BCTM, Thirty Years of Success

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***Abstract*—Anecdotal history of BCTM during its first thirty years, written by the originator and a faithful attendee.**

I. THE FIRST YEAR, 1986

John Shier was the originator of BCTM. Fig. 1 shows John Shier and Ken Sodomsky, an early Exec. Com. Member. The following is John's description of how and why BCTM was started.

"From the mid-70s I was a fairly regular attendee at the IEEE International Solid-State Circuits Conference. One of the things I noticed was that fewer and fewer papers on bipolar ICs were accepted for the conference, although I also knew that there were still lots of people (myself included) working with bipolar ICs. I think that the committees choosing the papers tended to be dominated by MOS technologists, convinced that bipolar was history.

This was the main motivation for starting BCTM.

I believe that we got about 400 attendees in 1986 (1st year) and some good papers. From there the conference became established.

The initial action was to send a letter to IEEE Electron Devices proposing the conference. I think I had contacted several people willing to serve on the committee by that time, and included their names. An important name was Ray Warner, professor of EE at the U of MN and an IEEE Fellow. (Ray Warner in included in Fig. 3.) The response was to invite me to an ED Society executive meeting to make my case. At the end of the discussion they reached two conclusions: (1) YES to use of the ED Society mailing list and (2) The meeting would not be sponsored by the ED Society, but if I could find another IEEE group willing to sponsor it could run. The next move was to meet in an executive session with IEEE Twin Cities Section. There I talked them into sponsorship, explaining that it would not require any funds from them. The involvement of Ray Warner (well known to a lot of MN EEs) was probably taken as a sign that this was serious business.

One needs "seed money". The committee members asked their own employers for $1000 donations, and we got enough of them that I think we started with $5000 in the bank.

From there Jim Dunkley (Fig. 2 shows Dunkley at the 25th Anniversary) and I moved ahead organizing the first meeting. I handled "arrangements" -- hotel, proceedings book and other written material. Jim did all the recruitment and organizing for the Program Committee.

I knew Jan Jopke (Shown in Fig. 4) as the wife of a business associate. A thoughtful and well-organized woman, she proved to be a great pick for helping with arrangements details. She took care of registration at the meeting, handing out of proceedings books, etc. Quite a few of the staff handling these things in '86 were her relatives. As you know, she went on to a long career doing BCTM arrangements.

At the first meeting we had a few papers on bipolar digital ICs, but by the end of the 80s that had mostly faded. The MOSFET camp were right about their technology being the wave of the future in digital and memory. Bipolar technology became more synonymous with analog ICs, and analog became the biggest area of interest for the conference. It was a very nice gathering for specialists, and brought me into contact with some really great people such as the inimitable Bob Pease (may he rest in peace).

Beginning with the 1987 BCTM we became an established ED Society meeting with full sponsorship. The 1986 meeting ran at a profit, and under IEEE rules this was to be returned to the sponsoring body. IEEE Twin Cities was quite thrilled with a windfall of $17k. "

BCTM was fashioned after IEEE ISSCC in format and quality, but each submission had to include a bipolar transistor. Unlike some conferences, which specialize in one aspect, BCTM included a variety of areas required for the final product. Originally, the committees were named, Process Technology, Analog Circuits, Digital Circuits, Modeling and Computer Aided Design.

Shier, the perennial Chair for the first 9 years, met with the Program/Executive Committee three times each year. They met once in January for keynote and invited paper suggestions, once in June, to vet and solidify the technical program, and immediately after each BCTM Conference. Jan Jopke received all the submissions (usually about 80), and mailed copies of all to each member of the Technical Committee. In the selection meeting, after allocated papers were vetted by sub-committees, Shier would list all the submitted papers, and ask the whole gathered technical committee if they were satisfied with each paper's acceptance or rejection. During those early years (early 90's), the attendance was around 250. The number of papers submitted and invited was about 85. The total number of papers presented was about 50. The emphasis was on quality presentations and documentations. There were a few exhibitors, but corporate sponsorship was secondary, and mostly comprised of exhibitors. In the early days, there was one panel discussion, and at each conference, there was one

included luncheon with a speaker with an interesting general topic.

BCTM has been a high quality technical information source. There have always been well vetted and presented voluntarily submitted papers. In addition, invited technical papers such as the Keynote and one invited paper for each subcommittee have always been a part of the BCTM Conference. They have helped maintain the high quality of the programs. There is now a conference-wide Emerging Technologies Session, with two to four speakers in emerging fields. Two technical features of BCTM emphasizing bipolar has been the panel discussions of the early years and the one-day Short Course, now 20 years old, which still continues. There have also been one day add-on programs which usually specialized in modeling. In addition to the programs, every year, there has been an associate editor on the committee, who edits a BCTM section in the Solid State Circuits Journal.

Although the Conference was started in Minneapolis, Minnesota, and stayed there for 17 years, Dave Harame is given credit for establishing the moving-conference concept. Always in late September, to late October, we have had four BCTM Conferences in Europe, one in Canada, four in the Eastern US, one in Texas, and five on the West Coast of the US.

II. Interesting Anecdotes

The conference started with one or two technical panels. For you new guys, a Technical Panel was a group of six "experts" from different companies and universities who discuss a controversial topic selected ahead of time. After all, some change is desired after sitting in a room eight hours listening to technical details. Probably the most memorable was about IC regulators. Bob Pease, from National Semiconductor, declared himself the "Czar of voltage regulators", and dressed the part, in the colorful clothes of a 19th century Russian Czar. Lou Counts, from Analog Devices and also on the panel, appeared with a paper bag over his head with eye holes. Lou claimed he didn't want to be recognized on the same stage with the "Czar". Fig. 6 is a more formal photo of Bob Pease. The great debate, in 1995, was between Paul Davis, from Bell Labs, designing bipolar RF IC's and Asad Abidi, Professor at UCLA, who presented the first CMOS single chip RF transceiver, as to the best technology for RF cellular. Asad won that debate on presentation, but bipolar dominated cellular for another five years.

III. Memorable events and Trends

The BCTM Executive Committee, led by Tad Yamaguchi, planned and executed a memorable celebration of the 50th Anniversary of the Invention of Transistors. Six "outside" (non BCTM) icons of the industry and John Shier were selected by the Technical Committee, and spoke at the banquet dinner. These included Jim Early, Jack Kilby, John Moll, Tak Ning, Tetsushi Sakai, John Shier, and Ray Warner. It was a thrill to hear their stories and shake their hands. Fig. 3 is a photo of these speakers.

The BCTM 25th Anniversary was celebrated, with all the past chairs invited to attend and speak. Alvin Joseph led the affair at John Cressler's home school, Georgia Tech. Fig. 4 is a photo of those chairs and early committee members who attended.

As was indicated in the opening section, the popularity of bipolar circuit development was apparently going down. However in 1987, 15 European countries decided to adopt a common cellular standard, GSM. The lowest band was around 1 GHz, which was frighteningly close to the fT of IC's, even in small scale production. While the RF circuits in required base stations were being built with three-five technology, companies in many countries were hoping to build handsets, with a cheaper, and smaller, technology. Cell phone handsets at that time were large, and had to be carried in the trunk of a car. It is interesting that fishermen in Finland, home of Nokia, created the first blip of demand, in 1991. The legal requirements for nonlinearity, gain, low power, and noise were beyond the capability of CMOS for another ten years. Bipolar ICs with Surface Acoustic Wave filters were proposed and adopted. All areas in bipolar design and production had to be improved BCTM was already covering many of the areas. Process Technology, Analog Circuits, Modeling and Computer Aided Design was covered by BCTM Committees. Even RF Testing, a tough, but essential subject, was promoted by Cascade Microtech, an RF probe company, as an exhibitor. Although digital bipolar circuits were used in the first frequency synthesizers, that BCTM committee was replaced by an RF Circuits Committee, and the BCTM programs tilted toward RF.

A Short Course was started and led by Ken O in 1995 and continued until the present. It has been a financial and technical success, attended by about 40% of the attendees to the conference. The first Short Course, and most thereafter, used RF as the overall topic. The six hour course was divided into three parts, usually covering technology, circuit design, and systems, which appealed to a broad audience.

Another addition to the BCTM conference were workshops on the day after the Conferences. One group, "Compact Modelling for RF/Microwave Applications" (CMRF), met for several years. They revised the bipolar model, then generally adopted, for production-quality prediction of RF IC's. Suggested by John Shier, CMRF was originated by Achim Burghartz (TU Delft). Two major contributors were Colin McAndrew and Larry Nagel, shown in Fig. 5. In addition, the day following the 2013 meeting at Bordeaux, France, there was a public day-long technical report of the EU-Dot5 project, which aimed to build the 500 MHz bipolar transistor.

Thanks to the enthusiasm of Dave Harame (IBM), the BCTM conference started moving, from the original location (for 17 years) in Minneapolis to different locations, usually with different attractive features close by. Dave also elicited two Nobel Prize winning speakers to BCTM conferences. Starting in 2003, here was also the rotation to a location in Europe about every third year. Approximately one third of the

papers and committee members were from Europe. These four European meetings were hosted by Maurice Bafleur(LAAS/CNRS, France), John Long (TU Delft, the Netherlands), Nic Rinaldi (U of Napoli, Italy), and Jean-Baptiste Begueret (U. of Bordeaux, France). Most of the locations have been chosen because an Executive Committee member has been willing to be host.

IV. Why have Technical Conferences?

IEEE technical conferences, in my opinion are the forefront of timely, technical information for working engineers. It is true that university professors serve a premier role in the training of young engineers, especially in techniques of solving problems. IEEE Journal articles, while better vetted, are often old news. They usually appear six months to a year after being presented at a conference. Intra-company information, while valuable and quick, is restricted to one company. BCTM is a conference whose value and quality have been maintained by the volunteer Technical Committee members. Vetting of submitted papers requires reading all papers submitted, and selecting the best, usually 60%, to be presented. In addition, the chair of each session works with each presenter to assure a quality presentation and Proceedings article. While not always on bipolar, the prominence [notoriety] of some of the invited speakers has been outstanding. In 2005, in Santa Barbara, CA, we had the Nobel Prize winner in 2000 in physics, Dr. Herbert Kroemer, talked of "The HBT : How it Got Started". In 2009, in Caprice, Italy, we had Dr. Thomas Skotnicki, Director of Advanced Devices Program, ST Microelectronics. His topic, "Does the Future of Silicon Reside in Other Materials?"

V. Technical vs. sponsor emphasis

BCTM was started as a technical conference emphasizing bipolar semiconductors. In my experienced opinion, BCTM has been both a technical and financial success. Last February, the Electron Devices Society approved technical sponsorship of BCTM for another five years. But like any sustained endeavor, BCTM requires high quality, dedicated workers (to do paper selection and run the meetings), supporters, and money (not often considered except in committee meetings.) Fig. 7 is photograph of committee members at work around a computer. Supporters are companies, mostly our employers, who give BCTM direct grants and, in most cases pay your expenses to attend and to give papers. Supporters are individuals who attend and present papers. I am not suggesting individual donations. However, campaigning, including reports, to your boss and fellow group members plays an extremely important role in your company's enthusiasm and monetary support BCTM, IEEE, and technical universities must have you and your employer's enthusiastic support (time, effort, and money) to provide valuable information we all need to contribute.

VI. Conclusion and appreciation

The Bipolar and BiCMOS Circuits and Technology Meeting is alive and well. Rumors of its immediate demise have been premature for the last 30 years. I wish to thank the hundreds of volunteer committee members for their work and the companies who have supported BCTM over the years.

Fig. 1 Ken Sodomsky, early Exec. Committee member and John Shirer, Gen. Chair for nine years

Fig. 2 Jim Dunkley, Original Technical Committee Chair, at 25th Birthday of BCTM Celebration

Fig. 3 50th Anniversary of Invention of Transistor Celebration Speakers, l-r, J. Kilby, R. Warner, J. Early, J. Shier, T. Ning, J. Moll, T. Sakai


Fig. 4 25th Anniversary of BCTM Celebration, with Gen. Chairs and Original Committee Members. Standing l-r, Ken O, C. McAndrew, J. Long, F. Thiel, J. Dunkley, A Burghartz, A. Joseph. Sitting l-r, J. Hayden, J. Shott, J. Jopke, M. Bafleur, D. Harame


Fig. 5 Colin McAndrew and Larry Nagel, Modeling and Simulation Innovators on CMRF

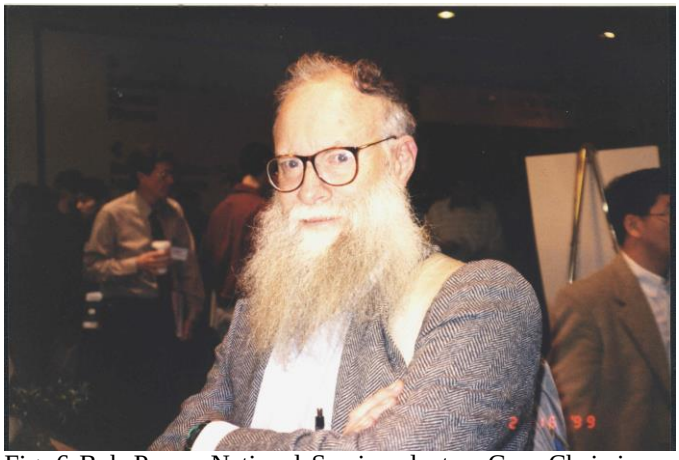
Fig. 6 Bob Pease, National Semiconductor, Gen. Chair in 1995 and the "Czar of voltage regulators"


Fig. 7 Some of Executive Committee of 2006 Arranging Schedule During Paper Selection Meeting. Seated, F. Thiel, Standing, left to right, J. Long, B. Hecht, Y.-F. Chyan, M Tutt, L. Nagel, H. Veenstra, D. Ngo

List of General Chairs

1986-94	John Shier	2006	John R. Long
1995	Bob Pease	2007	Yih-Feng Chyan
1996	Krishna Shenai	2008	Marise Bafleur
1997	Tad Yamaguchi	2009	Frank Thiel
1998	Jim Hayden	2010	David Ngo
1999	John Shott	2011	Alvin Joseph
2000	Joachim Burghartz	2012	John D. Cressler
2001	Ken O	2013	Bruce Hecht
2002	Hiroshi Iwai	2014	Donald Y.C. Lie
2003	Colin McAndrew	2015	J-B Begueret
2004	Ross Teggatz	2016	Doug Weiser
2005	David Harame		