

Divergence in Applications and Convergence in System-on-Chip with Process Integration

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"If you make it, they will come", this baseball motto (Field of Dreams) has not been with us. Microelectronics and optoelectronics industries that started in universities are now facing major difficulties. Industries are basically struggling in the slime while projecting the sublime, however, those on the supply side of the equation have thus far been happy with their clear targets and technical guidelines. The suppliers have been successfully innovating under the assumption of an ever-growing marketplace. Whenever the demand for existing products seemed to lag, additional demand was generated by such products as portable music devices, flat panel displays, personal computers, *etc.* A current example is the mobile phone, which has become one of the most reliable information technology business drivers by constantly adding new functionality: electronic mail, Internet access, GPS, digital photography and, in the coming generation, ultra-wideband (UWB) capability. Rapid progress of mobile phone technology is evidence that innovation is still the bottom line. At the same time, the product lifetime has become annoyingly short and speed of production the very critical issue.

The enabling technologies also need a breakthrough beyond the 100-nm regime both in process technologies and in logical and physical design. How to manage the divergence in applications and the convergence in system-on-chip (SOC) with process integration is a significant issue in industry, where DRAM is no longer the dominant technology driver. Industry is concerned about looming technological limits and the specific requirements of the emerging technologies, but it has not successfully transferred these concerns to the universities.

Japanese information technology industry (five large and seven medium-sized companies, device vendors and tool vendors – perhaps too many?!) form consortia with universities, such as MIRAI, ASKA, *etc.* with the help of Japanese government to survive and undergo a fundamental transformation.

My presentation will discuss the new challenges facing us in the dense fog of the current environment.