

DMTF Technologies Overview

John Crandall

Technical Council Vice-Chair, DMTF

Agenda

- ❑ Standardizing Systems Management
 - ❑ What drives the need for standardization
- ❑ Introduction to the DMTF
 - ❑ Organization/History
 - ❑ Standardization
- ❑ DMTF Management Initiatives
 - ❑ VMAN
 - ❑ SMASH
 - ❑ DASH
 - ❑ CDM
- ❑ Additional DMTF Standardization
 - ❑ Protocols, Profiles, Generic Operations, Registries
 - ❑ Protocols/data models for intercommunications within a platform
 - ❑ Power & Cooling
 - ❑ CMDBf
 - ❑ Cloud
- ❑ Summary

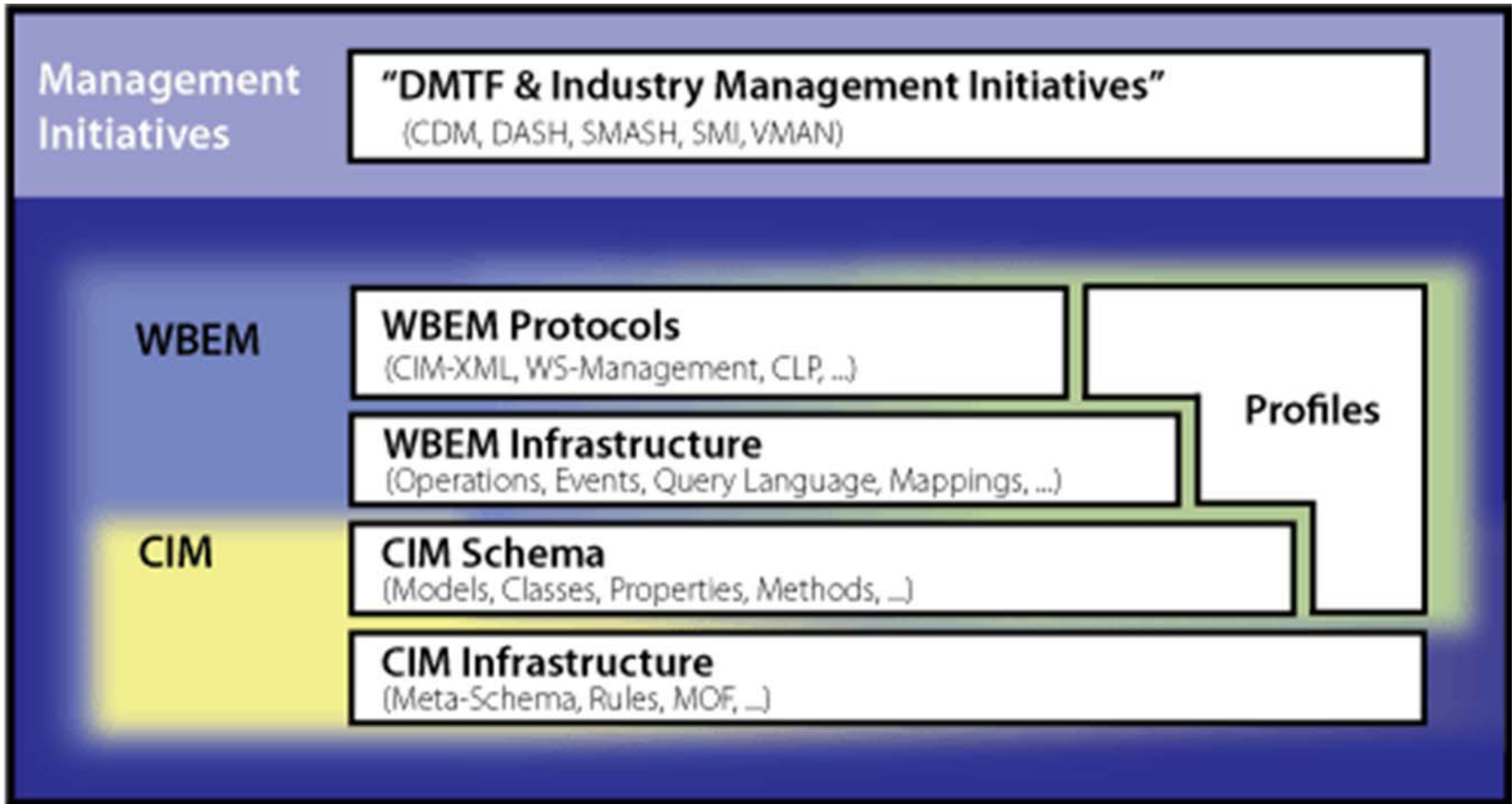
But management tools often contribute to the problem...

- ❑ Too many tools that perform commodity functions but fail to interoperate.
- ❑ Server, desktop, and mobile platforms management is time consuming and tools are costly to install, configure and maintain.
- ❑ Security integration & concerns
 - ❑ Poor authentication mechanism
 - ❑ Requires ports to be opened in firewall
 - ❑ Legacy protocols
- ❑ Perception that management agents consume too many cycles and destabilize OS.

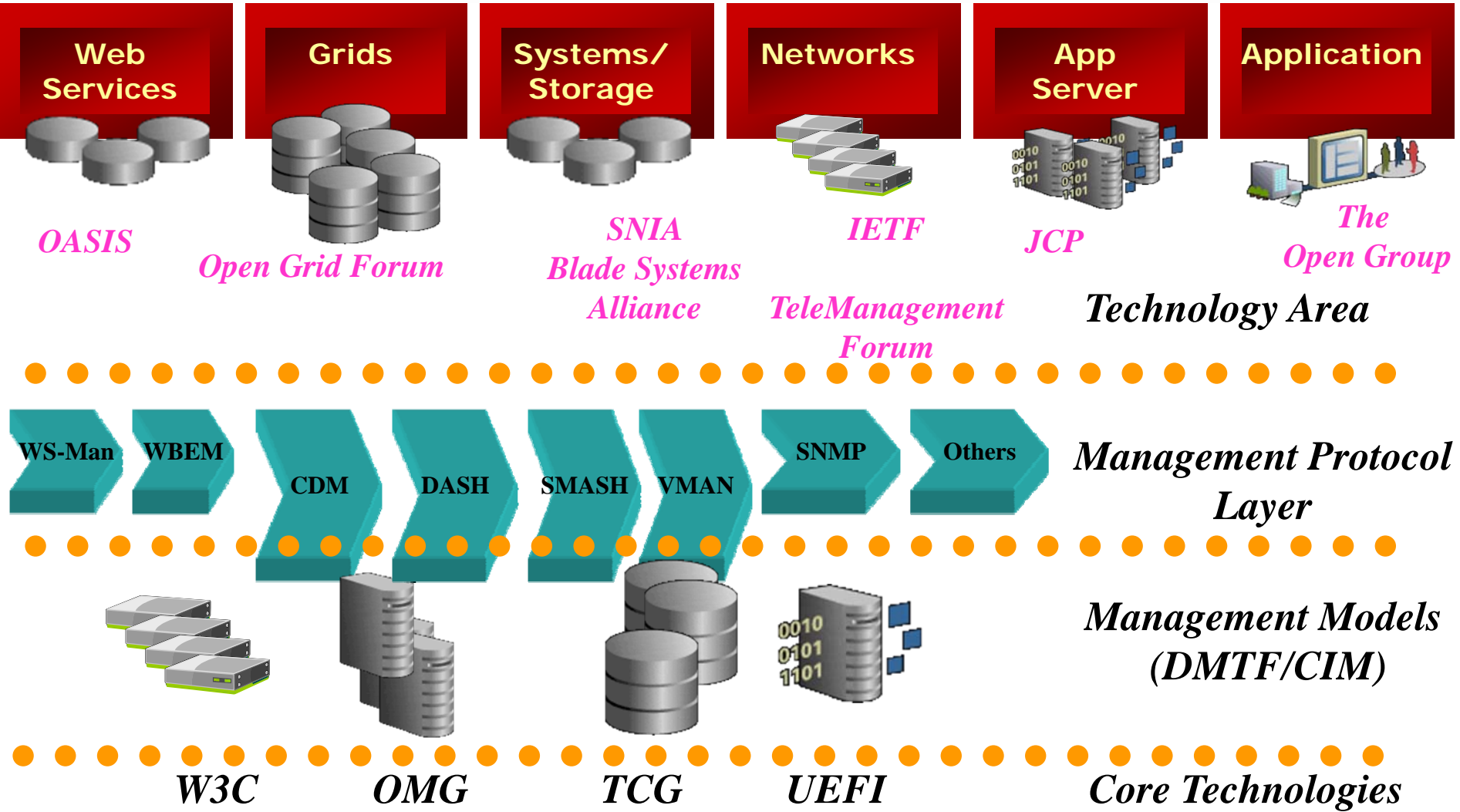


- ❑ Develops management standards and promotes interoperability for enterprise and internet environments
- ❑ More than 4,000 active participants from nearly 200 organizations in over 40 countries.
- ❑ Board Members:
 - ❑ AMD, Broadcom, CA, Dell, EMC, Fujitsu, HP, Hitachi, IBM, Intel, Microsoft, Novell, Oracle, Sun, Symantec and VmWare
- ❑ Formed in 1992.
- ❑ 3 Major committees (Technical, Marketing & Interoperability) with about 25 Working Groups/Forums.
- ❑ Developed the following standards & initiatives:
 - ❑ CIM, WBEM (CIM/XML), SMBIOS, CDM, DMI, ASF, SMASH, DASH, WS-Management...
- ❑ Over a dozen Alliance Partners
 - ❑ SNIA (Storage Network Industry Association) is the storage partner to the DMTF
 - ❑ OGF/GGF, NGN, TMF, TCG, OASIS, etc.

DMTF Technology Diagram



A Technology-Oriented View



Standardization driven by the types of Management Interfaces

- ❑ Types of Interfaces
 - ❑ External (Network) & Internal
 - ❑ Customers only see External (network) interfaces
 - ❑ As vendors, we see the internal interfaces as well
- ❑ Three types of External Interfaces
 - ❑ Command Line
 - ❑ High demand for Script-oriented clients, particularly Linux Administrators
 - ❑ High need for standardization
 - ❑ Programmatic
 - ❑ High demand for Application-oriented clients, particularly Windows Administrators
 - ❑ High need for standardization
 - ❑ Web Based
 - ❑ Web browser based management of system
 - ❑ Vendor / Platform unique, therefore hard to standardize
- ❑ Three Types of Internal Interfaces
 - ❑ Chip to Chip
 - ❑ Enables building an ecosystem
 - ❑ Chip to Operating System
 - ❑ Enables out-of-box support for subset of offerings.
 - ❑ Within the Operating System
 - ❑ Operating System Specific.

- ❑ Preliminary for specifications as been eliminated.
 - ❑ Schema still has Experimental
- ❑ Specifications can contain contain text that is Experimental or Deprecated
- ❑ Schema can go final upon release of a specification (not work in progress) referencing the schema in the DMTF
 - ❑ CR is required
 - ❑ Alliance partners can use the same process to take schema final

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- ❑ DMTF currently has 4 Management Initiatives
 - ❑ VMAN – Virtualization Management
 - ❑ SMASH – Systems Management Architecture for Server Hardware
 - ❑ DASH – Desktop and mobile Architecture for System Hardware
 - ❑ CDM – Common Diagnostics Model
- ❑ DMTF Recognizes SMI as a Management Initiative

DMTF Profiles

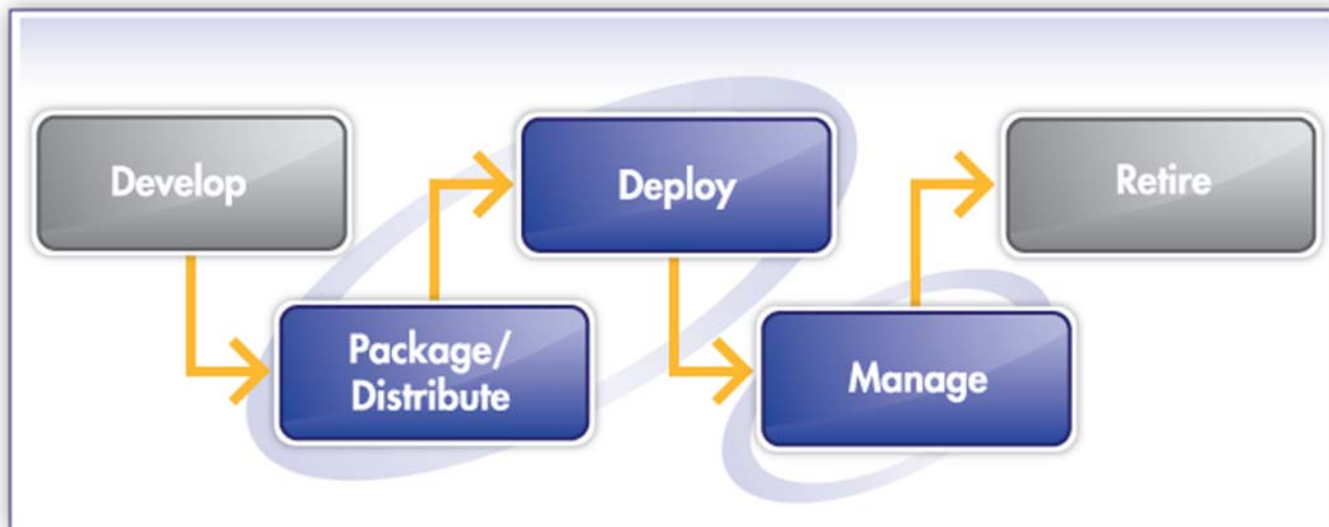
- DSP1002 Diagnostics Profile 1.0
- DSP1002 Diagnostics Profile 2.0 (Preliminary)
- DSP1003 Policy Profile (Preliminary)
- DSP1004 Base Server Profile
- DSP1005 CLP Service Profile
- DSP1006 SMASH Collections Profile
- DSP1007 SM CLP Admin Domain Profile
- DSP1008 Modular Systems Profile
- DSP1009 Sensors Profile
- DSP1010 Record Log Profile
- DSP1011 Physical Asset Profile
- DSP1012 Boot Control Profile
- DSP1013 Fan Profile
- DSP1014 Ethernet Port Profile
- DSP1015 Power Supply Profile 1.0.1
- DSP1015 Power Supply Profile 1.1.0 (Preliminary)
- DSP1016 Telnet Service Profile
- DSP1017 SSH Service Profile
- DSP1018 Service Processor Profile
- DSP1019 Device Tray Profile
- DSP1020 Pass-Through Module Profile
- DSP1021 Shared Device Management Profile
- DSP1022 CPU Profile
- DSP1023 Software Inventory Profile
- DSP1024 Text Console Redirection Profile
- DSP1025 Software Update Profile
- DSP1026 System Memory Profile
- DSP1027 Power State Management Profile
- DSP1028 Alarm Device Profile
- DSP1029 OS Status Profile
- DSP1030 Battery Profile
- DSP1033 Profile Registration
- DSP1034 Simple Identity Management Profile
- DSP1035 Host LAN Network Port Profile
- DSP1036 IP Interface Profile
- DSP1037 DHCP Client Profile
- DSP1038 DNS Client Profile
- DSP1039 Role Based Authorization Profile
- DSP1040 Platform Watchdog Profile
- DSP1041 Resource Allocation Profile
- DSP1042 System Virtualization Profile (Preliminary)
- DSP1043 Allocation Capabilities Profile
- DSP1045 Memory Resource Virtualization Profile
- DSP1052 Computer System Profile
- DSP1053 Base Metrics Profile
- DSP1054 Indications Profile
- DSP1057 Virtual System Profile (Preliminary)
- DSP1058 Base Desktop and Mobile Profile
- DSP1059 Generic Device Resource Virtualization Profile (Preliminary)
- DSP1061 Bios Management Profile
- DSP1070 Opaque Management Data Profile
- DSP1074 Indicator LED Profile
- DSP1075 PCI Device Profile
- DSP1076 KVM Redirection Profile
- DSP1077 USB Redirection Profile
- DSP1080 Enabled Logical Element Profile
- DSP1086 Media Redirection Profile
- DSP1088 WI-FI Port Profile

Storage Developer Conference 2009

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What is VMAN?

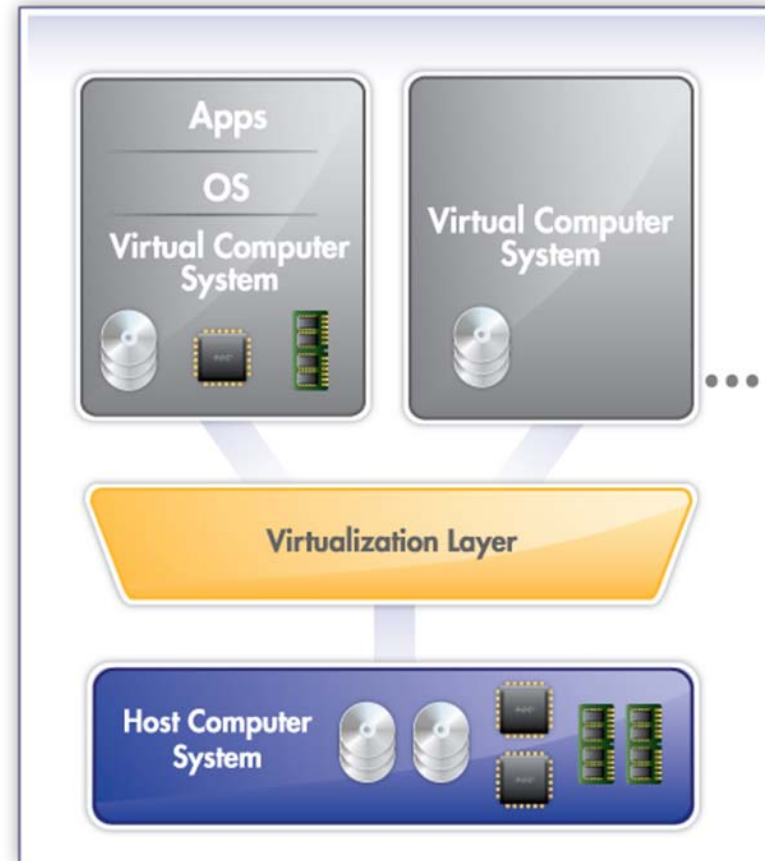
- ❑ VMAN Stands for Virtualization Management
- ❑ DMTF Standards for Management of Virtualization Systems
 - ❑ Open Virtualization Format (OVF) addresses the packaging/distribution and deployment/ installation aspects
 - ❑ System Virtualization Management standards target the management stage of a virtualized system life



- ❑ OVF is a DMTF standard for packaging and distributing virtual appliances.
- ❑ A Virtual Appliance is a pre-built software solution, comprised of one or more Virtual Machines that are packaged, maintained, updated and managed as a unit.
- ❑ OVF enables portability and simplifies installation and deployment of virtual appliances across multiple virtualization platforms.

System Virtualization Management

- ❑ System Virtualization Management Standards for system virtualization management define a consistent way for managing any virtualized environment (i.e. virtual machines manager and associated virtual machines).
 - ❑ Cover various aspects related to the control and management of the operational lifecycle of a virtual system including the creation, modification, enabling, disabling, suspending, creating snapshots, as well as monitoring a virtual computer system for these changes.
- ❑ Monitoring of both virtual and physical resources.
 - ❑ Monitoring includes the detection and tracking of changes to the environment, configuration, as well as monitoring of health and performance.
 - ❑ A mapping between virtual and physical resources



- Virtualization Profiles Released
 - Virtual System
 - System Virtualization (hyper-visor)
 - Resource Allocation
 - Allocation Capabilities
 - Memory Resource Virtualization
 - Generic Device Resource Virtualization
- More under way
 - CPU & Memory Virtualization
 - IO Virtualization
 - Virtual Switch

What is SMASH?

- ❑ SMASH Stands for Systems Management Architecture for Server Hardware
 - ❑ SMASH is a suite of specifications that deliver industry standard protocols and profiles to unify the management of the data center.
 - ❑ Vendor independent
 - ❑ Platform neutral
 - ❑ Independent of machine state
- ❑ The SMASH specifications utilize the **CIM data model** and industry standard transports and security mechanisms.
 - ❑ Align out-of-service with in-service manageability.
 - ❑ Align in-band with out-of-band manageability.
 - ❑ Customer Driven
- ❑ 1.0 Standard completed Dec, 2006
- ❑ 2.0 Standard completed Sep 2007
 - ❑ DMTF Standard Fall 2009

State of the SMASH

- ❑ 1.0 Specs Architecture White Paper
 - ❑ SM CLP at 1.0 Final Standard
 - ❑ SM ME Addressing at 1.0 Preliminary Standard
 - ❑ Profiles & Mapping Specs at 1.0 Preliminary Standard or final standard
 - ❑ www.dmtf.org/standards/smash
- ❑ Interoperability Forum formed in the DMTF
 - ❑ SMASH 1.0 CLP: tester completed, tests 40% complete
 - ❑ DASH 1.0/1.1, SMASH 2.0: choosing platform to test through VWS-Management
 - ❑ Infrastructure: developing certification repository
- ❑ 2.0 announced, 9/2007
 - ❑ Including VWS-Management Support
 - ❑ Added Discovery
 - ❑ Additional Profiles: PCI, LED, KVM Redirection, Watchdog, OS Status, Indications
 - ❑ Added reference to SMI-S Host Hardware Raid Profile
 - ❑ Updated White Paper
- ❑ Planning on periodic “train” to add features/functions

What is the SM CLP?

- ❑ SM CLP (Server Management Command Line Protocol) is
 - ❑ Designed for a human (primary) or a script (secondary)
 - ❑ Working over, but not limited to, industry standard transports
 - ❑ Telnet & SSHv2
 - ❑ Exposes CIM data model in a “human friendly” fashion through simple commands
 - ❑ SM ME Addressing Spec turns CIM containment into command targets like “system1\fan1”
 - ❑ NOT a full featured programming interface
 - ❑ Because it is a lightweight communication mechanism with some semantics were intentionally left out.
 - ❑ Therefore, a programmatic interface is still required for some operations
 - ❑ But input and output are fully machine-parsable.
 - ❑ BUT all of the Hardware Operations (provisioning, allocation, configuration, inventory, state change, security) can be done with the CLP.
 - ❑ Either by a human, script or program
 - ❑ Because there is a grammar that defines input and XSD defined output.
 - ❑ Very light weight implementations can be done.

What is DASH?

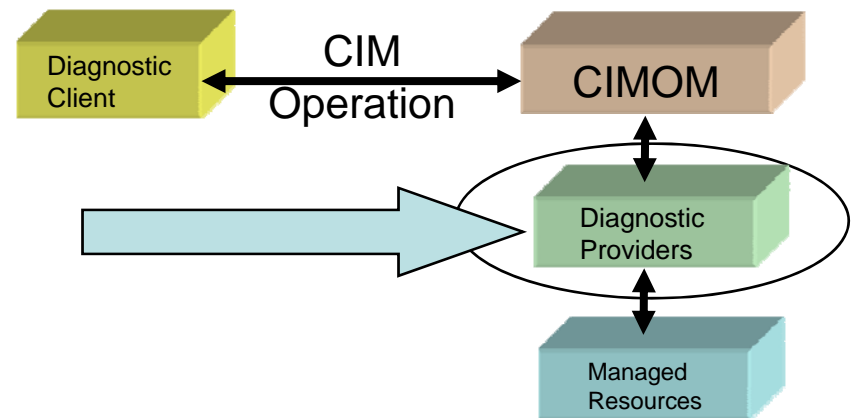
- ❑ DASH Stands for Desktop and mobile Architecture for System Hardware
 - ❑ Ultra light weight programmatic interface for desktop to mobile environment, including bladed PCs.
 - ❑ Utilizes the **CIM Data Model**, leveraging the SMASH Profiles & Architecture gives this effort a head start.
 - ❑ Tackling tough issues like standardized Eventing.
 - ❑ First revision maps to ASF functionality.
- ❑ DASH consists of:
 - ❑ Architecture White Paper
 - ❑ **WS-Management**
 - ❑ DASH Implementation Requirements Specification
 - ❑ Profiles (over 20 of them).
 - ❑ More than half of them are I.0 Final Standards and most of the rest are I.0 Preliminary Standards
- ❑ DASH 1.0 and DASH 1.1 are DMTF Standard
 - ❑ www.dmtf.org/standards/dash
 - ❑ Plans include a rolling “train” model for updates.

Management Functionality Overview

DASH 1.0	DASH 1.1	Functionality being considered for future versions
<ul style="list-style-type: none"> • Power control • Boot Control • Push Indications (equivalent to PET alerts) • Correlatable System ID • FW Version info • HW info <ul style="list-style-type: none"> • Chassis model/serial, CPU, Memory, Fan, Power Supply, Sensor • Login credentials and Roles • Profile Registration Profile 	<ul style="list-style-type: none"> • Wired NIC Management • Record Log • FW/SW Update • BIOS Management • Opaque Data (Offline Mailbox/Data Store) • Text Console Redirection • USB Redirection • Media Redirection • KVM Redirection • OS Status • Battery 	<ul style="list-style-type: none"> • Video Controller • VLAN Management • Port/Device Management <ul style="list-style-type: none"> • PCI, USB, Serial, Parallel, IR, 1394, Card Bus, Optical Drives • TPM • Storage Management • Wireless NIC Management • Certificate Management

CDM (Common Diagnostics Model)

- A common industry standard diagnostics interface that enables seamless integration of vendor-supplied diagnostic services into system and SAN management frameworks that is Platform and OS independent:
 - *discover, configure and execute diagnostic tests*
 - *view progress and control test execution*
 - *view and manage test execution results*
- Not intended to be directly customer visible
 - Internal interface provider libraries to integrate in other tools via programmatic interfaces
 - Initial benefit from factory diags



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- ❑ Protocols in the DMTF
 - ❑ CIM/XML
 - ❑ Continues refinement – working on update to take to ISO
 - ❑ WS-Management
- ❑ DMTF Standard
 - ❑ WS-CIM Binding Specifications
 - ❑ WS-Man CIM Binding Specification
- ❑ Nearing DMTF Standard
 - ❑ Discovery
 - ❑ Expanding to include all WBEM Protocols
 - ❑ Generic Operations

Profiles & Registries

- ❑ Profile Development continues
 - ❑ PUG/PRP continues
 - ❑ PRP 1.0 is DMTF Standard
 - ❑ Development of a PUG 1.1 and 2.0 under way.
 - ❑ “Higher level” profiles under way
 - ❑ Enabled Logical Element Profile
 - ❑ Computer System
 - ❑ Working on CIM Server & other services.
- ❑ Machine Readable Profiles (MRP)
 - ❑ Work In Progress
 - ❑ DSP8028 - Management Profile XML
 - ❑ DSP8029 - Management Profile Print XSLT
 - ❑ DSP2023 - MRP Samples
- ❑ DMTF tackling Registries
 - ❑ Develop schema & repositories for Messages
 - ❑ DSP8007 – Platform Message Registry
- ❑ Working on others as well
 - ❑ Message, Metrics and others under consideration

- ❑ Platform Management Components Intercommunications (PMCI) Specifications
 - ❑ Management Component Transport Protocol (MCTP) Specification is a chip-to-chip interface with transport mapping to standard signaling technologies
 - ❑ First of these specifications has been released
 - ❑ Base transport, IDs, two transport bindings (PCIe, SMBus)
 - ❑ Platform Level Data Model (PLDM) to provide efficient access to low-level information like platform inventory, BIOS control and configuration data, platform monitoring and control, events...
 - ❑ Development of these specifications is still under way. Nearing preliminary
- ❑ Network Controller – Sideband Interface (NC-SI) Specification
 - ❑ Specifies management controller to NIC communication interface and protocol

- ❑ Application of Resource Allocation Setting Data profile to Power & Cooling
- ❑ Specification development & accompanying MOF changes nearing completion.
 - ❑ DSP1027 Power State Management Profile 1.0.1 DMTF Standard
 - ❑ DSP1027 Power State Management Profile 1.0.1 2.0 WIP
 - ❑ DSP1084 Power Topology Profile
 - ❑ DSP1085 Power Utilization Management Profile

- ❑ The CMDBf standard enables organizations to federate and access information from complex, multi-vendor infrastructures.
- ❑ Simplifies the process of managing related configuration data stored in multiple CMDBs and MDRs
- ❑ Supports the creation of an ITIL v3 Configuration Management System (CMS).
- ❑ Provides IT personnel with a more complete picture of their entire IT environment
 - ❑ Allowing them to more effectively manage the components in their IT environment
 - ❑ Better utilize configuration data to streamline management tasks and resolve issues without the need of creating a single monolithic repository of configuration data.
- ❑ A standard way for vendors and tools to:
 - ❑ Share and access configuration data, organizations can use their CMDBs to keep track of changes to an IT environment
 - ❑ Better understand the impact of proposed changes to the IT environment.

- ❑ Defines the XML schema for federating management data repositories in a model and protocol neutral fashion.
- ❑ Defines encapsulating XML elements for items (Configuration Items and/or process artifacts), relationships, and data records associated to the items and relationships. The data model of the encapsulated data is not defined.
- ❑ Defines a query interface and expression format through which clients may request item and relationship data from CMDBs and other management data repositories, and that facilitates queries involving the navigation of graphs consisting of items and relationships.
- ❑ Defines protocol-specific bindings, reusing existing standards where applicable.
- ❑ Defines methodologies and interfaces for accessing data sources and their capabilities.

- ❑ An Incubator
- ❑ Will focus on enabling management interoperability between private clouds within enterprises and private, public and hybrid cloud providers.
- ❑ No specific standards currently exist
- ❑ Will work toward developing:
 - ❑ cloud resource management protocols
 - ❑ packaging formats
 - ❑ security mechanisms to facilitate interoperability.

- ❑ Customer Advantages of Standards-Based Management for Data Center
 - ❑ Reduced Cost
 - ❑ Increased Choice
 - ❑ Improved Interoperability
- ❑ Industry is working together to improve Management of the Data Center
 - ❑ DMTF working on SMASH, DASH, CDM but also non-solution specific internal & external interfaces
 - ❑ Profiles, Protocols, Discovery, Registries
 - ❑ PMCI & NC-SI
 - ❑ Cloud and CMDBf
- ❑ You can help by demanding & driving standardized solutions and getting involved in their adoption
- ❑ For more information www.dmtf.org