



Bread and Butter of the Industry: Semi-Conductor of New Generation

Speakers: Sungjoo Hong (SK Hynix, Executive Vice President Head of R&D)

Eun Seung Jung (Samsung Electronics, Executive Vice President)

Moderated by: Milo Jones (IE Business School, Professor)

On October 22, 2015, the final day of the 16th Annual World Knowledge Forum, Milo Jones, IE Business School Professor, spoke with industry leaders about the future of digital technology and semiconductors.

Eun Seung Jung, Executive Vice President of Samsung Electronics, illustrated the development of technology since the advent of the first transistor, which was created in 1947 at AT&T Bell labs.

“Without the semiconductor, nothing was, nothing is, nothing will be possible,” Dr. Jung said.

Ten years later, the first transistor radio revolutionized personal device technology. Currently, there are 16 semiconductor components among a total of 19 solutions, which are powered by Samsung in their Galaxy S6 smartphone.

Sungjoo Hong, Executive Vice President Head of R&D at SK Hynix, echoed Dr. Jung’s statement that nothing is possible without the semiconductor. Dr. Hong highlighted the capacity of scaling down technology according to Moore’s law, which observes that the number of transistors in a dense integrated circuit doubles every two years. This law, which he referred to as the magic of scaling down, has enabled the tremendous improvement in technological performance.

In the past, the use of semiconductors was an indicator of nuclear weapons research but now, semiconductors are implemented in nearly every aspect of our daily lives.

“Nuclear weapons are no longer a reliable indicator because the fact is the computing power available in a few video game components now equal the computing power that used to be used at places like Sandy and National Laboratory to develop and model the behavior of nuclear weapons,” Dr. Jones said, “so in the space of about 15 years we have gone from transistors and semiconductors that take entire loads and are used by governments to model the most advanced weapons systems and they have ended up inside video games.”

The scale of the industry has developed over the last fifty years to transform the mobile era.

“We had ten billion electronic devices [in 2014] and in 2015, it will be about 50 billion. Wow, we will need a lot of semiconductors,” said Dr. Jung. The total revenue created by the semiconductor market in 2014 was \$353 billion and is projected to grow by about 73 billion in 2018.

The semiconductor has evolved lifestyle solutions and improved the world of IT, health care and AI robotics. New applications in industrial, automotive, medical and wearable technologies will continue to grow the semiconductor market, according to Dr. Jones.

“Most of the computing power of a phone like this, if Moore’s Law continues as it has, twenty years from now, this will be the size of a white blood cell and will cost less than 1 cent,” he said. “So it will be injectable and goodness knows what these two companies will be doing to give us these things.”

Dr. Hong compared scaling down technology to the pedals of a bicycle.

“You have to pedal, keep on pedaling, or else you will be out of business,” he said.

There seems to be signs of slowing in the semiconductor market research in Japan, the U.S., and even some signs of plateau for the Korean market.

“We have to accept this as a warning signal for the possible downfall of the semiconductor industry in the long term. We have to make some changes,” Dr. Hong warned. The rate at which semiconductor research papers have been published have declined in these aforementioned countries, but China’s semiconductor development has experienced a constant increase over the past several years.

Korea’s future in the semiconductor industry lies in the hands of its people and the potential to develop its non-memory sector.

“Just like the human brain, memory is just a little part of the human brain. Everything is related to the memory part...we started with memory and we are extending our knowledge and technology to the non-memory areas. We are in the beginning stages,” Dr. Jung said.

There is much potential for the future of semiconductors to increase Korea’s technological capabilities to develop high powered technological solutions for future generations.