Storage Management Interface – Specification (SMI-S)

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Microsoft IOP Program Manager
Hewlett-Packard

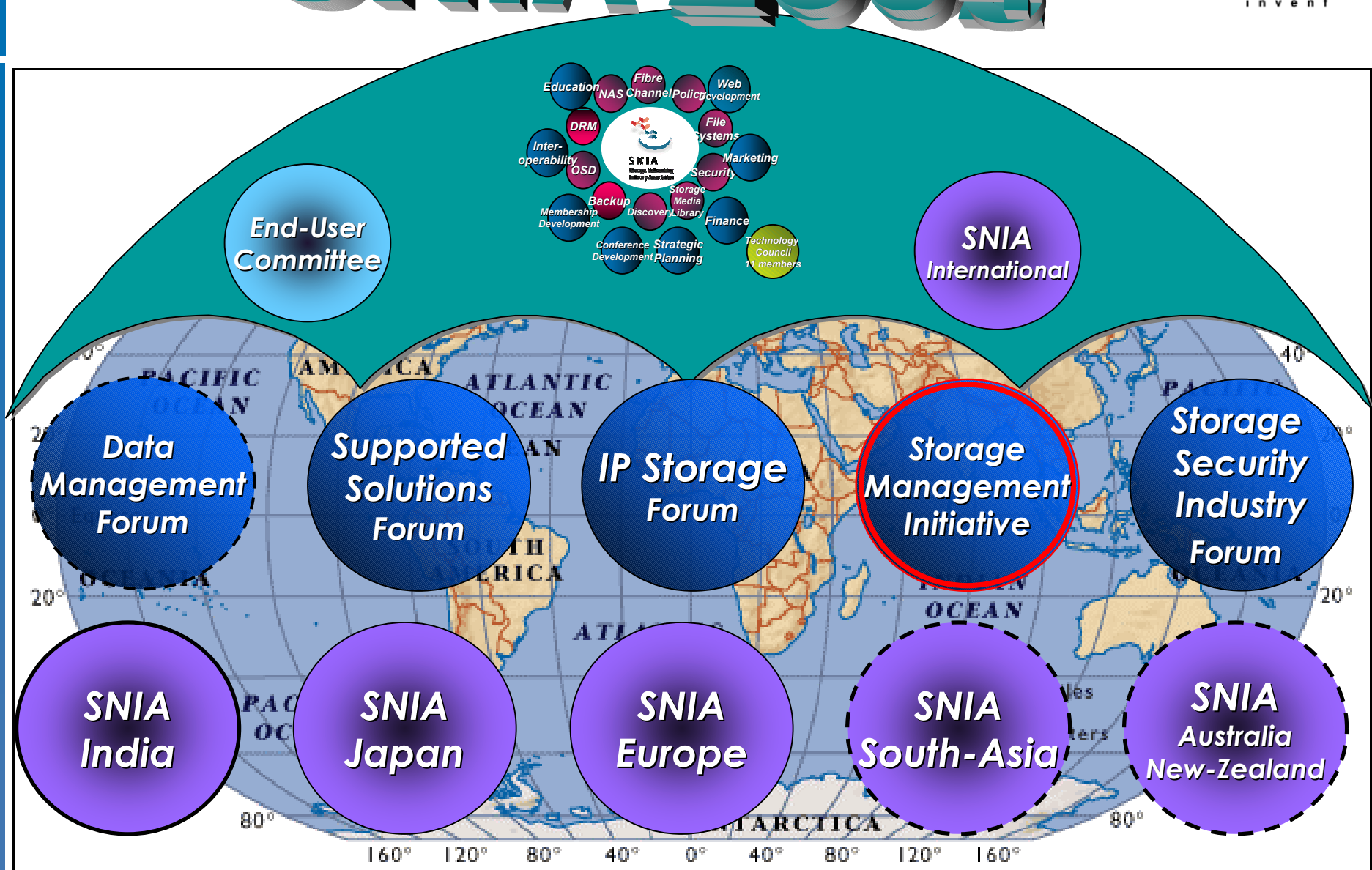
The Storage Networking Industry Association

- The SNIA Mission
  - To ensure that storage networks become efficient, complete, and trusted solutions
- The SNIA Vision
  - ***Accelerate*** new technology development and evolution of standards
  - ***Define*** smart, collaborative, rigorous methods
  - ***Collaborate*** with the IT community to address relevant business issues
  - ***Deliver*** materials, programs and services
  - ***Educate*** and evangelize acceptance among vendors and IT professionals

SNIA Core


Education
NAS
Fibre Channel
Policy
Web Development
DRM
File Systems
Inter-operability
Marketing
OSD
Security
SNIA
Storage Networking Industry Association
Backup
Storage Media Library
Membership Development
Discovery
Finance
Technology Council
11 members
Conference Development
Strategic Planning

SNIA 2004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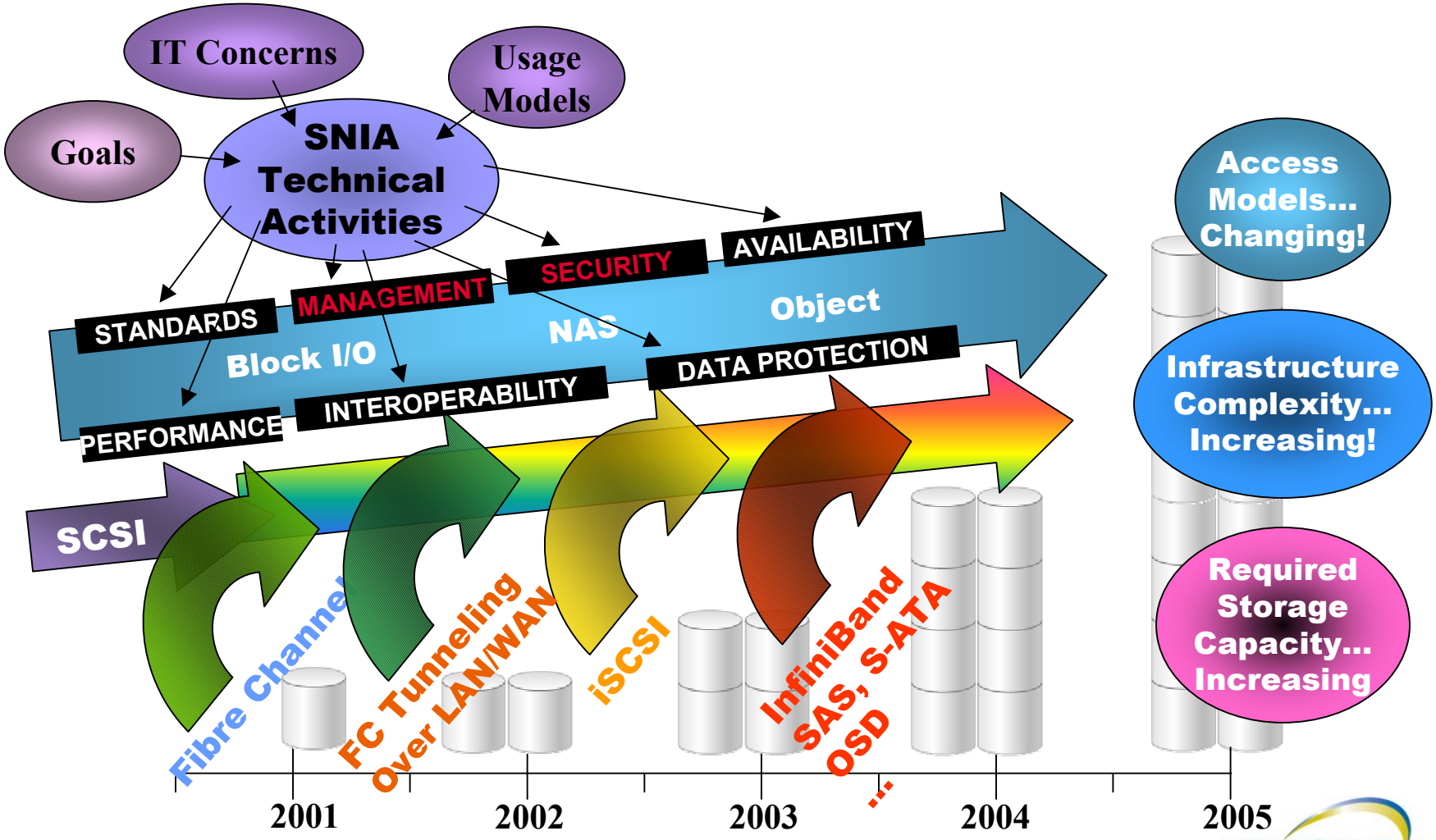
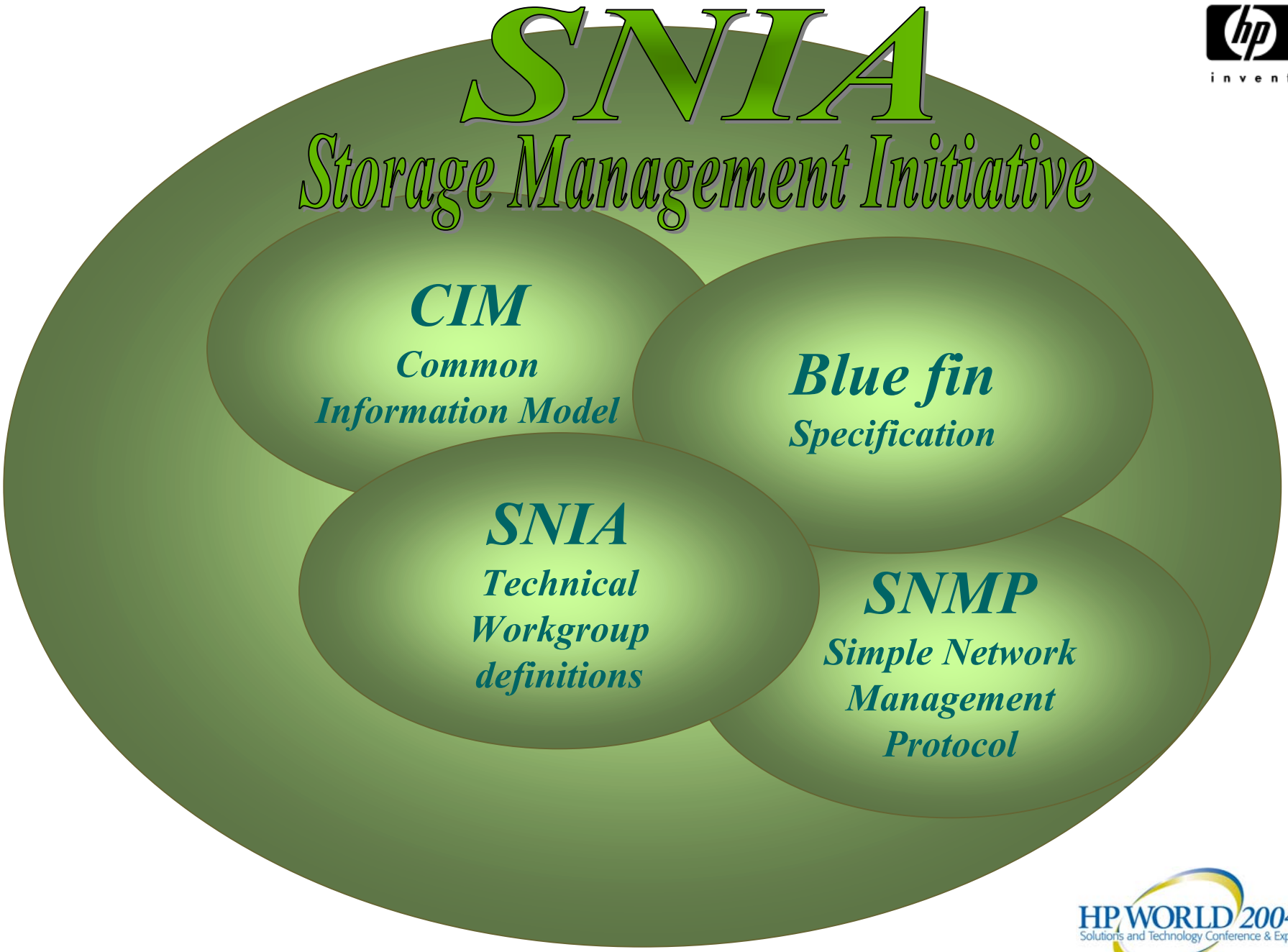
Technology Council
11 members
SNIA
End-User Committee
SNIA International
Data Management Forum
Supported Solutions Forum
IP Storage Forum
Storage Management Initiative
Storage Security Industry Forum
SNIA India
SNIA Japan
SNIA Europe
SNIA South-Asia
SNIA Australia New-Zealand
PACIFIC OCEAN
ATLANTIC OCEAN
INDIAN OCEAN
SOUTH AMERICA
ANTARCTICA
20°
40°
80°
160° 120° 80° 40° 0° 40° 80° 120° 160°

SNIA Technical Activities

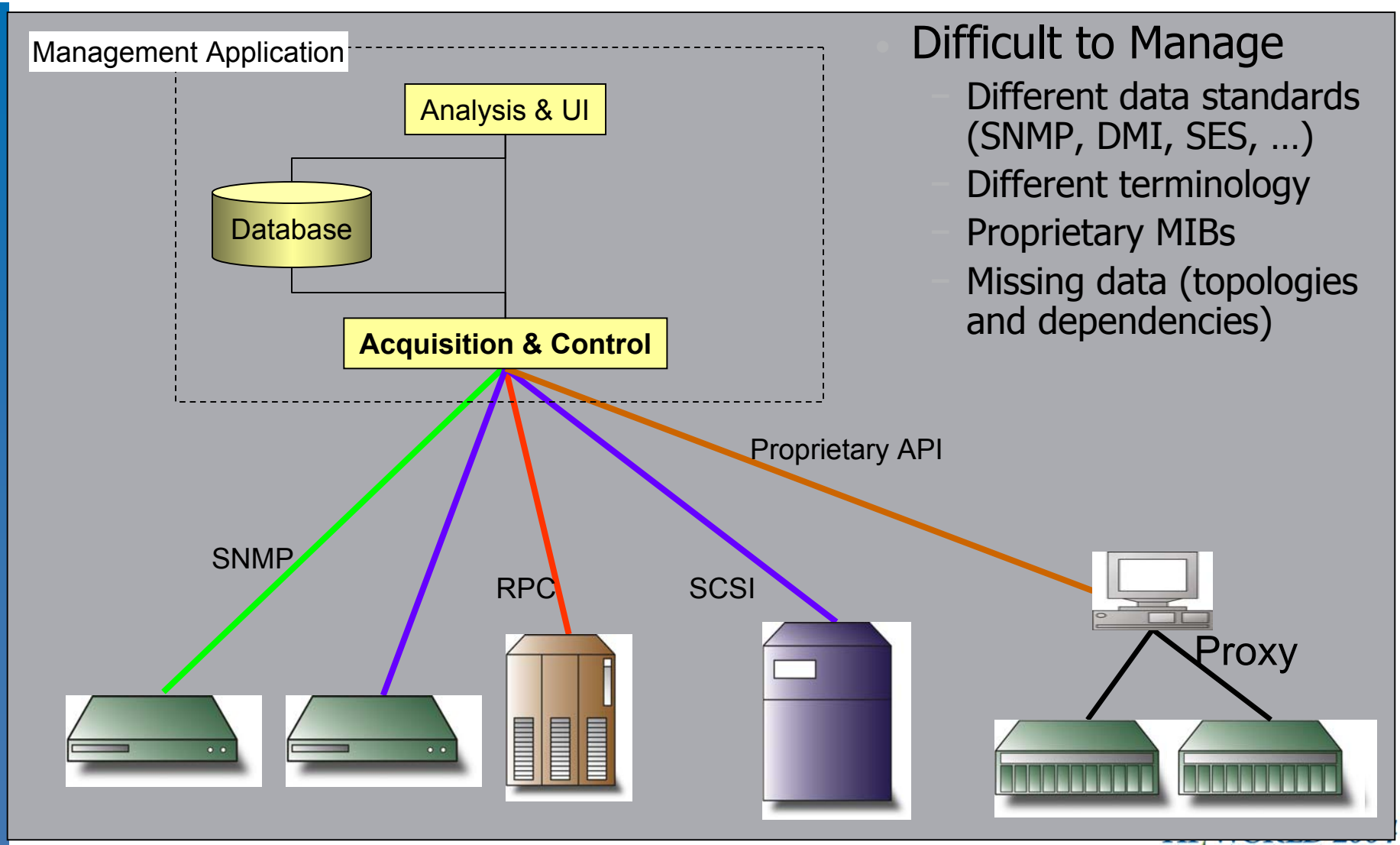


The SNIA Storage Management Initiative (SMI)

- The Storage Network Industry Association (SNIA) is creating and driving to broad adoption a highly functional and interoperable management interface for multi-vendor storage networking products.
- The SMI is:
  - Enabling the integration of larger and more diverse multi-vendor storage networks.
  - Creating a new class of more powerful management applications.
- In support of these goals the SNIA is now working toward the strategic imperative of: *"All storage managed by the SMI Interface in 2005".*

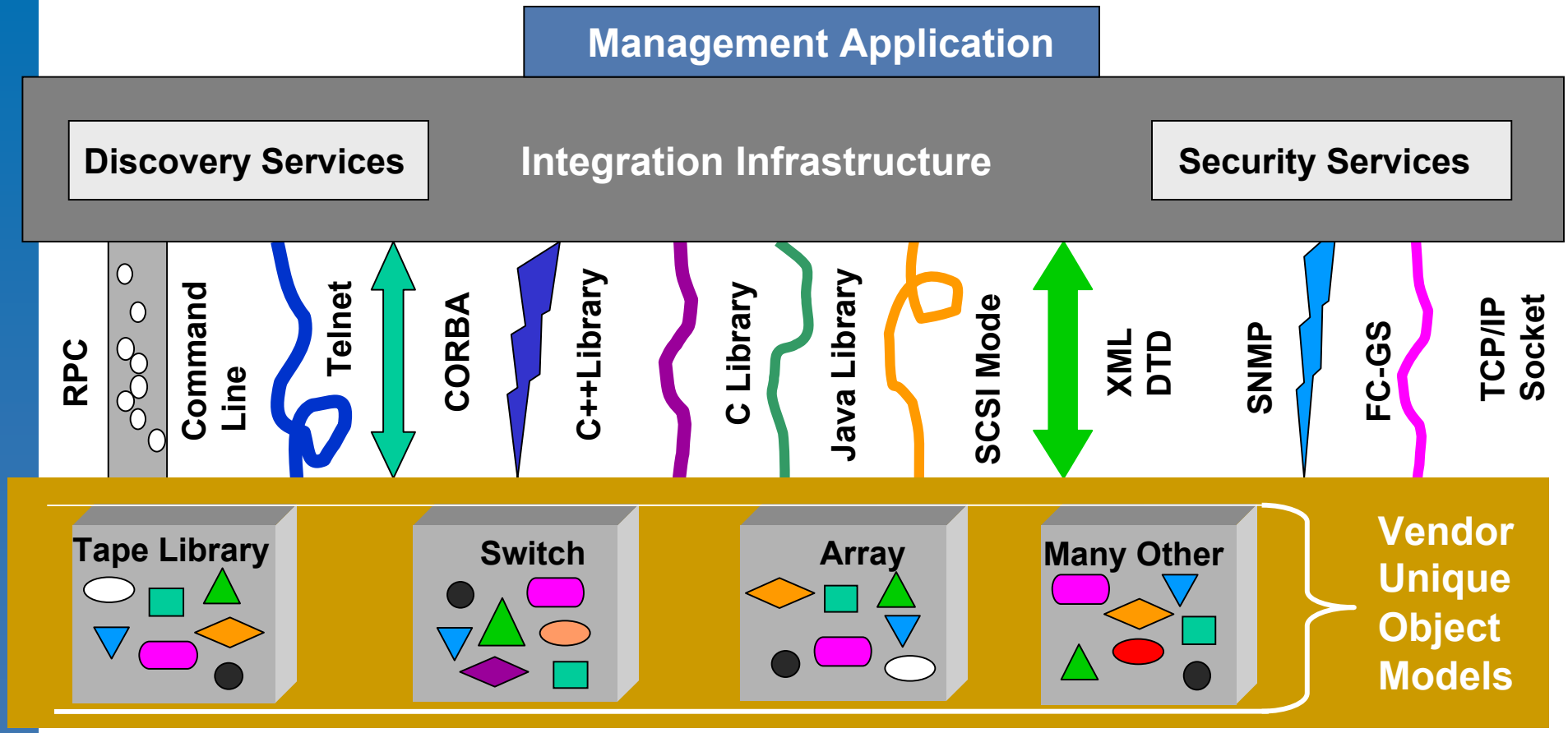

SNIA
Storage Management Initiative
CIM
Common
Information Model
Blue fin
Specification
SNIA
Technical
Workgroup
definitions
SNMP
Simple Network
Management
Protocol

Storage Management Environment Today



- Difficult to Manage
  - Different data standards (SNMP, DMI, SES, …)
  - Different terminology
  - Proprietary MIBs
  - Missing data (topologies and dependencies)

Management App Dilemma



Management App Accelerator

Management Application

Auto-generation of application and infrastructure constructs

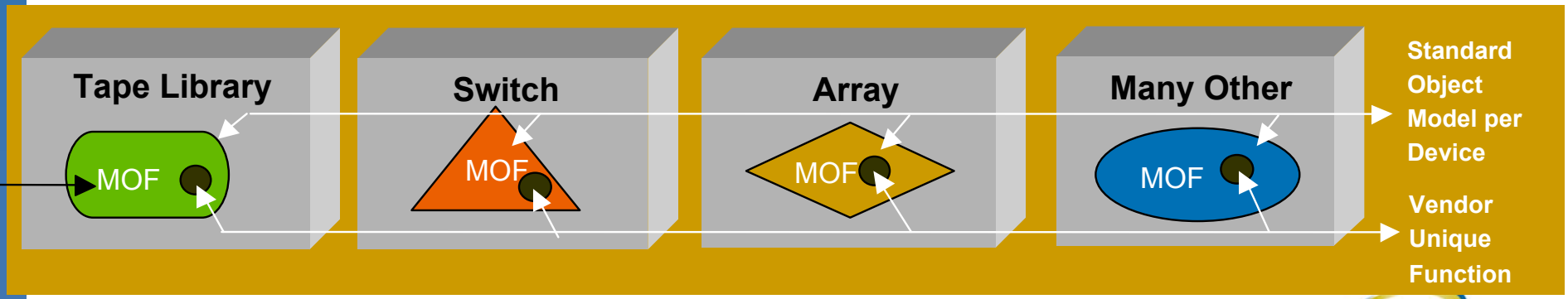
Integration Infrastructure

Object Model Mapping – Vendor Unique Features

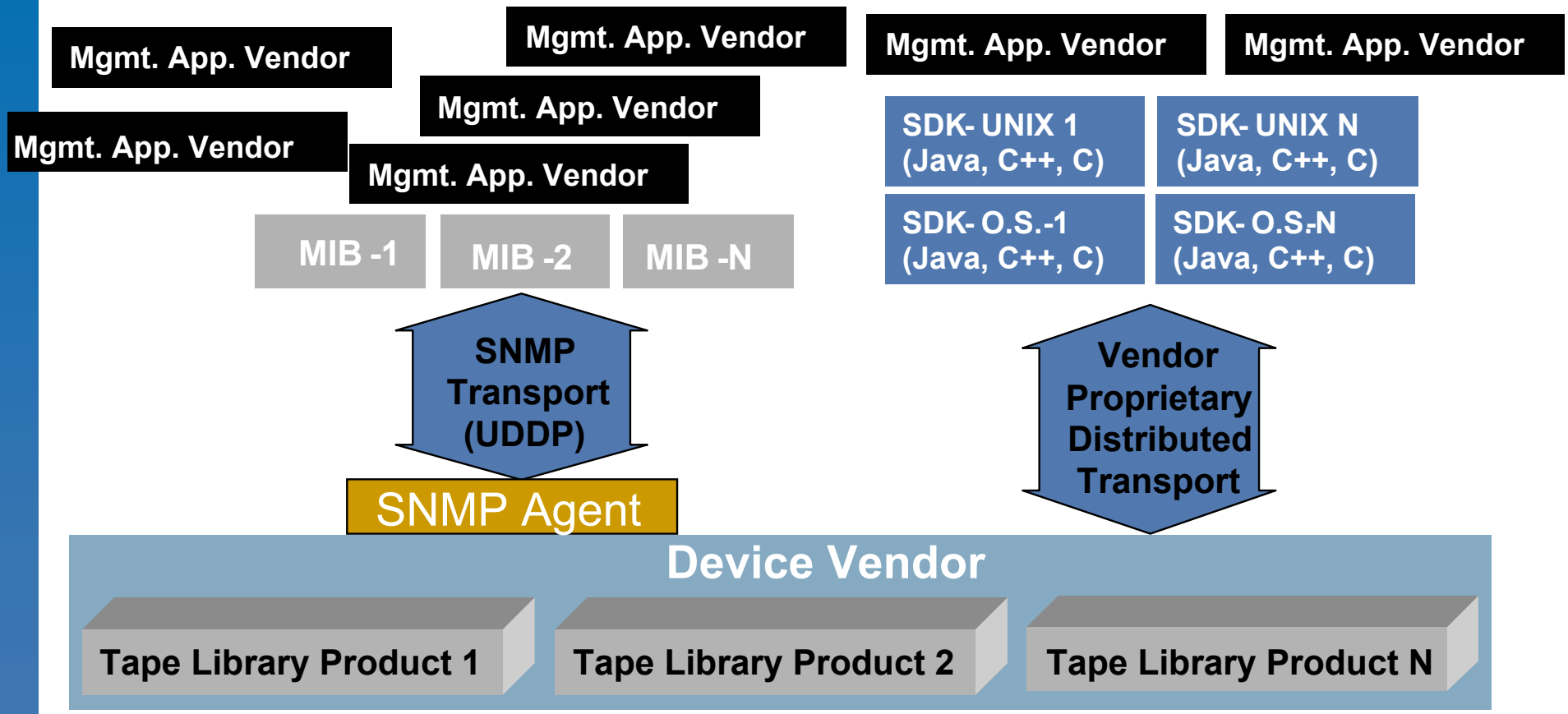
SMIS Interface

Platform Independent
Distributed
Automated Discovery
Security
Locking
Object Oriented

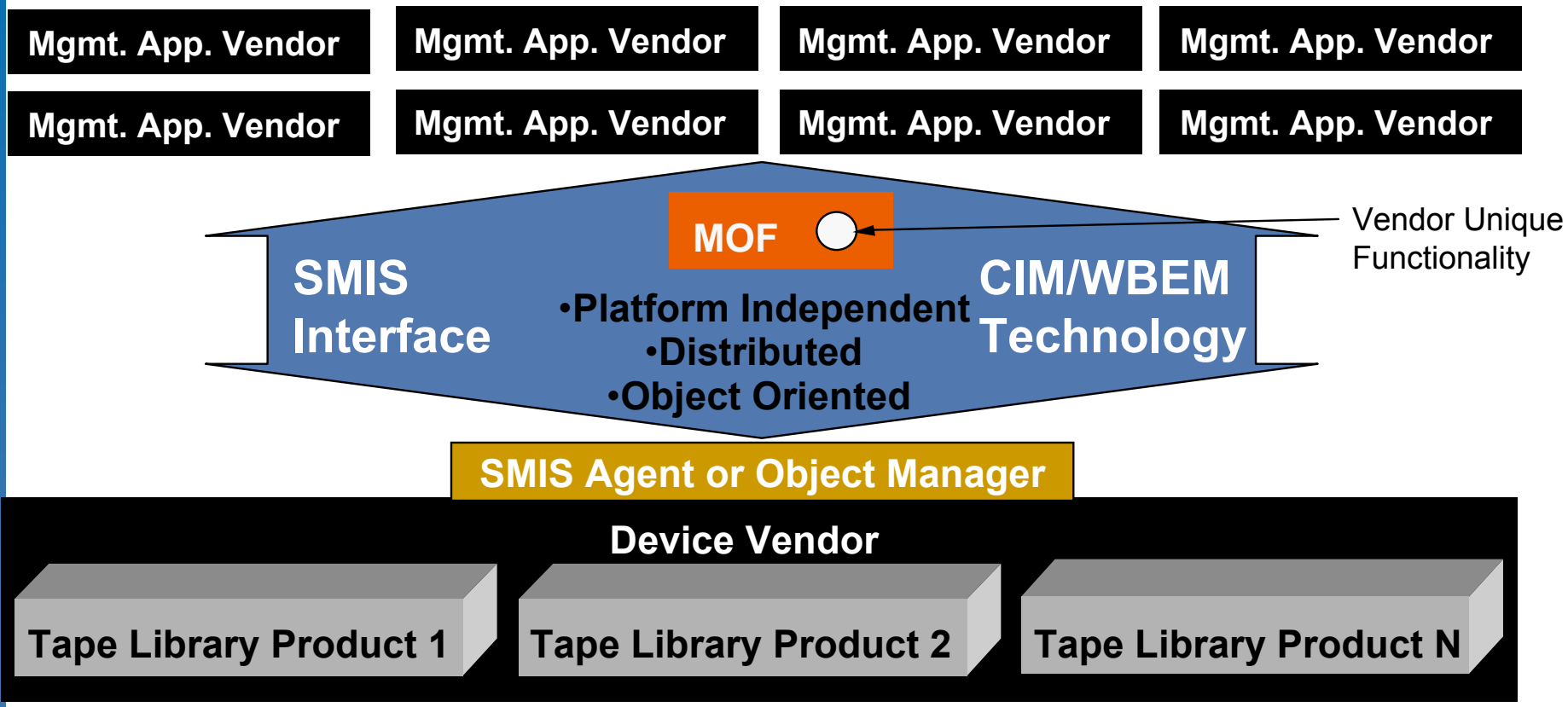
CIM/WBEM Technology



Device Vendor Dilemma

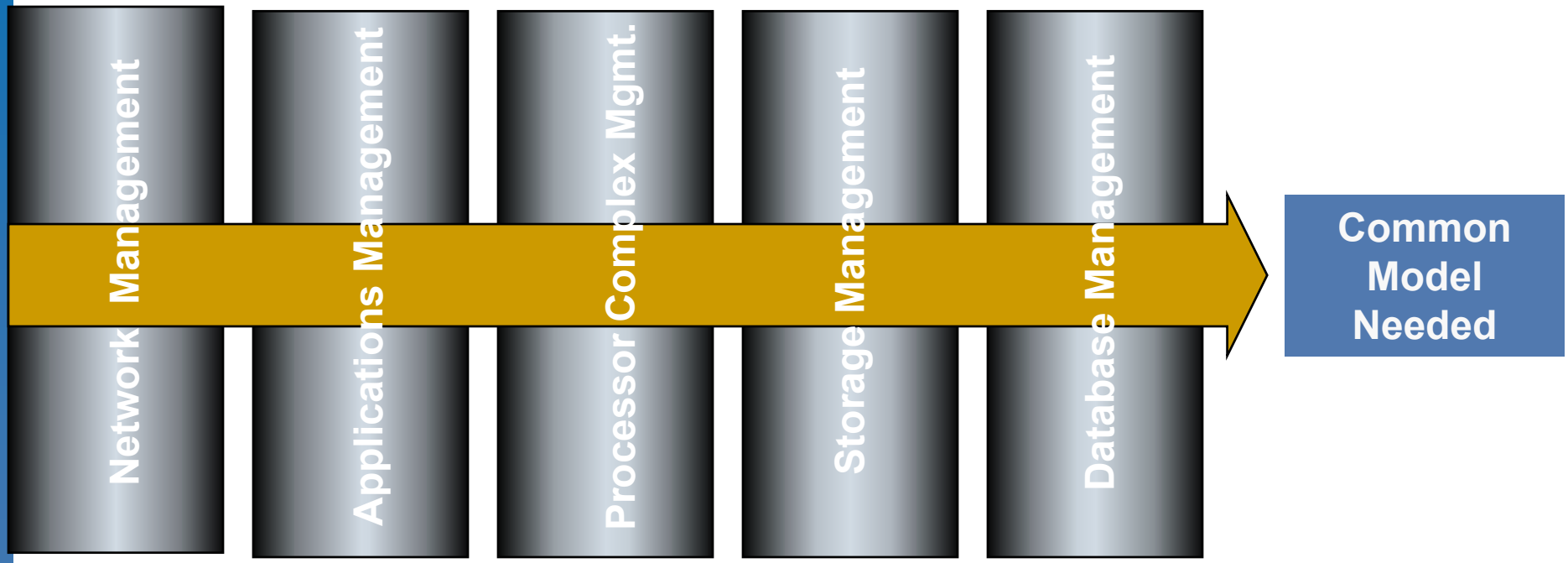


Device Vendor Accelerator



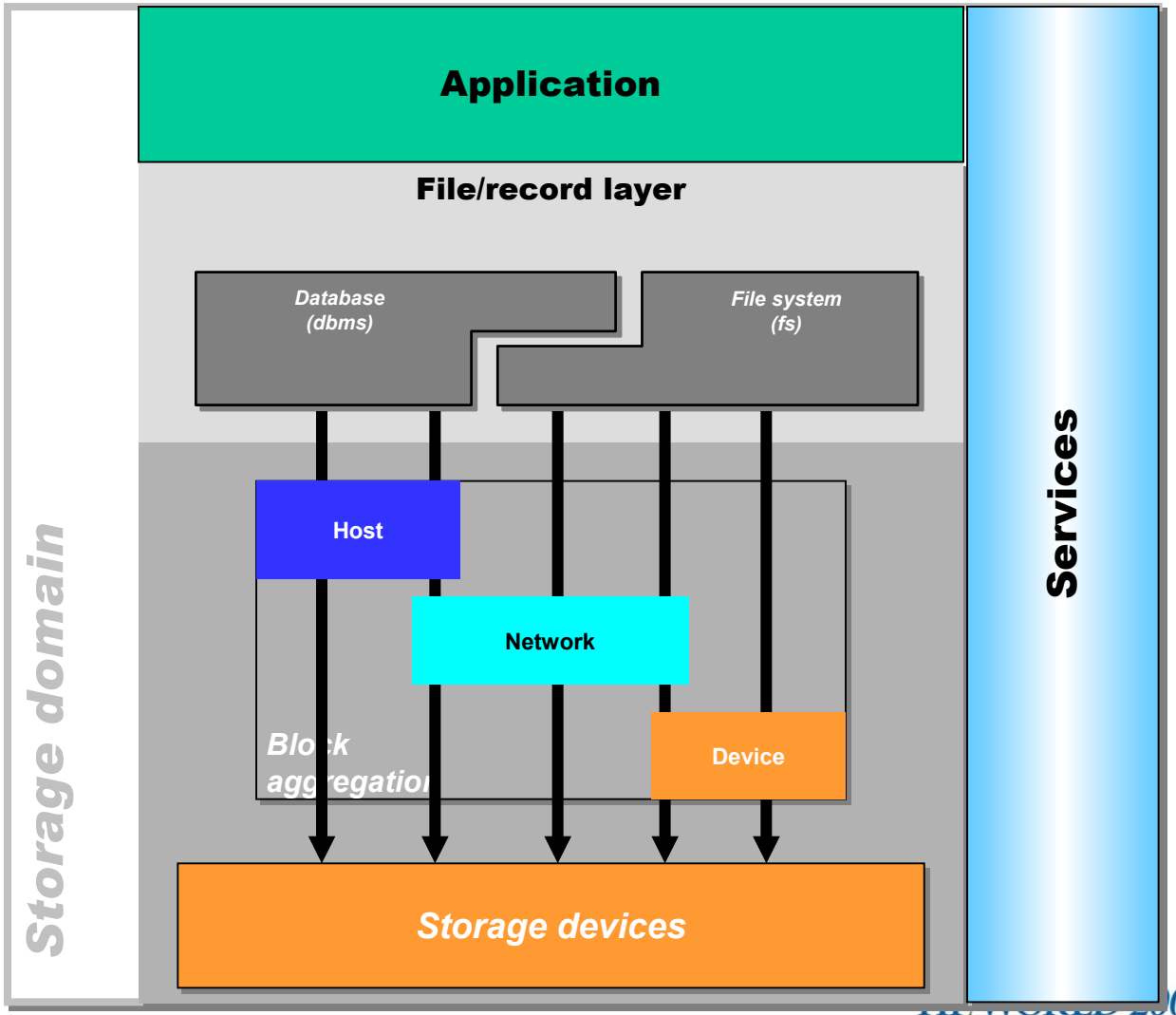
The Larger Problem

Systems Management “Stovepipes”

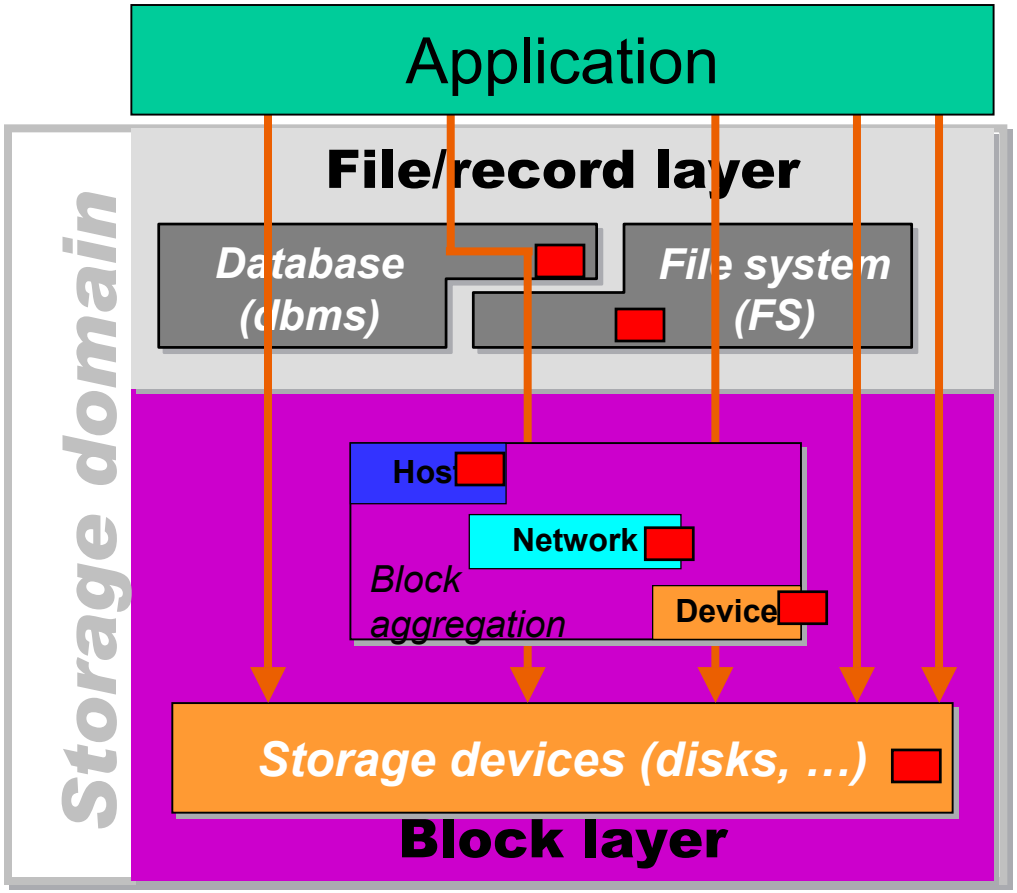


SNIA Shared Storage Model

- Application
- File/record layer
  - Database
  - File system
- Block aggregation
  - Host
  - Network
  - Device
- Storage devices



The Data Path



Native Control Functions

Real time requirement

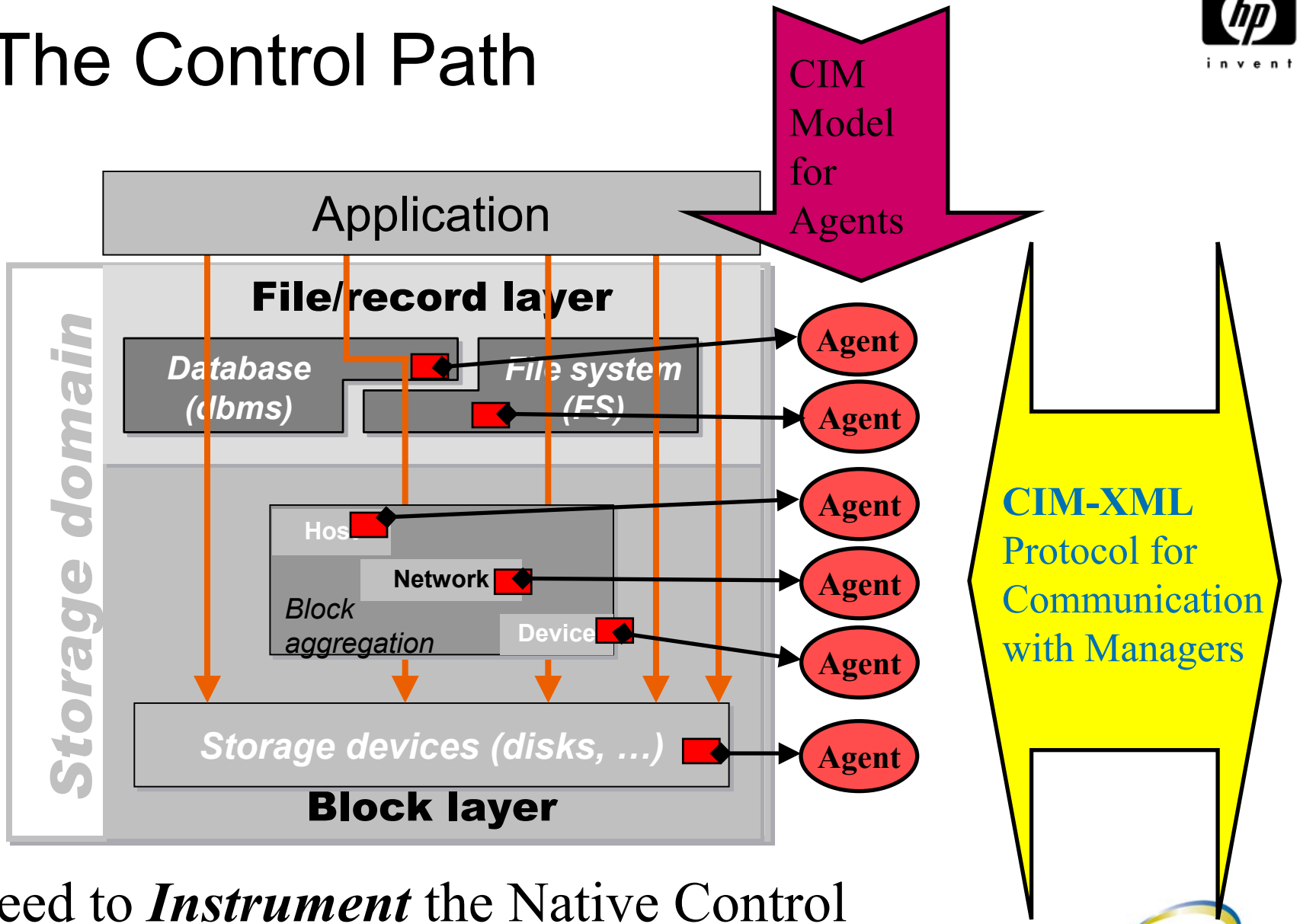
Functional API/Protocol

- Used to transfer Data
- open/close/read/write
- Already Standardized
  - POSIX
  - SCSI
  - etc.

Administrative API/Protocol

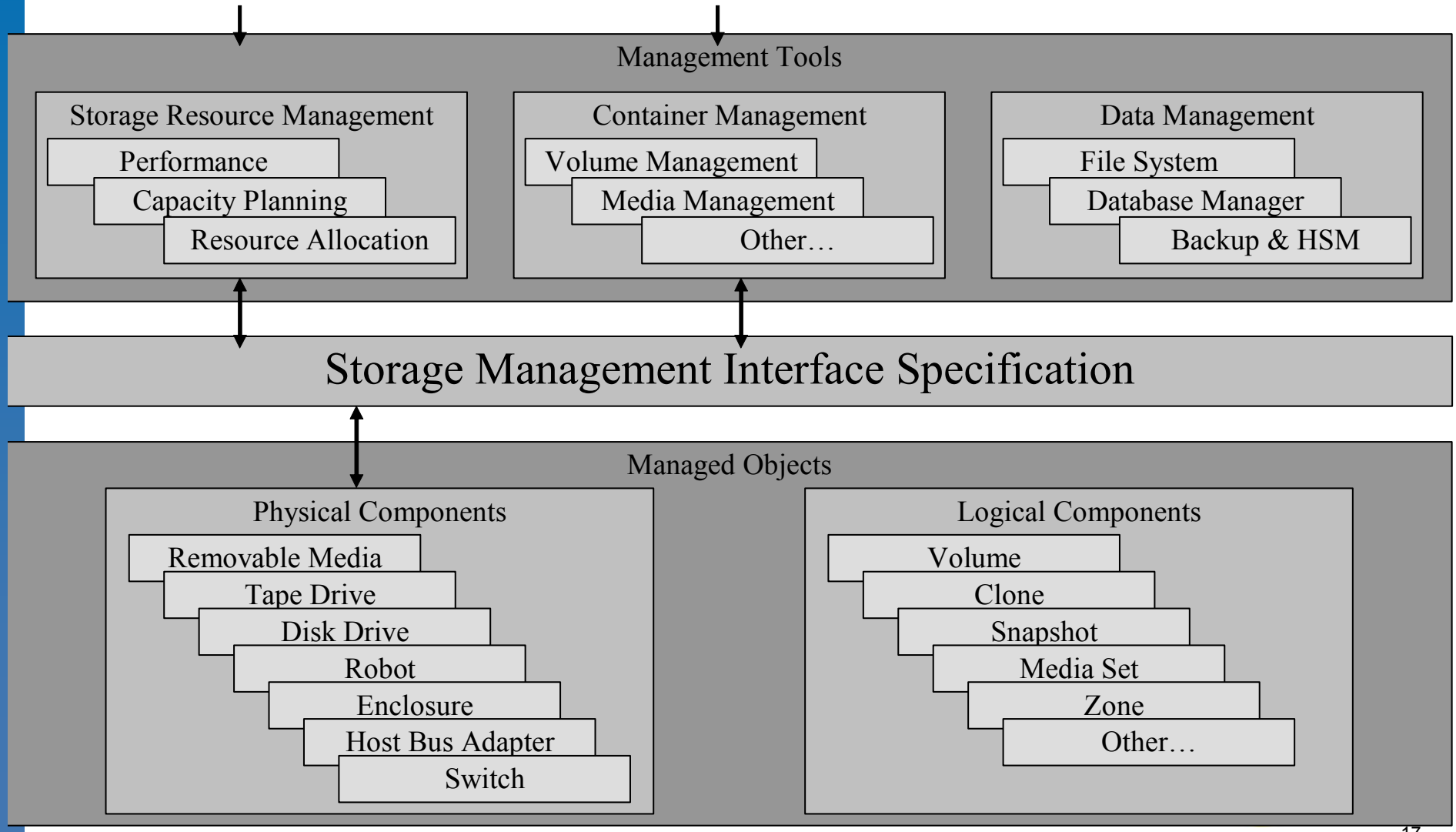
- Used for metadata control
- Configuration
- Monitoring Status
- Control Operations
- Few Standards
  - SNMP MIBs rare
  - CIM/WBEM better

The Control Path

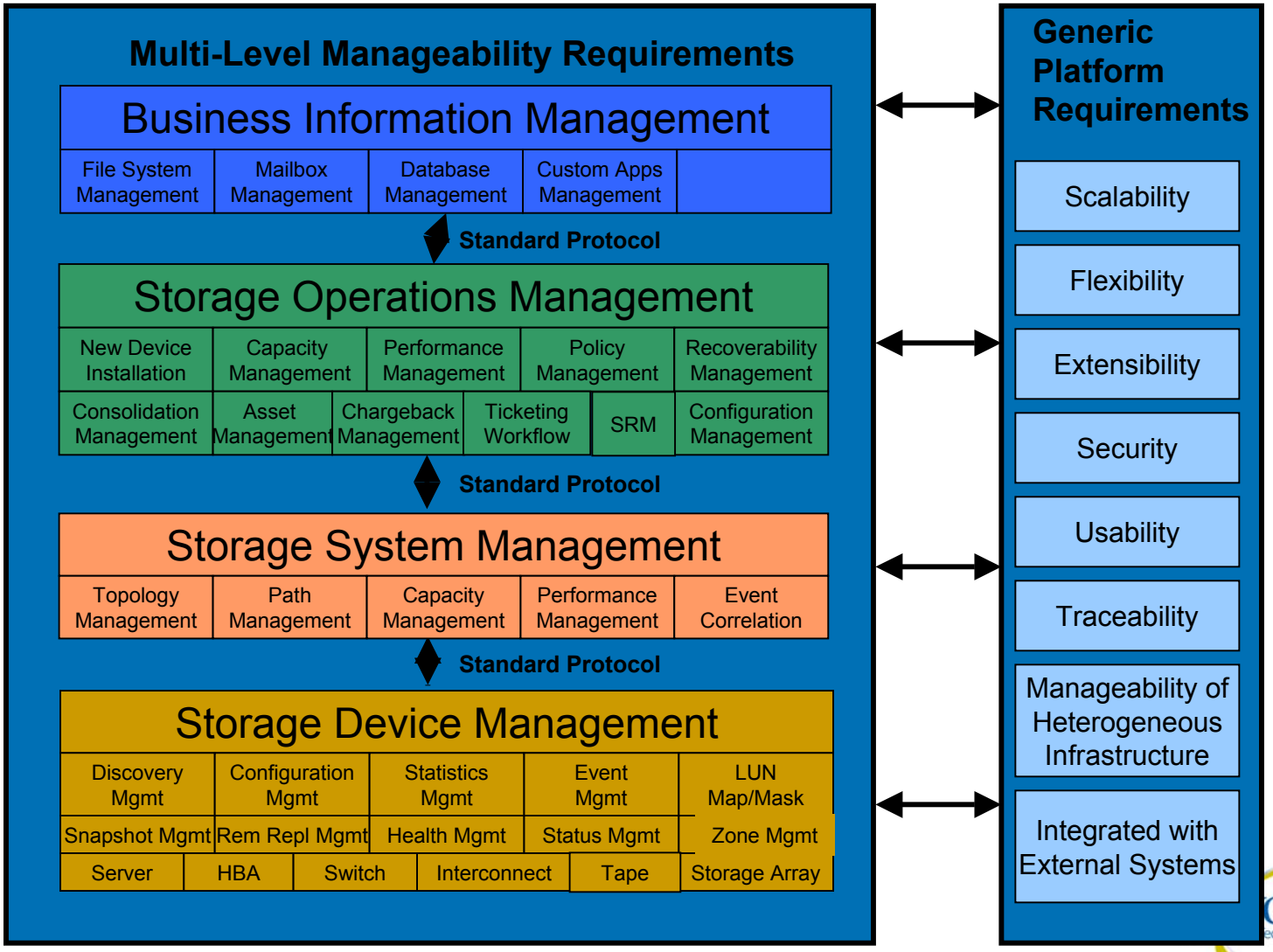


Need to ***Instrument*** the Native Control Functions with SMI Management ***Agents***

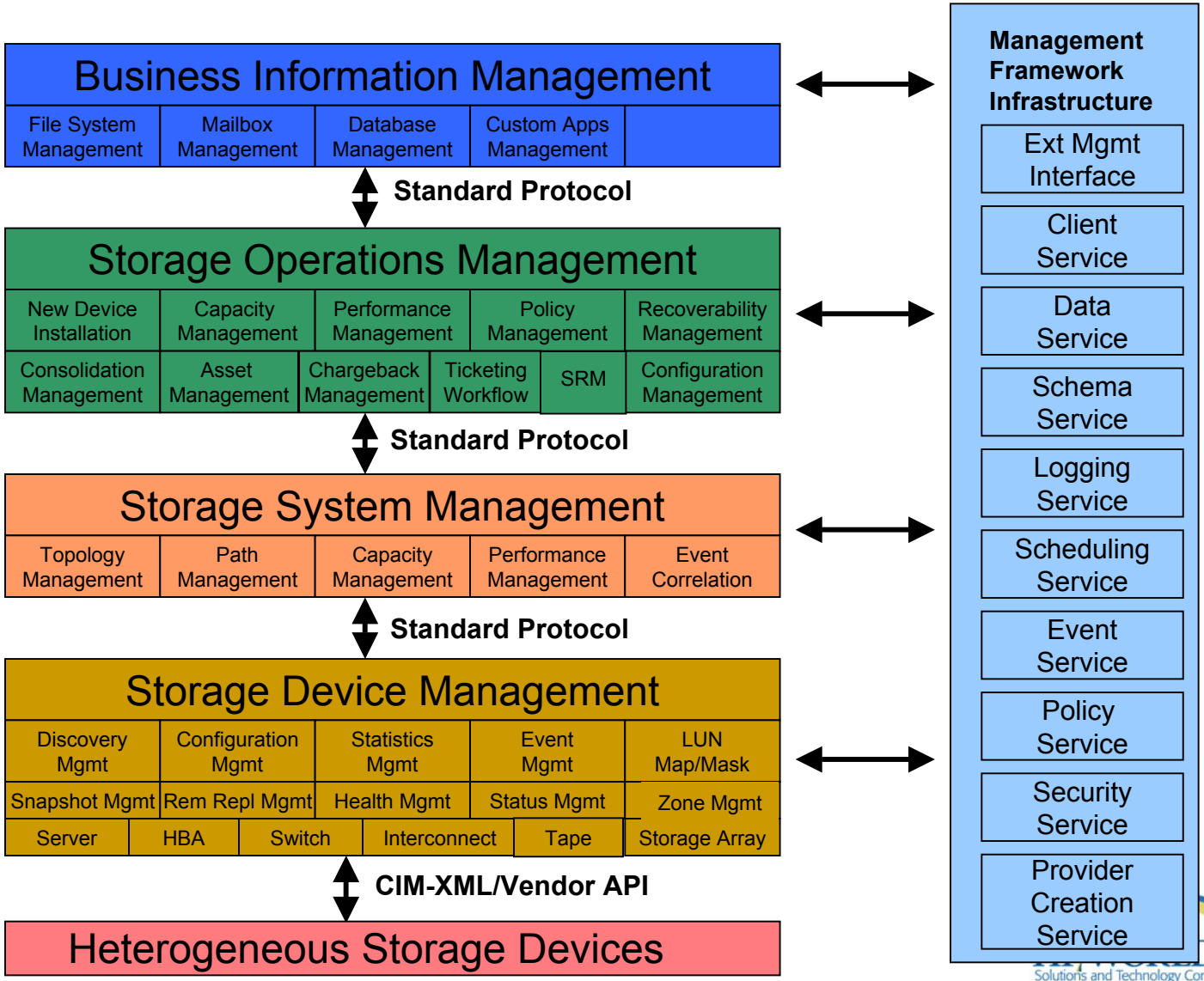
Architectural Vision of Standardized Management



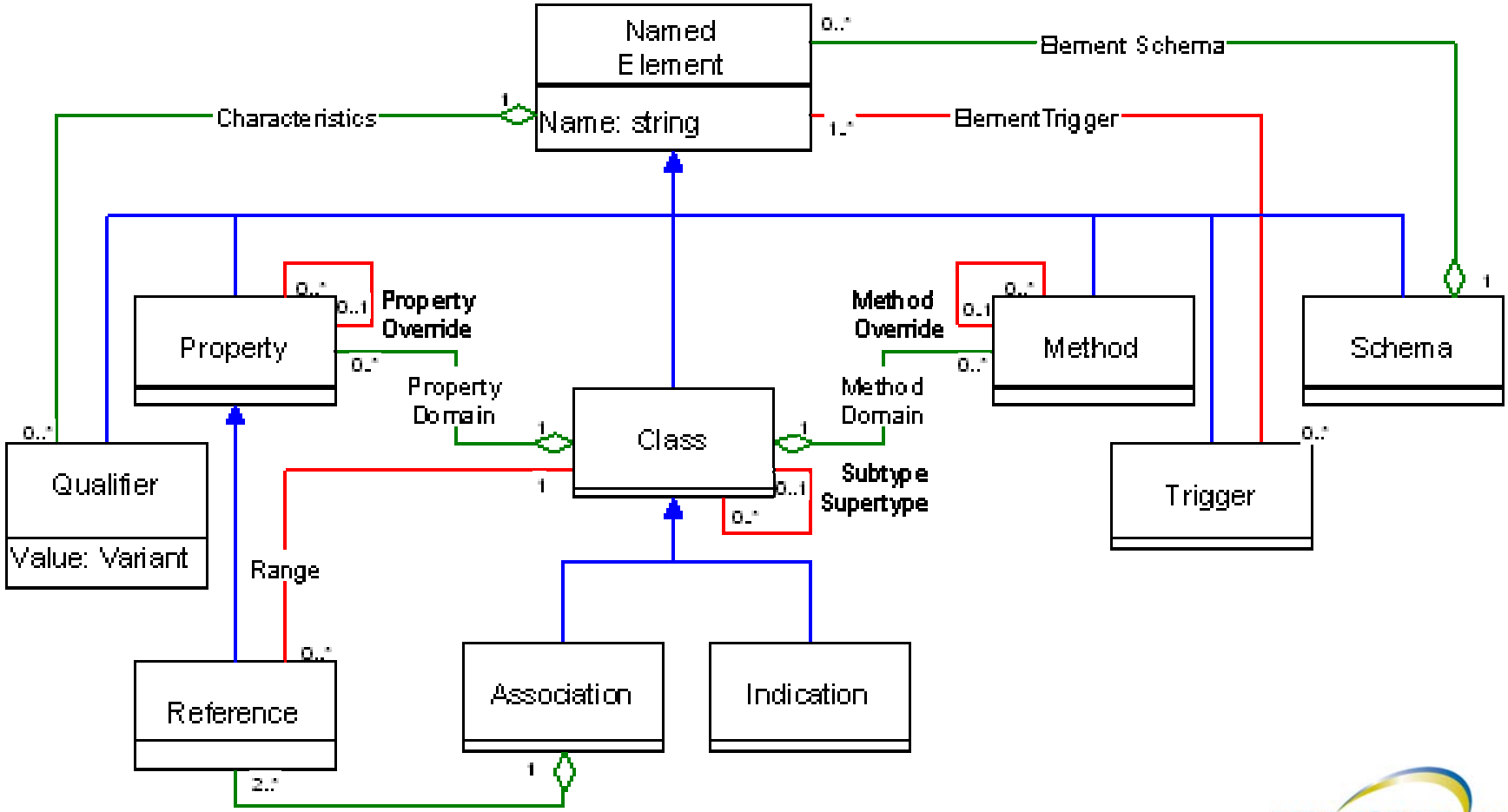
Management Model Requirements



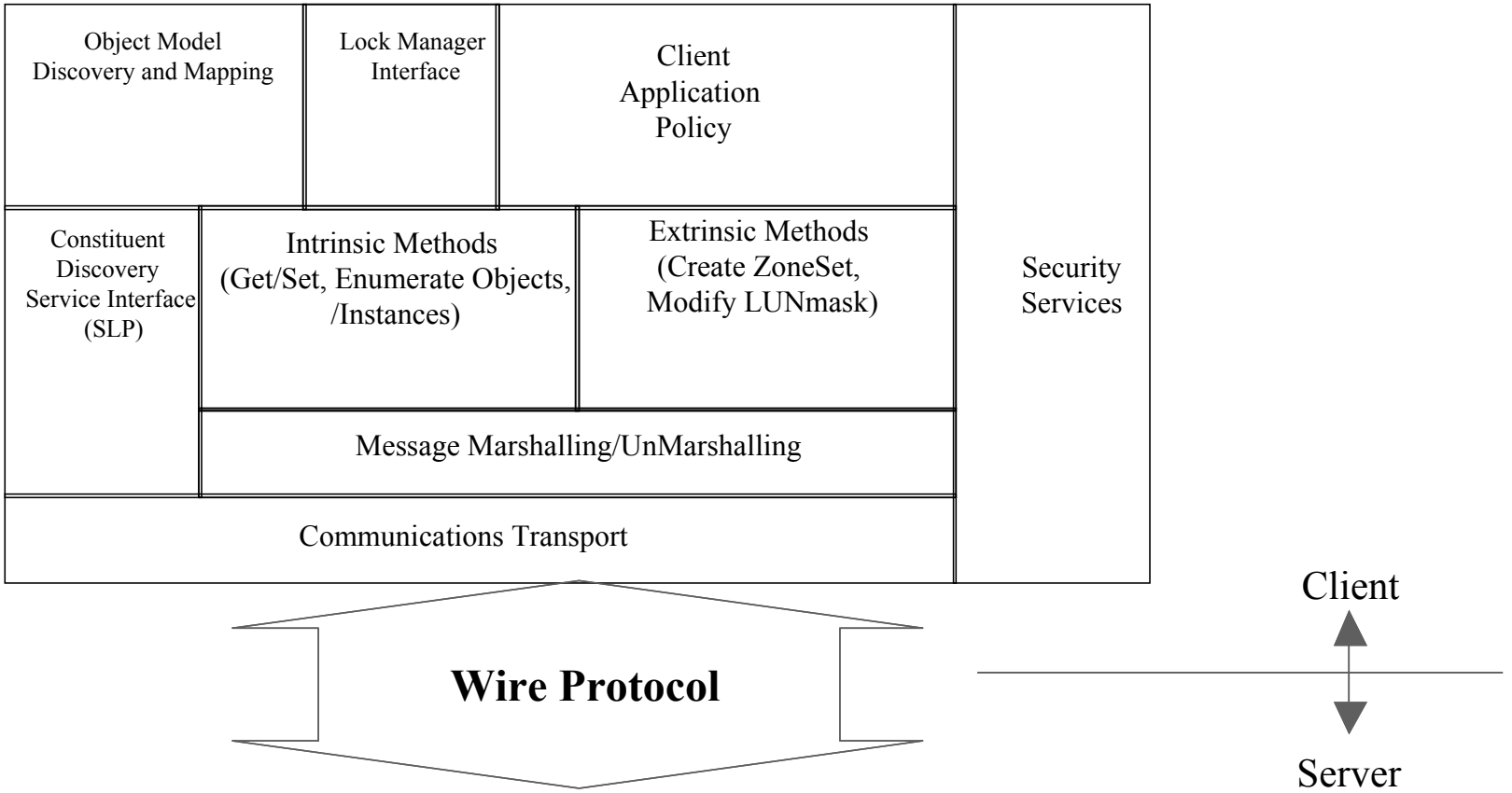
Storage Management Model



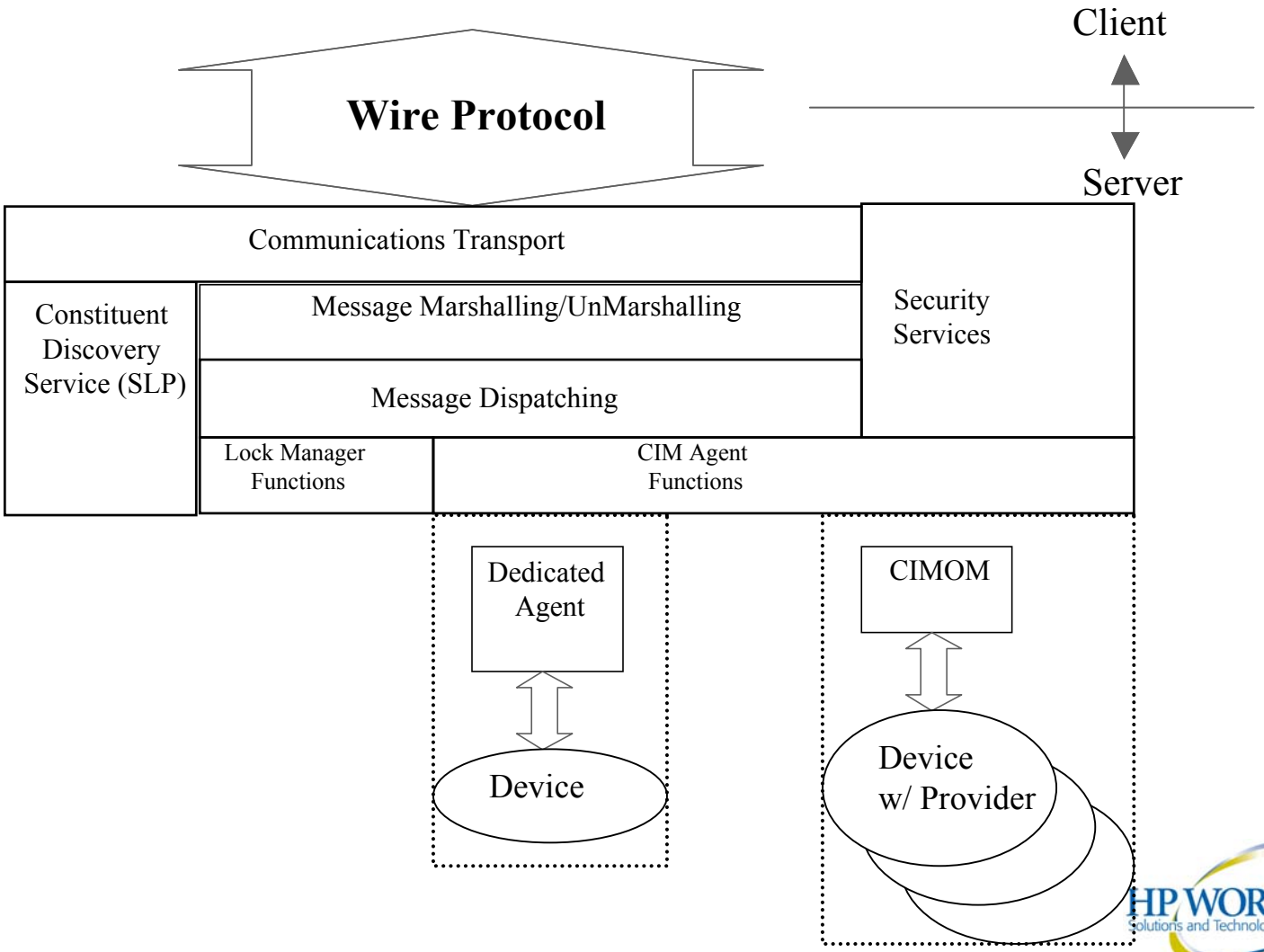
Common Information Model (CIM)



Layers (Client)

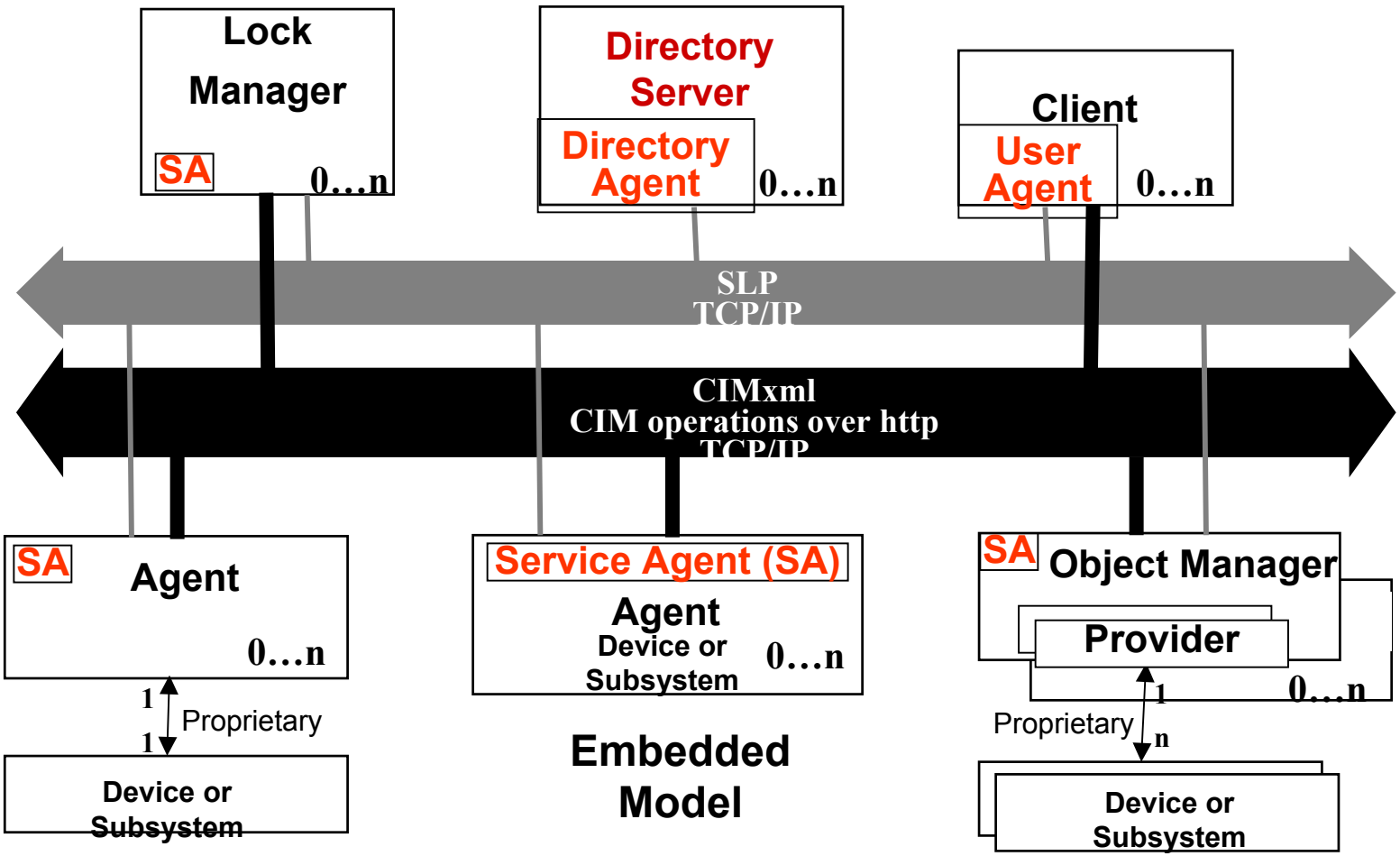


Layers (Server)



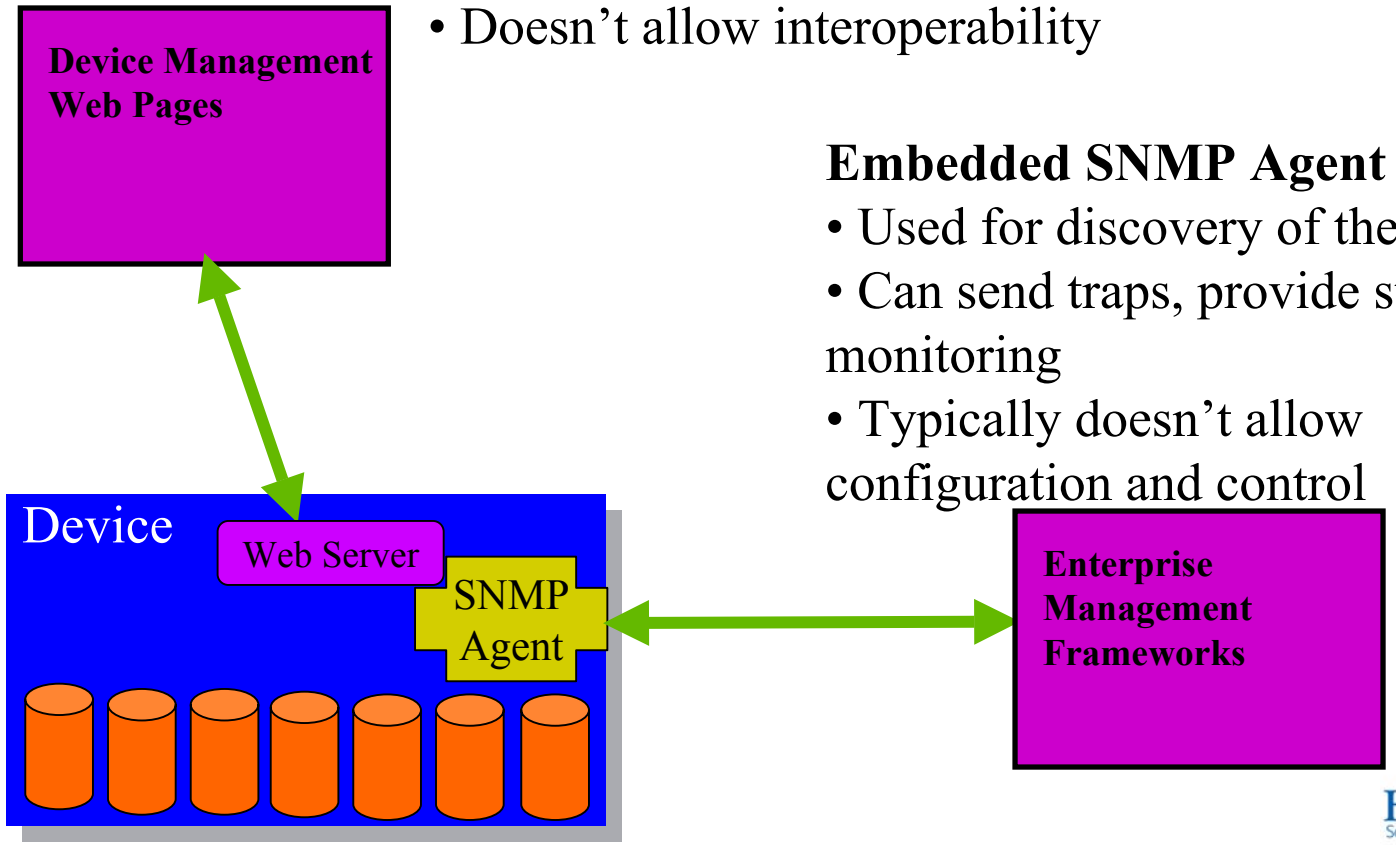
Profile Content

Profile Element	Goal
Description	A textual introduction to the SAN entity being profiled. It provides a high-level foundation for the more detailed descriptions to follow.
Schema Diagram	A diagram of the subset of the PDP Object Model that is most concerned with the SAN entity being described.
Instance Diagrams	One or more instance diagrams to highlight common implementations that employ this section of the Object Model.
Client Considerations	This section summarizes the implementation concerns that will be encountered by products and services that rely on the SAN entity being described.
Agent Considerations	This section summarized the implementation concerns that must be accounted for by agent implementations (either embedded or proxy) that provide information from one or more of the SAN entities to PDP clients.
Indications	This section details any indications that have been defined in conjunction with this SAN entity.
Classes	This section provides a list of the classes upon which this class of SAN entity relies, information on whether the class is required for the particular profile, and profile-specific notes. Each class reference includes a cross-reference to the detailed definition of the class.


Lock Manager
SA
0…n
Directory Server
Directory Agent
0…n
Client
User Agent
0…n
SLP
TCP/IP
CIMxml
CIM operations over http
TCP/IP
SA
Agent
0…n
1
1
Proprietary
Device or Subsystem
Proxy Model
Service Agent (SA)
Agent
Device or Subsystem
0…n
Embedded Model
SA
Object Manager
Provider
1
0…n
Proprietary
n
Device or Subsystem
Proxy Model

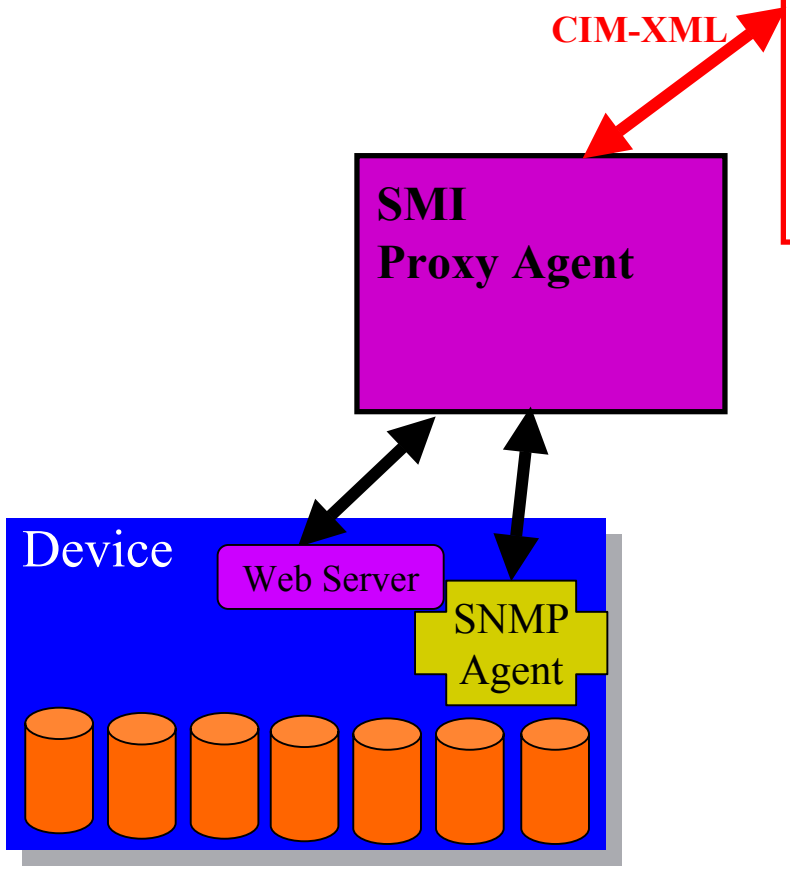
Existing Vendor Instrumentation

Device Management Web Pages
- Allows configuration of the device
- Doesn't scale for monitoring
- Doesn't allow interoperability



Embedded SNMP Agent
- Used for discovery of the device
- Can send traps, provide status for monitoring
- Typically doesn't allow configuration and control

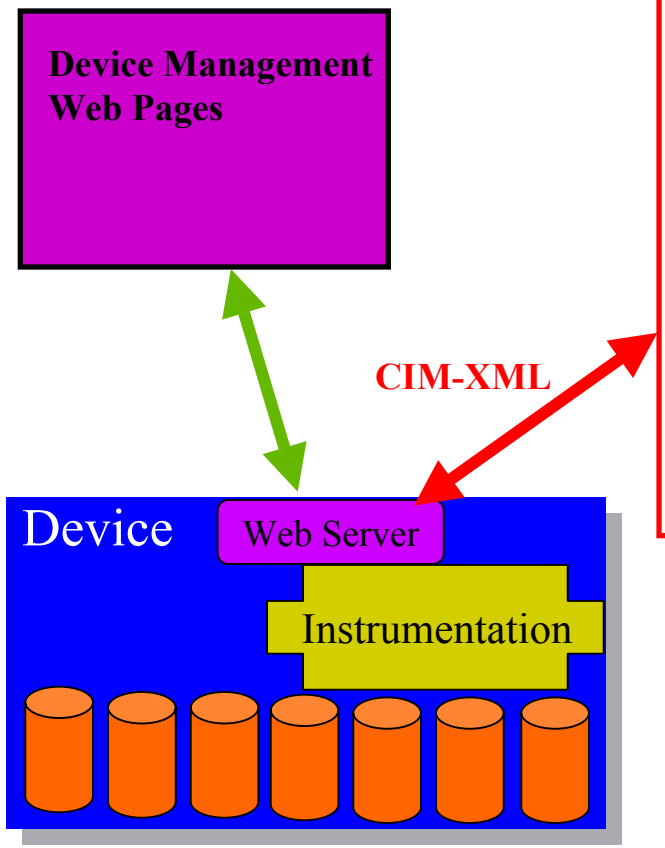
Legacy/Installed Base Proxy



SMI Proxy Agent

- Works with legacy, installed base
- Can use existing proprietary protocols
- Upgrades device to new standard
- Can run on an attached host, or plug into existing infrastructure

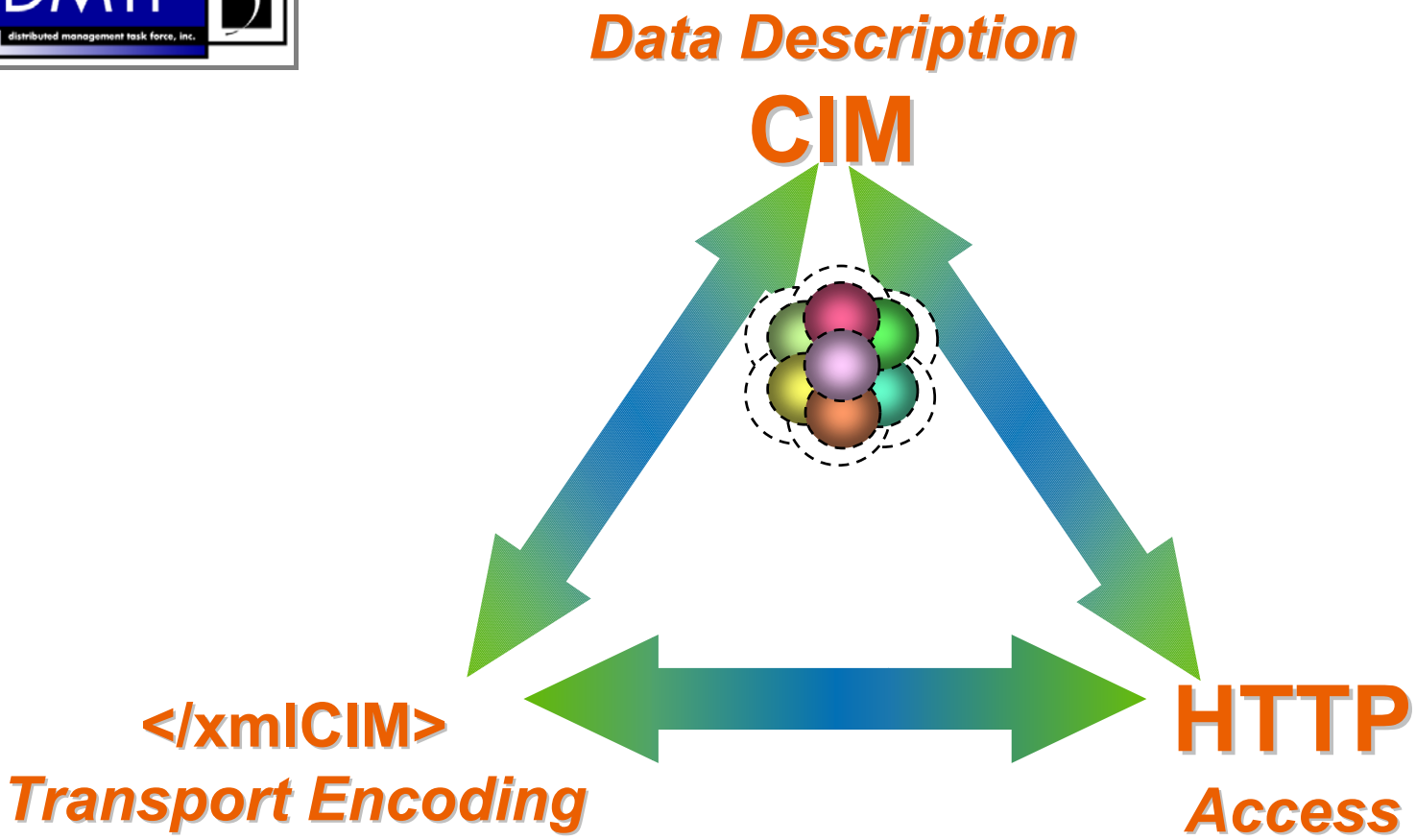
Embedded Instrumentation



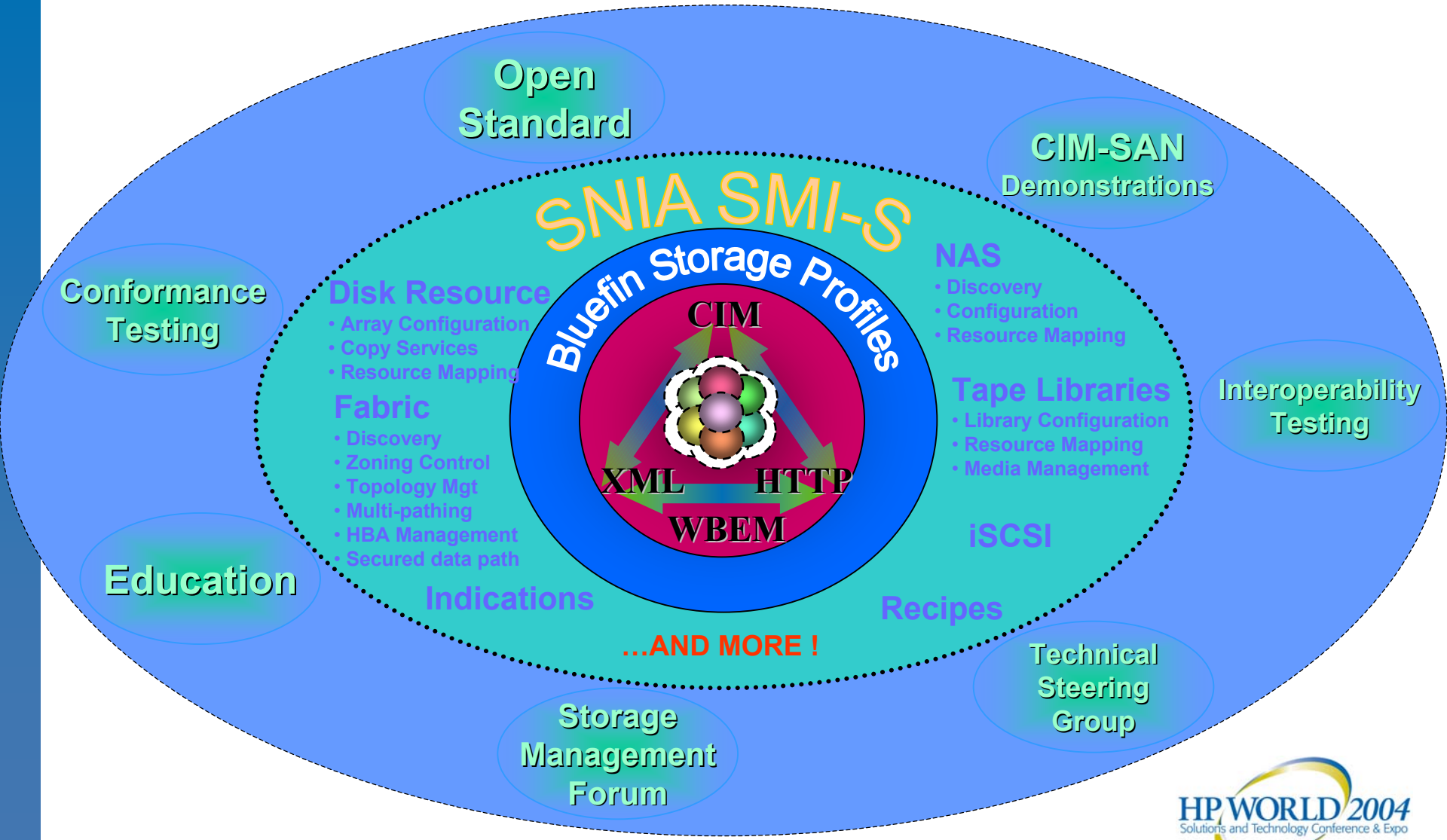
SMI Agent Instrumentation

- Used for discovery of the device
- Can send events, provide status for monitoring
- Allows interoperable configuration and control
- Integrates with management frameworks
- Supports locking, transactions for consistency

SMI Builds off of Web-Based Enterprise Management



Storage Management Initiative



All Storage Managed by the SM-S

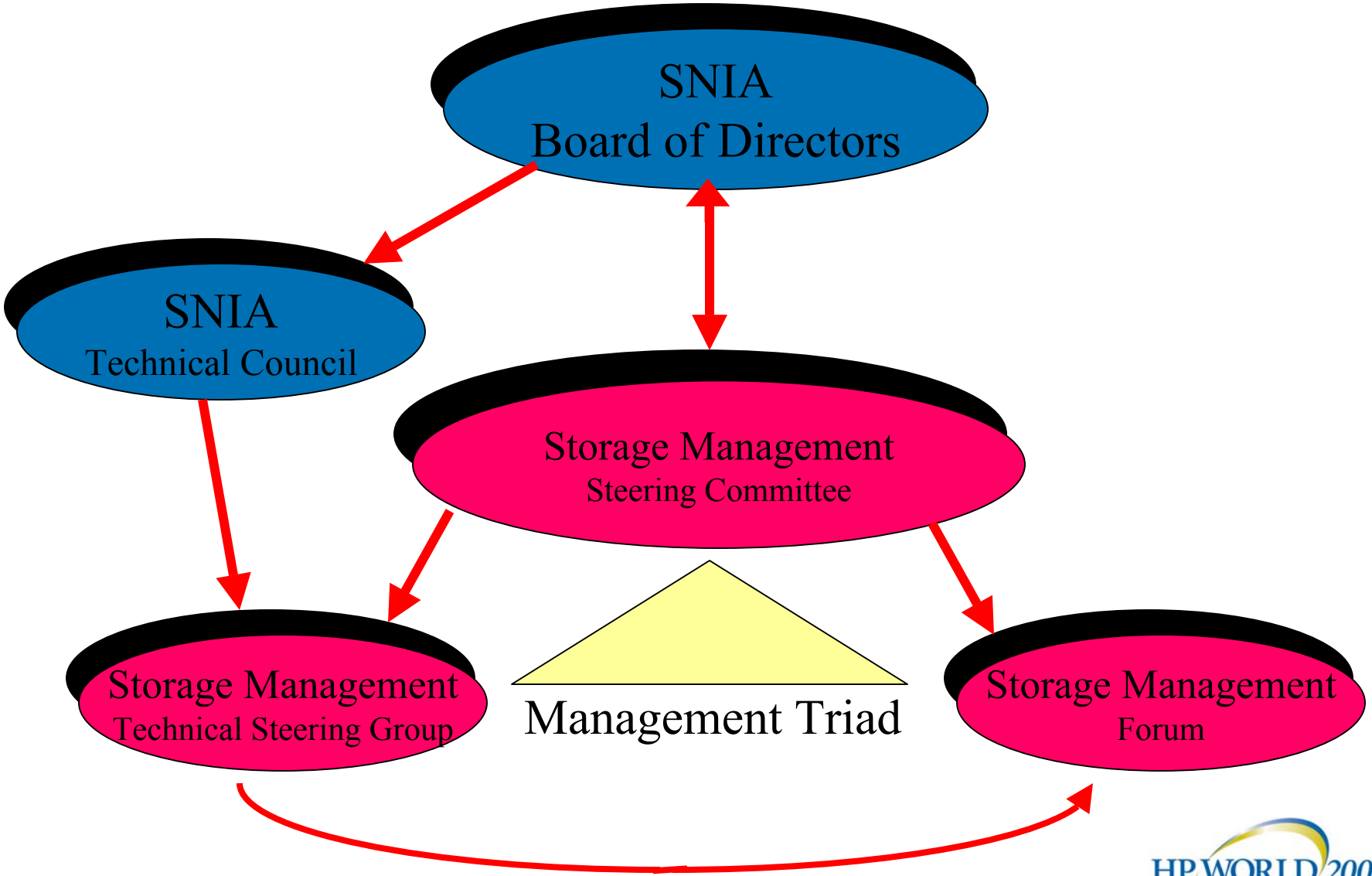
" All new storage networking products containing SMI-S Object models that GA after 2005 from SNIA member companies will use the SMI-S interface for management"

SNIA Board of Directors - 2002

Strategic Questions

- How does the SNIA:
  - successfully augment/complete the Bluefin SAN management specification?
  - drive vendor implementation of the interface?
  - create multi-vendor interoperability for vendors who implement the interface?
  - move from SAN management into Storage Management?

SMI Infrastructure Development



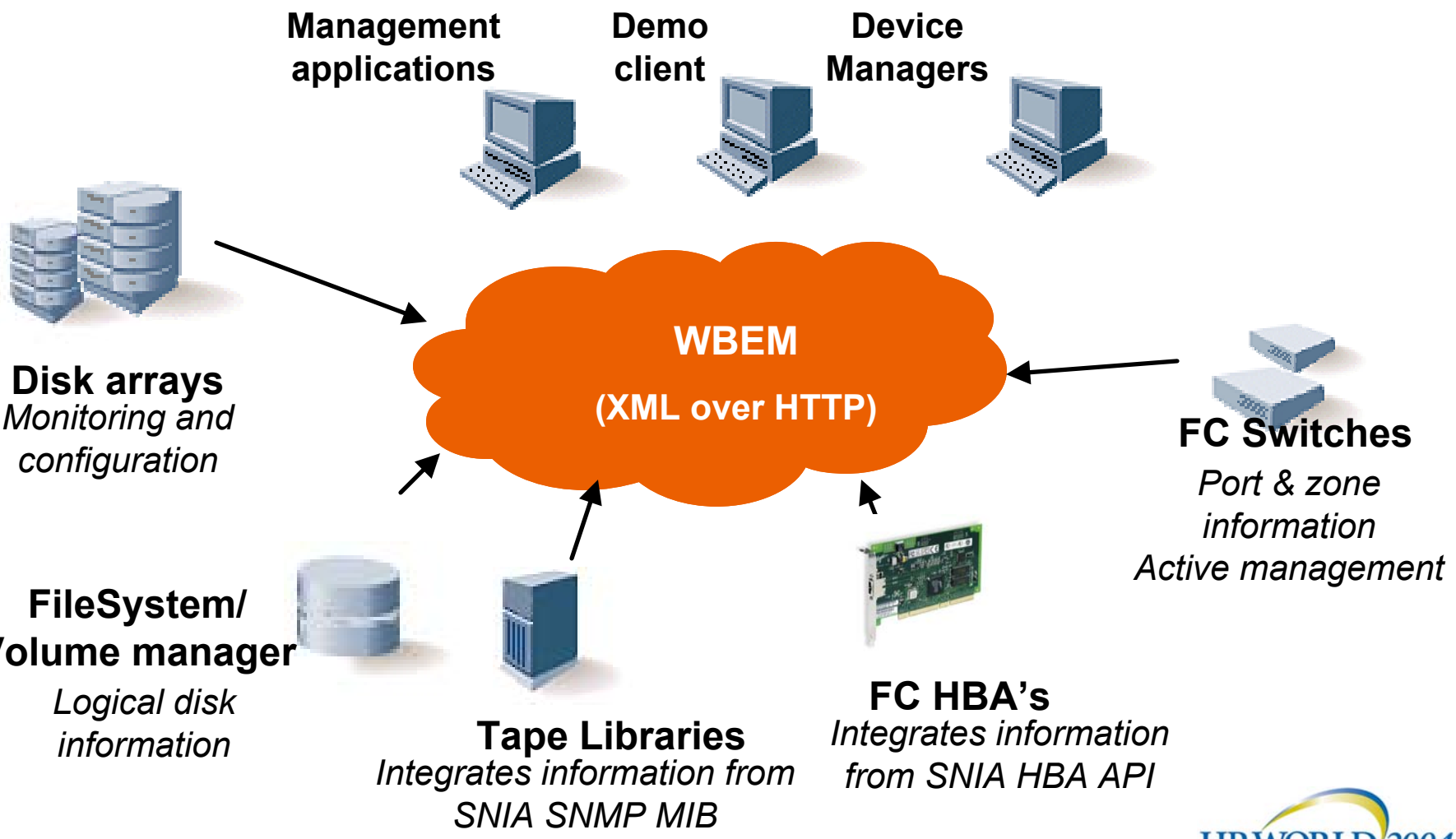
SMI Conformance Test Process

- SNIA-CTP bulletproofs SMI-S
- SNIA-CTP certification Instills trust
- Vendors passing receive SNIA “Mark”
- Privacy/confidentiality for vendors
- Source code made available to vendors

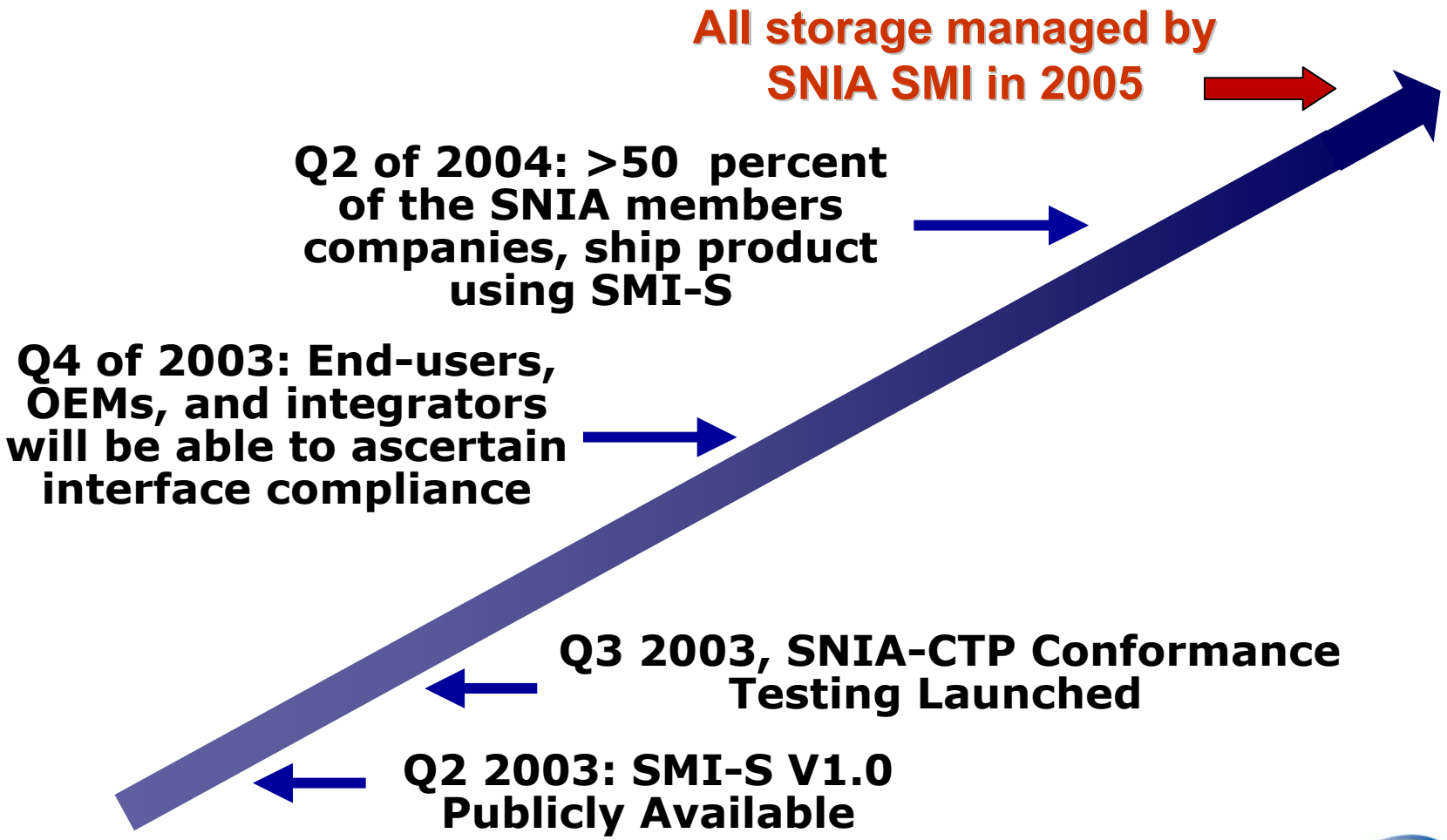
Industry Standards Collaboration

- **DMTF**
  - WBEM (Web-Based Enterprise Mgmt), CIM
- **INCITS / ANSI / ISO**
  - **T10** (SCSI, Object-oriented Storage Device)
  - **T11** (Fibre Channel, Storage Network Management)
- **IEEE**
  - Media management and tape
- **IETF**
  - SNMP, IP SANs, IP storage, directories/LDAP and policy
- And others
  - **FCIA** – Fibre Channel Industry Association
  - **IBTA** – InfiniBand Trade Association

SMI-lab Topology



SMI-S Strategic Vision



SMI-S v1.0 Functionality

Array Volume Creation

Create logical volumes in an array and make them available to a host

Array Snapshot & Mirror Control

Create, split, and synchronize snapshots and mirrors

Indications

Provide device awareness and operations monitoring

Fabric Topology & Zoning Discovery

Discover the path between hosts, switches and arrays; configure and report on zones

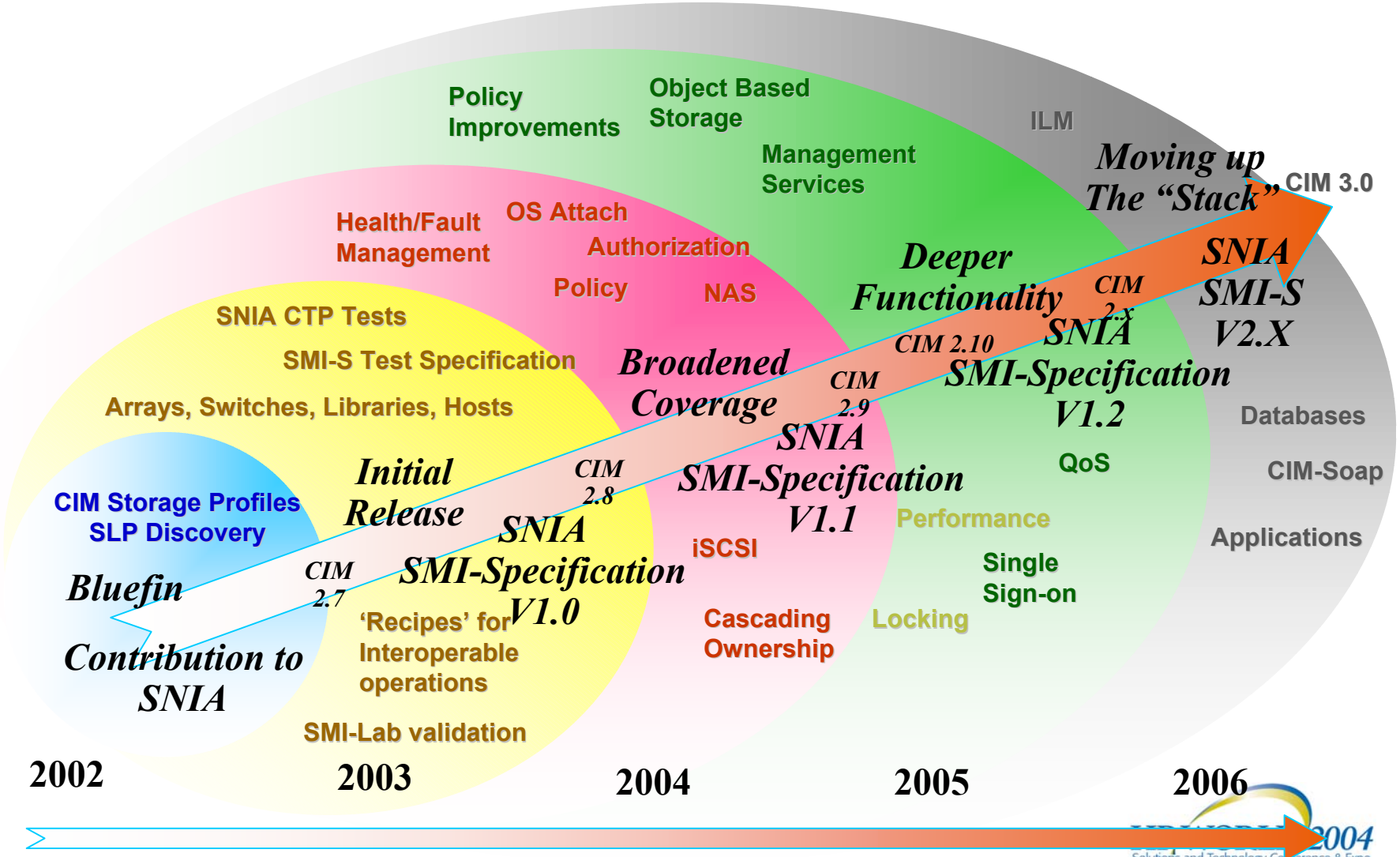
Array LUN Masking

Control the visibility of logical volumes to hosts (a form of security)

Tape Library Management

Track library health, capacity and resources, plus LAN-based media movement

SMI: Functionality Onion



SNIA Technology Trends: Storage Management Automation

In the old days, airplanes were a very hands-on activity…

More complex, but easier to use!

Today:

Commercial Aircraft can be monitored… rather than flown

questions?


invent

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