CIS 210 Tutorial 4

What is the difference between Business Process Engineering and Product Engineering? Explain with Examples.

Answer :

System engineering process is called Business Process Engineering (BPE) when the context of the engineering work focuses on the Business Enterprise. When a product is to be built, the process is called product engineering (PE).

Goal of BPE is to define architectures that will enable a business to use info effectively. Need to specify the appropriate computing architecture, software architecture that populates the unique configuration of heterogeneous computing resources that must be developed. BPE is an approach for creating an overall plan for implementing the computing architecture.

The 3 different architectures that is to be analysed and designed are :

Data – framework for the info needed of a biz or biz function. Building blocks of the architecture are the data objects that are used by the biz. Data object contains a set of attributes that define some aspect, quality, characteristic or descriptor of the data that are being described.

Applications – encompasses elements of the system that transform objects within the data architecture for some biz purpose. May sometimes include role of people and procedures that were not automated.

Technology – foundation for the data and application architectures. Encompasses the hardware and software that are used to support the application and data. This includes computers, o/s, networks, telecomm links, storage technologies, and the architecture that has been designed to implement these technologies.

Goal of PE is to derive architecture and infrastructure. Architecture encompasses 4 distinct system components : software, hardware, data (and databases) and people. A support infrastructure is established and includes the technology required to tie the components together and the information that is used to support the components.

What is FAST? Define the basic approach to FAST.

Answer :

FAST is short form for Facilitated Application Specification techniques – which is approach encouraging the creation of a joint team of customers and developers who work together to identify the problem, propose elements of the solution, negotiate different approaches and specify a preliminary set of solution requirements.

FAST approach includes :
A meeting is conducted at a neutral site and attended by both software engineers and customers
Rules for preparation and participation are established
Agenda is suggested that is formal enough to cover all impt points but informal enough to encourage the free flow of ideas
A ‘facilitator’ controls the meeting
A ‘definition mechanism’ is used (which can be work sheets, flip charts, or wall stickers or an electronic bulletin board)
The goal is to identify the problem, propose elements of the solution, negotiate different approaches and specify a preliminary set of solution requirements in an atmosphere that is conducive to the accomplishment of the goal.

Define the components of a computer-based system. How would you represent diagrammatically, the system engineering hierarchy? How does understanding the hierarchy help in system engineering?

Answer :

The components are :
Software – computer programs, data structures and related documentation that serve to effect the logical method, procedure or control that is required.
Hardware – Electronic devices that provide computing capability, the interconnectivity devices, that enable the flow of data and electromechanical devices.
People – Users and operators of the hardware and software
Database – A large, organized collection of information that is accessed via software
Documentation – Descriptive information (e.g. hardcopy manuals, online help files, websits) that portrays the use and/or operation of the system
Procedures – the steps that define the specific use of each system element or the procedural context in which the system resides.

The hierarchy is useful as elements constituting 1 system may represent 1 macro element of a larger system. As such during development, the process begins with understanding the world view. That is the entire business or product domain is examined to ensure that the proper biz or tech context can be established. The world view is refined to focus more fully on specific domain of interest. Within a specific domain, the need for targeted system elements is analysed. Finally the analysis, design and construction of the targeted system element is initiated.

Prepare a Use Case for a customer who goes to an ATM machine to withdraw money. Identify the actors and any assumptions made.

Answer :

The steps include : (Actors include : customer, database)

Customer observes screen on ATM to determine whether system is ready for input.
If system is not ready, customer waits until ATM displays screen indicating it is ready for input.
If system is ready, the customer inserts the ATM card into the Card reader slot. The Card Reader slot accepts the card and system displays message asking customer to enter Pin (Personal Identification Number). The customer enters the pin.

The system accepts the pin and reads the customer's id from the ATM card. The system then retrieves the customer's pin from the database by using the customer id.
The system checks the entered pin against the retrieved pin. If they are the same, the system displays options for the customer to choose. The various options available include
Withdraw $50
Withdraw $100
Withdraw $150
Withdraw other amounts
Enquire Balance
Other transactions

If the pin is not the same, the system displays error message and asks the customer to enter the pin again.
If invalid pin is entered 3 times, (on the 3rd time), the system saves the ATM card into the storage area and displays error message to the customer informing that the ATM card has been retained and ask the customer to contact the bank.
If Customer chooses to withdraw other amounts and presses enter. The system displays screen to allow the customer to enter the amount required. The customer is enters the amount required and presses "enter".
The system checks that the amount entered must not be more than the limit of $3000 set for daily withdrawal for all customers.
If the amount is greater than the limit, the system displays error message. Customer will be prompted to choose another transaction or terminate transaction.
System then retrieves from the Backend database the amount already withdrawn for the day and checks that when this amount is added to the amount requested, the total does not exceed the daily limit set for all customers of $3000.
If the amount exceeds, system displays error message and prompts customer to chooses another transaction or terminate transaction.
If amount is within limits, the system issues the cash to the customer, prints the receipt.
When customer has removed the cash, the system releases the ATM card.
If customer fails to remove the cash, the system displays a prompt to the user. If the cash is not removed in 2 minutes, the system retracts the cash, and saves the ATM card into storage for later retrieval (by the ATM administrator).

The customer removes the cash. When the system releases the ATM card to the user, the customer takes the ATM card.
System displays that it is ready for another input.
Use Case ends.

You have been tasked to gather requirements for a project. Briefly explain the steps you will take and the type of problems you may encounter. Where required give examples.

Answer :

The steps include :
Requirements elicitation – to determine the objectives and what is to be accomplished producing a statement of need and feasibility and bounded statement of scope for system or product.
Assess biz and tech feasibility
Identify people to gather requirements
Define tech requirements
Identify "domain constraints"
Define methods
Solicit participation from people
Identify ambiguous requirements as candidates for prototyping
Create usage scenarios
Some problems include :
Problems of scope – boundary of system is ill-defined or unnecessary technical detail is specified causing confusion
Problems of understanding – poor understanding of capabilities and limitations of computing envt or of problem domain
Requirements analysis and negotiation - categorises requirements and organizes them into related subsets, explores requirements and their relationships, examining requirements for consistency, omissions and ambiguity and ranks them.
Problems encountered may be due to customers asking for more than can be achieved given limited biz resources. Common also for customers or users to propose conflicting requirements. Need to reconcile conflicts through negotiation. Rank requirements and discuss conflicts in priority. Using an iterative approach, requirements are eliminated, combined and/or modified.
Requirements specification – produce the requirements specifications which is the final work product produced by the system and requirements engineer. Foundation for hardware engineering, software engineering, database engineering, and human engineering. Describes the function and performance of a computer-based system and the constraints that will govern its development. Specification bounds each allocated system element.
Problems include should you use a standard template or should you remain flexible? What is the language used to write? Natural or graphical or mixture?
System modeling – To define the system model so that it is easy to assess the efficiency of work flow. To evaluate the components in relationship to one another, to determine how requirements fit into this picture and to assess the "asthetics" of the system as it has been conceived.
Requirements validation – work products produced are assessed for quality during a validation step. To examine the specification to ensure that all system requirements have been stated unambiguously, that inconsistencies, omissions and errors have been detected and corrected and that work products conform to the standards established for the process, the project and the product. Performed through review by system engineers, customers, users and other stakeholders.
Requirements management – activities to put into place to help project team to identify, control and track requirements and changes to requirements at any time as the project proceeds. With requirements identified, traceability tables are developed and maintained as part of a requirements

database so that they may be quickly searched to understand how a change in one requirement may affect different aspects of the system to be built.

Discover ambiguities or omissions in the following statement of requirements for part of a ticket issuing system. Rewrite the requirements to remove the ambiguities/omissions.

An automated ticket issuing system sells rail tickets. Users select their destination, and input a credit card and a personal identification number. The rail ticket is issued and their credit card account charged with its cost. When the user presses the start button, a menu display of potential destinations is activated along with a message to the user to select a destination. Once a destination has been selected, users are requested to input their credit card. Its validity is checked and the user is then requested to input a personal identifier. When the credit transaction has been validated, the ticket is issued.

Answer :

The ambiguities/omissions are
order of actions/reactions are not clear
Types of errors not clear
Types of checks (against what/which is not clear)
What personal identifier is this?
What types of validation checks are required.

System element ┌

Domain of Interest ┌

Domain View

World View

Element View

Detailed View

Construction & Integration

Info System

Business systems design

A Biz Area

Processing requirement ┌

Business Area ┌

Business Area analysis

Information Strategy Planning

S/W Engineer

S/W Engineer

Construction & Integration

Analysis & Design Modelling

Behaviour

Data

Function

Processing requirement ┌

Capabilities

Component Engineering

Requirements Engineering

Hardware

Software

Program Component