DR. CRAIG MILLER
Partner

Specialty:

Strategic planning for advanced technology
Marketing and sales of advanced technology
Development and assessment of emerging technologies with emphasis on commercialization in the following areas:
- Electrical generation and transmission
- Manufacturing technologies
- Energy conservation technology
- Electronic devices
- Environmental technologies
- Information technology (particularly advanced architectures and web services)
- Trading systems
- Derivative instruments

Applied mathematics and modeling
Software Development

Summary:

In Craig Miller's role as a partner in the MAPA Group, he focuses on the development, evaluation, and commercialization of advanced technology and development of corporate strategy for development and investment. His experience for this role is nearly 30 years of work developing cutting edge systems. More than 1000 companies in the U.S. use systems he has architected or developed. These systems range from a compiler for a specialized simulation language for modeling the handling of nuclear waste, to large scale EDI with elements of artificial intelligence, to many integration applications using Internet protocols.

He has participated in five startups, four of which were commercially successful. These include:

- Energy and Resource Consultants
- RRR Leasing (office and equipment leasing)
- Document Control (desktop publishing service)
- CATEX (an online reinsurance exchange),
- GreenOnline, an online marketplace for environment commerce (still in process)

He holds a Ph.D. in Systems Engineering from the University of Virginia and in 1998 was awarded a gold medal by the Smithsonian Institution for "heroic achievement in the advancement of information technology".

Education:

University of Virginia, Ph.D. Systems Engineering, 1980
Area of research was decision-making under uncertainty
University of Virginia, M. Eng., Systems Engineering, 1975
Wilkes College, B.S. Physics, 1973
Independent research in the area of artificial intelligence with emphasis on artificial neural networks

1775 Pennsylvania Avenue, NW, Suite 1050
Washington, DC 20006
Tel: (202) 463-7744
Fax: (202) 955-5791

Career:

Dimension Data, *Chief Technology Officer for North America and Global Chief Architect,* 2000 - 2004

Dimension Data is a $2.5 billion global system integration firms. As the CTO for North America, and Director of Technology for Global Strategy, Craig Miller was responsible for setting the strategic technical direction for the company. His specific responsibilities included:

- providing the technical face of the company to partners, investors, analysts, and technology providers,
- consulting on the technical architecture of innovative or complex problems,
- evaluating new technologies and technology trends,
- identifying and researching trends in technology and the market for IT services to position the company's service offerings,
- identifying and qualifying technical partners and helping to develop and maintain these relationships,
- leading development of the company's project methodologies
- selecting and maintaining the development tools used by the company including code generators, requirements analysis tools, code checkers, version control, documentation, and load testing systems,
- business development, including marketing presentations and proposal writing,
- developing reference solutions to guide technical work across the company,
- establishing and operating the company's laboratories, and
- teaching, motivating, and advocating for the company's technologists.

Craig Miller retained Dimension Data as a consulting client on his departure to found Muybridge.

Science Applications International Corporation, *Chief Scientist and Vice President,* 1986 - 2000

While at SAIC, Dr. Miller managed the Modeling and Analysis Division with P&L responsibility. He achieved or exceeded all targets for profitability and growth. He led or contributed to more than $300 million in contract wins while at SAIC.

After successful management of the Modeling and Analysis Division, he was promoted to the position of Chief Scientist, with concentration on electronic commerce. In this role he consulted on projects across the company and established SAIC's Electronic Commerce Rapid Application Development Laboratory (EC RADLab™), defining its mission, establishing its organization and infrastructure, recruiting its members, and building its trademark RAD methodology.

The mission of the EC RADLab was to develop methodology and tools for e-commerce applications and to serve as an incubator for e-commerce ventures within and outside of SAIC. The laboratory generated substantial new technology focused in the area of trading of complex instruments (e.g.) contracts. It also helped create CATEX™, the first and highly successful online reinsurance exchange, and GreenOnline™, an online market for products and services related to the environment. SAIC retained an equity interest

1775 Pennsylvania Avenue, NW, Suite 1050
Washington, DC 20006
Tel: (202) 463-7744
Fax: (202) 955-5791

in both ventures. Dr. Miller was the first Director of Trading Operations for CATEX, which operated as neutral reinsurance intermediary regulated by the New York State Insurance Commission.

For his work on CATEX, Dr. Miller received a reward in 1998 from the Smithsonian Institution for "Heroic Achievement in the Advancement of Information Technology". Craig Miller also received the 1999 SAIC award for outstanding technical performance for his work on CATEX.

While at SAIC, Craig Miller served as the technical lead on several large and complex multi-year projects, breaking new ground in the areas of EDI, cryptography, and modeling.

He led the company's $25 million dollar engagement for the Energy Information Administration with a staff of 100+. The project produced more than 2,500 deliverables, and provided the basis for winning the competition for the follow-on contract with a perfect score.

In 1987 Dr. Miller architected PEDRO, the Department of Energy's first and premier electronic data collection tool. PEDRO has operated without interruption for 14 years. The current Internet-based version is used by more than 2000 companies. The architecture of PEDRO, which combines EDI with elements of artificial intelligence, has been documented as a model of electronic data collection done right. It broke new ground in the areas of data error detection and correction.

The Clean Air Act Amendments of 1990 established the legal foundation for the first large-scale air pollution emissions market. With passage of the act, Craig Miller shifted his work at SAIC from the energy sector to the environmental sector to work on implementation of that market, pursuing his interest in economic approaches to environmental problems. Dr. Miller architected the three key electronic components of the marketplace – (1) the system that issues allowances and tracks trading, (2) the system that certifies the emissions monitoring systems at power plants, and (3) the EDI and AI systems that collect and audit emissions data. He also led the development team. All three systems came on line on November 15th, 1994, precisely on the date set by Congress. The system has operated without error since that time, provides the backbone for the $30 billion emissions allowance market, connects more than 2,000 power plants, and collects and validates more than 20 gigabytes of data annually with a minimal staff.

Energy and Resource Consultants, Inc., *Co-Founder and Vice President,* 1981 – 1986

In 1981 Craig Miller started Energy and Resource Consultants with three partners. The company grew rapidly through its sale in 1986 to Hagler Bailly. ERC was an intellectual leader in energy and environmental policy studies for the public sector. Private sector work was concentrated in the energy industry, particularly electric utilities. Services included modeling, economic analysis, and energy engineering. Dr. Miller led the company's modeling and engineering services. He also developed, maintained, and operated all of the company's internal information systems.

1775 Pennsylvania Avenue, NW, Suite 1050
Washington, DC 20006
Tel: (202) 463-7744
Fax: (202) 955-5791

University of Colorado, *Visiting Professor of Computer Science*, 1981 – 1982

Energy and Environmental Analysis, Inc., *Senior Scientist*, 1976 – 1981

Project Experience:

Energy

- Design of an integrated energy management technology for incorporation of alternative power (wind, photovoltaics, fuel cells and small-scale wind and hydro turbines) and demand side management in residence and small-scale commercial premises.
- Development of a model for predicting the market penetration and potential for new fossil fuel technologies (for the Energy Research and Development Administration)
- Development of a model for predicting the value of research into conservation and solar technologies. Analysis of the Department of Energy's research program in these areas (independent dissertation research and funded research for the Department of Energy)
- Estimation of the coal reserves in Wyoming. This project involved the development of new computer code for the first commercial application of least-absolute-value regression, a technique that places less weight on outliers than does least-squares regression
- Assessment of the potential for low-flow hydro-electrical generation in the State of Colorado
- Assessment of the potential energy savings from conversion of master (whole building) energy meters to meters on individual apartments (for the Pacific Gas and Electric Company)
- Development of algorithms for estimating the energy efficiency appliances and HVAC equipment in use from readily observed parameters without monitoring (for the Pacific Gas and Electric Company)
- Development of a tool for the analysis of the proximity of energy facilities to environmentally, culturally, and economically sensitive areas. The project involved the development of software to link databases to GIS systems prior to this linkage being available
- Development of tools for the assessment of the vulnerability of U.S. Energy Facilities to terrorist attack
- Economic analysis of private low-head hydro-development project in East-Central Colorado
- Development of a model to predict the electrical load of air-conditioners as a function of ambient temperature patterns (for the Electric Power Research Institute)
- Assessment of the total worker health and safety impacts of alternate forms of electrical generation. This project involved a novel use of input/output analysis
- Adaptation and Implementation of an electric utility dispatch model for the Colorado Public Utility Commission
- Assessment of the state and prospects of the Ras Kiviter oil shale refinery in Khotla Jarva, Estonia prior to international investment

1775 Pennsylvania Avenue, NW, Suite 1050
Washington, DC 20006
Tel: (202) 463-7744
Fax: (202) 955-5791

Environment

- Evaluation of potential projects for international investment in environmental cleanup in Egypt, Czech Republic, Slovakia, and Bulgaria. The work spanned a period of about two years. It focused principally on district heating facilities, but included one large power plant, one aluminum plant, two steel mills, several coking facilities, one paint factory, and a recycling facility.
- Evaluation of the environmental impact of a proposed pharmaceutical plant outside Moscow for a major U.S. pharmaceutical company. The work involved developing the first summary of combined U.S. and Russian environmental monitoring and emissions standards for a facility of this type.
- Development of the first model for assessing the cost and impact of emissions trading systems. This project involved the first application of the Senju-Toyoda heuristic algorithm for the solution of extremely large-scale binary integer programming problems. The study established the potential for a 90% reduction in the cost of meeting ambient air quality standards when compared with technology-based standards
- Assessment of the health impacts asbestos cement pipe in municipal water systems
- Assessment of the feasibility, costs, and impacts of particulate controls for residential diesel automobiles (for Daimler Benz)
- Analysis of the impacts of lead in gasoline on human health, laying the foundation for the phase-out of lead in gas

1775 Pennsylvania Avenue, NW, Suite 1050
Washington, DC 20006
Tel: (202) 463-7744
Fax: (202) 955-5791