



Celebrating 25 Years

Jessica Isquith, PICMG President

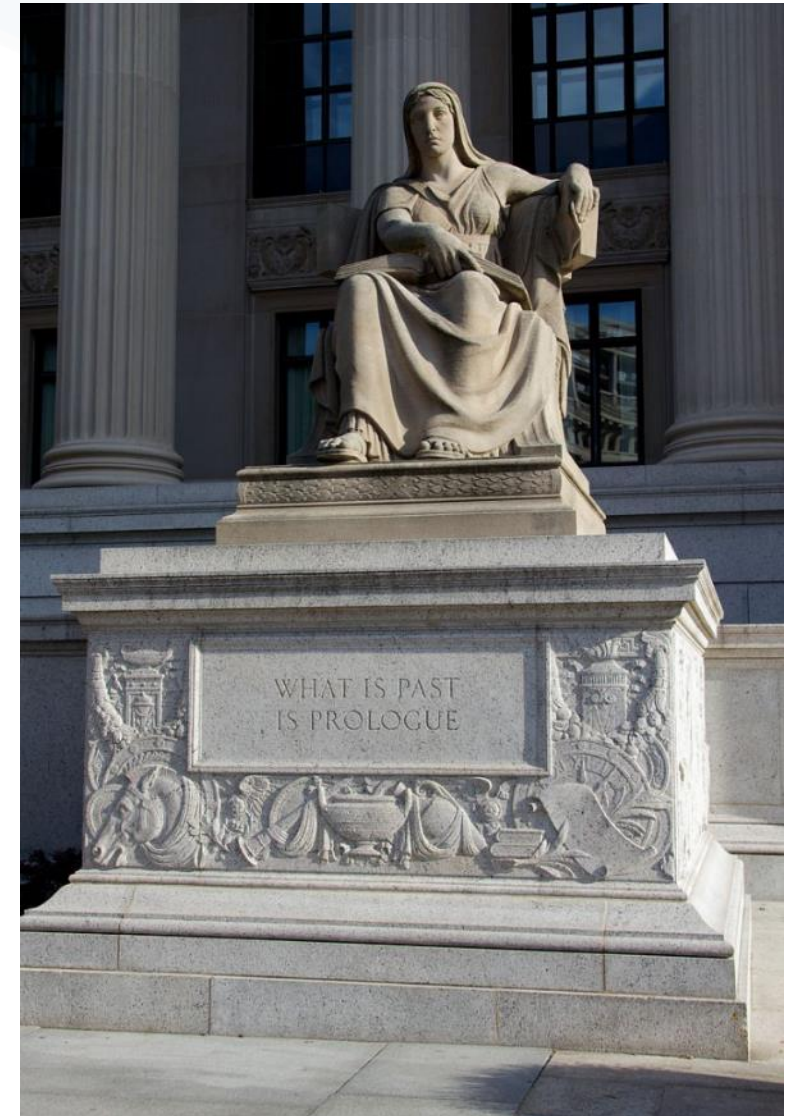
What's Past is Prologue

New Officers Introduction

- Valerie Andrew
- Dylan Lang

Re-elected Officers

- Doug Sandy
- Justin Moll



[National Archives Building](#) in Washington, DC



Overview: 25 years of Specifications

- Modular
- Scalable
- Interoperable

- 100s of participating companies
- 100s of thousands of work hours
- Global organization
- Over 50 specifications
- Billions of dollars in PICMG compliant products

CompactPCI[®]
Serial

μTCA[®]

CompactPCI[®]

SHB Express[™]

Advanced TCA[®]

COM
Express[®]

HPM, eAPI, PICMG 1.0



PICMG Timeline

| Spec Family | 1994 1995 | 1996 1997 | 1998 1998 | 2000 2001 | 2002 2003 | 2004 2005 | 2006 2007 | 2008 2009 | 2010 | 2011 | 2012 2013 | 2014 2015 | 2016 2017 | 2018 |
|--------------------------|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------|--------------|--------------|--------------|-------------------------|------|
| PICMG 1.0 | Moved all of the components normally located on a PC motherboard to a single plug-in card or SBC (SHB added PCI Express slots) | | | | | | | | | | | | | |
| SHB Express | 1.0 | | | | | 1.3 r1 | 1.3 r2 | | | | | | | |
| CompactPCI | CompactPCI 3U & 6U Euro card , PMC specifications family | | | | | | | | | | | | | |
| | 2.0 | | 2.3 | 2.16 | | | | | | | EXP.0 | | | |
| AdvancedTCA | Advanced Telecommunications Computing Architecture | | | | | | | | | | | | | |
| | | | | | 3.0 | | | 3.3 | | | | 3.7 | 3.1 r3 | |
| MicroTCA | Modular, open specifications for building high performance switched fabric computer systems in a small form factor | | | | | | | | | | | | | |
| | | | | | | | MTCA.0 | MTCA.1 | MTCA.3/4 | MTCA.2 | | | | |
| AdvancedMC | Family of mezzanine card specifications for AdvancedTCA and MicroTCA | | | | | | | | | | | | | |
| | | | | | | AMC.3 | AMC.2 | AMC.4 | | | | | | |
| HPM | Hardware Platform Management specifications augment management layer of three key PICMG platforms: AdvancedTCA, AMC and MTCA | | | | | | | | | | | | | |
| | | | | | | | HPM.0 | | | | | HPM.2 | HPM.3 | |
| CompactPCI Serial | High speed serial interconnects while maintaining CompactPCI mechanical specifications and backwards compatibility with older I/O cards | | | | | | | | | | | | | |
| | | | | | | | | | | CPCI-S r1 | | CPCI-S r2 | cPCI Serial Space | |
| COM Express | Computer On Module (COM) single board computers family of specifications | | | | | | | | | | | | | |
| | | | | | | COM.0 r1 | | | | COM.0 r2 | | | COM.0 r3 | |



Markets Served

| | COM Express | CompactPCI | CompactPCI Serial | HPM | MicroTCA / AMC | AdvancedTCA | SHB |
|-----------------------|-------------|------------|-------------------|-----|----------------|-------------|-----|
| Aerospace | X | X | X | X | X | | |
| Defense | X | X | X | X | X | X | X |
| Drones / UAV | X | X | X | X | X | | |
| Energy | X | X | X | X | X | | X |
| Gaming | X | | | | | | |
| Industrial Automation | X | X | X | | X | | X |
| IIoT | X | X | X | | | | |
| Medical | X | X | X | X | X | | |
| Physics | | | | X | X | X | X |
| Railway | X | X | X | X | X | | |
| Telecommunications | X | | | X | X | X | |
| Test / Measurement | X | X | X | X | X | X | |



AdvancedTCA & MicroTCA Today

AdvancedTCA®



Spinoff Specifications



μTCA®



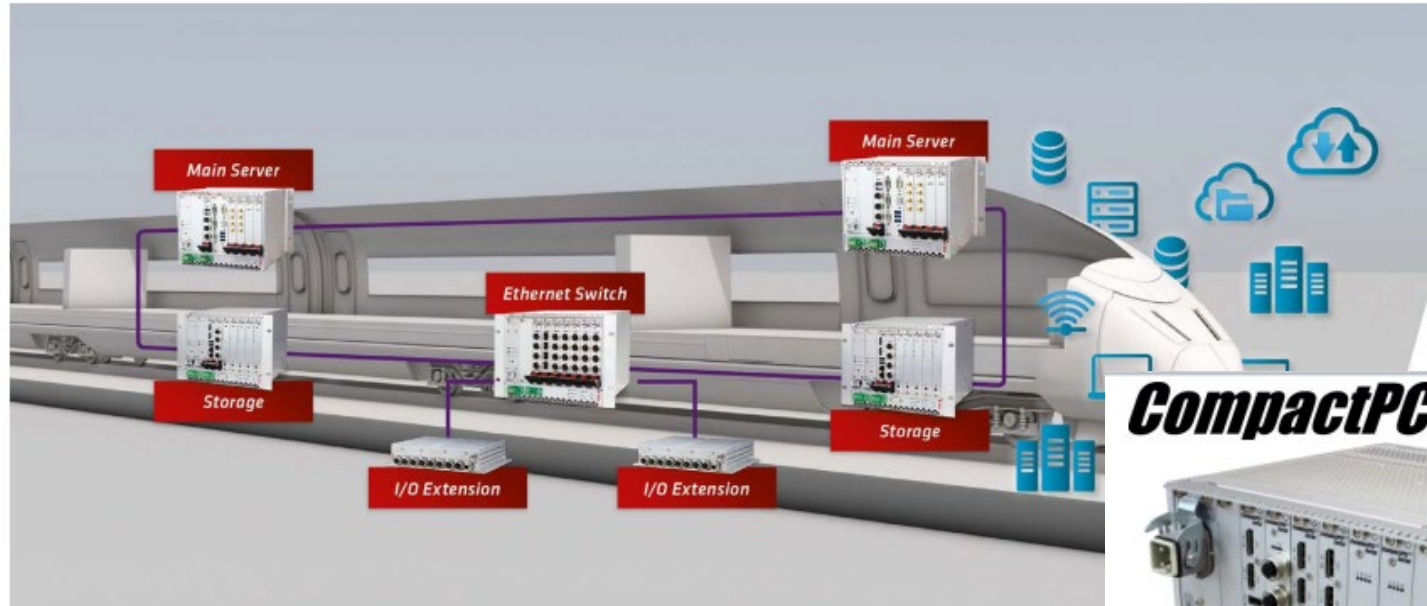
AdvancedMC®





CompactPCI Serial / CompactPCI Leads the Way

CompactPCI on Mars!



CompactPCI[®] Serial



CompactPCI[®]





COM Express is Everywhere!



Figure 1. TQ industrial IoT platform concept addresses individual gateway, industrial firewall, edge server and AI solutions.



Figure 3. The MBax-ADV is equipped with four independent Gigabit Ethernet ports and is therefore suited for industrial firewall applications. The compact size and the robust housing addresses use cases within the harsh factory floor environment.



Figure 2. A modular approach enables scalability and flexibility. The TQ standard carrier board MB-M10-1 in combination with COM Express Mini modules like Intel Atom based TQMx38M builds the heart of very compact, robust and powerful IoT applications.



Figure 4. The carrier board MB-COME6-3 is designed for COM Express Type 6 modules and offers PCIe x4 and PCIe x16 high bandwidth connectivity to add-on cards which are used in high-performance AI solutions, for example.



◀ ICES 5100

Intel® Core™ i5-6300U processor

Single DIMM with two channels up to 32GB max DDR4 2133MHz



TQ IoT Solutions based on COM Express

COM Express® basic

COM Express® compact

COM Express® mini



Nexcom



IIoT: familiar territory for PICMG



**Industrial
Automation**



Transport



Utilities



Medical



**Defense &
Aerospace**

Internet of Things techniques applied to industrial applications

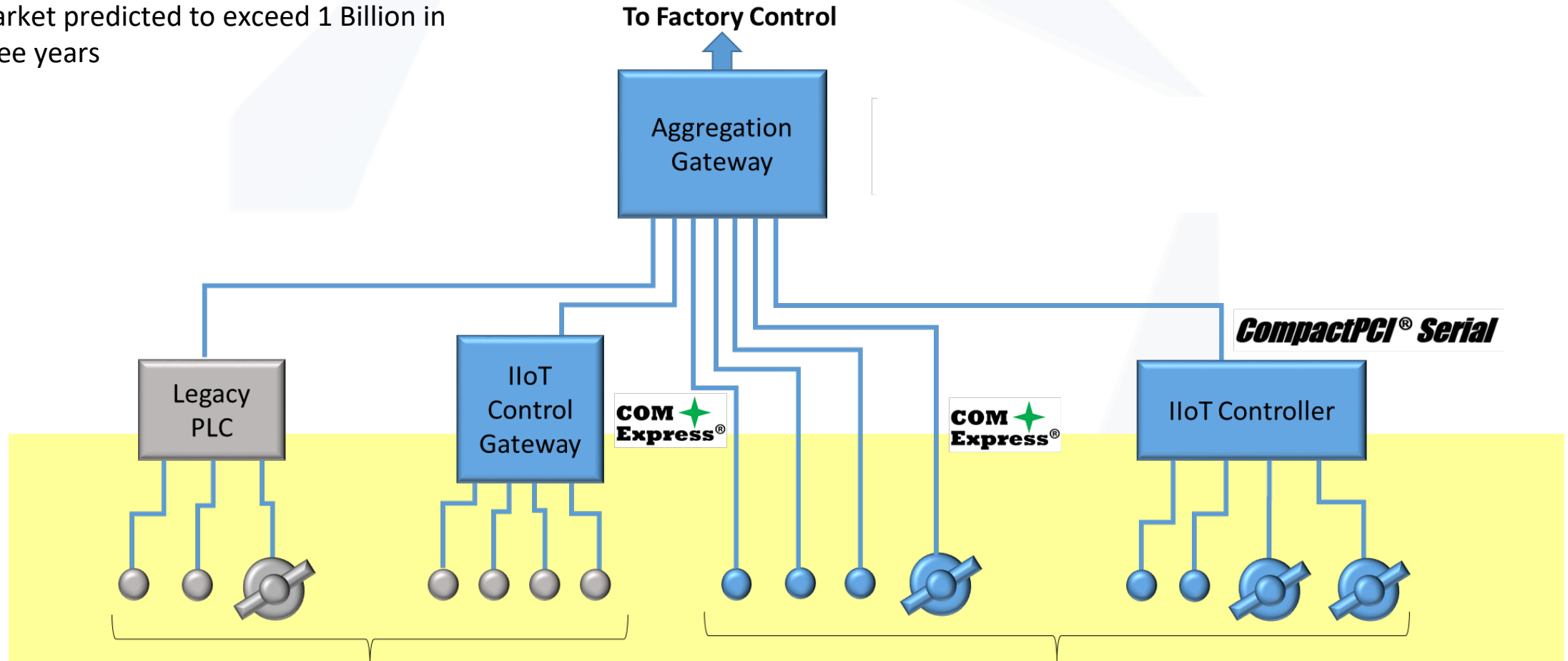
Hardware, software, services

Asset management, instrumentation and control, operations



PICMG Product Fit within IIoT (Smart Factory example)

- IIoT multi billion dollar market
- COM market predicted to exceed 1 Billion in next three years



Legacy Sensors, Actuators & Control Points

- I2C, Zigbee, Ethernet, CAN and other interfaces
- Non-standard data representation

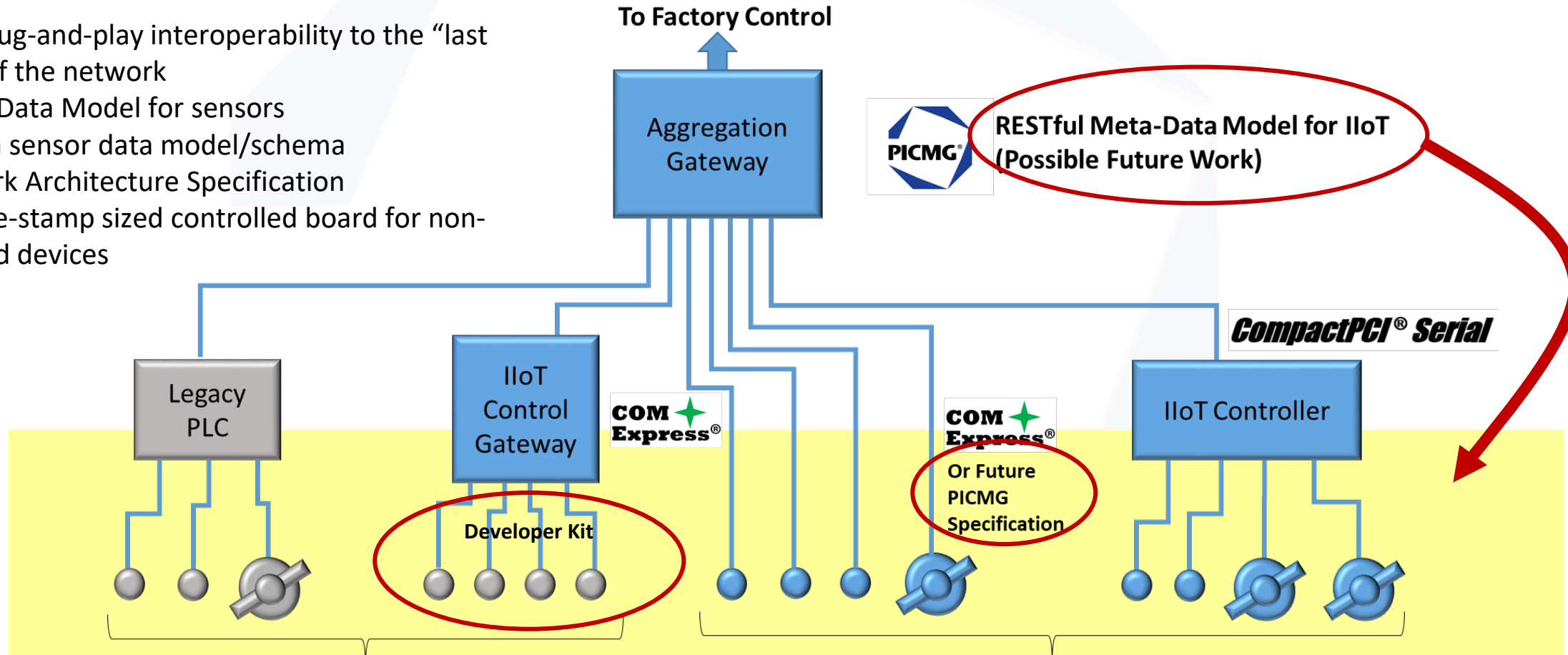
IIoT Enabled Sensors, Actuators & Control Points

- Standardized RESTful interfaces
- Common Meta-data representation model



Interoperability to the “last Foot”

- True plug-and-play interoperability to the “last foot” of the network
- Binary Data Model for sensors
- Redfish sensor data model/schema
- Network Architecture Specification
- Postage-stamp sized controlled board for non-enabled devices



RESTful Meta-Data Model for IIoT
(Possible Future Work)

- Legacy Sensors, Actuators & Control Points**
- I2C, Zigbee, Ethernet, CAN and other interfaces
 - Non-standard data representation

- IIoT Enabled Sensors, Actuators & Control Points**
- Standardized RESTful interfaces
 - Common Meta-data representation model



Additional 2019 Initiatives

- COM-HPC
- Rugged COM Express
- 40G MicroTCA
- University outreach

Rumblings

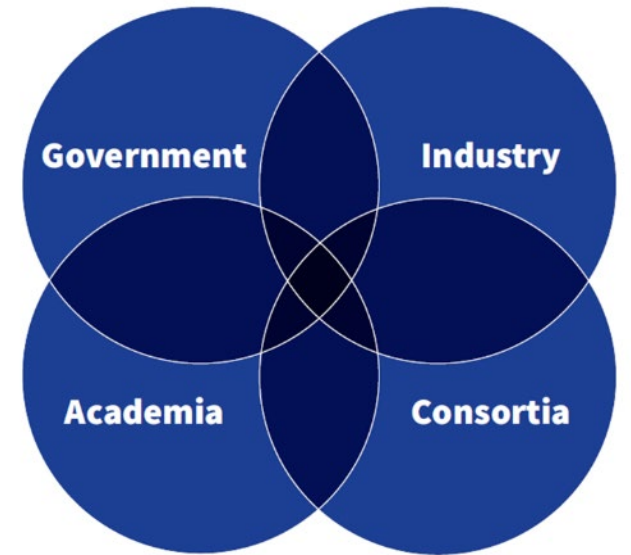
- Next generation
 - CompactPCI Serial
 - MicroTCA (beyond 40G)

Member driven!



Future

- Value of Open Standards / Specifications vs. proprietary solutions remain the same
- Continued Globalization of requirements
- More diverse engineering force
- Greater collaboration





Thank You

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Open Standards encourage innovation and differentiation amongst multiple vendors – interoperability is key