PPO 객체 진화에 의한 BPR-ISP-A/D 통합 방법론

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요약

CALS, Enterprise Integration, Virtual Enterprise 등을 구현하는데 있어서 BPR (business process re-engineering), ISP (Information Strategy Planning), Analysis/Design 등은 필수 적이다. 이러한 BPR, ISP, A/D 추진하는데 있어서 각 단계의 산출물은 유연하게 연계되지 못한다. 그 이유는 각 단계가 접근하는 초점이 다르고, 산출물의 성격이 다르며, 무엇 보다도 각 단계의 전문가가 다르기 때문에 발생한다. 현재 기업이 각 단계를 추진할 때에는 반복적인 피드백을 통하여 정보를 공유 하거나, 각 단계의 정보 연계가 제대로 이루어 지지 않는다. 이러한 문제를 해결하기 위하여 BPR-ISP-A/D의 정보 연계를 유연하게 하기 위하여 PPO (Product-Process-Organization) 객체 진화에 의한 통합 방법론을 제안 하고자 한다. 그 과정은 1) Real world 정보를 PPO 객체로 정의하고, 2) PPO 객체를 기반으로 BPR을 수행하여 TO-BE model 을 만드는 동시에, 3) PPO TO-BE model과 함께 IT Architecture를 정의하며, 4) PPO 객체를 기반으로 Analysis and Design 과정을 통하여 Application system 객체 및 Data 객체를 정의한다. 이때 PPO 객체는 Real-world 객체에서 Application system 객체 및 Data 객체로 진화하게 되고 BPR-ISP-A/D의 seamless 통합이 이루어 진다.

여기서, 단계 1) 과 2)는 System Engineering을 통하여 이루어 진다. ARIS(Architecture of Integrated Information System, Dr. A-W. Scheer, 1998)개념을 도입하여 실세계를 정해진 규약에 따라 Model로 Mapping하고, 생성된 Model을 바탕으로 BPR을 수행하여 개선된 Model을 산출해 낸다. 단계 3)은, IE (Information Engineering, James Martine, 1990) 의 ISP가 도입되어, 설계업무를 지원하기위한 기본적인 시스템 구조를 구상하게 된다. 이와 함께 IT Model을 구성하게 되는데, 객체지향적 접근 방법으로 Model을 생성하고 UML(Unified Modeling Language)을 Tool로 사용한다. 단계 4)는 Software Engineering 관점으로 접근한다. 이는 최종 산물이라고 볼 수 있는 설계업무 지원 시스템을 Design하는 과정으로, 시스템에 사용될 데이터를 Design하는 과정과, 데이터를 기반으로 한 기능을 Design하는 과정으로 나눈다. 이를 통해 생성된 Model에 따라 최종적으로 Coding을 통하여 실제 시스템을 구축하게 된다.

Key Word: BPR, ISP, Analysis & Design, UML, ARIS, PPO, Object-Oriented

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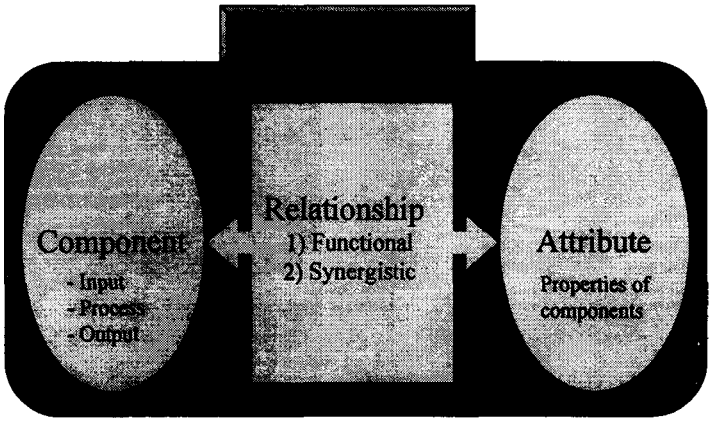
목차

- System Engineering
- Information Engineering
- Software Engineering
- BPR-ISP-AD
- Approaches for SysE, IE, SofE
- Object-Oriented Approach (UML)
- PPO & PPO Object Evolution
- PPO Object-based BPR-ISP-AD

System Engineering: Definitions



SysE: Elements of System

- Components (Structural, Operating, Flow components)
  - The operating parts of a system consisting of input, process, and output. Each system component may assume a variety of values to describe a system state as set by some control action and one or more restrictions.
  - Structural components
    - ✓ The static parts
  - Operating components
    - ✓ 프로세스를 수행하는 parts
  - Flow components
    - ✓ material, energy, information처럼 바뀌는 것.
- Attributes
  - The properties or discernible manifestations of the components of a system. These attributes characterize the system.
- Relationship (Functional, Synergistic relationship)
  - The links between components and attributes

SysE: System and Subsystem

- Subsystem
  - System is made up of components, and any component can be broken down into smaller component.
  - **계층(hierarchical)구조**를 가진 두 시스템 중에서 낮은 수준의 시스템
- Objective : 어떤 수준의 시스템도 objective를 갖는다.
- Environment
  - 시스템의 **Boundary, Limits** 밖의 모든 것들.
  - 시스템은 환경과 밀접한 관계를 갖는다.
  - (input, output, throughput)

SysE: Definition of System Engineering

- System engineering is
  " the design, production, and maintenance of trustworthy systems within cost and time constraints"
- Definition
  - Structural Definition
  - Purposeful Definition
  - Functional Definition

SysE: Definition of System Engineering

- Functional Definition

  Systems engineering is "an appropriate combination of theories and tools, carried out through use of a suitable methodology and set of systems management procedures, in a useful setting appropriate for the resolution of real-world problems that are often of large scale and scope"

- Purposeful Definition

  The purpose of systems engineering is information and knowledge organization that will assist clients who desire to develop policies for management, direction, control and regulation activities relative to forecasting planning, development, production and operation of total systems to maintain overall integrity and integration

- Structural Definition

  System engineering is management technology to assist clients through the formulation, analysis, and interpretation of the impacts of proposed policies, controls, or complete systems upon the perceived needs, values, institutional transactions of stakeholders

IE: Information Engineering (1)

• Definition

- The application of an interlocking set of formal techniques for the planning, analysis, design, and construction of information systems on an enterprise-wide basis or across a major sector of the enterprise

- An interlocking set of automated techniques in which enterprise models, data models, and process models are built up in a comprehensive knowledge base and are used to create and maintain data processing systems

IE: Information Engineering (2)

• Characteristics

IE applies structured techniques on an enterprise-wide basis, or to a larger sector of an enterprise, rather than on a project-wide basis

IE progresses in a top-down fashion through the following stages
- Enterprise strategic systems planning
- Enterprise information planning
- Business area analysis
- System design
- Construction
- Cut-over

As it progresses through these stages, IE builds a steadily evolving repository (encyclopedia) of knowledge about the enterprise, its data models, process models, system designs.

IE: Information Engineering (3)

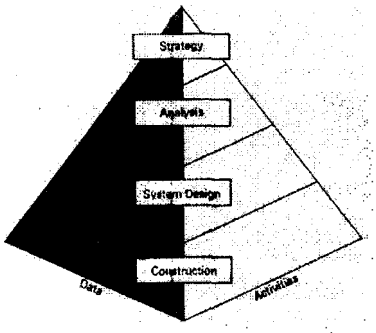


Figure 1.2 Information systems pyramid

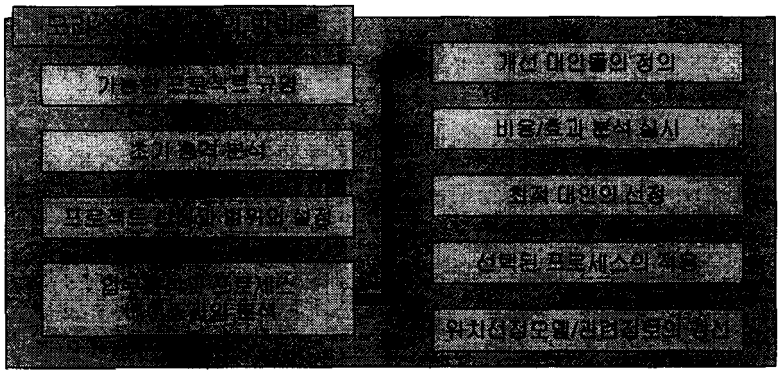
IE Stages	Data	Activities
Strategy	Strategic overview of the information needed to run an enterprise as effectively as possible	Strategic overview of how technology can be used to improve the enterprise
Analysis	Fully normalized logical data model	The processes needed to operate the enterprise, and how they integrate
System Design	Design of the records used by specific procedures	Design of procedures for executing specified processes
Construction	Application program view of the data	Design of detailed program logic or input to a code generator

SofE: Analysis & Design

Analysis	Fully normalized logical data model	The processes needed to operate the enterprise, and how they integrate
System Design	Design of the records used by specific procedures	Design of procedures for executing specified processes
Construction	Application program view of the data	Design of detailed program logic or input to a code generator

	gram Types (Data)	Diagram Types (Activities)
Analysis	• Fully normalized logical data m • Data Descriptions	• The processes needed to operate the enterprise, and how they integrate • Process Dependency Model • Process/Entity Matrix • Process Life-Cycle Matrix
System Design	• Data structure Diagram • Data Descriptions	• Data Navigation Diagram • Data-Flow Diagram • Decision Tree • Dialog Design • Screen Layout • report Layout • Prototypes

BPR-ISP-AD: Business Process Re-engineering



- 동적 비즈니스 리엔지니어링(dynamic business reengineering)개념으로 급변하는 기업환경에 대응하기 위하여 기업이 향후 나아갈 방향을 정하는 위치설정(positioning)활동을 수행한 후 본격적인 리엔지니어링 활동을 추구하는 과정으로 구성되어 있음
- 이 방법론은 프로세스, 조직 및 정보 기술을 리엔지니어링 대상으로 하고 있으며 제2단계의 "초기 총격분석" 작업수행에서 고려대상이 되는 프로젝트 각각에 대해 정보시스템 및 통신 시스템,생산용량에 대한 초기 총격정도를 검토하고 있음

BPR-ISP-AD: Information Strategy Planning

ISP Stages =>	Of primary interest to top management	Of primary interest to MIS planners

1. Create an overview model of the enterprise : Maps the business functions hierarchically. It associates these with the organizational units, locations, and the entities about which data is stored

2. Perform analysis of goals and problems : Creates a structured representation of the goals and problems of an enterprise and associates them with departments or organizational units and with the management-by-objectives motivation of individual managers. Goals and problems are associated with information needs and systems

3. Perform CSF analysis : Is concerned with identifying those areas where "things must go right" if the enterprise is to succeed fully. It is concerned with concentrating resources on the most critical areas.It identifies critical assumptions that need checking, critical information needs, and critical decisions for which decision-support systems are needed

4. Perform technology impact analysis : Is concerned with the extremely rapid evolution of technology and the business opportunities and threats created by it. It maps a taxonomy of new technology against the opportunities for new products, services, changes in corporate structure, and so on. Technology impact analysis attempts to identify and prioritize the opportunities and threats and bring them to the attention of executives who can take appropriate action

5. Perform strategic systems analysis : Is concerned with strategic opportunities for creating new systems to make a corporation more competitive. These "strategic" systems may require restructuring of the corporation or the way it does business rather than automation of what already exists

6. Entity -relationship modeling : Creates a chart of the entities and their relationships which is an overview of the data that must be stored in the enterprise databases. The entities are associated with business functions in matrix, and the matrix is clustered to find naturally cohesive groups of entities and functions

7.Establish priorities for business area analysis

BPR-ISP-AD: Analysis & Design

Analysis	Fully normalized logical data model	The processes needed to operate the enterprise, and how they integrate
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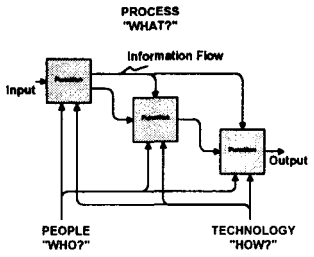
Approaches for SysE, IE, SofE, BPR

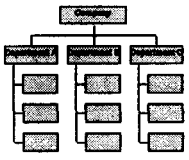
- SADT & IDEF
- Structured Analysis & Design
- Object-Oriented Analysis & Design
- UML
- ARIS

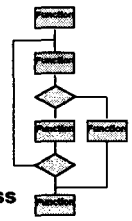
IDEF



Note:
The same picture can be cut in many different puzzles

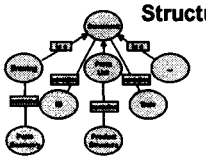
Organizational Structures





Business Process

Object Structures



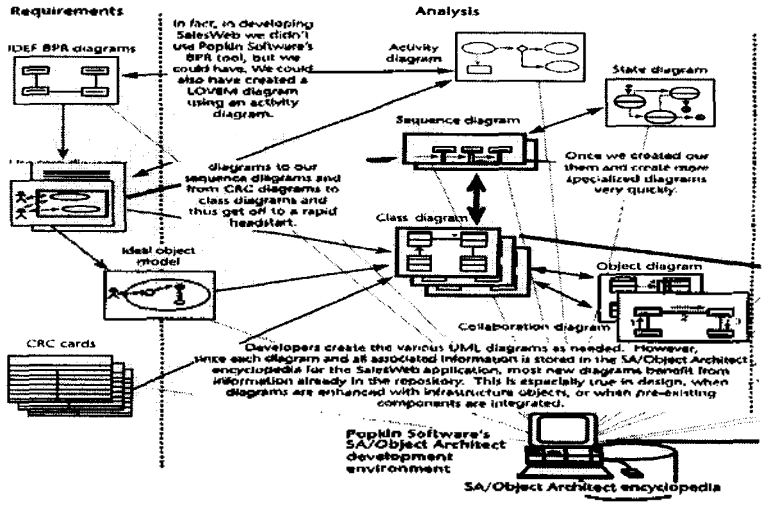
Structured Analysis & Design

- 구조적 분석 가법 뿌리
  - 뿌리: 구조적 프로그래밍
  - 구조적 프로그래밍 - 시스템을 기능에 의해 모듈화 시켜 분할
    - 1960년대 부터 발달
  - 구조적 설계 기법 - 설계 원칙들을 제시
  - 구조적 분석 기법 - 요구사항 분석
- 구조적 분석 기법 개요
  - 자료흐름도: DFD - 정보의 흐름 & 변환 (기능)
  - 하향 접근: Top-down 방식 - 상위 레벨기능 -> 하위레벨 기능으로 분할
  - 계층화: Layered or Leveling approach
  - 기능 중심의 분할 & 계층화 개념 필수
- 구조적 분석 기법 도구
  - 자료흐름도 DFD - 프로세스 사이의 데이터 흐름을 강조
  - 프로세스 명세서 - DFD의 말단 프로세스의 기능을 명시
  - 자료사전 - DFD의 데이터의 정의
  - 개체관계도
  - 상태전이도

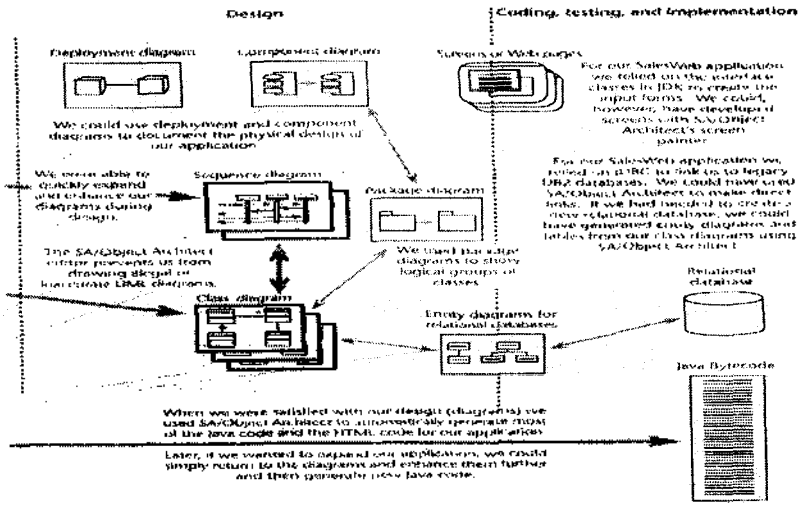
Object-Oriented Analysis & Design

- 객체지향 개념
  - 시스템 요구사항 변화에 대한 수용
  - 객체-속성-관계를 알아내는 데서 시작
  - 기본개념
    - ✓ object, attribute, behavior, class, relationship
  - 실세계 객체의 개념에 근간 - 실세계의 현상을 보다 정확 묘사
    - ✓ 어려운 응용 분야에 적용 가능
  - 분석,설계,프로그래밍,테스트등에 동일한 방법론 지원
  - 재사용 & 확장성이 용이
  - Prototyping, Spiral 방법에 적당
- 객체지향 분석의 뿌리
  - 객체지향 프로그래밍 & 객체지향 설계에 근간
  - 상향식 접근 방법 - 객체 중심의
  - 정보 & 데이터 중심의 개발
  - 객체를 정적인 정보 (attribute) 와 동작 (behavior) 추가하여 객체를 완벽하게 정의 (기존방법 - 어떤 기능이 어떤 데이터를 참조하는지 알 수 없음)

UML(1)


Requirements
Analysis
IDEF BPR diagrams
In fact, in developing SalesWeb we didn't use Popkin Software's BPR tool, but we could have. We could also have created a LOVEM diagram using an activity diagram.
Activity diagram
State diagram
Sequence diagram
Once we created our them and create more specialized diagrams very quickly.
diagrams to our sequence diagrams and from CRC diagrams to class diagrams and thus get off to a rapid headstart.
Class diagram
Ideal object model
Object diagram
Collaboration diagram
CRC cards
Developers create the various UML diagrams as needed. However, since each diagram and all associated information is stored in the SA/Object Architect encyclopedia for the SalesWeb application, most new diagrams benefit from information already in the repository. This is especially true in design, when diagrams are enhanced with infrastructure objects, or when pre-existing components are integrated.
Popkin Software's SA/Object Architect development environment
SA/Object Architect encyclopedia

UML(2)


Design
Coding, testing, and implementation
Deployment diagram
Component diagram
Servlets or Web pages
We could use deployment and component diagrams to document the physical design of our application.
For our SalesWeb application we relied on the interface classes in JDK to create the input forms. We could, however, have developed screens with SA/Object Architect's screen painter.
We were able to quickly expand and enhance our diagrams during design.
Sequence diagram
Package diagram
For our SalesWeb application we relied on JDBC to link up to legacy DB2 databases. We could have used SA/Object Architect to make direct links. If we had decided to create a new relational database, we could have generated entity diagrams and tables from our class diagrams using SA/Object Architect.
The SA/Object Architect simply prevents us from drawing illegal or inaccurate UML diagrams.
We used package diagrams to group logical groups of classes.
Relational database
Class diagram
Entity diagram for relational databases
Java Bytecode
When we were satisfied with our design (diagrams) we used SA/Object Architect to automatically generate most of the Java code and the HTML code for our applications.
Later, if we wanted to expand our application, we could simply return to the diagrams and enhance them further and then generate new Java code.

ARIS(1)

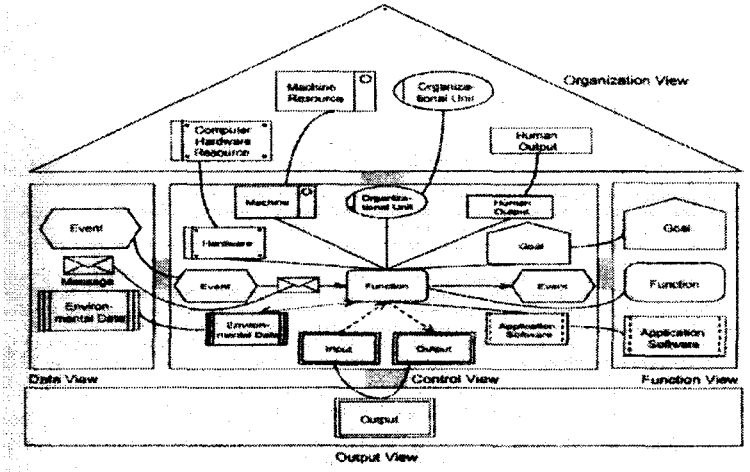


Fig. 15 Views of the ARIS house

ARIS(2)

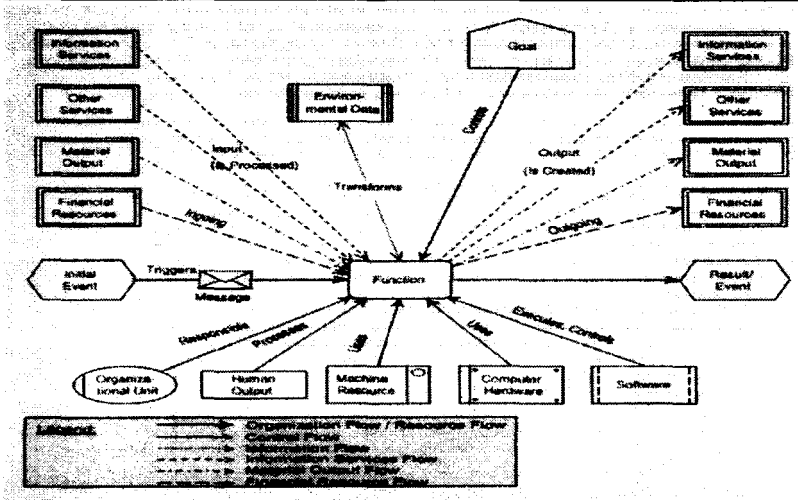
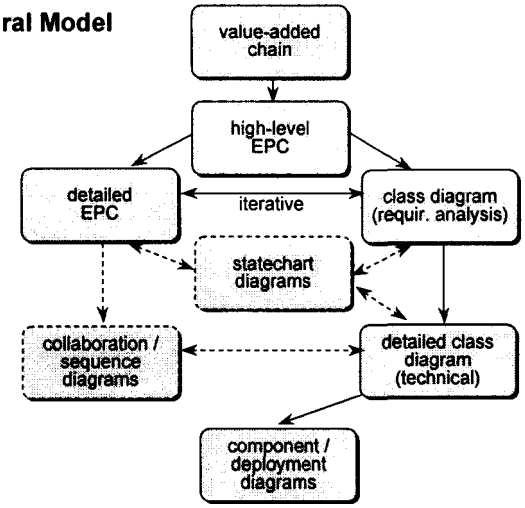


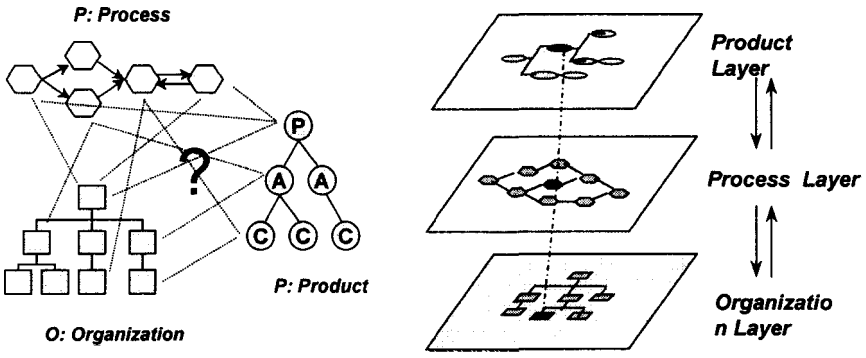
Fig. 13 The general ARIS business process model

ARIS (3)

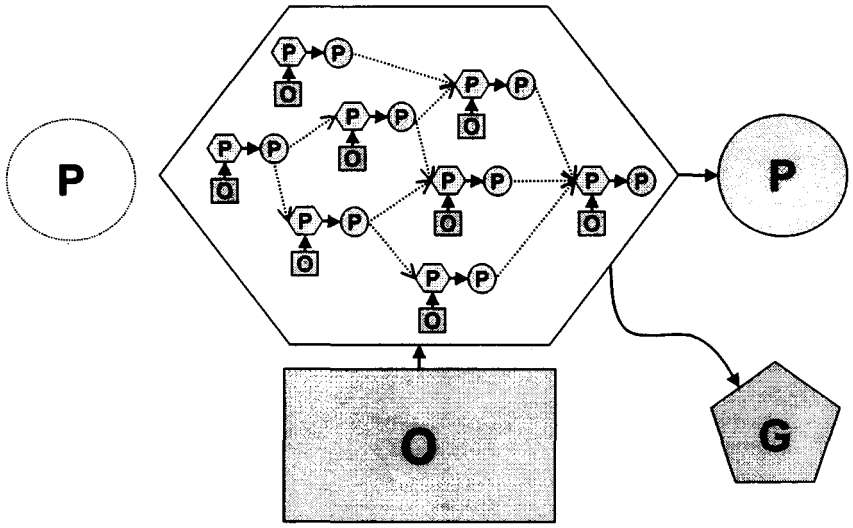
Procedural Model



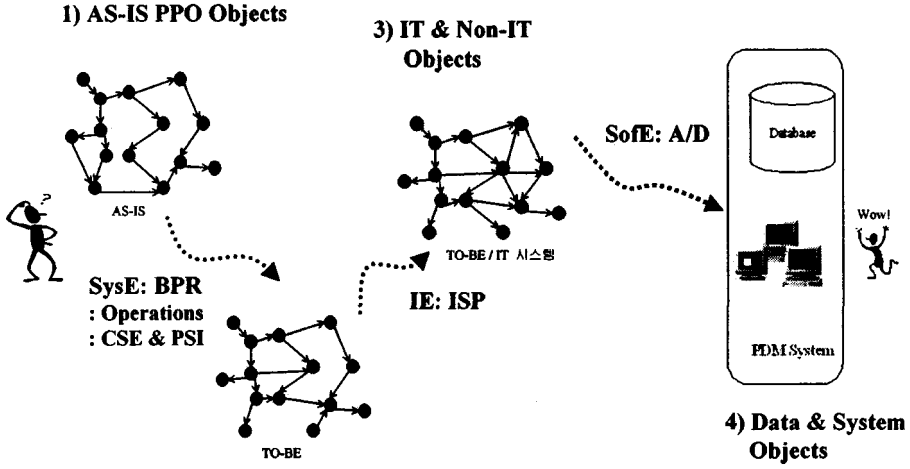
PPO Model



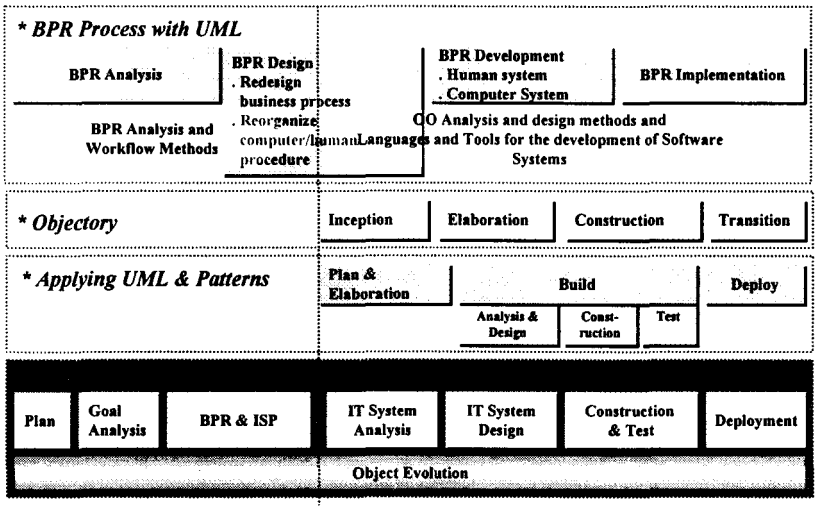
PPO System



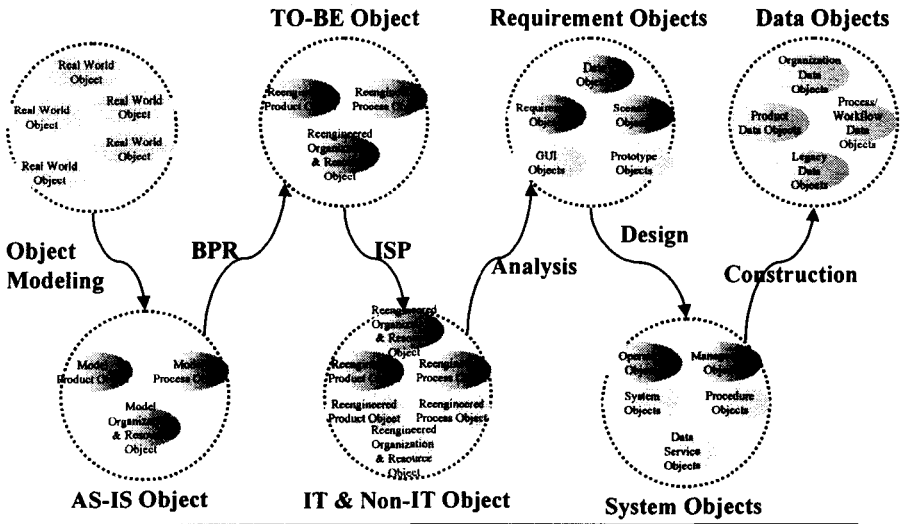
PPO based BPR-ISP-AD



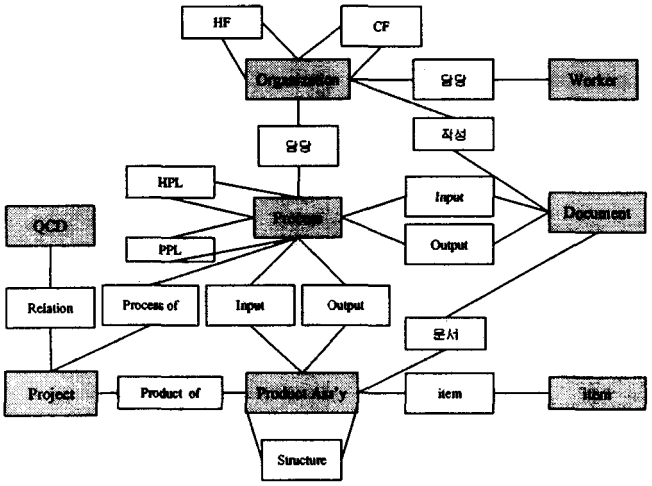
PPO Object Evolution



Object Evolution



Object Modeling: PPO



BPR: PPO Reengineering

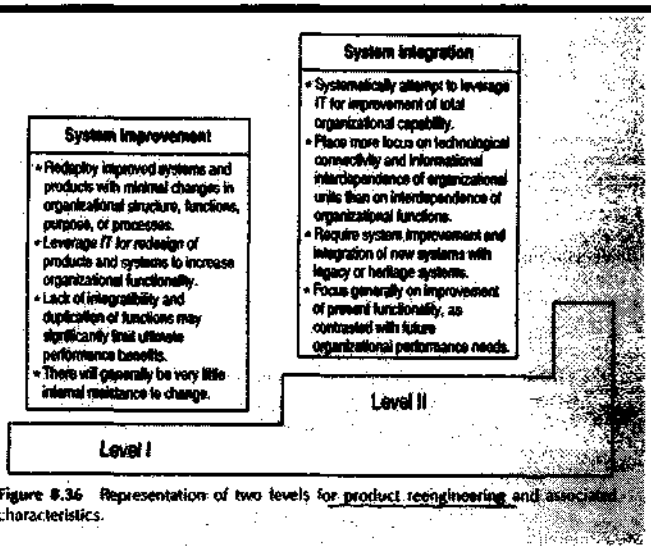


Figure 8.36 Representation of two levels for product reengineering and associated characteristics.

BPR: PPO Reengineering

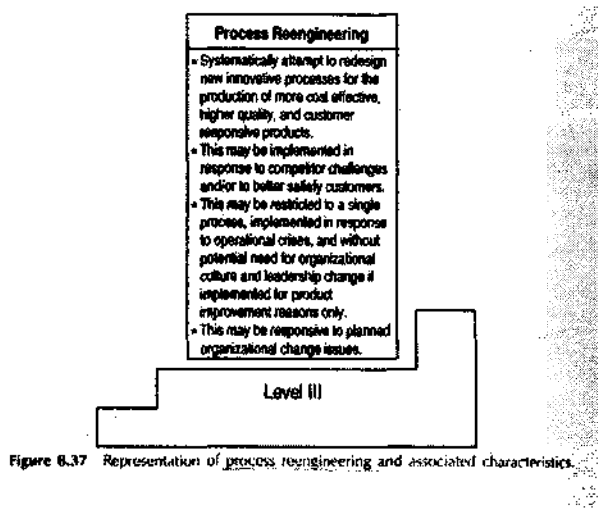


Figure 8.37 Representation of process reengineering and associated characteristics.

BPR: PPO Reengineering

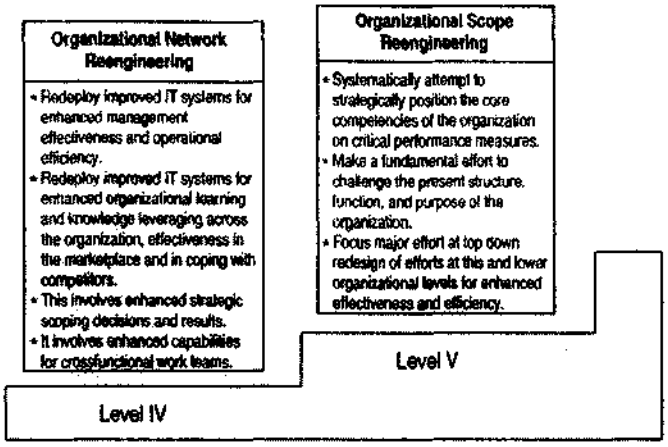


Figure 8.38 Representation of two levels for organizational reengineering and associated characteristics