

Panel:

What Drives EDA Innovation?

Chair: Steve Schulz, TI
Organizer: Georgia Marszalek, ValleyPR

Abstract

If EDA technology innovation drives return on investment, what drives innovation? Is it tied to the semiconductor retooling cycle? To productivity requirements? To Moore's Law? Or is there something more fundamental that we are missing? What driving forces could result in a \$30 billion EDA industry, and what role will innovation play? Will the industry provide the needed breakthroughs for their customers, or seek instead the lowest common denominator user? Will designers "roll their own" tools or seek common solutions? How does EDA innovation track with the semiconductor business cycle? Does a slowdown accelerate or depress creation of new tools and new designs? Panelists will discuss the forces at work in the EDA industry of tomorrow.

Position Statements

Greg Hinckley *Mentor Graphics Corporation*

Innovation in the EDA industry occurs in two ways. Innovation happens when discontinuities in design occur, and a new approach becomes necessary. This usually occurs at the interfaces – where hardware has to work with software; where analog circuitry interfaces with the digital design; where embedded processors have to work with the surrounding random logic; where the design meets the physical test of manufacturing; where different design groups in diverse global geographies have to be able to bring a design to completion; and even where the IC meets the board.

Innovation also occurs when and where opportunities arise to either make an impact in a new area not traditionally serviced by the EDA industry, or to take a technology from a different area and turn it into a design advantage in the EDA space.

In both areas, the real driver for EDA technology innovation is perceiving (or anticipating) a customer need. The innovation process also feeds upon itself. When, by virtue of the advances in EDA tools, you enable more innovators in the design engineering team, system design innovation accelerates. That leads to new design breakpoints, which in turn necessitates further innovation in EDA tool development.

Greg Spirakis *Intel*

Continued growth of the EDA industry depends on its ability to solve designers' critical technology problems, and on the easy acceptance of those solutions by designers.

The EDA industry's emphasis during the 1990s on supporting ASIC design resulted in the neglect of some critical EDA technology needs of leading-edge processor designs. This has led to more EDA expertise being grown in-house at major processor design houses.

Advanced processor designs will continue to lead the industry in challenging EDA tools in terms of design complexity, frequency, and capacity/runtime. Technical innovation by the EDA industry to address these problems will yield solutions not just for processors, but also for large SoC designs.

Processor designers will choose from the best EDA technologies in the market to address their problems, and combine them on the design platforms most suited to their needs. The key to customer acceptance of new EDA technologies will therefore be the interoperability and easy integration of tools from multiple vendors.

The most important drivers for EDA innovation are thus:- solving the hard technical problems of leading edge designers; and simplifying the integration of multiple vendor solutions.

Karen Vahtra *Magma Design Automation*

The singular driving force for useful innovations in EDA is simply solving important customer needs. As every sales person knows, you can sell product to someone who clearly articulates a need that your product can deliver a solution.

These customer needs can take on a variety of forms. Moore's law regularly requires new approaches in EDA tools. Since design engineers are crucial to the long-term viability of any design house, EDA customers are willing to pay for dramatic increases in productivity even during semiconductor slowdowns. Also, enough dissatisfaction with a current tool vendor can result in new tool sales.

Too many EDA companies have focused their energies on developing new technologies without considering whether or not these technologies would address critical problems. People spend money for solutions, not for fancy algorithms. The value of EDA will go up as the match between technology innovations and solving important customer needs becomes closer.

John Darringer *IBM*

The EDA Industry is challenged in three directions and breakthroughs are required in each:

- UP: To raise design to the system level and provide the productivity needed for tomorrow's products.
- OUT: To "tightly integrate" the growing set of analysis and optimization functions essential for automated design of large complex chips.
- DOWN: To master the growing intricacies of semiconductor technology as more and more "tricks" are used to maintain performance and density growth.

Historically, innovation has come from talented people in the just the right environment. The key ingredients are:

- an important difficult problem,
- talented people,

- resources to try new approaches,
- flexibility to take significant risk,
- most important, a close cooperation among designers, technology developers and tool experts.

If we look at today's EDA research and development centers: startups, EDA companies, universities and semiconductor and system companies, we can question where will these breakthroughs originate.

Startups, in my opinion, are effective for commercializing an existing idea, but typically do not provide a suitable environment for breakthrough discovery.

EDA Companies have the resources but focus on market "sweet spots" to maximize investor returns, and tend not to drive innovation.

Universities have an excellent track record of innovation, but the more demanding challenges of the future require a closer cooperation among academic researchers and with industry. The Gigascale Silicon Research Center is an excellent model for promoting this needed cooperation and providing much needed additional funding.

Semiconductor and System Companies have the most to lose if there is a shortfall of innovation and the most to gain if they can be the first to capitalize on new advances. This motivation has led many companies to impressive records of innovation, and I expect this trend to be continued by the survivors. These companies have the challenges, the resources and the ability to foster effective cooperation across designer, technology and tool groups. Occasionally they have a shortage of talent and an impatience that can inhibit invention, but this presents a superb opportunity for closer partnerships with universities.

In Summary, I believe the EDA innovation necessary to sustain continued growth of the electronics industry will come from leadership semiconductor and system companies in close cooperation with university researchers.

J. George Janac ***InTime Software***

EDA innovation has always been driven by a hybrid of the need to solve problems and individuals willing to seize the opportunity to solve them.

Electronic product companies who were comfortable yesterday are now under business pressure. There is pressure to reduce cost, there is pressure to keep the Fabs full, and there is pressure to beat your competitor with a much better product. Why beat up on your competitor when both of you are making a killing, selling all you can make? How do you get new business? You make new electronic products that are better, cheaper, and you need them yesterday.

Intellectual Property providers as well as tool vendors have to convince the customer base they have a better answer. EDA subscription models provide a reliable revenue stream that

removes the pressure to innovate. You get money whether you make a big leap or not. Under the selling model, if you did not make a big leap, you did not get the big sale. To say it bluntly, subscription models are likely to lower innovation.

Subscriptions are a double-edged sword. Why 3 year subscriptions? To remove the temptation of customers to switch EDA tools. Subscriptions however allow new tools to be incorporated into a design team at a lower initial cost, helping new and innovative tools get used.

The innovation will come from motivated savvy entrepreneurs that can both build a better mousetrap and run a business. Four years ago you had to sell your idea to investors, convince people you can run a company, and build it up to profitability. This is how Cadence, Synopsys, Avanti all got started.

What is driving EDA? Need for better electronics products. Is it good for EDA! Is it good for innovation? Seizing and opportunity today, will not result in a new tool for 1-2 years. Consulting has been the vehicle for fixing issues. Experts make things work. The problem is there are 20-50 RTL designers, and one physical design engineer. There are experts all over the team doing coordination, management, I/O frames, power, synthesis scripts, clocks, testing, packaging, etc. Will we return to expert systems as a means of supplanting user knowledge and consulting?

Design with current EDA tools is too hard. Companies have invested in internal resources and consulting to make flows work. Customers make do with what they have, and it is harder to get new tools evaluated and purchased. Subscriptions help maintain the status quo. Innovation will be in making design easier and easier. That is what will drive EDA innovation. Good old fashion productivity improvements.

Handel H. Jones ***International Business Strategies***

The electronics industry as well as the IC industry is highly dependent on effective platform-level IC designs, which include processor cores, mixed-signal functionality as well as the supporting software.

The EDA tool development efforts need to anticipate the future requirements of system design and IC design. The structure of the current business environment is to respond to problems as they emerge. The IC vendors are compounding the problems by regarding EDA licenses as expense items where costs have to be minimized rather than as capabilities that can provide market leverage.

The system companies, IC vendors, and EDA vendors need to become proactive regarding future needs of IC designs and system designs. One key area to focus on is the development of metrics that can determine the benefits of new technology concepts. The present situation of IC designs, which has high levels of flexibility in implementation is not sustainable, and highly structured design flow methodologies will need to be established.