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Marketing in the Maturing EDA Industry

by Barry Olney
IN-CIRCUIT DESIGN PTY LTD / AUSTRALIA

The EDA industry has evolved from its humble, free-for-all, Wild West beginnings into a mature industry employing a record 35,000 professionals and turning over a staggering $2 billion per quarter. Whilst the Americas market is still recovering, Asia-Pacific and Japan have experienced double digit growth. But Europe, the Middle East and Africa (EMEA) have experienced a downturn over the past quarter.

Cadence Design Systems, Mentor Graphics, and Synopsys, a.k.a. "The EDA Big Three," have realized significant growth in IC design and signoff and the functional verification sectors. However, revenue for the PCB segment grew just 5.3% in 2014 to $853.1 million. The revenue comparison of these leading EDA companies is shown in Figure 1.

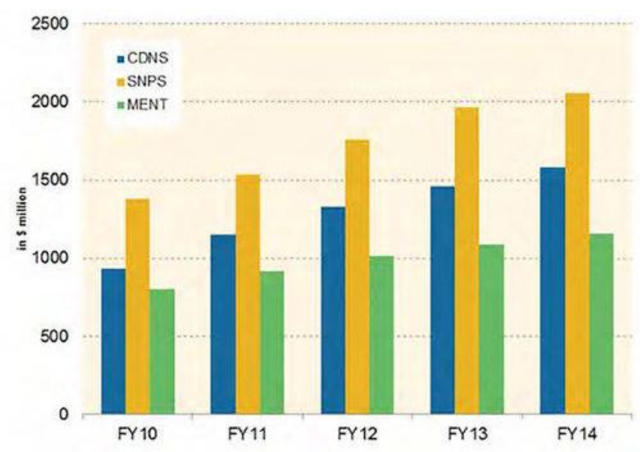

Figure 1: Revenue comparison of major EDA companies (source: Cadence 10-K filings).

Although only a small part of the total EDA revenue, the PCB sector has a different pecking order: Mentor Graphics, Cadence, Zuken, Altium, Pulsonix, Intercept Technology and CadSoft. Mentor, Cadence and Zuken are all competing in the enterprise and the mainstream markets and all have double-digit market share. In terms of seat count, Altium, the relative new kid in town, is lower in the spectrum, but positioning themselves into enterprise-level solutions.

There are also many free or low-cost PCB applications available such as KiCad, DipTrace, Toporouter, DesignSpark, CircuitMaker, PCB123 and PCB Artist, just to name a few. But these packages mainly cater to the electronics enthusiast or entry-level market.

The major EDA revenue streams come from the following operations:

- Perpetual and term licensing of EDA software and intellectual property
- Software support and post-contract maintenance
- Professional services, including consulting and training

EDA companies generally innovate through acquisitions and mergers as it is easier to buy new technology than expend time and resources developing a product and risk losing market

	Mentor Graphics	Cadence	Zuken	Altium	Pulsonix	Intercept	Cadsoft
Enterprise	Xpedition Multiboard	Allegro	CR-8000				
	PADS Professional	OrCAD PCB SI	CR-5000				
Mainstream	PADS Standard	OrCAD PCB	CADSTAR	Altium Designer	Pulsonix	Pantheon	Eagle

Table 1: Professional PCB design software tools.

share. However, some tend to focus on partnering with other EDA vendors rather than acquisition. But this leaves them vulnerable to outside influence. Many small EDA start-ups develop niche technology, an innovation that adds value in a specific area. But their fast growth soon reaches a burn-rate threshold whereby their momentum can no longer be sustained. These companies are ripe for the picking, as their technology can be merged into existing applications to provide an end-to-end solution.

"The EDA industry is very competitive and is characterized by strong leadership positions in specific segments of the EDA market."

The EDA industry is very competitive and is characterized by strong leadership positions in specific segments of the EDA market. These strong leadership positions can be maintained for significant periods of time as the software can be difficult to master and customers are disinclined to make changes once their employees, and others in the industry, have developed familiarity with a particular software product. For these reasons, much of the profitability arises from areas in which a vendor is the market leader. These industries can be cyclical and are subject to constant and rapid technological change and product obsolescence, price erosion, evolving standards, short product life cycles, wide fluctuations in product supply and demand, and industry consolidation.

If you consider the history of any EDA company, you will see multiple acquisitions and mergers over the years. The technology was once an expensive, difficult to use and administer, UNIX-based dinosaur. I recall having to pay in the order of $100k per seat, for such systems, only to find multiple bugs. I guess the real breakthrough was back in 1995 when the Windows NT operating system came of age, and was able to support large databases with huge memory requirements giving us a low-cost alternative to UNIX applications.

The thought of changing vendors, with no way to port libraries and databases, was a nightmare. And when you finally bite the bullet and purchased new software, it was often worse than the previous solution, plus it had an extended learning curve. Fortunately, EDA companies have cleaned up their act and are now providing feature-rich tools, capable of analyzing and designing extremely complex products.

The EDA vendors are working hard to keep up with the changing needs of their customers. Failure to respond quickly to technological developments or customers' increasing technological requirements could make their products uncompetitive and obsolete.

The early market is dominated by innovators and visionaries who will pay top dollar for new technology, allowing complex and expensive competitive tools to thrive. However, the mainstream market waits for the technology to be proven before jumping in. For instance, power distribution network (PDN) planning was previously overlooked during the design process but it is now becoming an essential part of PCB design.

The mainstream market, representing more than 65% of the total EDA software market (Figure 2), demands established technology at an affordable price. Most enterprise tools require a high level of expertise to drive. Enterprise tools differentiate based on the size of the team (more people equals faster design, usually), and specialization within the team (e.g., SI/PI, DFM, thermal engineering, etc). The specialist uses only a few tools, so he can learn them well and live with ease-of-use issues easier than a mainstream engineer. However, the mainstream market demands tools that are intuitive and can be used by any member of the development team from EEs to PCB designers to achieve quick results.

The major EDA companies, who once only sold enterprise-level solutions, now also provide entry-level and mid-range tools with highly productive features at very competitive prices. It is amazing how much bang you get

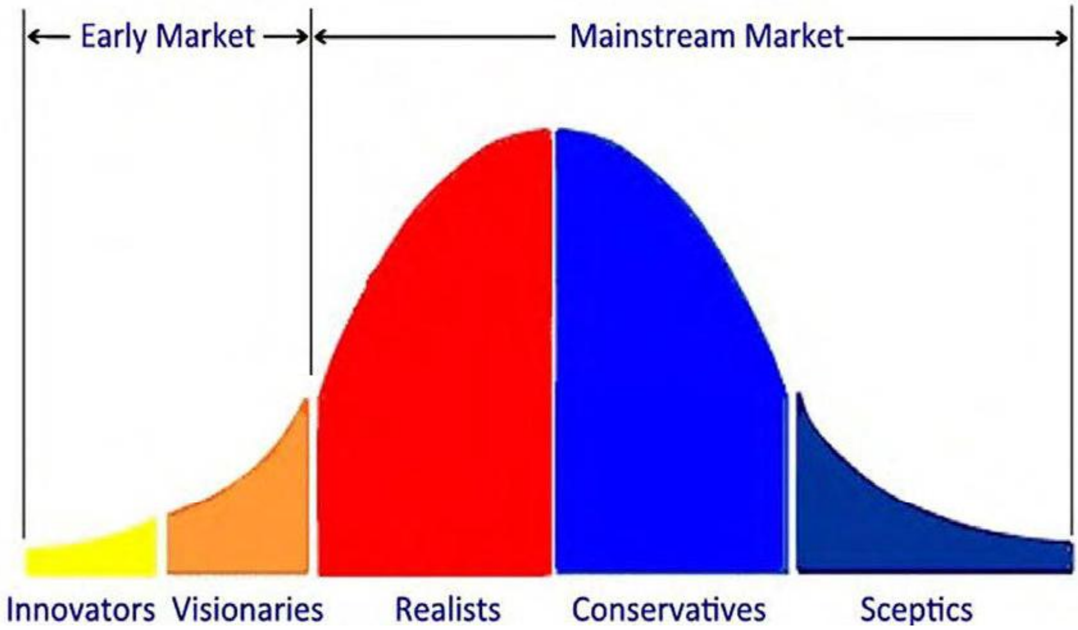

Figure 2: Technology adoption life cycle (source:Crossing the Chasm).

for your buck. Today, the PCB design process entails much more than just schematic capture and PCB layout. With increasing complexity in electronics systems, engineers need to develop with the whole product in mind. Having access to a design tool that encompasses PCB design, coupled with comprehensive simulation and analysis, really gives design engineers the confidence that their products will be delivered on schedule and at the highest performance and reliability. Also, as electronics becomes smaller, faster and more densely packed, engineers are compelled to consider virtual prototyping to meet stringent schedules.

Small and medium enterprise (SME) companies now dominate the EDA market and as the number of global customers builds, the prices of the technology drop as it can be spread across the larger user base. Over the years, the cost of ownership has dropped from ~$100,000 to ~$15,000 per seat with even more advanced features. This is no doubt great for the customer, but not so for the EDA company and their global reseller network. From a salesperson's point of view, they now have to put in a similar amount of effort for far less reward.

Price competition in the EDA industry is intense, which can lead to price reductions, longer selling cycles, lower product margins, loss of market share, and additional working capital requirements. If competitors offer significant discounts on certain products, then other vendors may need to lower their prices or offer other favorable terms to compete successfully.

Any broad-based changes in pricing policies could cause new license and service revenues to decline or be delayed as the sales force implements these changes and the customers adjust to the new pricing policies. Some of the competitors may bundle certain software or hardware products with other more desirable products at lower prices or no marginal cost for promotional purposes as a long-term pricing strategy, or engage in predatory pricing.

EDA vendors promote their products and services through advertising, marketing automation, trade shows, public relations and the internet. They generally market their products and provide services to existing and prospective customers through a direct sales force consisting of sales people and applications engineers. They also selectively utilize value-added resellers to broaden their reach (especially internationally) and reduce cost of sales.

At the enterprise level, where huge profits can still be realized, months of sales and engineering effort can be invested in a sale that may eventuate in multiple seats globally. The complexity and expense, associated with EDA products and services, generally require a lengthy customer education, evaluation and approval process and greatly depend on the customers' budgetary constraints and budget cycles. These salespeople use target account selling techniques to break into the closed circle of influence within a company to close the sale. However, at the SME level, this amount of effect can no longer be justified. So the lower-level sales are more a numbers game, where profit margins are much tighter. Rather than make sales visits to a prospective company, vendors now easily demonstrate online and market via public webinars.

While most design is now performed by the SME companies who now dominate the EDA market, EDA tools must evolve to satisfy the challenging needs of today's engineers and PCB designers. The latest EDA offerings provide highly productive tools for the ever-increasing number of global users, at an affordable price point. Really, it has never been better! **PCBDESIGN**

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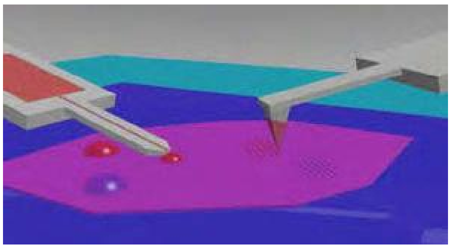
Graphene Calligraphy

Scientists at The University of Manchester and Karlsruhe Institute of Technology have demonstrated a method to chemically modify small regions of graphene with high precision, leading to extreme miniaturisation of chemical and biological sensors.



Writing in ACS Applied Materials & Interfaces, researchers led by Dr. Aravind Vijayaraghavan have shown that it is possible to combine graphene with chemical and biological molecules and form patterns, which are 100s of nanometres wide.

Graphene is the world's first two-dimensional material. It is strong, transparent, flexible and the world's most conductive material. Every atom in graphene is exposed to its environment, allowing it to sense changes in its surroundings.

Using technology that resembles writing with a quill or fountain pen, the scientists were able to deliver chemical droplets to the surface of graphene in very small volumes. In order to achieve such fine chemical patterns, the researchers used droplets of chemicals less than 100 attolitres (10-16 L) in volume; that's 1/10,000,000,000,000,000th of a litre.

Two types of 'pens' were used, one which is dipped into the reactive 'ink' like a quill to cover the nib, and the other where the ink is filled into a reservoir and flows through a channel in the nib, just like in a fountain pen. An array of such micro-pens are moved over the graphene surface to deliver the chemical droplets which react with the graphene.

These techniques are key to enabling graphene sensors which can be used in real-world applications; graphene sensors fabricated this way have the potential to be used in blood tests, minimising the amount of blood a patient is required to give.