

## **SMALL BUSINESS RESEARCH & DEVELOPMENT: OXYMORON OR GOLDEN OPPORTUNITY**

**Organizer & Moderator:** Christopher A. Miller, Chief Scientist, SMArt Information Flow Technologies

**Panelists:**

Daniel Serfaty, Chief Scientist and Founder, Aptima, Inc.  
Floyd Glenn, Executive Vice President and Chief Scientist, CHI Systems, Inc.  
Mica Endsley, President, SA Technologies, Inc.  
Ron Laughery, President, MicroAnalysis and Design, Inc.

The chief question of this Professional Development panel will be whether or not the small business environment provides a good venue for pursuing a career in Human Factors research and development—or, perhaps more accurately, how it can be made to do so. The panelists will be recognized successes within the Human Factors community in terms of both their professional careers as small business owners or workers and in terms of their sustained ability to contribute valuable research to the more academic pursuit of Human Factors as a science. Panelists will be asked to tell their ‘story’—why and how they chose to go the small business route—and then will be asked to provide answers to a specific set of questions about the ability to do research in a small business venue. Audience participation will round out the session and should uncover additional insights on the ability to mix income with research in this setting.

### **PANEL DESCRIPTION**

The chief question of this Professional Development panel will be whether or not the small business environment provides a good venue for pursuing a career in Human Factors research and development—or, perhaps more accurately, how it can be made to do so. The Panelists will be four virtually undisputed success stories on two equally important dimensions. First, they are each successful small business entrepreneurs who have, collectively, managed to support themselves under their own initiative for more than 55 years. Second, they are also active members of the Human Factors research community with a collective total of 450 papers and conference presentations. They have been chosen specifically because they seem to have succeeded at simultaneously balancing the needs of making a living and of doing good research—and have done so in what might, on the surface, seem to be the most demanding of domains: a small business climate where their research pursuits are not funded by corporate coffers or tuition payments.

The Panelist’s role will be to share their secrets and insights with those of us interested in accomplishing the same goals.

Each panelist will be asked to spend roughly 5-8 minutes describing their ‘story’—how and why they decided to go the small business route, how long they’ve been at it, and a brief statement of the focus and successes of their research and business. They will then be asked to provide their answers to the following specific questions:

- What’s your view of the pros and cons of conducting research from a small business vs. the alternatives and, assuming you do, why do you think they balance out in favor of the small business?
- What can a small business person do to improve the research content and quality of his or her work?
- What insight can you provide on how to balance research with other business aspects and goals in the small business environment?

- If you had it to do over again, would you? What might you do differently?

This panel will also provide a unique opportunity for business people who are, in some sense, competitors, to interact and share with each other. To take advantage of this opportunity and on the principle that domain experts frequently make the most insightful questioners of other experts in their domain, I have also asked each panelist to develop a specific question he or she would like to ask of the others. Following the initial period of ‘introductions and positions’ described above, each panelist will have the opportunity to ask his or her question of the others.

Following these portions of the panel, the floor would be opened to questions and answer and audience participation.

This panel follows and builds on two successful HFES Professional Development panels in recent years. The first, organized by Barry Beith in 1997 and titled “Human Factors and Ergonomics as a Small Business Endeavor”, concentrated on the careers of small HFES business owners, as well as their methods, tips and insights, without emphasizing research. The second, organized by Michael Paley and Jean MacMillan in 1999 and titled “Is there Research off the Tenure Track?”, examined the prospects for HFES research in four different non-academic climates: large corporations, government labs, small businesses and consulting organizations. Each of these panels was well attended and comments from the attendees indicate that the panels were helpful. This panel is intended to round out and extend the previous ones with a more specific focus on research in the small business climate.

### STATEMENTS FROM PANELISTS

Below, we include brief statements from each of the four panelists. These statements are intended to provide a summary of the biographical and ‘position’ information each panelist will provide at the panel discussion—and also to include the question that each panelist wishes to pose to his or her fellow panelists.

**Daniel Serfaty**  
President and CEO,  
Aptima, Inc.

Daniel Serfaty is the principal founder, president and CEO of Aptima, Inc., a human-centered engineering company specializing in human-system interface design and evaluation tools; usability of network-based software products; collaborative team support systems and team performance measurement for distributed systems; computer-based and network-based training and decision support; and re-engineering of large-scale human systems, including organizational design, functional allocation, and performance enhancement. Aptima was founded in December, 1995, and over five years has grown to include more than 40 people with offices in Woburn, Massachusetts and Washington, DC.

Daniel’s academic background includes undergraduate degrees in mathematics/physics, psychology, and aeronautical engineering from the Université de Paris and the Technion, Israel Institute of Technology, an MS in aeronautical engineering (Technion) and an MBA in international management (University of Connecticut). His doctoral work at the University of Connecticut pioneered a systematic approach to the analysis of distributed decision-making in dynamic and uncertain environments. For the last twenty years his research interests have included the application of rigorous modeling and experimental methods to study individual and team decision-making processes, the development of innovative training procedures for teams and individuals, the study of expertise in naturalistic environments, and the application of systems analysis methods for the design of human-machine interfaces in large-scale, complex, and decentralized organizations.

*Research in a small business.* One research advantage for a small business is that we’re faster on our feet—more agile, and able to respond more rapidly—than either a university or an R&D group in a large organization. From a business perspective, we’re usually less expensive than a large company because we don’t have the overhead costs. At Aptima, we have the flexibility to put together multidisciplinary teams that include

specialists who come from many different backgrounds, but are all dedicated to a human factors perspective. Universities are much more “stovepiped” by departments, and large companies also tend to be less flexible in putting together diverse teams. On the “con” side, universities can do basic research, where the timeline is often not too demanding, much less expensively than we can, and they have more time to publish their results. We need to be careful to work at the right level. We can’t do basic research exclusively because universities have an advantage. On the other hand, we don’t have the tools and resources available in large company to do major system development. Our niche is in applied research, and in the early development of prototypes for innovative ideas.

*Question for other panelists.* Do you think the market for what we produce is large enough to encourage cooperation among small businesses, or does it foster competition?

### **Ron Laughery**

President

MicroAnalysis and Design, Inc.

First the biographical information – I’m 47 years old, have a bachelors, masters, and Ph.D. in Industrial Engineering from the State University of New York at Buffalo (thank you Dr. Colin Drury for instilling some of your wisdom in me...), and the son of a University professor who has been active in the human factors profession for about 40 years and who got me connected to the profession when I was still in High School (thank you, Dad!). I started Micro Analysis and Design MA&D 17 years ago (turned in my resignation to my old job on, I’m not kidding, my 30<sup>th</sup> birthday) and the business has grown steadily over the past 17 years. We now have about 60 people and have sustained a relatively steady growth rate of about 19% per year for the last 15 years. Of course, there were a few “big ones” that allowed us to grow so steadily and painlessly (relatively speaking, of course), but mostly it has been just one step at a time. MA&D is heavily involved in human factors in many ways, from usability engineering to workflow analysis to training systems to, what we are probably best known for, modeling and simulation of humans in

systems. We provide consulting services and software products to a wide variety of customers including the Department of Defense, other Government agencies, and a wide variety of commercial companies. While we do work that is somewhat outside of the human factors area, almost everything we do is within the general title of “human/systems integration.”

At the paper session, I will happily expound answers to the questions that are being posed to us, but you’re going to have to come to the session to hear what I have to say on those! However, here, I’d like to offer some of the simple principles that have helped me through the process of building a business. Some of these are quotes that I don’t know the sources, and some I may have made up, but really can’t be sure. Still, they have been useful to me and I would suggest that they might be good things to at least consider:

1. The best marketing you can do is a good job on the work that you have.
2. Your people are your greatest asset – build a corporate culture that reflects their value to the company.
3. Follow the “Eight Attributes of Excellence” from the book *In Search of Excellence* (look ‘em up, they are already sitting on my desk)
4. Reward performance.
5. Relationships between people are at the heart of every business transaction. Build relationships.
6. Next to your people, your reputation as an ethical and customer-oriented company is your most important asset and must be guarded carefully.
7. Make bold promises, but always strive to deliver more than you promised. Delight the customer.

Okay, there are no really new thoughts there and I’m *never* going to get rich or famous writing this stuff, but they do seem to summarize some of the forces that have been shaped MA&D’s history, and I have never regretted adhering to any of them.

*Question for the other panelists:* “What do you think has been your one biggest break in building your business?”

## **Floyd Glenn**

Executive Vice President and Chief Scientist  
CHI Systems, Inc.

I am a principal with CHI Systems, Inc. (Executive Vice President and Chief Scientist) where I lead R&D projects in decision support systems, intelligent training systems, and human performance modeling. After studying applied mathematics as an undergraduate, I combined the study of mathematical psychology and cognitive psychology to obtain a Ph.D. at the University of Pennsylvania in 1977. While still a graduate student, I began working for Analytics, Inc. on human factors technology research, initially on the development of the Navy's Human Operator Simulator (HOS) and on the Office of Naval Research program on Operational Decision Aiding. I left Analytics in 1987 to join CHI Systems, Inc. which had been started by Wayne Zachary shortly before that. Together we led the steady growth of CHI Systems to a current size of about 60 employees and three primary offices that support diverse government and industry clients in the areas of cognitive technologies and custom software systems. In addition to the development of HOS and the micro-model approach to cognitive modeling, my other major multi-year project effort has been in the Navy IE-NATOPS project in which I have led a team of government and contractor researchers in the development of a decision support system for helicopter aircrews to aid in management of aircraft mechanical problems. Probably the most notable success of CHI Systems has been in our development of the COGNET framework for cognitive modeling, which now subsumes all of HOS, and the associated iGEN<sup>TM</sup> software toolset for implementing those models.

I chose to build and work in a small business in order to maintain control over the kind of work that I do and where I do it. My first employer (a moderately small business) had no commitment to human factors as a business area and would not invest in its development. Most other opportunities in this area would have required relocation as well as the risk that the employer's business development interests would eventually differ from mine. Also, I discovered early in my career that I

enjoy the full spectrum of the business, from writing code and running subjects to writing business plans and courting clients – only in a small business can (must) you do it all.

A number of factors have facilitated small business R&D over the past decade – particularly the government SBIR program and the trends toward downsizing and outsourcing by large companies. Of course, most basic research is only supported directly by the government, and the best opportunities at that level are through universities. But there are many possibilities for conducting applied research by a small business, where the advantages of cost, agility, and innovation can be leveraged. And human factors work is always set in some work context, so it is inherently applied in character. I think that a small human factors business is ideally suited to find some of the most interesting application problems and to make important R&D contributions by virtue of the unique small business advantages. To be successful, I think it is important to keep those advantages in mind in developing such a business and try to avoid competing too much in areas where the advantages don't apply.

*Question for the other panelists:* How could we improve the SBIR and STTR programs or create other small business programs to improve small business R&D opportunities with the federal government?

## **Mica Endsley**

President  
SA Technologies, Inc.

SA Technologies is a cognitive engineering firm specializing in the development of operator interfaces for advanced systems, including the next generation of systems for aviation, air traffic control, medicine and military operations. Prior to forming SA Technologies, I was a Visiting Associate Professor at Massachusetts Institute of Technology in the Department of Aeronautics and Astronautics and Associate Professor of Industrial Engineering at Texas Tech University. Prior to 1990 I worked in industry, where my last position was as an Engineering Specialist for the Northrop Corporation, serving as Principal Investigator of a

research and development program focused on the areas of situation awareness, mental workload, expert systems and interface design for the next generation of fighter cockpits.

SA Technologies is much smaller than several of the other companies on this panel. We currently have 7 people, distributed across the U.S. As such, we provide unique and specialized services in research and design for our customers in government and private industry. Having worked in industry for large companies and in academia, I have a good perspective on the pros and cons of doing human factors from the vantage of a small business. While there are some advantages to being in a large company or University, and I have greatly enjoyed both, I have found that the flexibility afforded by the small business climate can far outweigh the disadvantages.

I started SA Technologies four years ago following the unique business model of the internet era. Our personnel and offices are all distributed, relying on the internet and telecommunications for coordination and team management. With a distributed customer base that is not location dependant, and a highly skilled staff, this business model is working quite well. It provides significant personal advantages to myself and our employees. I will discuss the advantages and disadvantages of the

new business model for small businesses in the human factors profession.

Our customer base is broad, including government agencies such as the FAA, NASA, the U.S. Army and the U.S. Air Force as well as private companies in the medical field. Our research and development activities are focused on situation awareness, decision making, automation and design of future systems. We are able to span the range from basic and applied research to systems design and training systems development. The range of opportunities available to us as a small business is probably much larger than what would be available in a University or a large corporation. We have developed a successful business however, by focusing on our unique strengths rather than trying to take on all projects in the field. This has allowed slow and steady growth while maximizing job satisfaction for us all.

I don't think there are any real shortcuts or secrets to starting your own small business in this field. The most important thing is to keep your customers happy with quality work, and you will continue to have a steady stream of business. The rest can be learned and there are numerous resources out there that make the job much easier.

*Question for the other panelists:* Is there an optimal size for businesses like ours?