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Business Scenario: The Interoperable Enterprise

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Preface

The Open Group is acting on a vision to "**create a worldwide market for interoperable IT products supporting integrated access to integrated information, in which all stakeholder needs are addressed.**"

For too long, IT customers have had to pay for the failure of IT suppliers to get their products to work together effectively. To avoid negatively impacting business, IT customers have often had no choice but to pay for "integration services" that simply consume development budget today and increase maintenance costs down the road.

IT customers have each experienced the frustration of trying individually to get key IT suppliers to fix this problem. Many have also tried collaborative efforts, both within their own industry and across industries, to marshal collective procurement $$ to bring pressure on the supply side.

Also for too long IT suppliers have had to deal with large lists of vague and ambiguous requirement statements. This has resulted in the implementation of some features that had no market value, and others that didn't actually fulfill the real needs of the customer, and all at enormous costs.

We all know that open standards can help, but they must be the right standards addressing the right areas. The Open Group is offering a unique opportunity to come together to provide leadership for global information technology standards and certification practices.

Actively participating in setting the directions for open standards will help ensure that the standards that move forward are those best positioned to support your business.

To further these aims, The Open Group is evolving this business scenario[1] that describes the problem caused by the lack of interoperability. The Open Group will use this business scenario to achieve convergence around the real business issues that IT suppliers should be addressing on behalf of their customers, and to set in motion an empowered team of our technical champions to work with The Open Group in setting the standards agenda to address these problems.

As a technology neutral forum for both customers and vendors, The Open Group is ideally positioned to facilitate effective dialog between the buy side and supply side of the IT industry. It is unique in underpinning the results of IT standards efforts - both its own and those of other standards bodies - with a world-class product certification process.

A presentation overview of this document is embedded in the following.

CC-Interoperable-Enterprise-R14.PPT

Embedded Presentation

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[1] A more detailed description of Business Scenarios is given in Appendix A.

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Executive Summary

Business Scenarios - "So What?"

In the information age, many enterprises have passed the point where information technology merely supports or enables the business – increasingly, information technology **is** the business.

The business scenario documented here addresses the issue of **integrated information, and integrated access to that information, in order to support the many different business processes of the enterprise - both internal, and spanning the key interactions with suppliers, customers, and partners**. The title "The Interoperable Enterprise" connotes the **end state vision** of addressing the above issue.

The main technical challenge in addressing this problem is the lack of interoperability between the different systems that generate and provide access to the data, and of the underlying IT infrastructure, whether these are based on COTS products or custom-built solutions.

The buy side and the supply side of the industry typically have different explanations for this.

Customers often cite:

- Decreased commitment and accountability of suppliers in solving the real business problems of their customers in their products

- Increased focus of suppliers on the services model – vendors externalize the interoperability cost and pass it on to customers as integration services, rather than internalizing and solving the core problem in their products

- Increased interest of suppliers in selling rather than delivering

Conversely, suppliers often cite:

- Failure of customers to develop and deliver a sufficiently integrated process definition and corresponding set of requirements.

- Tendency of customers to give requirements for different parts of the business to different vendors at different times, on a short-term, point-solution basis, with no integrated or long-term view

- Tendency of customers dictate solutions to vendors rather than describe requirements

to which customers would counter that:

- After solutions have been deployed and have matured, organizations often re-examine their internal and external business processes. This leads to the emergence of opportunities and needs for system-to-system cooperation that were not identified originally.

- Customers often have to make pragmatic and conscious decisions to select / designate / design solutions that meet local requirements, knowing full well that system-to-system interoperability will be difficult and expensive to obtain at a future time. These decisions are driven by business imperatives, even if from a purely IT perspective they are sub-optimal.

There are probably elements of truth in both of these positions. The situation is further complicated by the continued development of new and incompatible technologies that are embraced by both suppliers and buyers.

Whatever the cause, customers would still like to be able to choose best-of-breed solutions for each business application area and for the supporting IT infrastructure, have it all "just work". Instead, they are forced to choose between selecting entire product suites with less than optimal functionality, in the hope that the components of the suite will at least interoperate; and non-interoperable products, with the

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concomitant integration cost and the on-going cost of maintaining the resulting custom-built integration solution.

In many cases customers have tried a common product line as the basis of a solution to their interoperability problem, and have found it wanting.

Standards can help, but in a world of limited resources, customers often face a choice between developing standards to retrofit to existing problems, versus seizing a window of opportunity to influence emerging technologies, where product suppliers have not yet established a dominant market position, and customers have not yet developed a large legacy of developed systems, so that standards can help solve or avoid the problems of lack of interoperability.

The challenge to The Open Group is to marshal the necessary resources and critical mass from both the buy-side and supply-side of the industry to deal effectively with the issues identified in this business scenario.

How This Business Scenario Will Be Used – Business Scenarios "So That…"

The Open Group aims to help IT customers and suppliers alike to realise the vision of the Interoperable Enterprise, by means a two-fold strategy.

- Firstly, The Open Group hopes to enable IT customers and suppliers to share a common understanding of the requirements of customers for interoperable IT solutions, so that the supply side in particular will be able to construct the business case for creating the interoperable solutions, in both applications and infrastructure products, that genuinely address those requirements.

- Secondly, The Open Group intends to deliver, to IT customers and suppliers alike, the assurance of interoperability that will enable the IT market to function effectively.

This document forms an essential part of the first element of this strategy.

Enterprises within an individual vertical industry sector such as Transportation often find they have many problems in common both in their applications suites and their IT infrastructures as depicted in the figure below. In the figure below you see that many manufacturers have different manufacturing processes, different manufacturing process support business logic, and different metadata. However it is likely that there is commonality in the scheduling, procurements, and human resources areas.

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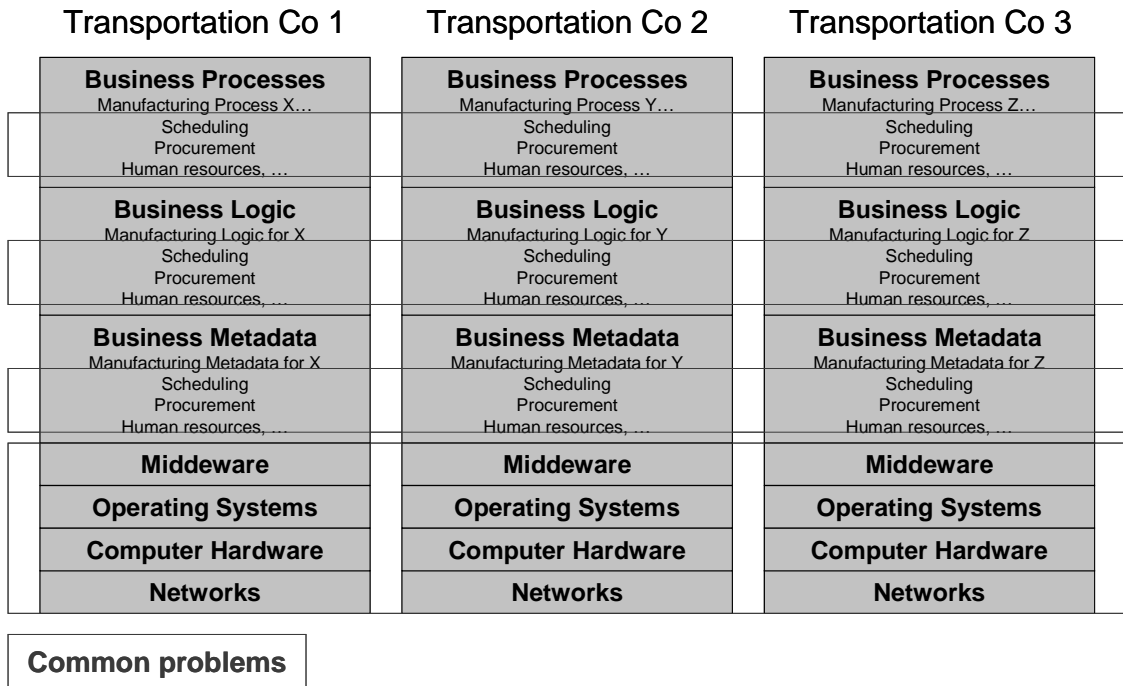| Transportation Co 1	Transportation Co 2	Transportation Co 3
Business Processes	**Business Processes**	**Business Processes**
Manufacturing Process X…	Manufacturing Process Y…	Manufacturing Process Z…
Scheduling	Scheduling	Scheduling
Procurement	Procurement	Procurement
Human resources, …	Human resources, …	Human resources, …
Business Logic	**Business Logic**	**Business Logic**
Manufacturing Logic for X	Manufacturing Logic for Y	Manufacturing Logic for Z
Scheduling	Scheduling	Scheduling
Procurement	Procurement	Procurement
Human resources, …	Human resources, …	Human resources, …
Business Metadata	**Business Metadata**	**Business Metadata**
Manufacturing Metadata for X	Manufacturing Metadata for Y	Manufacturing Metadata for Z
Scheduling	Scheduling	Scheduling
Procurement	Procurement	Procurement
Human resources, …	Human resources, …	Human resources, …
Middeware	**Middeware**	**Middeware**
Operating Systems	**Operating Systems**	**Operating Systems**
Computer Hardware	**Computer Hardware**	**Computer Hardware**
Networks	**Networks**	**Networks**

Common problems

Figure 1: Common Issues in an Industry

The same holds true even for enterprises in ostensibly very different vertical sectors like Transportation, Finance, and Petrochemicals as depicted in a similar manner by the following figure.

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Transportation	Finance	Petrochemicals
Business Processes Manufacturing… Scheduling Procurement Human resources, …	**Business Processes** Banking… Scheduling Procurement Human resources, …	**Business Processes** Exploration… Scheduling Procurement Human resources, …
Business Logic Manufacturing Scheduling Procurement Human resources, …	**Business Logic** Banking… Scheduling Procurement Human resources, …	**Business Logic** Exploration… Scheduling Procurement Human resources, …
Business Metadata Manufacturing Scheduling Procurement Human resources, …	**Business Metadata** Banking… Scheduling Procurement Human resources, …	**Business Metadata** Exploration… Scheduling Procurement Human resources, …
Middeware	**Middeware**	**Middeware**
Operating Systems	**Operating Systems**	**Operating Systems**
Computer Hardware	**Computer Hardware**	**Computer Hardware**
Networks	**Networks**	**Networks**

Common problems

Figure 2: Common Issues Across Industries

The Open Group intends to develop from this document both a single, guiding, generic Business Scenario that captures interoperability issues that are common across most vertical sectors; and a suite of industry-specific scenarios – one for each vertical sector for which it can find CIOs and Chief Architects willing to collaborate with it – that elaborate on the aspects that are specific to the sector concerned.

Like much of The Open Group's output, this scenario and its companions will in due course be placed in the public domain, so that organizations around the world can see the progress of the initiative, contribute to it, and leverage it where appropriate.

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Business Scenario

The Interoperable Enterprise

> *Interoperability is very important to us, we integrate technology on the fly for a joint task force …we get interoperable products that are cost effective out of the box so we get better products that we can integrate easily to provide capability to our war fighters.* – Ms. Dawn Meyerriecks, CTO DISA

Ms. Meyerriecks' statement above is demonstrative of the need for products that work together more readily and easily. Here Ms. Meyerriecks points out the benefits of products that are capable of working together more readily in support of a very important mission. It is not necessarily understood from day one that each and every product work together, because in a mission scenario much can happen to require things to work together out of necessity. Ms. Meyerriecks' challenge is very similar to the challenges in the commercial sector, as missions change; systems need to interoperate with other systems out of necessity. Even systems that do not interoperate today might be required to interoperate tomorrow. Ms. Meyerriecks often sites the importance of open standards in making this possible.

Business Scenario Problem Description

Problem Summary

The business scenario documented here addresses the issue of gaining operational efficiencies through **integrated information, and integrated access to that information, in order to support the many different business processes of the enterprise - both internal, and spanning the key interactions with suppliers, customers, and partners**.

The main technical challenge in addressing this problem is the lack of interoperability between the different systems that generate and provide access to the data, and between different parts of the underlying IT infrastructure, whether these are based on COTS products or on custom-built solutions. In practice the results of addressing this challenge are often technical work-arounds, which not only represent greater IT cost – they are costly to develop initially, and lead to greater on-going maintenance cost – but also lead to greater business operational cost due to mis-routing of supplies, services, and personnel, etc., or in extreme situations to loss of life.

Currently new approaches are being explored, for example at the storage level (with technologies such as Storage Area Networking (SAN) and Network Attached Storage (NAS)) in order to integrate different sources of information, and at the portal level in order to provide integrated access to domain-specific information areas. However, applying new technologies that are non-standard inevitably cause new pain – e.g., multiple portal infrastructures that are not interoperable, and that may actually conflict with each other. Therefore The Open Group sees value in looking at the approaches and the necessary standards in possible solution areas to help the buy-side address this business scenario.

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Background of Scenario

The present draft of this business scenario is based on information that was gathered in two workshops and follow-up analysis conducted in mid-year 2001. Contributions come from:

- Elaine Babcock, US Dept of Defense/DISA
- Terry Blevins, The Open Group
- Allen Brown, The Open Group
- Ian Dobson, The Open Group
- Alan Doniger, Petrotechnical Open Software Corporation
- William Priestley, Compaq Computer Corporation
- Russ Richards, US Department of Defense
- Skip Slone, Lockheed Martin
- Martin Smith, The Security Company
- John Spencer, The Open Group
- Walter Stahlecker, Hewlett-Packard Company

This work was a result of two workshops focused on gathering an understanding of interoperability. After proceeding with each workshop and considering the discussions, the description of the business scenario in each case could be characterized as: "**Gaining operational efficiencies through integrated information, and integrated access to that information, in order to support the many different business processes of the enterprise - both internal, and spanning the key interactions with suppliers, customers, and partners**." Providing integrated access to integrated information will support the interoperation of the business processes within the enterprise.

While the characterization above is technically precise, this statement makes for a less than inspiring document title, and so the short-hand "The Interoperable Enterprise" has been adopted as the title of this Business Scenario.

Purpose of Scenario

The purpose of this business scenario is to express business and technical **requirements** – not solutions – and to communicate them effectively to the IT market. The intent is to enable the supply side to understand the needs of the buy side, and the value proposition for meeting those needs, and to engage them in delivering the solutions. The ultimate goal is the availability of products that support integrated access to integrated information that meets the needs of all its stakeholders.

The business scenario is generic, and describes an idealised enterprise, but it is based on inputs from a number of real organizations, and is supported by specific examples in the appendices.

This document will be a starting point rather than a final product. The intent is to add to it with input from a wider community of CIOs and Chief Architects of organizations who are experiencing similar problems and who seek to drive the standards process into the market if needed, so that the market will provide the solutions that genuinely address their needs.

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Definition of Terms

Interoperability – The ability of two or more systems or components to exchange information and use the information that has been exchanged to do useful work. In this business scenario this term specifically relates to the challenges of providing integrated access to information and providing integrated information and infrastructure so business processes can exchange information and do useful work.

Integration – the process of combining components into an effective overall system. In this business scenario the phrase "integrated access to integrated information" is used repeatedly. The term "integrated access" connotes an overall system that provides a single point of access to information, and that combines various individual access mechanisms in order to do so. The term "integrated information" connotes an overall system in which a single view of information is presented, achieved by combining various information sources.

Detailed Objectives

This business scenario describes how information managed by various applications in various environments needs to support **operational and process efficiencies**.

The main drivers for the scenario are the generic business needs to:

- Provide integrated access to integrated information by staff, customers, suppliers, and partners, to support the business
- Provide higher quality products and service to customers
- Maintain the security and confidentiality of information.

In addition to the business drivers, there are often legal and regulatory requirements relating to access to information, and to the security and confidentiality of information, such as the safety requirements imposed by the FAA on the air transportation industry.

The main objectives are typically to:

- **Improve business process performance** – for example if the process is a logistics process where food is provided to the war fighter, then the performance metrics would be associated with the success of that process; if the process is about product lifecycle development, the metrics could be about budget, time, break even time, return on investment, etc.
- **Decrease IT costs** – implementing a standards based solution to the problems described in this business scenario will help remove redundancy and duplication in IT assets throughout the enterprise, decrease the reliance on external IT service providers for integration and customization, and for subsequent maintenance, and will reduce the need for data translation between different formats used by different systems.
- **Improve effectiveness of business operations** – lower overall IT costs means being able to allocate budget to new business features rather than "keeping things running", and this in turn will decrease the costs of running the business, decrease the time to market for the enterprise's products, and increase the quality of its services to customers. Reducing the need for data translation will also improve the quality of business information and thereby increase business operations efficiency.
- **Improve effectiveness of information technology organization** – information technology is currently a restraint not an enabler. Service provision to users is poor, and information technology changes are not implemented when the business needs them.

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- **Improve management efficacy** – today the information technology environment system is too complex to manage and is often not managed by a strategic architecture. This results in difficulty of balancing the short and long term choices.

- **Reduce risk** – complexity in the information technology environment makes it all the harder to implement effective security processes. Errors introduced into business processes through complex and faulty IT systems can lead to real world safety hazards, and even to loss of life.

Effective interoperable IT solutions can significantly contribute directly or indirectly to all the above objectives by avoiding the inefficiencies and inaccuracies of manually transferring information from one system to another.

Conversely, the customers represented in this business scenario indicate that the lack of interoperability in information technology generally causes the following "pain" symptoms, which effective interoperable IT solutions would address:

- Increasing IT cost without related improvement in productivity
    - o redundancy and duplication in IT assets
    - o increased maintenance cost
    - o increased reliance on (expensive) external IT service providers

- Lack of effectiveness of IT in delivering required services to the business
    - o poor service provision to users
    - o IT changes not implemented when the business needs them
    - o IT a restraint, not an enabler

- Resultant lack of effectiveness of business operations
    - o increasing costs to run the business
    - o increased time to market for the enterprise's products and services
    - o inability to provide effective services to customers

- Lost opportunity to add value to the business
    - o non-discretionary spend rising, spend on extra business value decreasing.
    - o new features sacrificed just to "keep things running"

- Reduced management control
    - o IT and business environment too complex to manage
    - o IT not driven from strategic architecture
    - o difficult to balance short and long term choices

- Increased operational risk
    - o security
    - o safety criticality
    - o IT becomes a "choke point" - the business stalls

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Not all organizations have all of these objectives and "pain points", and the importance given to different objectives in different organizations varies. But every organization will have some of them.

Measures of Success

Business Scenarios are SMART – **S**pecific, **M**easurable, **A**ctionable, **R**ealistic, and **T**ime-constrained.

The following budget classifications are typical key measures of success in addressing the issues in this business scenario, from a customer viewpoint. To the extent that IT customers are able to spend IT budget in pursuit of these measurable goals, they also represent the basis of the value proposition for IT suppliers.

- Funding growth through consolidation - improved asset utilization
    - o **but** - IT must deliver
- Improving business operations
    - o effectiveness of business operations more important than effectiveness of IT - leverage is orders of magnitude higher
        - ▪ E.g, 25% increased spend on IT produces 30% improvement in business operational efficiency - immediate cost benefit . . .
        - ▪ . . . but the improvement in business operational efficiency results in much higher returns to the enterprise than just the cost saving
- Driving revenue growth

Other typical measures include:

- Lower IT spend for the entire organization
- Increase % of procurements against standards
- Decrease spend on customizations
- Improved cycle time for rolling out upgrades
    - o In-between rollouts of information technology there are often interoperability discontinuities that cost time and money in business operations.

Views of Environments and Processes

Business Environment

Enterprises range from small, unified companies to large, complex, distributed organizations. Interoperability is important to them all, but the value increases with the organization's size and complexity. The organizations on whose experience this scenario is based are generally at the upper end of the complexity scale.

The key organizations and entities in the typical business environment – particularly those relevant to the processes discussed in this Scenario – are illustrated in the following figure.
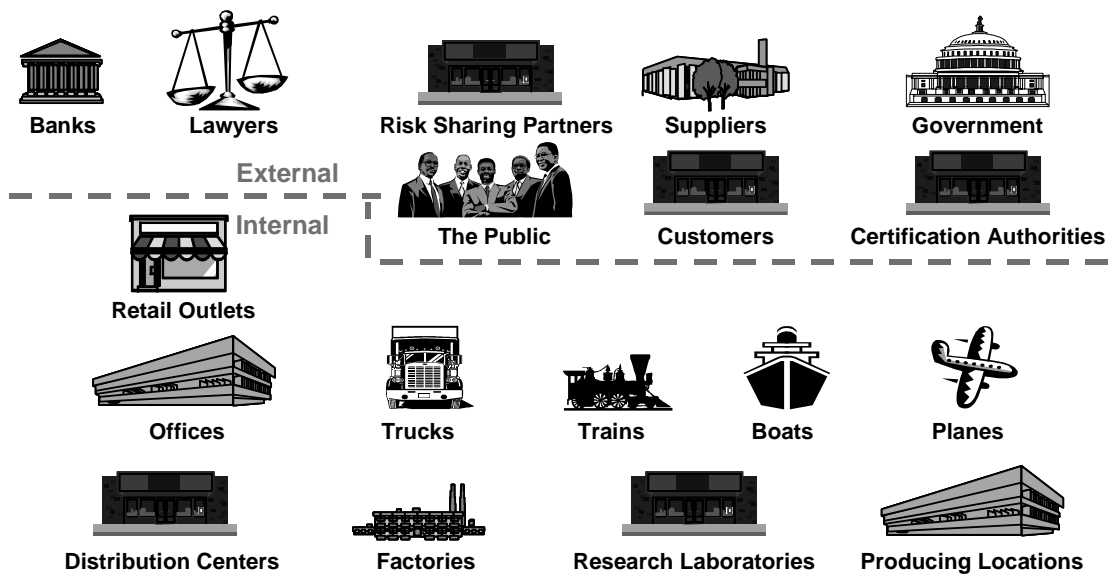
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Figure 3: The Business Environment

Not all organizations will have all of these internal components and external relationships. But the figure can be used to bring out a number of points typical of complex modern-day enterprises, each of which has particular implications for issues of interoperability. Points to note:

- The organization typically has a number of facilities of **different kinds** and in **different locations**. These include shops, offices, warehouses, factories, and laboratories. They may also include special-purpose facilities such as hospitals, oil rigs, and construction sites.

- In addition to fixed locations, an organization usually has users who are **mobile**. Users can roam between different locations inside and outside the organization.

- Organizations have business relationships with **other organizations** of various kinds, including customers, suppliers, risk sharing partners, banks, legal advisors, regulatory agencies, and government departments.

- As well as having established business relationships, an organization may interface with the **general public**.

- The shape of the organization and its business relationships can change **dynamically**.

- The distinction between those "inside" and those "outside" the organization may not be easy to make.

Process Description

The high level processes that are the subject of this scenario are numerous, but they fall into three general categories: **buy side**, **internal**, and **sell side** processes. Whether the processes are automated or assisted by people, they need to have access to information in order to work. Integrated access to integrated information would significantly improve the execution of all these processes.

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Process Categories	Process Description and Output
• Buy side processes	Buy-side processes include processes such as ordering, procurement, and accounts payable and receivable.
• Internal processes	Internal processes include processes such as logistics, manufacturing, competitive intelligence, production, assembling, delivery, and product lifecycle.
• Sell side processes	The sell-side processes include processes such as sales, customer support, and customer relationship management.

Technical Environment

The technical environment has hundreds or thousands of systems and equipment types that cannot be used together. Some of the systems are "legacy" systems and some are new systems. There is mission value in mapping the information in these legacy systems to current systems if the price is affordable. This is usually driven by the need to improve process efficiency. A new process requires the interoperation of multiple stove piped systems to enable exchange of information with the various legacy systems.

Current solutions include translators and manual re-entry of data. Another solution approach is to reduce to a minimum the number of systems that perform similar functions. Another dimension of the environment is that of currency of information; existing information ranges from being very stale to being current in a real-time sense. Similar data sometimes has different levels of integrity, depending on where it is in the overall process. Finally some of the data is stored and carried around on laptops and desktops rather than in safe repositories (data stores).

The key entities in the technical environment relevant to the processes discussed in this Business Scenario are illustrated in Figures 4a and 4b. Below is a high level depiction of the drive for integrated information and access points. The fundamental driver is the need to improve business operations through new processes or improvements to existing processes. This is generating demands to integrate information from multiple sources of the same or similar type data, e.g. the multiple procurement systems or multiple requirements systems. Additionally the information is transferred from one system to another when operating new business processes under technologies such as process and workflow. Finally information is provided through integrated access points to users such as customers, suppliers, and internal employees.

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However fundamental issues are:

Integrated information
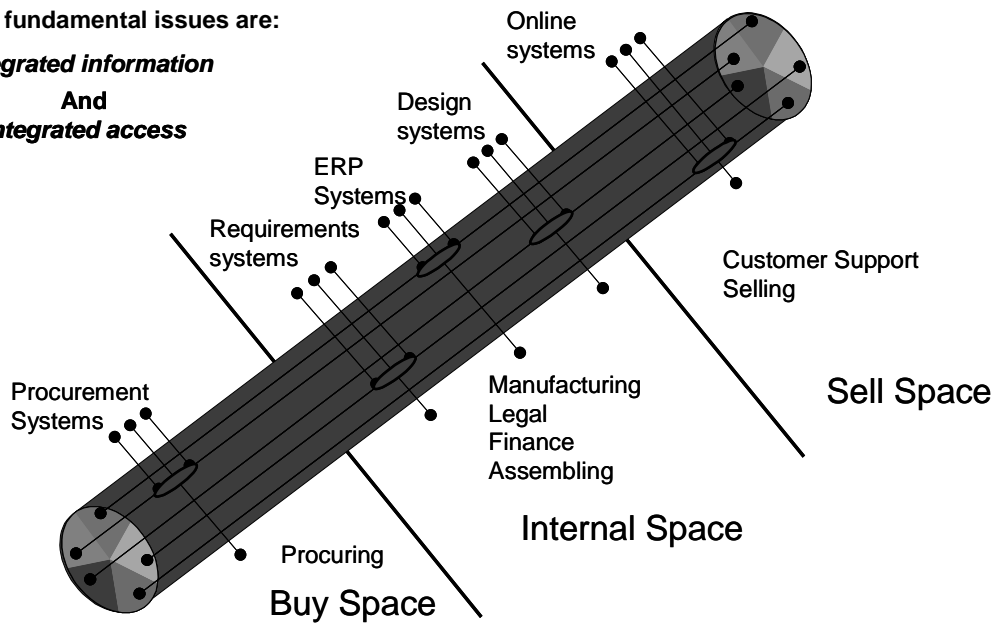**And**
Integrated access

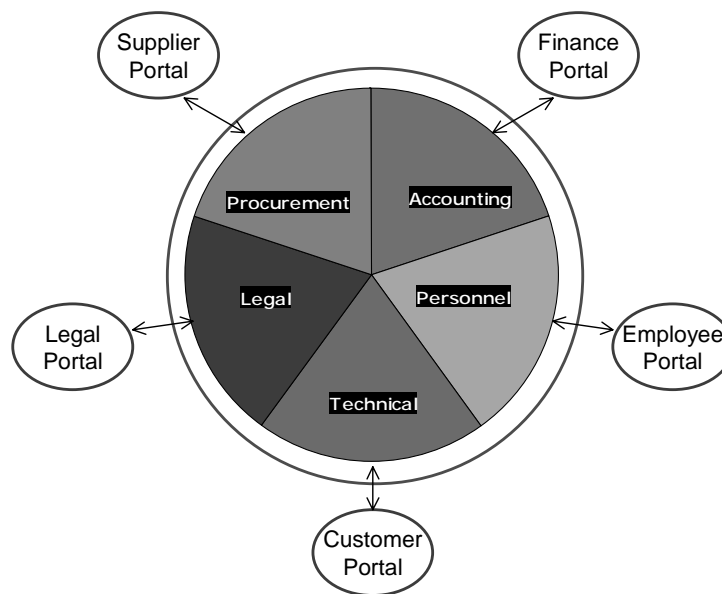*Figure 4a: The Technical Environment – Integrated Information*

Figure 4b: User Views – Integrated Access to Integrated Information

Within the business environment there are multiple businesses areas involved, usually:

- Buy side processes of the business – suppliers

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- Internal processes of the business – employees and partners
- Sell side process of the business – customers

The systems will typically be a mix of systems specific to particular vertical domains and systems common to multiple vertical domains. In the manufacturing domain, for example, the product lifecycle processes typically include:

- product definition;
- manufacturing process design and definition;
- inbound logistics;
- workflow / shop floor logistics;
- outbound logistics (fulfillment/delivery);
- maintenance; and
- discontinuance

Systems that support enterprise functions common to a number of vertical domains typically include:

- personnel management
- workflow management
- finance
- procurement
- supply chain and catalog management
- customer relationship management.

All of these systems need to talk to each other.

Process Steps Mapped to Environment

The following table maps the individual process categories to presumed environments, either business or technical environments.

High Level Processes	Environment mapping
1. Buy side processes	These processes are dealing with suppliers, the procurement organizations, and the accounting departments. Also in today's approaches collaboration services are used frequently to facilitate these processes, for example to obtain signatures of authority.
2. Internal processes	These processes are dealing with the internal employees of the organization across departmental boundaries. The organization can be a company or a government.
3. Sell side processes	These processes are dealing with users of the organization's products or services, be they customers of a private company or civilian beneficiaries of a government service. The sell side processes include processes such as sales, customer support, and customer relationship management.

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Figure 5 provides a "network" view of the various components in an IT environment that has the types of issues outlined in this business scenario. The diagram shows the diversity of information technology within most organizations, i.e. that many departments have various types of servers and clients. The clients are also inside and outside the firewall indicating a need for access from either position. Network access is provided through external ISPs where needed.
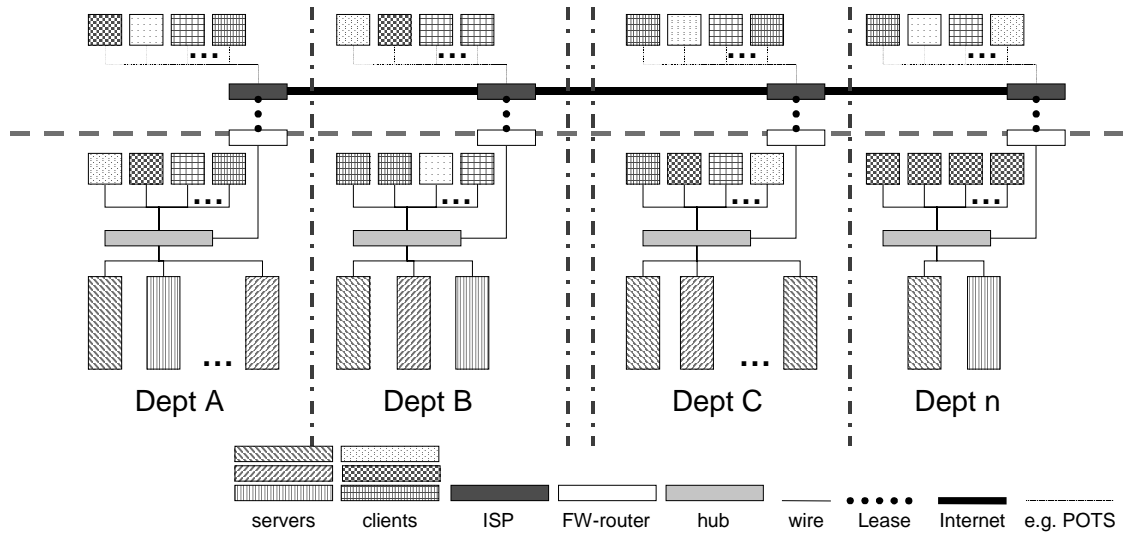

Figure 5: Network View of Technology Environment

Figure 6 depicts the detail of a typical department. Of importance here is the depiction of the numerous owners of the subject data; from the clients, desktops, applications servers, database servers, and file servers.
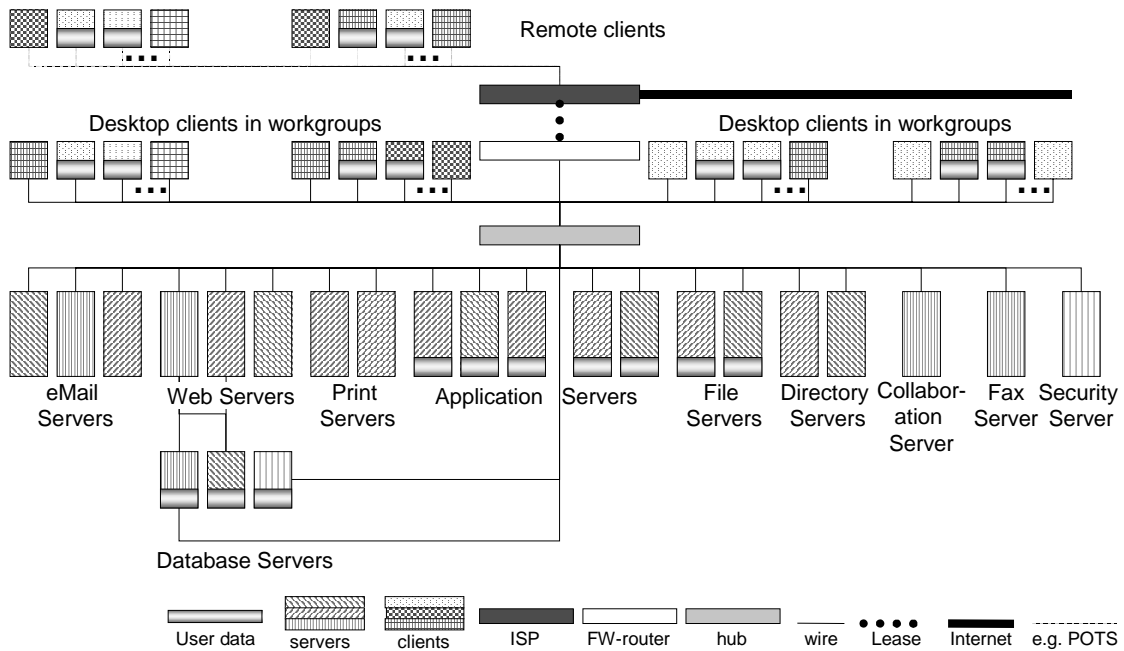
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Figure 6: Network View of Department

Actors and Their Roles and Responsibilities

Human Actors and Roles

No attempt is made here to describe a "generalized" set of human actors and roles, since these will be entirely dependent on the enterprise concerned. Lists of actors and roles for the specific enterprises that provided input to this business scenario are given in the various appendixes to this document.

Computer Actors and Roles

The following table provides a very high level list of computer actors and their roles. The list is segmented into layers. Note that between client and server layers there appear to be overlap, e.g. web portal. In the client there is software that exposes the web portal to the user, in the server there is software that fulfills the requests from the client.

Note there is a fundamental assumption that the network can be "opened" through the appropriate use of routers, switches and networking protocol converters. This particular part of the problem is out-of-scope of this business scenario.

Computer Actors	Roles
Client – Runtime	
Human Interface	Client GUI, Web browser, Application windows
Client Applications	Web portal interface, mail, desktop video conference, streaming audio/video, telephony, project management

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Client Services	Messaging request, Transaction Processing, Data Access, Networking and Communications
Client Platform	Client OS and hardware platform
Network – Runtime	
Value Added Network Services	Messaging services, event brokering, component and object management, process and workflow control, enterprise application integration services, data interoperability services
Network Security	Encryption, firewall services, intrusion detection services
Network Platform	Network OS and networking hardware such as routers, switches, hubs, …
Server – Runtime	
Mail Servers	Gateway services, inbound email services, outbound email services
Telephony Servers	Phone services, facsimile services
Web Servers	eForm services, proxy services, portal and personalization services, instant messaging services, stream audio/video services, commerce services, video conferencing services
Application Servers	Application execution environment, application support services, transaction management services
Database Servers	Database access services, document management services, resource management services
Directory Servers	LDAP services, X.500 services
Collaboration Servers	Discussion groups
Security Servers	Authentication, authorization, and access control services
File Servers	ftp services
Server Platform	Server OS and hardware platform
Protocol Languages	
XML	To provide the means for open standard message formatting
Development	
Tools	Business modeling, design modeling and construction tools
Management	
Utilities	Operations, administration, information copy, and storage management

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Resulting Technical Requirements

The following are high-level technical requirements driven from this business scenario.

- Openness – Standards based open interfaces need to exist for critical interfaces to more easily provide interoperability and integration of components. For example the areas of protocols, web portal, collaboration, database, and storage connections would require standards based interfaces. The rationale for this is that without open standards based interfaces the implementation of web portals for integrated access and storage solutions for integrated information will cause interoperability issues down the road.

- Data integrity – today the same data actually is stored in many places and in many formats. For example a customer record may reside in multiple databases in multiple places. The solution must support interoperability by translating as necessary between the multiple formats. For example if height is stored in multiple places, then the solution must assure that when height is used, it is provided to the user (person or application) in the desired unit, e.g. feet, inches, meters, etc.

- Availability – the solutions being proposed must be available 7*24*365 as business processes that must be available continuously are using these services. This places high requirements on all services of the system. Where maintenance requires downtime, fallback services must be available.

- Security – the solutions being provided must be able to support different security levels and protection based upon both the sensitivity of the data, whether or not the data is exiting the firewall, and the use of the data. Included are the normal requirements for data integrity, confidentiality, logging and tracking. The system security must provide flexible policy management to handle these situations. Additionally the solution must provide strong authentication yet provide users with single sign-on and user administration. PKI certificates are managed by either internal or external certification authorities.

- Accessibility – the solutions being proposed must provide global accessibility to the information while not compromising security.

- Manageability – the solutions must be manageable.

- Internationalization and Localization – as the solutions will be deployed around the world they should be designed to accommodate multiple languages and adapt to cultural and technical requirements of specific countries.

Technology Architecture Model

Constraints

There are generally constraints on the definition of any technology architecture. Typical ones include:

- Quality
- Cost
- Legislation, such as data privacy legislation
- The need to work with particular existing or planned elements of the enterprise's IT infrastructure
- Corporate IT rules and policies

IT Principles

Solutions should be based on standards – which can be international, imposed, or market-driven given the need to assure new technologies can more easily allow for interoperation and integration in the future.

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Technology Architecture Supporting the Process

This section does not attempt to define a complete nor technically accurate technology architecture. In the first place, the requirements are only partially understood at present. In the second place, even if the requirements were understood completely, circumstances differ so widely between different enterprises that it is unlikely that a single architecture could suit them all.

What this section does attempt to do is to present a software architecture that depicts the key components and subcomponents. Figure 7 depicts an architecture that supports the processes described in this business scenario. This software architecture was created as part of the analysis of the issues presented here. Note the 3 separate major components; the Client, the Network, and the Server. Also there is a backplane of two key qualities driven by an organizations policy, security and management.
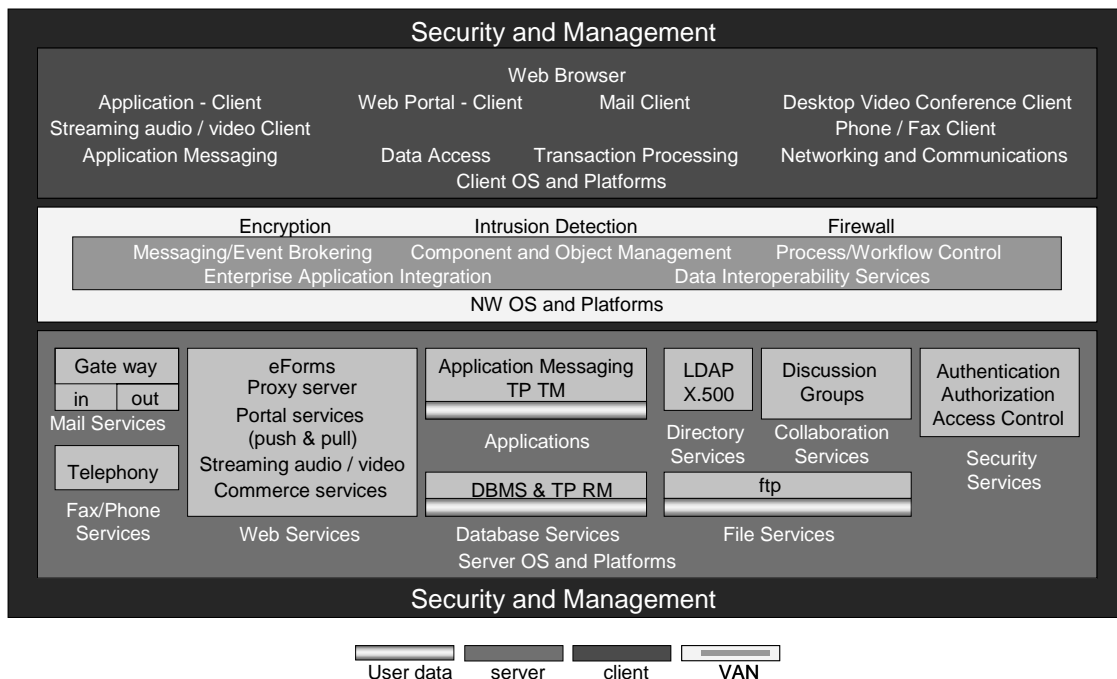

Figure 7: Technology Architecture

Comparison with Architecture

In the table below we focus on the areas depicted in the architecture that require more standards work in support of this business scenario.

Computer Actors	Standards Areas Needed
Client – Runtime	
Client Applications	Client-side "Web portal" standards
Network – Runtime	
Value Added Network Services	Standards for each of: • Unified Messaging

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	• Event brokering
	• Process and workflow control
	• Enterprise application integration
	• Storage and semantic mapping for data interoperability
Server – Runtime	
Web Servers	Standards for each of:
	• eForm services
	• Proxy services
	• Portal and personalization services
	• Instant messaging services
	• Commerce services
Protocol Languages	
XML	To provide the means for open standard message formatting

Further Requirements Mapped to Architecture

To be analyzed further.

Next Steps

At the heart of this effort is a new global initiative on the part of The Open Group to create a trusted forum at the level of the CIOs and Chief Architects of the Fortune 500 IT customer organizations and their equivalents around the world. The Open Group believes that a key responsibility of CIOs is to lead the task of standardization within the IT industry, so that standards initiatives are driven by the real business needs and requirements of the global IT customer community rather than by ad hoc technology trends and vested interests.

This scenario document provides a vehicle to communicate business needs and requirements, and to articulate them in a common format. Through this The Open Group hopes to foster a common understanding of the requirements of IT customers for interoperable IT solutions, so that the supply side in particular will have the business case for creating the interoperable solutions in both applications and infrastructure products that genuinely address those requirements.

The business requirements presented above included measures. These measures are measures that a business would use to determine if progress was being made in addressing the problems described in this business scenario. The following table suggests how The Open Group **could** support those measures through possible actions.

Business Measure	Support from The Open Group
Funding growth through consolidation	Providing standards and certification of products that:
Improving business operations, effectiveness of business operations more important than effectiveness of IT	

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Driving revenue growth	• Provide consolidation of information
Lower IT spend for the entire organization	
Increase % of procurements against standards	• Provide integrated access to information
Decrease spend on customizations	
Improved cycle time for rolling out upgrades	

An initial analysis of this business scenario has resulted in the identification of two of many **possible** areas of emerging technology, where The Open Group's strengths of providing a trusted, technology-neutral forum for customer/supplier dialog, standards integration to facilitate market growth, and acknowledged certification skills, can be brought to bear effectively. These technology areas are: web portal technologies; and Storage Area Networking (SAN) / Network Attached Storage (NAS). Web portal technologies address integrated access, and SAN/NAS address integrated information. There may be more or other alternatives that address integrated access and integrated information and it is hoped that exposing this business scenario to public scrutiny will expose these alternatives. The appropriate groups within The Open Group, such as the Customer and Supplier Councils, should decide whether other possibilities should be explored.

We have documented some issues related to interoperability in this paper and identified some areas that could be tackled. There are many opportunities for standardization, in many areas that will ease the pain associated with tackling interoperability issues. Identifying and selecting the areas that The Open Group will tackle is the main focus of the next steps required to move forward.

The following represents further actions recommended.

- ✓ Publish and present Revision 1.0 of this paper in Amsterdam

- ✓ Revise based upon feedback and republish in Anaheim

- Convene a customer-member sub committee to review the document for action

- Convene a supplier-member sub committee to review the document for action

- Convene a combined customer and supplier member meeting to compare results and propose a way forward to deal with the requirements considering some of the subjects below:

  o Identification the architecture building blocks and "logical owners"

  o Creation of profiles for the building blocks

  o Obtain champions to transfer requirements to forum

  o Creation of a more detailed action plan

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Post Script – Further Definitions

The following are some definitions of newer concepts introduced in this paper.

Web Portal * – A Web "supersite" that provides a variety of services including Web searching, news, white and yellow pages directories, free e-mail, discussion groups, online shopping and links to other sites.

Storage Area Network (SAN) * – A back-end network connecting storage devices via peripheral channels such as SCSI, SSA, ESCON and Fibre Channel. There are two ways of implementing SANs: centralized and decentralized. A centralized SAN ties multiple hosts into a single storage system, which is a RAID device with large amounts of cache and redundant power supplies. The cabling distances allow for local as well as campus-wide and metropolitan-wide hookups over peripheral channels rather than an overburdened network. SCSI distances have also been extended. Using fiber, Gigalabs' SCSI switches can communicate over 20 km. This centralized storage topology is commonly employed to tie a server cluster together for failover.

Network Attached Storage (NAS) * – A specialized file server that connects to the network. A NAS device contains a slimmed-down (microkernel) operating system and file system and processes only I/O requests by supporting popular file sharing protocols such as NFS (UNIX) and SMB (DOS/Windows). Using traditional LAN protocols such as Ethernet and TCP/IP, the NAS enables additional storage to be quickly added by plugging it into a network hub or switch. As network transmission rates have increased from Ethernet to Fast Ethernet to Gigabit Ethernet, NAS devices have come up to speed parity with direct attached storage devices.

* Source Computer Desktop Encyclopedia

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Appendix A: Business Scenarios

The following detailed description is taken from Part IV of The Open Group Architectural Framework (TOGAF) - http://www.opengroup.org/public/arch/. This publicly available document describes an open framework and method for IT architecture, which includes Business Scenarios as a method for articulating the business and technical requirements that architecture work is to address.

Introduction

A key factor in the success of any IT architecture is the extent to which it is linked to business requirements, and demonstrably supporting and enabling the enterprise to achieve its business objectives.

Business scenarios are an important technique that may be used prior to, and as a key input to, the development of the architecture, to derive the necessary characteristics of the Technical Architecture directly from the high-level requirements of the business. They are used to help identify and understand business needs, and thereby to derive the business requirements that the architecture development has to address.

A Business Scenario describes:

- a business process, application, or set of applications, that can be enabled by the architecture
- the business and technology environment
- the people and computing components (called "actors") who execute the scenario
- the desired outcome of proper execution

A good Business Scenario is representative of a significant business need or problem, and enables vendors to understand the value to the customer organization of a developed solution.

A good Business Scenario is also "SMART":

- **S**pecific, by defining what needs to be done in the business
- **M**easurable, through clear metrics for success
- **A**ctionable, by clearly segmenting the problem, and providing the basis for determining elements and plans for the solution
- **R**ealistic, in that the problem can be solved within the bounds of physical reality, time and cost constraints
- **T**ime-bound, in that there is a clear statement of when the solution opportunity expires

Benefits of Business Scenarios

A business scenario is essentially a complete description of a business problem, both in business and in architectural terms, which enables individual requirements to be viewed in relation to one another in the context of the overall problem. Without such a complete description to serve as context:

- There is a danger of the architecture being based on an incomplete set of requirements that do not add up to a whole problem description, and that can therefore misguide architecture work.
- The business value of solving the problem is unclear
- The relevance of potential solutions is unclear

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Also, because the technique requires the involvement of business line management and other stakeholders at an early stage in the architecture project, it also plays an important role in gaining the buy-in of these key personnel to the overall project and its end-product - the IT architecture.

An additional advantage of business scenarios is in communication with vendors. Most architectures nowadays are implemented by making maximum use of commercial off-the-shelf software (COTS) solutions, often from multiple vendors, procured in the open market. The use of business scenarios by an IT customer can be an important aid to IT vendors in delivering appropriate solutions. Vendors need to ensure that their solution components add value to an open solution and are marketable. Business scenarios provide a language with which the vendor community can link customer problems and technical solutions. Besides making obvious what is needed, and why, they allow vendors to solve problems optimally, using open standards and leveraging each other's skills.

Creating the Business Scenario

Creating a business scenario is a 7-step process, as illustrated in Figure A-1.

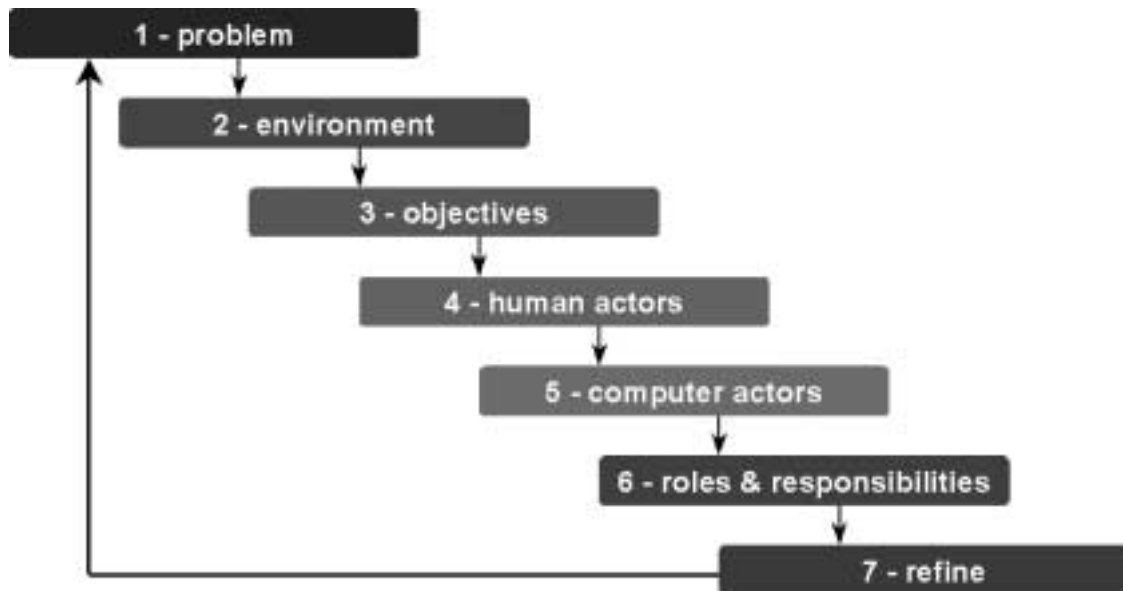*Figure A-1: Business Scenario 7-Step Process*

1 - Identify, document and rank the problem driving the scenario

2 - Identify the business and technical environment of the scenario and document it in scenario models

3 - Identify and document desired objectives (the results of handling the problems successfully) - get "SMART"

4 - Identify the human actors (participants) and their place in business model

5 - Identify computer actors (computing elements) and their place in technology model

6 - Identify and document roles, responsibilities and measures of success per actor; document the required scripts per actor, and the results of handling the situation

7 - Check for "fitness for purpose" and refine only if necessary.

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Contents of a Business Scenario

The documentation of a Business Scenario should contain all the important details about the scenario. It should capture, and sequence, the critical steps and interactions between actors that address the situation. It should also declare all the relevant information about all actors, specifically: the different responsibilities of the actors; the key pre-conditions that have to be met prior to proper system functionality; and the technical requirements for the service to be of acceptable quality.

There are two main types of content: graphics (models), and descriptive text. Both have a part to play.

Business Scenario models capture business and technology views in a graphical form, to aid comprehension. Specifically, they relate Actors and interactions, and give a starting point to confirm specific requirements.

Business Scenario descriptions capture details in a textual form. A typical contents list for a business scenario is given below.

Table of Contents

Business Scenario Problem Description
    Purpose of Scenario
Detailed Objectives
Environment and Process Models
    Process Description
    Process Steps Mapped to Environment
    Process Steps Mapped to People
    Information Flow
Actors and Their Roles and Responsibilities
    Human Actors and Roles
    Computer Actors and Roles
    Requirements
Resulting Technology Architecture Model
    Constraints
    IT Principles
    Technology Architecture Supporting the Process
    Requirements Mapped to Technology Architecture

Contributions to the Business Scenario

It is important to realize that the creation of a business scenario is not solely the province of the Architect. As mentioned previously, business line management and other stakeholders in the enterprise are involved, to ensure that the business goals are accurately captured. In addition, depending on the relationship that an organization has with its IT vendors, the latter also may be involved, to ensure that the roles of technical solutions are also accurately captured, and to ensure communication with the vendors.

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Typically, the involvement of the business management is greatest in the early stages, while the business problems are being explored and captured, while the involvement of the architect is greatest in the later stages, when architectural solutions are being described. Similarly, if vendors are involved in the business scenario process, the involvement of the customer side (business management plus enterprise architects) is greatest in the early stages, while that of the vendors is greatest in the later stages, when the role of specific technical solutions is being explored and captured. This concept is illustrated in Figure A-2.
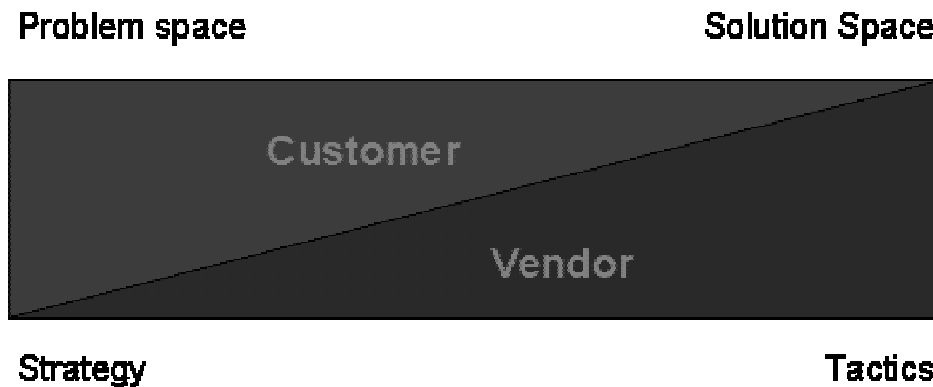

Figure A-2: Relative Contributions to a Business Scenario

Business Scenarios and the TOGAF Architecture Development Method

Business Scenarios figure most prominently in the initial phase of the Architecture Development Method (ADM), Initiation and Framework, when they are used to define relevant business requirements, and to build consensus with business management and other stakeholders.

However, the business requirements are referred to throughout all phases of the ADM life cycle, as illustrated in Figure A-3.
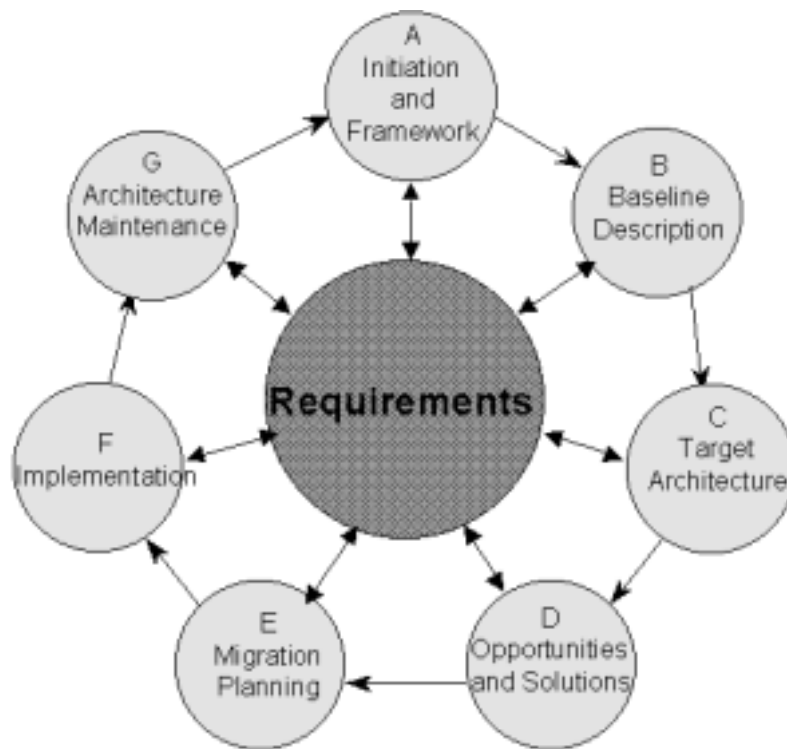
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Figure A-3: Relevance of Requirements Throughout the TOGAF Architecture Development Method

Because business requirements are important throughout all phases of the ADM life cycle, the Business Scenario method has an important role to play in the TOGAF ADM, by ensuring that the business requirements themselves are complete and correct.

Guidelines on Developing Business Scenarios

Questions to Ask at Each Step

Step 1: Identify, document and rank the problem

Is the problem described as a statement of WHAT needs to be accomplished, like steps in a process, and not HOW (with technology "push")?

If the problem is too specific or a "how":

- raise a red flag
- ask "why do you need to do it that way?" questions

If the problem is too vague or unactionable:

- raise a red flag
- ask "what is it you need to do?" questions

Step 2: Identify the business and technical environment, and document in models

Questions to ask about the business environment:

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- the steps that need to be processed?

- location/scale of internal business departments?

- location/scale of external risk sharing partners?

- any specific business rules and regulations related to the situation?

Questions to ask about the current technology environment:

- what components are already presupposed to be used?

- are there any technology constraints?

- are there any technology principles that apply?

Step 3: Identify and document objectives

Is the "what" sufficiently backed up with the rationale for "why"? If not, ask for measurable rationale:

- return on investment

- scalability

- performance needs

- compliance to standards

- ease of use measures

Step 4: Identify human actors and their place in business model

An actor represents anything that interacts with or within the system. This can be a human, or a machine, or a computer program.

Actors initiate activity with the system, e.g.:

- computer user with the computer

- phone user with the telephone

- payroll clerk with the Payroll System

- internet subscriber with the web browser

An actor represents a role that a user plays: i.e., a user is someone playing a role while using the system (e.g., John (user) is a dispatcher (actor)).

Each actor uses the system in different ways (otherwise they should be the same actor).

Ask about the humans that will be involved, from different view points, such as:

- developer

- maintainer

- operator

- administrator

- user

Step 5: Identify computer actors and their place in technology model

Ask about the computer components likely to be involved, again from different points of view. What must they do?

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Step 6: Document roles, responsibilities, measures of success, required scripts

When defining roles, ask questions like:

what are the main tasks of the actor?

will the actor have to read/write/change any information?

will the actor have to inform the system about outside changes?

does the actor wish to be informed about unexpected changes?

Step 7: Check for "fitness for purpose", refine if necessary

Is there enough information to identify who/what could fulfill the requirement? If not, probe more deeply.

Is there a description of when, and how often, the requirement needs to be addressed? If not, ask about timing.

Guidelines on Business Scenario Documentation

Textual documentation:

- Capture all the important details about a Business Scenario:
    - situation description and rationale
    - all measurements
    - all actor roles and sub-measurements
    - all services required
- Capture the critical steps between actors that address the situation, and sequence the interactions
- Declare relevant information about all actors
    - partition the responsibility of the actors
    - list pre-conditions that have to be met prior to proper system functionality
    - provide technical requirements for the service to be of acceptable quality

Business Scenario Models:

- Remember the purpose of using models:
    - capture business and technology views in a graphical form
    - help comprehension
    - give a starting point to confirm requirements
    - relate actors and interactions
- Keep drawings clear and neat
    - Do not put too much into one diagram
    - Simpler diagrams are easier to understand

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- Number diagrams for easy reference
  - o Maintain a catalog of the numbers to avoid duplicates

General Guidelines

The stakeholders (e.g., business managers, end-users) will tell you what they want, but as an architect you must still gain an understanding of the business, so you must know the most important actors of the system.

If the stakeholders do not know what they want:

- Take time, observe and record how they are working today
- Structure information in such a way that it can be used later
- Uncover critical business rules from domain experts
- Stay focused on the "what", not the "how"

This effort provides the anchor for a chain of reason from business requirements to technical solutions. It will pay off later to be diligent and critical at the start.

Finally, it is important to remember that Business Scenarios are just a tool, not the objective. They are a part of, and enable, the larger process of architecture development, and the architect should use them, but not get lost it them. The key is to stay focused - watch out for "feature creep", and address the most important issues that tend to return the greatest value.

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Appendix B: Input to Business Scenario - Logistics

The logistics process assures that supplies of food, services, equipment, etc. are provided to the war fighter. The process crosses ordering, fulfillment, packaging, tagging, loading, transportation, and receiving.

Actors and Their Roles and Responsibilities

Human Actors and Roles

Human Actor	Role
Company clerk	- orders needed supplies - interfaces with order system, computer assisted or paper based
Supply clerk	- fills orders for needed supplies - interfaces with supply system, computer assisted or paper based
Logisticians	determines the best way to solve problems, including problems of optimizing the delivery of supplies
Computer operators (behind scenes)	assures that the computing facilities are operating, performs back ups, responds to tape and disk mounts, responds to application requests for specific resources
System designers (behind scenes)	designs the systems and applications to fulfill specific missions
System analysts (behind scenes)	- provides necessary support to system designers by analyzing current capabilities of systems - provides support when problems in the system require deep knowledge of the entire system
Data entry staff (behind scenes)	typically transcribes data from paper to the entry mechanisms of legacy applications

Computing Actors and Roles

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Computing Actor	Role
Tagging and bar coding equipment	• create and read bar codes that index to packaging records
Acquisition system	• the system that manages and controls acquisition requests
Web server	• provides services such as eForms, proxy services, portal and personalization services, instant messaging services, stream audio/video services, commerce services, video conferencing services
Procurement system	• the system that provides procurers with information on procurement standards, preferred suppliers and rules of procurements
Web form for ordering	• the web based to ordering systems, provides users with a simple means to place an order
Internal accounting system	• the system that manages and controls accounting information for finance
Transportation system	• the system that tracks and controls trucks, trains, and aircraft delivery and routes
Embarkation control system	• the system that tracks and controls the embarkation process, e.g. packing palettes and moving them onto a truck, train, or plane and tracking
Debarkation control system	• the system that tracks and controls the debarkation process, e.g. what is leaving a truck, train, or plane at a given destination and tracking
Port systems	• the system that manages the interface to the port authority, could be involved with fee payment and scheduling services
Value Added Network Services	• Messaging, event brokering, component and object management, process and workflow control, enterprise application integration services, data interoperability services

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Appendix C: Input to Business Scenario – Product Lifecycle

The product lifecycle process typically encompasses:

- **Product definition** – develop the specifications for something that has to be manufactured and delivered

- **Process design and definition** - take the product specifications and design a repeatable process to manufacture a whole series of the products

- **Inbound logistics** - acquire all the materials that need to go into the eventual product.

- **Shop floor logistics** - put under shop floor manufacturing control.

- **Outbound logistics -** fulfillment/delivery to end customer.

- **Maintenance** – of the delivered product

- **Discontinuance** – of the product and its entire life-cycle

These processes are supported by different systems, which need to have access to similar data and would benefit from sharing data. Product data may need to be maintained for decades, e.g. the designs of C-130 cargo aircraft is still maintained and used.

Solving problems in this area would lower risk, lower cost (dis-intermediation), and improve efficiency.

Actors and Their Roles and Responsibilities

Human Actors and Roles

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Human Actor	Role
Engineers	• design and develop the product
Materials acquisition and procurement specialists (secondary actor)	• shop, select, and purchase materials used in the design process
Suppliers (secondary actor)	• supply components for the development and manufacturing process
Shop floor workers and technicians (secondary actor)	• construct the product
Shipping and delivery personnel (secondary actor)	• manage and control the shipping and receiving processes
Support - Accounting personnel, Sales, Human resources (secondary actor)	• support the entire process

Computer Actors and Roles

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Computing Actor	Role
CAD/CAM	• provides the designer a design and modeling platform
Web server	• provides services such as eForms, proxy services, portal and personalization services, instant messaging services, stream audio/video services, commerce services, video conferencing services
Procurement system	• the system that provides procurers with information on procurement standards, preferred suppliers and rules of procurements
Requirements systems	• provide management and control for requirements of products
Logistics applications (ERP)	• supports the manufacturing process through enterprise resource planning
File systems, DataBase Management systems and DataBases	• provides storage and management of critical data
Operating systems	• provides a fundamental platform for the various hardware platforms
Directories	• provides name based access to information such as email address, location, etc
Value Added Network Services	• Messaging, event brokering, component and object management, process and workflow control, enterprise application integration services, data interoperability services

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Appendix D: Input to Business Scenario – Information Intelligence

The information intelligence process covers acquiring dependable and reliable information on competitors. This process crosses: intelligence gathering during and after conflicts; and analyzing and distributing the information. The process can go as far downstream as providing the information for target acquisition. The process goes through analysis, then analysis management, then strategic command channels, then tactical command channels, then possibly to war fighters and/or a command to fire. Many transformations occur in the process, from the person collecting to the person analyzing, to the decision maker, etc – the information has to be translated from one format to another each time, and has to be retained for an indefinite length of time. Information is stored in a variety of ways – for example in data administration devices information is collected from aircraft, is buffered and decision are made on how much to sample and store from transient to permanent - then stored forever.

Actors and Their Roles and Responsibilities

Human Actors and Roles

Human Actor	Role
Intelligence gatherers	• search a variety of potential sources for information vital to a mission
Intelligence support technicians	• provide intelligence gathers with technical support and tools for "processing" information
Cryptographers, Encryption/decryption analysts	• provide expertise in writing or breaking codes
Arial photo analysts	• provide advise on aerial photographs, such as picking out camouflaged areas
Satellite image analysts	• provide advise on satellite images, such as picking out camouflaged areas or terrain reading
Warfighter	• protect civilians and follow orders of superiors as guided by intelligence

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Computer Actors and Roles

Computing Actor	Role
Computer assisted unmanned weapon	• receives and executes fire requests as guided by intelligence
Satellite imaging equipment	• provide support on analyzing images using pattern recognition
Aerial photography equipment	• take aerial photographs
Human intelligence devices	• microphones, cameras, … that capture information under cover
Encryption equipment	• provide encoding and decoding of messages, using technologies such as 128 bit and 256 bit encoding or new encryption/decryption algorithms, in both digital and analog form
Radar equipment	• scan areas in real time for objects and assist in identification of objects
Document and newspaper scanners	• capture documents and newspaper text and images for storage and further analysis
Information stores	• capture information for re-use, from transient storage to more permanent storage, such as archive
Supercomputers	• provide the necessary processing power to run analytical application such as screen communications, pattern recognition, signal filtering