



SMBIOS, DMI and CIM: Which, When and Why?

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Truth in Presentation Statement

This is a vendor presentation

While it attempts to represent DMTF positioning for CIM, DMI and SMBIOS technologies, there is no guarantee that it represents the position of all DMTF members or even any vendor other than the one making this presentation

That said, we hope to provide you with valuable insight into the core DMTF technologies and how they relate and interconnect

Your mileage may vary



Agenda

- **DMTF Overview and Audience**
- **SMBIOS**
- **DMI**
- **CIM**
- **Cross Mapping Technology**
 - DMI to SNMP
 - CIM to DMI
- **What you need to do**



DMTF

Mission: To lead the development of management standards for distributed desktop, network, enterprise and Internet environments

- **Goals as an Organization**
 - Accelerate adoption of management standards
 - Unify industry management initiatives
 - Promote interoperability among management solution providers

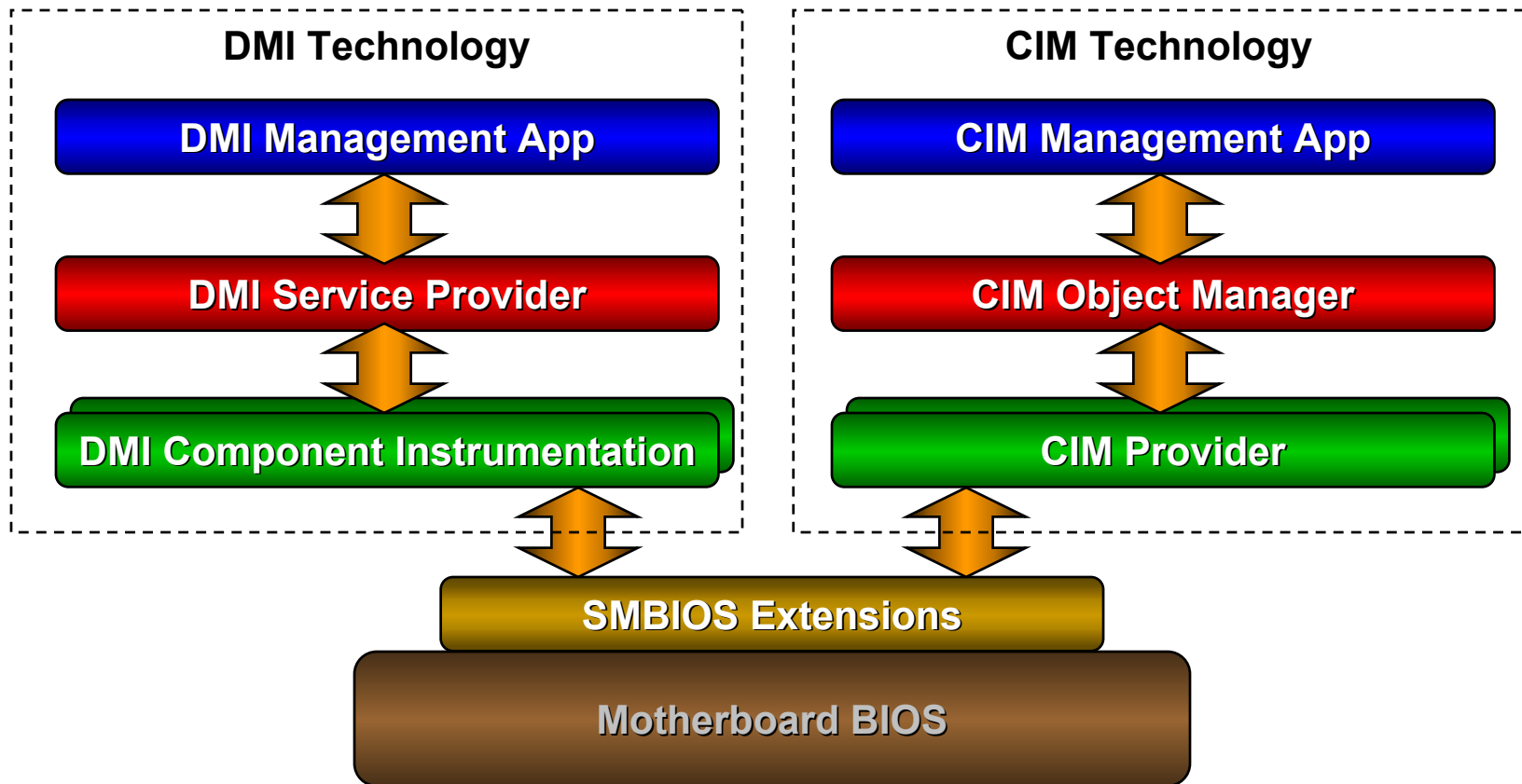


DMTF Specification Audience

- **Device or Software Vendors**
 - Enable product for management in various environments
- **Operating System Vendors**
 - Provide generic support within their environment
- **Managed System Vendors**
 - Integrate motherboard and standard peripheral support
- **Enterprise Management Software Vendors**
 - Integrate managed systems enabling centralized management
- **Enterprise Managers (End-Users)**
 - Responsible for deploying solutions
 - Responsible for ROI



Where Do the Pieces Fit?





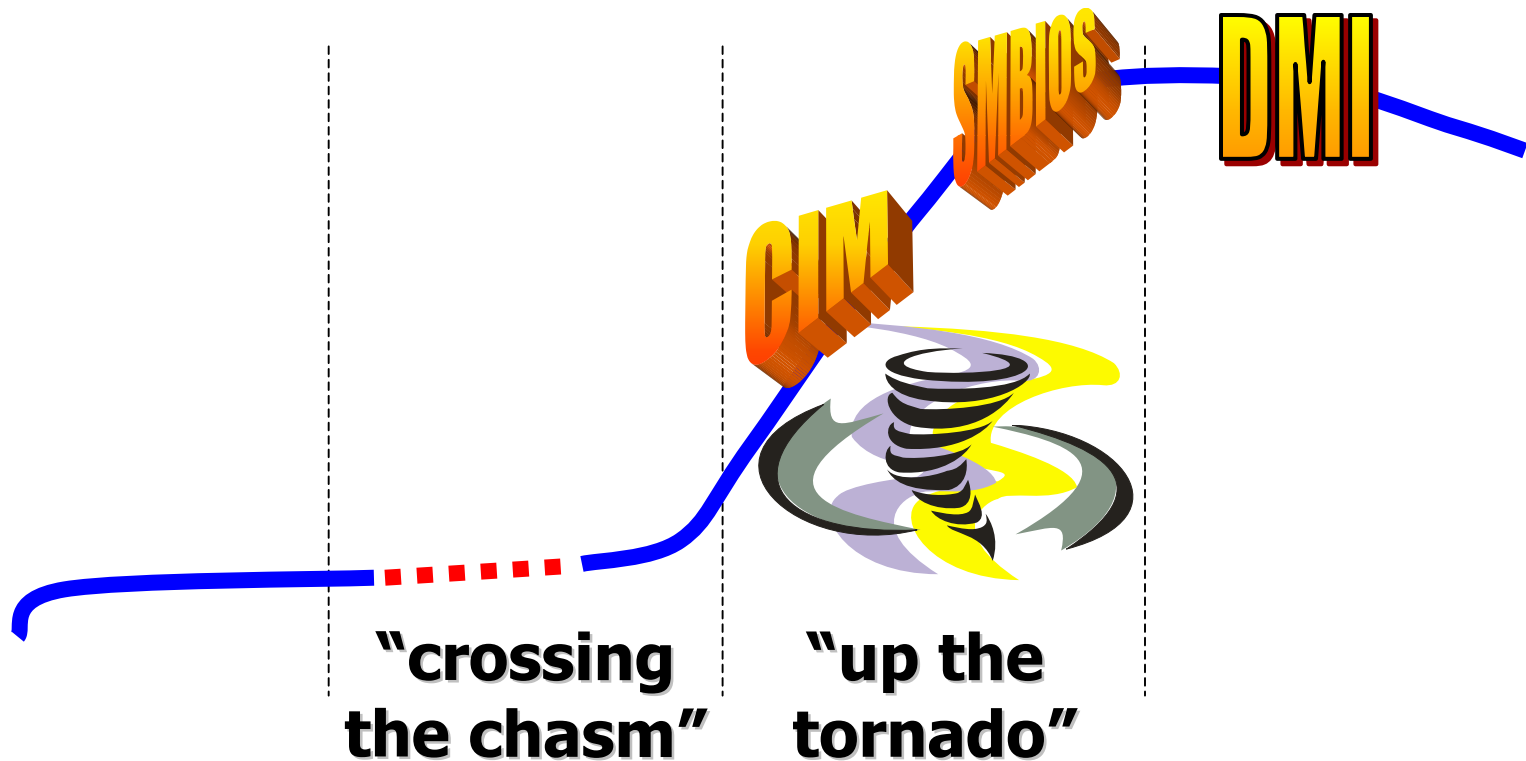
Technology Lifecycle

Concept

Product

Adoption

Commodity





SMBIOS: What is It?

- **System Management BIOS**
 - <http://www.dmtf.org/standards/bios.php>
- **BIOS extension to provide system management information to local clients**
- **Based on PnP extensions**
- **Make, model, serial number, BIOS version, processor, memory configuration and more**



SMBIOS: Why is It Important?

- **Only standard programmatic method of determining system information**
- **Provides key system asset management information**
- **Can identify system health monitoring sources**
- **May provide access to system event log**



SMBIOS: Interfaces

- **Table**
 - Locate data structure in upper 1 MB of real-mode memory
 - Use pointer to array of data structures
- **Plug 'n Play**
 - Locate data structure in upper 1 MB of real-mode memory
 - Use pointers in table to reach SMBIOS methods and establish data pointer
 - Requires special access when attempted from protected mode operating systems



SMBIOS: Data Structures

- **Discovery**
 - Locate PnP data structure and interpret fields
- **Data Tables**
 - Every structure begins with Type, Length and Handle
 - Text strings in table referenced by number, returned as separate structures
 - Specification identifies required structures and data, but you should probably do more
 - Some values map directly to DMI Groups or CIM Classes



SMBIOS: Pros and Cons

- **Pros**

- Standard programmatic source for system management information
- Only reliable cross system interface for some data
- Eliminates need for dangerous system probes to determine hardware configuration

- **Cons**

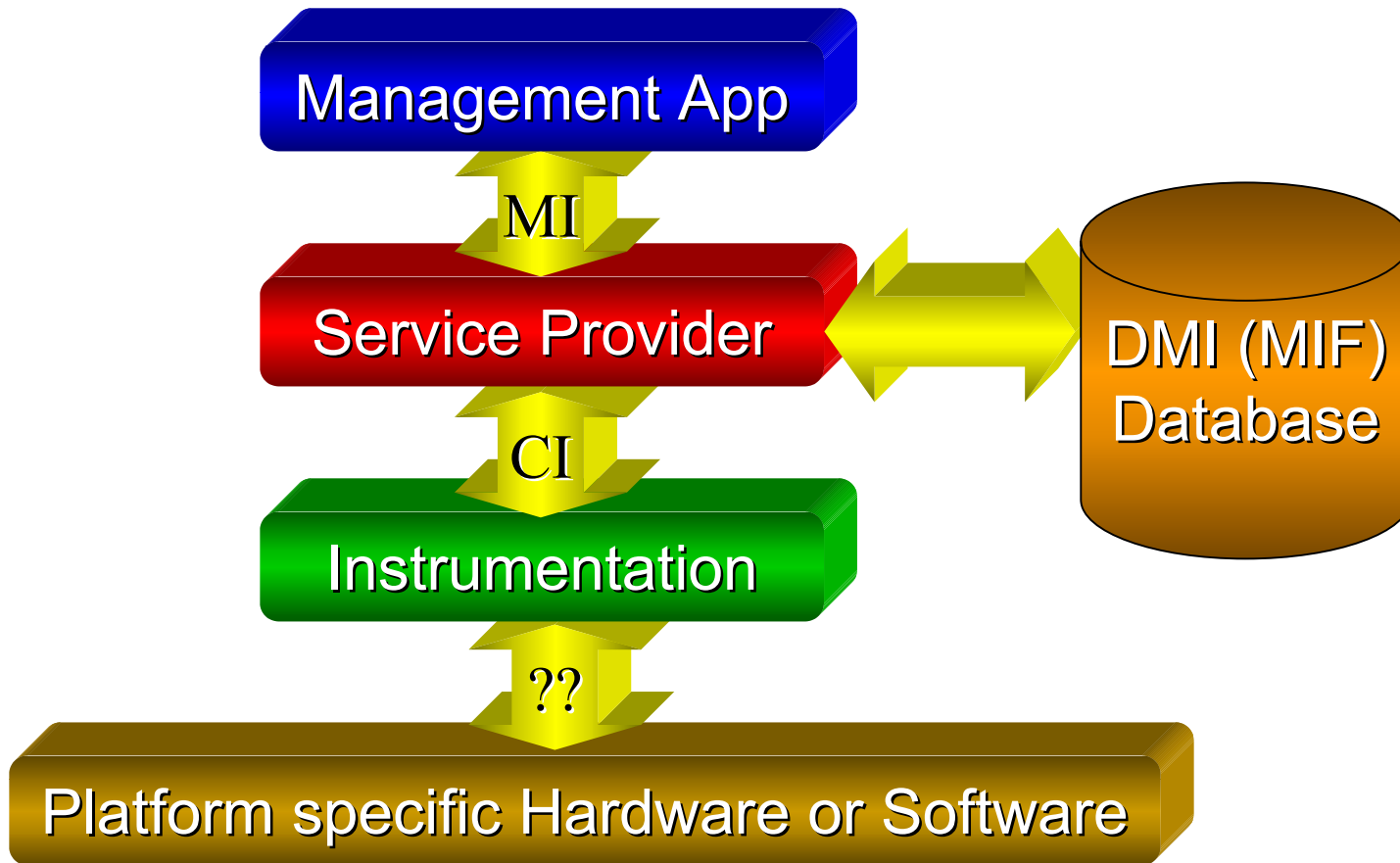
- May only implement single interface – forces applications to support both approaches
- Difficult to reach PnP interface on protected-mode operating systems
- Complete functionality may be constrained to IA32 architectures



SMBIOS: Why do I Want It?

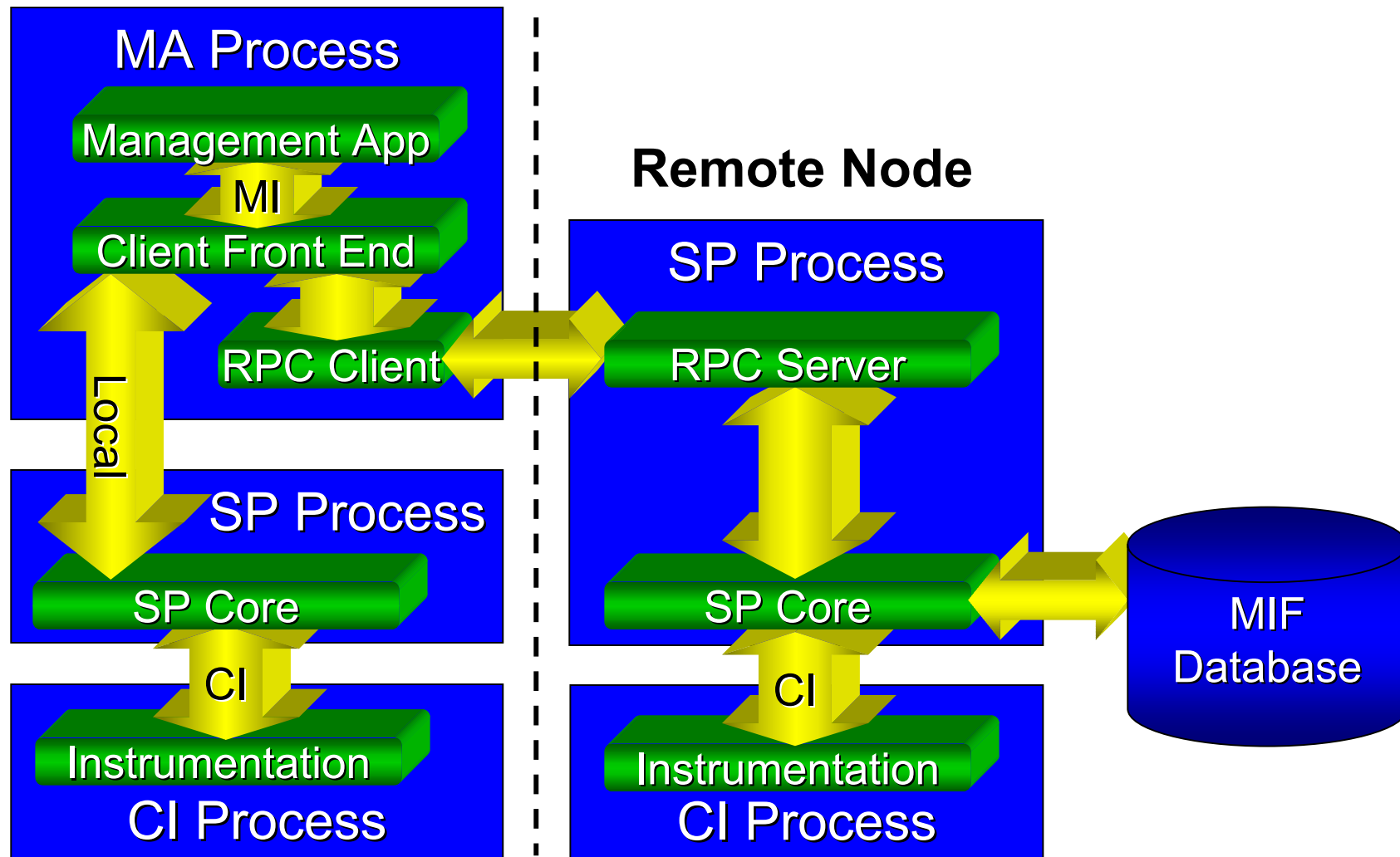
- **Device or Software Vendors**
 - Promotes interoperability: Allows my product to be managed by others – less work for me, more value for customer
- **Operating System Vendors**
 - Determine motherboard capability without probing
- **Managed System Vendors**
 - Better identification of motherboard component information, especially management controller information
- **Enterprise Management Software Vendors**
 - Support health monitoring, accurate system info
- **Enterprise Managers (End-Users)**
 - Better system-specific information (serial number, make, model, as well as health monitoring)

Simplified DMI Architecture





Expanded DMI 2.0 Architecture





DMI: What is It?

- **Desktop Management Interface**
 - http://www.dmtf.org/standards/standard_dmi.php
- **Enables mobile, desktop and server management**
- **DMI Releases**
 - 1.0 released in April of 1994 (Local interface only)
 - 1.1 released in January of 1996 (Fixes to 1.0)
 - 2.0 released in March of 1996 (Added remote interface)
 - 2.0, Errata #1, released in August of 1997
 - 2.0s released in June of 1998 (added security)
- **Master.MIF updated quarterly**



DMI: Why is It Important?

- **Extended enterprise management beyond SNMP-managed network nodes**
- **Independent of specific computer or operating system**
- **Standardized data definitions**
- **Self-descriptive data**



DMI: Interfaces

- **MI – Management Interface**
 - Provide API for management apps
 - Prefaced with “Dmi”
 - Local or remote access to DMI database and instrumentation
- **CI – Component Instrumentation Interface**
 - Prefaced with “Ci”
 - Local only



DMI: Data Structures

- **Discovery**
 - **DmiRemoteRegister()**
 - Specified by node address (or name), RPC and transport
- **Data Tables**
 - **Component** – collection of Groups
 - **Group** – collection of Attributes
 - **Attribute** – data value and meta data



DMI: Pros and Cons

- **Pros**

- Standardized data definitions
- Self-descriptive data
- Widely deployed
- Well-tested Service Providers for Windows, NetWare, Linux and SUN
- Well-supported RPC and Transports
- Well-understood interfaces
- Map-able to SNMP

- **Cons**

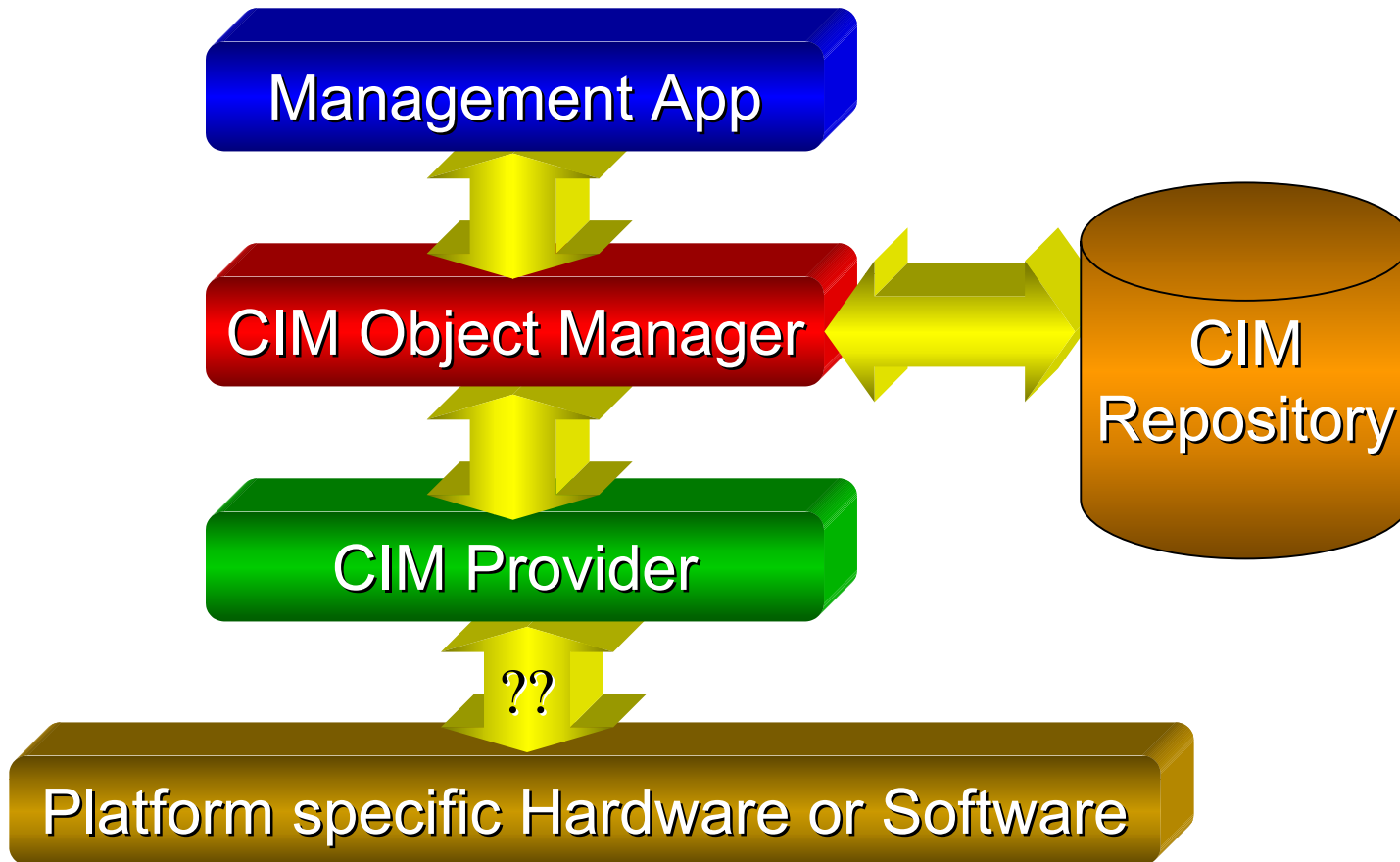
- Hierarchical approach
 - Components
 - Groups
 - Attributes
- Weak discovery
- Not very granular
- Few required attributes
 - Other than keys
- Doesn't "domain" map well to CIM



DMI: Why do I Want It?

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WBEM/CIM Architecture





WBEM/CIM: What is It?

- **Web-Based Enterprise Management**
- **Common Information Model**
- **Object-oriented and associative method of modeling**
- **Data encoding (XML) and methods (CIM Operations over HTTP)**
- **Meta schema (Class, Instance, Property, Qualifiers, etc.)**



WBEM/CIM: Why is It Important?

- **Industry standard with self-descriptive data**
- **Hardware independent**
- **Operating system independent**
- **Supports wider range of devices and systems than other management technologies**
- **Uses common technologies for encoding and transport**
- **CIM Object Managers are becoming widely deployed**



WBEM/CIM: Interfaces

- **CIM Operations Over HTTP**
 - http://www.dmtf.org/download/spec/xmls/CIM_HTTP_Mapping10.php
- **XML Encoding**
 - http://www.dmtf.org/download/spec/xmls/CIM_XML_Mapping20.php
- **WBEM Specifications**
 - http://www.dmtf.org/standards/standard_wbem.php



WBEM/CIM: Data Structures

- **Discovery**

- A CIM Client that wishes to communicate with a CIM Server on an HTTP Server **SHOULD** try an **OPTIONS** request to that HTTP Server. If the **OPTIONS** request fails, or the response does not include the **CIM-CIMOM** extension header, then the CIM Client **MAY** assume that the value of **CIM-CIMOM** is the relative URI **cimom**.
- HTTP/1.1 200 OK
Opt: http://www.dmtf.org/cim/mapping/http/v1.0 ; ns=48
48-CIMOM: /access/cimom
...

- **Data Tables**

- Retrieves XML-encoded classes and instances
- Data encoding using meta schema – easy to add classes without change infrastructure



WBEM/CIM: Pros and Cons

- **Pros**

- Hardware independent
- Operating system independent
- Supports wider range of devices and systems than other management technologies
- Uses common technologies for encoding and transport
- CIM Object Managers are becoming widely deployed

- **Cons**

- “Newer” technology
- Interoperability not yet established across all implementations
- Models not yet tested as interoperable across vendors
- Some core components just being deployed
- Windows using DCOM



CIM: Why do I Want It?

- **Device or Software Vendors**
 - Promotes interoperability, more granular data representation
- **Operating System Vendors**
 - Extremely rich data definitions. Provides configuration as well as asset management and health monitoring
- **Managed System Vendors**
 - Better description of systems and network appliances (SAN, Fiber Channel)
- **Enterprise Management Software Vendors**
 - Common model for management everything
- **Enterprise Managers (End-Users)**
 - Everything in the IT infrastructures managed under one umbrella



Cross Technology Mapping

- **Domain vs. Recast**
 - Little value in Recast mapping
- **Differences in granularity**
- **Typically used during periods of transition**
 - Dominant, but less capable technology in place
 - Giving way to more capable technology
 - Allows gradual infrastructure update without requiring wholesale replacement

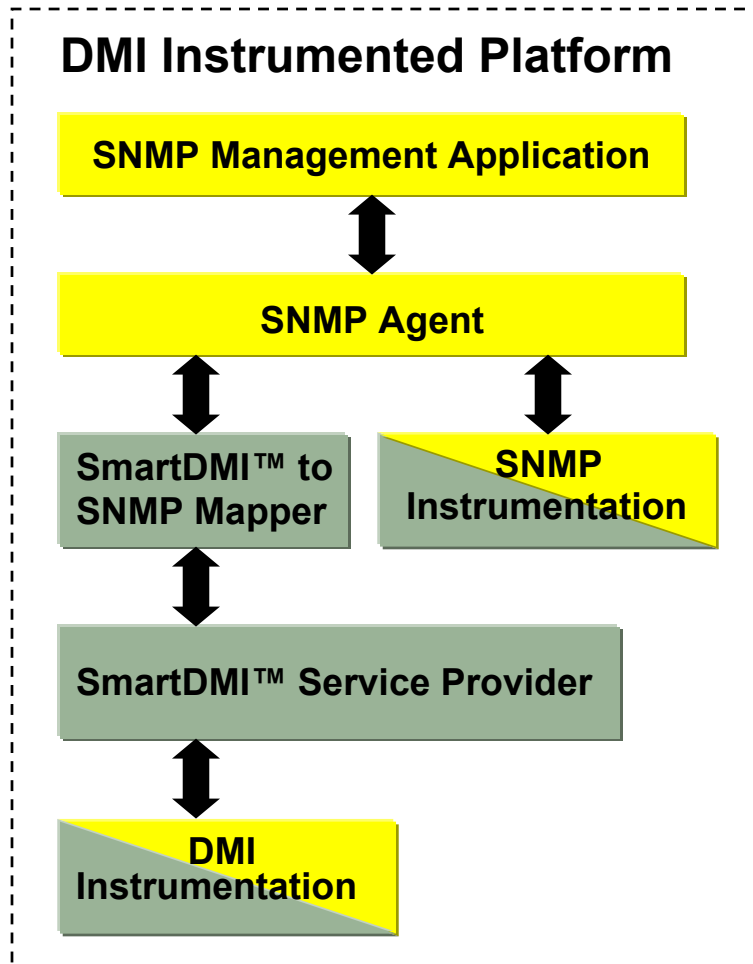


SmartDMI™ to SNMP Mapper

- **Allows SNMP management consoles to access DMI data**
- **Maps DMI Indications to SNMP Alerts**
- **Follows the DMTF standard for DMI to SNMP mapping including DMTF OIDs**
- **Allows for mapping vendor specific Groups to SNMP**
- **Preserves investment in SNMP while accommodating DMI implementations**



SmartDMI™ to SNMP Mapper Architecture



Third party

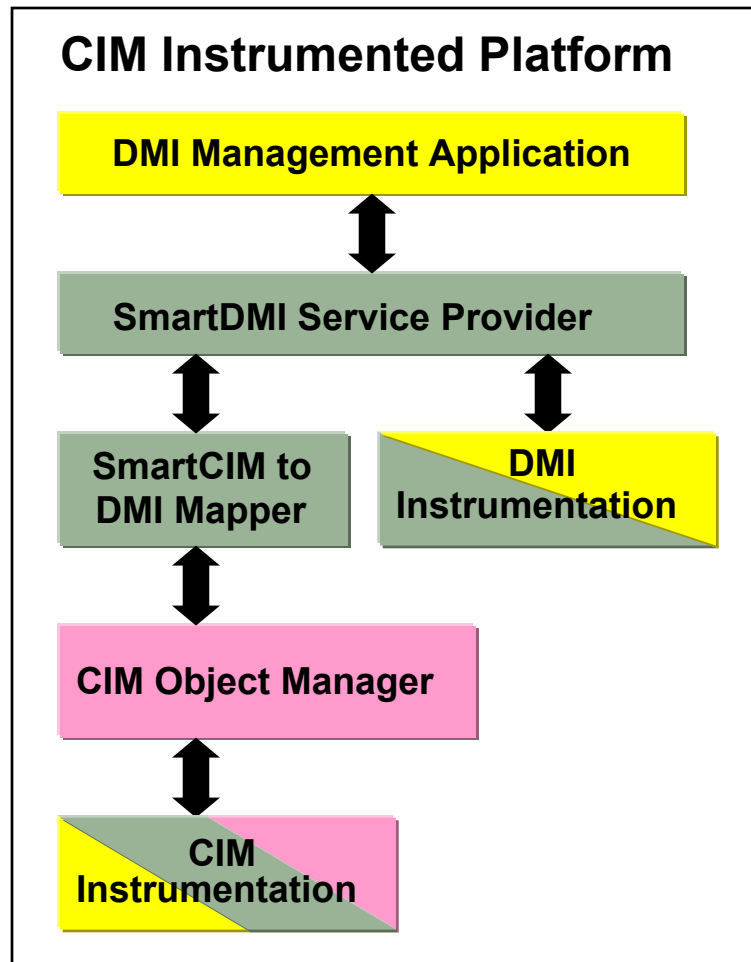
Enablers



SmartCIM™ to DMI Mapper

- **Allows DMI management consoles to access CIM data**
- **Preserves investment in DMI while accommodating CIM implementations**
- **Extends DMTF CIM mappings**
- **Provides support for WMI Indications**
- **Allows for mapping vendor specific CIM Objects to DMI**

SmartCIM™ to DMI Mapper Architecture





SmartCIM™ to DMI Mapper

- **Data**
 - Gathers data from multiple CIM class instances to populate a DMI group
 - Performs unit translation operations on numeric data
 - Performs language and encoding translations if necessary supporting language mappings exist
- **Indications**
 - Reacts to various indications both from DMI and CIM
- **Configuration**
 - Constructs and installs DMI component definition dynamically
 - Accommodates multiple rows in a DMI table having identical key lists



Device or Software Vendor

- **SMBIOS**
 - **Device Vendors:** Provide data tables to system vendors for your products included on the motherboard
 - **Software Vendor:** Not applicable
- **DMI**
 - **Deliver DMI Component Instrumentation or CIM to DMI Mapping for your products**
- **CIM**
 - **Deliver CIM Providers**



Operating System Vendor

- **SMBIOS**
 - Mine SMBIOS data directly or through DMI and/or CIM
- **DMI**
 - Provide DMI Service Providers for the use of device, software and system management vendors
- **CIM**
 - Provide CIM Object Manager for the use of device, software and system management vendors



Managed System Vendor

- **SMBIOS**
 - Make sure your motherboard correctly populates SMBIOS data tables and supports both interfaces
- **DMI**
 - Make sure your managed system provides DMI Service Provider and Component Instrumentation
 - Or, SmartCIM™ to DMI Mapper
- **CIM**
 - Make sure your managed systems provides CIM Object Manager and CIM Providers



Management Software Vendor

- **SMBIOS**
 - Retrieve SMBIOS data through DMI or CIM
 - Deploy direct agents to use local SMBIOS interface
- **DMI**
 - Use DMI MI interface to retrieve management information from DMI-enabled systems
- **CIM**
 - Use WBEM (CIM Operations over HTTP and XML) or system proprietary interfaces to retrieve management information from CIM-enabled systems



Enterprise Managers

- **SMBIOS**
 - Insist on managed systems that implement SMBIOS, the later the better ... and both calling interfaces
- **DMI**
 - If you have invested in DMI management solutions, continue to require DMI solutions from your vendors
 - Have them use CIM to DMI Mappers if they only support CIM management data
- **CIM**
 - If you're ready to move to CIM because a significant portion of your enterprise is CIM-enabled, make the switch



Questions Still to be Answered

- **What about SMNP**
 - Not a DMTF technology, so we don't address it directly
- **SMBIOS and IA64 Systems**
- **When will:**
 - DMI be obsolete
 - CIM be all I need

Do you have any more?



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 - CIM to DMI
- **What you need to do**



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