Is it time to re-tool the business model?

Solid State Technology *asked experts about the growing perception that R&D is becoming too commercialized while the industry struggles to make innovation profitable.*

The recovery is here, so where's the profit?

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No one needs to tell those of us who toil in the semiconductor space that this world has changed. In the last three years, the semiconductor business model mutated yet again and we all must change with the market. Three key elements of the new market are changes in market and end-user behavior, lack of broad markets, and constantly rising costs. As we work through the excitement, we will see this model play out.

Much of the big change centers on the "consumer-like" behavior of the new semiconductor market. Consumer-like means short product cycles, market segment fragmentation, and what the trade calls "nonspousal approval" products. Typically, electronic gizmos have price points at $200–$300, low enough so they don't require discussion with the spouse.

The customer has changed. The end-user markets have splintered into smaller segments, and users will no longer pay more for more functions. The consumer attitude is, "Why should I pay for a cell phone with a camera?" This consumer doesn't care about the cost of delivering and integrating new camera functionality with that of the phone, because the phone is free.

Next, the broad billion-dollar markets, with their DRAM-like fab runs, are gone. Still, IDMs search to find new volume markets such as the PC or display to take advantage of declining IC costs by expanding demand. We know that Moore's Law works best in broad markets that respond to increasing price cuts — but what happens when those markets don't appear?

To find a solution, IDMs and fabless companies try to develop a "platform product," the foundation around which the company can build derivatives and develop extensions, as Intel has done with microprocessors. This is the old, overly-familiar crapshoot.

We are also familiar with the difficulty of amortizing rising design and process costs as designs go below 0.13µm. Mask costs are rising to the $900,000–$1 million range; 300mm isn't going to be cheaper nor are process requirements of low-*k* and copper, as the foundries are finding out. However, that's just entry stakes, as design simulation and test costs raise the bet on a new design in the $15–$25 million range, leaving the platform game for the most experienced gamblers.

The OEM customer also has changed from a fellow engineer to a contract manufacturer who will only pay for functions required, nothing more. Added functionality is also seen as a negative because of the potential to add cost from more engineering requirements.

With all these changes, firms in the semiconductor value chain need to rethink their antiquated business models to understand how they will make money and not lose margin in 2004's market. Often, a new profitability strategy is required.

Profit is in the details: paying attention to a profit rule, which deals with the interrelationship between market opportunity, competitive actions, and investment. The profit rule is a function of both tangible costs — which include the real costs for development and design, plus other costs of business— and the intangible business circumstances of market opportunity, competition, and investment.

$$\text{Profit Rule} = \frac{(\text{Market Opportunity} / \text{Competitors})}{\text{Investment}}$$

Market opportunity = projected total available market; competitors = number of existing and projected competitors. Investment = that required to create the chip; in this case, we can use design costs as a surrogate. The result is a probability for product profitability index. Profit should be the goal. Volumes and market share are nice to have, but profit insures the life of the business. We believe that this rule needs to be ≥10 to consider the project worthwhile. The trick is how to keep that value, rather than pass it down the chain.

Blindly following the IC manufacturer's quest for a platform product, volume markets became a siren song in the new millennium. Volume represented great revenue and profits; however, getting the volume required large capital investments, while continually looking for ways to squeeze equipment suppliers. Along the way, IDMs and foundries tried to maintain their margins, forcing their vendor companies to "take it or leave it."

Today, those living along the semiconductor value chain are experiencing the worst of Moore's Law — increasing costs and rapidly declining pricing that cannot be amortized over larger and larger volumes because those large markets are gone. Along the IC value chain, the power of IDMs, foundries, EMSs (electronic manufacturing services or contract manufacturers), and OEMs continues to drive down margin and lower ROI. The final blow: EMSs and OEMs don't care about functionality or performance, but are more concerned about reliability, interoperability, or ease of design-in at their cost.

Once again it's a brave new world where luck and good business models play as great a part in success as do ideas and great engineering.

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