LAMBDA Magazine Fostered Structured Design Revolution

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Today there would be websites, blogs, twitters, email blasts, etc., but in the late summer of 1979, when it came time to build a community around the rapidly expanding Mead-Conway Design Methodology, we didn't have those options. OK, we had email to ARPA Net sites, but that was it. Text only - no graphics...with limited access. So, what to do?

Along with several others at Xerox Palo Alto Research Center (PARC) and Caltech in Pasadena, we conceived the idea of a magazine focused on this new approach to IC design. We needed to reach a whole new community of designers - engineers who were interested in taking a systems approach to IC design...mapping architectures to silicon...silicon compilers.... new types of design automation. There were lots of new ideas, articles to write, and excitement to share. Working through the mainstream publications was just not going to work.

It probably seems shocking to most that we could formulate an idea and make plans to publish a magazine on a new design methodology from the confines of an industrial research lab. But for those of us at Xerox PARC, it was just a natural extension of what we were already doing. The lab had been in operation for eight or so years by then and its research focus was almost entirely internally directed. Whatever we thought was a good idea was what got done. That philosophy, combined with some of world's best computer scientists, engineers, physicists and other researchers had already created the first personal workstation, Ethernet, laser printers, the optical mouse and many other building blocks of the personal computer revolution to come.

In fact, it was this strong expertise in document creation and publishing which made the idea of a magazine seem downright reasonable. We found a Xerox group in Pasadena CA who had interfaced an optical typesetting machine to PARC's Alto personal computer. They saw the new magazine as a way to work out the kinks and prove the value of computer-based typesetting. They agreed to help with the logistics, and most importantly pay for the layout and printing of the first four issues of LAMBDA.

I did clear the project with our lab director, Bert Sutherland, and figured with his approval I didn't need to seek any further permission. Even at PARC, I knew if you asked enough people, there were certainly some who would find it outside our mission! As I remember, he had only one serious question: "What would I do after the first four quarterly issues?". My response was practical, "If it is a roaring success, I'll know what to do. If it's a dismal failure, I'll know what to do. If it's somewhere in between, I'll have to decide." With that we were off and running.

The next step was content...starting with the cover. Given the title of LAMBDA (the scaling unit in the Mead/Conway design methodology), it was an easy choice to use the Chuck Seitz analogy comparing the network of interconnect with the grid of roads which made up a typical city. The cover showed four different scales for LAMDA from LAMBDA=12µ to Lambda = 0.12µ. At the time LAMBDA was first published lambda values were approximately 2.5µ, implying minimum lines and spaces of 5µ. Moore's law was well-recognized at the time, and we knew that

dimensions would shrink well below a micron before scaling was done. In fact, the cover art envisioned lines and spaces of approximately 0.5µ. Today we are well beyond that - with lines and spaces less than 0.05µ! This implies 100x greater density than that envisioned on this early cover.

Note that even at 0.5µ dimensions, the complexity of an integrated circuit would be equivalent to covering the North American continent with streets at an urban density.... and we are 100x beyond that in today's systems-on-chip!! Our vision only went so far!

The magazine opened with a letter "from the editors". We boldly forecasted that "In the near future we will see a radical upgrading of design aids", a need "to develop new design methodologies... "and "to turn our attention to higher level optimizations". These seem obvious now, but at the time the universal focus on optimizing silicon area at all costs was still strongly in place and would remain so for nearly a decade. We closed the editorial comments with the following paragraph:

> When design activity is localized within small groups in a few companies, formal communications mechanisms such as magazines are not appropriate. Now that integrated circuit design has broken those bounds and is actively practiced by a large number of people in diverse companies and universities, we feel that a magazine devoted strictly to their needs is required. LAMBDA is that magazine.

The remainder of this first 32-page issue contained various news items, an update on university activities, and four feature articles on "IC Fabrication for the Independent Chip Designer" by Robert Hon, "Ideas About Arbiters" by Prof. Charles Seitz of Caltech, "The Design of a 16 x 16 Multiplier" by Rodney Masumoto or TRW, and "VTI Bets on Custom" by yours truly.

This last article is of particular note, as it outlined the business plan of a company which planned to offer foundry services to the new design community at which LAMBDA was targeted. As fate would have it, I became the fourth founder of this new company, quitting Xerox to join the new firm on about the same day (January 8th, 1980) the first issue of LAMBDA hit the streets.

So, there were new challenges! Amazingly enough, Xerox agreed to underwrite the second issue of LAMBDA, even though I had left the company. But that was the end of their largesse and I was on my own. Even though I was part of a new startup, VTI was still in fund-raising mode, and I had lots of time on my hands. I set about learning what it meant to be a magazine publisher, a business I had no clue about at the time.

First step - put the magazine on hold while I figured out a business plan. I journeyed to Anaheim CA, home of Disneyland to attend a magazine publisher's conference. There I attended a seminar given by a guy I found was the guru of magazine startups. Following the Anaheim conference, I flew to New York City to meet him on his own turf...in a penthouse condo on Fifth Avenue. What was I doing here? He still sported the tan and shorts he was wearing when I saw him in California. He welcomed me into his home and gave me the instant course on starting a magazine...must have cost me thousands of dollars. But that was nothing. He told me I had to go see some marketing guru on Madison Ave. and have them put together a glossy promotional

package aimed at determining if there was a market for my new publication. You know...the fancy envelope that comes in the mail with all sorts of full color promotional material and that letter signed in blue ink (the blue ink is important...generates more responses!) And don't forget the sticker you have to remove from one piece and put it on the return postcard. A final complication was that it would take weeks to develop the package and there was no use mailing it during the summer as the return rates are too low... must wait until September when people are back to work. OK - I've spent $20,000, been forced to wait until the fall, and I still don't know if I have a business or not! I obviously didn't know what I was doing. Then fate took control.

I was sitting in my home office, keeping myself busy while my magazine business was on hold when the phone rings. Some guy from Harris Semiconductor in Florida wanted to place an ad in the next issue! Uh... call you back! Now what? I don't know if there will be a next issue! But wait, maybe this is it! A quick calculation shows I need $15,000 to pay the printing bill. If I sell 15 pages of ads for $1,000 each, I've got it covered. I called him back - sold him the back cover of the Fourth Quarter issue (never was a Third Quarter issue that year) and went to the work on the phones. I called all my friends and non-friends who I knew in the industry, and after 6 weeks of working the phones, I had it! Exactly 15 pages of ads! And what an issue! 80 pages of ads and quality editorial. Advertisers included Calma, Applicon, Sperry-Univac, Harris (of course) and many others. Jim Clark, Ron Rivest, Randy Bryant, Ed Cheng, and others who in the subsequent years would make major contributions to the field, authored eight featured articles. We were off!

Oh, what about the Madison Avenue circulation test? It went out in September, with results back in October and November. About the time our blockbuster issue hit the streets, Madison Ave. told me I had a loser. I hardly noticed. Had to get busy on the First Quarter 1981 issue!

About this time, VTI finally got funded, so I had two full-time jobs. There was never any doubt I knew silicon and design better than the magazine business, so I gradually added staff to take over my duties at the magazine while I poured myself into the VTI startup. I had hired my assistant from Xerox back in 1980, added an ad sales rep by the beginning of 1981 and finally replaced myself primary technical editor in 1982.

There was one more magazine industry lesson I learned in 1981 - don't be too clever when it comes to a name. In early 1981, I received a letter from Lambda Electronics saying that I was infringing their copyright and that I should cease using their name for the magazine. I had already discovered that although LAMBDA might seem like a clever name, it's meaning was far from obvious to those who weren't already "in the know". People commented that they saw the magazine and assumed it was a power supply catalogue (that's what Lambda Electronics made at the time). As I looked around, I discovered that magazines were normally pretty up front with their names: Newsweek, Playboy, House and Garden, Electronics, Electronic Times....you get the idea. So we took the opportunity to get off Lambda's "sue 'em" list and changed the name to "VLSI Design".

The second form of outside recognition in 1981 was a little more positive. We were awarded a "Maggie" by the Western Publisher's Association as the best Electronics and Data Processing

Magazine. We joined the big time! The actual Maggie award is a true door-stop quality block of lucite, which was a welcome recognition of the hard work we had put into launching the magazine.

In January, 1983 I woke up one morning and said to myself, “I can’t do this anymore!” Two startups are killing me! Again, fate played its hand. Within a week or two of this self-realization, I had two parties interested in buying the publication. By then it was a well-known, and well-respected industry magazine with a circulation in the 30,000 range. In February 1983, VTI went public. In May 1983, I sold the magazine to CMP Publications, the most respected electronics industry publisher of the day. We’ll put that down as a good year!

Retrospective

Outside of the excitement and learning around building a startup in an industry I knew nothing about I’m most proud of the impact the magazine had on the industry. It really did provide not only a communications vehicle, but a sense of community around these new ideas and helped speed their understanding and adoption. To this day I still run into people who have kept all their LAMBDA/VLSI Magazines. There clearly was something there beyond being another technical rag.

Credits

As with any great (ad)venture, this magazine was the work of many. I am particularly grateful for the support and nurturance provided by two people. First is Lynn Conway of Xerox PARC, without whom there would have been no book, no design revolution, and no magazine. Second to my long-time business partner and supporter, Jim Rowson. At the time the magazine was launched, Jim was at Caltech in Pasadena and a former consultant at PARC. He shared the load in launching the magazine, soliciting and editing articles, inputting text, sticking on mailing labels...whatever it took. For his wisdom, hard work, and support, I am eternally grateful.

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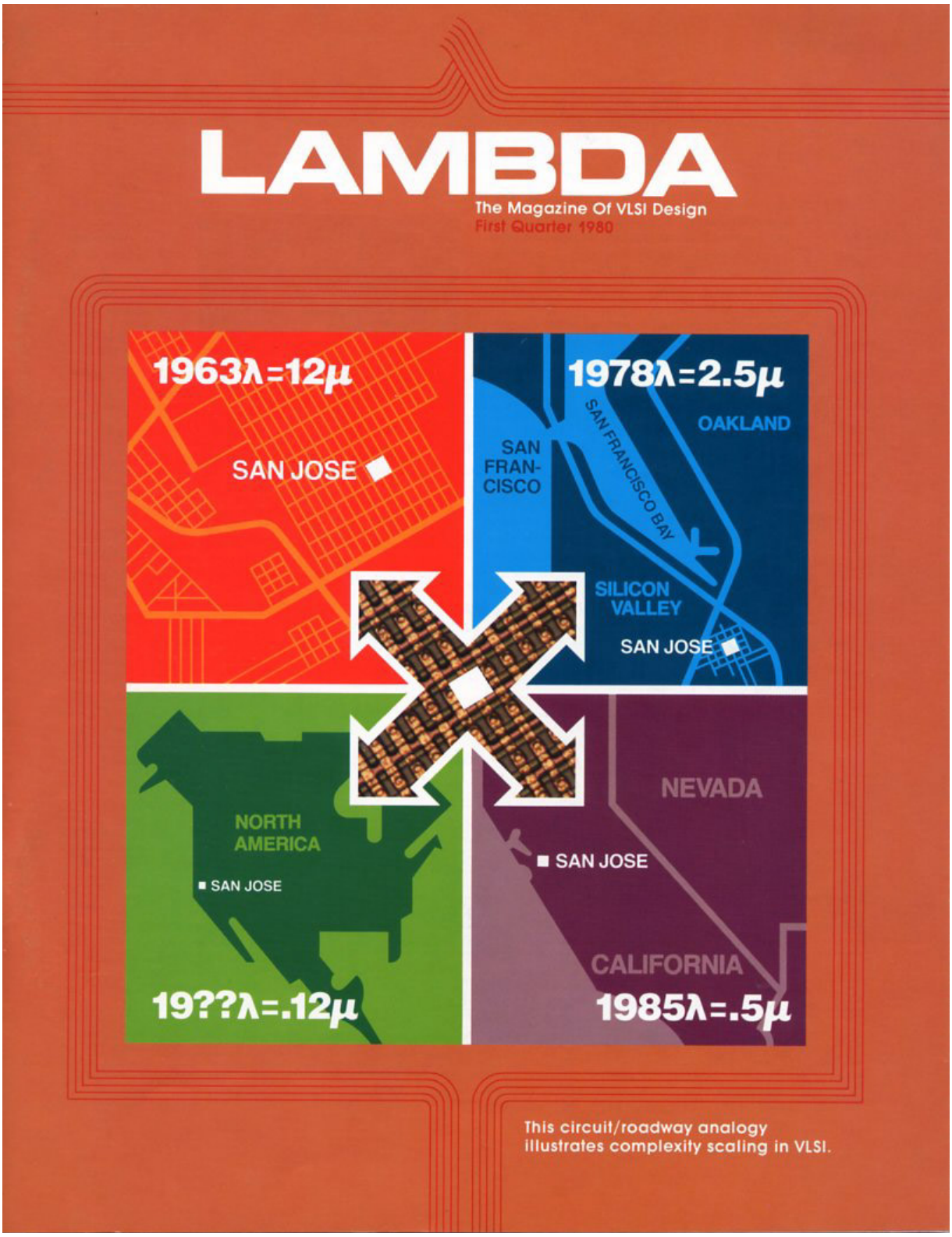
Cover of first issue



From the first issue.

FROM THE EDITORS

The integrated circuit industry is entering a new era. The first two decades of its development have been marked by ever more surprising advances in technology, but the innovative application of this technology has not kept pace. Memories have gotten larger but not smarter; processors have gotten smaller but not better. These two basic elements of digital systems are still interconnected in the same architectures used when gates and core were the building blocks.

The integrated circuit industry's next decade will be different. It will be the decade of the designer, a time keynoted by new systems architectures and novel applications. No doubt the technology will continue to progress on its fast-paced course, but it will be the design groups who capture the innovation spotlight. The exciting ways in which VLSI technology can be applied to systems design are just now being widely explored.

There are a number of forces acting from within and without the industry that are combining to bring us into this new era.

David Beckford

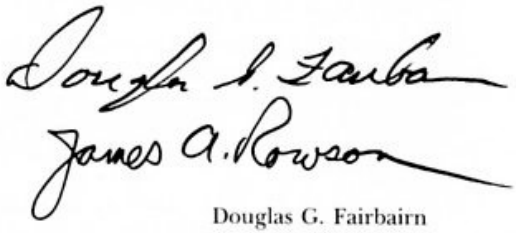
In the near future we will see a radical upgrading of design aids. These improved aids will not only allow more complex chips to be developed, they will also simplify the design process to the point where more people with a broader outlook can participate.

The relentless march of VLSI fabrication technology is both a problem and an opportunity. This advance is forcing us to develop new design methodologies and tools to cope properly with the circuit densities already available. On the other hand, with the increasing density, we no longer need to focus so strongly on packing density and speed optimization. We can now turn our attention to higher level optimizations and to minimizing the design time. The effort to utilize intelligently the extreme complexities of ICs while keeping the design time under control will lead to tremendously increased emphasis on design.

Within the last year, VLSI design programs have been started in many universities around the country. Whereas two years ago there were only one or two universities teaching courses in the systems aspects of VLSI design, there are now more than a dozen, with many more around the corner. The people emerging from these courses will be in a position not only to understand the implications of VLSI but also to *make it happen*. They will be the work force that determines the future course of the industry.

The increasing complexity of ICs is also having a dramatic effect on the industry's structure. As semiconductor firms move into the systems business, the traditional systems companies are forced to move into semiconductors, developing their own in-house LSI design and fabrication facilities. This development alone means a significant rise in the numbers of people actually structuring, designing, and testing *integrated systems*. The number in the design area will grow even more significantly as the smaller firms move into the custom IC design arena. They will be forced to do so to remain competitive.

When design activity is localized within small groups in a few companies, formal communications mechanisms such as magazines are not appropriate. Now that integrated circuit design has broken those bounds and is actively practiced by a large number of people in diverse companies and universities, we feel that a magazine devoted strictly to their needs is required. LAMBDA is that magazine.



Douglas G. Fairbairn
James A. Rowson

Collage of first six issues of the magazine.

Maggie Award from the Western Publisher's Association