Software Development Management Techniques

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The Course Outline

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- **Course Title:** Preparation course for ITEE FE examination
- **Intended Participants:** University Students who are going to take ITPEC examinations
- **Course Duration:** 60 hours

The Lecture Plan

Lecture Plan: Morning Exam, Sec 4-Development Technology, Chapter 2-Software Development Management Techniques

Time	Learning Points/Keywords	Explanation Points	Method	Level
20 minutes	Development process and methods	Software development models (Waterfall model, Spiral model, Prototyping model	Verbal Explanati	Medium
		RAD, Agile, Software product line, Iterative and Incremental Model		
		Evolutionary Model), Software life cycle (SLCP-JCF2007, JIS X 0160)		
		Process maturity model of CMMI with 5 stages, Reuse of software (Module independence,		
		Standardization, Customization), Reverse engineering (Compatibility, Call graph)		
		Structured methods (Hierarchical structuring , Stepwise refinement, Structured chart		
		State transition diagram, HIPO (Hierarchy plus Input Process Output), DFD,		
		Software structure), Formal method (VDM Tools) Mashup (Web2.0)		
10 minutes	Intellectual property application management	Author of the program, Employee work, Patent right	Verbal Explanati	Low
		Exclusive license, Non-exclusive license, Licenser, Licensee		
15 minutes	Development environment management	Configuration item, Software license, Security, Resource management		Low
		Operations management, Change history control, Access right control,		
		Unauthorized copying, Inventory taking		
15 minutes	Configuration management	Configuration management (SCM (Software Configuration Management)	Verbal Explanati	Medium
	and change control	SCI (Software Configuration Item), SLCP (Software Life Cycle Process), Configuration management plan		
		Change control (Consistency, Accuracy), Version control, Retention period		

Objectives

2.1 Development process and methods**

- Understand the concept of typical techniques concerning software development process, and apply them to the associated matters.

Keywords

2.1 Development process and methods**

- Software development models (Waterfall model, Spiral model, Prototyping model, RAD (Rapid Application Development), Agile, Software product line, Iterative model, Incremental Model, Evolutionary Model) Software life cycle (SLCP-JCF2007, JIS X 0160) Process maturity model of CMMI with 5 stages, Reuse of software (Module independence, Standardization, Customization) Reverse engineering (Compatibility, Call graph) Structured methods (Hierarchical structuring , Stepwise refinement, Structured chart , State transition diagram, HIPO (Hierarchy plus Input Process Output), DFD, Software structure), Formal method (VDM Tools) Mashup (Web2.0)

Objectives

2.2 Intellectual property application management

- Understand the outline of types of intellectual property rights, their features, items to be protected, and management.

Keywords

2.2 Intellectual property application management

- Author of the program, Employee work, Patent right, Exclusive license, Non-exclusive license, Licenser, Licensee

Objectives

2.3 Development environment management

- Understand the outline of necessity of managing the development environment, items to be managed, and management.

Keywords

2.3 Development environment management

- Configuration item, Software license, Security, Resource management, Operations management, Change history control, Access right control, Unauthorized copying, Inventory taking

Objectives

2.4 Configuration management and change control**

- Understand the outline of configuration management and change control.

Keywords

2.4 Configuration management and change control**

- Configuration management (SCM (Software Configuration Management), SCI (Software Configuration Item), SLCP (Software Life Cycle Process), Configuration management plan), Change control (Consistency, Accuracy), Version control, Retention period

Analyzation

Analyzation

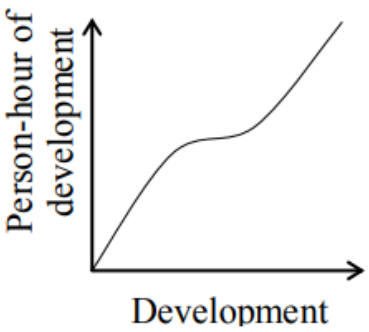
- Analyzed 6 questions
- Covered most recent years
  - 2021 Q1 Exam
  - 2021 Q2 Exam

Questions

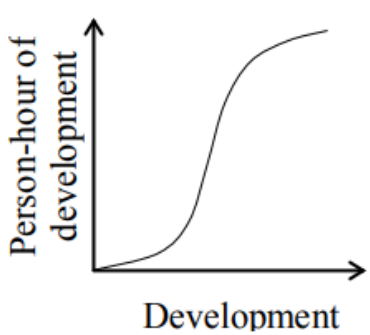
Question 1

Q1. (q4-20) Which of the following is a graph that indicates the relationship between development scale and person-hour of development for software?

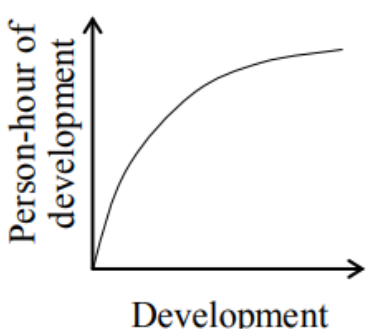
a)



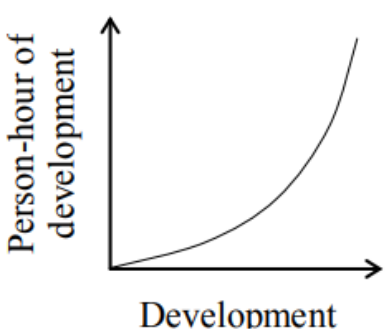
b)



c)



d)



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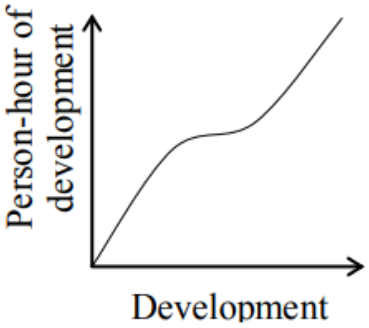
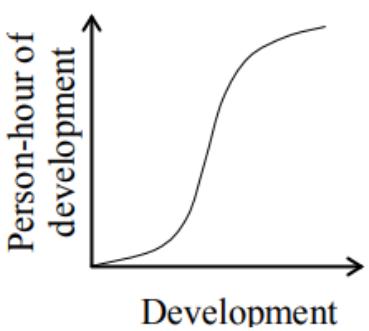
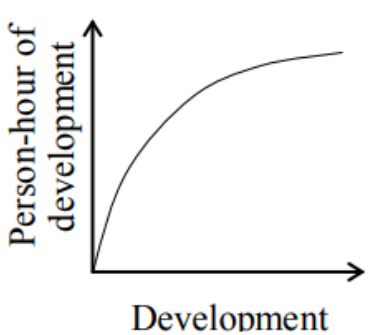


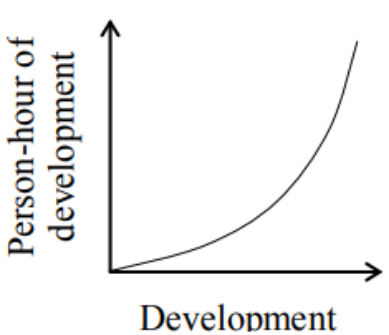
b)



c)



d)



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- Option d)

Question 1: Answer Explanation

For the relationship between the development scale and workload (i.e., person-hours) in software development, it is known that an increase in development scale will generally increase the person-hours of development exponentially; that is, as the development scale increases, the increase in person-hours of development is dramatically huge. Therefore, the graph shown in d) is correct. In addition, a) is incorrect because an increase in person-hours of development has slowed down at the middle point, while b) and c) are incorrect because the increase in person-hours of development is slowing down as the development scale increases.

Question 2

Q2. (q4-21) Which of the following is an explanation of CMMI?

a. It is a model for evaluating the maturity level of a software development organization and project processes.

b. It is a type of process model for software development.

c. It is a common frame for software-based system development and transactions.

d. It is a model that defines the procedure of software development according to the maturity level of a project.

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Question 2: Answer Explanation: Slide I

CMMI (Capability Maturity Model Integration) is essentially a model developed by adding an interface with hardware development to CMM (process maturity model), which is for software development. None of the answers describes the details entirely. However, description of a) is an explanation of CMM, which forms the basis of CMMI. As none of the answers from b) through d) are related to CMMI, the correct answer is a). In addition, CMM is a process evaluation method defined by Software Engineering Institute of Carnegie Mellon University of the United States. Like CMM, in CMMI also, maturity of development process is evaluated with the following 5-stage evaluation criteria.

- Level 1: The initial stage where no processes are established.
- Level 2: Although individual processes are managed, they are not organized.

Question 2: Answer Explanation: Slide II

- Level 3: The experience of each individual is collected and documented, and a consistent standard processes are established for the organization.
- Level 4: Standardized processes are quantitatively measured and analyzed.
- Level 5: Standardized processes are optimized and improved according to the difference in technology and requirements of the environment.

To analyze other options:

- b) "Process model for software development" refers to a model like the waterfall model and growth model, where the method for proceeding with development work is modeled.
- c) "Common frame for software-based system development and transactions" stipulates the mechanism of a common software lifecycle process for clear specification development and transactions. At present, the revised SLCP-JCF 2007 is the latest version.

Question 2: Answer Explanation: Slide III

- d) No such model exists.

Question 3

Q3. (q4-22) JIS X 0160 (Software Life Cycle Process) stipulates not only the responsibilities of a supplier in a software transaction but also the responsibilities of a buyer. Which of the following is appropriate as the responsibility of a buyer?

a. Clear specification of acceptance criteria and procedures
b. System operations
c. Correction of product defects
d. Implementation of an internal quality audit

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Question 4

Q4. (q4-23) Which of the following is a technique that analyzes source code or object code, and extracts information about program specifications and design?

a. Reengineering
b. Restructuring
c. Reverse engineering
d. Refactoring

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Theme: Software Development Management Techniques, Category: FE

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Question 4: Answer Explanation

The technique of extracting information about the design and specifications of a program by analysis of the source code or the object code is called reverse engineering. Therefore, c) is the correct answer.

- a) Reengineering refers to revision of the existing organization structure and rules, and redesign of the business flow and job duties, management mechanism, or information systems for corporate restructuring from the viewpoint of processes.
- b) In Japan, restructuring is generally considered to be a reduction of the workforce. In correct terms, it not only means a reduction of the workforce, but also includes transforming the management structure by rearranging the business structure.
- d) Refactoring refers to a manual modification of source code so that it does not affect or change the execution results of the program.

Question 5

Q5. (q4-24) When programs are written in Java, which of the following specifications is used to create frequently-used functions and other features as reusable components?

a. JavaBeans
b. JavaScript
c. Java application
d. Java applet

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Theme: Software Development Management Techniques, Category: FE

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b. JavaScript
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Question 5: Answer Explanation

- "JavaBeans" refers to the specifications of software components that can be used from a Java program. Individual software components are called Beans. Just as coffee is made from many beans, this originated from the concept of creating a Java program using components (JavaBeans) that can be reused. Therefore, a) is the correct answer.
- b) JavaScript is a different language to Java.
- c) Java application refers to a program developed in Java.
- d) Java applet refers to a small program written in Java. It is downloaded from the server and then executed on the client side. Applet is a composite word of application and –let, and it means a "small application."

Question 6

Q6. (q4-25) Which of the following is the most appropriate description of maintenance management in the development environment for an embedded system that is used in the development of a certain product?

a. Even if the development environment is not used frequently, it should be maintained by upgrading to the latest development environment.

b. As the development environment will not be needed again after the product is developed, maintenance of the development environment is not necessary.

c. Irrespective of the frequency of use, the development environment should be maintained by checking operations periodically.

d. A development environment borrowed from a rental company is maintained indefinitely under the rental company's responsibility.

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Question 6: Answer Explanation: Slide I

- The most important point to be considered concerning maintenance of a development environment after product development is the consideration of reuse during the product maintenance phase, and maintenance of the development environment as it is in the development phase so that it can be used without any delay when required. Therefore, conducting periodic operation checks is important. Accordingly, c) is the correct answer.
- a) Updating the development environment after product development to the latest condition may lead to a situation where the environment for generating the same modules as during development cannot be maintained.
- b) This is not appropriate in consideration of the product maintenance phase and the possibility of the subsequent development of similar products.

Question 6: Answer Explanation: Slide II

- d) It is difficult to assume this situation because it depends on contract terms and conditions with the rental company, including duration.

Any Questions?

References

 IT Fundamentals (New FE Textbook Vol. 2)