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ANSA Phase III

HP PSO Symposium Presentation on ANSA

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Abstract

This is a 50 minute presentation on ANSA for the HP PSO Symposium on Emerging Technology, 20th October 1993.

It looks at the vision and principles behind ANSA and ODP. It describes three key concepts: viewpoints, the service and selective transparency. Finally it looks at the relationship between ANSA and emerging standards demonstrating that ANSA is complementary to these standards, producing technology which will enable the deployment of these standards to provide information services.

Much of the material is drawn from APM1063, APM1057 and APM1055.

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ANSA: The Advanced Networked Systems Architecture

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Overview

- **Background and introduction to ANSA**
- **The vision and principles behind ANSA and ODP**
- **Key Concept: Viewpoints**
- **Key Concept: The Service**
- **Key Concept: Selective Transparency**
- **Position with respect to emerging standards**
- **Summary and how to find out more**



ANSA - a brief history

1983 UK Alvey Program → 1989 Esprit ISA → February 1993 ANSA Phase III

BT
DEC
GEC
GPT
HP
ICL
ITL
Olivetti
Racal
STC

AEG
Alcatel
BT
CASE
Chorus
CNET
CTI
DEC
Ellemtel
GEC

GPT
HP
ICL
Origin
SEPT
Siemens
STC
Syseca
Televerket

BT
BNR
Bellcore
CNET
DEC
GEC
GPT
HP
ICL
?
?



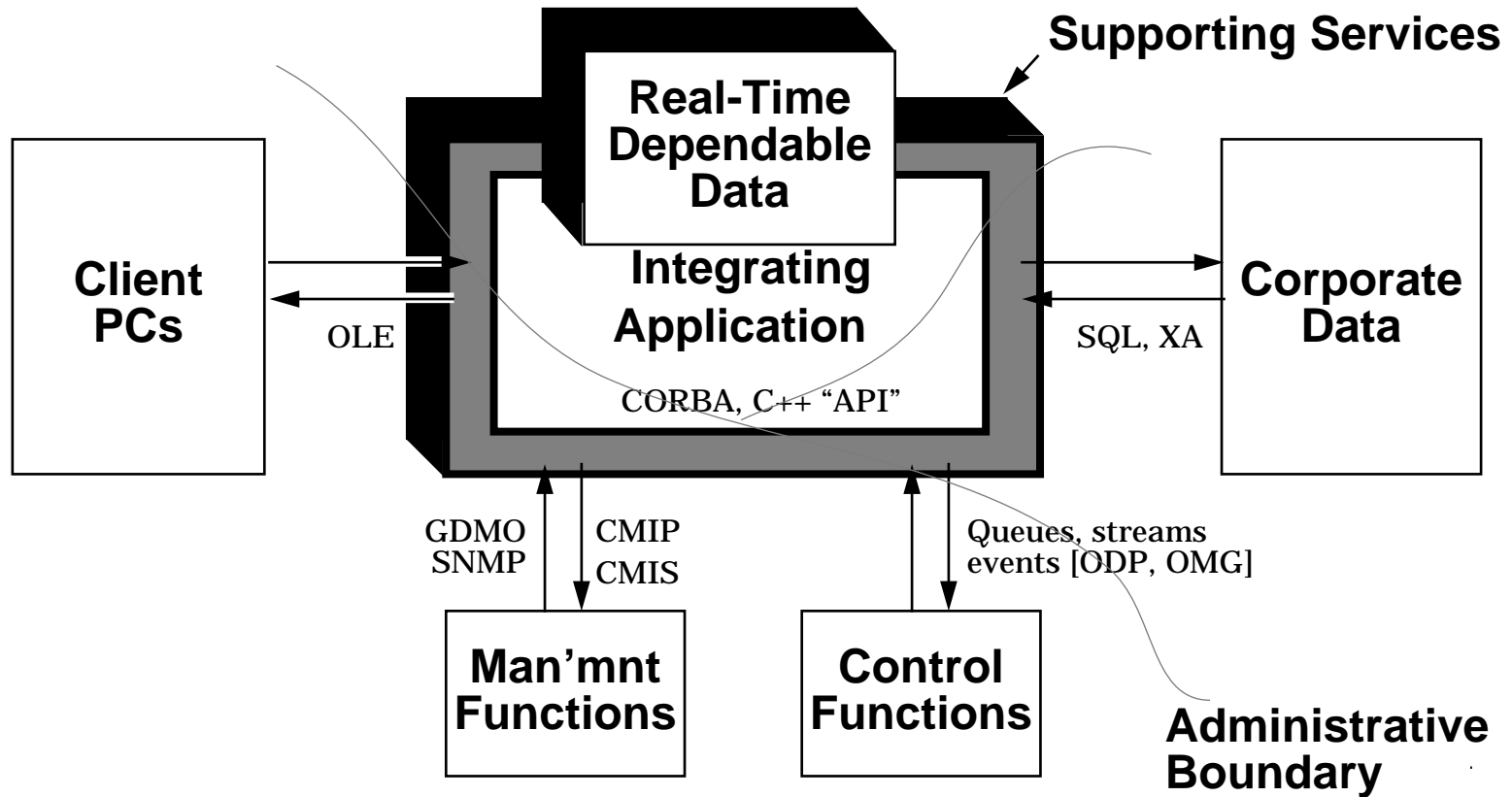
ANSA Phase III

- **Jointly agreed programme of research and development between sponsors**
- **Harvest and integrate leading edge research into context of advanced product development**
- **Validation in applications done by sponsor's field trials**
- **Work with teams in sponsors on requirements, technology, architecture and prototypes**
- **Focus on International Standards (ODP) for architectural framework, industry standards (OMG, OSF, UI, X/Open) for technology**

THE FOCUS: DEPENDABILITY & PERFORMANCE FOR OPEN DISTRIBUTED SYSTEMS



The "Management Engine"





The Business of Information Services

Networked information SERVICES will succeed ONLY IF:

- **they can be developed rapidly, to meet market windows**
- **existing services can be interworked into new services**
- **services are easy to deploy**
- **services are easy to manage**
- **services are dependable and provide required performance**



The Wish List

A truly open solution should:

- **Integrate products from many vendors**
- **Span application domains**
- **Hide system boundaries and enable inter-organisation computing**
- **Preserve existing investments**
- **Allow rapid, low-risk adoption of new technology**
- **Match IT style to Enterprise requirements**
- **Be manageable**



Reaching the Solution

- **Specify systems using application concepts**

then they will be durable against technical change and comprehensible to applications programmers

- **Define a robust, high level model for distributed programming**

Agree what programmers can and can't do ; limit the number of options to increase the level of abstraction and enhance portability

- **Use tools to automatically generate the engineering detail**

Follow the trend towards ever more "declarative" input (i.e. say what you want, not how to do it)

- **Define structures for integration**

- **management and monitoring**

What is going to be controllable in the system, where is it controlled from?

- **trading and federation**

How is my system linked to yours - what services do we provide to one other - what "adaptors" do we need?

- **transparency**

what is going to be hidden (by automation)?

- **Define models for common application domains**

so we can talk to each other - to get here we need to start from some common "describing languages"

- **In other words, an architecture**



What is an Architecture?

- **A set of basic components**
- **Design rules**

Ways to structure and combine systems so as not to fall foul of key problems like scaling, and other traps.

- **Recipes**

Ways to build components into more complex subsystems which behave in the way you want - a cookbook for designers

- **Guidelines**

When to break the rules and what the penalties are - optimizations - trade-offs

- **.... which follow a set of architectural principles**



ANSA/ODP principles - in one slide

- **Distributed systems have different properties to centralised systems**

You have to reverse a number of assumptions — see next slide

- **Hide unnecessary complexity from programmers**
- **Different users need different solutions**
- **Use object-orientation to maximize simplicity and commonality**



Reversed Assumptions

- Review, and reverse, many traditional system design assumptions:

TRADITIONAL	REVERSED
Local	Remote
Sequential	Concurrent
Single Environment	Diverse Environment
Fixed Location	Mobile
Single Copy	Multiple Copies
Synchronous	Asynchronous
Direct	Indirect
Shared	Separate
Global	Context Relative
Complete Failures	Partial Failures
Early Binding	Late Binding



KEY CONCEPT: THE VIEWPOINTS

Separating Concerns, five ODP viewpoints, derived from the ANSA projections

- **Enterprise**

Concerned with how IT system fits Enterprise it serves - describes objectives in terms of boundaries, policies, roles, responsibilities, contracts etc.

- **Information**

Structure and meaning of information flow around the system; constraints on validity of information

- **Computational**

The functional components, how they interact, what they do and the way they do them

- **Engineering**

Block diagram of the infrastructure supporting the system, transparency provision, interceptors/gateways/adaptors

- **Technology**

The conformance requirements on components and interfaces; which standards, which products, where



KEY CONCEPT: “THE SERVICE”

- **A conceptual view of an application or system component**
- **Anything can be an ANSA service, even a legacy system**
- **Components (objects) are providers and users of services (client/server)**
- **Service associated with an interface**
- **Quality of Service**
- **Service users find service providers via Trading Services**
- **Service references are the currency of the system**



The Service (continued)

- **Service SPECIFICATIONS must be visible in the network**
 - enables integration and evolution
 - basis for **CONTRACTS** between service providers, service users and service bearers
- **Service IMPLEMENTATIONS must be available from the network**
 - enables re-use and reduction of complexity
 - requires **STANDARDS** for **PORTABILITY, INTERCONNECTION** and **MIGRATION**



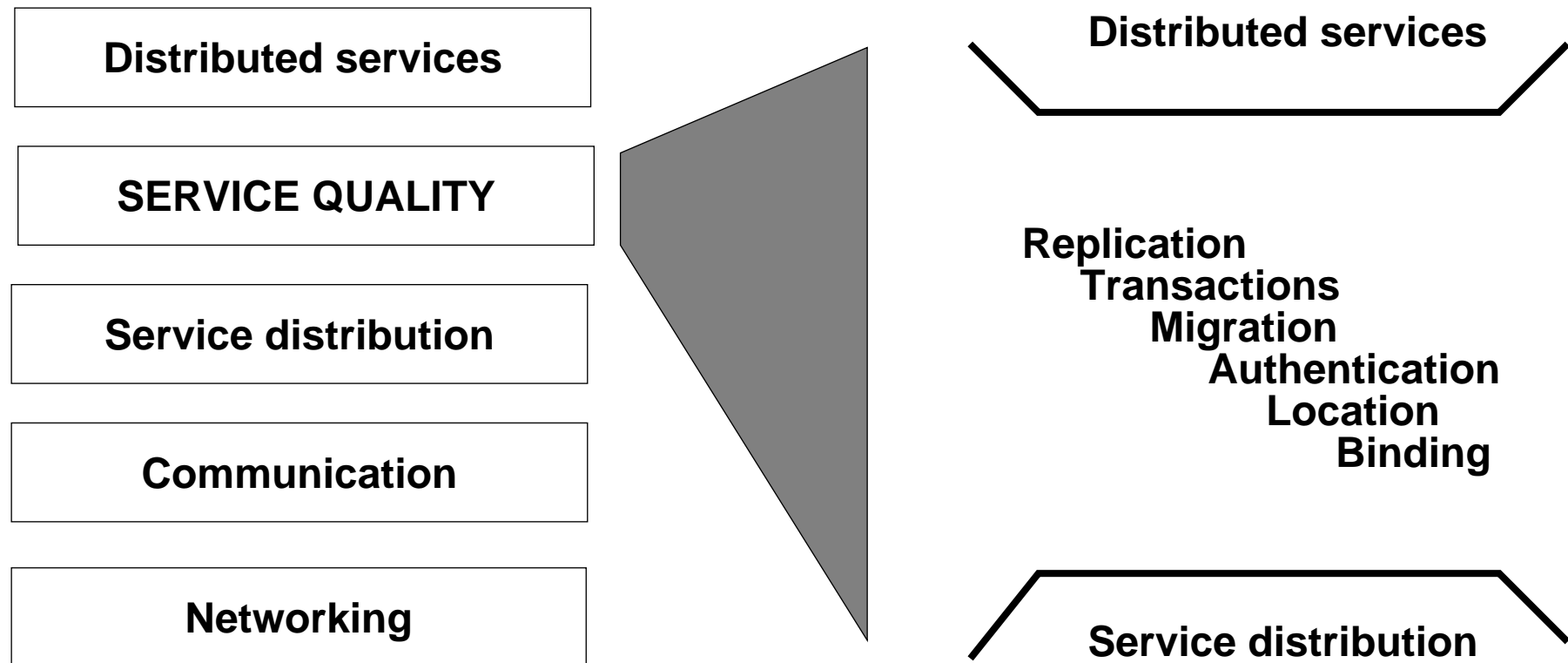
Engineering issues

- **Engineering is about making trade-offs — there is not going to be a single response to the wish list**
- **ABSTRACTION versus SPECIALIZATION**
The more you hide, the less chance there is to tinker
- **CONSISTENCY versus AVAILABILITY**
Availability means copies, increases risk of inconsistency
- **AUTONOMY versus UNIFORMITY**
Autonomy gives more freedom, but leads to differences which increases complexity
- **SECURITY versus CONVENIENCE**
Security makes things harder to do

**There is no one answer, and therefore there cannot be one ubiquitous
DISTRIBUTED PROCESSING ENVIRONMENT. Hence SELECTIVE
TRANSPARENCY**



KEY CONCEPT: SELECTIVE TRANSPARENCY





Selective Transparency — hiding irrelevant complexity

- **Location**

don't need to know where it is to use it

- **Access**

don't need to know how it works to use it

- **Migration**

it can move while you use it, to balance loads or reduce latency

- **Replication**

there may be multiple copies for reliability and/or availability

- **Partial Failure**

it always gets to a consistent state

- **Federation**

you don't have to be within the same administration to use it



Tools

**The real productivity benefits come from automating
transparency provision**

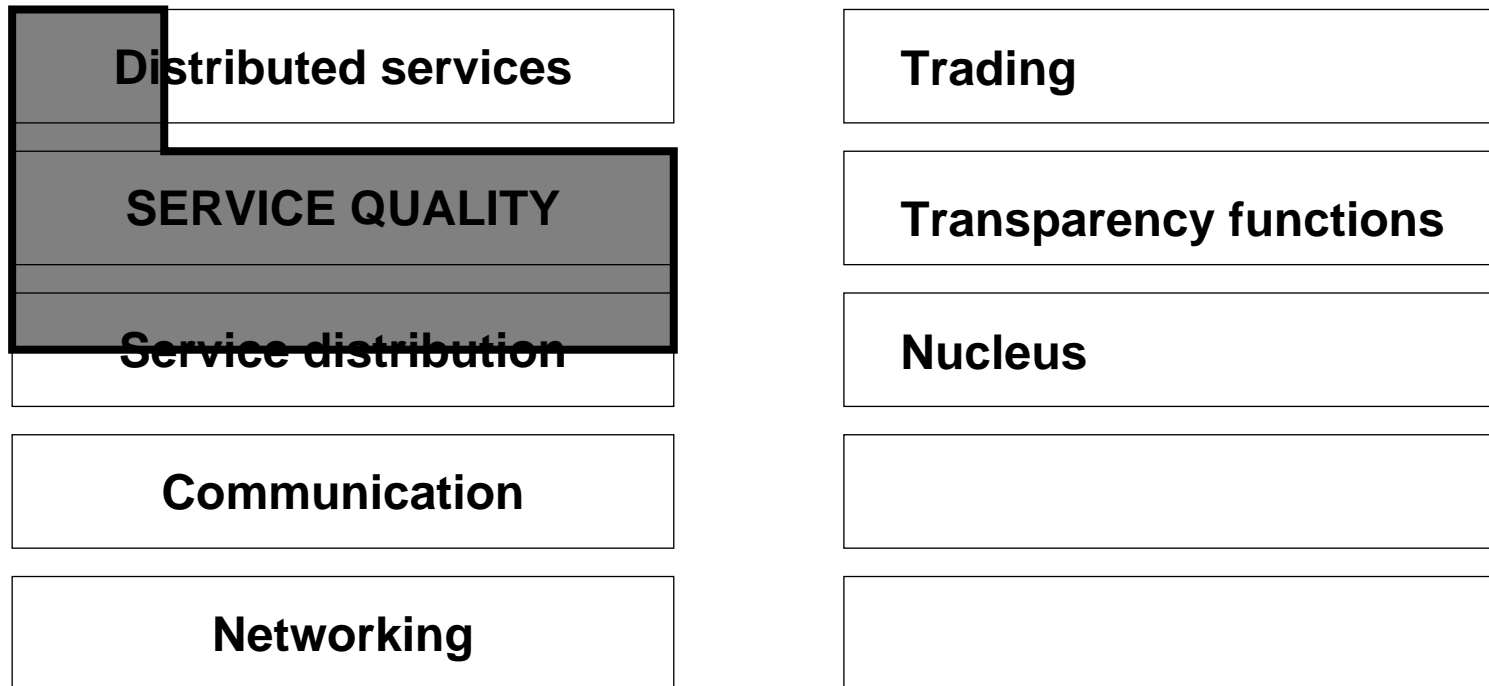


Where are the Standards?

- **ISO / CCITT**
 - **OSI TP service and protocol**
 - **OSI Management information model and protocols (GDMO, CMIS/CMIP)**
 - **OSI Remote Data Access, SQL**
 - **Open Systems Environment (POSIX)**
 - **Basic Reference Model for Open Distributed Processing**
- **Industry standards**
 - **OSF Distributed Computing Environment, Distributed Management Environment**
 - **Unix International Atlas**
 - **OMG Combined Object Request Broker Architecture, Object Services**
 - **X/Open XA**
- **De facto standards**
 - **MicroSoft Object Linking and Embedding (OLE), NT,**
 - **COSE**

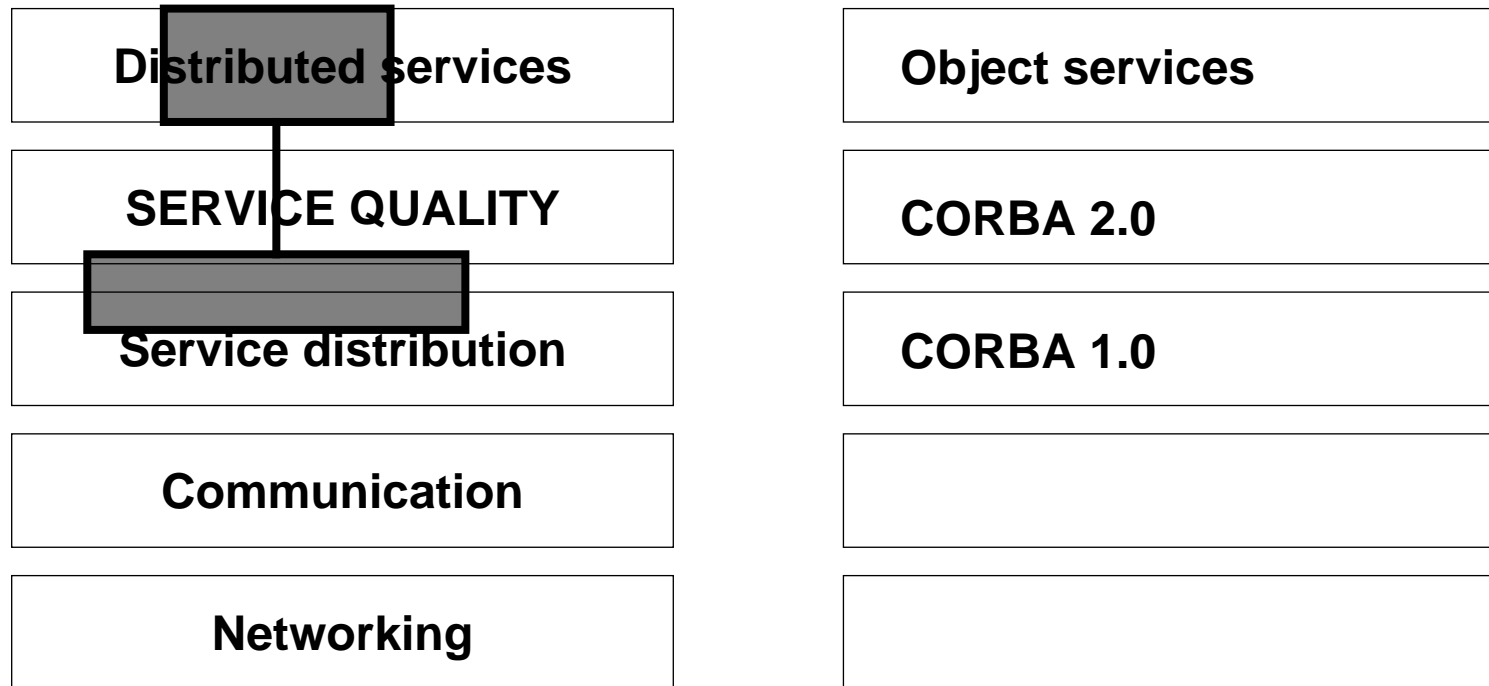


RM-ODP/ANSA



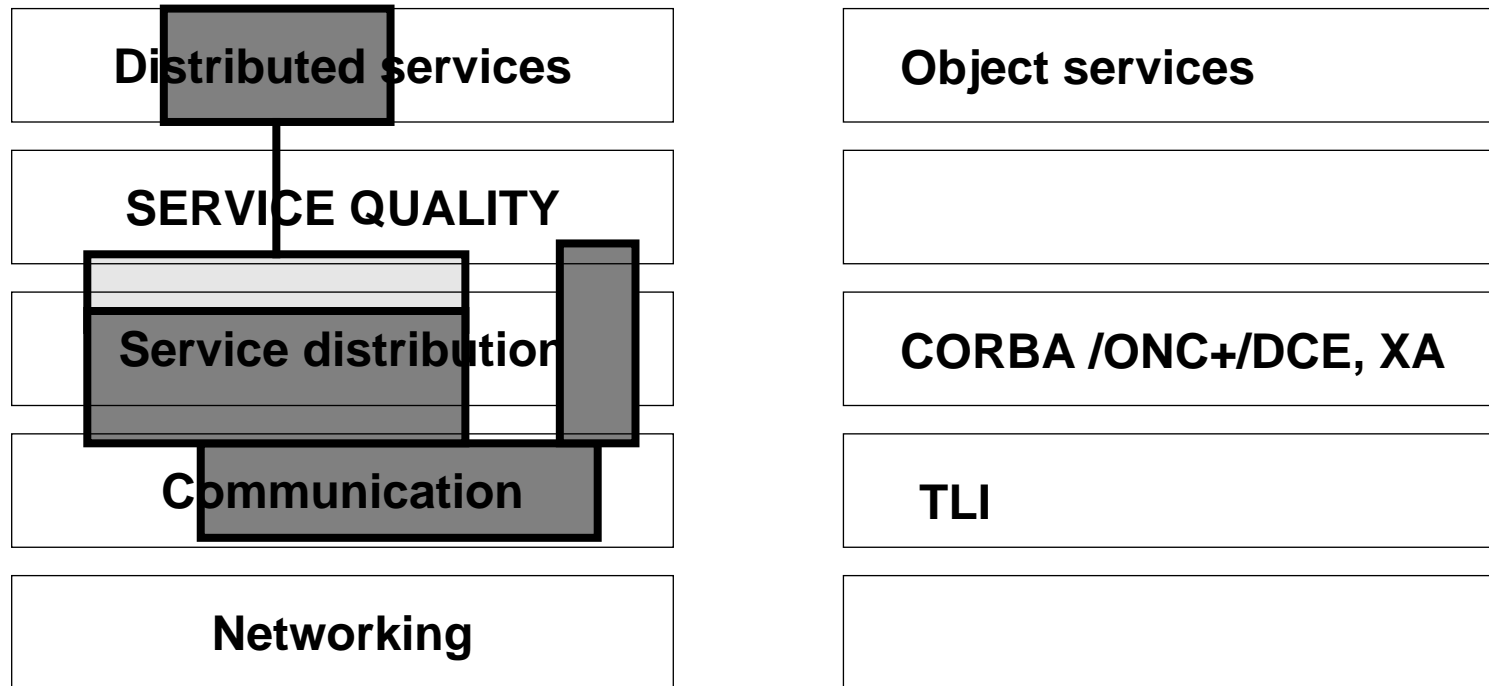


OMG



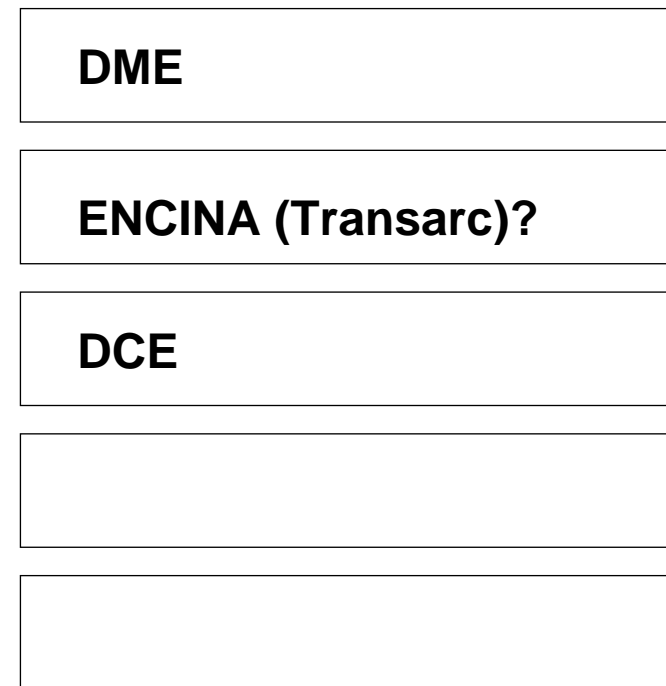
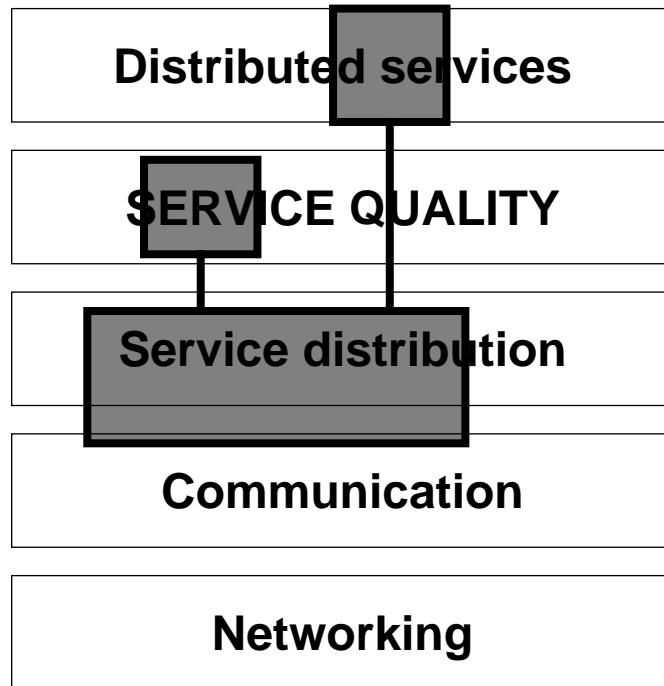


UI/ATLAS



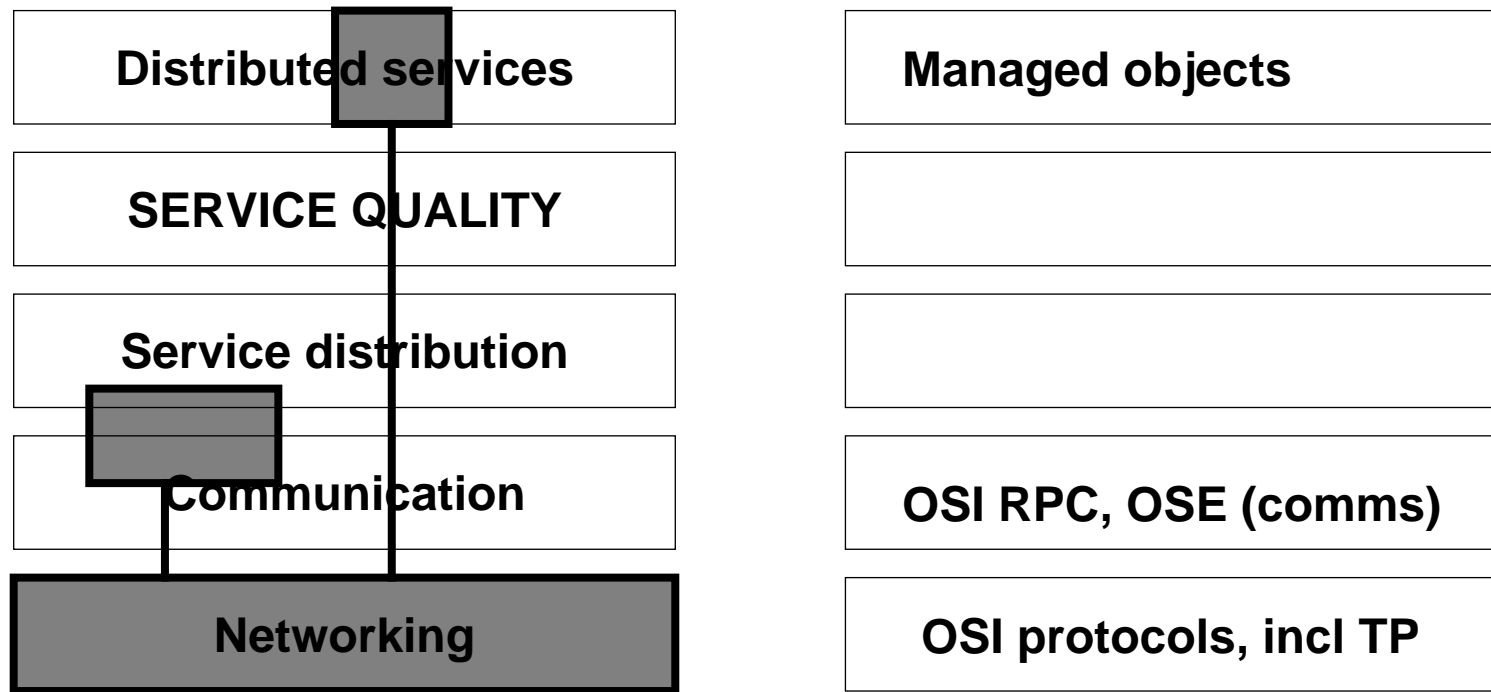


OSF





OSI & OSE





Impact

- **Standards**
 - **ISO Basic Reference Model for Open Distributed Processing**
 - **OMG CORBA, OMG JOSS (Lifecycle, Naming)**
 - **OSF DCE, DME**
 - **TINA-C (architecture, DPE?)**
- **Users**
 - **NASA Astrophysics Data System**
- **Sponsors**
 - **Reliable, high performance OSI routers**
 - **Integrating Banking and Healthcare applications**
 - **Technology feed into “distributed object” product lines**



Summary

- **Described the principles and vision on which ANSA and ODP is based**
- **Some of the key concepts are:**
- **The five viewpoints**

enterprise, information, computational, engineering and technology

- **The service**

may comprise of many components, use references as an abstraction

- **Selective transparency**

to make the engineering trade-offs

- **ANSA is complementary to many of the emerging standards, developing technology which will enable the deployment of these standards to provide information services and also feeding ideas into these standards.**



To find out more.....

- **Contact nje@ansa.co.uk or nje@hplb.hpl.hp.com (Tel. +44 223 323010)**
- **Many of the ANSA documents are available via anonymous ftp on [rabbit.hpl.hp.com \(pub/ANSAdocs\)](ftp://rabbit.hpl.hp.com/pub/ANSAdocs)**
- **The System Designer's Introduction to the Architecture**
- **AR0: AN Overview of ANSA**
- **ODP-RM Part 3.**