



Marcel Pelgrom

Stepping Out of Line

Every vintner is eager to get a good review from Robert Parker—a leading U.S. wine critic widely published in newsletters and books—as it directly doubles the commercial value of their inventory. A lot of vintners add oak chips to the ripening process because Mr. Parker loves the scent of wood in wine. So the taste of a single critic sets off a dreary convergence in an industry that would otherwise welcome multiple fantastic tastes, and with incredible speed thanks to today's 24/7 news cycle. Indeed, diversity in many fields, including electrical engineering, is drastically diminishing.

A century ago, a rice merchant could offer as many as 150 variants. Today, only a few species survive, although parcel delivery companies can reach any place in our consumption-driven world within 24 hours. Have you noticed? Business suitcases began to look alike after budget airlines started enforcing maximum dimensions for cabin luggage; smartphones all operate with the same finger movements; fast-food in every town in the world is horrible. Box office returns dictate Hollywood story lines. In food, fashion, entertainment, automotive, and many other industries, the world is getting pruned of variation, leaving a limited and omnipresent set of easy and cheap solutions.

In electronic design and research, converging mechanisms likewise play important roles. Software solutions, by their flexibility, would

seem to defy this statement. Yet, in industry, standardization has become a necessity, and consumer-market software solutions seem to be written in concrete, as the threat of replacing many years of development stymies fundamental innovation. Many examples exist of too strictly formulated standards that prevent break-through improvements, and only the introduction of a completely new gadget (like the tablet) allows for new platforms.

Although governmental funding agencies want to contribute to the progress of humanity, they face parliamentary scrutiny. Consequently, they look for research programs that run around in identical application domain circles: energy, health, security, and communication. All over the world, research groups in the field of microelectronics align to these programs, and university program directors present the same sales pitches as a result (neglecting challenging alternative application domains like instrumentation, aerospace, defense, and agriculture).

At the circuit level, funding realities translate into a zillion microscopic variations of the same RF chain, the same interface optimization and energy scavenging schemes; the same kind of sensor and detection algorithms with 0.05 dB improved performance. In the face of such convergence, fundamental novelty is scarce and "figure-of-merit" discussions dominate the technical

committees of conferences—not to mention the meetings where feature sessions concentrate on figures of merit. Wouldn't it be better to have at least some sessions with papers on "breakthroughs in search of an application" or an award for the wildest idea?

Technology acts as a strong converging mechanism: Paraphrasing Henry Ford, "You can have any technology as long as it is CMOS."

Of itself, aligning expensive technology developments is not a bad idea. Indeed, the International Technology Roadmap for Semiconductors has created a set of common goals that have allowed the semiconductor community to realize amazing progress for several decades. On the other hand, the sole availability of CMOS technology has so

erased awareness of other semiconductor technologies that few educational institutions still offer a full electrical engineering curriculum of bipolar design and technology, let alone crazy stuff such as four-layer devices like thyristors, charge-coupled devices, III-V compounds, and other gems.

Given the technological and economic limitations of CMOS technology that lie ahead, it is time to rethink converging mechanisms, especially in the places where innovation starts: the university research centers. While hundreds of IC groups

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Dear Editor:

I have received the complimentary copies of the Summer 2012 issue of the *IEEE Solid-State Circuits Magazine*. Besides thanking you

very much for this recognition, I wish to acknowledge the effort you've made to add a considerable amount of important information to the text I had provided.

Yours sincerely,
Emilio Gatti

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ASSOCIATE EDITOR'S VIEW

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battle for one mm² in a standard CMOS process, dozens of university clean rooms are waiting for some bright, crazy ideas that implement and explore the unexpected.

Many crucial inventions have not followed a precooked strategy. The invention of the CD was not planned by funding agencies. Nobody ever drafted a road map for the first micro-processor. Many breakthroughs

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come from "serendipity," a nice term indicating that tinkering around in science sometimes results in completely unexpected and very useful solutions.

Really fresh ideas come from people who seem to go in the wrong direction.

Let them diverge; they might come back with some real novelty. After all, diversity is fun, requires brain power and courage, and is essential for progress.

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