

Nanoelectronics in Japan and TIA Part 1 of 7

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Tsukuba Innovation Arena

Computers in 1960s when SSDM started

A mainframe was manufactured by one electronics manufacturer.
The manufacturer fabricated all wafers, devices, circuit boards, systems, and operating systems.



Smart phones of 2013





Decline of Japanese electronics products





RoS of top 5 Japanese electronics companies declined almost 50% in 20 years
The drop of Japanese share is becoming more steep

The horizontal division of labor was easily attainable in many of those digital products and specification of parts and modules became standardized. This lead products commoditized faster.







*Foundry

Source: IC Insights' Strategic Reviews Database

**Fabless

In 1987, global top three companies were Japanese companies. After 1993, Japanese companies continued to drop their market share. Since 2000, Korean and Taiwanese companies are increasing market share



- Cutting-edge R&D on LSIs foresees that technology generations of the sub-10-nm design rule will come in less than a decade.
- Transition to 450-mm wafer processes is no longer an event of the distant future.
- R&D on mass production of ultimately scaled LSIs requires a huge investment . R&D risk is too high for any single company to take.



Tough times for Japanese semiconductor industry



- Traditionally, Japanese companies were good at SURIAWASE of technology, integration of downstream technology with upstream technology. This was made possible by vertical alliance of product line.
- SURIAWASE was useful in that tacit knowledge of each value chain could be sophistically integrated=> state of art !
- However, it took time and effort.
- Today's Electronics industry demand standardized specification of device and module of high quality in short span of time
- It requires fast decision on large equipment investment hence needs high volume output in short span.
- In recent electronics industry, competition in downstream value chain(e.g. application software, network etc) is sucking up margin for investment in semiconductors.

Downfall of Japanese semiconductors in current market business trend.



Nanotech R&D Bases in the world



- Deadlock of Japanese economy/industry
- R&D scheme for Open Innovation

Each technology has become complicated & not independent



- Proposal by the Japan Business Federation: "Promotion of Japanese New-Deal"
- Proposal by COCN: "Realization of Environment-harmonized Ubiquitous Society"
- •Large-scale budgets by METI, MEXT etc.

COCN : Council on Competitiveness-Nippon



Core Members of TIA-nano



