Panel: How Will the Fabless Model Survive?

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ABSTRACT
The fabless model was traditionally enabled through clean interfaces – both in technical and business terms – between foundries and fabless semiconductor companies. However, with advanced geometry and analog/mixed-signal process nodes, the technical challenges have been greatly magnified, so that successful semiconductor design requires intimate co-optimization of design and manufacturing, infringing upon those clean interfaces. The panel presents views to these challenges and specifically how companies are planning to address them.

Categories and Subject Descriptors
B.m Miscellaneous

General Terms: Management

Keywords: Business, DFM, Foundry, Fabless

Position Statements:
Panelists have provided their position statements (see below) outlining their opinions. In the panel, each panelist will give no more than three specific takeaway points that designers must consider while analyzing their designs.

1. Mark Bohr:
The fabless Model will continue to survive. New markets based on new applications will continue to emerge. Fabless "design houses" have demonstrated the agility and speed required to satisfy them during the initial phases. Integrated-Device-Manufacturers (IDM's), on the other hand, continue to be the most cost-efficient model to satisfy high-volume markets, once the application requirements are standardized. The IDM cost-efficiency comes from several factors: 1. Innovations from well-funded R&D; 2. Leading-edge fab capacity from capital investment; 3. In-house resources such as design, design tools, mask, process integration and packaging. Due to the increasing complexity as we continue to advance Moore's Law, IDM's advantages over Fabless Model will increase for all but niche markets. This will translate to not only better cost-efficiency, but also superior power or energy-efficiency for a broad-range of semiconductor products.

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2. Thomas Hartung:
Whether companies use deep sub-micron or analog features, the 'one size fits all approach' is very tough to achieve. Switching from one supply to another has become much more difficult. Whether the fabless model survives or not is highly dependent on cooperation from both sides – including whether foundries are able to provide the right access and the right technology to enable fabless customers to address the right market opportunities. While X-FAB believes it's key that foundry and fabless companies share a common understanding about the market applications to be addressed, it is vital that the foundry provide access to technology that is generic enough to be manufacturable and flexible enough to provide fabless customers with the right features and options. Both the nanometer technologies and high-performance analog features require intensive characterization and technology features in order to provide fabless customers efficient data for successfully designing functional and parametrically correct silicon with minimum redesigns. Therefore, comprehensive physical design kits (PDKs) and according design and engineering support are key enablers for the success of fabless companiese.

3. Ana Hunter:
The foundry market is undergoing a transition, forcing more semiconductor companies to move towards more fab-lite or fabless strategies. The investment required for advanced semiconductor manufacturing is outpacing most companies' financial resources. Market analysts believe a commercially viable deep sub-micron 300mm fab requires a minimum $3B in capital investment. To stay competitive and develop products using advanced process technologies, many companies are going to have to partner with a leading-edge foundry for those services. As a result of these and other market forces, there will be a consolidation in the market and the fabless semiconductor model will continue as the predominant trend

4. Felicia James:
As design teams face the challenges of delivering leading edge designs on advanced process nodes such as 65 nm and beyond, there is no doubt that the interaction between the process and the design continues to increase. Just as at earlier process nodes, EDA will continue to drive characteristics that have a more significant impact on creating successful designs as early into the design process as possible. Any step that today requires complex rule checking after completing a step is an obvious candidate for being moved into the design process itself and not allowing those

types of errors to be created at all. Integrated IDM's do have an inherit advantage that the process development experts and design teams can easily exchange information as the new challenges are identified and resolved, but strong business economics will enable solutions that still support the foundry model. Foundries can leverage deeper relationships with certain key customers as early adopters, and EDA can play a role in facilitating the exchange of more detailed physical data including developing and supporting encrypted formats for sensitive data such as doping profiles that are needed to accurately model substrate noise

5. Brad Paulsen :

The emergence of consumer electronics as an industry driver increases the need for advanced technology, but the economics of IC development presents a significant challenge. Innovative companies will lead by exploiting the foundry's advanced technologies and high-yield, high-volume manufacturing capabilities. Design-process integration, when based on a proven ecosystem, will provide the high value, low risk, and ease of use necessary to be first to market, first to volume, and first to money. Through strong partnerships with leading-edge manufacturers and design services, fabless companies can remain on the innovative cutting edge for many years to come..

6. Nick Yu :

The fabless business model will definitely not only survive, but will thrive, as the economic and technical factors that dictate the need to amortize the cost of technology development and fab ownership across multiple entities are all accentuated at each successive technology node. However, the fabless model will bifurcate into two classes; one applicable to leading edge technology users, and one to the users of mature process technologies. Leading edge technology users, whether IDM or Fabless, experience a new class of challenges that dictate the need for tighter process-design integration, and more structured concurrent process and design development. The traditional fabless business model does not easily accommodate these new requirements. The tighter integration required obviously has strong implications for technical end of the fabless-foundry relationship. Thus development methodologies on both, process and design end, need to accommodate changes to allow for global optimization of the end product, rather than just optimizing the process or the design. Hence systems, tools and practices that enable this will all have to be developed – as is currently happening in the physical DFM arena. Tighter process-design integration obviously also has strong implications on the business end of the fabless-foundry relationship, but we do not foresee that the only way of managing the integration is through a conventional IDM business model. We anticipate evolution of an Integrated Fabless Manufacturer business model which will leverage the advantages of both approaches.