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Globalfoundries impact and evolution could be significant, says Petrov Group – Part II

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The emergence of Globalfoundries (GF) could be one of the most significant events in recent semiconductor history. While the new company faces significant near-term execution and, especially, organizational challenges, there are also several likely strategic actions that GF will undertake to enable its evolution and transformation, says Boris Petrov, managing partner of The Petrov Group.

Part one of this series can be found here.

Evolution Stage Two: Acquisition of IBM's IC Design Tool Systems and Expertise

Automation of system-level processes of any kind is the very cornerstone of IBM's technological power; IBM's chip design automation tools are part of this core corporate capability. In 2005 Petrov Group published a report titled "Inside IBM Research: Focusing on Design Automation and Productivity." The report's insights are still relevant today. IBM's corporate DNA is to build tools for automation of processes. The results of this focus are self-evident in IBM's Research itself – an organization that consistently outperforms its global counterparts. Petrov Group's analysis of IBM's innovation machine confirmed its six unique capabilities which should be of high interest to any corporation that aspires to research productivity excellence.

The three primary areas of concern to an electronic system designer (Petrov Group calls them "system survival" requirements) are power, timing, and noise. An optimal design technology would address them in an integrated manner; such a system approach is the essence as well as a unique differentiation of IBM's chip design approach. A useful metaphor is that each IBM tool is either a leaf, or a branch, or the trunk of IBM's design automation tree, that is, of IBM's EDA tool ecosystem.

Such an integrated system approach is the essence of IBM's renowned first-pass design success. IBM's "abstraction engines," or "the tree trunks" in the Petrov Group description, have a life cycle of 30+ years; they model basic concepts (shapes, timing, other) at such high levels that they are also used in IC-unrelated modeling (financial, materials, biological, other). As chip designs become larger and more complex, such an approach will be increasingly mandatory for successful "first-pass" design with billions of transistors in 28nm, 20nm, and finer lithography technology nodes.

IBM's IC design focus continues to be on the needs of state-of-the-art technology. The focus has moved away from proprietary modeling and toward open systems which are mandatory for adopting third-party intellectual property (IP). Verification flow, making designs manufacturable without having to model down at the transistor level, and power and timing closure in 28nm and finer lithography all present immense new challenges. IBM's tool systems continue to be more of a "bow wave" looking at modeling and designing at the bleeding edge and using others to

maintain and support the older tools. IBM has already augmented and integrated its tool systems with industry standard tools for commodity tool solutions.

Despite its advantage in design systems, IBM has had limited success outside internal use. The external mainstream merchant market's cost and IBM's profitability margin requirements are too far apart. IBM's cost structure and focus on internal requirements often make IBM the IC design partner of last resort; a customer selects and pays for IBM services only because it has nowhere else to turn. IBM provides an expensive guarantee of on-time delivery of differentiated ICs; CEOs can sleep peacefully knowing that their products will not miss holiday introduction dates.

To successfully deploy IBM's IC design tool systems and expertise to much larger and rapidly growing segments of the consumer market, GF would have to be able take the good and differentiated and to reject the obsolete and gold-plated. This would require that GF enter this evolution stage with a clear strategy, very talented people, and continuing close cooperation with IBM. The difficult challenge will be of "mining for the nuggets" and to convert the immensely valuable technology into fiscal gold.

Summary

IBM will maintain its IC process technology leadership via research, but the critical business requirement is also that its Common Platform silicon alliance continues to be successful. The IC industry has moved away from the Computing to the Consumer sector. To be successful GF would have to meet cost economics that IBM has apparently failed to meet. This evolution stage represents an immense opportunity – if GF, jointly with IBM, is able to construct and implement a new and differentiated vision.

A key implication of GF's and the industry's evolution is that chip design is becoming synonymous with an industrial robotic factory. System vendors need tightly integrated chip design and wafer foundry factories. If GF is able to obtain, adapt, and cost effectively deploy IBM's chip design capabilities it will have a decisive and sustainable competitive advantage in advanced technology nodes for its foundry customers, asserts Boris Petrov.

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