

# SESSION 3C

## Embedded Panel Discussion

Wednesday, March 28

1:00pm – 3:10pm

### Consequences of Technology - What is the Impact of Electronic Design on the Quality of Life?



*Organizer*

**Nader Vasseghi**  
CEO/VP Engineering  
AuroraNetics



*Moderator*

**Steve Ohr**  
Managing Editor  
EDTN Networks

#### Description

Electronic Design changed the world in every aspect of our life. Latest semiconductor process technologies allow the integration of 50 million transistor chips and beyond. The panel will examine the impact of electronic design on our day-to-day life.

The way communication, business and life-style changed, would not be possible without electronic design. The applications for electronic devices are unlimited and what sounds science fiction today, will be common sense tomorrow. Are there impacts on the way we operate as a society?

What are the opportunities we have by utilizing actual and future electronic devices of all sorts? Where will electronic design take us?

One controversial question is how risky are computer-oriented communication, transactions, and operations, and how they can influence the quality of our life. Despite computer and electronic design related failures throughout the world, the increase of new applications of electronic devices will not slow down in the next decade.

Another provocative question will be how growing EMF influence electronic devices as well as the human body. How much trust in electronic design is healthy in the long term?

The panel, representing scientists, electronics and design executives, will share their visions, experiences and concerns regarding the impact of electronic design on our life.

## Panelists Statements:

### **Peggy Aycinena**, Editor, ISD Magazine, San Mateo, CA

Clearly the end-users of the products that emerge out of the electronic design industry are in most cases perceived as winners. They have at their disposal a wealth of devices that impact every aspect of their lives from health care, to education, transportation, communication, and entertainment. How can there be a dark side to this story of success? I would argue that the din from these electronic marvels is so great that we can no longer hear ourselves think, literally or figuratively. We are unable to sit in silence, go through a day without electronic stimulation, or spend time alone. Our ability to observe, process, and internalize information has been completely overwhelmed by the tsunami of input that comes our way 24x7.

Meanwhile, what of the technologists who drive the industry? Their lives are similarly impacted. They eat, sleep, and drink their work, their time-to-market pressures, their latest, greatest, disposable gadgetry. Although, the wunderkinds that drive the design industry are perceived as having won the lottery — living glamorous Silicon Valley lifestyles of youth, fast cars, and early retirement — in fact, they are exhausted and facing shortened lifespans due to the stress of produce, produce, produce.

Am I a Ludite? Absolutely not. Do I think that we need reserve the right to pick and choose what parts of modern life we buy into? Absolutely.



### **Joe Hall**, CEO Clarus Inc., San Rafael, CA

The human body has many trillions of individual cells. On the surface of each are millions of ion receptors exchanging billions of extremely subtle impulses in a complex electromagnetic messaging system we are just now beginning to understand. Recent advances in cellular biology reveal that the extraordinary biomagnetic and electrochemical processes that take place within every human cell are even more complex. In the last 15 years we have created a vast new world of powerful tools that have literally transformed both the world economy and our everyday lives. At the same time we have dramatically increased by a factor of millions our daily exposure to hundreds of different sources of electromagnetic fields (EMF) especially from the high frequency EMF resulting from the explosive growth of wireless communication networks. While the long-term health effects of our exposure to rapidly increasing EMF “background noise” is still an unknown factor the “real-time” negative impact of EMF on the quality of our lives includes a reduction in our resistance to stress, an increase in fatigue, and impaired performance.



### **Bryan Hoyer**, Senior Director of System Level Solutions, Altera, Santa Cruz, CA

It's been stated that the challenge of technology is to get us off the planet before our technology makes it uninhabitable.

Before we can address the value of electronics we need to address the broader issues of technology. In the 60s and 70s Electronics was billed as the “Clean industry” largely due to it's lack of smokestacks.

When I joined the workforce in 1979, my first job was in at an Integrated Circuits process lab. I dealt with gases that could kill at 100 parts per billion, gases that caught fire when exposed to air and acids that could etch glass. I was also on the safety team, which included responsibility for inspecting the 1-inch hydrogen line for leaks after an earthquake.

I moved into system design and was exposed to the printed circuit industry with it's own set of unique hazards, and yet all of this is fairly well regulated and dealt with. In fact there is a substantial technology sector devoted to providing solutions to these problems. The clear advantage of electronic design for quality of life is not found in the convenience factor of appliances but in the ability of electronics to alleviate the problems created by itself and other technologies.

There are also social impacts. The computer revolution has in particular enabled problem solving in all areas at levels that were prohibitively expensive in the past (read only suitable for military applications).

These are all well known, but the single greatest contributor to quality of life will be the Internet enabled information age allowing the decentralization of the population. The redistribution of the population and the reduction in dependence on the automobile will be the real turn in quality of life.



**Sabrina Kemeny**, CEO and President, Photobit, Pasadena, CA

CMOS image sensor technology, pioneered in the early 90's by Photobit's founders, has radically altered the world of digital imaging. The technology, enabled by modern electronic design techniques and fabrication capability has enabled the production of low cost, ultra miniature still and video cameras. People, accustomed to processing information visually, have embraced the technology to communicate with one another. From posting pictures on web sites, to dating services on the internet, to selling used merchandise, instant access to visual information is changing a variety of human interactions. Today, transmission of images starts and ends with the PC, tomorrow it will become ubiquitous as PDA's, cell phones, cars and other technology tools are utilized to obtain and transmit images. Although these digital eyes may enhance our lives, the privacy rights of individuals do come into question. Will "big brother" be watching? Although there are very few situations today that warrant the cost of paying people to monitor other people, advances in automated techniques for analyzing image data may lead to more monitoring in the future.



**Tom Mahon**, Writer, President of Thomas Mahon Associates, Walnut Creek, CA

The Internet at first appears to be the fulfillment of everyone's dream: instant access to infinite knowledge.

But there is a shadow side: the pace of life seems more than we can tolerate: physically or mentally; individually or communally. An electron goes around the world seven times a second; the fastest human barely breaks a four minute mile. The resulting stress may be as harmful to the inner landscape as the industrial revolution was to the external landscape. Most efforts to deal with this have been reactive: how do we cope?

Perhaps we should instead ask:

- what could our situation look like?
- how can we use technology to leverage our human-ness
- what in my tradition defines a 'good life'
- what tools exist (or need to exist) to realize this 'good life'
- how can I propagate this vision of a 'good life'?



**Peter G. Neumann**, Principal Scientist, Stanford Research Institute, Stanford, CA, Co-Founder of PFIR - People for Internet Responsibility, Author of "Computer Related Risks"

Computers are a classical double-edged sword. They can be used to dramatically improve the quality of life. However, their use can also have seriously deleterious consequences — such as loss of life and liberty, and even inabilities in the pursuit of happiness, sanity, and survival. The archives of the Risks Forum are littered with thousands of cases in which computers and people did not do what was expected of them when it was required to do so. The blame must be widely dispersed, but the original design is often a serious part of the problem.

As aviation, automobiles, health-care systems, financial systems, the environment, law enforcement, and indeed critical national infrastructures and national defense become ever more involved with computer systems, and as we expect everything to be more automated (with no exception conditions to have to worry about, because everything of course works perfectly the first time!), the risks tend to increase as well. Ubiquitous computers and the Internet have given us vastly new opportunities, but have also created new problems for operational integrity, security, and privacy (among other requirements); among other attacks, denials of service are almost trivial to perpetrate, and can bring many operational environments to their knees. But they are widely ignored.

Designs are often based on faulty models (the America's Cup Stars and Stripes, the Hartford Civic Center and Salt Lake City mall roof collapses) and faulty simulations (the Electra aircraft design, the Colorado River flooding, Northwest Flight 255 MD-80 — where the airframe and the simulation behaved differently), as well as faulty requirements (the Stark missile system and the Sheffield communications) and faulty specifications (many examples). Much greater care is needed throughout the design, development, maintenance, and operational phases to ensure that systems have even a

reasonable chance of working properly. Enormous amounts of time and effort are wasted on designs that are inherently inadequate from the outset, although that is not discovered until it is too late. We need much greater rigor in design — to avoid rigor mortis in the resulting systems.

We still have many unanswered questions that must be addressed. Much greater discipline, education, and awareness is needed in system design, implementation, operation, and use. In terms of avoiding the risks outlined here and many others, we still have a long way to go.



**Daniel M. Russell**, Senior Manager of the User Sciences and Experience Research lab, IBM's Almaden Research Center, San Jose, CA

The quality of one's life isn't determined by the products of electronic design, but one's life can certainly be made miserable by poor attention to overall design of electronic products.

That subtle switch is revealing: Designers create more than just their intended artifacts. The things they design, the products they create then become part of the whole fabric of life and work. It's the ensemble that determines the quality of your workspace, your kitchen and your living spaces in general.

In our work at the User Sciences & Experience Research (USER) lab at IBM Almaden, we very consciously take on the responsibility of understanding the entire effect of design practice in the user's life. We design and study artifacts that are beautiful and useful in isolation, and then re-design and re-study them for use in realistic settings. By working from a deep understanding of the ways objects function in real use practices, we believe we can design better products that amplify — rather than diminish — a person's life.