipeline (in some industries, like advanced materials, development times count in the decades, not in months or years); and, most important, developing human resources.

**Dr. Bamberger** noted his first role as CTO of a firm that sells electrons (sustainably and at low cost) is to push development of different technologies (hydro, nuclear, etc.) in pursuit of that goal. But he increasingly sees a new, “second” role for the CTO that has emerged strongly since the 1990s: to see how IT is changing our world and transforming global value chains (eg, Japanese aggregators selling electricity directly to citizens). A “third” role particular to his industry (but with similarities in

other sectors) is that of the CTO as mitigator with regulators (the price of electrons is a political issue in every country round the world).

**Dr. Berger** argued persuasively that the CTO/Chief Science Officer/Chief Research and Development Officer is part of a community and an engine for societal change and improved quality of life. But, to be successful, the CTO as change agent must be embraced by the very top level of companies.

**Dr. Crawford Heitzman** noted that, in her case, sustainability is the major R&D driver and core business objective. With this in mind, in her role as “CTO” she focuses on: comprehension—a network internal and external to the firm (“having antennae”); navigation—navigating the technology portfolio and budgets; influence—influencing management within the company and external stakeholders (like regulators); and overall management, balancing short and long-term goals for the firm, as well as focusing time on making “geeks cool” and encouraging more women to enter (and stay) in STEM careers.

**Dr. Khan** paid particular attention to the fact that for many global enterprises there often is no single “core” technology driving the majority of revenue or growth—and that the CTO has to drive and manage this complexity. For example, PepsiCo sells many technologies—and has many partners (7 companies around the table in this meeting are partners and/or suppliers). The CTO has to understand and curate this network.

## CTO Top 10

1. The CTO is the “starting point” of corporate R&D, development of new/ core technology to bring products into market.
2. The CTO creates and manages a “federation of ideas,” and leads the integration of all the R&D capabilities and technological development activities.
3. The CTO has clear line responsibility for, priority setting and management of R&D, IP strategy and business execution.
4. CTOs are increasingly core leaders in the internal and external “communications” strategy of firms and organizations—with employees, top management, customers, government leaders, etc.
5. CTOs have to focus on “technology intelligence”: identification of technological opportunities inside and outside of a company; recognition of mega trends—like an aging population in developed countries and high demand in developing countries—that will drive business opportunity.
6. CTOs must be involved directly in defining a company’s core business strategy, aligned to technology.
7. CTOs also play a growing role in overall supply chain management for firms.
8. CTOs must play a role of “reconciliation”—balancing the importance of competition and collaboration; weighing technological innovation and development with societal sustainability and environ; optimizing both internal, intellectual property and open innovation networks; being responsive to the shareholder and shorter-term returns, while also ensuring a long-term, strategic vision for the company.
9. CTOs must engage in and push beyond the traditional corporate social responsibility definitions—weighing technological innovation and development with broader, societal sustainability and environmental goals.
10. The CTO is also a critical leader in a firms’ human resources development strategy.

# Chief Technology Officer Plenary Panel

The Role of the CTO: Creating Sustainability, Prosperity and Value in a World of Conundrums, Crises and Challenges

*STS forum*  
7 October 2013  
Kyoto International  
Conference Center

## Setting the Stage

Since the fall of the Berlin Wall in 1989, profound shifts have been taking place in global technology investments and developments.

Across the world, political consensus and the budgets for investment in long-term, high-risk science and technology have been eroding in many sectors in many countries, while at the same time increasing in others. Second, the need to survive intense and growing international competition has driven industry at large toward a shorter-term, product-oriented investment focus and put into question the role of public sector investments, as well as the relationship between the private and public sectors. Third, nations around the world have centered on the necessity to build long-term sustainability and prosperity off of an innovation model investing in talent, research, education, infrastructure and technology. As a result, the number of innovator nations with a cutting-edge capacity is growing every year with no country holding a sure grip on global technology and innovation leadership.

Yet today, as has always been the case, technology and innovation leadership are keys to economic competitiveness, national security and sustainability.



*Dr. Ray O. Johnson, Senior Vice President and Chief Technology Officer, Lockheed Martin Corporation.*

But changes over the past three decades in the nature of innovation itself have accelerated the challenges facing all nations and peoples:

- Technology is diffusing at ever-increasing rates. It took 75 years for the telephone to connect to 50 million people, 38 years for radio, 13 years for television, 4 years for the World Wide Web, 3.5 years for Facebook, 3 years for the iPod, 2.5 years for AOL, 50 days for the Draw Something app, and 35 days for the Angry Birds app. This pace and volatility create competitive risks as well as opportunities.
- Innovation has become more collaborative requiring active cooperation and communication among scientists and engineers, users and providers, and the public and private sectors.

- Research is multidisciplinary and technologically more complex with advances often arising from the intersections of fields and spheres of activity.
- The capacity for cutting-edge research and technology is now global in scope with advances coming from centers of excellence around the world.

Tomorrows winners are learning today how to collaborate and communicate more effectively, leveraging complexity and cost, in this environment of churn. Sitting in the midst of this innovation maelstrom and increasingly responsible for navigating this turbulence is the Chief Technology Officer.

## **The Role of the CTO**

Building off of key themes explored and findings developed over the past 4 years in the U.S. Council on Competitiveness Technology Leadership & Strategy Initiative, co-chaired by Dr. Ray O. Johnson, Senior Vice President and CTO, Lockheed Martin Corporation, this panel and moderated conversation addressed a range of questions, including:

- How does today's chief technology officer help create for the long-term a more sustainable planet by using the instruments of technology, engineering, manufacturing, sustainment and supply chains?

**MODERATOR**

Dr. Ray O. Johnson  
Senior Vice President and  
Chief Technology Officer  
Lockheed Martin Corporation

**PANELISTS**

Dr. Shigeru Azuhata  
Executive Vice President and Executive Officer  
Hitachi, Ltd.

Dr. Geneviève Berger  
Chief Research and Development Officer  
Unilever NV

Dr. Mehmood Khan  
Chief Executive Officer of Global Nutrition Group  
and Chief Scientific Officer  
PepsiCo Inc.

Dr. Richard Roberts  
Chief Scientific Officer  
New England Biolabs Inc.  
Nobel Laureate for Medicine

Mr. Bertrand Bonvin  
Senior Vice President, Research  
and Development  
Philip Morris International

- In the face of global grand challenges from addressing and mitigating global climate change; to optimizing scarce, yet interdependent resources, like energy, food and water; to securing the private in an increasingly public and cyber-enabled world; to engineering better health outcomes how does the CTO lever technology and innovation to manage large-scale organizations and create value?
- In what way is the role of the CTO evolving as global enterprises seize on business opportunities arising at the intersection of technology, management, finance, and societal transformation?
- How do CTOs scope and scale long-term, value-creation and sustainability-enhancing opportunities for companies and society at large from the nano to the macro/cosmo scale (exploring the invisible atoms or information to the extremely visible large products, systems, infrastructure)?

Dr. Ray O. Johnson kicked off this first-ever CTO panel at STS *forum's* 10th Anniversary by noting that the context in which a Chief Technology Officer (CTO) operates is replete with challenges that are increasing both in number and complexity, while the resources available to combat them are decreasing. The CTO must act as the bridge between the latest research, science and technology developments and the business needs of the organization for which they work serving as engines for change, as well as being a steward for an organization's capabilities.

This broad mandate, in some sense, encompasses certain contradictions or schizophrenia: balancing the long timeframes inherent to the development of fundamental R&D, while serving as a senior corporate leader to ensure immediate and sustainable success in the marketplace. The job

also requires tremendous collaboration between business, academia and government, in a context of intense business competition. The CTO thus plays an essential role in any organization.

Within this context, Dr. Johnson posed several framing questions for his fellow panelists:

- How does today's CTO or Chief Scientific Officer (CSO) help create—for the long-term—a more sustainable planet by using the instruments of technology, engineering, manufacturing, sustainment and supply chains?
- In the face of global grand challenges, how does the CTO/CSO lever technology and innovation to manage large-scale organizations and create value?
- How do CTOs/CSOs scope and scale long-term, value-creation and sustainability-enhancing opportunities for companies and society at large?

In response to Dr. Johnson's opening remarks and questions, Dr. Shigeru Azuhata spoke about a range of basic leadership requirements today's CTO must possess: the ability to generate new technology and product lines; the talent to align these new technologies and products with the company's overarching business plan; the skill to feed back into an organizations overall management strategy the future opportunities inherent to technological developments; the capability to lay out a strategic approach to address major global concerns (energy-food-water; climate change; etc.); and the drive to integrate technology and human resources to meet these many challenges and opportunities.

These responsibilities touch on many core management areas. As a result, C-level executives must understand the role of the CTO/CSO and must realize the strategic impact of the CTO/CSO portfolio to the long-term viability of a company. And, as companies are part of societies, with their technology making significant impacts on societies,



**Top:** The Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness; and, Dr. Ray O. Johnson, Senior Vice President and Chief Technology Officer, Lockheed Martin Corporation.

**Bottom:** Dr. Shigeru Azuhata, Executive Vice President and Executive Officer, Hitachi, Ltd.; and, Dr. Ray O. Johnson, Senior Vice President and Chief Technology Officer, Lockheed Martin Corporation.



*Mr. Bertrand Bonvin, Senior Vice President Research & Development, Philip Morris International; Dr. Mehmood Khan, Chief Executive Officer of Global Nutrition Group and Chief Scientific Officer, PepsiCo Inc.; and, Dr. Richard Roberts, Chief Scientific Officer, New England Biolabs Inc. and Nobel Laureate for Medicine.*

the roles and responsibilities of CTOs/CSOs are not limited solely to their employer. The actions of CTOs/CSOs affect many other stakeholders.

Dr. Geneviève Berger echoed Dr. Johnson and elaborated on her own conviction that the worldwide community of CTOs is, and has to be, an engine for change for future societies, people and the environment. In positive circumstances, their actions can lead to improvements in quality of life around the world. Given the changing nature of technology and innovation, these sorts of actions are increasingly the responsibility of companies and the private sector, far beyond traditional definitions of corporate social responsibility. Unilever, while not abandoning its growth agenda, encourages sustainable living through its products and relationships with its

customers a conscious choice and expression different from traditional definitions of sustainability and environment.

The CTO's role is growing in responsibility within organizations, increasingly shaping and constructing the future agenda of companies. CTOs today must have competencies in management but they must also be big thinkers, with vision, innovating at the core of the business as well as in the adjacencies, helping to transform a company's portfolio. She argued CTOs/CSOs must: help the company address the right questions with regard to technology; take calculated risks; support cutting-edge and multidisciplinary science; take into account the rapid evolution of the world to build an externally focused organization that can develop the new relationships and ideas that lay the foundation for the company's future success; unleash their teams creativity without falling into chaos; and not listen to marketing as CTOs are the ones who know what is possible.

Dr. Richard J. Roberts, Nobel Laureate, shared his experiences working for a much smaller science and technology organization where his role as CSO has been and remains to: first, drive research; and, second, pick new areas of research that would be profitable for the company and satisfying for himself and his team. As one of the first employees of New England Biolabs, he introduced technology that kick-started the growth of his entire industry. His role today is in some ways unchanged: setting the agenda for future research. He has also focused specific attention to growing a sustainable

company—developing a growth strategy to preserve the advantages inherent to smaller, perhaps more nimble research organizations. He has also focused research efforts into partnerships and projects that engage emerging leaders from the developing world partnerships that benefit the company but also equip these leaders to return to their country of origin and start their own companies.

Dr. Mehmood Khan made the case that a CTO translates invention into innovation. Faced with limited resources—capital, operating cash, natural resources, talent, etc.—the CTO must embrace this challenge and transform it into business opportunity. Traditionally, large companies have grown by reducing flexibility and creating efficiencies but with global demand growing for customization, the CTO must now pursue strategies to optimize flexibility.

In addition, today's CTO must influence R&D decisions not just inside an individual company. Rather, CTOs operate in a global environment, within a complex environment of suppliers, partners and stakeholders far more diverse today than in the past. For example, PepsiCo buys more plastic film than any other company in the world. So the decisions it takes about whether to focus on biodegradable or bio-combustible films, for example, will have an impact on an entire supplier ecosystem and industry removed from its own core business. In such a context, the role of the CTO is to take on this complexity and bring clarity to the entire executive team.

Mr. Bertrand Bonvin described how Philip Morris International's (PMI) future depends on technological innovation and that today's CTO needs to leverage science and technology to create transformative products. The challenge is to do so in a way that is consistent with a company's long-term strategy, with regulators, and with societies' needs. The issues of complexity—for example between smoking, morbidity and mortality—are growing for all CTOs/CSOs, requiring a new scale of engagement for results. For example, PMI wants to reduce the harm caused by smoking—and this requires pushing the limits of technology to produce new, more reliable risk assessment methods in support of this. And this type of new, robust, risk assessment requires leveraging highly advanced technologies like high performance computing to quantify relative risks of different products. On this front, the CTO cannot act alone. Collaboration is increasingly necessary particularly engagement with regulators and society at large to ensure innovation has a sustainable benefit. Multidisciplinary methods must be validated and gain acceptance from all stakeholders. The CTO, therefore, needs not only to understand research methods, but also to build bridges with all relevant stakeholders. The future of companies will depend on these efforts by the CTO.

# Conclusion

As the CTO conversations at the STS *forum* have highlighted, new management strategy, better public policies and new forms of collaboration are needed to compete in technology markets that offer small windows for growth and rapid rates of obsolescence.

The strategic role of the CTO/CSO in understanding and acting on these needs and opportunities has never been greater—and is only growing in importance.

This peer-to-peer meeting and panel set at the STS *forum* is a step in the globalizing conversation around the role of the CTO to advance productivity, sustainability and prosperity—initiated and led by the Council on Competitiveness Technology Leadership & Strategy Initiative (TLSI). This initiative, chaired by Dr. Ray O. Johnson of Lockheed Martin Corporation, will continue to explore the CTO's ever-expanding portfolio to:

- Map the technology landscape of the 21st century global economy: how, where, why and in what do private sector technology leaders choose to invest?
- Chart the most promising frontiers of technology and sources of competitive advantage in the 21st century.
- Benchmark technological capacity and deployment in the United States and globally.
- Identify barriers to being a first mover toward frontier technologies.
- Design a policy strategy to leverage public and private sector technology investments more effectively and collaboratively.
- Accelerate technology deployment and value creation in the United States.



**Council on Competitiveness**

1500 K Street, NW, Suite 850, Washington, D.C. 20005 T 202 682 4292

Compete.org



**Compete.**

Council on  
Competitiveness