# Must-know Knowledge of “Software Engineering and Management”

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# Fundamental to SEM

1. List at least five principles of seven Engineering Principles. 列出七項工程原則中的至少五項原則。

**原則一：建立標準作業程序**

作業程序及步驟要定義的很明確與可行，並依照所制訂的程序來執行，並持續檢討與優化SOP。

**原則二：分解**

將一個複雜的大需求或問題分解成階層式的小需求或小問題，方能找出其處理方法。

**原則三：模組化**

將上述小問題的解決方案於以模組化，以利未來的重複使用，以達提昇生產力目標。

**原則四：遞增法**

將上述階層式的分解結構圖依其重要性先完成較重要的部分，在確認沒問題後逐步遞增完成大系統的建置。

**原則五：預視改變**

在處理目前的問題時，需要想到未來問題與環境等是否會變動，亦即要有風險/不確定的意識，並能及時作好規劃。

**原則六：焦點分離**

將一個複雜的問題分為不同的層次或構面來處理，而不同的層次或構面需要專注與聚焦在各自要處理的問題上。

**原則七：通用性**

將一個特定問題的解決方法於以通用性，使其能適用在一 般性問題的解決，達到再使用與擴大其效益。

1. What are the four natures/essences for a software development project. 軟體開發專案的四種性質/本質是什麼。

軟體開發的本質

從「問題」到「答案」 從「程式」到「系統」

從「人腦」到「電腦」 從「個人」到「團隊」

1. How to define a good quality application software? 如何定義一個優質的應用軟體？

**Functional requirement / 功能性需求**

Accuracy / 正確

Completeness / 完整

Etc.

**Non-Functional Requirements / 非功能性需求**

Performance / 效能

Ease of Use / 易用性

Reliability / 可靠性

Maintainability / 維護性

Security / 安全性

Portability / 可移植性

1. What is the theory of triple constraint in project management? 專案管理中的三重約束理論是什麼？

**成本**（符合預算（如本）、價廉）

**時間**（準時交付（如期）、交付或上市時間）

**品質**（優異品質（如質）、物美）

1. What is scope creep and ripple effect in software engineering? 什麼是軟體工程中的範圍蠕變和漣漪效應？

scope creep：增加未經授權的新產品、要求或工作的附加特性或功能（即超出商定的範圍）。

ripple effect：連鎖反應指標顯示了**軟體變更將對系統的其餘部分產生什麼影響**，連鎖反應的計算是基於**單一變數的變更對程式其餘部分的影響**；可稱之為**程序複雜性的衡量標準**。

1. List at least 6 knowledge areas (KA) in “Guide to SWEBOK”. 在“SWEBOK 指南”中列出至少 6 個知識領域 （KA）。
2. Software Requirement軟體要求
3. Software Design軟體設計
4. Software Construction軟體構建
5. Software Testing軟體測試
6. Software Maintenance軟體維護
7. Software Configuration Management 軟體配置管理
8. Software Engineering Management 軟體工程管理
9. Software Engineering Process軟體工程流程
10. Software Engineering Models and Methods軟體工程模型和方法
11. Software Quality軟體品質
12. Software Engineering Professional Practices軟體工程專業實踐
13. Software Engineering Economic軟體工程經濟
14. Computing Foundations計算基礎
15. Mathematical Foundations數學基礎
16. Engineering Foundations工程基礎

# Software Process

1. List three generic software development process models? 列出三種通用的軟體開發流程模式？

Waterfall mode

Incremental model

Agile model

Iterative model

1. What are four fundamental activities that are common to all software processes?

所有軟體流程共有的四項基本活動是什麼？

Specification – defining what the system should do;

規範－定義系統應該做什麼

Design and implementation – defining the organization of the system and implementing the system;

設計與實施－定義系統的組織並實施系統

Validation – checking that it does what the customer wants;

驗證－檢查它是否符合客戶的要求

Evolution – changing the system in response to changing customer needs

進化－改變系統以回應不斷變化的客戶需求

1. List the common components in the definition of process description. 列出流程描述定義中的公共元件。

Work / Final Products : which are the outcomes of a process activity

工作/最終產品：是過程活動的結果

Roles : which reflect the responsibilities of the people involved in the process

角色 ：反映參與流程的人員的職責

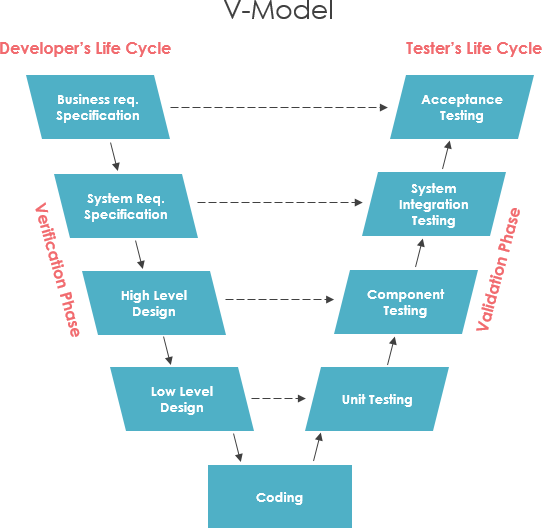
Pre-and post-conditions : which are statemments that are true before and after a process activity has been enacted or a product produced.

前置條件和後置條件：在流程活動頒布或產品生產之前和之後的狀態。

Operation Procedure : a set of written instructions that decribes the step-by-step process taken to properly perform a sepfific activity.

操作程式 ：一組書面說明，描述了正確執行安全活動所採取的分步過程。

1. What is “V model” in software engineering? 什麼是軟體工程中的「V模型」？

V 模型代表了一個開發過程，可以被視為**瀑布模型的擴展**。在編碼階段(coding)之後，**製程步驟不再以線性方式向下移動，而是向上彎曲，形成典型的 V 形**。 V 模型展示了開發生命週期(Developer’s life cycle)的每個階段與其所對應的測試階段(Tester’s life cycle)之間的關係。

1. List two often used approaches coping with software changes due to its inevitable nature.

由於軟體變更不可避免，請列出兩種常用的因應方法。

1. List principal factors affecting the choice of plan-based or agile software development.

列出影響選擇計劃或敏捷軟體開發的主要因素

# Agile Software Developemnt

1. What’s Manifesto for Agile Software Development?
2. List at least five principles of agile methods.
3. List at least six practices or techniques that were introduced in extreme programming (XP)?
4. Why has the Scrum agile method been widely adopted in the practice of software development industry?
5. For what types of system particularly are agile development approaches likely to be successful?
6. List four practical problems with agile software development.
7. List three questions that should be asked when deciding whether or not to adopt an agile method of software development.
8. Drawing the SCRUM workflow to illustrate three roles, three artifacts, and three ceremonies.
9. Why is ScrumBan widely adopted in APP development?

# Capability Maturity Model Integration (CMMI)

1. What are the three models of SEI Capability Maturity Model Integration (CMMI) V1.3?
2. List five Maturity Levels (ML) in the CMMI V1.3 model.
3. List four Capability Levels (CL) in the CMMI V1.3 model.
4. List four categories of process areas in the CMMI-DEV V1.3 model.
5. List at least five process areas at ML2 in the CMMI-DEV V1.3 model.
6. List at least five process areas at ML3 in the CMMI-DEV V1.3 model.
7. List at least six generic practices within Generic Goal 2.
8. List two generic practices within Generic Goal 3. (2%)
9. What’s the distinction between stage and continuous representations in the SEI’s CMMI model?
10. What’s the definition of “Defined Process” in the CMMI model?
11. What are the practices to be done for REQM PA to certify CL 1?
12. What’s the distinction between the generic goal and specific goal in the SEI’s CMMI model?
13. What is the meaning of “Process Institutionalization” in the CMMI model?
14. Explain the following English abbreviations “SCAMPI, IDEAL, PAL, PIID”. What are they used for?