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Shelf Management & IPMI: more control at system level

Ralf Moellers Elma Electronic GmbH
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About Elma
Elma in Brief

Elma is a leading global manufacturer of products of electronic packaging system solutions and high precision rotary switches for demanding applications

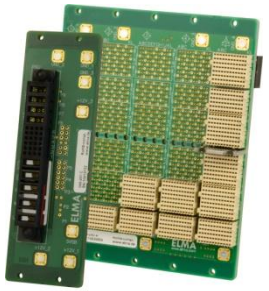
- Experience since 1960
- Facilities in 9 countries on 3 continents (Europe, America & Asia)
- Representatives in over 30 countries: Elincom in the Benelux
- Approx. 700 employees worldwide

Germany
Competence Center
Backplanes, Systems

http://www.elma.com

Romania
Competence Center
Active system parts
in cooperation with SAMWAY

http://samwayelectronic.com



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About Elma

Product Applications & Market Segments

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SYSTEM SOLUTIONS

Military/Aerospace

Communications

Safety & Security

ENCLOSURES & COMPONENTS

Scientific/Research

Transportation

Medical

ROTARY SWITCHES

Industrial

Broadcast/Audio

Test & Measurement

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Shelf Management & IPMI

PICMG VITA Standards

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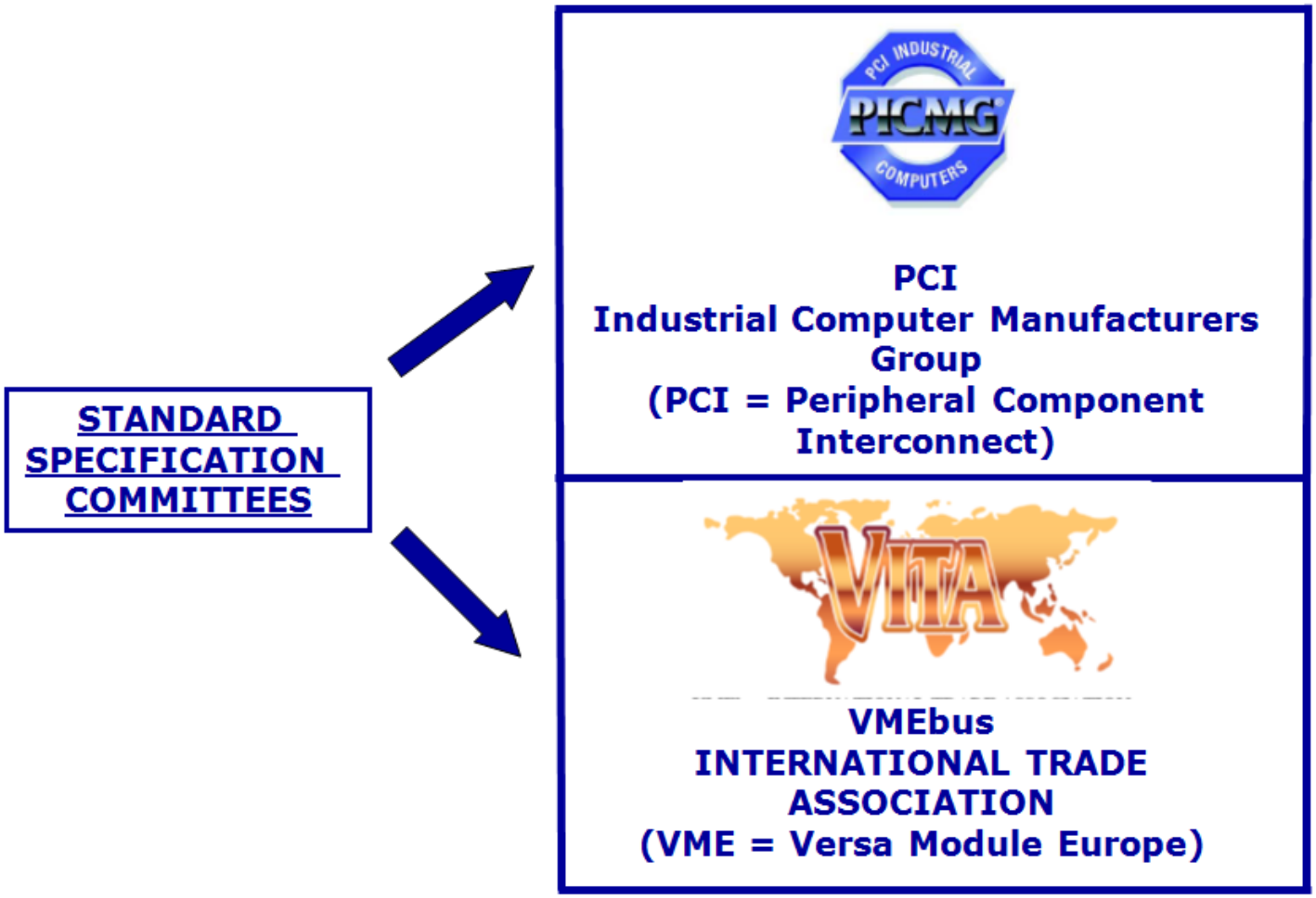

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PICMG VITA Standards

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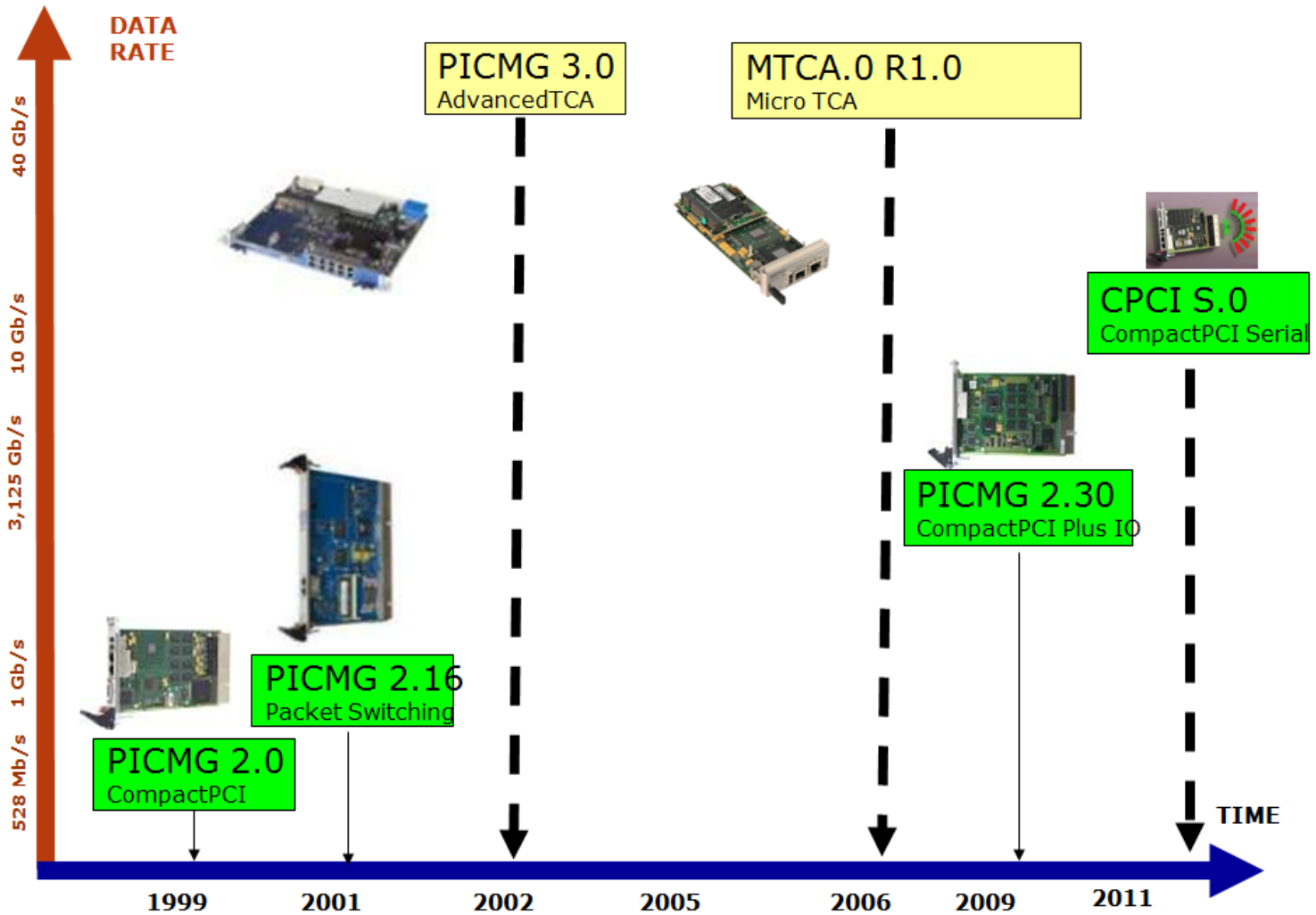

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PICMG VITA Standards

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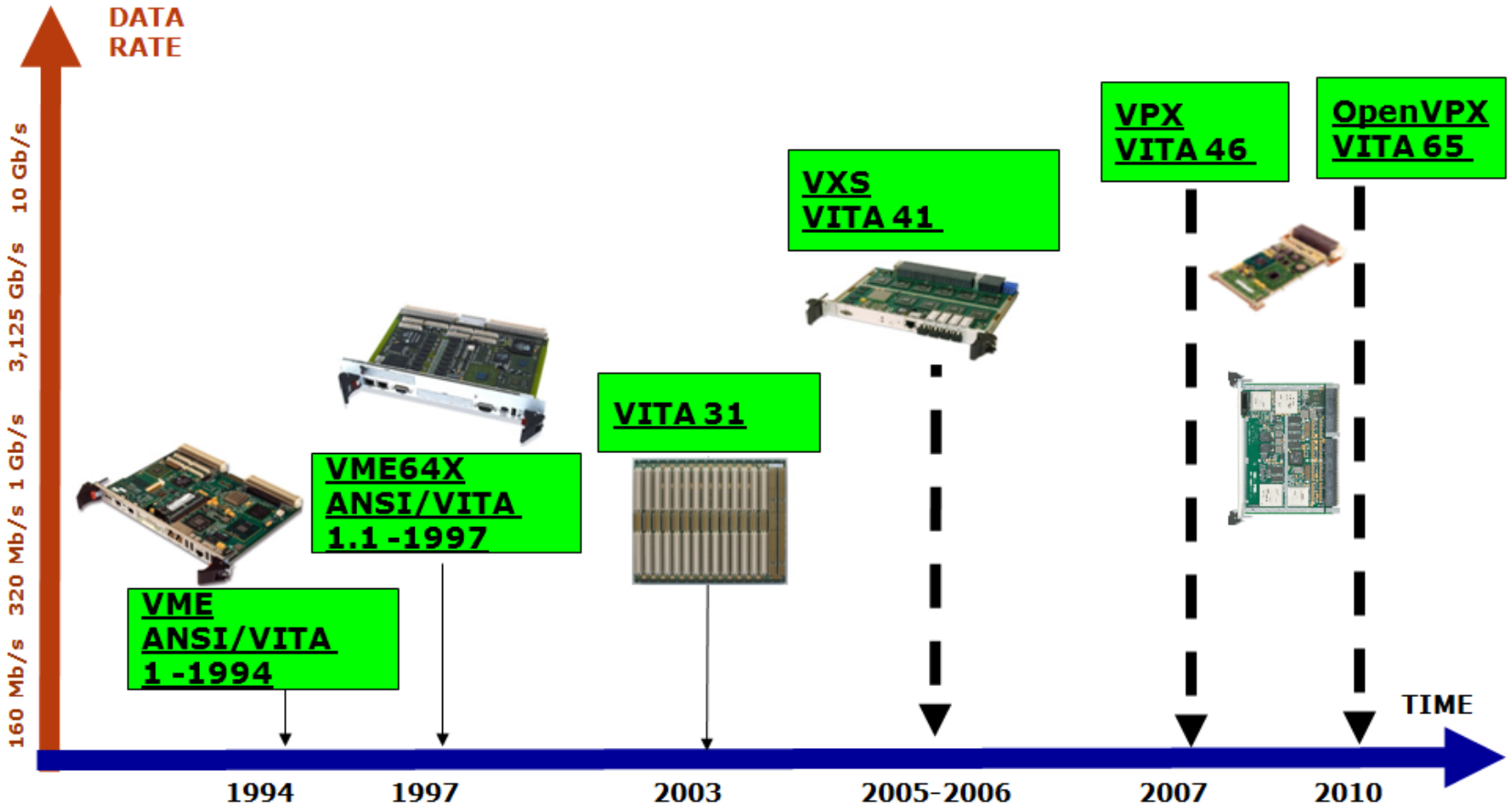

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Shelf Management & IPMI

Old & New system platforms

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11U VME64x

- 320MB/s
- Bus structure

2U MTCA

- 40GB/s
- Serial topology

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Shelf Management & IPMI
Monitoring and Management

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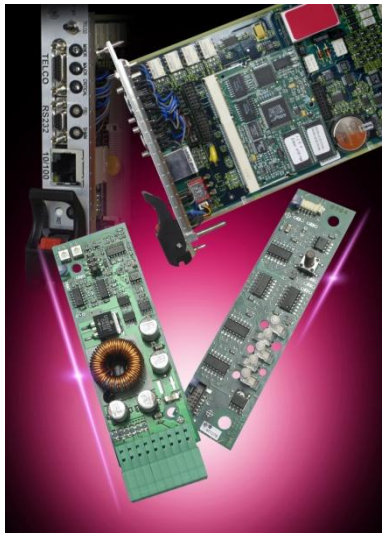
Traditional system monitoring



- Monitor temperatures inside the system
- Control fan speed based on temperatures
- Monitor the voltages on the backplane
- Remote power on/off or reboot
- Trigger alarms in case of failures

Limitations:

- No information about the boards present and their healthy
- Temperature on boards are not used for thermal management.
- The boards may run hot even the temperature inside the system is fine

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Example: Elma System Monitor

Battery for RTC

Analog

Thermistors

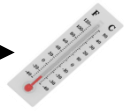
Digital Outputs

LCD

Digital Inputs

I2C

Humidity



Temperature

TACH

PWM

RS232

LAN

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Monitoring vs Management

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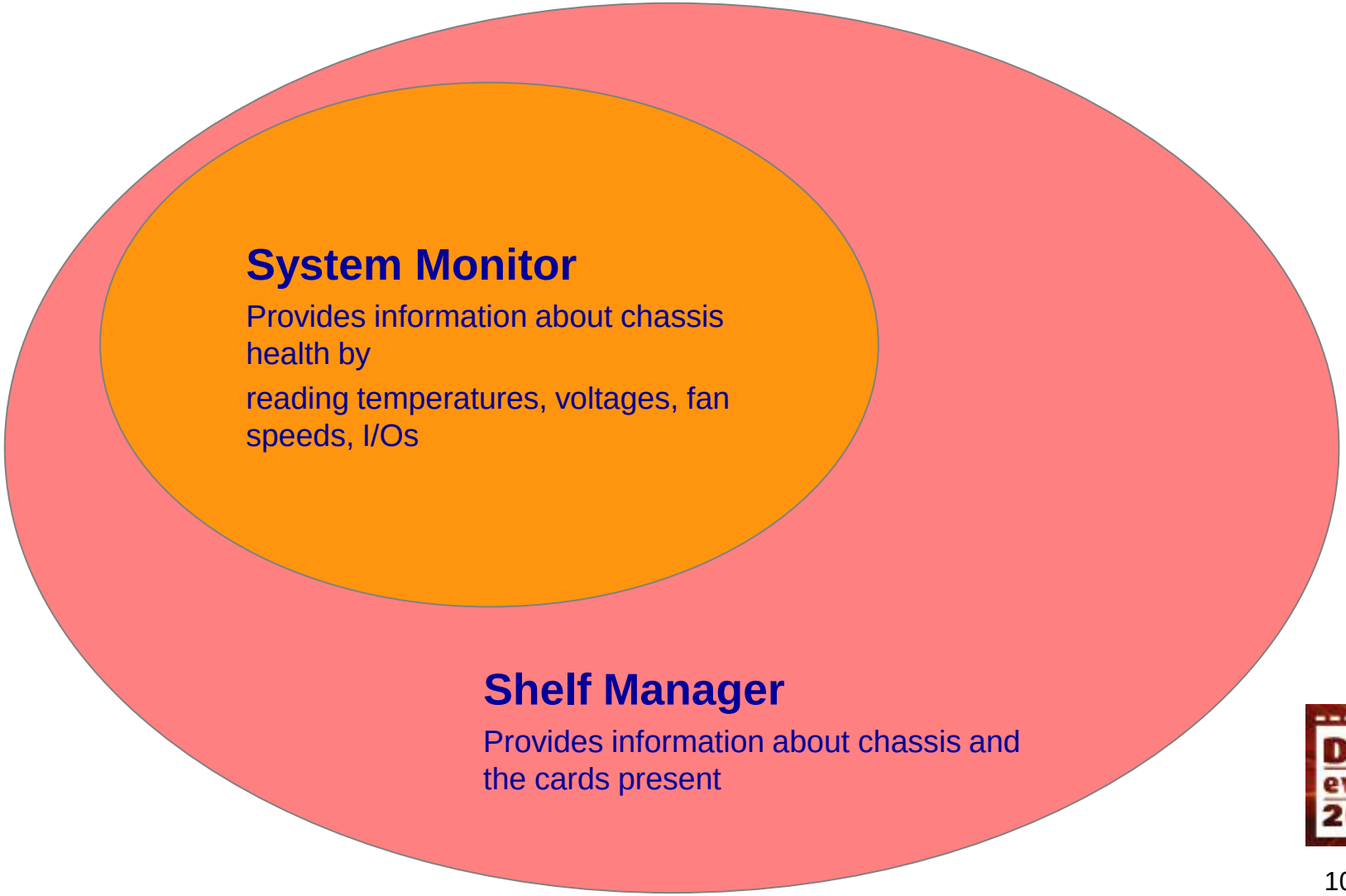

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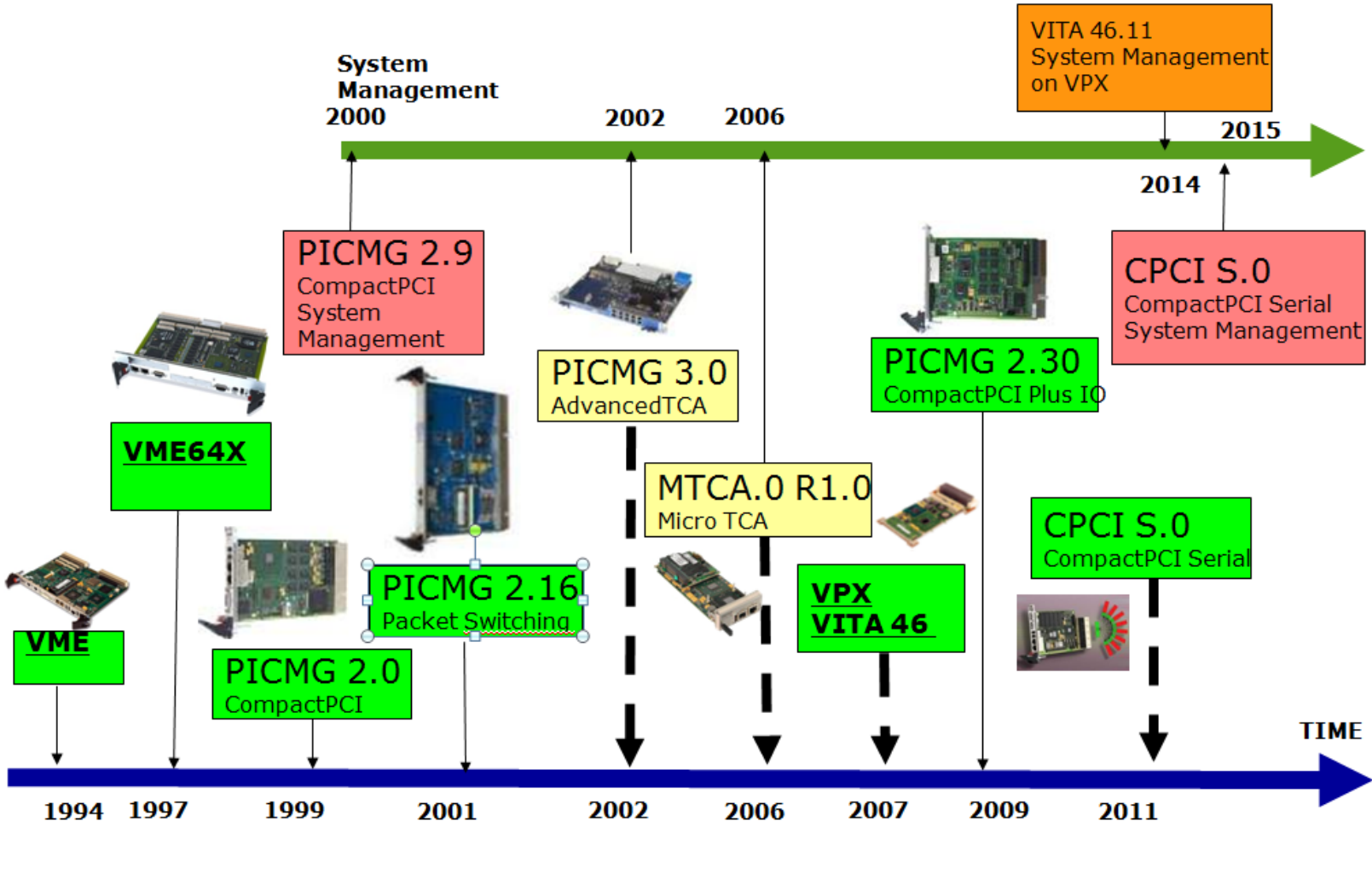
Shelf Management & IPMI

Management specifications



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Management and Monitoring?

- Predict failures, determine the cause of failures remotely
  => reduce maintanance costs
- Controls fan speed based on temperatures
  => reduce audible noise and power
- Inventory of the components pre set in a chassis
  => reduce maintanance costs
- Take corrective actions
  => extend time between failures
- Remote firmware updates (management only)
  => reduce maintanance costs

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What does management and monitoring imply?

- Monitor the chassis health remotely, **out of band**
  (even when the main applicaton is not running)
- Identify what cards are present in a chassis
- Monitor all sensors placed on cards or inside the chassis
  (temperatures, voltages, currents, fans, status signals)
- Controls fans speed based on temperatures
- Remote power on/off or reboots
- Trigger alarms in case of failures
- Take corrective actions
- Remote software updates

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Shelf Management & IPMI

IPMI Architecture

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To overcome the system monitoring limitations PICMG has adopted a standard protocol (IPMI) for system management and monitoring

IPMI (Intelligent Platform Management Interface)

- Developed by Intel, Hewlett-Packard, NEC and DELL for server management
- Software protocol, a language, transported over I2C inside the chassis
- First implemented in CPCI and further developed for ATCA and MTCA
- With IPMI the cards could be discovered and the sensors they support are read
- There is no need to know in advance what sensors are implemented on a card, they will be discovered

- This requires every component (Card, PSU, Fan tray) to have a management controller capable of “speaking” IPMI
- An additional module, the shelf manager, centralizes the information it collects from cards and present it to the external System Management Software

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Shelf Management & IPMI

Shelf Manager

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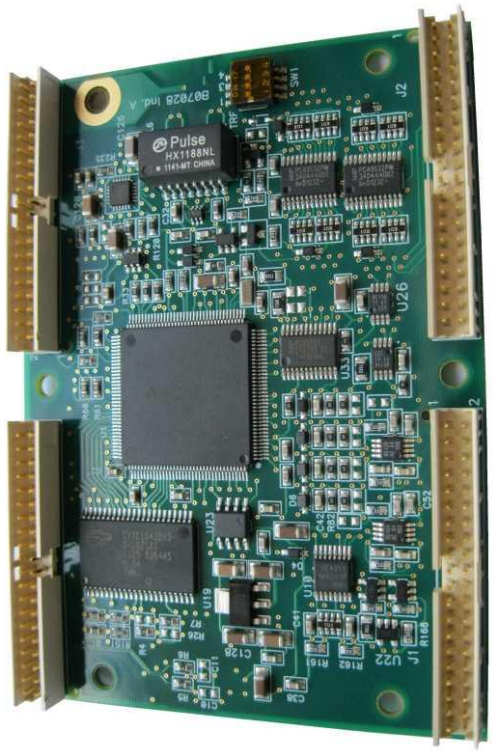
Elma's Shelf manager hardware:

- Designed for multiple architectures:
  ATCA, AXIe, CPCI, CPCI-S
- Could be mounted as a mezzanine
  module on a card or on dedicated carrier board
- Monitors/controls cards supporting IPMI
- Monitors the chassis by reading:
  voltages, temperatures, currents and fans status
- Provides configurable digital I/O's
- 10/100Mbps Ethernet interface supporting
  RMCP, HTTP (graphical WEP page),
  Telnet, SNMP v3, DHCP, TFTP and Serial Over Lan
- Extended temperature range: -40..+85 °C
- Dimensions 68x95mm



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Shelf Management & IPMI

Shelf Manager Block Diagramm

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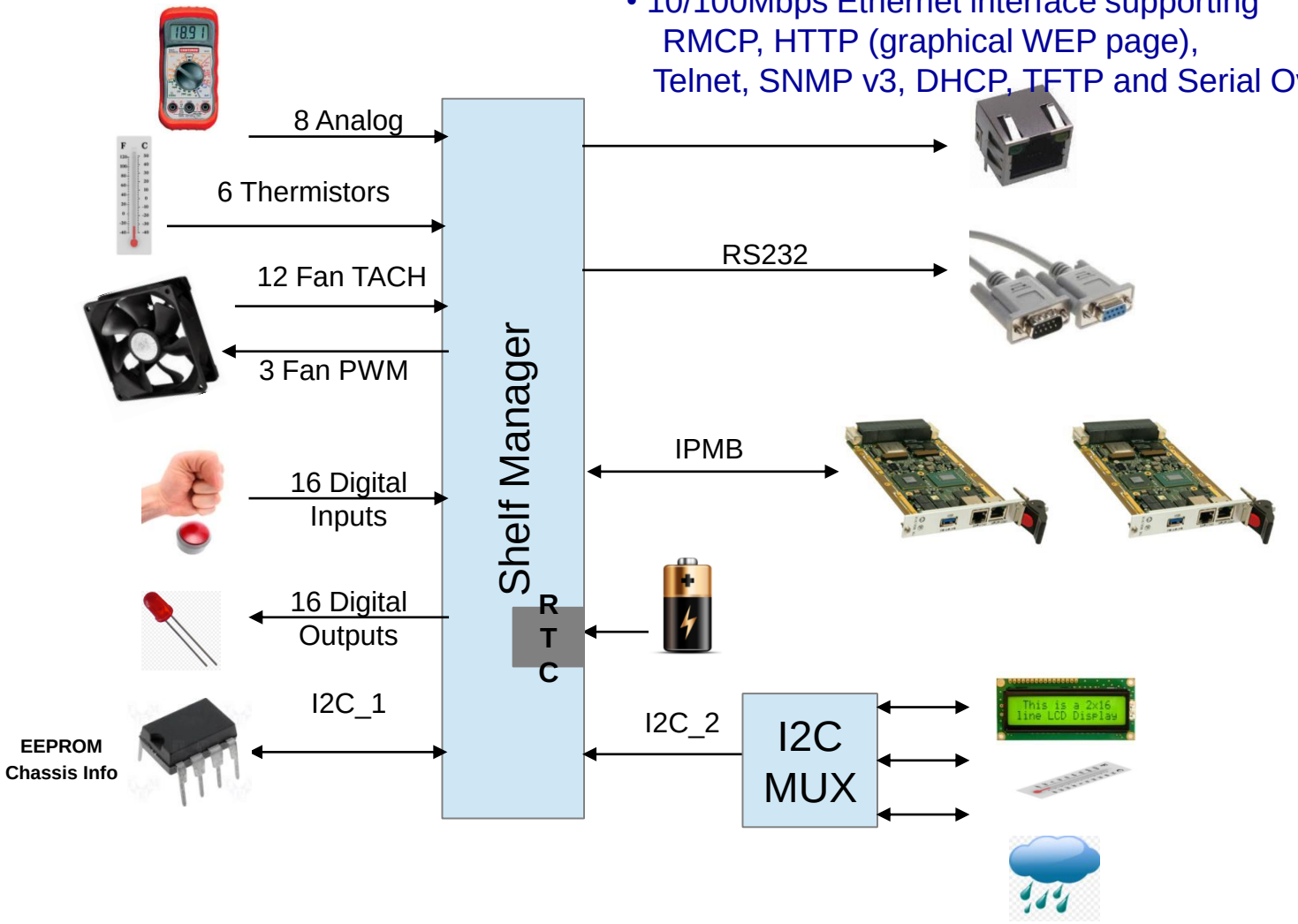
- 10/100Mbps Ethernet interface supporting
  RMCP, HTTP (graphical WEP page),
  Telnet, SNMP v3, DHCP, TFTP and Serial Over Lan



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Monitoring and Management

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Shelf Manager WEB Page

- Provides a simple and intuitive interface for reading management information
- Based on XML
- No additional software needed- just a WEB browser (could be accessed from a mobile phone or tablet)
- Information about a board is obtained with just a mouse click

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Shelf Management & IPMI
MTCA MCH

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In MicroTCA the MicroTCA Carrier Hub (MCH) is responsible for management and monitoring of the boards. Beside this it has also the switching functionality

Elma MCH

- Support for up to 12 AMCs, 12uRTMs, 2 CUs and 4 PMs
- MTCA.4 Compliant
- 16 ports Gigabit Ethernet Switch
- PCIe Gen 3 switch, x4 links to each AMC
- PCIe clock distribution
- Front panel 16x PCIe optical link.
  May be split in two x8 links for daisy-chaining

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Shelf Management & IPMI

IPMI on a board as service

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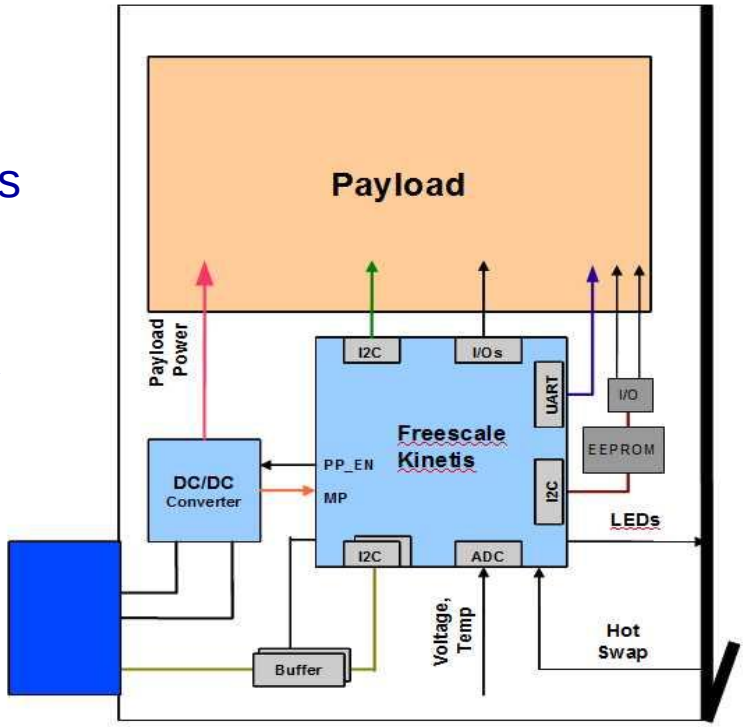
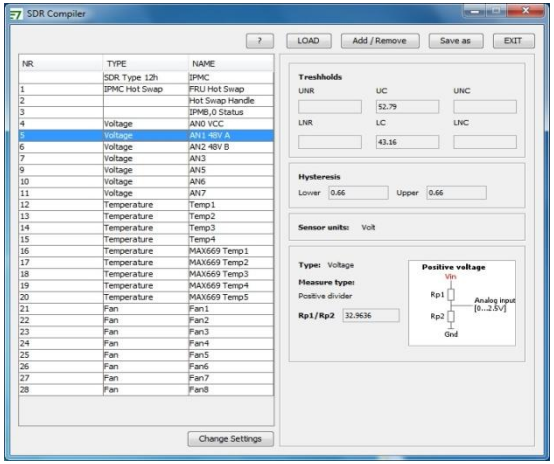
IPMI Software for ATCA/MTCA cards (IPMC/MMC)

- Delivered on pre-programmed microcontrollers
- No royalties
- Fast development, low cost and minimum risk
- Easy customizable
- Graphical tools for configuring the sensors and board information (manufacturer name, part number...)





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Shelf Management & IPMI

Simplified IPMI

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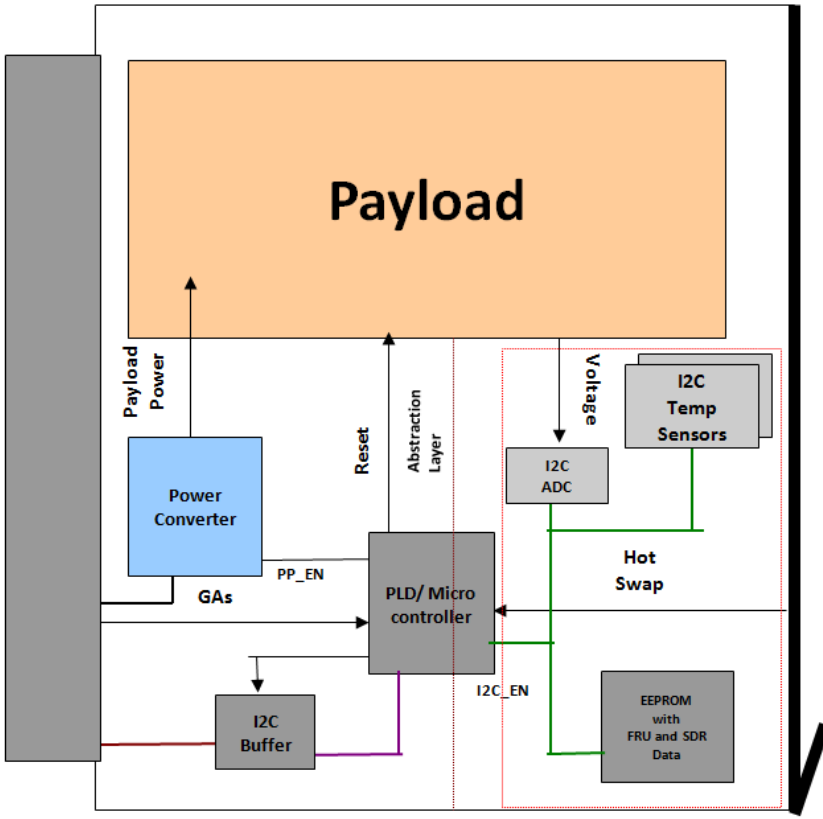
Simplified IPMI management

- The simplified IPMI board is seen by the shelf manager as a memory.
- Board information and sensor values are read from different offsets
- The Shelf Manager instantiate Virtual IPMI controllers to represent the simplified IPMI boards to an external System Manager

Benefits:

- Fast development
- No complex IPMI software needed on cards. The IPMI complexity is transferred to the Shelf Manager
- Simplified and standard IPMI boards could operate in the same time



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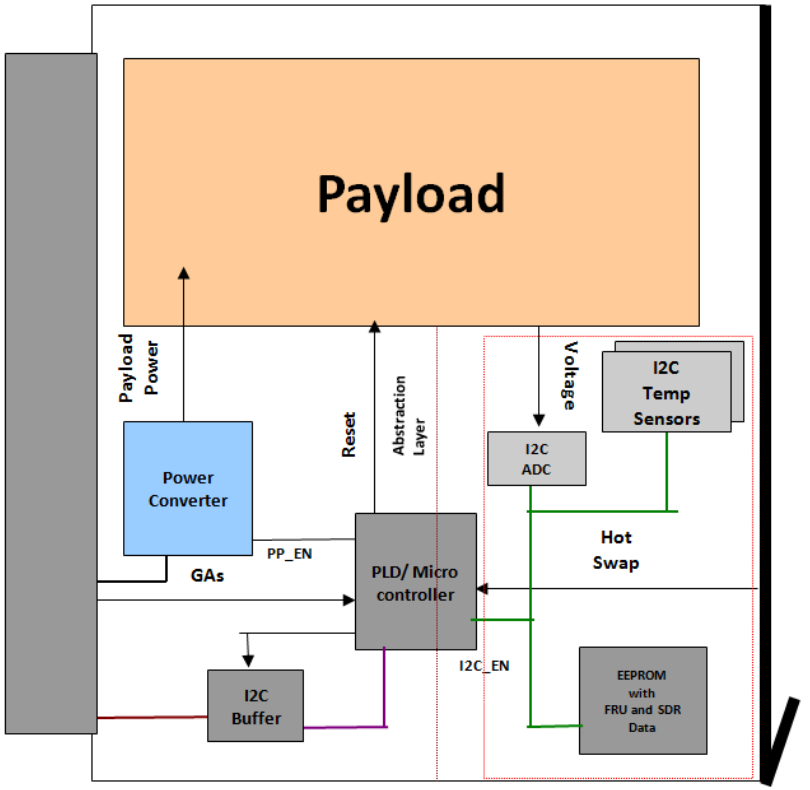

Benefits:

- Fast development
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This solution will be standardized for CPCI-Serial (under development).

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