UIT VNUHCM University of Information Technology

# QUALITY ASSURANCE
# CMMM & ISO


1. ThS. Nguyễn Công Hoan
2. TS. Nguyễn Tấn Trần Minh Khang

# CONTENT

- Quality Management Standard: ISO
- ISO 9000 2000
- Capability Maturity Model Integration: CMMI

# What is ISO 9001 : 2000 ?

- What is ISO ?
  - ISO stands for International Organization for Standardization
  - ISO is located in Geneva - Switzerland and was officially established in 1947 to develop common international standards in many areas.
- What is ISO 9000 : 2000
  - ISO 9000 : 2000 is developed by ISO
  - **Being process standards (not product standards)**
  - Term ISO 9000 refers to a set of quality management standards.

# What is ISO 9001 : 2000 ?

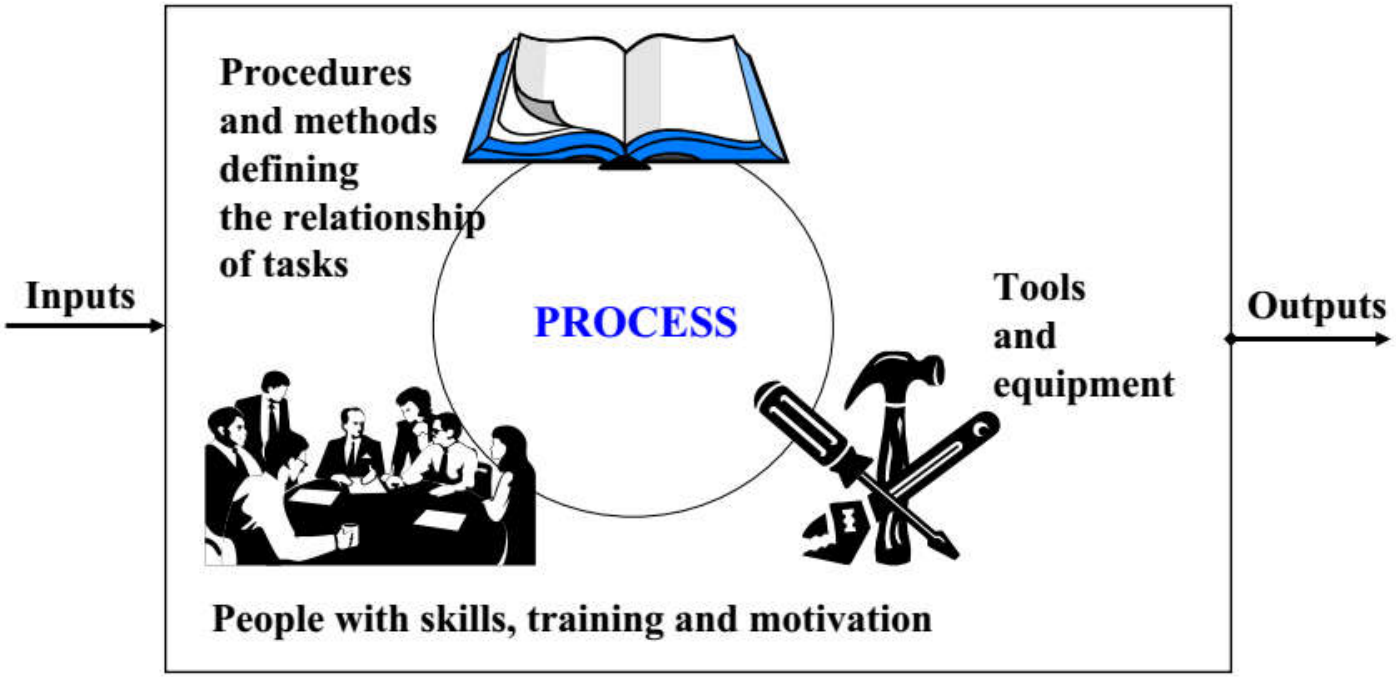
- Term ISO 9000 refers to a set of quality management standards.
- ISO 9000 currently includes three quality standards:
  - ISO 9000:2000 - Fundamentals and Vocabularies
  - ISO 9001:2000 - Requirements
  - ISO 9004:2000 - Guidance for performance improvement
- First published in 1987, revised in 1994, and then updated in 2000.
- The ISO 9000 2000 Standards apply to **all kinds of organizations in all kinds of areas**

# Why is ISO 9000 Important ?

- ISO 9000 is important because of its International orientation and Systemic orientation
  - **International orientation**: Currently, ISO 9000 is supported by national standards bodies from more than 120 countries.
  - **Systemic orientation**: motivation and right attitude are not enough, “if you want to have a quality attitude you must have a quality system”

# Process approach: what is process?

– An activity using resources, and managed in order to enable the transformation of inputs into outputs, can be considered as a process




Note: A process description is not a process

# What is a software process?

- A software process can be defined as a set of activities, methods, practices and transformations that people employ to develop and maintain software and the associated products.

"The quality of a software system is governed by the quality of the process used to develop and evolve it."

# Quality Management Principles

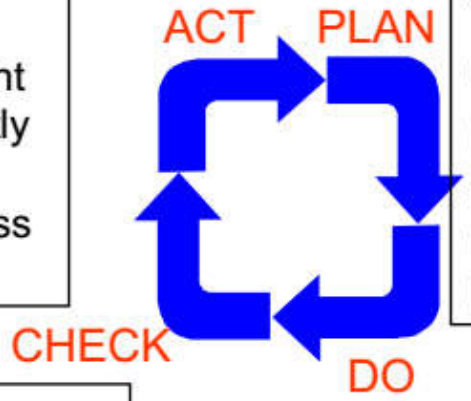
- ISO 9000 2000 standards are based on eight quality management principles:
  1. Focus on your customers
  2. Provide leadership
  3. Involve your people
  4. Use a process approach
  5. Take a systems approach
  6. Encourage continual improvement
  7. Get the facts before you decide
  8. Work with your suppliers

# The PDCA process management cycle

– The ISO 9001:2000 Quality Management System embraces the **P - D - C - A** continual improvement

**Clause 8: Measurement, analysis and improvement**

Acting upon data identified in the check cycle, the suggestions for improvement can be implemented - directly or when fed into the Management Review process (Clause 5.6)




**Clause 5: Management Responsibility**

Everything flows from management who define the requirements for the system

**Clause 6: Resource Management**

From these requirements the resources will be identified and management must ensure they are provided and applied within the system

**Clause 8: Measurement, analysis and improvement**

The results will be measured, analyzed and opportunity for improvement identified

**Clause 7: Product realization**

The necessary processes are established and carried out

# Five Main Sections

4. Quality Management System
5. Management Responsibility
6. Resource Management
7. Product realization
8. Measurement, analysis and Improvement

# Clause 4-Quality management system

- 4.1 General **Requirements**
  - Must define and manage processes;
  - Must define the interaction of these processes, and
  - Must improve the quality management system itself
- 4.2 **Documentation** Requirements
  - 4.2.1 General
  - 4.2.2 Quality Manual
  - **4.2.3 Control of Documents**
  - **4.2.4 Control of Quality Records**

# Clause 5 - Management responsibility

5.1 Management Commitment

5.2 Customer Focus

5.3 Quality Policy

5.4 Planning

5.5 Responsibility, Authority, and Communication

5.6 Management Review

# Clause 6 - Resource management

University of Information Technology

6.1 Provision of Resources

6.2 Human Resources

6.3 Infrastructure

6.4 Work Environment

# Clause 7 - Product realization

7.1 Planning of Product Realization

7.2 Customer-related Processes

- 7.2.1 Determination of Product Requirements
- 7.2.2 Review of **Product Requirements**
- 7.2.3 **Customer Communication**

7.3 Design and Development

- **7.3.5 Design and Development Verification**
- **7.3.6 Design and Development Validation**
- 7.3.7 Design and Development Changes

7.4 Purchasing

- 7.5 Product and Service Operations
- 7.5.3 Product and Service Provision, Identification and Traceability
- 7.5.5 Product and Service Provision, Preservation of Product
- 7.6 Control of Measuring and Monitoring Devices

# Clause 8-Measurement, analysis & improvement

- 8.1 General
- 8.2 Monitoring & Measurement
  - **8.2.1 Internal Audit**
- 8.4 Analysis of Data
- 8.3 Control of Non-conforming Products
- 8.5 Improvement
  - 8.5.1 Continual Improvement
  - **8.5.2 Corrective Action**
  - 8.5.3 Preventive Action

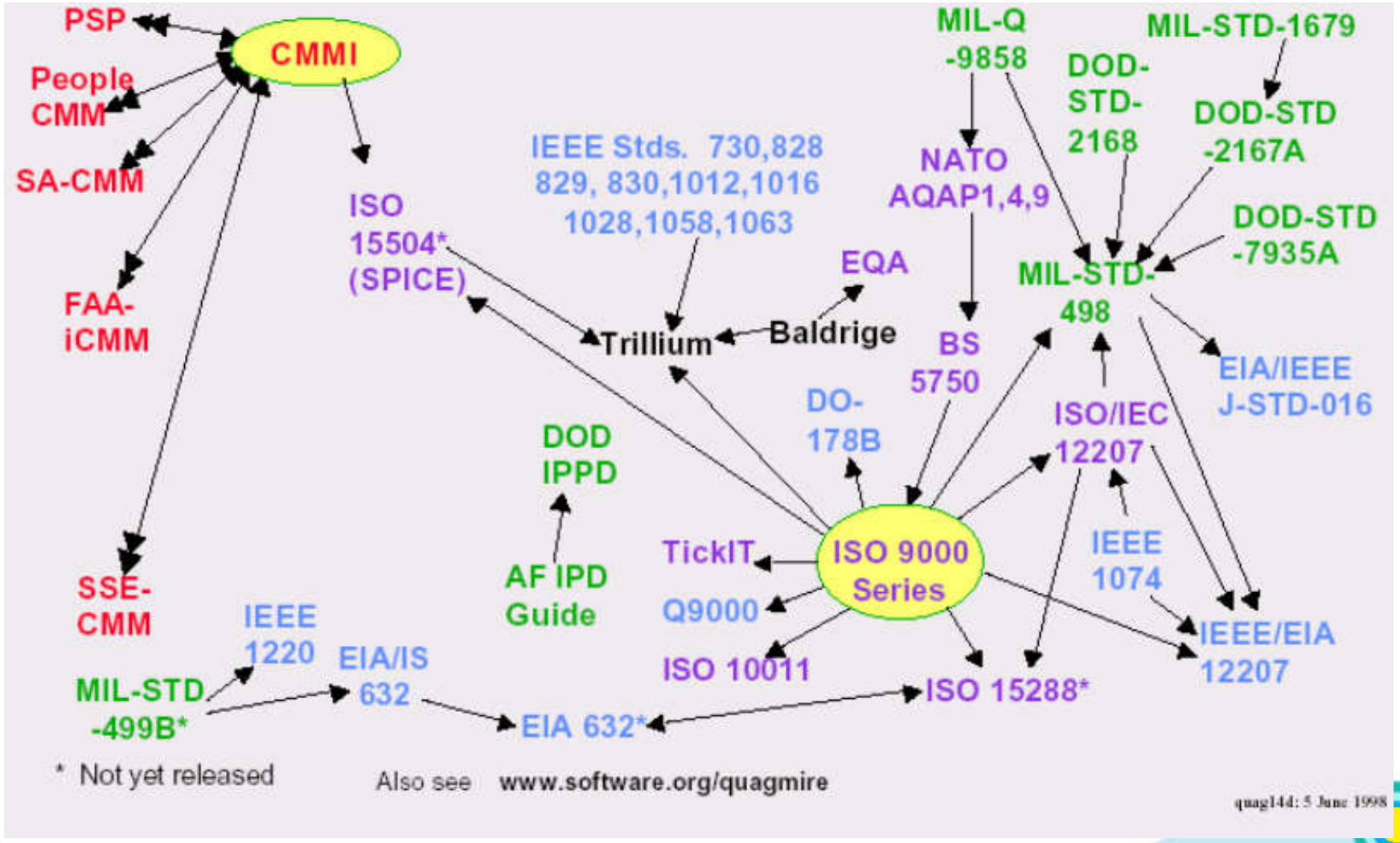
# What is CMMI?

- **CMMI** stands for **Capability Maturity Model Integration**
- Developed by Software Engineering Institute (SEI - USA)

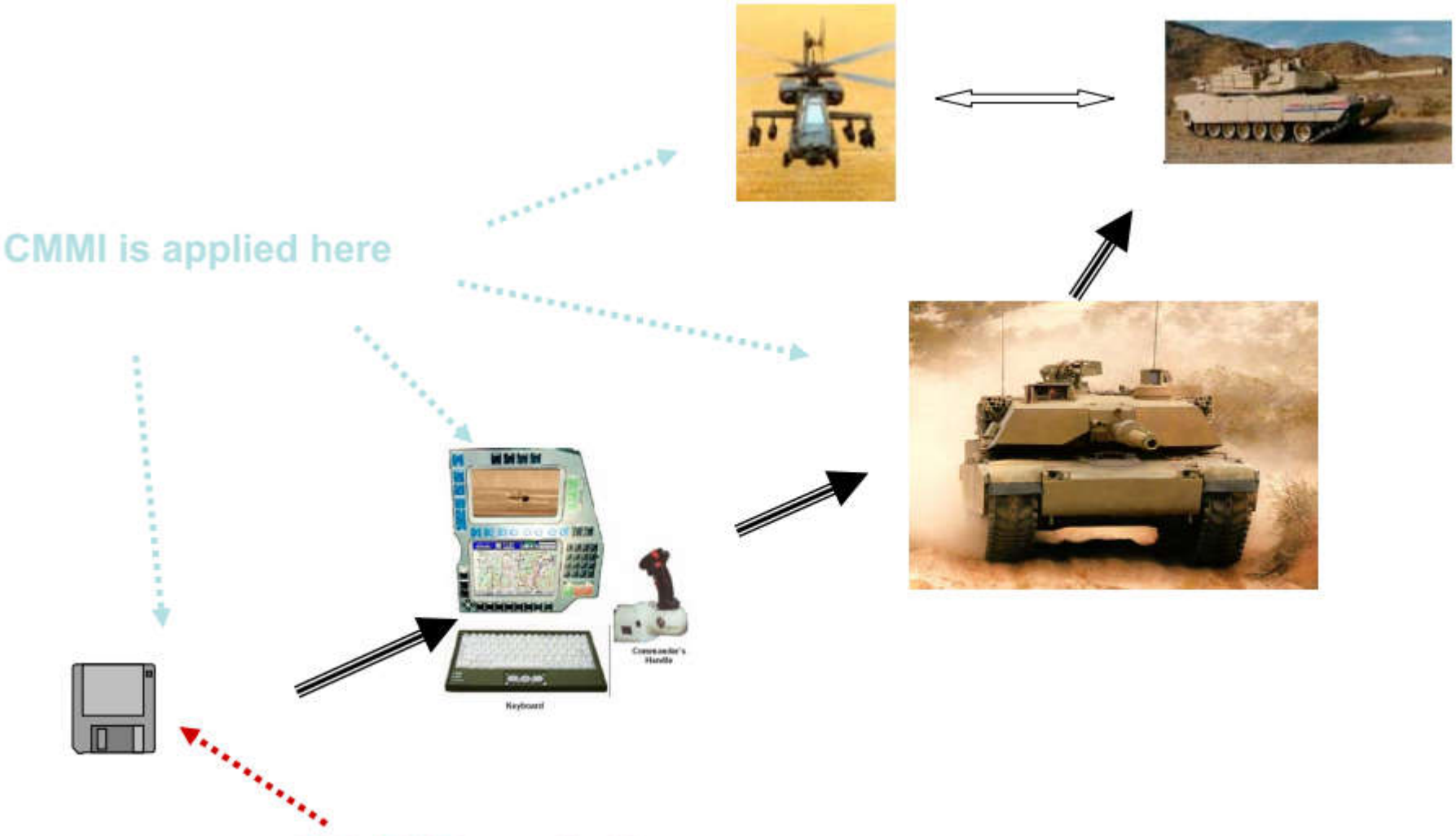
Is CMMI a software engineering process?

**NO !** CMMI model provides guidance/best practices to use when developing processes. CMMI model is not processes or process descriptions

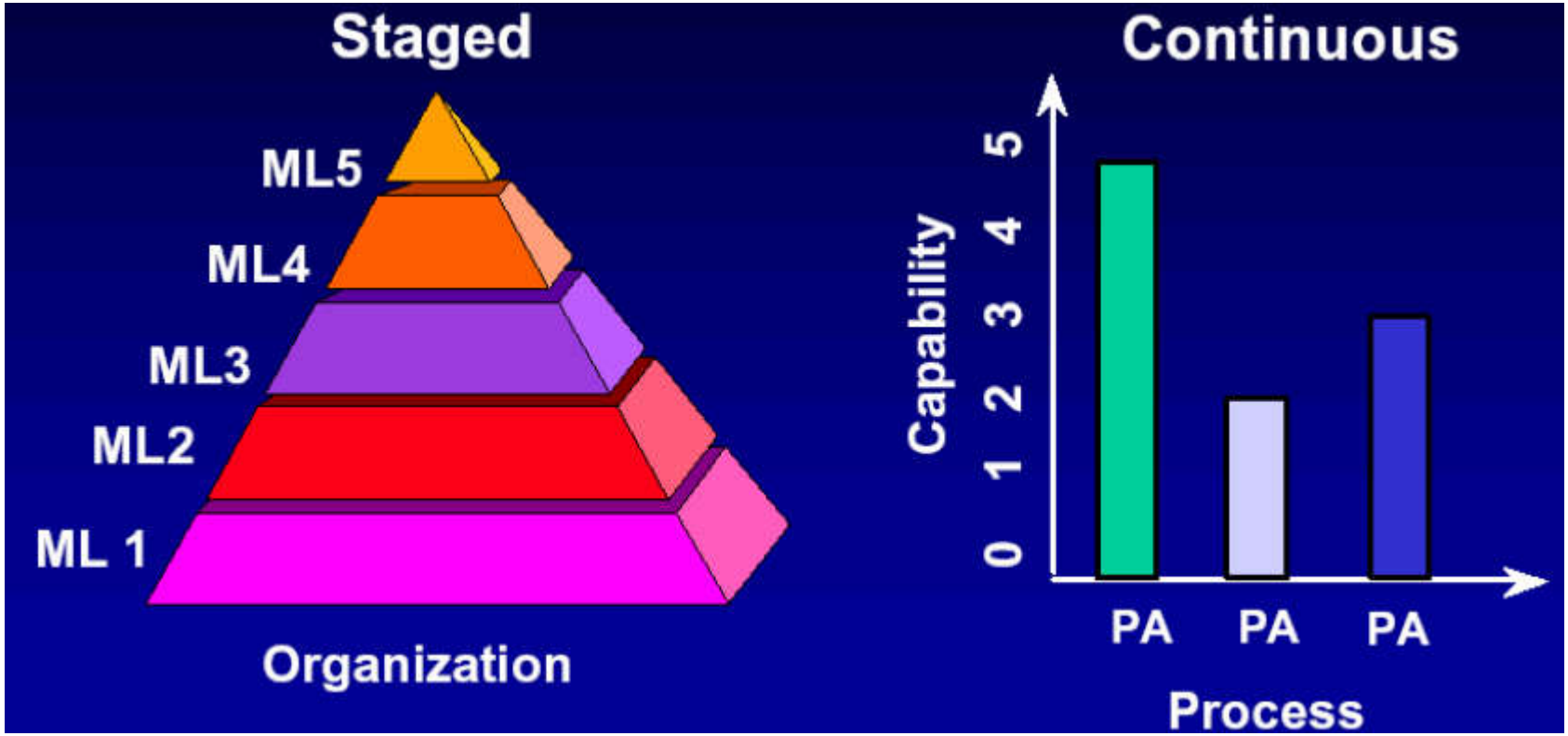
# The Frameworks Quagmire



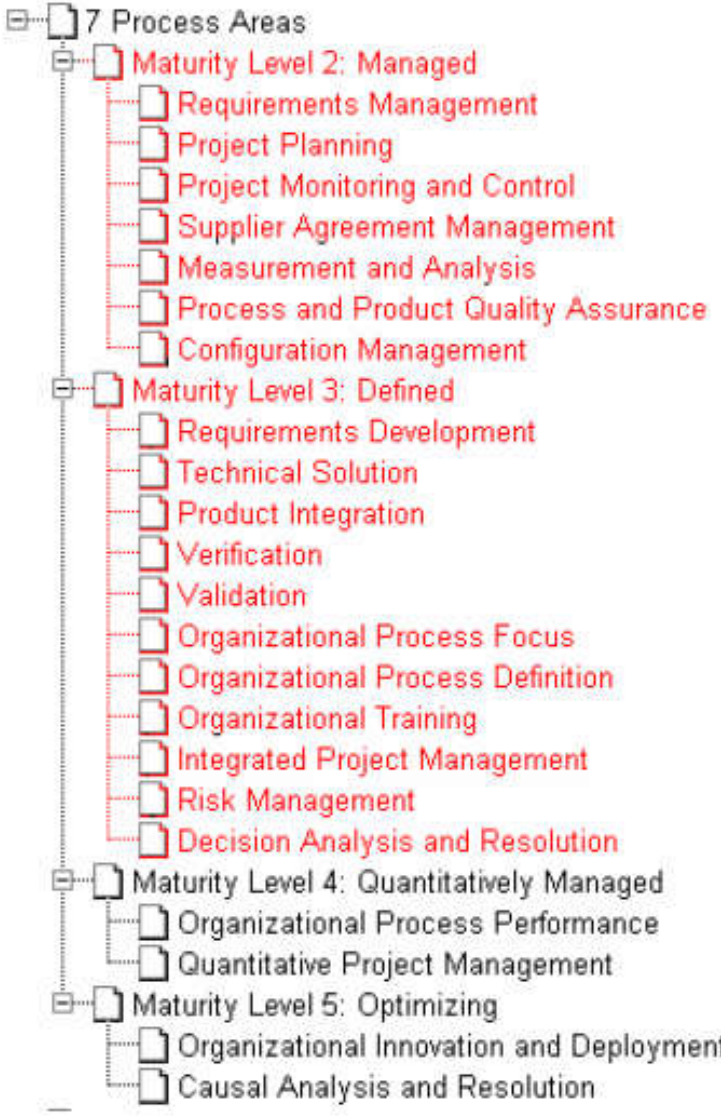
# Focus of CMMI



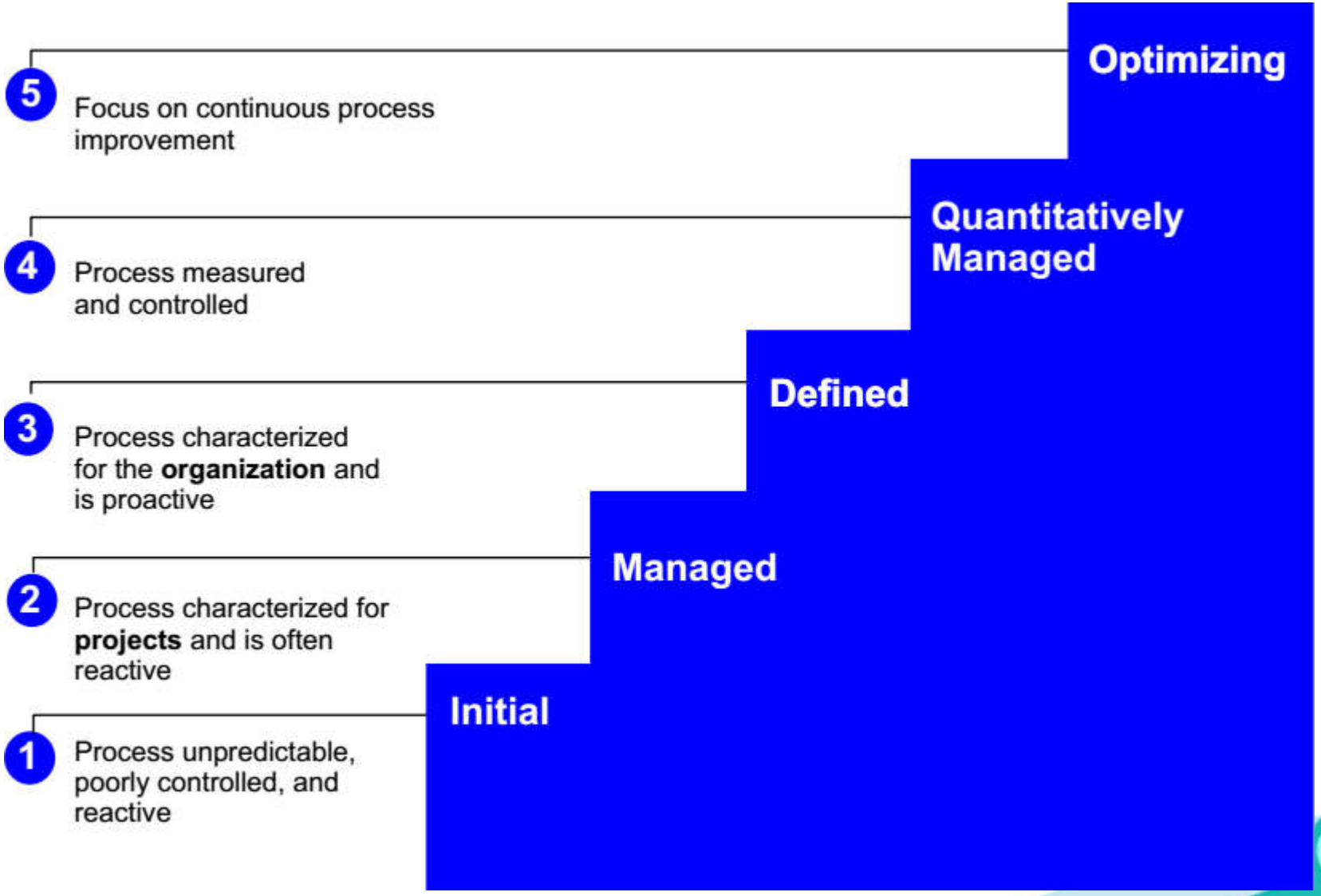
# Staged vs Continuous



# Staged vs Continuous

# CMMI - The Maturity Levels



# Process Areas


**Optimizing (5)**
- Causal Analysis and Resolution (CAR)
- Organizational Innovation and Deployment (OID)

**Quantitative (4)**
- Quantitative Project Management (QPM)
- Organizational Process Performance (OPP)

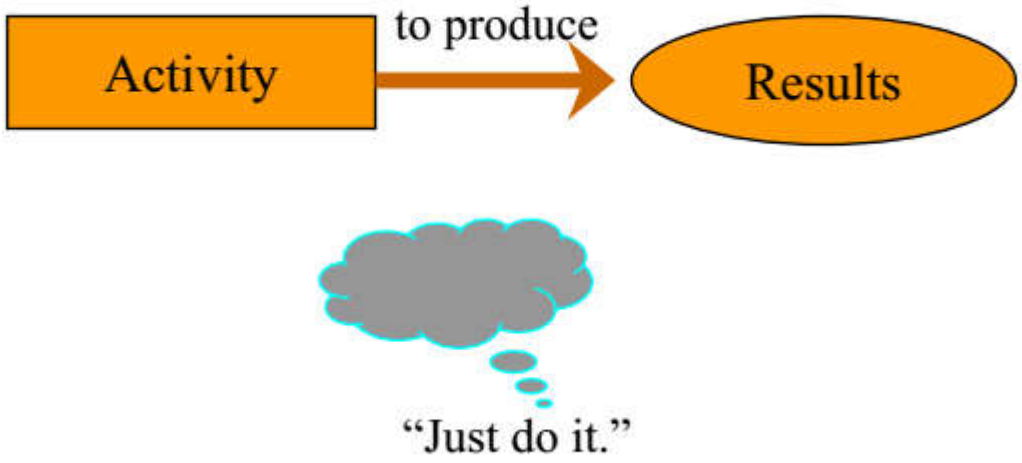
**Defined (3)**
- Requirements Development (RD)
- Technical Solution (TS)
- Product Integration (PI)
- Verification (VER)
- Validation (VAL)
- Organizational Process Focus (OPF) Organizational Process Definition (OPD)
- Organizational Training (OT)
- Integrated Project Management (IPM)
- Risk Management (RSKM)
- Integrated Teaming (IT)
- Decision Analysis and Resolution (DAR)
- Organizational Environment for Integration (OEI)

**Managed (2)**
- Configuration Management (CM)
- Measurement and Analysis (MA)
- Project Monitoring and Control (PMC)
- Project Planning (PP)
- Product and Process Quality Assurance (PPQA)
- Requirements Management (RM)
- Supplier Agreement Management (SAM)

**Performed (1)**

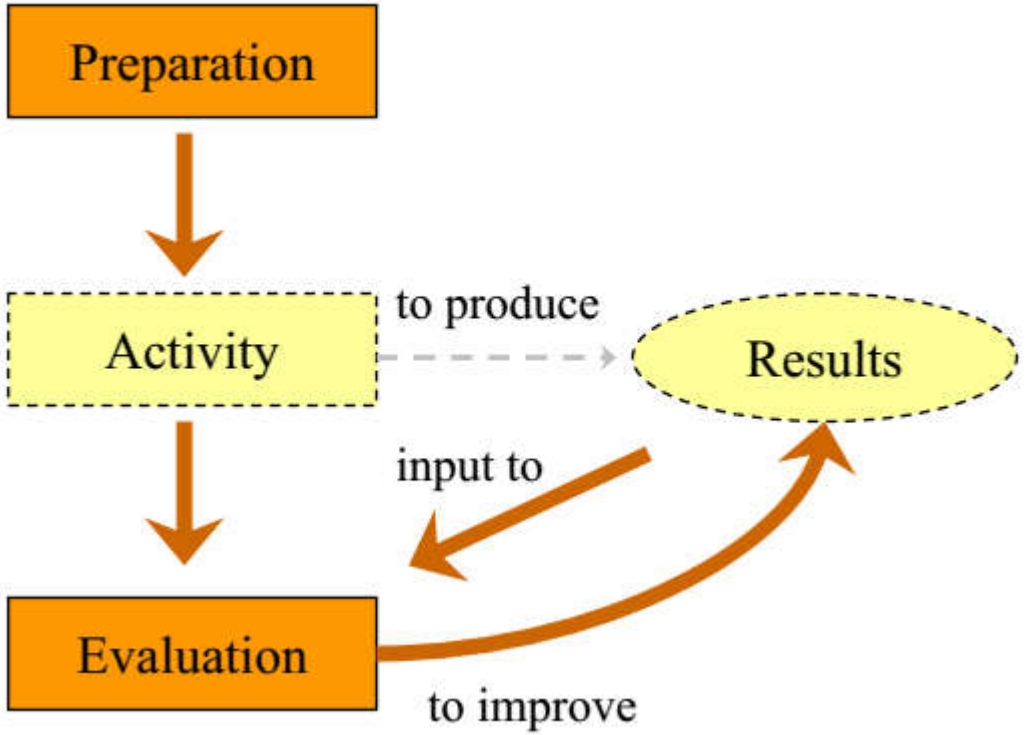
# Level 1 - Initial

- At the Initial Level, the organization typically does not provide a stable environment for developing and maintaining software.
- Success depends entirely on having an exceptional manager and a seasoned and effective software team.



## Level 2 - Repeatable

- **Policies** for managing a software project and **procedures** to implement those policies are established.
- **Planning** and **managing** new projects is **based on experience with similar projects**.



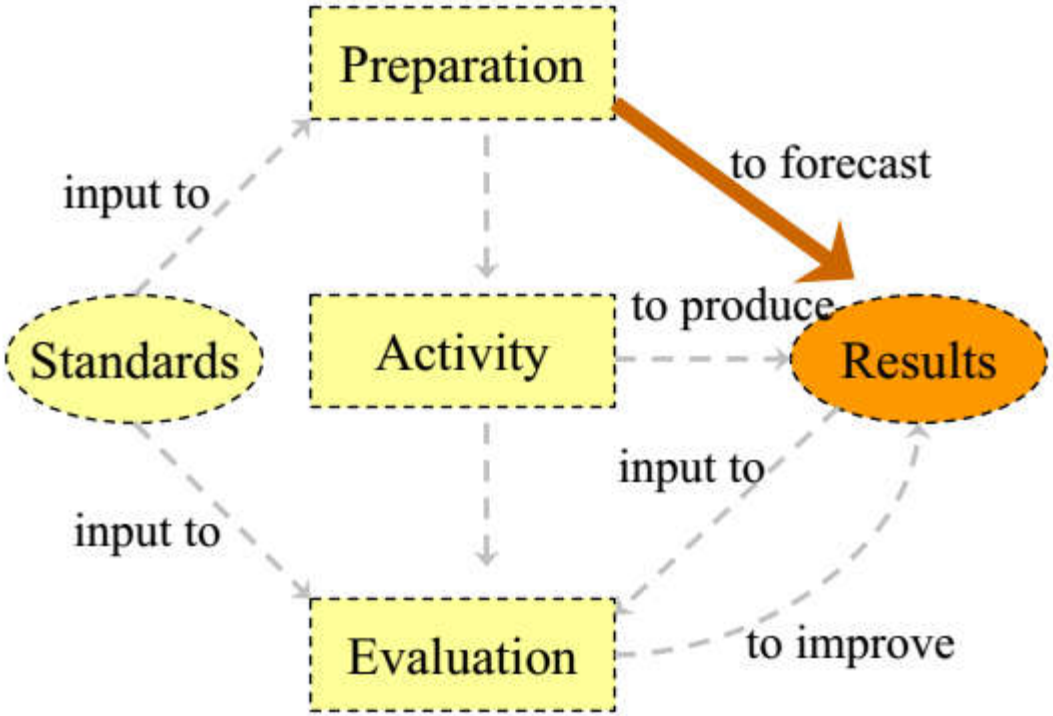

"Think before you act and think after you act, just to make sure that you did it right."

## Level 3 - Defined

- **Organization's standard software process** is established for developing and maintaining software, including both software engineering and management processes.
- **Customizing** process and **SEPG** role

## Level 4 - Quantitatively Managed

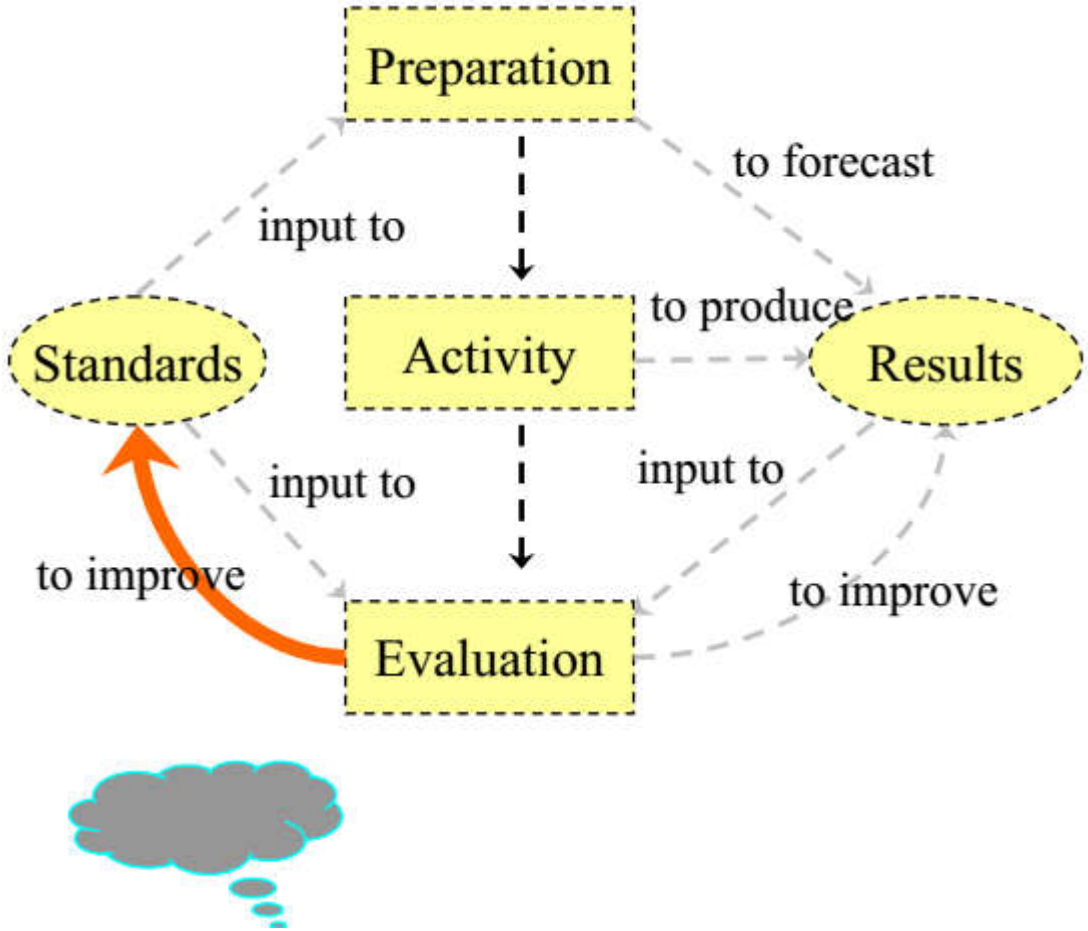
- Organization sets **quantitative quality goals** for both software products and processes.
- **Organizational measurement program** for measuring the productivity and quality for important software process activities across all projects
- **Forecasting**




"Create self-fulfilling prophecies."

## Level 5 - Optimizing

- Entire organization is focused on **continuous process improvement**.
- The organization has the means to identify weaknesses and strengthen the process proactively, with the goal of **preventing the occurrence of defects**




"Create lessons learned and use lessons learned to create more lesson learned…etc."

# REFERENCES


- Web
  - http://www.sei.cmu.edu
- Book
  - CMM in practice: Processes for executing Software Projects at Infosys
- ISO 9001 : 2000 QMS – Requirements
- ISO 9000 : 2000 QMS – Fundamentals and Vocabularies