UNIT III
Information System Development

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Information System Development

- Without an information system, a company can take a lot of time and energy in the decision-making process.
- However, with the use of IS, it's easier to deliver all the necessary information and model the results to make better decisions

Process of System Development

- System development process – a set of activities, methods, best practices, deliverables, and automated tools that stakeholders (Chapter 1) use to develop and continuously improve information systems and software (Chapters 1 and 2).
  - Many variations
  - Using a consistent process for system development:
    - Create efficiencies that allow management to shift resources between projects
    - Produces consistent documentation that reduces lifetime costs to maintain the systems
    - Promotes quality

Capability Maturity Model (CMM)

- CMM was developed and is promoted by the software engineering institute (SEI), a research and development center.
- It is **not a software process**. CMM is used as a benchmark to **measure the maturity** of an organization's software process
- Capability Maturity Model (CMM) – a standardized framework for assessing the maturity level of an organization's information system development and management processes and products. It consists of five levels of maturity:
  - Level 1—Initial
  - Level 2—Repeatable
  - Level 3—Defined
  - Level 4—Managed
  - Level 5—Optimizing

Capability Maturity Model (CMM)

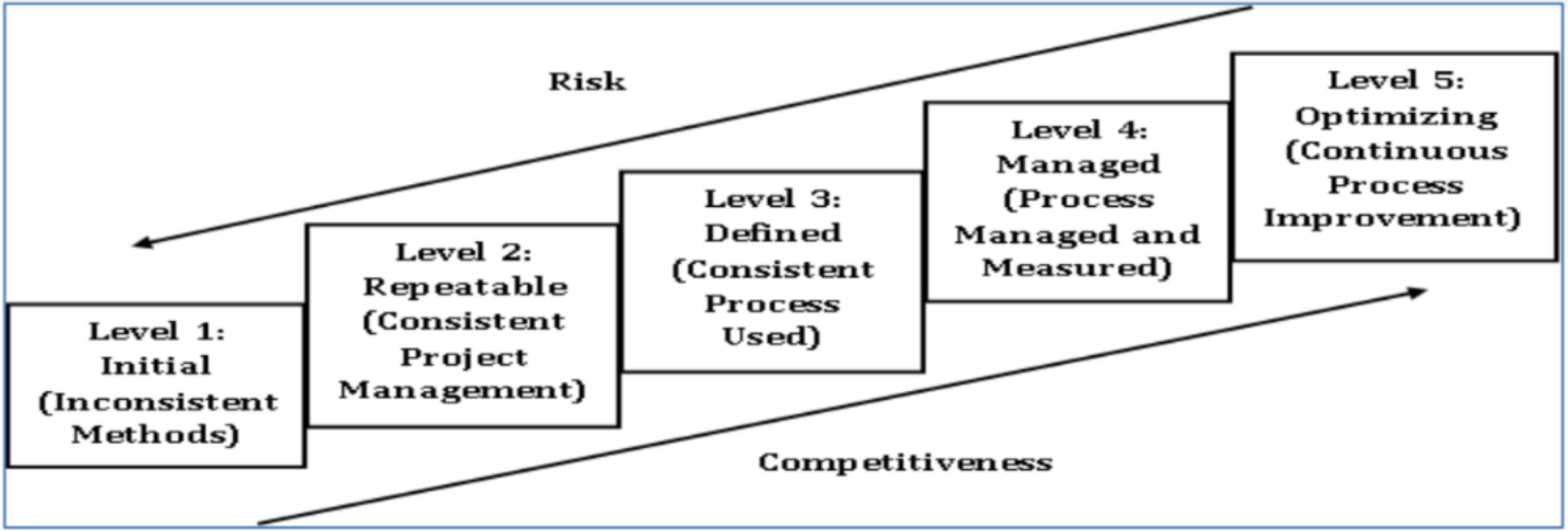


Fig: The Capability Maturity Model (CMM)

Level 1—Initial

- **Work is performed informally**
- A software development organization at this level is characterized by **ad hoc activities**(organization is not planned in advance).
- System development projects follow no prescribed process

Level 2—Repeatable

- **Work is planes and tracked**
- This level of software development organization has a basic and consistent project management processes to **track cost , schedule, and functionality**. The process is in place to **repeat** the earlier successes on projects with similar applications.
- Project management processes and practices are established to track project costs, schedules, and functionality

Level 3—Defined

- **Work is well-Defined**
- At this level the software process for both management and engineering activates are **Defined** and **document.**
- A standard system development process (sometimes called a “methodology”) is purchased or developed. All projects use a version of this process to develop and maintain information systems and software.

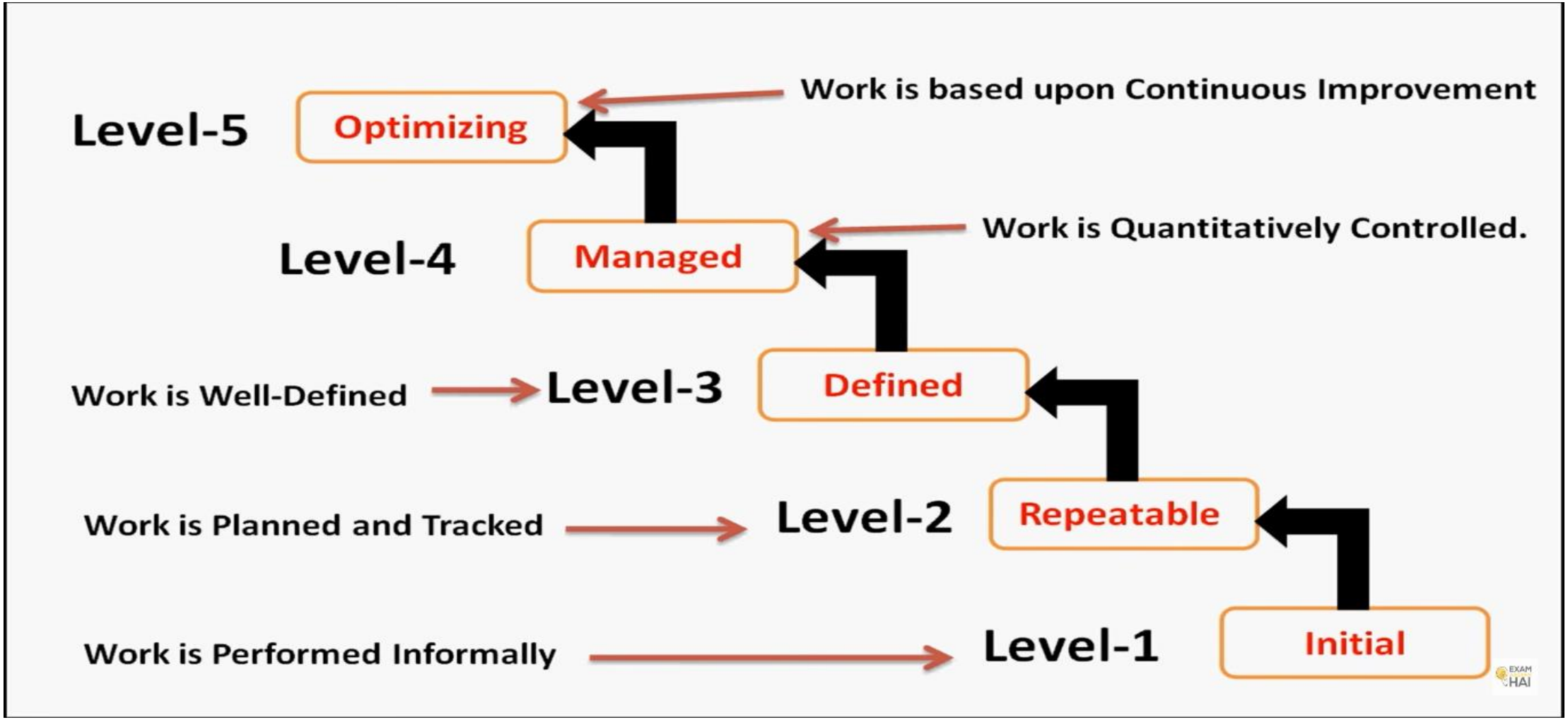
Level 4—Managed

- **Work is Quantitatively controlled**
- Measurable goals for quality and productivity are established.
- **Software quality management**
  - Management can effectively control the software development effort using precise measurements. At this level, organization set a quantitative quality goal for both software process and software maintenance.
- **Quantitative process management**
  - At the maturity level, the performance of processes is controlled using statistical and other quantitative techniques, and is quantitatively predictable

Level 5—Optimizing

- **Work is based upon continuous improvement**
- The key characteristic of this level is focusing on **continuously improving process** performance . Key features are:
  - **Process change management**
  - **Technology change management**
  - **Defect prevention**
- The standardized system development process is continuously monitored and improved based on measures and data analysis established in Level 4.

Summary – CMM


Level-5
Optimizing
Work is based upon Continuous Improvement
Level-4
Managed
Work is Quantitatively Controlled.
Work is Well-Defined
Level-3
Defined
Work is Planned and Tracked
Level-2
Repeatable
Work is Performed Informally
Level-1
Initial

Life cycle vs Methodology

- System life cycle – the factoring of the **lifetime of an information system** into two stages,
  (1) systems development and
  (2) systems operation and maintenance.
- System development methodology – a standardized development process that defines (as in CMM Level 3) **a set of activities, methods, best practices, deliverables, and automated tools** that system developers and project managers are to use to develop and continuously improve information systems and software.

Life cycle vs Methodology

- A **life-cycle** is a set of phases that an effort goes through to be completed (that effort could be a product, a project, or almost anything)
- A **Lifecycle** helps you by telling you what sequence do things in, and what has to be done at each step.
- A **methodology** is a more specific way of solving a particular kind of problem - a methodology may or may not be associated with a life-cycle at all.
- A **methodology** has no sequence, and focuses on HOW things get down.

Underlying principle for software development

The general principles for system development are:

- Get the system users involved in system development
- Use a problem solving approach
- Establish phases and activities
- Create documents throughout the development
- Establish standards
- Manage the process and projects
- Justify information system as capital investments
- Don’t be afraid to cancel or revise scope
- Divide and conquer
- Design systems for growth and changes

A Systems Development process

Where Do Systems Development Projects Come From?

Where Do Systems Development Projects Come From?

- **Problem** – an **actual undesirable situation** that prevents the organization from fully achieving its purpose, goals, and/or objectives.
- **Opportunity** – a **chance to improve** the organization even in the absence of an identified problem (using PIECES framework).
- **Directive** - a **new requirement** that is imposed by management, government, or some external influence/parties.

Problem-Solving Approach

- Study and understand the problem, its context and its impact.
- Define the requirements that must be meet by solution.
- Identify candidate solution that fulfill the requirements and select the "best solution".
- Design and/or implement the chosen solution.
- Observe and evaluate the solution impact and refine the solution correspondingly.

Problem-Solving

What “problems” to solve: (Project Definition)

– True problem situations, either real or anticipated, that require corrective action

– Opportunities to improve a situation despite the absence of complaints

– Directives to change a situation regardless of whether anyone has complained about the current situation

PIECES Framework for Systems Improvement

PIECES Framework method is **a framework containing the categories of classification and problem-solving problems**

P the need to improve **performance**

I the need to improve **information** (and data)

E the need to improve **economics**, control costs, or increase profits

C the need to improve **control** or security

E the need to improve **efficiency** of people and processes

S the need to improve **service** to customers, suppliers, partners, employees, etc.

THE FAST PROJECT PHASES

- It is a system development methodology.
- This term FAST is widely used in information system engineering.
- FAST stands for Framework for the Application System Thinking.
- It is a hypothetical methodology used to demonstrate a representative systems development process.
- Each methodology will use different project phases.
- It is not real world commercial methodology.
- It is developed as a composite of the best practices encountered in many reference and commercial methodologies.
- It also referred to as eight step methodology. Number of phases vary from one methodology to another.

THE FAST PROJECT PHASES

- Each phase produces deliverables that are passed to the next phase. The FAST methodology employs eight phases:
  - Scope definition
  - Problem analysis
  - Requirement analysis
  - Logical design
  - Decision design
  - Physical design
  - Construction and testing
  - Installation and delivery

Project Phases

- **FAST** - (Framework for the Application of Systems Thinking) a hypothetical methodology used throughout this book to demonstrate a representative systems development process.
- Each methodology will use different project phases.

FAST Phases	Classic Phases (from Chapter 1)			
	Project Initiation	System Analysis	System Design	System Implementation
Scope Definition	X			
Problem Analysis	X	X		
Requirements Analysis		X		
Logical Design		X		
Decision Analysis	(a system analysis transition phase)			
Physical Design and Integration			X	
Construction and Testing			X	X
Installation and Delivery				X

CROSS LIFE CYCLE ACTIVITIES

- Cross life cycle activities are activities that overlap many or all phases of the methodology.
  - Fact-finding (Problem analysis, data analysis, testing, etc.)
  - Documentation and presentation
  - Feasibility analysis
  - Process and project management
  - Change management Quality Fact finding

CROSS LIFE CYCLE ACTIVITIES -- Fact-finding

- Also called **information gathering or data collection**.
- It is the formal process of using research, interviews, meetings, questionnaires, sampling, and other techniques to collect information about systems, requirements, and preferences.

CROSS LIFE CYCLE ACTIVITIES --Documentation and presentation

- Communication skills are essential to the successful completion of a project.
- Two forms of communication that are common to systems development projects are documentation and presentation
- Documentation is the activity of recording facts and specifications for a system.
- Presentation is the related activity of formally packaging documentation for review by interested users and managers. Presentations may be either written or verbal.

CROSS LIFE CYCLE ACTIVITIES --Feasibility analysis

- A system development life cycle that supports our creeping commitment approach to systems development recognizes feasibility analysis as a cross life cycle activity.
- Feasibility is a measure of how beneficial the development of an information system would be to an organization.
- Feasibility analysis is the activity by which feasibility is measured.

CROSS LIFE CYCLE ACTIVITIES --Process and project management

- Project management is the ongoing activity by which an analyst plans, delegates, directs, and controls progress to develop an acceptable system within the allotted time and budget.
- The systems development life cycle provides the basic framework for the management of systems projects.
- Project management tools help to plan system development activities, estimate, and assign resources, schedule activities.
- Process management's intent is to standardize both the way we approach projects, and the deliverables we produce during projects.
- Process management is an ongoing activity that establishes standards for activities, methods, tools, and deliverables of the life cycle.
- Process management tools help us document and manage a methodology, routes and quality management standards.

CROSS LIFE CYCLE ACTIVITIES -- Change management Quality Fact finding

- It is concerned with phase's activities, deliverables quality standard that should be consistently applied to all projects.

Sequential Development vs Iterative Development

Sequential Development	Iterative Development
It is an approach for a system development that completes each phase one after another.	It is an approach for a system development that completes entire information system in successive iterations.
It is system for developing software where in development flows, waterfall-like. (only once each stage)	It follows the fall life cycle several times within a single project.
It is sometimes called waterfall model.	It is sometimes called Incremental development process.
It has principle of completing in detail, each stage before moving on to next.	It has principle of risk analysis and risk management.