

The case for heating up a chip race

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The United States needs to bolster its capacity to manufacture and develop cutting-edge semiconductors not just for economic reasons, but for national-security purposes as well, or so industry analysts argue.

For one, despite the fact that the United States still has the largest semiconductor industry in the world, the country only has 15 percent of the world's leading edge capacity. John Greenagel, director of communications for the Semiconductor Industry Association pointed out that five years ago, it held 35 percent of the total share, and added that the country must regain at least 25 percent to 30 percent of the leading edge in order to maintain a healthy industry.

Currently, the defense science board task force on high-performance microchip supply is examining just how chips can be developed for security purposes including weapons, communications and intelligence services.

When it comes to military applications, semiconductors often need to be tailor-made, but the customization is rarely profitable for private companies, argued William Howard, chairman of the task force who pointed out that even simple parts are very expensive in small numbers, and so while manufacturing practices are good for the economy, they are not in the nation's best interests.

Hence the trend to outsource the manufacturing process overseas, but "you want to be sure that the chip has the same function as what you designed ... one of the problems is relying on a foreign manufacturer to

manufacture something where you don't have control over every step of the process," Howard said. In addition, chips can hide viruses and thus make sensitive equipment more vulnerable to sabotage if made abroad.

SIA's Greenagel likened the possible future scenario of having to buy semiconductors from potentially adversarial nations to "going into war and buying bullets from the enemy." He added that it may also be possible for viruses or worms placed in non-critical chips to spread and compromise systems. He said that many semiconductors used in airplanes and computers, including those used by the Defense Department, are most likely produced abroad.

"I can imagine that if you went inside a missile or an airplane that's full of all sorts of different computers, I'm sure there are some foreign semiconductors inside those planes," Greenagel said.

Another issue the DoD faces is the constantly changing technology. Howard pointed out that performance is said to double every 18 months and there is "a lot of pressure to stay at the leading edge." Yet according to Howard, the only two vertically integrated companies remaining in the United States are Intel and IBM. Of these two, only IBM is willing to manufacture chips of a sensitive nature for military purposes.

"What has happened may have been seen as a major triumph of a foreign interest had it not been done by ourselves," Howard said.

Other countries' efforts to advance in the semiconductor industry only add to the problems. In countries such as Taiwan, China, Singapore, Germany, and Italy, governments are giving manufacturers incentives to build plants. The United States government, however, is taking no such steps.

Japan is currently the second largest producer of semiconductors, with

South Korea, Taiwan, and some European countries such as Germany also making up large portions of the industry.

George Scalise, president of the Semiconductor Industry Association, added that China is also working on expanding its portion of the industry. The Chinese government has gone so far as to pay all of the costs associated with the establishment of semiconductor factories. China also has a very favorable lease rate, and so companies are able to start up factories without any financial risk.

"We're on the threshold of that next generation of technology, the nano era," Scalise said. "Instead of having a running start, we're all going to start together. Are we going to be willing to compete?"

Currently, about 80 percent of semiconductor research and development is taking place in the United States. However, in order for that aspect of the market to remain here, the government must find ways to bring more manufacturing into the country.

Scalise said one of the necessary steps in order to achieve this is to "keep our universities in the forefront of the technology ... in the economic sense, this is just as much a race as the space race," he said.

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