



Globalization of Innovation and R&D

- Moderator: **Stefan H. Thomke**, *William Barclay Harding Professor of Business Administration*
- Panelists: **William V. Hickey Jr.**, *President and CEO, Sealed Air Corporation*
Anand G. Mahindra, *Vice Chairman and Managing Director, Mahindra & Mahindra Ltd.*
Philip L. Yeo, *Chairman, Spring Singapore*

Overview

Organizations from around the world are pursuing unique approaches to innovation and R&D. Paramount is creating a culture and an organizational structure where innovation is not an isolated event, but is repeatable. This entails having focused, systematic innovation while also creating an environment where serendipitous innovations can thrive.

Success requires leaders who are passionate about innovation, invest in innovation, and figure out how to motivate employees to innovate through some combination of vision of what could be, urgency, and financial rewards.

Context

Professor Thomke framed the topic of the globalization of innovation and R&D. The panelists then described how their organizations benefit from a global approach to innovation and how they cope with innovation-related challenges.

Key Takeaways

- **Along with the opportunities from globalizing innovation and R&D come significant challenges.**

Professor Thomke recently visited a company developing a new blood analyzer—a product of engineering done in Massachusetts, software created in Spain, micro fluidics performed in Germany, and chemistry work in Finland. When complete, the product will be sold around the world.

The story epitomizes the globalization of innovation and R&D that is typical today. Businesses are allocating R&D resources wherever the greatest advantage lies. In so doing, they are capitalizing on such opportunities as:

- Proximity to local markets.
- Access to talent and expertise wherever it is found.
- Flexibility in resource allocation and in the ability to work across time zones.
- Cost arbitrage.
- Leveraging sources of innovation beyond traditional boundaries.

Along with these opportunities come challenges such as:

- *Coordinating and managing global projects.* How does a company manage communication, decision making, etc., across countries, continents, and cultures? What are the tools, methods, and metrics to use?
- *Overcoming “not invented here.”* Often organizations reject solutions from outside their organization. The challenge is how to overcome this mindset and open

up an organization to work across traditional company, country, and cultural boundaries.

- *Building and investing for the long term.* Innovation and R&D are long-term commitments that require the appropriate infrastructure. Does the organization have the management and financial commitment? How does it attract and retain the best talent?

“This [the advantage of global innovation] is all wonderful, but we also know that these opportunities bring some challenges. . . . Doing this is hard; it’s complex with a lot of wheels turning.”

— Stefan H. Thomke

- **Innovation comes through focused and systematic processes as well as serendipitous “aha” moments.**

Mr. Hickey sees two types of R&D innovations.

- *Structured, narrowly focused innovations.* Traditional R&D labs within corporations tend to be narrowly focused. They produce necessary and important incremental innovations with immediate payoffs. However, these narrowly focused innovations are not the breakthroughs that transform companies and industries.
- *Serendipitous innovations.* These are the seemingly random “aha” innovation moments, often from highly creative people, that are unplanned, unexpected, and produce unimagined results. In fact, Sealed Air’s success comes from such a serendipitous moment.

The company was originally founded to create wall coverings with embedded air pillows, a concept that proved highly unsuccessful. But through serendipity, the company’s bubble wrap product and the entire protective packaging industry was born. Teflon, Scotchgard, and aspartame are just a few of the other countless examples of products invented through serendipity; not through the intent of the researcher.

“Focused research gives you good products. Serendipitous research gives you great products.”

— Stefan H. Thomke

Mr. Mahindra agrees regarding the power of serendipity. His automotive company was in the process of an incremental innovation to create a vehicle that seated 15 passengers instead of 12. In the process, a 26-year-old product designer came up with a concept for an entirely new vehicle called “Scorpio,” which has become one of India’s best-selling vehicles. This invention came about without direction or input from management; it was born solely from serendipity and creativity.



▪ **Sustained innovation requires the right leadership, structure, and allocation of resources.**

The panelists agreed that long-term success requires creating an innovation-focused organization that produces both sustained and repeated innovations. This includes focused, incremental innovations and breakthrough, serendipitous ones. Such organizations must have the following characteristics:

- **Leadership.** Mr. Mahindra emphasized that innovation starts with a company's CEO, who must make it a priority and must be passionate about it.

"You have to have your CEO passionately convinced of your R&D. You have to have your CEO willing to risk his or her job."

— Anand G. Mahindra

- **Culture.** Mr. Mahindra's organization has a culture of "frugal engineering" which entails figuring out how to do things effectively and inexpensively. The Scorpio was developed for \$120 million; it would have cost Ford \$600 million. And, the company manufactures a Renault for 15% less than is manufactured elsewhere, but struggles to explain why. Mr. Mahindra sees the reason as the company's culture, which can't be expressed or copied.

- **Organizational structure.** The success of both focused innovations, which take place internally, and serendipitous ones, which often take place externally, has led Sealed Air to create structures to deliver both.
 1. **Corporate R&D lab.** This is a traditionally structured internal R&D lab with scientists and technicians reporting to a vice president of R&D. This lab works on focused incremental innovations.
 2. **Mavericks.** These creative individualists don't fit into Sealed Air's organizational culture; they lack social and political skills and can be dismissive of rules. But their creativity can produce tremendous innovations. Instead of losing them, Mr. Hickey deems these folks as mavericks and shelters them. (Sealed Air has a handful of mavericks.)
 3. **External inventors.** These are free-thinkers, like the mavericks employed at the company, but who work for themselves. Sealed Air subsidizes their labs and project work, keeps them on retainer, and then pays them a success fee. External inventors have created valuable innovations for Sealed Air that would never have been developed internally.
 4. **Third-party university labs abroad.** Via technical centers in Europe, India, and China, Sealed Air finds the best concepts wherever they may be.
 5. **Virtual organization.** Working by Internet, the company offers projects to people based on their skills. Individuals work on projects on their own time and the company pays for success.

In total, Sealed Air invests 2% of its revenues in R&D. Of that, 80% is spent internally and 20% externally. The

returns on the internal spending are more certain; the external spending is riskier. The company's belief is that on the whole, this structure produces a range of innovation that will help the company prosper in the long term.

"We've got the internal, the mavericks, the external, the global footprint, and the virtual. The result has been a steady stream of new products, new ideas, new ways of doing things."

— William V. Hickey Jr.

▪ **In Singapore, innovation is a strategy for national economic development.**

A national objective of Singapore is to build the nation's knowledge-based economy, a strategy it believes will drive innovation and make Singapore competitive in the 21st century. Mr. Yeo has been charged with developing four biomedical industry sectors (pharmaceuticals, health care services and delivery, medical technology, and biotechnology) and four science/engineering sectors (electronics, chemicals, IT/communications, and engineering).

A vast \$3 billion biomedical and science research complex will house biomedical and science & engineering research institutes. Each will be staffed with 1,500 scientists, some of whom will live in apartments on site. Private companies will also be occupants of the complex and can use the scientists to develop marketable products.

With no national tradition in R&D and without the luxury of relying on serendipity, Singapore's research capabilities must be built from scratch. This means developing and importing top scientists. Singapore will sponsor the higher education of promising high school students. They are supervised throughout their studies until earning doctoral degrees, after which they commit to working in Singapore's labs for five years. Via this long-term investment in capabilities and human capital, Singapore hopes to generate numerous innovations that will enable the country to realize its economic development goals.

"The aim of this: If I have the talent, I can build a sustainable, vibrant economy. It takes about 15 years . . . so you need patience and deep pockets, but also deep commitment."

— Philip L. Yeo

▪ **Innovation often comes from crisis.**

The panelists and audience members agreed that great innovations often come out of moments of deep crisis, such as facing extinction. Such situations instill a sense of urgency and desperation, and create an uncomfortable environment where creativity is essential.

But how to sustain innovation in the absence of a crisis? Three ideas: 1) create crises that keep people hungry; 2) create a transcending goal that engages people, motivates them, and makes them want to innovate to reach the goal; and 3) create motivational incentives such as sharing of revenues.



Speaker Biographies

Stefan H. Thomke (Moderator)

William Barclay Harding Professor of Business Administration, Chair, MBA Required Curriculum

Stefan Thomke, an authority on the management of technology and product innovation, is the William Barclay Harding Professor of Business Administration. Since joining the HBS faculty in 1995, Thomke has taught and chaired MBA and executive courses on technology and operations management, product development, R&D and innovation management, and operations strategy, both at HBS and in individual company programs in the United States and abroad. He is the faculty chair of the first-year curriculum in the MBA Program and faculty cochair of the Doctoral Program in Science Technology and Management, a collaboration between HBS and Harvard's Faculty of Arts and Sciences. He is faculty chair of Leading Product Innovation, an Executive Education program that helps business leaders revamp their product-development processes for greater competitive advantage.

Thomke's research has focused on the process, economics, and management of experimentation in innovation. An important part of his research examines the impact of new and rapidly advancing technologies (such as computer simulation and prototyping) on the economics of innovation in general and on product development performance and organization in particular. He has more than three dozen articles, cases, and notes published in books and leading journals such as the *California Management Review*, the *Harvard Business Review*, the *Journal of Product Innovation Management*, *Management Science*, *Organization Science*, *Research Policy*, the *MIT Sloan Management Review*, *Strategic Management Journal*, and *Scientific American*. He is also the author of *Experimentation Matters: Unlocking the Potential of New Technologies for Innovation* (2003) and *Managing Product and Service Development* (2006).

Thomke is an editor of *Research Policy* and serves on the editorial boards and as associate editor of several other leading management journals.

Thomke was born and grew up in Calw, Germany. He holds BS and MS degrees in electrical engineering, an MS in operations research, an MS in management from the MIT Sloan School of Management, and a Ph.D. in electrical engineering and management from MIT, where he was awarded a Lemelson-MIT doctoral fellowship for invention and innovation research. Before joining the HBS faculty, he worked in electronics and semiconductor fabrication and later was with McKinsey & Company in Germany, where he served clients in the automotive and energy industries.

William V. Hickey Jr., MBA 1972

President and CEO, Sealed Air Corporation

William Hickey has been president and CEO of Sealed Air Corporation since 2000. Earlier he served in a variety of executive positions at Sealed Air, including president, COO,

EVP, CFO, and vice president and general manager of several divisions. Sealed Air Corporation is a *Fortune* 500 company and a leading global manufacturer of a wide range of food and protective packaging materials and systems, with nearly 18,000 employees and over 100 manufacturing locations in 51 countries. Since Hickey joined Sealed Air Corporation in 1980, the company has grown from net sales of \$78 million to a highly profitable corporation with net sales of about \$4.6 billion in 2007.

Hickey is a director of Sealed Air Corporation, Sensient Technologies Corporation, and the Public Service Enterprise Group. He is also a director of the National Association of Manufacturers and an executive board member of the Northern New Jersey Council of the Boy Scouts of America.

Hickey earned an MBA from HBS and an engineering degree from the U.S. Naval Academy and served as a U.S. naval officer.

Anand G. Mahindra, MBA 1981

Vice Chairman and Managing Director, Mahindra & Mahindra Ltd.

Anand Mahindra is vice chairman and managing director of Mahindra & Mahindra Ltd. (M&M), a Mumbai-based "federation" of almost 100 companies with revenues of \$6.6 billion and 60,000 employees.

After earning his MBA at HBS in 1981, Mahindra returned to his native India and joined Mahindra Ugin Steel Company Ltd. (MUSCO), the country's foremost producer of specialty steels, as executive assistant to the finance director. In 1989 he was named MUSCO's president and deputy managing director of the company. During his stint at MUSCO, he initiated the Mahindra Group's diversification into the new business areas of real estate development and hospitality management.

In 1991 Mahindra was appointed deputy managing director of Mahindra & Mahindra Ltd., the country's dominant producer of utility vehicles and tractors. He was named managing director in 1997 and in 2003 was given the additional responsibility of vice chairman. Mahindra has been engaged in a comprehensive change program in M&M Ltd. to make the company an efficient and aggressive competitor in the new liberalized economic environment in India. Mahindra was a co-promoter of Kotak Mahindra Finance Ltd., which in 2003 became the first company in India to convert to a commercial bank. Today, Kotak Mahindra is one of India's leading financial conglomerates.

Mahindra is a member of several corporate boards. He is the cofounder of the HBS Association of India and cochairman of the International Council of the Asia Society, New York. He has served as president of the Confederation of Indian Industry and of the Automotive Research Association of India. He is the founding chairman of the Mumbai Festival.



Launched in 2005, it is the first comprehensive festival to celebrate the rich cultural diversity of the city.

Mahindra frequently shares his views and ideas on the Indian economy and business through his writings in some of India's leading business magazines. Before attending HBS, Mahindra earned a BA in visual studies (film) from Harvard College.

Philip L. Yeo, MBA 1976

Chairman, Spring Singapore

Philip Yeo is chairman of Spring Singapore, senior advisor for science and technology to Singapore's minister for Trade and Industry, and special advisor for economic development in the prime minister's office. He is recognized for his contributions to Singapore's economic development and his pioneering role in the promotion and development of the country's IT, semiconductor, chemical, and biomedical sciences sectors.

Yeo received his engineering degree in 1970 from the University of Toronto. He then returned home, where he earned a master's in systems engineering while working for the Ministry of Defence. After graduating from HBS in 1976, and after more service in the ministry, he was named chairman of the National Computer Board in 1981. During his tenure, he introduced computers to every government ministry and agency and promoted Singapore's IT industry. In 1986, as chairman of the Economic Development Board (EDB), Yeo began to direct Singapore's economy into growth industries such as semiconductors and specialty chemicals. In 2001 he was named chairman of the Agency for Science, Technology, and Research (A*Star), while serving as cochairman of EDB until 2006.

As chairman of A*Star, Yeo was instrumental in growing the biomedical sciences (BMS) and attracting global biomedical companies to set up operations in Singapore. He established the Biomedical Research Council (BMRC), the Genome Institute of Singapore, the Bioinformatics Institute, the Institute of Bioengineering and Nanotechnology, the Centre of Molecular Medicine, and the new Singapore Institute for Clinical Sciences. In 2003 the Biopolis was opened, an international R&D center for the BMRC research institutes and private-sector BMS R&D laboratories.

Yeo also strengthened physical sciences and engineering research in Singapore, including leading the development of Fusionopolis, which will be Singapore's new physical sciences and engineering R&D hub. In 2001 he established a national scholarship program to support the work of Singaporean students pursuing doctorates in science and engineering who are committed to continuing their careers in Singapore.

Since 2007, Yeo has been chairman of Spring, an enterprise development agency for growing innovative companies. As the national standards and accreditation body, Spring develops and promotes internationally recognized standards and quality assurance to enhance competitiveness and

facilitate trade. Yeo is a nonexecutive chairman of Accuron Technologies Pte. Ltd. (an aerospace and precision engineering company based in Singapore), MTIC Holdings Pte. Ltd., Dornier MedTech GmbH., Ascendas Property Fund Pte. Ltd., and Hexagon Development Advisors Pte. Ltd.