Software Quality Management

Model & Activities

Lecturer: **Nguyễn Ngọc Tú**
Email: *Tu.NguyenNgoc@hoasen.edu.vn*
Web: *sites.google.com/site/QuanLyChatLuongPhanMem/*
Face Group: *www.facebook.com/groups/SoftwareQualityManagement/*

#AdTekDev #ICoTek #VNASQ #VNSQA #VNSoftwareTesting

Outline

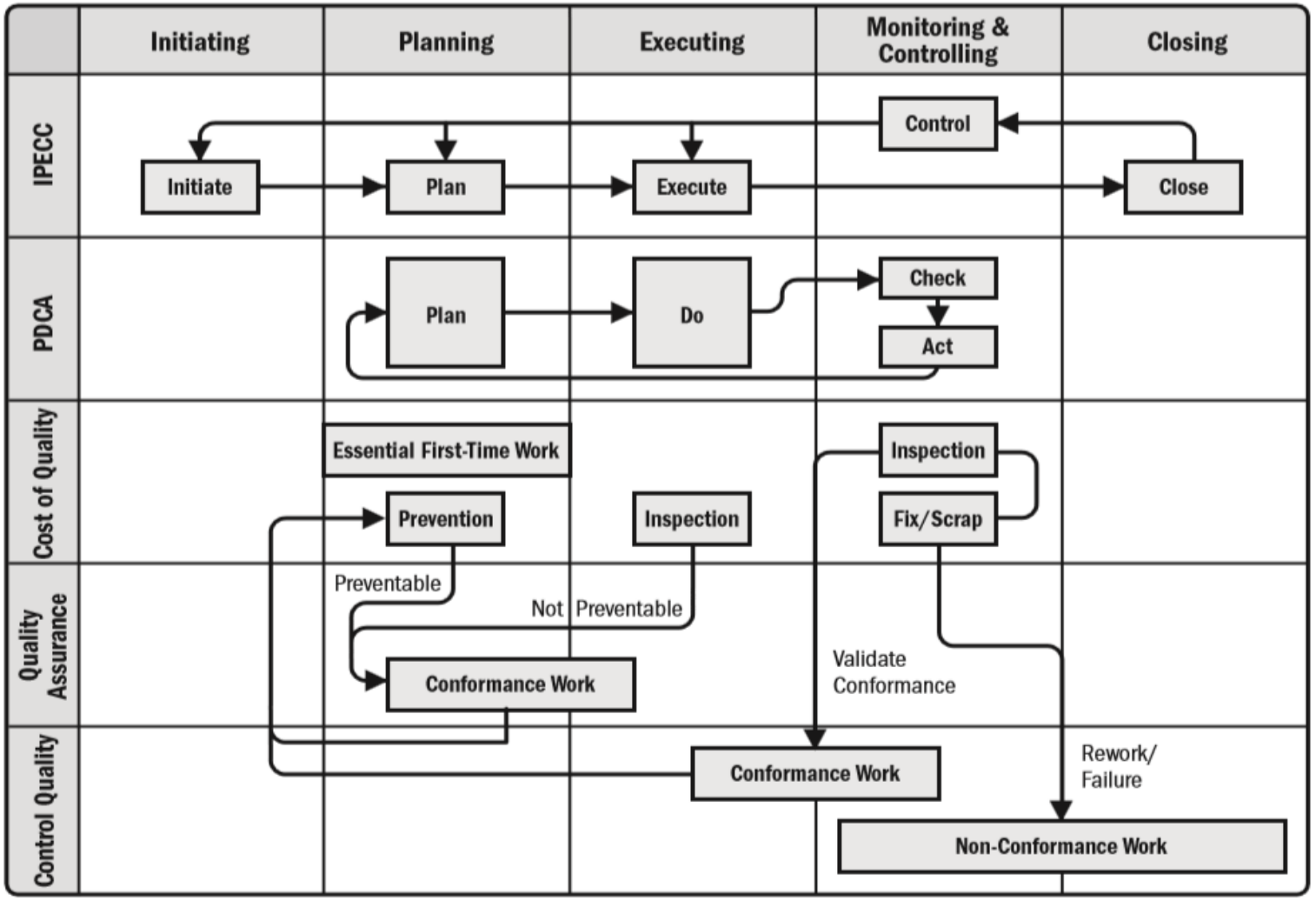
- Models
- SQM Activities

Models

	Conformance	Improvement
Product	ISO 9126 …	best practices …
Process	ISO 9001 SQA …	CMM CMMI …

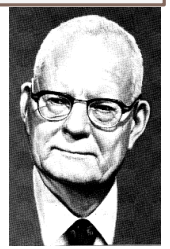
Models

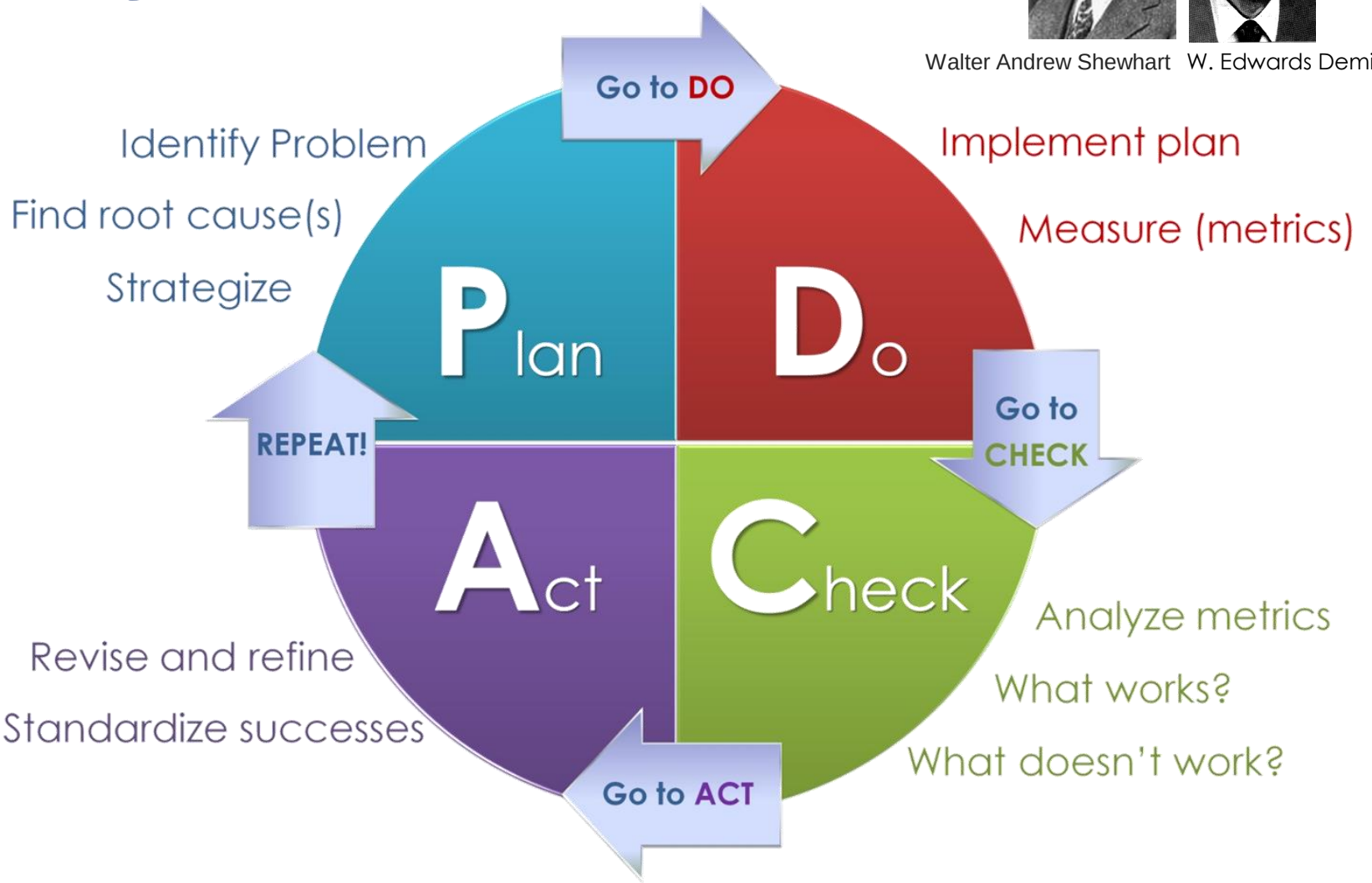
(PMP BOK)



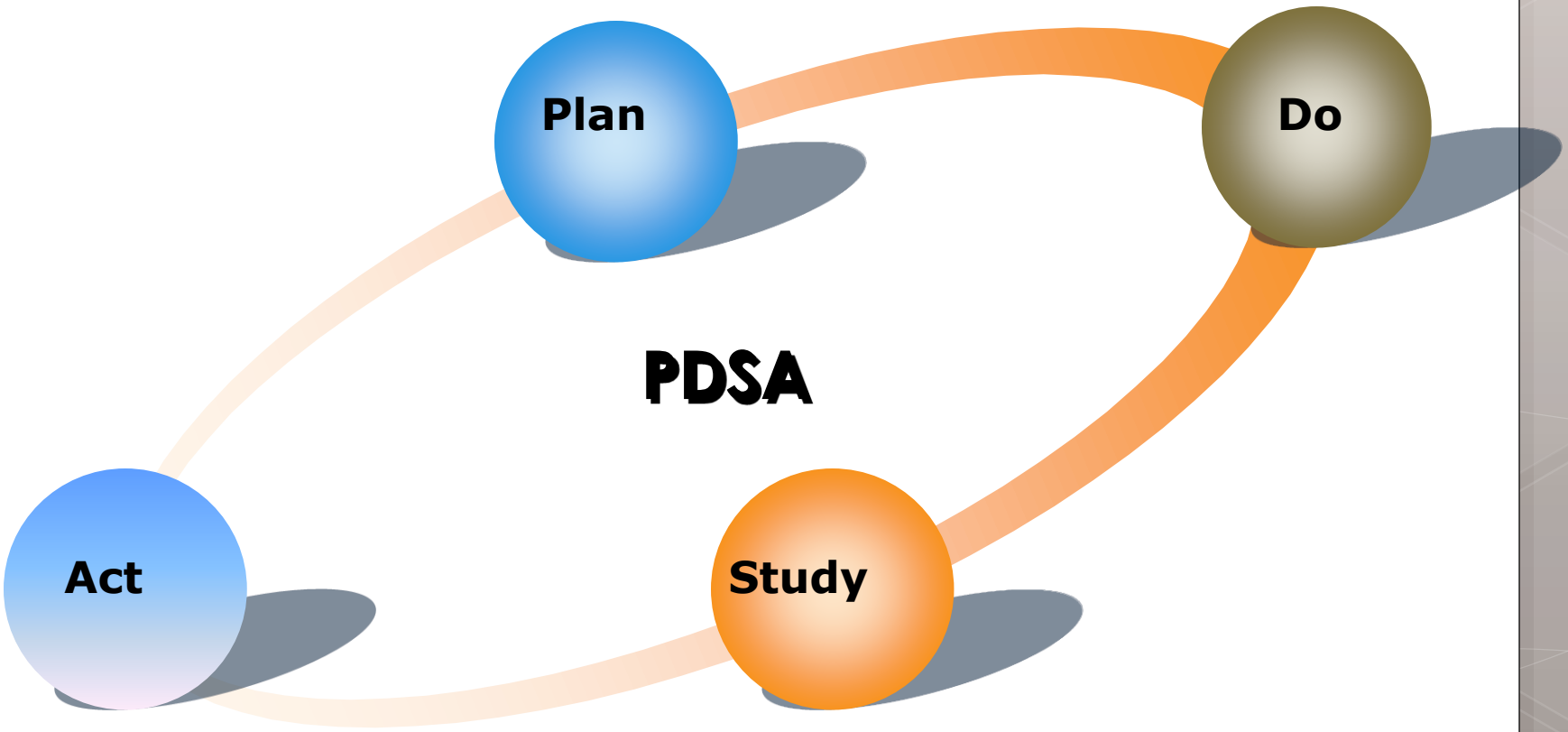
PDCA


Walter Andrew Shewhart

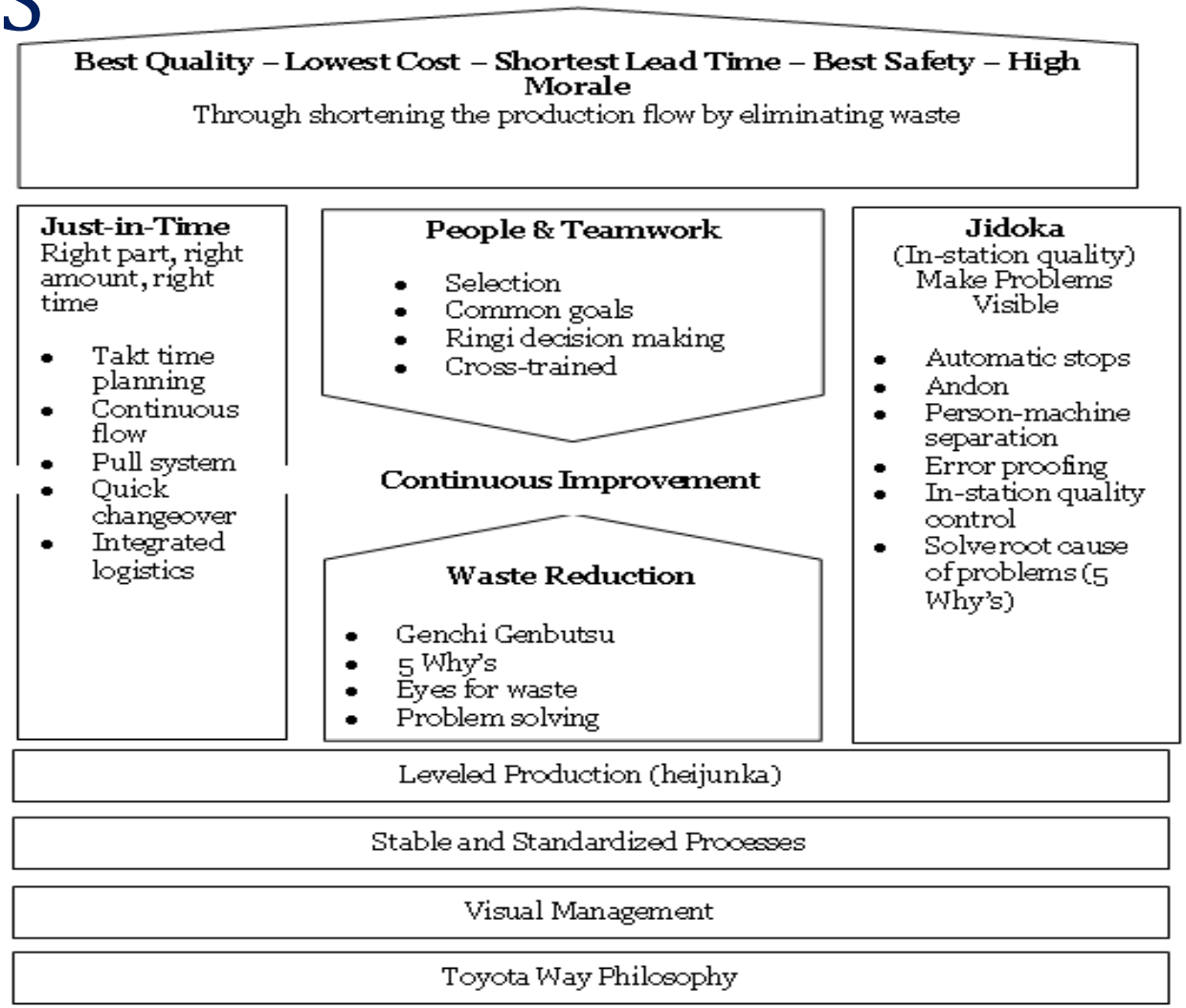

W. Edwards Deming



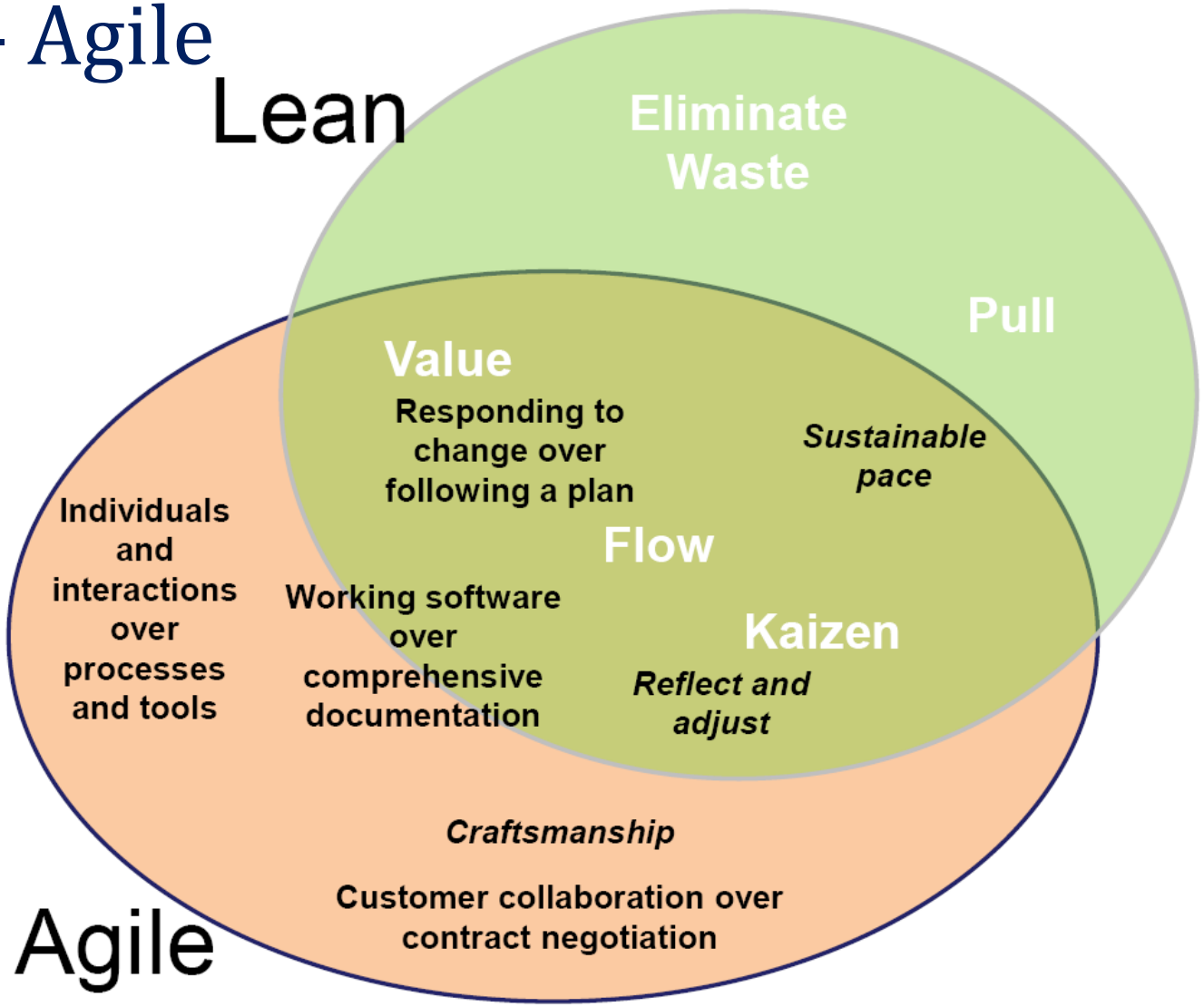
PDSA



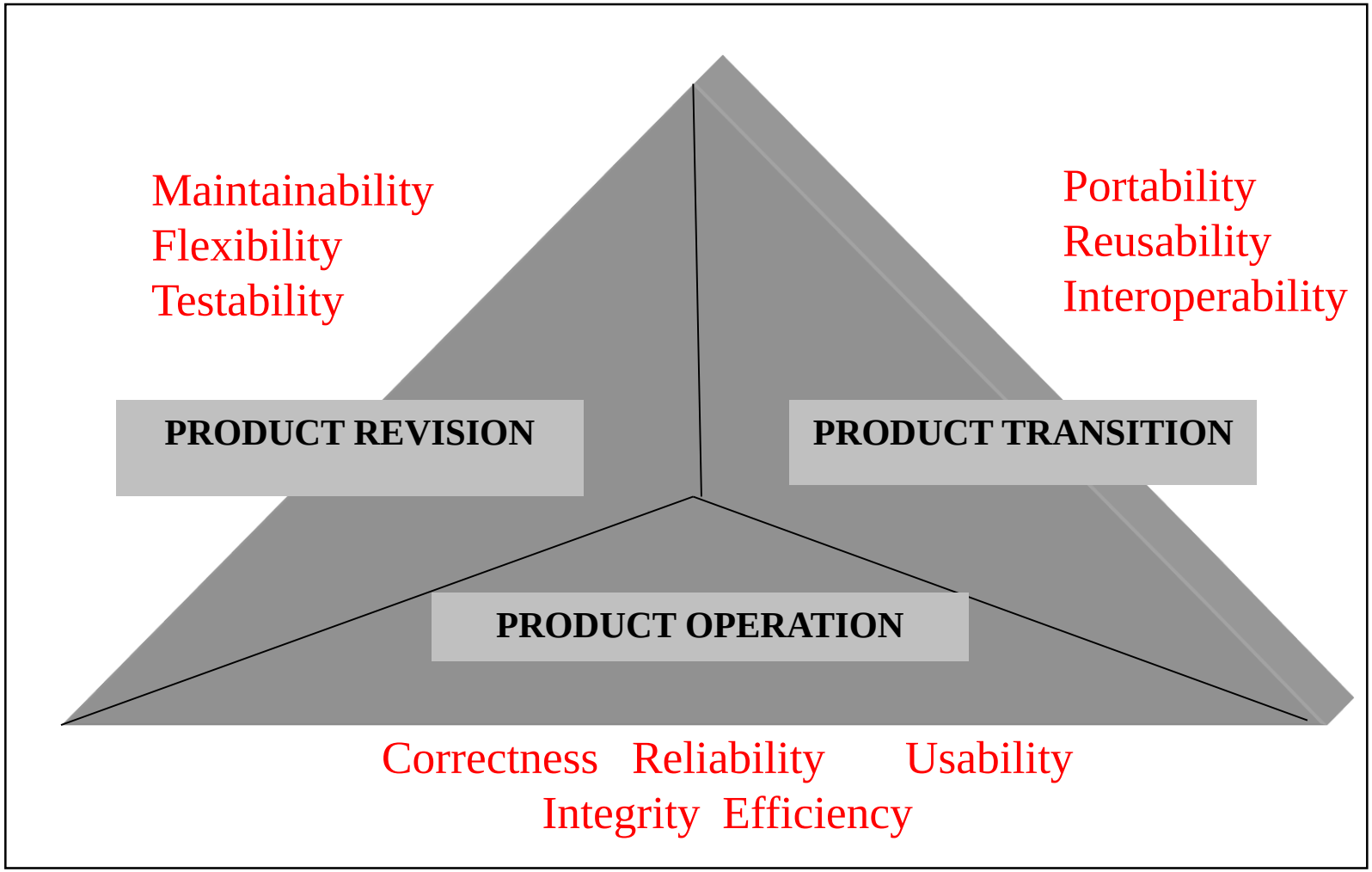
TPS


Best Quality – Lowest Cost – Shortest Lead Time – Best Safety – High Morale
Through shortening the production flow by eliminating waste
Just-in-Time
Right part, right amount, right time
Takt time planning
Continuous flow
Pull system
Quick changeover
Integrated logistics
People & Teamwork
Selection
Common goals
Ringi decision making
Cross-trained
Continuous Improvement
Waste Reduction
Genchi Genbutsu
5 Why's
Eyes for waste
Problem solving
Jidoka
(In-station quality)
Make Problems Visible
Automatic stops
Andon
Person-machine separation
Error proofing
In-station quality control
Solve root cause of problems (5 Why's)
Leveled Production (heijunka)
Stable and Standardized Processes
Visual Management
Toyota Way Philosophy

Lean – Agile


Lean
Eliminate Waste
Pull
Value
Responding to change over following a plan
Sustainable pace
Flow
Individuals and interactions over processes and tools
Working software over comprehensive documentation
Kaizen
Reflect and adjust
Craftsmanship
Customer collaboration over contract negotiation
Agile

McCall


Maintainability
Flexibility
Testability
Portability
Reusability
Interoperability
PRODUCT REVISION
PRODUCT TRANSITION
PRODUCT OPERATION
Correctness
Reliability
Usability
Integrity
Efficiency

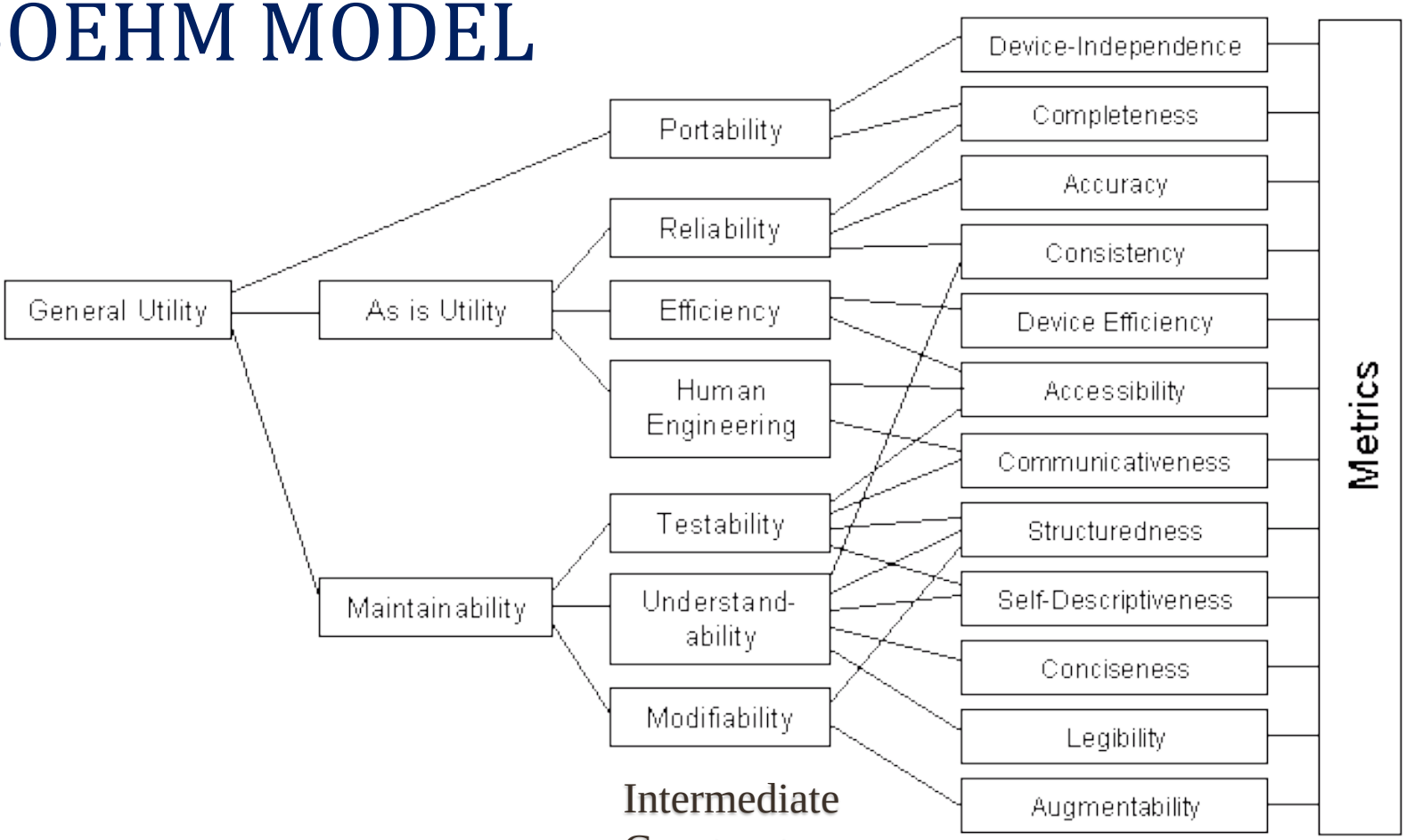
McCall

Quality Categories	Quality Factors	Broad Objectives
Product operation	Correctness	Does it do what the customer wants?
	Reliability	Does it do it accurately all of the time?
	Efficiency	Does it quickly solve the intended problem?
	Integrity	Is it secure?
	Usability	Can I run it?
Product revision	Maintainability	Can it be fixed?
	Testability	Can it be tested?
	Flexibility	Can it be changed?
Product transition	Portability	Can it be used on another machine?
	Reusability	Can parts of it be reused?
	Interoperability	Can it interface with another system?

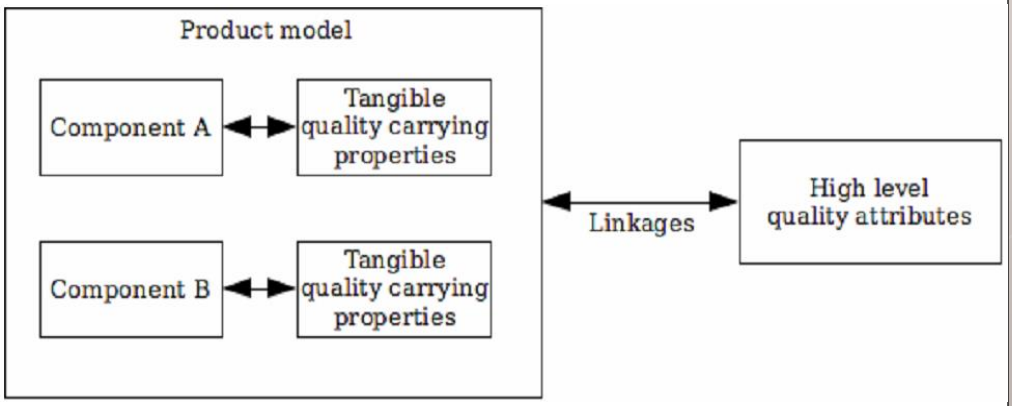
McCall

Quality factor / Software quality metric	Correctness	Reliability	Efficiency	Integrity	Maintainability	Flexibility	Testability	Portability	Reusability	Interoperability	Usability
Auditability				X			X				
Accuracy		X									
Communication commonality										X	
Completeness	X										
Conciseness			X		X	X					
Consistency	X	X			X	X					
Data commonality										X	
Error tolerance		X									
Execution efficiency			X								
Expandability						X					
Generality						X		X	X	X	
Hardware independence								X	X		
Instrumentation				X	X		X				
Modularity		X			X	X	X	X	X	X	
Operability			X								X
Security				X							
Self-documentation					X	X	X	X	X		
Simplicity		X			X	X	X				
Software system independence								X	X		
Traceability	X										
Training											X

BOEHM MODEL


General Utility
As is Utility
Maintainability
Portability
Reliability
Efficiency
Human Engineering
Testability
Understand-ability
Modifiability
Device-Independence
Completeness
Accuracy
Consistency
Device Efficiency
Accessibility
Communicativeness
Structuredness
Self-Descriptiveness
Conciseness
Legibility
Augmentability
Metrics
Primary Uses
Intermediate Constructs
Primitive Constructs

Dromey (1995)

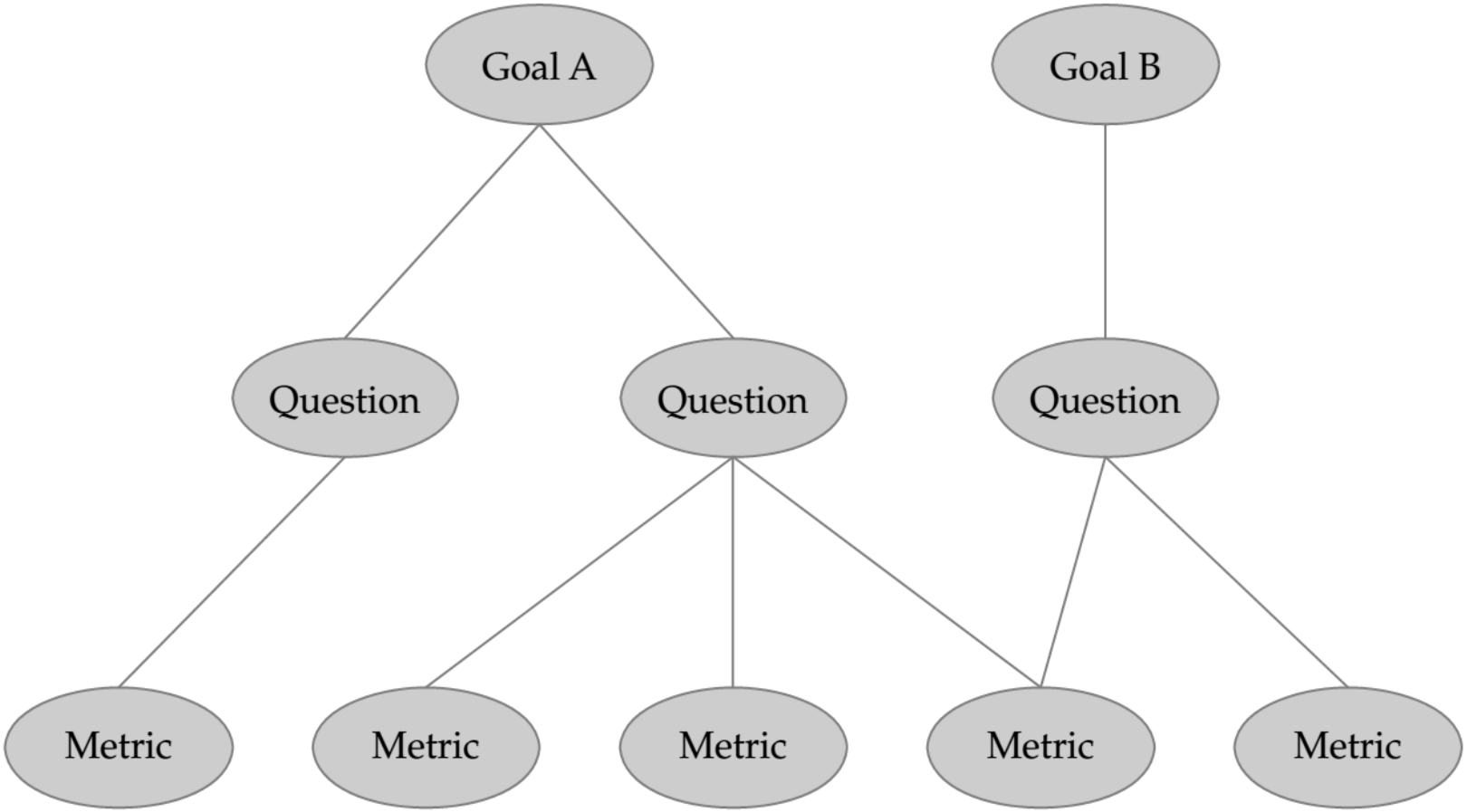


- Four categories:
  - Correctness:
    - Evaluates if some basic principles are violated.
  - Internal:
    - Measure how well a component has been deployed according to its intended use.
  - Contextual:
    - Deals with the external influences by and on the use of a component.
  - Descriptive:
    - Measure the descriptiveness of a component.

GQM

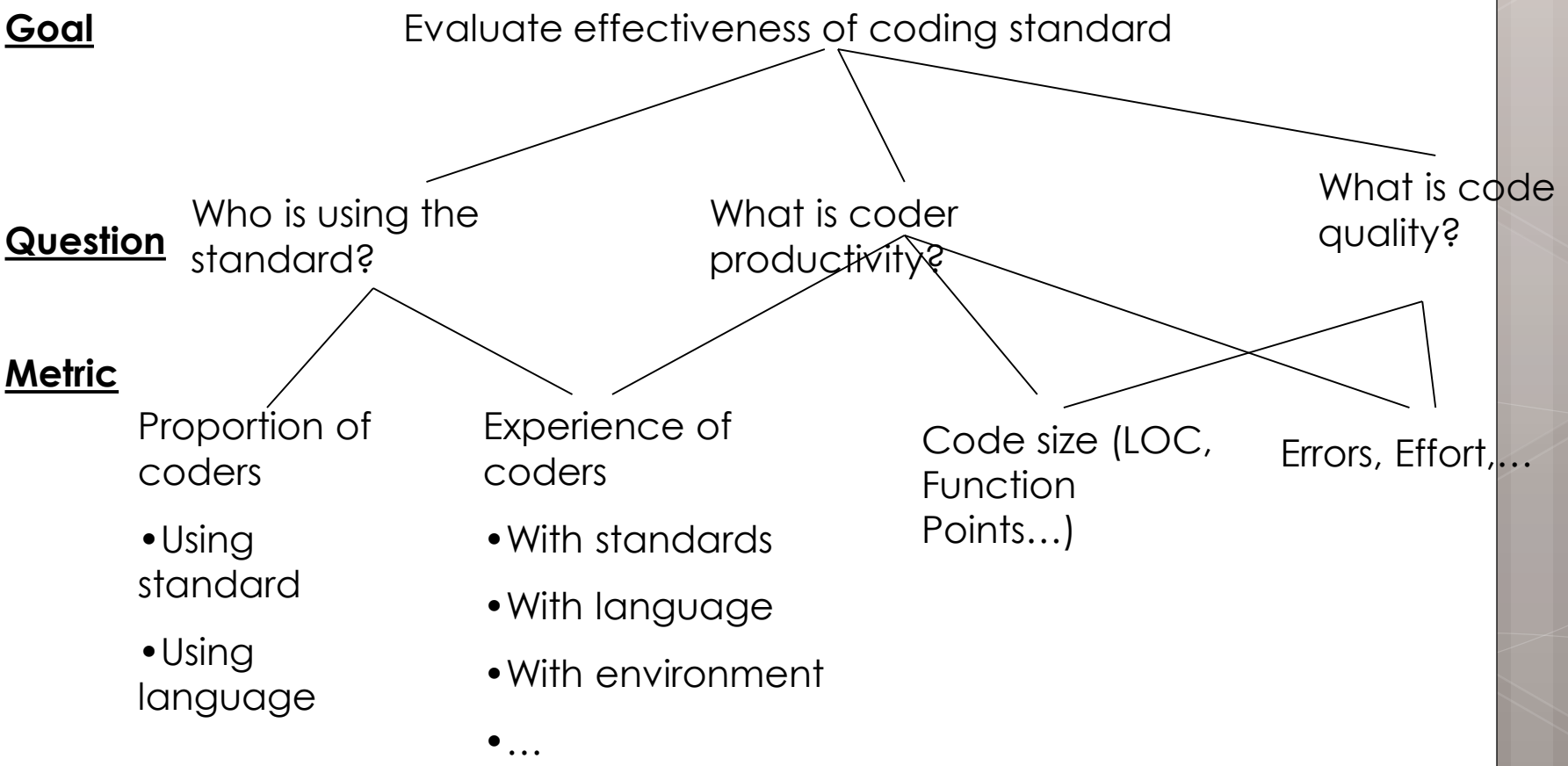
- **G**oal – **Q**uestion – **M**etric (Basili)
- Approach to select metrics
  - Avoids "let's collect a lot of data and decide afterwards what we do with the values" (*fishing for results*)
- **Approach**
  1. Classify the entities
  2. Express goals of organization
  3. Generate questions to meet goals
  4. Analyze questions and define metrics
  5. **Finally**, check whether metrics can be collected

GQM



The Goal-Question-Metric Method

E.x.


Goal
Evaluate effectiveness of coding standard
Question
Who is using the standard?
What is coder productivity?
What is code quality?
Metric
Proportion of coders
•Using standard
•Using language
Experience of coders
•With standards
•With language
•With environment
•…
Code size (LOC, Function Points…)
Errors, Effort,…

GQM – Goal template

Goal Component	Description	Example
Outcome	The purpose of the project, what will be achieved	Improvement, assessment, understanding
Elements	The boundaries and objects (systems, processes, characteristics) involved in or impacted by the goal	Vulnerabilities, network components, regulatory compliance, system users
Perspective	The point of view taken to understand the goal	External attackers, compliance auditors

E.x.

Goal Components	Outcome: Increase Element: Enforcement of security policy Element: User awareness Element: User acknowledgement of security policy documents Perspective: Security manager
Goal Statement	*The goal of this project is to increase the enforcement and awareness of the corporate security policy by increasing user acknowledgement of the company's security policy documents from the perspective of the security manager.*
Question	What is the current level of enforcement of the corporate security policy?
Metrics	Number of reported security policy violations in the previous 12 months Number of enforcement actions taken against policy violations in the previous 12 months
Question	What is the current structure of the corporate security policy?
Metrics	Number of documents included in the corporate security policy Format(s) of security policy documents Location(s) of security policy documents Types of policy acknowledgment mechanisms Length of time since the last security policy review by management

E.x.

Goal Statement	*The goal of this project is to understand security impacts on system availability by comparing security-related downtime to general availability from the perspective of the security team.*
Question	How often is the system down due to failure?
Metrics	Time between failures Failure duration Mean system availability
Question	How often is the system down due to maintenance?
Metrics	Time between maintenance Maintenance duration Mean system availability
Metrics	How often is downtime the result of a security event?
Question	Number of security events in time period Duration of event remediation

ISO 9000 Standards

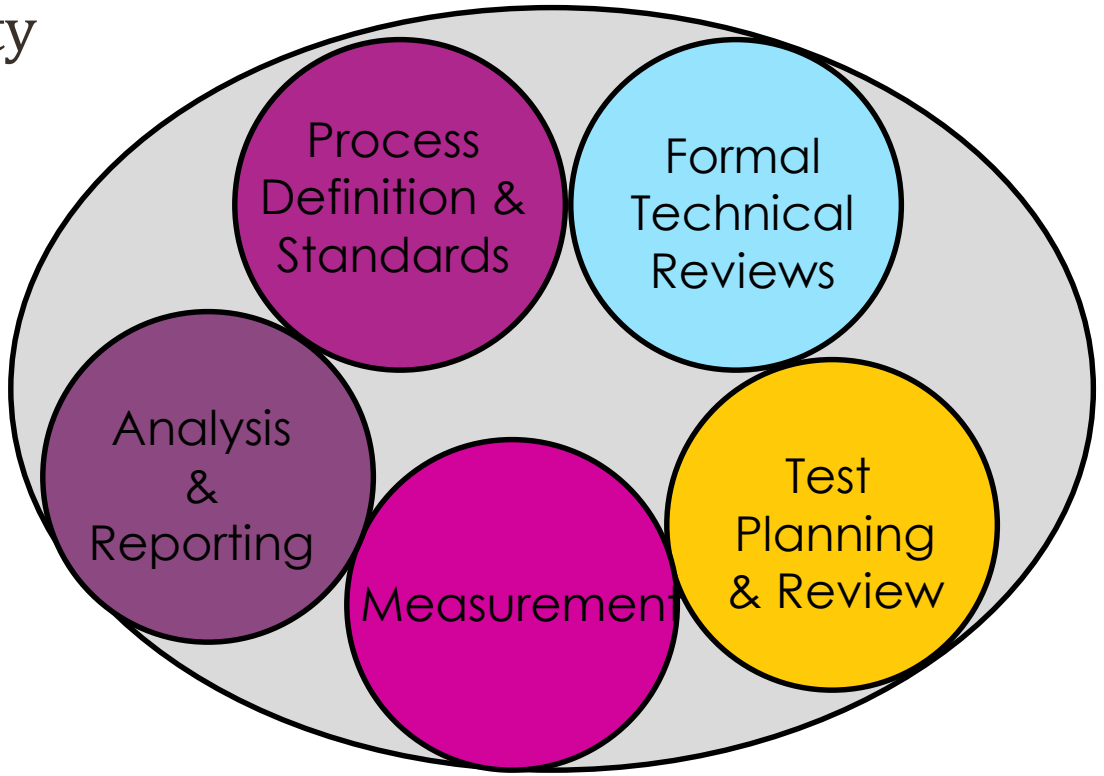
- Set of documents dealing with quality systems that can be used for external quality assurance purposes
  - ISO 9000:2000, Quality management systems – Fundamentals and vocabulary
  - ISO 9001:2000 Quality management systems – Requirements
  - ISO 9004:2000 Quality management systems - Guidelines for performance improvements.
  - ISO 9000-3

COBIT PO11: Manage Quality

- Control objectives
  - General quality plan
  - Quality assurance approach
  - Quality assurance planning
  - Quality assurance review of adherence to IT standards and procedures
  - System development life cycle (SDLC) methodology
  - SDLC for major changes to existing technology
  - Updating of SDLC
  - Coordination and communication
  - Acquisition and maintenance framework for the technology infrastructure
  - Third-party implementer relationship
  - Program documentation standards
  - Program testing standards
  - System testing standards
  - Parallel/pilot testing
  - System testing documentation
  - Quality assurance evaluation of adherence to development standards
  - Quality assurance review of the achievement of IT objectives
  - Quality metrics
  - Reports to quality assurance reviews

SQM Activities

- Plan Quality Management
- Perform Quality Assurance
- Control Quality



QUALITY – Plan Quality Management

Inputs

- *Project management plan*
- *Stakeholder register*
- *Risk register*
- *Requirements documentation*
- *Enterprise environmental factors*
- *Organizational process assets*

Tech

- *Cost-benefit analysis*
- *Cost of quality*
- *Seven basic quality tools*
- *Benchmarking*
- *Design of experiments*
- *Statistical sampling*
- *Additional quality planning tools*
- *Meetings*

Outputs

- *Quality management plan*
- *Process improvement plan*
- *Quality metrics*
- *Quality checklists*
- *Project documents updates*

QUALITY – Perform Quality Assurance

Inputs

- *Quality management plan*
- *Process improvement plan*
- *Quality metrics*
- *Quality control measurements*
- *Project documents*

Tech

- *Quality management and control tools*
- *Quality audits*
- *Process analysis*

Outputs

- *Change requests*
- *Project management plan updates*
- *Project documents updates*
- *Organizational process assets updates*

QUALITY – Control Quality

Inputs

- *Project management plan*
- *Quality metrics*
- *Quality checklists*
- *Work performance data*
- *Approved change requests*
- *Deliverables*
- *Project documents*
- *Organizational process assets*

Tech

- *Seven basic quality tools*
- *Statistical sampling*
- *Inspection*
- *Approved change requests review*

Outputs

- *Quality control measurements*
- *Validated changes*
- *Validated deliverables*
- *Work performance information*
- *Change requests*
- *Project management plan updates*
- *Project documents updates*
- *Organizational process assets updates*

Q/A ?!