

J. MICHAEL MUNROE

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PROFILE: Experienced strategic product manager with over 18 years in the electronics arena. Highly developed problem solving skills. Recognized by peers as an expert on Eurocard chassis design and connectors. Active in the international standards community. Provided vision, which established direction for company's long-term growth and profitability. Cross-company collaborator, product designer; technical writer; presenter; trainer; standards development.

PROFESSIONAL EXPERIENCE

ELMA Bustronic Corp, a Subsidiary of ELMA, Switzerland
TECHNICAL PRODUCT SPECIALIST - December 2004 - Present

Reporting to the engineering manager of the Fremont, CA based backplane division. I am responsible for supporting field sales and also responsible for pioneering within the mid-Atlantic region to develop custom backplane business. I also continued Elma-Bustronic on industry committees developing new standards for the embedded computing market. I served on the board of directors of PICMG and the BizCom committee of the VME International Trade Association.

I have been responsible for innovating new backplane solutions for the VXS and VPX industrial architectures. I chaired the VITA 41.7 committee where Processor VXS architecture was standardized and was the draft editor of VITA 41.6 - Control Plane on VXS. I also served on the OpenVPX Technical Steering Committee and was a member of the VITA 65 Technical Working Group. In conjunction with that effort, I received a plaque from the VITA Committee Chair, "For your invaluable contributions towards the successful completion of ANSI VITA 65-2010."

Bustronic Corp, a Subsidiary of ELMA, Switzerland
TECHNICAL PRODUCT SPECIALIST - September 2003 - December 2004

Report to the general manager of this \$ 7 million backplane division of this global manufacturer of backplanes, Eurocard subrack hardware, front panel accessories and rotary switches. Responsible for a new signal integrity initiative, mentoring the SI engineer, representing Bustronic Corp on numerous standards and providing technical back-up to regional sales.

ERNI Components, Inc., Chester, VA. A Subsidiary of ERNI Holding AG, Switzerland
DIRECTOR, BUSINESS DEVELOPMENT 1999 - July 2003
DIRECTOR of MARKETING November 2001 - November 2002 (temporary assignment)
STRATEGIC PRODUCT MARKETING MANAGER 1997 - 1999
PRODUCT MANAGER, June 1995 - 1997

Report to the vice president of manufacturing of this \$75+ million global manufacturer of electronic connectors, enclosures & bus interface connectors. Responsible for product management, applications engineering, and research and development as well as business and product development, marketing strategies and partner development activities. Coordinated development activities with the German sister company, ERNI GmbH. Worked closely with the executive team, engineers, product managers, sales force and manufacturing managers.

Significant Responsibilities:

- Established a close relationship with the VME International Trade Association (VITA) and the PCI Industrial Computer Manufacturer's Group (PICMG) and worked to propose ERNI products as part of new computer architecture standards.

- Established close relationships with other connector manufacturers that culminated in the formation of a connector consortium, which jointly obtained legal advice regarding patent and licensing issues, related to the proposed VME64x connector.
- Worked with other competitors to create market acceptance for the 2mm IEC 61076-4-101connector family and coordinate the development of new 2mm products such as the Type AB shroud and transition card connector.
- Monitored other architecture development special interest groups such as Saleable Coherent Interface (SCI), Small Form Factor (SFF), RaceWay Interlink, Miracom and others, and advised ERNI's development group about market opportunities.
- Worked with the marketing communications manager to develop a new style of product literature, which served the needs of engineers working within specific new computer architecture.
- Initiated a close collaborative relationship with a major competitor, developed several product concepts and coordinated development activities that resulted in a joint teaming relationship and the introduction of a major new connector offering.
- Developed a close collaborative relationship with one of the best known and respected public figures in the field of high-speed digital signal propagation. Established a long term consulting agreement and implemented a new high-speed characterization methodology that strengthened our relationship with corporate technology partners.
- Secured an exclusive license for a 2mm HM compatible power connector and introduced it into the N. American market.
- Conceived, registered and established a joint website to promote the ERmetZD and Z-PACK HM-Zd connector.

Product Development Activities:

- Led the development of a complete line of modified 2 mm connectors, which established ERNI as a leading supplier of CompactPCI components.
- Developed a relationship with a supplier of custom high performance cable assemblies and worked to jointly develop a cable connector compatible with the ERNI ERmet line of 2 mm connectors.
- Developed the concept and product goals for a next generation, high-speed differential connector. Coordinated the collaborative efforts of ERNI and Tyco Electronics at four locations worldwide which was successfully tooled and promoted, leading to its adoption for PICMG 3.0, PICMG 2.20 and VITA 34 as well as for numerous commercial applications.
- Worked with engineers in our sister company to design, tool and license an ERNI version of the Tyco UPM power connector.
- Conceived a product format and manufacturing method for a new high-speed differential cross-connect connector compatible with the ERmet ZD/XT.

Hybricon Corporation, Ayer, MA
STRATEGIC MARKETING MANAGER, 1992 - 1995

Reported to the vice-president of sales and marketing of this \$ 7+ million manufacturer of back planes (Futurebus, VME, MBII) and enclosure assemblies. Principal technical specialist for significant opportunities. Responsible for pricing custom enclosures, handling customer calls and providing technical support for sales staff and manufacturers' representatives.

Significant Responsibilities:

- Introduced the Hybricon Fast Response Futurebus power supply and backplane to the industry.
- Identified new opportunities and led Hybricon to become an executive member of the PCI Industrial Computer Manufacturer's Group (PICMG).
- Developed strategic alliances with customers and vendors, i.e. SAIC & Hewlett-Packard, ETRI and Rittal
- Represented the company on relevant industry committees such as IEEE & VITA-during which time Hybricon became recognized as a leader in the design and simulation of telecom backplanes. Also during this time was elected vice-chair of the VITA Standards Organization (VSO).

Carlo Gavazzi (formerly Mupac Corporation), Brockton, MA

MICROS PRODUCT MANAGER, 1991-1992
PRODUCT SPECIALIST, 1988-1991

Reported to the vice president of sales & marketing of this \$25 million manufacturer of subrack and backplane assemblies. Responsible for initiating new product development such as: card guides, new extrusions, hot swap backplanes; Sun SPARC overlay modules, extended VSB backplanes, and Futurebus backplane design improvements. Worked closely with engineering to contract outside testing services. Primary responsibility for final costing of significant backplane opportunities, i.e. Motorola, with 8 different designs and 8,500 units annually. Responsible for costing company's first sub rack assembly contract, which had a value of \$1.1+ million annually.

AEG Corporation, Somerville, NJ (formerly known as AEG Telefunken Corp.)
A subsidiary of Daimler Benz, Germany
PACKAGING ENGINEER, 1986-88

Reported to the INTERMAS (tm) sales manager for this US subsidiary of the multibillion-dollar European manufacturer of electrical and electronic equipment and components. Helped establish a US sales operation for powered Eurocard chassis systems. To meet market demand, established & supervised in-house manufacturing group to modify standard products to customer specifications. Worked with OEMs to design and specify systems comprising card cages, power supplies, fans & backplanes. Designed special custom parts and modified existing parts. Supervised in-house assembly and interfaced with outside vendors fabricating some components.

AEG Telefunken Corporation, Somerville, NJ
A subsidiary of AEG GbmH, Germany
APPLICATION ENGINEER, 1984-1986

Reported to the sales manager for the new technology group. Provided applications engineering support for photovoltaic system installation, supported manufacturer's representatives in the marine hardware industry, prepared quotations for public and private photovoltaic demonstration projects, traveled to make presentations and demonstrate the company's product line of polycrystalline silicon solar cells. Served as the liaison to the United Nations Renewable Energy Department in support of a photovoltaic powered vacuum desalination and water purification project on the Red Sea.

Tech-Search, Newark, DE.
Owner/President, 1982-1984

A private contracting and mechanical development company. Fabrication of marine hardware and custom specialty items.

SES Incorporated, Shell Oil Company, Newark, DE.
PRODUCTION TECHNICIAN, 1979-1982

Reported to the director of manufacturing of this thin film photovoltaics manufacturing company. Responsible for process development of and technical support of various mechanical processes. SES was devoted to the commercialization of a process to manufacture thin film Cadmium Sulfide Copper Sulfide solar cells on a coated steel substrate with a chemically tempered glass cover.

Institute of Energy Conversion, University of Delaware, Newark, DE.
RESEARCH TECHNICIAN, 1977-1979

Member of group developing photovoltaic devices. Responsible for maintaining vacuum deposition equipment, designing necessary fixtures and performing various experimental deposition experiments in high vacuum. Also responsible for coordinating the installation of basic electrical and plumbing services when the institute moved to a new location.

W. L. Gore Associates, Newark, DE.
MACHINIST, 1973-1977

Member of the development group at the headquarters of this \$ 50 million worldwide manufacturer of medical film, Gore-Tex (tm) and flat cable. Worked as a machinist teamed with the principal development engineer to develop vertical tape wrappers, wire washing equipment, reel to reel knife coaters for polyester film, and lamination equipment.

EDUCATION

Lehigh University, 1971-73. State of Delaware Machinist Program, 1980-83 MicroCad Inst., 1987.
Electrical Engineering Delcastle Vo-Tech Cambridge, MA.

PROFESSIONAL AFFILIATIONS

1994-Present PCI Industrial Computer Manufacturer's Group – (Secretary-Treasurer 1999 - present)
1991-Present VITA Standards Organization (Vice-chair 1995)
1992-2002 Institute of Electrical and Electronic Engineers – Computer Architectures
2002-Present Institute of Electrical and Electronic Engineers - Microwave Theory and Methods Society
2004-Present VITA Business Communication Committee
2005-Present PXI Alliance Marketing Team

ARTICLES

M. Munroe "The Packaging Design Equation", *I&CS*, May Issue, 1987.
M. Munroe, D. Dai, M. Hayward, "Futurebus+ Trouble Report Noise at 2.1V", *Futurebus+ Design Magazine*, September/October, 1992.
M. Munroe, D. Dai, "SPICE Simulations of a Connector Matrix", *Futurebus+ Design Magazine*, (unpublished) 1993.
M. Munroe "Viewpoint - No Time for Standards", *VITA Journal*, March, 1995.
M. Munroe "Standards Time - Take a Spin at ATM", *OEM Magazine*, April, 1995.
M. Munroe "Connecting the Expanding Backplane", *Connector Specifier*, March, 1996.
M. Munroe, M. Canestrano, "Choosing a 2-mm Connector", *Electronic Products*, January, 1997.
M. Munroe, R. Modinger, "High Performance Connectors", *Electronic Design*, February 3, 1997.
M. Munroe, "CompactPCI: An Overview", *TIPCIC Proceedings*, October, 1997.
M. Munroe, "Mechanical Considerations for CompactPCI and H.110 in Telecom", *TIPCIP Proceedings*, October 1997.
M. Munroe, "Higher Densities Require New Connector Contact Designs", *ECN-Connector Supplement*, February 2001
M. Munroe, T. Young "RJ45 Ethernet Connectors Pack in Wireless Power and Data", *Connector Specifier*, July 2003
(Wrote and illustrated this modular jack article)
M. Munroe "Backplane Design Moves to Center Stage", *E.E. Times*, March 8, 2004
M. Munroe "Fast Buses Impact Backplane Design", *EE Product Center*, March 15, 2004
M. Munroe, J. Moll "Giving VME B/Ps a Shot in the Arm," *VMEbus Systems*, June 2004
M. Munroe "Power Management: It's in the System", *RTC Magazine*, December 2005
M. Munroe "VXS Processor Mesh Architecture: Powerful, Flexible, Compatible", *RTC Magazine*, April 2006
M. Munroe "VXS Processor Mesh: An Ultra-High Bandwidth Configuration for VXS" *VMEbus Sys.Mag.*, June-July 2006
M. Munroe "VPX and the Brave New World of Hybrid Backplanes", *RTC Magazine*, May 2007
M. Munroe "3U VPX: Small, Rugged and REDI" *RTC Magazine*, September 2007
M. Munroe, J. Child, "The 10 Gigabit Challenge", *Open Architecture Review*, May 2010
M. Munroe, T. Williams, "OpenVPX – An Overview of the New Standard", *RTC Magazine* June 2010
M. Munroe, K. Grob "Navigating the OpenVPX Standard" – Ghost contributions , *RTC Magazine* September 2010

WHITE PAPERS

"The Bus Architecture Cheat Sheet", Internal Mupac White Paper with M.Thompson, 1992.
"Cooling Systems - A Tutorial", Internal Hybricon White Paper, April, 1994.
"Simulating the 4 Row Futurebus+ Connector System", Hybricon White Paper - November 1994
"PCI Peripheral Component Interconnect", Internal Hybricon White Paper, March, 1995
"Bus Architecture Cheat Sheet" ERNI White Paper, with M. Thompson, updated April 1996
"Why Collaborate" ERNI White Paper - AMIRX regarding Switched Fabric Architectures, September 2002
"An Argument for Standard Architecture Development or Why Meshed Fabrics," April 2003
"Will the Backplane and Daughter Card Contacts Make Contact," July 2003
"The Standards List," extensive listing of embedded computer standards, <http://groups.yahoo.com/group/StandardsMM/>

“10G Ethernet Over Copper,” June 2006

“VXS Utility Bus Proposal” Proposal to VITA 41.6 to Solve IPMB Congestion, July 2006

“Interconnect Channel Topologies and Glossary” March, 2008

SIGNIFICANT CONTRIBUTIONS TO THE FOLLOWING SPECIFICATIONS

IEEE 1101.2 Mechanical Core Specification for Conduction Cooled Eurocards - Working Group-IEEE - July, 1991.
Live Insertion Board Level for the VMEbus ANSI/VITA P1.3 -Working Group-VITA - 1992.
IEEE Std 896-5-1993 IEEE Standard for Futurebus+ Profile M (Military) - Working Group-VSO - November, 1993.
ANSI/VITA 1-1994 American National Standard for VME64-VSO - April, 1995.
ANSI/VITA X.X RaceWay Interconnect Specification - Working Group-VSO - 1995.
ANSI/VITA 1.1 VME64 Extensions Standard - Working Group- VSO -February, 1995.
IEEE P1101.11 Draft Standard for Rear Plug-In Units – IEEE December, 1996.
IEEE P1101.10 Draft Standard for Additional Mechanical Specifications for Microcomputers, IEEE January, 1997.
VITA 31 High Speed Serial I/O for IEEE 1101.10 Architectures – uses ERmet HM 2mm Connector- VSO
VITA 34 Next Generation Switched Fabric – selection of ERmetZD connector- VSO
PICMG 2.5 CompactPCI Telecom Specification - Working Group and Executive Committee- PICMG - May 1998
PICMG 2.0 R.3 CompactPCI CORE Specification – Working Group and Executive Committee- PICMG -June 1999
ANSI/VITA 30-200X D0.1a – 2 mm Connector Practice for Euroboard Systems- VSO - July 2001
PICMG 3.0 AdvancedTCA Specification – Editor of Appendix A – Data Transport Connector- PICMG - 2002
ANSI/VITA 40-2003 – “Service Indicators” – Working Group –VSO - 2003
ANSI/VITA 41-2004 – Switched Serial P0 Bus on VME VXS - Working Group –VSO -January 2005
PICMG Exp0 CompactPCI Express – Working Group and editor of the ADF connector appendix- PICMG - 2004
ATCA300 – Helped bring this standard activity to Working Group status –PICMG - 2004 to present
CompactPXI Express PXI 2.0 – Working Group and Appendix editor – PXI Alliance – 2005
VITA 41.7 Processor Mesh – Working Group Chair – VSO – February 2006
PICMG Interconnect Channel Characterization Committee – Working Group Chair –VSO 2006 – present
PICMG 41.6 Gigabit Ethernet Control Plane on VXS – Draft Editor – VSO - October 2007
ANSI-VITA 46.0-2007 VPX Baseline Standard – Significant Contributor – VSO – October 2007
ANSI-VITA 65-2010, OpenVPX System Specification – Recognized as a Significant Contributor - VSO – June 2010

MAJOR SEMINARS AND PRESENTATIONS

Photovoltaic Power Systems - Washington Water Power - Spokane, WA - 1985.
Photovoltaic Systems by AEG - MIT Strong Conference - Cambridge, MA 1985.
VME Packaging Seminar - McDonnell Douglas - Kansas City, MO - 1994.
Futurebus Power Supplies Strategies Symposium - Hybricon, CCT, Futurebus+ Systems - Ayer, MA - 1993.
A Fast Response 2.1 v Power Supply - US Navy FB+ Conference - Arlington, VA - 1994.
2mm H. M. Connectors - Seminar - UB Networks, Cambridge, MA 1996.
2mm H. M. Connectors - Seminar -Mupac - Brockton, MA - July 1996.
2mm H. M. Connectors - Seminar - Schroff - Warwick, RI - July 1996.
CompactPCI-The ERNI Story - Wescon - San Diego - October 1996.
CompactPCI Packaging - Seminar - TIPCIC- Framingham, MA - December 1996.
CompactPCI Connectors - Seminar - Real Time Conference -Santa Clara - January, 1997.
CompactPCI: Why? - Seminar - Montreal and Ottawa - October, 1997.
CompactPCI Overview - Seminar - TIPCIC- Framingham, MA - October, 1997
The Next Generation -10 Row ERmet - Press Conference - Wescon - Santa Clara - November 1997
Coupling in 2mm Connectors and New Connectors for H110 Telecom Applications - Stuttgart – 1998
The Next Generation ERmet Connector – Nortel – Ottawa, October 2000
Joint Tyco Electronics-ERNI Components Press Conference – DesignCon, Santa Clara January 2001
The Next Generation 3-5 Gigabit Capable Differential Connector: Alcatel-Stuttgart, Juniper Networks-Santa Clara, Cisco Systems-Santa Clara, Luminous Networks-Fremont, IBM-RTP, Cisco-RTP, Tellabs-February 2001
ERmet ZD Connector, PICMG Plenary Mtg, joint ERNI Tyco Presentation, Chicago, Nov 2001
10 GHz SMT Daughter Card Attachment – Optical Internetworking Forum, Physical Link Layer W.G., June 2003
Next Generation Bus Architectures – Bustronic Seminar – Tewksbury, MA – October, 2004
Next Generation Backplane Architectures – General Dynamics, Taunton, MA, March 2005
AdvancedTCA Platform, Shelf Mech., Power, Cooling and Fabric Arch. – SeverBlade Summit, Santa Clara March, 2005
VXS Backplane Update – Bus & Board Conference, Long Beach February 2006
Backplane Technology Update – ACT Technico Global Sales Meeting, Warminster, PA, May 2006
Next Generation Bus Architecture Update –Northrop Grumman – Baltimore, MD, 2007

OpenVPX Introduction – Industry Webcast – Panelist - Open Systems Media, December 2009

Challenges Harnessing Next-Gen Open VPX Architecture– Moderator - RTECC- Santa Clara, CA January 2010

What are Open VPX Profiles – Panel Discussion – Moderator – RTECC –Melbourne, FL – March 2010

Introduction to OpenVPX – Seminar – RealTime Embedded Computing Conference – Boston, MA – May 2010

OpenVPX versus VITA 46 – Training Session – Session Presenter – Elma Electronic Intl. Training – September 2010