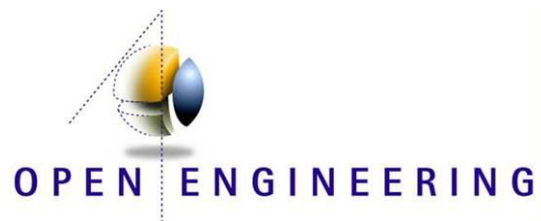


White Paper

Object Oriented Business Engineering™ (OOBE®)



Engineering Business

Solutions

June 2000

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1 Introduction

Open Engineering has developed and continues to evolve a unique methodology, Object-Oriented Business Engineering (OOBE). In essence, OOBE applies key architecture, engineering and object-oriented software design concepts to the transformation of businesses, enabling them to better cope with business change, challenges and growth.

OOBE is a framework for architecture, business engineering and object-oriented development. OOBE provides the framework that businesses use to articulate and communicate business process improvements, business definitions and rules. It provides the crucial link missing from traditional approaches to systems development and business process engineering: a clear path from business concepts to reusable information systems components.

OOBE represents the concept of information systems architecture in a way that a very complex and abstract idea can be implemented and managed. These ideas are systematically evolved from strategy through to implementation across the dimensions of the framework (Business, Application and Technical). The OOBE Framework is based on the Zachman Framework for Architecture, and essentially provides an object oriented business focussed framework.

OOBE encompasses three core elements of Framework, Business Patterns and Process. The white paper provides an overview of each.

2 OOBE Framework®

Open Engineering has developed and continues to evolve a unique methodology, Object-Oriented Business Engineering (OOBE). In essence, OOBE applies key object-oriented software design concepts to the transformation of businesses, enabling them to better cope with business challenges and growth.

This section gives an overview of the OOBE approach.

2.1 Overview

OOBE is a framework for architecture, business engineering and object-oriented development. OOBE provides the framework that businesses use to articulate and communicate business process improvements, business rules and core data definitions. It provides the crucial link missing from traditional approaches to systems development and business process engineering: a clear path from business concepts to reusable information systems components.

The OOBE Framework represents the concept of information systems architecture in a way that a very complex and abstract idea can be implemented and managed. Once practitioners are familiar with OOBE and the concepts that it embodies, it becomes a powerful tool for reasoning about, managing and delivering information systems and business process improvement.

The major difference OOBE provides over traditional Object Oriented Analysis and Design approaches is its heavy foundation in business modelling and engineering and the strong link through each viewpoint from strategy through to the implementation of software: coined as Concept to Code.

2.2 OOBE Dimensions

There are three primary dimensions to the OOBE framework; Business, Application and Technology.

The Business dimension provides a common understanding of an organisation's core processes, value-adding roles and products that is independent of who does the work, how it is done, and where those processes and results are executed.

The Technology dimension contains the technology elements and components that are specifically architected to allow the business to maintain its independence from specific technology vendors, and rapidly evolve to take advantage of new technological advances.

The Application dimension identifies the ways that the business applies technologies to meet its needs while addressing how existing applications are reused and integrated into new applications.

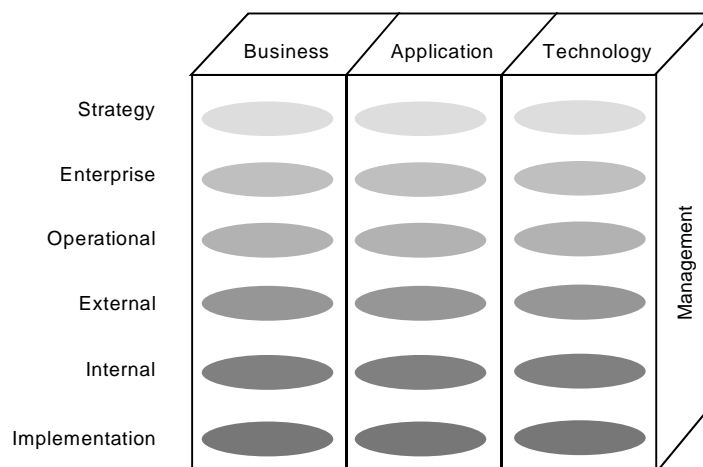


Figure 1: OOBE Framework®

A Management framework encompasses all of the dimensions and provides the organisational context in which architecture is applied. Each dimension of the framework spans from strategic thinking about the business to the implementation of software components that represent the business.

2.3 Concept to Code

The framework is based on the idea of concept to code. The framework advocates an iterative process applied to each of the dimensions, and accomplishes this by scoping tasks within each level of each dimension. Iteration is crucial, as the implementation of the architecture is a process of organisation growth and change. “Big bang” approaches to change generally fail. Iteration toward a clearly defined goal is manageable, achievable and measurable.

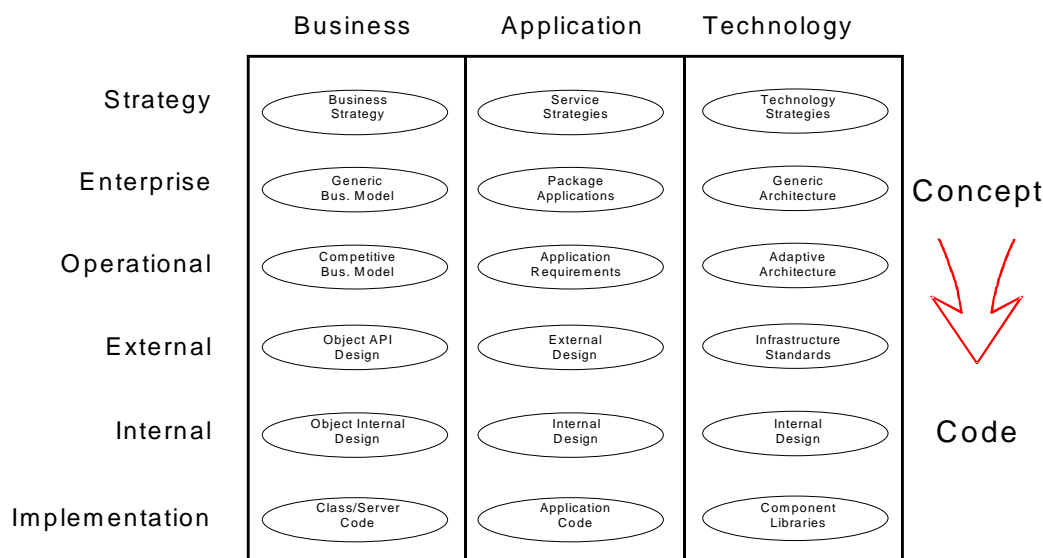


Figure 2: Framework Layer Semantics

2.4 Viewpoints

Each of the OOBE framework dimensions is further sub-divided into six viewpoints: strategic, enterprise, operational, external design, internal design, and implementation.

As shown in Figure 3 below, each viewpoint represents a clear stage of transforming an idea into an implemented reality within a specific dimension. The consistent use of these viewpoints to further separate business concerns enables an enterprise to trace its initiatives from conception to deployment, track performance, establish its own best practices for future endeavours, and increase its agility.

The top three viewpoints lie in the conceptual arena, consisting of generic patterns and modelled representations. The lower three are the actual transformation of the conceptual definitions in terms of design and implementation into information systems.

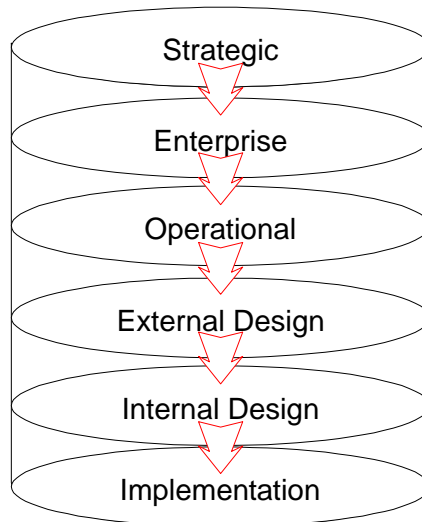


Figure 3 - OOBE Framework Viewpoints

Strategic Level

The Strategic level represents the goals, objectives, vision and strategies of the business, what it seeks to achieve with technology, and how applications will leverage key business processes. At this level the initiatives to be carried out using OOBE are given business grounding and relevance to display their relationship to the overall business strategy of the organisation. This is critical in ensuring that technology is not put in place for technology sake.

Enterprise Level

The Enterprise level represents best-of-class, generic business solutions for each domain. The Enterprise Business Model, for example, contains best-of-class business components, processes, relationship type and role structures, process-tuned organisation templates, and logistics models. At the Enterprise level, best-of-class business practices and components can be defined within a specific industry, or across industries. Enterprise means generic, but not necessarily abstract or "high level". Industry experience suggests that businesses are, in reality, 80-95% alike within any given industry. Thus the specification of generic business components is a realistic objective.

Operational Level

The Operational level is used to specialise the chosen Enterprise concepts to the needs and strategy of a particular organisation. The Operational level is company-specific. For example, an Operational level business model defines the "unique 5%" - that is, the parts of the organisation that are different from the generic in order to create a unique competitive advantage. At this level one develops "as is" business models that capture the business as it operates today; "to be" business models to identify target improvements; and "gap" models to specify incremental changes that can be managed into implementation. At the Operational level we also specialise generic models and patterns to reflect the specifics of an organisation.

External Level

The External level is used to design the external interface of each component, and (when used for object-oriented software development) the class hierarchy which will support specialisation of business objects to the needs of particular technologies or applications. As with the subsequent levels, External models are environment specific, reflecting the technology standards that have been selected at the Enterprise level. One can think of the External level as the integration level. It addresses the way an organisation integrates components within each architectural dimension.

Internal Level

The Internal level provides for design of the internal structure and workings of each component. The Internal level of the Business Core Model supports design diagrams and tasks for the following: object data and method structures:

- § storage keying and indexing,
- § data and process distribution mapping,
- § data and process mapping to legacy data structures and on-line transactions, and
- § the mapping of business rules and integrity constraints onto attributes and methods.

This is also the level at which we implement the integration between business objects and legacy systems. With respect to technology, this is the level at which "glue" software and organisation specific object services and common facilities are internally specified. For Applications, this is already a familiar concept: internal design of the application software itself, with the caveat that the "shape" of applications changes significantly under this approach to software development.

Implementation Level

The Implementation level comprises generated or written code based on the designs, which were created at the External and Internal levels. It also includes the implemented technology and application components – bought or built. Thus the Implementation level addresses both source code and runtime binary modules.

3 OOBE Business Patterns®

Enterprise level models are based on the concept of generic Business Patterns, which are effectively templates or design guides that define fundamental business processes (eg. Selling, Procuring) and structures (such as Party, Location, Agreement). A Business Pattern is a collection of Business Objects and associations that captures a recurring business theme, where the associations can be interactions, relationships or groups.

The use of business patterns dramatically reduces the need for re-invention when producing an organisations business object models, which via a process of specialisation encourages a high degree of reuse both within software and business activity itself.

Models at the Enterprise level are usually developed one business process at a time, with the modeller looking for components and patterns that may be shared with other business processes.

3.1 Generic Business Frameworks

A key issue when developing a complete architectural framework is the acknowledgment of the interdependency between business and technology perspectives. This section addresses the need to define Business Architecture providing the business frameworks from which business solutions can be implemented using the defined technical infrastructure. Business Architecture enables organisations to achieve business benefits being sought that wouldn't otherwise be achievable by implementation of technology alone.

In any organisation, there are three prime elements to consider: the Business element, Social element and Technical element. These elements work in unison to deliver the outcomes of the organisation. The recognition of the relationship between these three autonomous, yet related elements is the first and most vital step in harnessing the power of an organisation for the achievement of its goals and objectives. A change in any one of these elements will require changes in the other elements to ensure stability of the business.

3.2 Using Business Objects

The Object-Oriented Business Engineering™ (OOBE®) approach uses the concept of Business Objects as a means of engineering an organisation's business. Business Objects express how business processes or core business notions work in businesses. They contain the rules and procedures for such basics as *orders*, *customers* or *products*. Creating business objects starts with "business modelling" – which involves the mapping of business processes and their relationships between business information and the rules governing how business events (like the placing of an order) are handled through an organisation. Business modelling has long been central to business and information systems problem-solving and through OOBE it is being applied powerfully to a new application development paradigm – one that shapes business applications more like the business itself.

The task of creating and integrating reusable business components is inherently more complex than designing an application. Traditional applications have always been simplifications of the business. When Business Object models are used as the basis for new-generation client-server applications, more business knowledge, rules and process are built into the software than before. This happens because business is trying to leverage software, to extend the reach of the business, to speed up its processes.

This approach to software development takes the guesswork out of delivering business software that directly supports the business functionality required. The key to this is the choice of models with which to capture business knowledge. The OOBE models enable the capture and communication of this knowledge with both business and Information System professionals. This enables the business model to be moved from the business engineering phase into the implementation of software phase with no loss of meaning or confusion of the knowledge. The component engineers add implementation specific details, such as code for object methods.

When implemented in software, business objects become the core of a new kind of application that maintains data integrity by sharing common data across departments and related business activities; and lets users gather real-time operational information for measuring business performance and process variability. Business objects can enforce data quality and simplify data entry, even while integrating the operation of existing mainframe applications or package applications continue to run in the background.

Business objects can be deployed on an organisation's desired technology; they can be delivered to the Internet, using Java and browser technology, for electronic commerce and other networked systems. Business objects can run in today's local area network (LAN) environments, on all popular server and mini-computer platforms, and also on mainframes. They do not depend on any one programming language, tool or product. They are a way of re-thinking systems architecture that integrates – rather than rejects – the systems that companies depend upon today.

OOBE defines three types of Business Objects; these are Process Business Objects, Entity Business Objects and Event Business Objects.

Process Business Objects

There are 7 basic Process Business Objects from which all others can be defined by specialisation. Process Business Objects represent business verbs. They represent processes (not procedures, they are single behaviours usually specific to a single Entity Business Object), which are characterised by the interaction between a set of Business Objects. A Business Process is a predictable, repeatable set of interactions producing a recognised business result. Each interaction between a pair of Entity Business Objects is one step in a Business Process. Thus Entity and Process Business Objects are closely related, as the Entity Business Objects can be used to describe the implementation and operation of a Business Process.

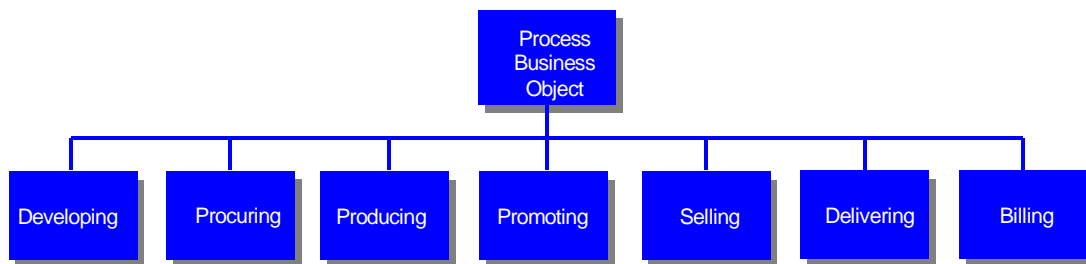


Figure 4 – Process Business Object Pattern

In parts of some industries (like financial services), it can be difficult to distinguish certain of these 7 due to the nature of work. Trading and swapping, for example, can be viewed as buying and selling simultaneously. Thus it is not uncommon that processes are known by other names in specific industries or businesses, or that a single core process shows aspects of more than one of the 7 basics.

Entity Business Objects

The Entity Business Object pattern contains seven primary Entities from which all others can be defined by specialisation or association. Entity Business Objects represent people, places and things. They represent business nouns. They package the procedures, rules and data that are specific to the concept being represented. Relationships between Entity Business Objects are defined including type classifications, roles, composites, aliases and populations. Entity Business Objects comprise the basic resources, players, and constructs that underlie day-to-day business.

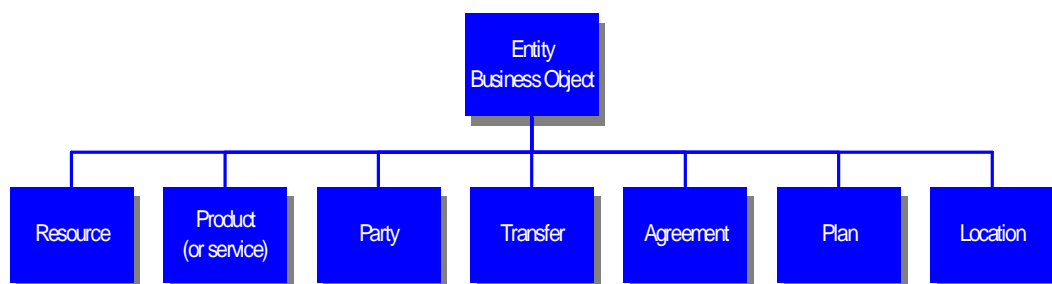


Figure 5 – Entity Business Object Pattern

Event Business Objects

Event Business Objects represent Business Events, such as business time boundaries, changes in the business environment, product life cycles or significant occurrences. Event Business Objects initiate or result from interactions between Entity Business Objects. Thus they are the triggers for, or results of, steps in Business Process Objects. The Event Business Objects pattern highlights a number of commonplace real-world events.

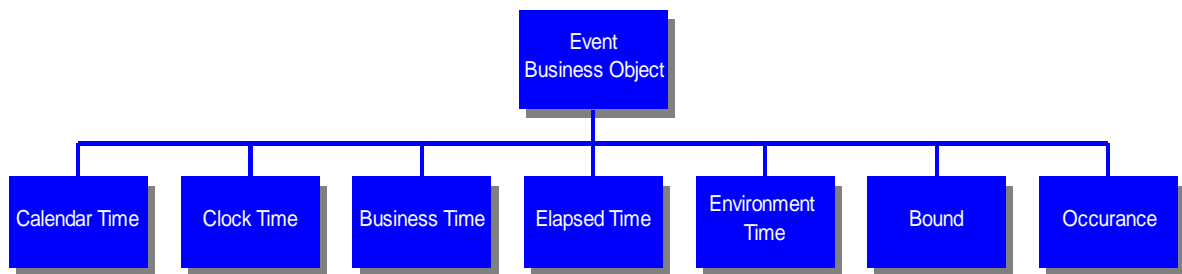


Figure 6 – Event Business Object Pattern

4 OOBE Process®

The following sections outline the key tasks that are undertaken to develop a typical solution using the OOBE Process®.

4.1 Overview

Figure 7, below, shows the main steps involved in an OOBE development.

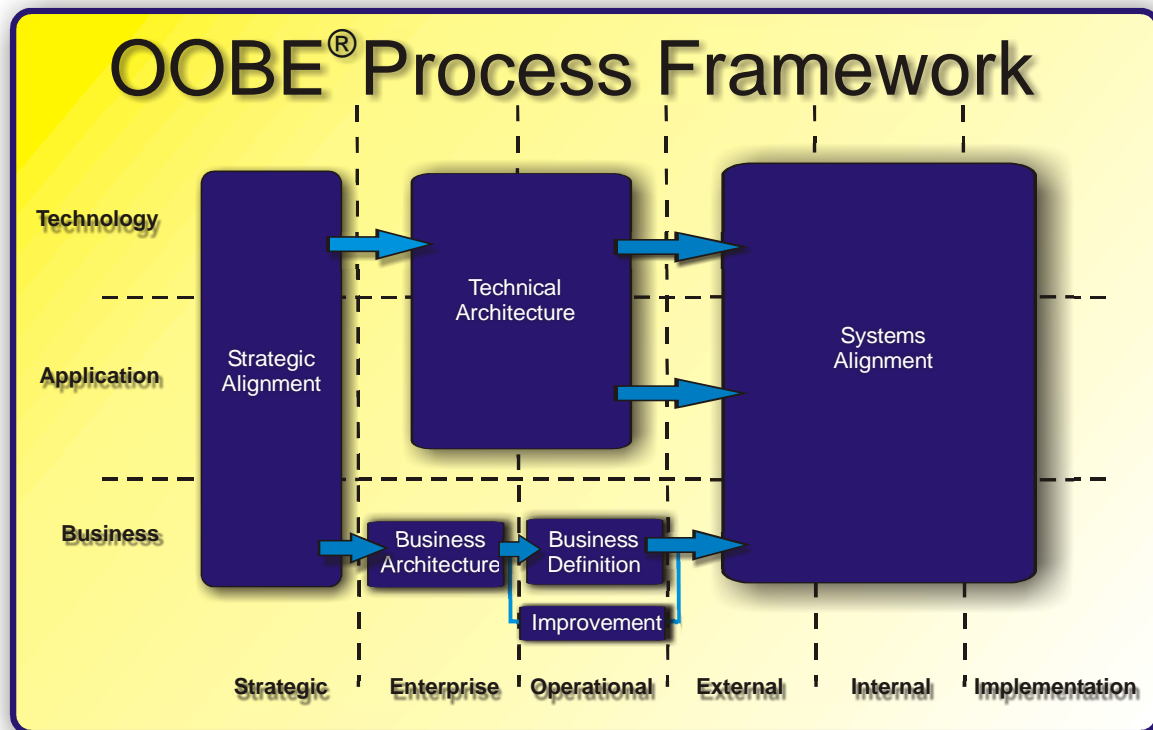


Figure 7 - OOBE Process®

4.2 Strategic Alignment Phase

The purpose of this phase is to capture corporate, business and technology strategy, to baseline the project scope and to review the project in terms of its fit into the overall strategy.

This phase addresses the Strategy viewpoint of the OOBE framework and is used to shift the perspective of IT projects (ie. technical infrastructure/middleware/ specific application) to have them express and focus on the business value of the technology. It provides the business with visibility of the project in terms of how it supports business strategy while also providing technologists with business relevance in terms of how technology is required to support the business.

The following tasks are undertaken:

§ **Capture business strategy**

§ Clarify what business strategies are to be supported and define problems/barriers that the proposed project will remove.

§ **Capture technical strategy**

§ Clarify what technology strategies are to be supported and define problems/barriers that the proposed project will remove.

§ **Scope**

§ Establish boundary around the proposed work so that all parties and stakeholders agree on what the project will do.

The outputs of this task are the models that are linked to the Strategy viewpoint (viewable through the Ptech Knowledge Base or the generated Web content).

4.2.1 Skills

The following skills are required in the project team for this phase.

§ **Business Architect**

§ **Technical Architect**

§ **Junior Business Engineers**

§ **Project Manager**

4.3 Business Architecture Phase

This phase addresses the need to define a business architecture that provides the business frameworks from which business solutions can be implemented. The Business Architecture enables businesses to achieve benefits being sought that would otherwise not be achievable by the implementation of technology alone.

This phase addresses the Enterprise viewpoint of the OOBE framework. It provides a set of generic business patterns for process, information and events that then provide the framework for the implementation of specific business components. These patterns enable the analysis of a business, independent of organisational structure and therefore support the notion of expandability to support new business areas.

The OOBE framework contains predefined business patterns that are tailored to fit a particular organisation. These patterns provide a level of abstraction that enables a common view across disparate and diverse business areas.

These generic Business Patterns are effectively templates or design guides that define fundamental business processes (eg. Selling, Procuring) and information (eg. Party, Location, Agreement). In terms of OOBE, a Business Pattern is a collection of Business Objects and associations that captures a recurring business theme, where the associations can be interactions, relationships or groups.

Depending on the nature of the project, this phase may involve the initial specification of the high level business architecture or the iteration of an existing high level business architecture in the relevant subject area.

The outputs of this phase are the models that are linked to the Enterprise viewpoint (viewable through the Ptech Knowledge Base or the generated Web content).

The following tasks are undertaken:

§ **Review existing architecture**

§ Review the contents of an organisation's architecture. This involves establishing what existing logical models can be used to specialise the OOBE patterns into organisation specific enterprise models.

§ **Align Enterprise Patterns**

§ Undertake a Gap Analysis based on the review of existing architecture to ensure that all aspects of the patterns are addressed. The OOBE patterns are specialised based on high level knowledge of an organisation's business. The purpose of this task is to understand where the process being implemented occurs in the value chain and to classify the types of information required.

4.3.1 Skills

The following skills are required in the project team for this phase.

§ **Business Engineers/Analysts**

§ **Senior Business Engineer/Analyst**

§ **Business Architect**

§ **Project Manager**

4.4 Business Definition Phase

The Business Definition phase focuses on the definition and modelling of one or more business processes. It provides a clear understanding of a business process in order to effectively implement solutions. Business Definition basically identifies and exposes the underlying engineering that exists in all business processes.

In terms of the approach, this is even more significant, as the business engineering not only provides understanding, but is also the basis from which the implementation of solutions is undertaken. This approach takes business concepts through to code development, using the same business model, therefore enabling clear business visibility, eliminating the need for translating business requirements and enabling rapid delivery of business solutions. It is important to note that this phase is a business view of a process and is therefore implementation independent. The system view will be developed in the design phase where system design and implementation specific issues are resolved.

This phase addresses the Operational viewpoint of the OOBE framework. It provides a set of models for process and information that then provides the framework for the design of specific software components.

The outputs of this phase are the models that are linked to the Operational (viewable through the Ptech Knowledge Base or the generated Web content).

The following tasks are undertaken:

§ **Model current business process**

§ The subject business process is modelled, so that a clear understanding of the “as is” is captured. A project may only use the “as is” model as the basis for implementation if no improvement is required. It should be noted that the this model can be used as the basis for further analysis such as metrication and a process of improvement instigated, at which time a “to be” model is developed.

§ The following models are developed:

– **Business Process Model**

Model of the processes involved in the subject area including their interdependencies and flow of information and control (Process Business Objects).

– **Business Workflow Model**

Model of the workflow between process steps for a particular process as specified in the Business Process Model (Process Business Objects).

– **Object Behaviour Diagrams**

Models of the behaviour of leaf node processes (Process Business Objects) and their interaction with entities (Entity Business Objects)

– **Object Relationship Diagram**

Model of the entities and relationship between entities (Entity Business Objects).

4.4.1 Skills

The following skills are required in the project team for this phase.

§ **Business Engineers/Analysts**

§ **Senior Business Engineer/Analyst**

§ **Business Architect**

§ **Project Manager**

4.5 Technical Architecture Phase

This phase focuses on producing the technical architecture to support the business architecture. It addresses the complete business architecture rather than just the components required for a specific project. This ensures that a technical architecture is produced which can support the whole system with the appropriate components.

The outputs of this phase are the models linked with the Enterprise and Operational viewpoints. There may be some overlap into the External viewpoint for some architecture areas.

Some prototyping may be performed during this time if new technologies are to be used for the architecture.

The following tasks are undertaken:

§ **Review the technical strategy**

§ **Review the business architecture**

§ **Identify the environment for the system**

This covers information on the machines, resources, numbers and sizes of objects to be handled. This also needs to define the external systems with which the system must integrate.

§ **Investigate the available approaches**

§ **Select a suitable approach**

§ **Architect the approach**

This involves high level component identification, class diagrams and interaction diagrams.

§ **Define technologies and deployment approaches**

This task needs to examine how the architecture will be deployed into the organisation's environment.

4.5.1 Skills

The following skills are required in the project team for this phase.

§ **Technical Architect**

§ **Senior Component Engineer**

§ **Business Architect**

§ **Project Manager**

4.6 Systems Alignment Phase

The Systems Alignment phase focuses on bringing information systems into alignment with the organisation's business model. This may involve the design and implementation of new business applications or software components and/or modification/integration of existing information systems.

In this phase the operational models (can be "as is" or "to be") are taken as input and transformed into business object server designs. In this phase implementation issues are addressed such as mapping server designs to packages/applications, resolving data integrity issues, technology implementation, data migration and deployment.

The outputs of this phase are the models that are linked to the External and Internal viewpoints (viewable through the Ptech Knowledge Base or the generated Web content) and the implementation and deployment of the business application.

The following tasks are undertaken:

§ **Review Strategic, Enterprise and Operational models**

This defines which entity, process and event business objects to implement and which information systems to implement these servers against.

§ **Determine Technology Design and Implementation**

This task uses the Business and Application viewpoints.

§ **Produce Business Design Models**

Transforming the appropriate Business Operational models based on Technology considerations produces the business design models.

§ **Produce Legacy Application Data Mapping**

Map business models to legacy application data using legacy wrappers or APIs.

§ **Identify Data Integrity Problems in Existing Systems**

Identify how these problems need to be resolved by business object servers. Identify master source for each data element.

§ **Deploy Technologies**

This involves the deployment of the technologies and their integration and test to ensure correct operation.

§ **Develop Implementation**

Go through the development cycle to produce the implementation for the models. Generate code through the tools where possible.

4.6.1 Skills:

§ **Implementation Architect**

- § **Technical Architect**
- § **Component Engineers**
- § **Infrastructure Engineer**
- § **Data Analyst**
- § **Project Manager**

5 OOBE Notation

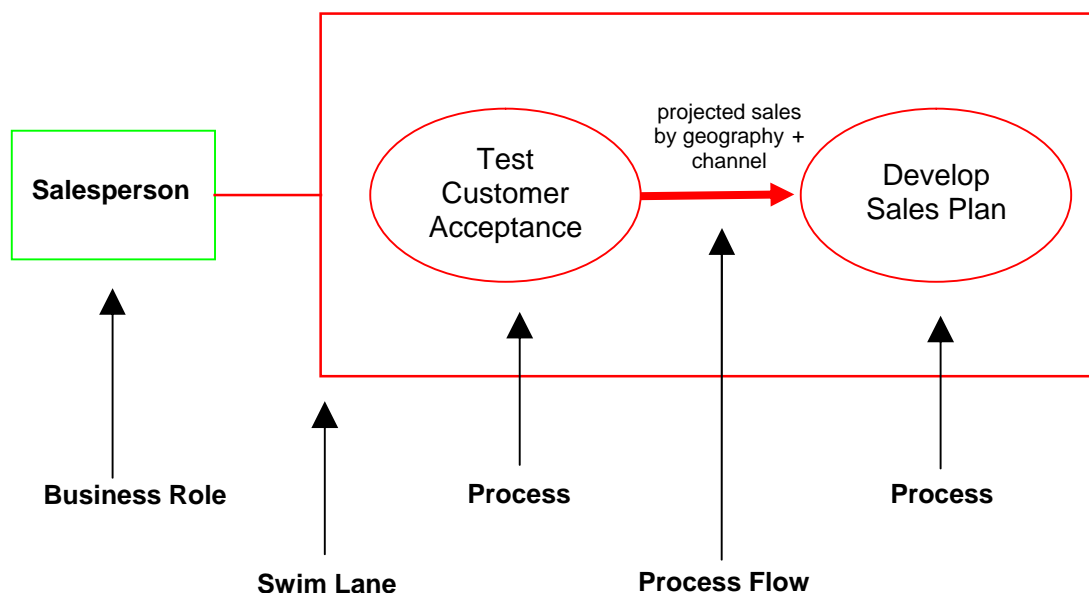
OOBE adopts accepted modelling conventions where they are in existence. It is Open Engineering's adopted policy to standardise by using UML (Unified Modelling Language) notation. A key overriding factor is that the notation must be easy to understand and adopted by business people and that it must support the capture of meta data required to facilitate the implementation of these models. OOBE contains a number of diagrams that are not supported by UML, specifically in the area of modelling business processes; this is due to the fact that Open Engineering does not believe that Use Cases is an adequate technique for capturing knowledge about business processes. It is acknowledged that as the UML standard continues to evolve and mature that UML notations will be adopted into the OOBE methodology, although at this time OOBE contains notations that have been adopted from other accepted modelling conventions.

This section provides an overview of the diagrams and a description of the notations used. The diagrams used within the Business Architecture include:

- § **Business Process Diagrams,**
- § **Business Workflow Diagrams,**
- § **Object Behaviour Diagrams, and**
- § **Object Relationship Diagrams.**

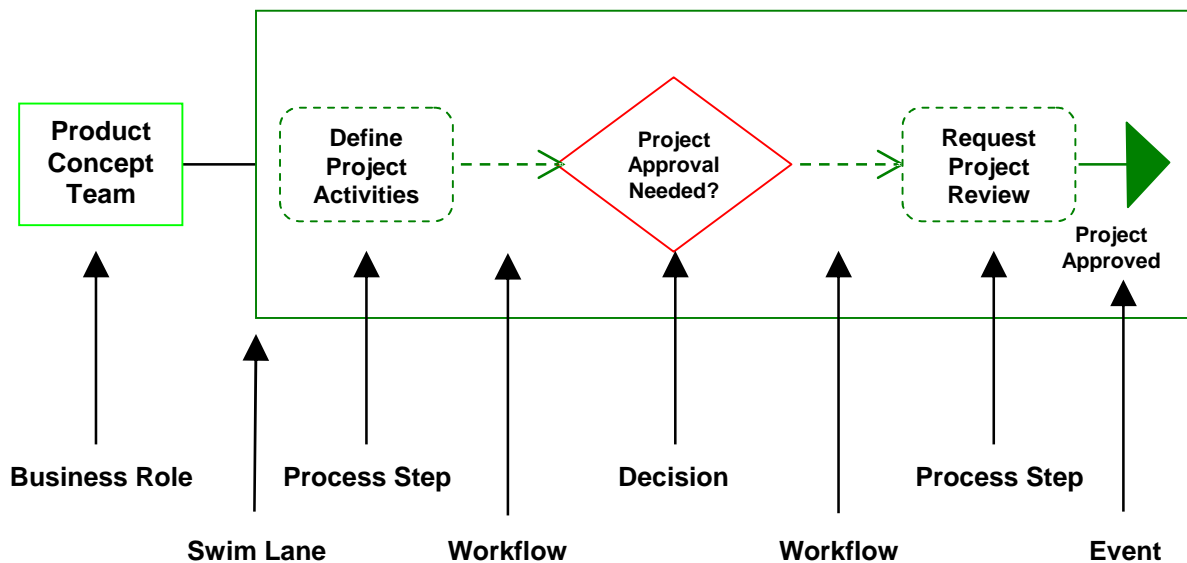
5.1 Business Process Diagram

This diagram enables a business process to be decomposed, showing at each level the functional group responsible for the business process. Each Process is a Process Business Object and when implemented is used to control its sub-processes.



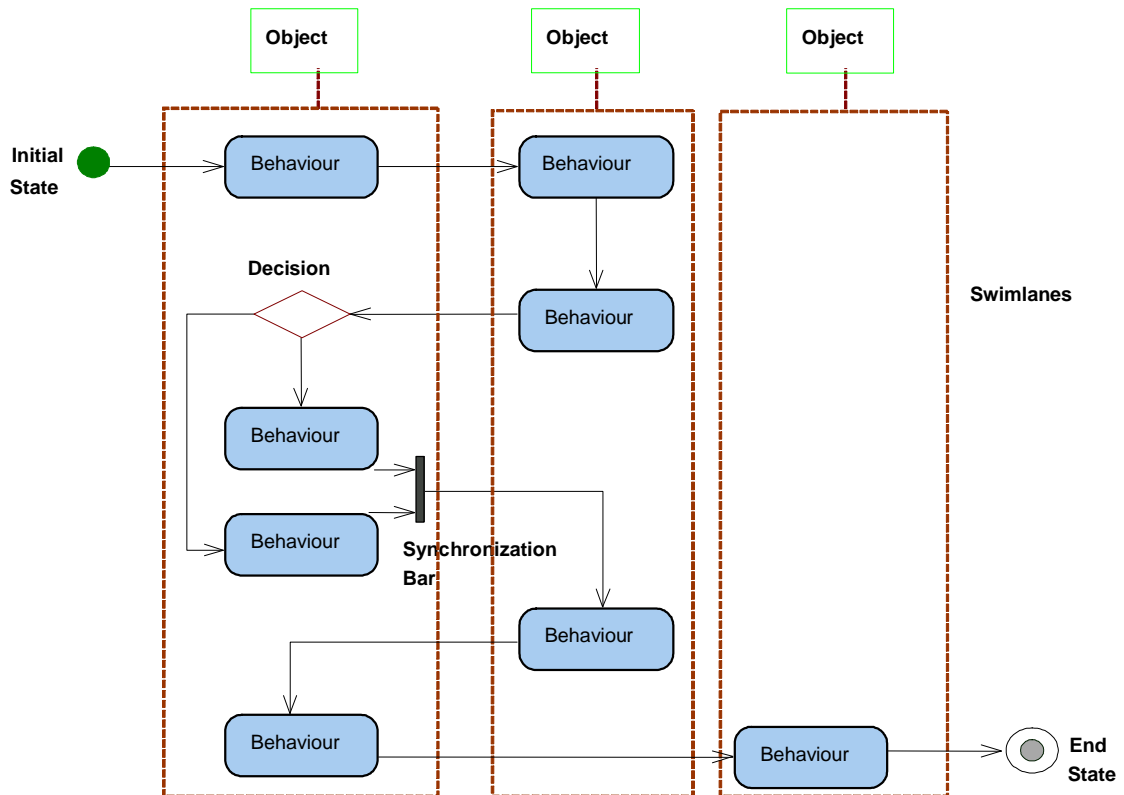
5.2 Business Workflow Diagram

The Business Workflow Diagram models the workflow interaction between each of the Process Steps for a given Process. Once a process has been decomposed to its lowest level, then these processes are labelled Process Steps. These Process Steps are specialisations of Business Process Objects and are implemented as business objects that have specific behaviour to enable the process step to be completed.



5.3 Object Behaviour Diagram

Each Process Step Business Object modelled in the Business Workflow Diagram can be modelled to diagrammatically illustrate the behaviour of that Process Step Business Object. This diagram highlights the artefacts that are used and manipulated by the Process Step. For each Process Step an Object Behaviour Diagram is produced for each major scenario relevant to that step. If only minor deviations from the main behaviour exist, those can be shown with decisions and alternative behaviour.



5.4 Object Relationship Diagram

The Object Relationship otherwise known as an object or data model represents the relationships and associations between entity business objects that are formed through interactions within business processes. The ORD expresses abstractions and generalisations and includes the definition of attributes and business rules (otherwise known as services or methods). Type Classifications include “T” for Types and “R” for Roles.

