Open Standards for Embedded Computing

An Introduction to the PICMG Standards Organization

Agenda

- Do we need open standards?
- Who is PICMG?
- Major PICMG technologies
- Work involved in making a new standard
- Which standards are to come tomorrow?

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Do we need open standards?

- 2 main questions:
  - “make“ vs. “buy“
  - “prorietary“ vs. “open“

- ✓ Supporters
- ✓ Time to market
- ✓ Costs

Proprietary Architectures

- Typically developed, built, and maintained by a single vendor – a complete solution
- Generally expensive and rarely the latest technology
- Only the largest companies have all of the requisite skills to be experts on all elements
- Upgrades usually slow to arrive – the vendor "owns" you

Open Architectures

- Open standards generally developed by non-profit consortia with many members that have a wide range of skills
- Multiple vendors provide price and feature competition
- If customers don't like their vendor(s) they can go someplace else
- Leading edge technology and improvements

Do we need open standards?

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✓ YES, we do!

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PICMG®

- Formal name: PCI Industrial Computer Manufacturers Group
- Pronounced “Pick-M-G” or “Pick-Mig”
- Founded 1994
- Non-profit consortium
- Over 250 members companies
- 45 standards released to date, grouped in 9 families, representing more than $10B in global revenue

PICMG®

- Hundreds of vendors building compliant, interoperable products
- Deep engineering expertise in member companies:
  - Electronic, mechanical, packaging, and thermal design
  - High speed signaling and simulation
  - Software and High Availability skills
- Rigorous Intellectual Property policies
- Long technology lifetimes (>20 years) with continuous improvement

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CompactPCI®
CompactPCI Serial®

- CompactPCI®:
  - Adoption 1995
  - first switched fabric backplane in 2000
- CompactPCI Serial®:
  - Adoption 2011
  - high speed serial fabrics (GbE, PCIe, USB, SATA)
- Popular and rugged 3U/6U Eurocard mechanics
- Used in a wide variety of industrial control telecommunications, transportation and automation applications

COM Express®

- Adoption 2004
- small single board computer “engines”
- Variety of sizes supported
- Very popular high performance Small Form Factor architectures
- Can be plugged into a customer-supplied baseboard containing application specific I/O

Advanced TCA®

- Adoption 2003
- aka ATCA®: now the global standard for high end telecom equipment
- Modular, rugged, NEBS compliant
- Architected for High Availability – system keeps running in the event of single item failures. ATCA is the only open architecture to offer this
- Global revenue greater than $2B USD/year
- VITA adopting ATCA Platform Management architecture for VITA 46 (VPX) with PICMG's blessing.

Advanced TCA® SpinOffs

- **Advanced Mezzanine Card** (AdvancedMC®)
  - Adoption 2004
  - Allows customizing ATCA cards for application specific I/O, reducing spares inventories for telecom carriers
  - Fully managed, supporting High Availability
- **MicroTCA®**
  - Adoption 2006
  - Utilizes AdvancedMC cards plugged directly into a backplane
  - Supports High Availability designs
  - multi-facted and rich ecosystem
  - Small-to-large migration path

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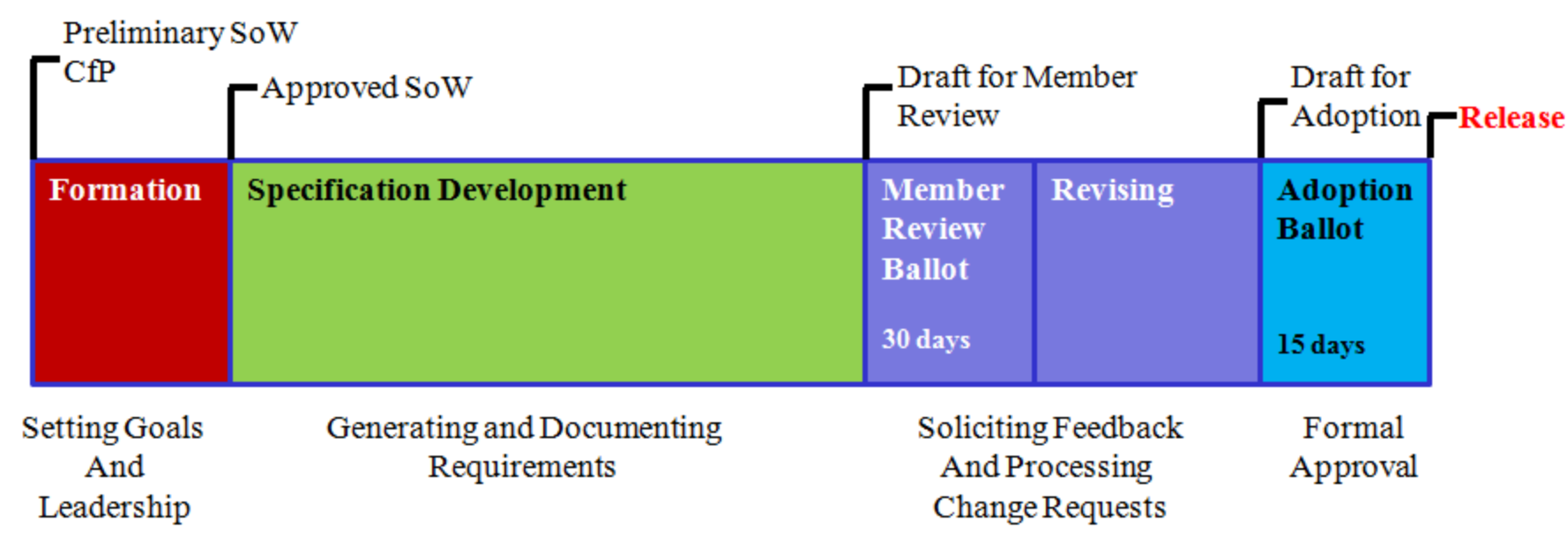
Work involved in a new standard



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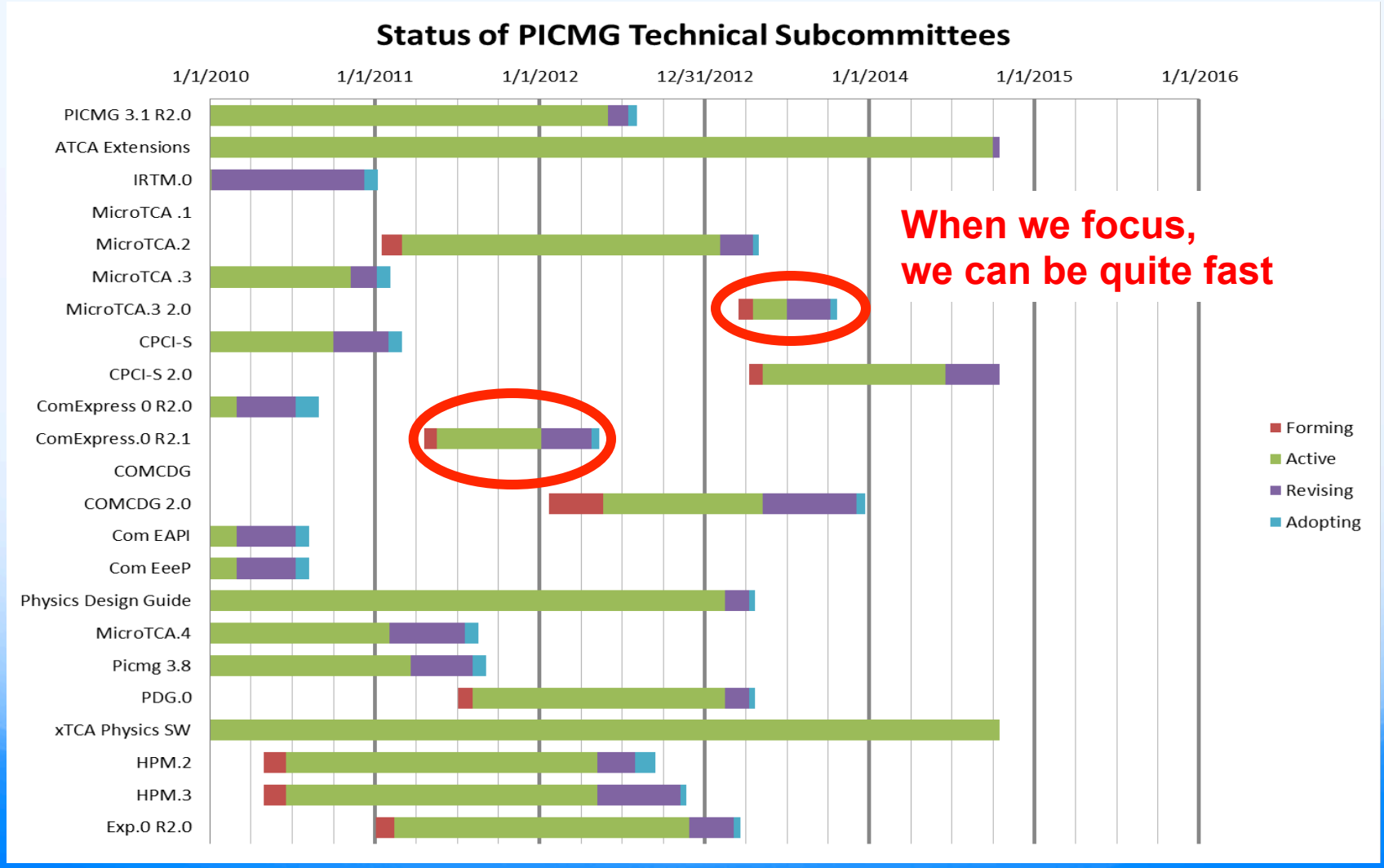
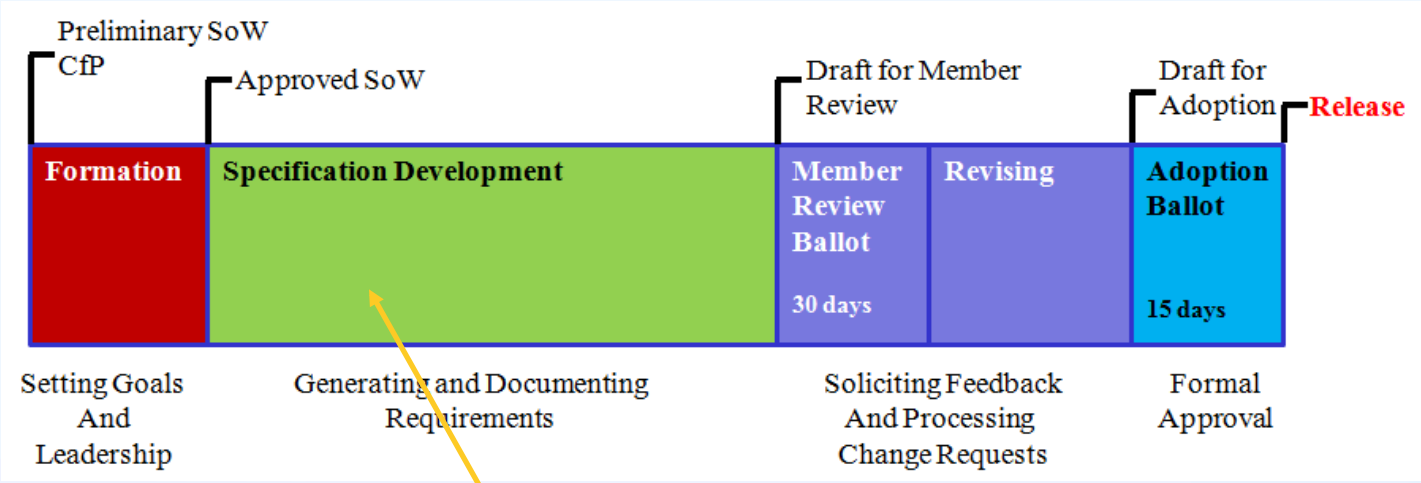


Work involved in a new standard

Pre-work by sponsors
~~**Discouraged**~~
Encouraged



Better visibility of scope and pitfalls
Reduces committee churn and shortens development time

Working Draft to enable "Compatible" product

Claims of Compatibility ~~**Discouraged**~~ **Encouraged**

Speeds review process and interoperability testing

- Changing our culture around specification development will enable PICMG to be more responsive

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Evolution and Revolution

- PICMG has developed roadmaps for the future of key technologies:
  - AdvancedTCA: add 100G backplane bandwidth, improved cooling, higher power capability, SDN and NFV, improved applicability for data centers (PICMG 3.7)
  - MicroTCA: add 40G backplane bandwidth
  - GEN4™ - a next generation platform with 10x system and module throughput, improved SWaP, reduced CAPEX & OPEX. Improved scalability and recognition of convergence of telecom central office and data center requirements.

Conclusion

- PICMG well established with significant track record of successful standards
- Extremely talented and diverse member base
- Strong Intellectual Property policies
- Low membership dues and not dominated by any single company
- Continuing evolution of key technologies

Thank you!