



**Poseidon House
Castle Park
Cambridge CB3 0RD
United Kingdom**

TELEPHONE:
INTERNATIONAL:
FAX:
E-MAIL:

**Cambridge (01223) 515010
+44 1223 515010
+44 1223 359779
apm@ansa.co.uk**

Training

ANSAwise - Management of Distributed Networks [CNET]

Chris Mayers

Abstract

Failure to manage services effectively may result in over-provisioning, excessive cost of maintenance, legal problems and lost revenue.

This module of the ANSAwise training programme explores the various open network and system management frameworks, and shows how a distributed systems approach can benefit systems management.

[This is a converted version of APM.1324 (in PowerPoint) written by Ian Macmillan, with some updates requested by CNET]

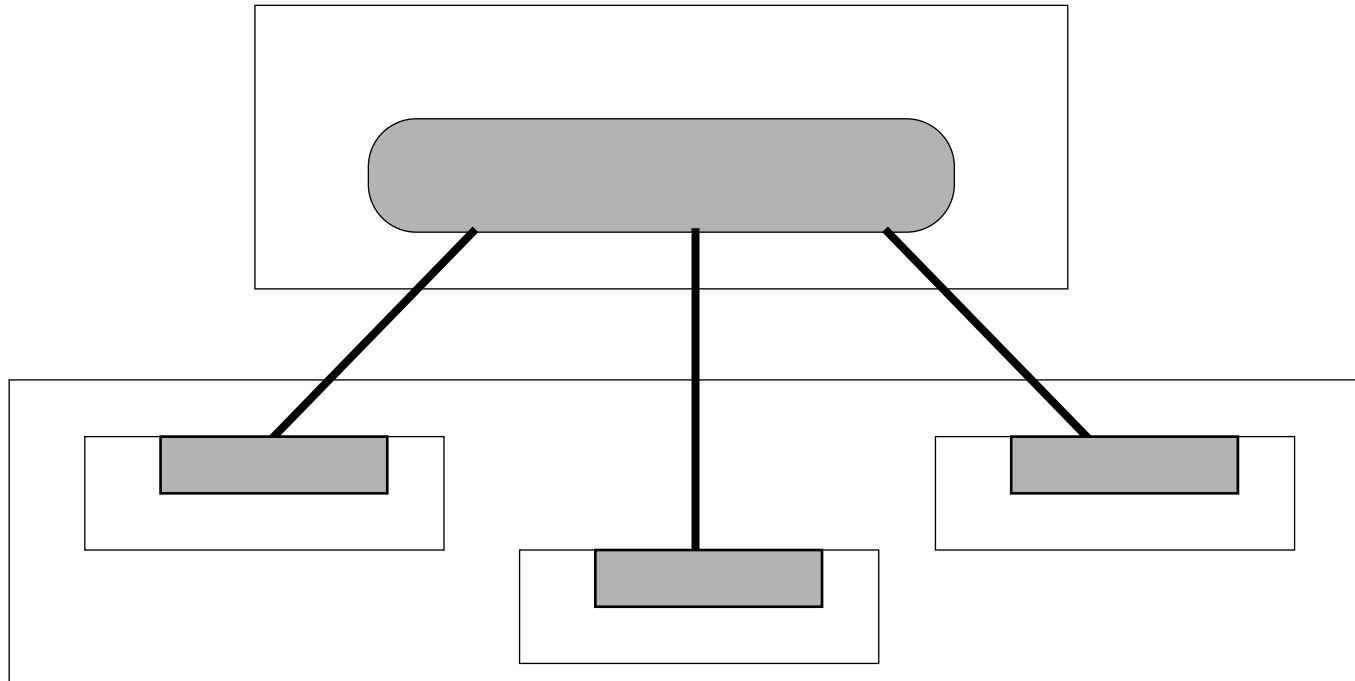
APM.1641.02

Approved
Briefing Note

2nd April 1996

Distribution:
Supersedes:
Superseded by:

Management of Distributed Networks





In this session

- Identify the management problem
- Introduce and contrast the key management frameworks
- Identify the management functional areas
- Explain applications management and management applications
- Extend ideas to cover distributed objects and management of the desktop
- Introduce related initiatives (DMI and OMNIPoint)



Introduction

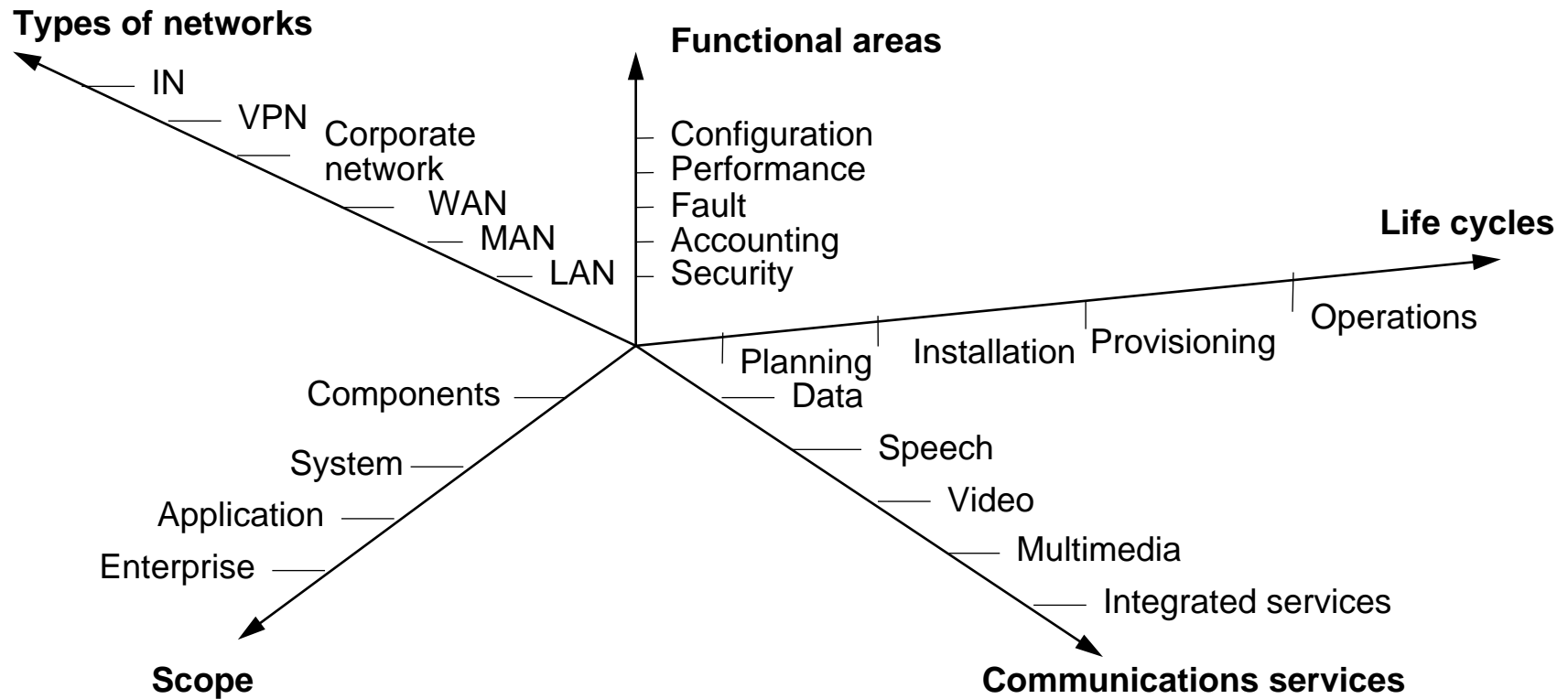
- **In the IT world, management is seldom seen as a primary requirement**
 - often added after the system design is completed
- **In the telecommunications world, the primary focus is on the management of the service**
 - the service itself being traditionally simple
- **The IT world is converging towards the service based view with the move towards distributed systems**
 - services must be managed



The Business Case for Management

- **Failure to manage your services may result in**
 - **Excessive investment cost of over-provisioning**
 - **Excessive cost of maintenance due to lack of information about problems**
 - **Penalty costs associated with failures and service degradation going undetected**
 - **Legal problems with being unable to comply fully with regulations**
 - **Lost revenue due to inadequate accounting and billing**
 - **Vulnerability to unauthorised tampering and manipulation**

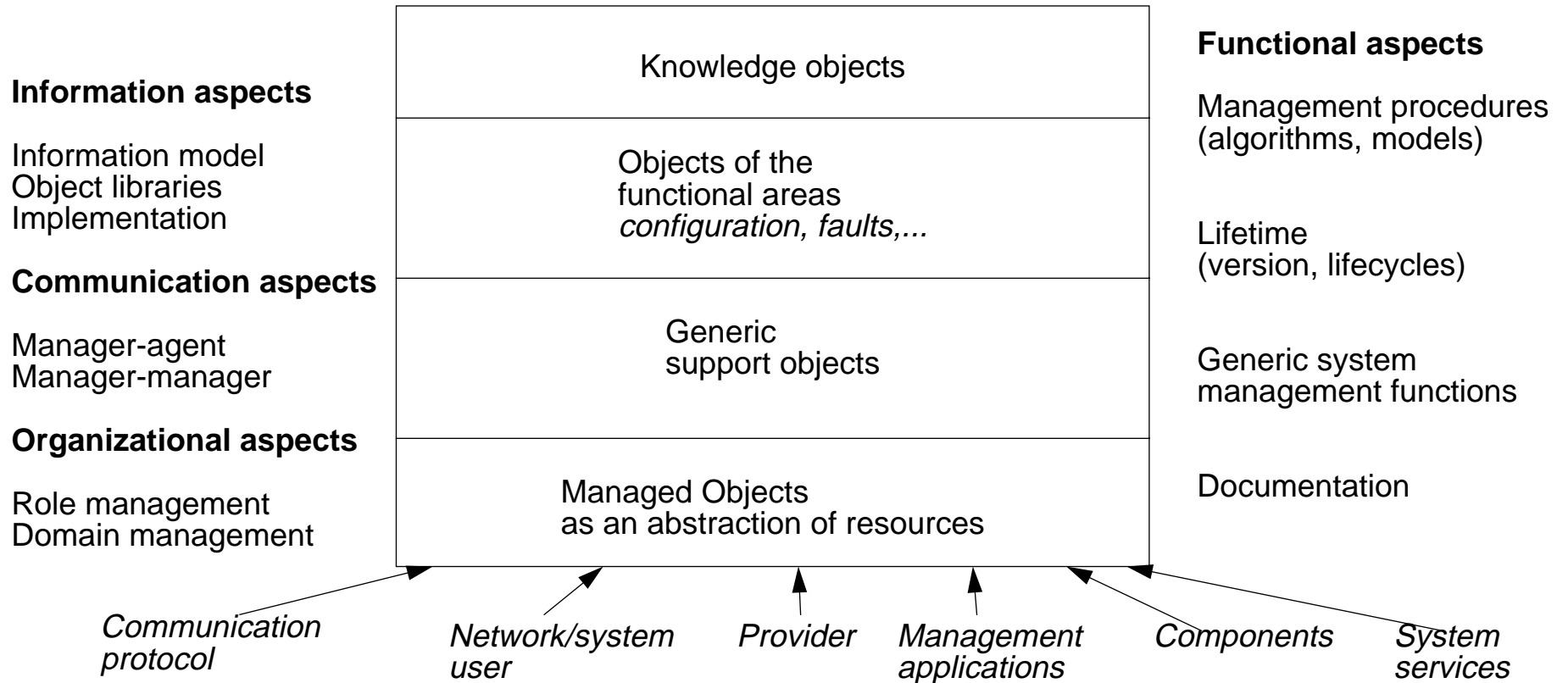
Management dimensions





Management information and its use

Management Information (MIB)





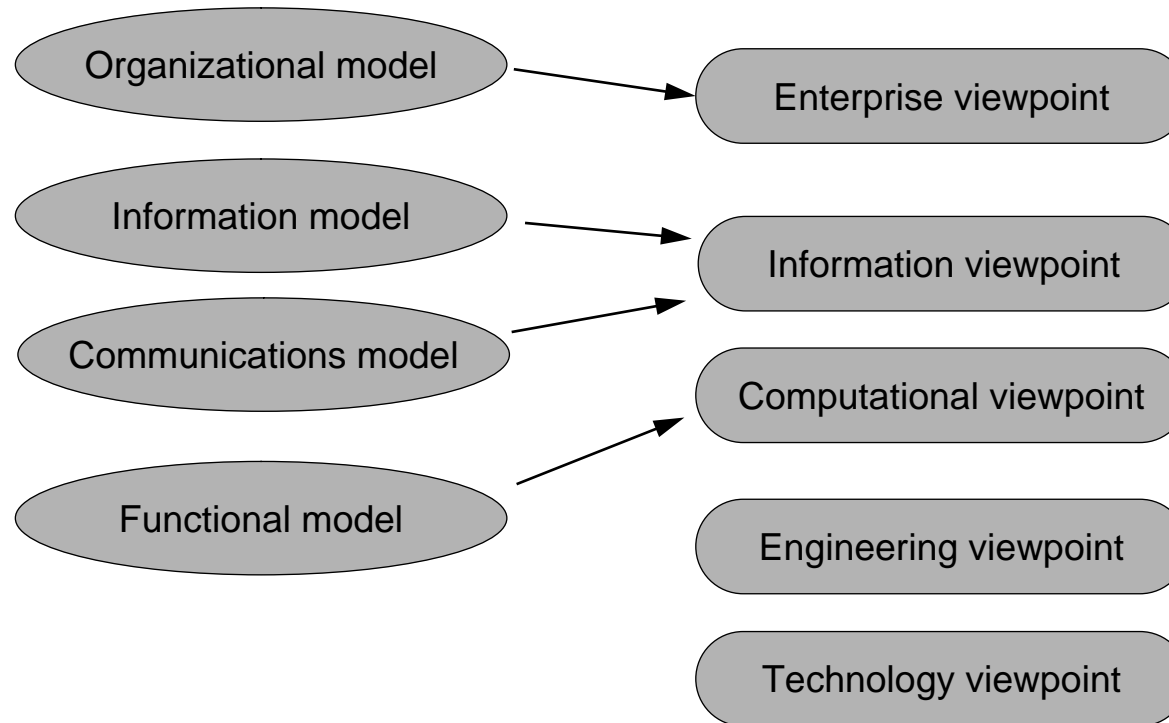
Management Frameworks

- **Management frameworks are required to manage heterogeneous distributed systems in an integrated manner**
- **Vendor-independent solutions require standards**
- **Frameworks include**
 - **Description of management objects (information model)**
 - **Support of organisational aspects (organisational model)**
 - **Description of communications procedures (communication model)**
 - **Structuring of management tasks (functional model)**

OSI submodels and ODP viewpoints

OSI submodels

ODP viewpoints

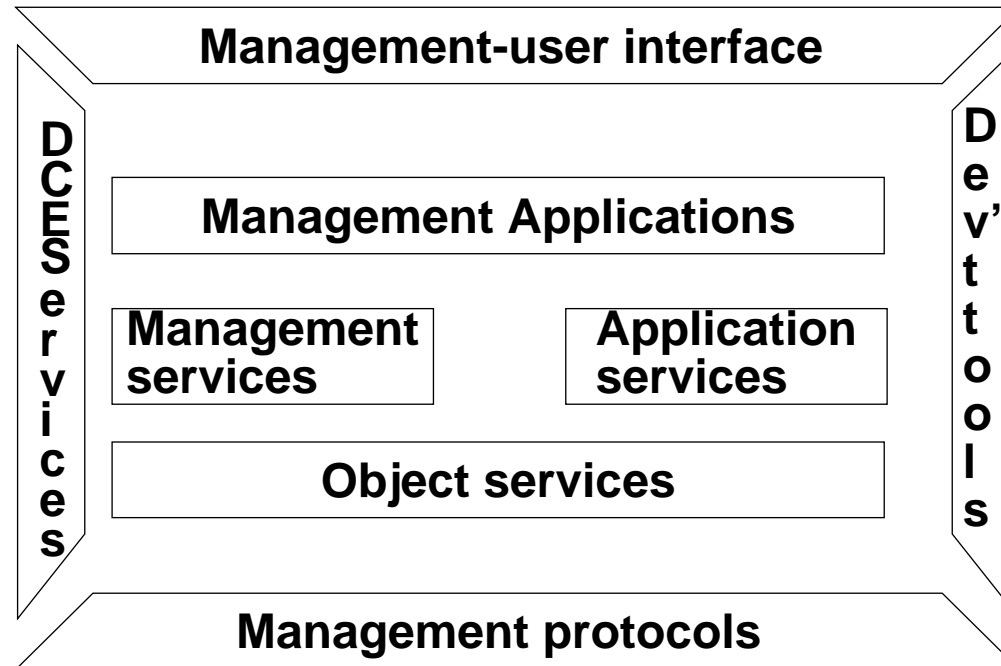




Distributed management architectures

- OSF distributed management environment (DME)
- OSI submodels of a network management architecture
- Internet management architecture model
- IEEE management architecture

DME Architecture and components

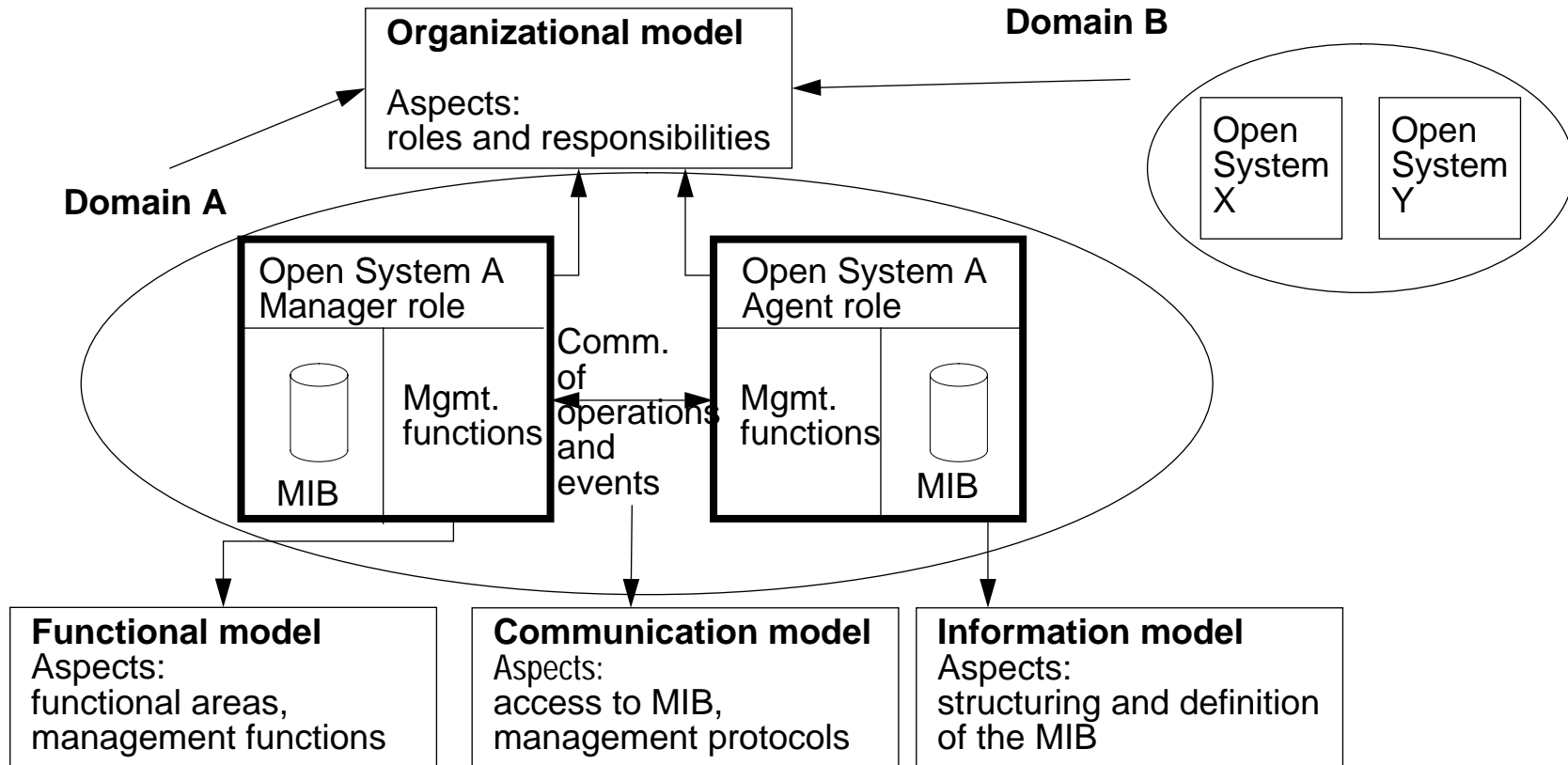




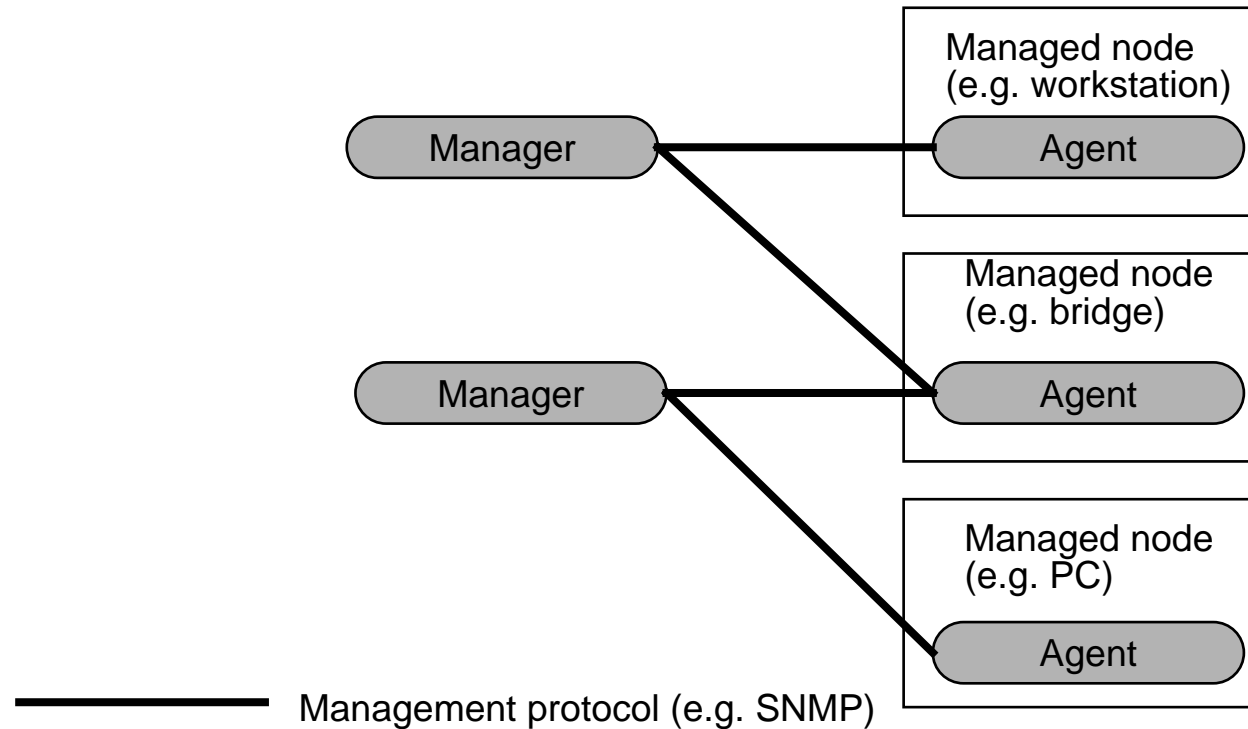
DME Services

- **Event Services (EVS)**
- **Software Distribution Services (SDS)**
- **License Management Services (SMS)**
- **Subsystem Management Services (SMS)**
- **PC Services (PCS)**

OSI Network Management Framework

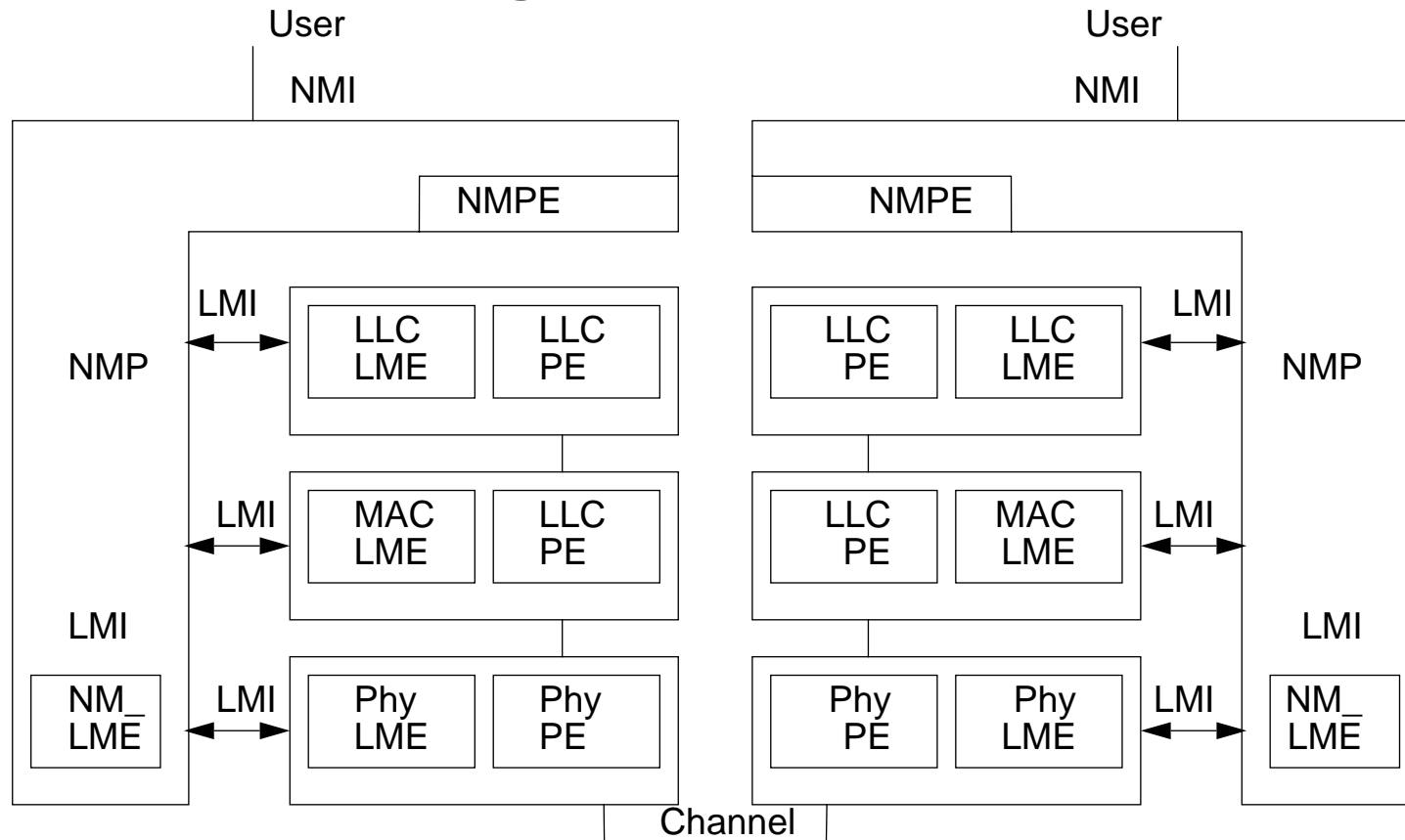


Internet Architecture Model





IEEE Management Architecture





Architecture summary

- **All are examples of open architectures (vendor-neutral)**
- **Scope and focus of each architecture is different**
- **DME is an example of distributed system management**
- **OSI concentrates on the communications aspects**
- **Internet management is characterised by a pragmatic approach rather than by complicated concepts**
- **IEEE is an example of communications layer management**
- **Variety indicates scale of the problem**



Network and Systems Management: functional areas

- **Fault management**
- **Configuration management**
- **Accounting**
- **Performance analysis**
- **Security**



Fault Management

- **Monitoring of the network or system state**
- **Receipt and processing of alarms**
- **Diagnosis of the causes of faults**
- **Determination of the propagation of errors**
- **Initiation and checking of error recovery measures**
- **Introduction of fault recording system**
- **Provision of a user help desk**



Configuration Management

- **Automatic updating of the configuration**
- **Reconfiguration of the resources**
- **Remote configuration**
- **Support for network versions**
- **... these require clear specification of the components involved**
 - **may be part of the component**
- **Initiation of jobs and tracing of their execution**



Accounting

- **Recording of usage data**
- **Maintenance of accounts**
- **Assignment of costs to accounts**
- **Allocation and monitoring of quotas**
- **Maintenance of usage statistics**
- **... in distributed systems architecture these are often seen as application services**



Performance

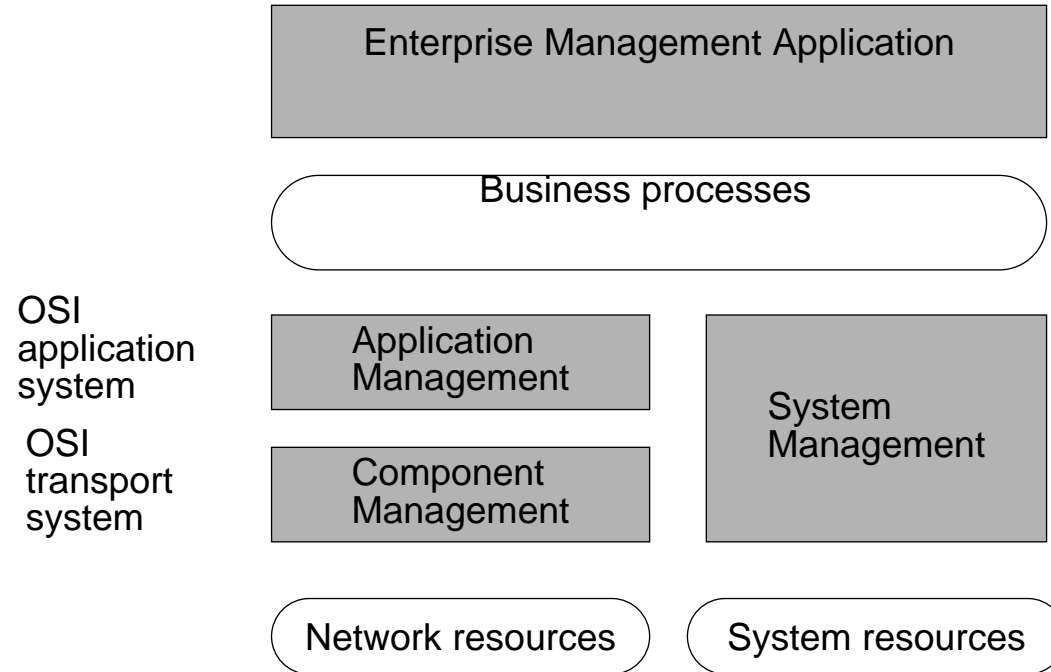
- **Determination of quality of service (QoS) parameters, monitoring, adjustment**
- **Monitoring of the network for performance bottlenecks**
- **Execution of measurements**
- **Processing of measurement data and generation of reports**
- **Performance and capacity planning**



Security

- **Monitoring of the system or network for attacks**
- **Management of information encryption**
- **Management of authentication procedures**
- **Implementation of security measures**

Scope of Management facilities

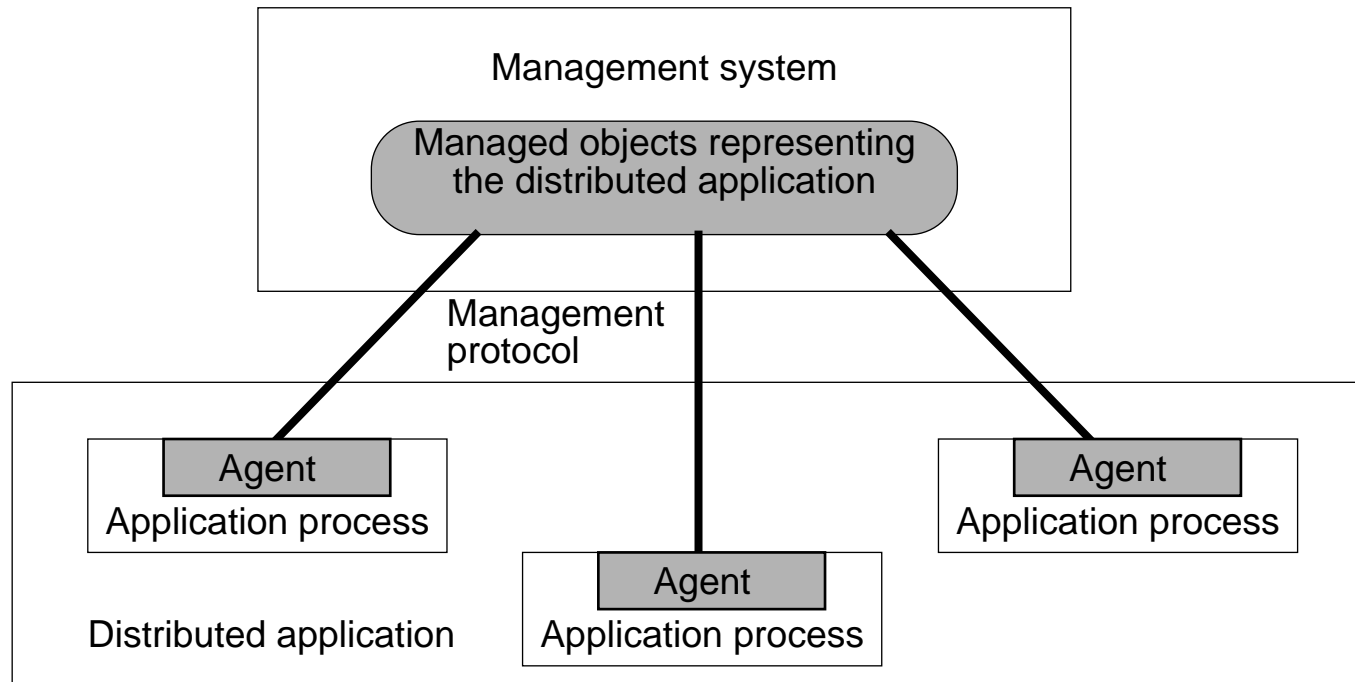




Applications Management

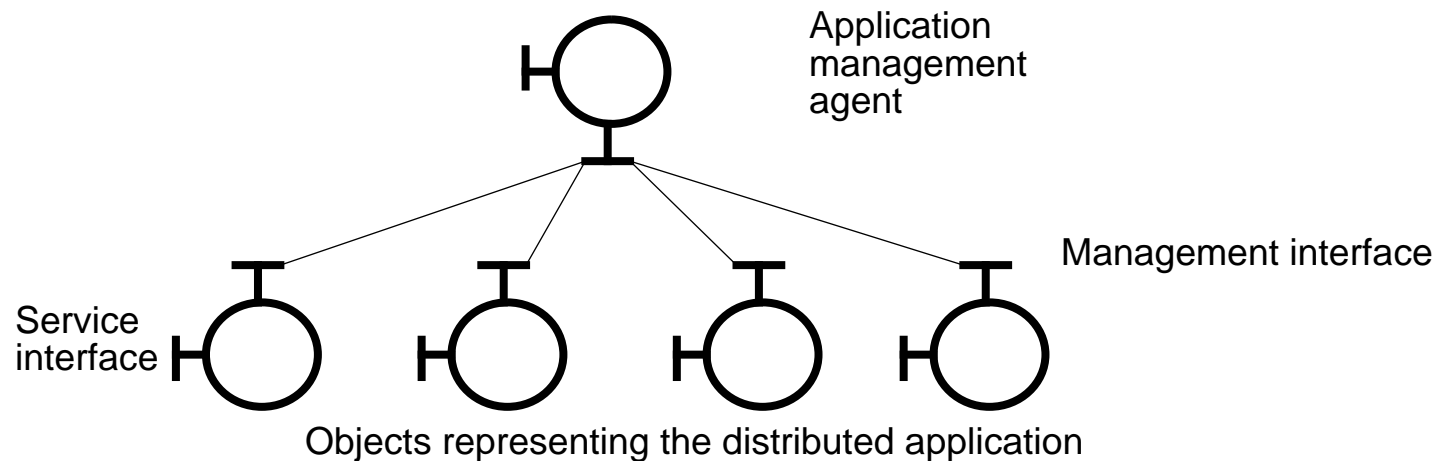
- Requirement is for end to end application management
 - distributed applications must be managed coherently
- Involves collecting information from
 - the application itself
 - the infrastructure supporting the application
- Each application may run on different hardware and software platforms
- Management involves many interfaces associated with many products

Management of distributed applications



Management of distributed objects

- Each object must provide a management interface
 - Separate from the normal service interface
- Applications must provide a management agent for end-to-end application management



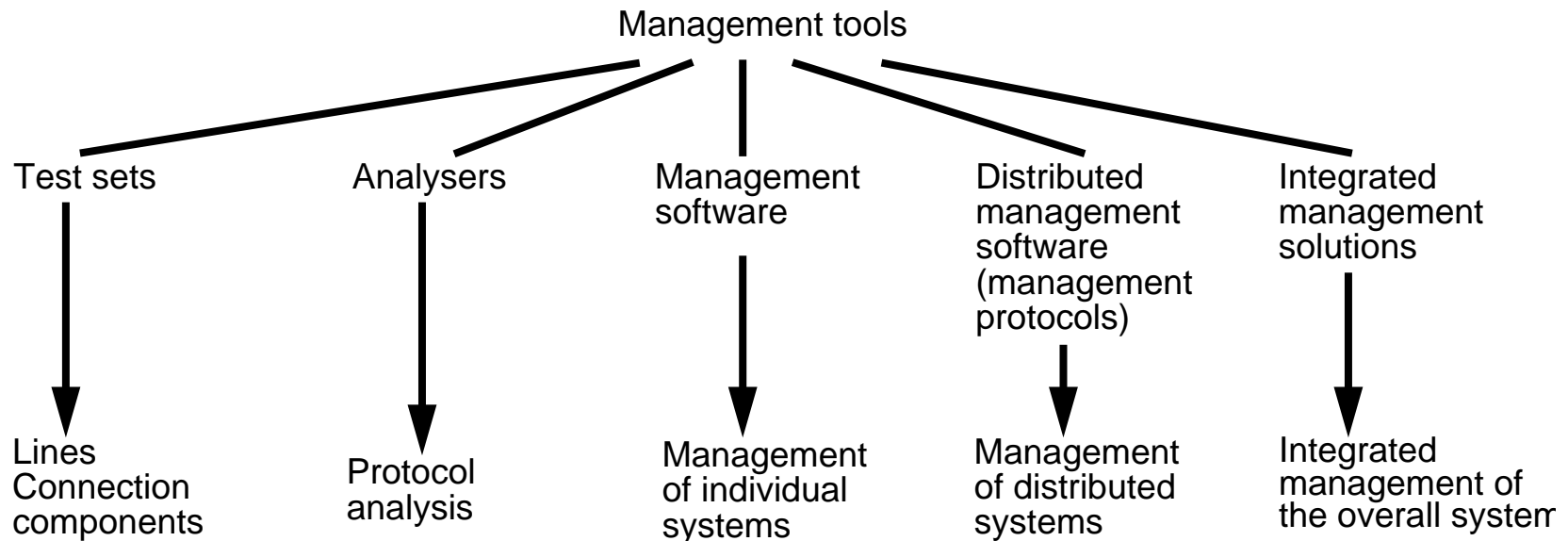


ODMA - Standardization of distributed object management

- **Work has started on ODMA (Open Distributed Management Architecture)**
 - **based on the ODP framework, and compliant with it**
 - **embedding all aspects of OSI management**
- **A set of notational techniques will be prescribed**



Management Applications





Management Applications

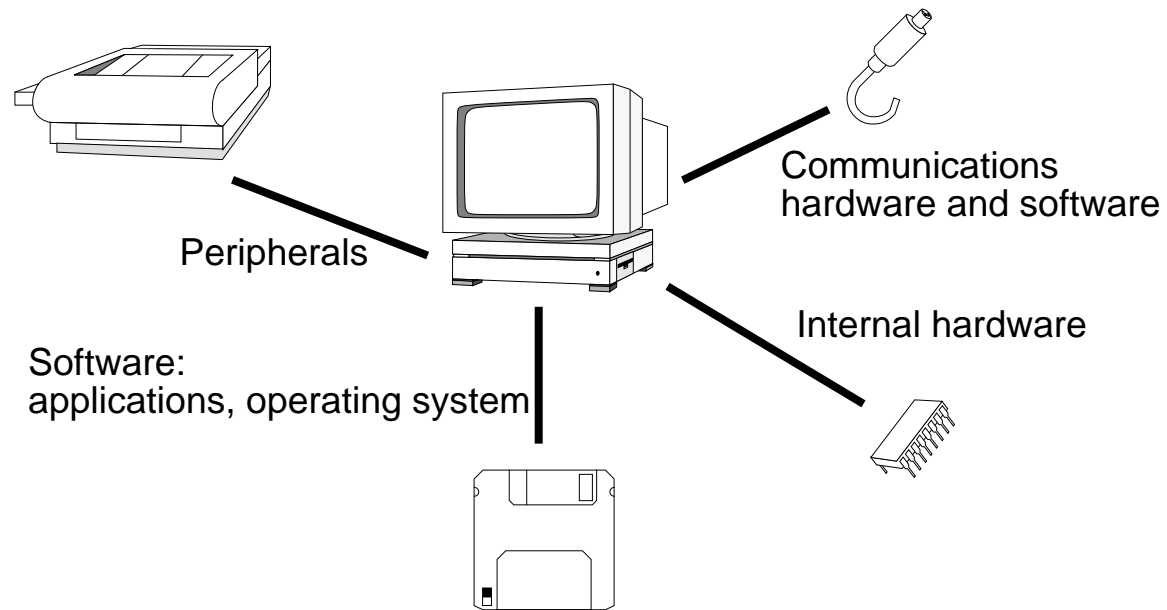
- **May be classified according to five areas of use shown on the previous slide**
 - these cut across the various functional areas
- **May be broadly divided into**
 - communications related (network management)
 - application related (applications management)
- **Where the systems are distributed, the management tools must also be distributed**
- **Integrated solution includes all these tools integrated by a management architecture**



Federation of Management Domains

- **Management applications from different vendors may not be compatible**
- **There is the problem of legacy management tools**
- **A large enterprise will consist of multiple management domains**
- **It will be necessary to build gateways between different management domains**
 - **Protocol gateways**
 - **Interface gateways**
 - **MIB gateways**

Management of the desktop





Management of the desktop

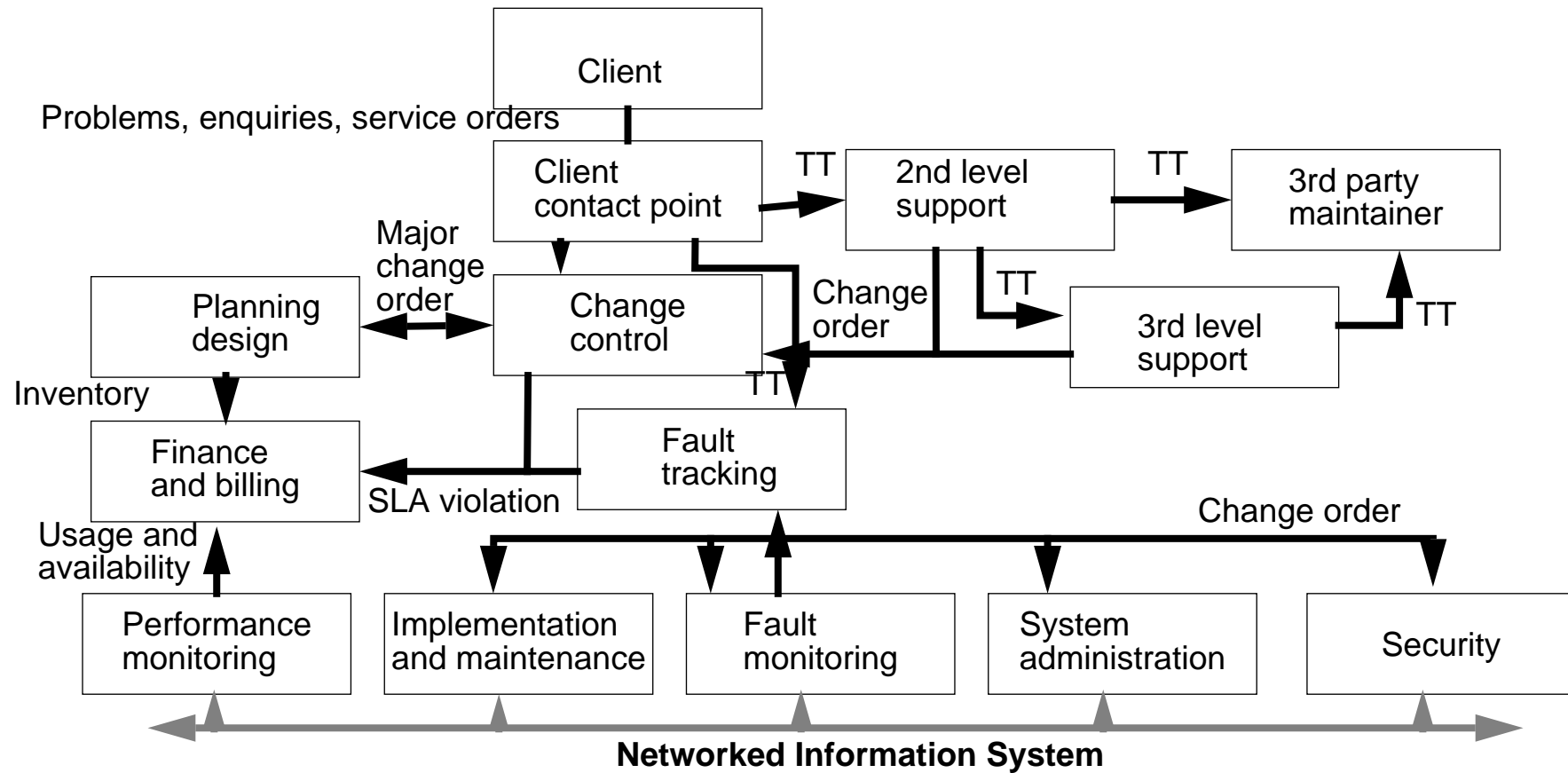
- **Desktop Management Task Force (DMTF)**
 - Formed in 1992 to manage desktop PCs and products
 - Composed of 12 major hardware and software vendors
- **Initiative to devise database for PC components**
 - Uses standard Management Information Format (MIF)
 - Provides administrators with enterprise-wide inventory
 - MIFs facilitate communication of status to management systems using DMI
- **DMI (Desktop Management Interface)**
 - Protocol independent standard for Intel-compatible PCs
 - Supported by several major vendors



Related initiatives (OMNIPoint)

- **Network Management Forum (NMF) programme**
... 'to make open integrated management a reality'
- **Multi-vendor — key partner organisations**
 - **Object Management Group (OMG)**
 - **Open Software Foundation (OSF)**
 - **Standards Promotion and Application Group (SPAG)**
 - **X/Open**
- **Key focus is on user requirements**
 - **Business practices rather than technology**

OMNIPoint Business Model





OMNIPoint

- **Pragmatic, fast track, user-driven programme**
 - **planned deliverables at two year intervals**
 - **OMNIPoint 1 delivered in August 1992**
- **UK and US governments likely to mandate for purchasing**
- **Deals with interoperability between management systems**
 - **CMIP/SNMP interworking and CORBA/CMIP/SNMP interworking**
- **Peer to peer, federated approach to management**
- **Defines how to exchange data and acts as an interface**
- **Associated SPIRIT initiative for procurement**



Summary

- **Historically, network management has been concerned with discrete areas**
- **There is a need to integrate these areas in the form of management applications**
- **Management applications must focus on end-to-end application management**
 - **Especially true in distributed object systems**
- **It must be possible to federate management domains**
 - **Using gateways**
- **Distributed systems will see the MIB migrate out into the managed objects**



Finding out more

- For more on this topic, see:
 - *Integrated Network and System Management*, Hegering and Abeck (Addison Wesley, 1994)
 - *Network Management Standards*, Uyles Black (McGraw Hill, 1992)
- For OMNIPoint from the Network Management Forum, see <http://www.nmf.com>