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Question 1:

Suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems and also justify your answer:

- A system to control anti-lock braking in a car
- A virtual reality system to support software maintenance
- A university accounting system that replaces an existing system
- An interactive travel planning system that helps users plan journeys with the lowest environmental impact

Answer:

- **Anti-lock braking system:**
This is a safety-critical system so it requires a lot of up-front analysis before implementation. It certainly needs a plan-driven approach to development with the requirements carefully analyzed. A waterfall model is therefore the most appropriate approach to use, perhaps with formal transformations between the different development stages.
- **Virtual reality system:**
This is a system where the requirements will change and there will be an extensive user interface components. Incremental development with, perhaps, some UI prototyping is the most appropriate model.
- **University accounting system:**
This is a system whose requirements are fairly well-known and which is used in many existing systems. Therefore, a reuse-based approach is most likely to be appropriate.
- **Interactive travel planning system:**
This is a system with a complex user interface. An incremental development approach is the most appropriate as the system requirements will change as real user experience with the system is gained.²⁷

Question 2:

Suggest why it is important to make a distinction between developing the user requirements and developing system requirements in the requirements engineering process.

Answer:

There is a fundamental difference between the user and the system requirements that mean they should be considered separately

.a) The user requirements are intended to describe the system's functions and features from a user perspective and it is essential that users understand these by requirements. They should be expressed in natural language and may not be expressed in great detail, to allow some implementation flexibility. The people involved in the process must be able to understand the user's environment and application domain

.b) The system requirements are much more detailed than the user requirements and are intended to be a precise specification of the system that may be part of a system contract. They may also be used in situations where development is outsourced and the

development team need a complete specification of what should be developed. The system requirements are developed after user requirements have been established.

Question 3:

To reduce costs and the environmental impact of commuting, your company decides to close a number of offices and to provide support for staff to work from home. However, the senior management who introduce the policy are unaware that software is developed using agile methods, which rely on close team working and pair programming. Discuss the difficulties that this new policy might cause and how you might get around these problems.

Answer:

If the company decided to close down a number of offices that were specialized in using agile methods they may face a multitude of difficulties. When a company is driven by a close team and is divided they will be unable to have daily meetings, which can cause issues with communication, programming in pairs would not be possible, a communication gap would be created, productivity will slow down due to communication issues, and detecting errors would be quite difficult. These problems can be avoided by creating merging offices together so pair programming and daily communication can be established. If that is not possible, a communication platform consisting of webcams, desktop viewing software, and microphones should be created to allow better communication.

Question.4: Discover difficulties/ ambiguities or omissions in the following statement of requirements for part of a ticket-issuing system:

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. 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:

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.

AMBIGUITIES AND OMISSIONS INCLUDE:

Can a customer buy several tickets for the same destination together or must they be bought one at a time?

Can customers cancel a request if a mistake has been made?

How should the system respond if an invalid card is input?

What happens if customers try to put their card in before selecting a destination (as they would in ATM machines)?

Must the user press the start button again if they wish to buy another ticket to a different destination?

Should the system only sell tickets between the station where the machine is situated and direct connections or should it include all possible destinations?

Choose random PAIRS of the following terms.

Compare and contrast and describe the logical relationship (equivalent, mutually exclusive, subset, orthogonal, etc.). user requirements system requirements software design specification functional requirements non-functional requirements domain requirements constraint on system functions constraint on development process product requirements organizational requirements external requirements

Question.5: INU Music Gala Case Study:

INU Music Gala is a famous Music festival, held in Peshawar every year. Since its first edition, it has gone through several major changes regarding its structure, length and location, but the tickets have always been sold in a traditional way: through two events agencies. The organizers decided to completely modernize the tickets selling system and created the following concept.

From this year on, the tickets will be sold in three distinct ways: traditionally, i.e. by the two events agencies, in electronic format directly on the INU website, and through Pakistan Railway (PR). All parties will have access to the same unique tickets database of the new system, to avoid double selling. A partnership with the PR railway company needs to be set up, such that PR can sell combi-tickets including both the festival admission fee and the train ride to the festival venue at reduced price, from anywhere in Pakistan. This way, more music fans would have easier and cheaper access to INU Music Gala. Since tickets will also be sold online, SecurePayment Inc. will be contracted to provide and ensure the security of the online payment service. The INU Music Gals event manager will take care and negotiate all these details with the involved parties.

Additionally, upon arrival at the festival venue, each participant has to self-check in at a touch screen terminal, which scans the barcodes on his/her ticket and issues a bracelet with an electronic chip. This can be used to load money, such that whenever (s)he wants to purchase snacks or cold drinks, (s)he does not have to use cash any more, thus reducing waiting times. This measure was initiated by the program manager and will be deployed by INUSolutions Inc. Lastly, according to the cantonal laws, the way the payment transactions are performed has to be audited by an external company at the end of the festival, since this is a public event, where the municipality of Peshawar is also involved - allowing free use of the public space.

Identify all the use cases in the INU Music Gala case study and represent them in a use case diagram.

Answer:

