ESI European Software Institute Center Eastern Europe

Partner of:

Software Engineering Institute | Carnegie Mellon

SEMP SOFTWARE ENGINEERING MANAGEMENT PROGRAM

МУК 2015/2016:

Модели за управление на качеството.
[Курс на базата на CMMI]

Software Quality Models
[CMMI based course]

SAM (Supplier Agreement Management)
CM (Configuration Management)
PPQA (Process & Product Quality Assurance)

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Информация, източници:

www.esicenter.bg >> general info and in “Resources”

links to CMMI models
http://cmmiinstitute.com/cmmi-solutions/
http://www.sei.cmu.edu/cmmi/tools/index.cfm

CMMI –DEV v 1.3 model (CMMI Institute, and SEI, Carnegie Mellon University)

http://cmmiinstitute.com/resource/cmmi-for-development-version-1-3/

*www.**sei**.cmu.edu/reports/10tr033.pdf*

General
www.sei.cmu.edu
www.cmmiinstitute.com

Къде сме?

1	Увод в управление на качеството. Компоненти и цена на качеството. Процеси. Преглед на моделите за управление на качеството и подобряване на процесите. Методи за оценка на зрелостта на ИТ-интензивни и софтуерни организации. Стратегически карти/Балансирана система от показатели (balanced ScoreCards).
2	Модел CMMI (ver 1.3). История, внедряващи организации. Обща структура. Процесни области. Генерични и специфични цели и практики. Презентации – Maturity/Capability нива на Continuous и Staged representations. Категории процесни области: Process Management, Project Management, Engineering, Support.
3	**Процесни области от ниво 2 на CMMI. Детайлно представяне на:** **REQM – Requirements Management** **PP – Project Planning** **MA – Measurement and Analysis** **PPQA – Process and Product Quality Assurance** **CM – Configuration Management** **PMC – Project Monitoring and Control** **Преглед на:SAM-Supplier Agreement Management**
4	Процесни области от ниво 3 на CMMI. Детайлно представяне на: RD – Requirements Development VAL - Validation VER - Verification RSKM - Risk Management TS - Technical Solution Преглед на: DAR - Decision Analysis and Resolution , IPM - Integrated Project Management , OPD - Organizational Process Definition , OPF - Organizational Process Focus, OT - Organizational Training , PI - Product Integration Преглед на Maturity Level 4 и 5. **Обобщение на връзките между процесните области: Tying all together**
5	Внедряване на програма за подобряване на процесите на база CMMI. Адаптирани подходи – Agile CMMI, CMMI/ISO. Нови модели CMMI – CMMI for Services, CMMI for Acquisition. Оценка (SCAMPI), роли.
6	Подобряване на процесите в малки фирми – IT Mark. Компненти на зрелостта – бизнес, организация/процеси, информационна сигурност. Оценка на нивото и план за подобрения.

CMMI (SEI/CMU) – reference model or de facto industrial standard
CMMI-DEV, CMMI-ACQ, CMMI-SVC

5 Focus on process improvement

Optimizing
Measurably increased process capabilities

4 Process measured and controlled

Quantitatively Managed
Use of statistical and other quantitative techniques in managing the processes and results

3 Process characterized for the **organization** and is proactive

Defined
Commonality among projects allows more uniform estimation of performance.

2 Process characterized for **projects** and is often reactive

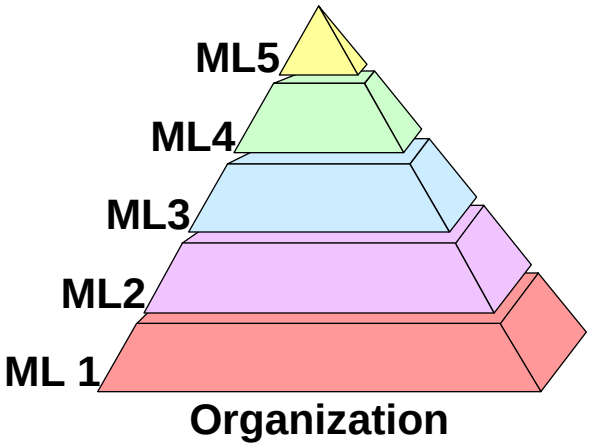
Managed
- Requirements flow in.
- Plans are developed in accordance with policies.
- Activities are performed in accordance with plans.
- Measurements and reviews occur at defined points.
- The product flows out and (usually) works

1 Process unpredictable, poorly controlled and reactive

Performed
- Requirements flow in.
- A product is (sometimes) produced by some amorphous process.
- The product flows out and (we hope) works.

Remember: CMMI Representations

Staged



Maturity Level 5 OID, CAR

Maturity Level 4 OPP, QPM

Maturity Level 3 RM, TS, PI, VER, VAL, OPF, OPD, OT, IPM, RSKM, DAR

Maturity Level 2 REQM, PP, PMC, MA, PPQA, CM, SAM

Process Areas

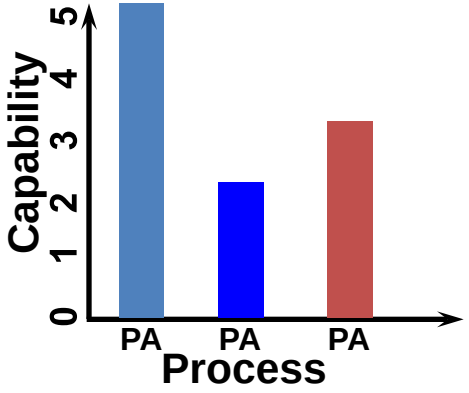
Organizational Innovation & Deployment (OID)
Causal Analysis and Resolution (CAR)

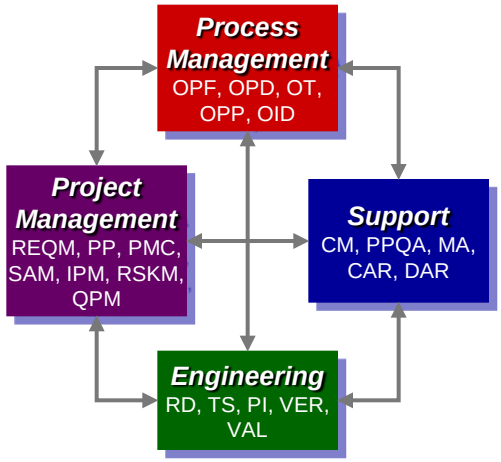
Organizational Process Performance (OPP)
Quantitative Project Management (QPM)

Requirements Development (RD)
Technical Solution (TS)
Product Integration (PI)
Verification (VER)
Validation (VAL)
Organizational Process Focus (OPF)
Organizational Process Definition (OPD) + IPPD
Organizational Training (OT)
Integrated Project Management (IPM) + IPPD
Risk Management (RSKM)
Decision Analysis and Resolution (DAR)

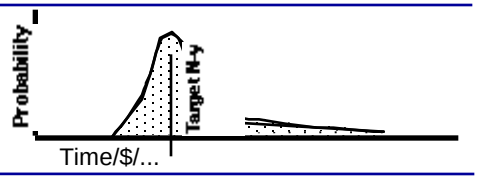
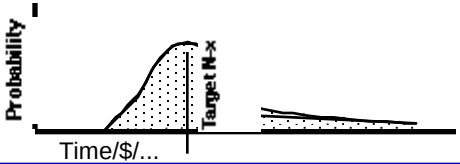
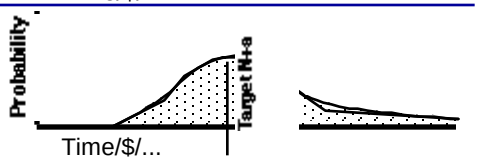
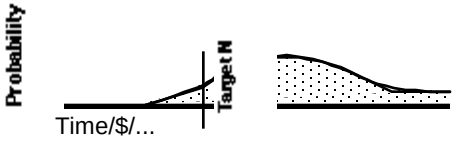
Requirements Management (REQM)
Project Planning (PP)
Project Monitoring and Control (PMC)
Supplier Agreement Management (SAM)
Measurement and Analysis (MA)
Process and Product Quality Assurance (PPQA)
Configuration Management (CM)

Continuous

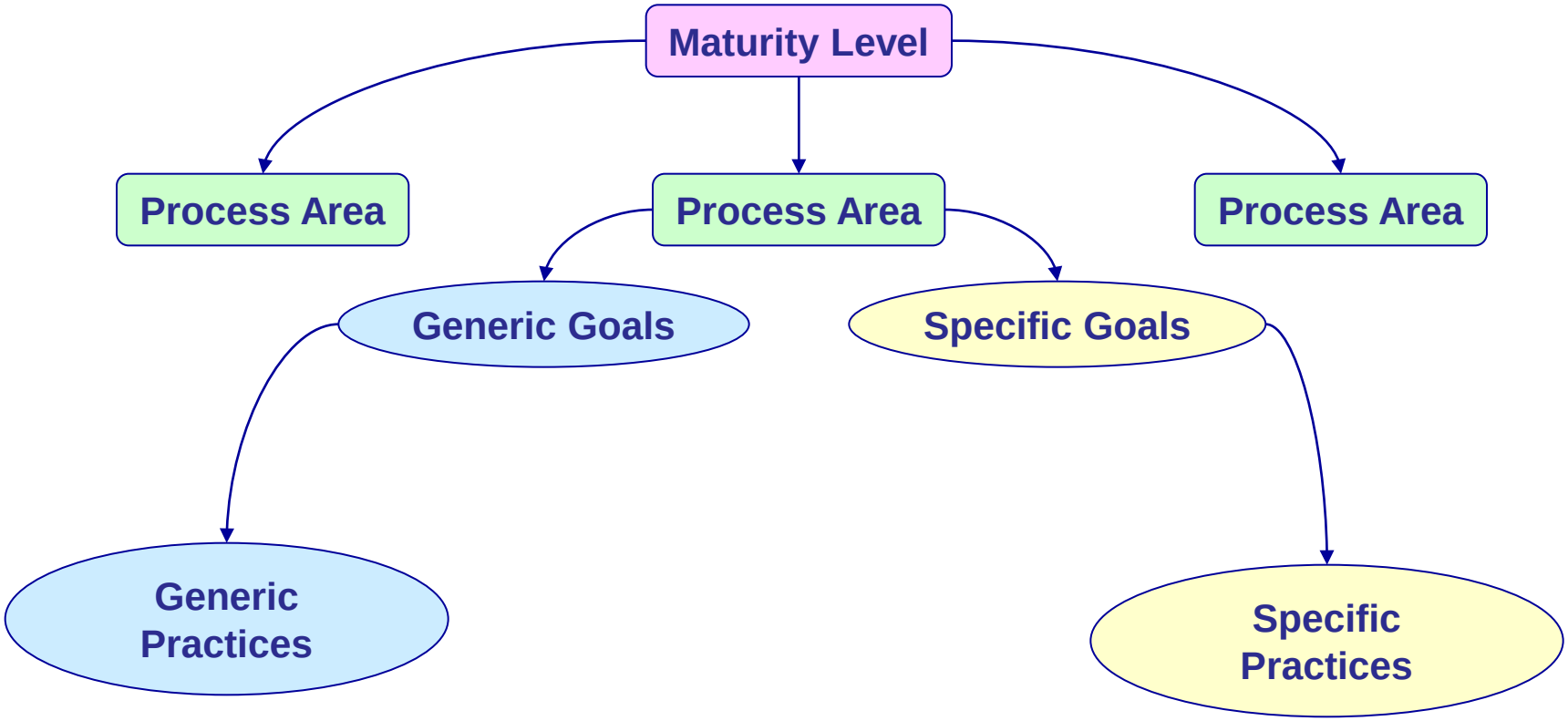




Remember: Evolution of Process Capability

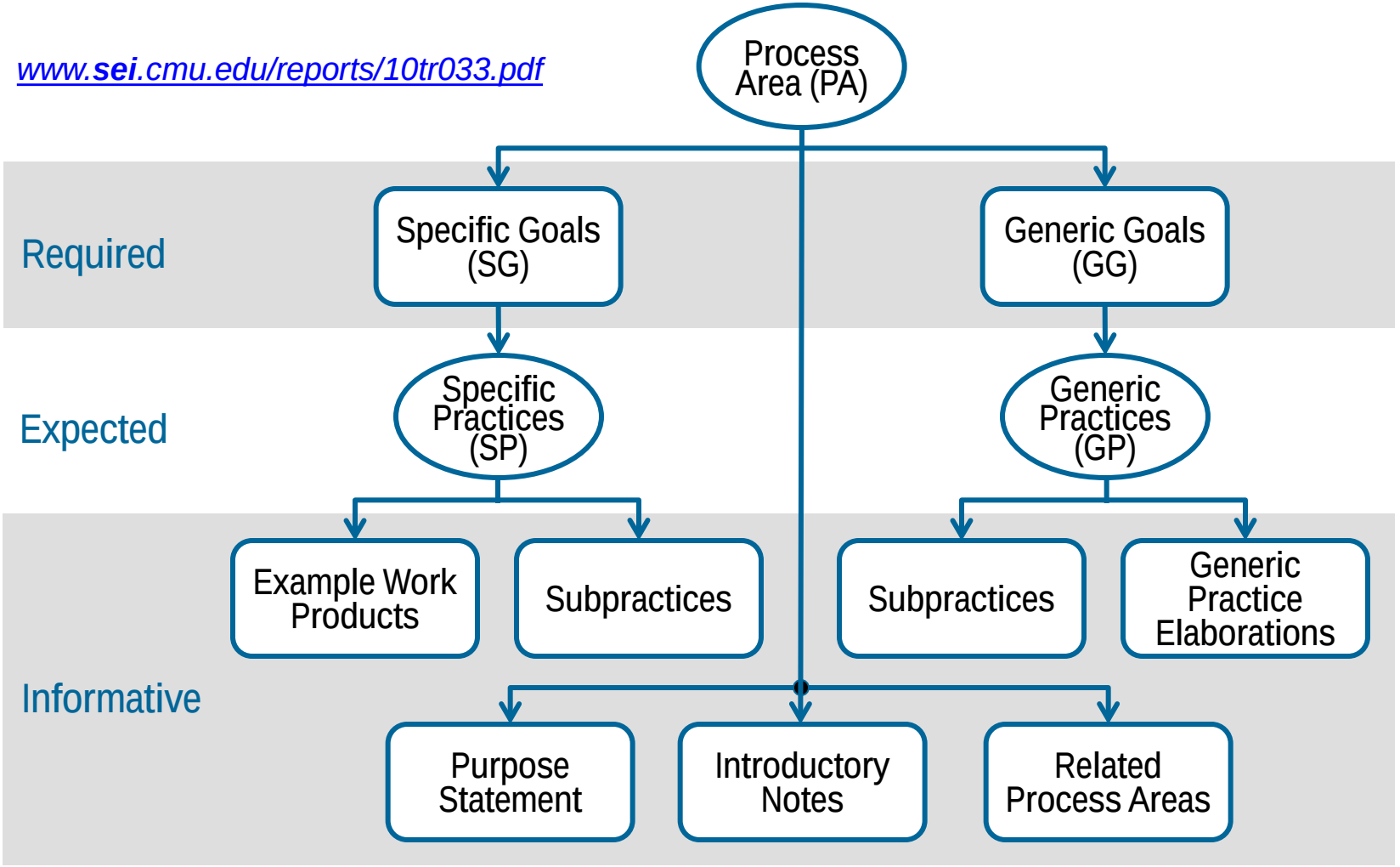
Level	Process Characteristics	Predicted Performance
5 Optimising	Process improvement is institutionalised	
4 Quantitatively Managed	Product and process are quantitatively controlled	
3 Defined	Software engineering and management processes are defined and integrated	
2 Managed	Project management system is in place; performance is repeatable	
1 Initial	Process is informal and unpredictable	

Structure of the CMMI
Staged Representation



What's in the model & book: Process Area Components

www.sei.cmu.edu/reports/10tr033.pdf



Remember:
Maturity Levels Cannot Be Skipped

- A level provides a necessary foundation for effective implementation of processes at the next level.
  - Higher level processes are easily sacrificed without the discipline provided by lower levels.
  - The effect of innovation is obscured in a noisy process.
- Higher maturity level processes may be performed by organisations at lower maturity levels, with risk of not being consistently applied in a crisis.

Maturity Levels & GPs

Maturity Level 2

- Requirements management
- Project planning
- Project monitoring and control
- Supplier agreement management
- Measurement and analysis
- Process and product quality assurance
- Configuration management

Maturity Level 3

- Requirements development
- Technical solution
- Product integration
- Verification
- Validation
- Organizational process focus
- Organizational process definition + IPPD
- Organizational training
- Integrated project management + IPPD
- Risk management
- Decision analysis and resolution

GP 2.1 Establish organizational policy
GP 2.2 Plan the process
GP 2.3 Provide resources
GP 2.4 Assign responsibility
GP 2.5 Train people
GP 2.6 Control Work Products (Manage configuration)
GP 2.7 Identify and involve relevant stakeholders
GP 2.8 Monitor and control the process
GP 2.9 Objectively evaluate adherence
GP 2.10 Review status with higher level management

GP 3.1 Establish a defined process
GP 3.2 Collect improvement information

About Generic Goals and Institutionalization

The degree of institutionalization is embodied in the generic goals and expressed in the names of the processes associated with each goal as indicated below.

	Generic Goal and Title	Progression of Processes
GG 3	Institutionalize a Defined Process	Defined Process
GG 2	Institutionalize a Managed Process	Managed Process
GG 1	Achieve Specific Goals*	Performed Process

* This generic goal is only used in the continuous representation.

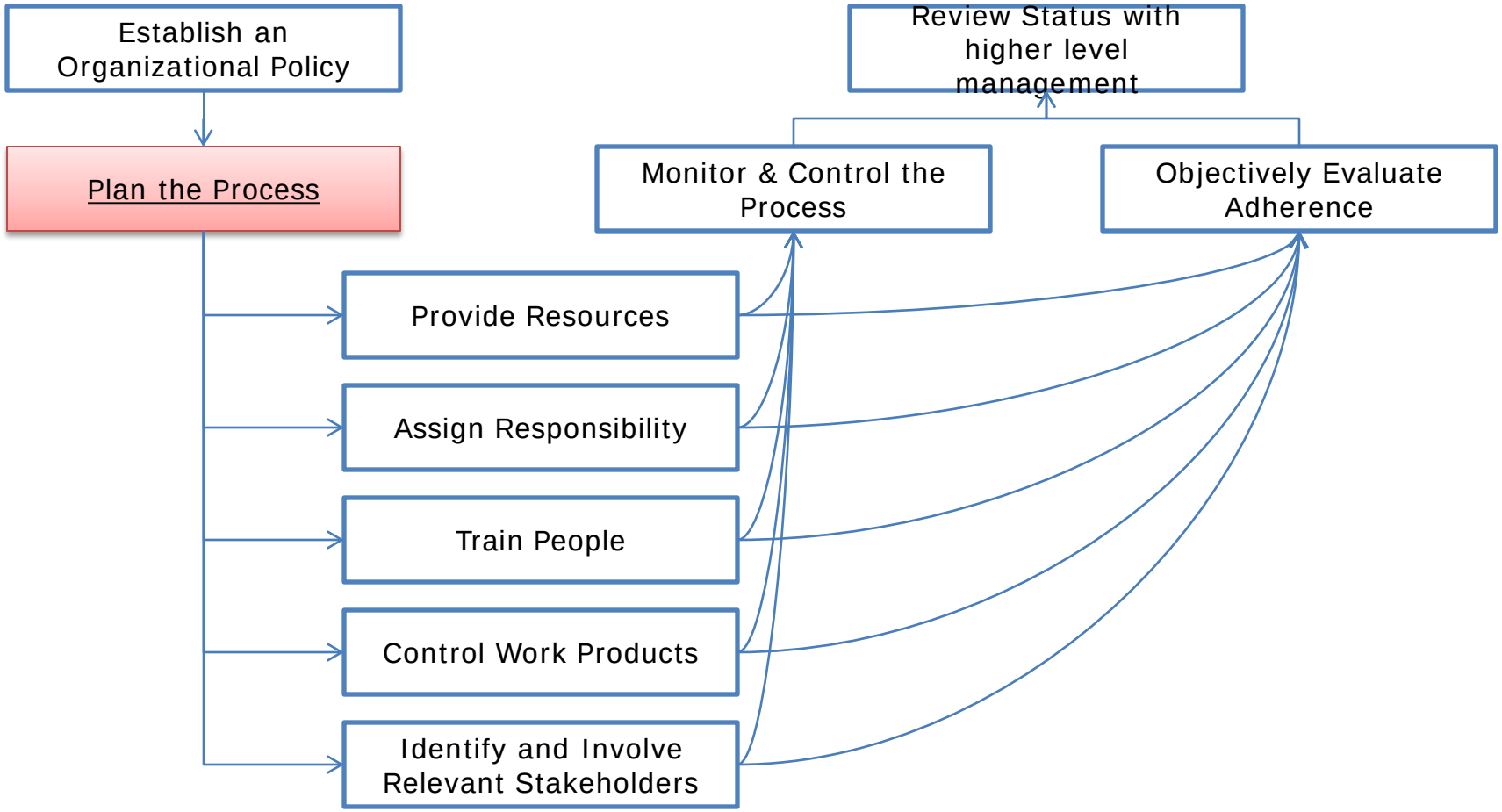
ML2 GG&GPs

GG2: Institutionalize a Managed Process

What should be applied to all PAs (from ML2 and up):

- GP2.1: Establish an Organizational Policy
- GP2.2: Plan the Process
- GP2.3: Provide Resources
- GP2.4: Assign Responsibility
- GP2.5: Train People
- GP2.6: Control Work Products
- GP2.7: Identify and Involve Relevant Stakeholders
- GP2.8: Monitor and Control the Process
- GP2.9: Objectively Evaluate Adherence
- GP2.10: Review Status with Higher Level Management

How PAs relate to Generic Practices?



Source: Kiril Karaatanasov, ESI Center Bulgaria

Just to mention SAM
(Supplier Agreement Management)

The purpose of Supplier Agreement Management (SAM) is to manage the acquisition of products and services from suppliers.

SG 1: Establish Supplier Agreements
Agreements with the suppliers are established and maintained.

SG 2: Satisfy Supplier Agreements
Agreements with suppliers are satisfied by both the project and the supplier.

The essence of SAM

Applies to the acquisition of:

- products/components that are delivered to the project's customer
- significant products/components not delivered to the project's customer (for example, development tools and test environments).

Does not apply when supplier is part of the team

Suppliers:

- in-house vendors
- fabrication capabilities and laboratories
- commercial vendors

The acquired product is delivered to the project from the supplier and becomes part of the products delivered to the customer

SAM Practices:

Type of acquisition (COTS, contract, in-house, from the customer) determined?

Supplier selection based on evaluation?

Criteria for evaluation established/documented?

Criteria for evaluation of proposals?

Agreement with supplier documented?

Agreement revised during project?

Criteria of evaluation of COTS?

Risk analysis performed on COTS?

Monitoring activities defined in the agreement?

Technical/management reviews with supplier performed?

Acceptance test/verification performed and results documented?

Next: Supporting PAs ML2:

- Requirements Management
- Project Planning
- Project Monitoring & Control
- **Process and Product Quality Assurance**
- **Measurement & Analysis**
- **Configuration Management**
- Supplier Agreement Management

Supporting PAs (overview)

Process and Product Quality Assurance (PPQA)

- **SG 1: Objectively Evaluate Processes and Work Products**
- **SG 2: Provide Objective Insight**

Configuration Management (CM)

- SG 1: Establish Baselines
- SG 2: Track and Control Changes
- SG 3: Establish Integrity

Measurement and Analysis (MA)

- SG 1: Align Measurement and Analysis Activities
- SG 2: Provide Measurement Results

Process & Product Quality Assurance (PPQA)

The purpose of Process and Product Quality Assurance (PPQA)

is to

provide **staff and management**

with objective insight into

processes and

associated **work products**.

What PPQA provides?

- Management knows if **process assets** are being used
- Failures to follow process that may **endanger projects become visible early on**
- Problems with **process definitions** are uncovered and addressed
- Process descriptions are **followed**

Terminology

Quality assurance

- A planned and systematic means for assuring management that defined standards, practices, procedures, and methods of the process are applied.

Objectively evaluate

- To review activities and work products against criteria that minimize subjectivity and bias by the reviewer.

Analyze that (1):

"I'd rather have it wrong than have it late.
We can always fix it later."

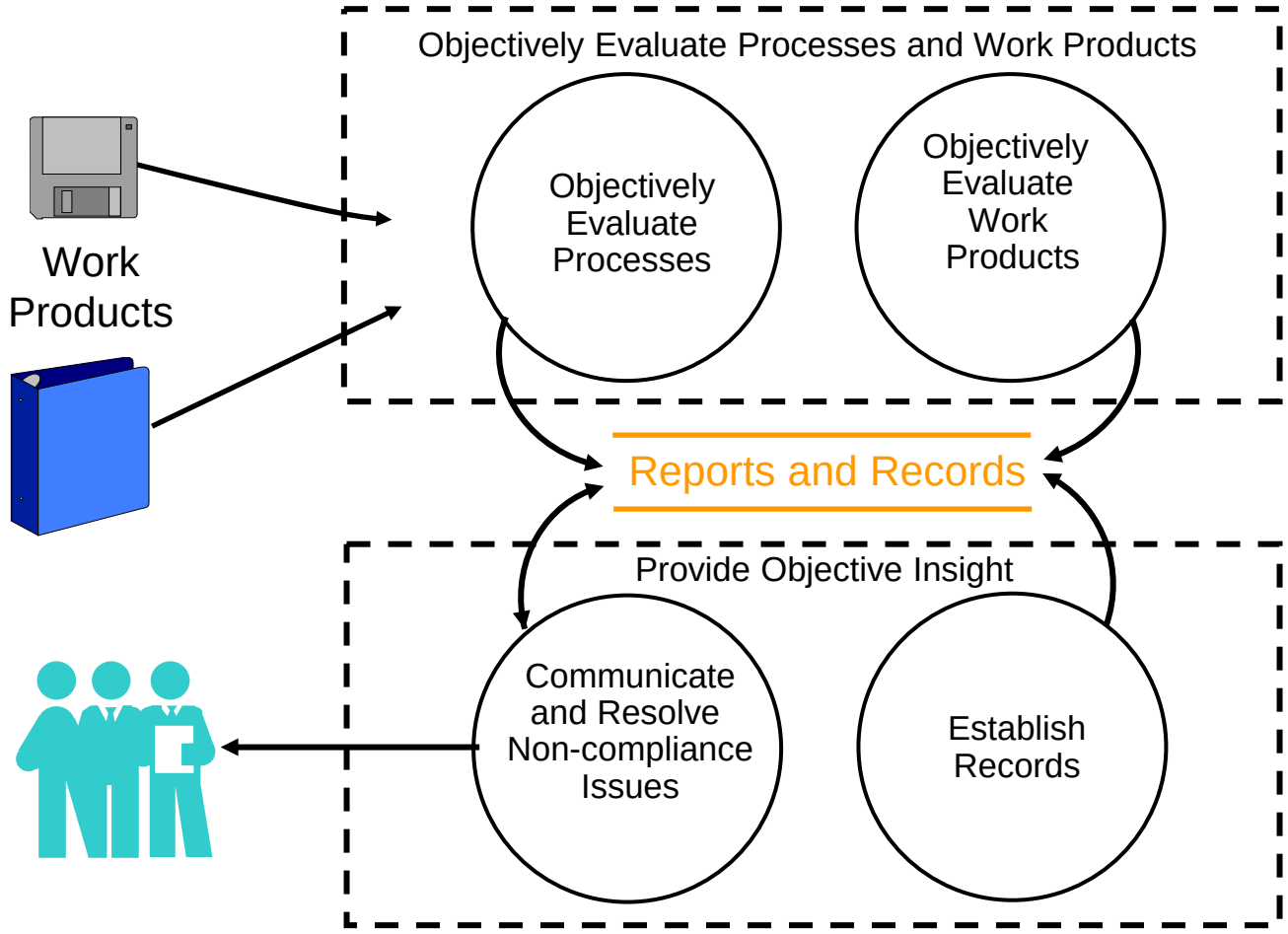
Process and Product Quality Assurance (PPQA)

The purpose of Process and Product Quality Assurance (PPQA) is to provide staff and management with objective insight into processes and associated work products.

SG 1: Objectively Evaluate Processes and Work Products
Adherence of the performed process and associated work products to applicable process descriptions, standards, and procedures is objectively evaluated.

SG 2: Provide Objective Insight
Noncompliance issues are objectively tracked and communicated, and resolution is ensured.

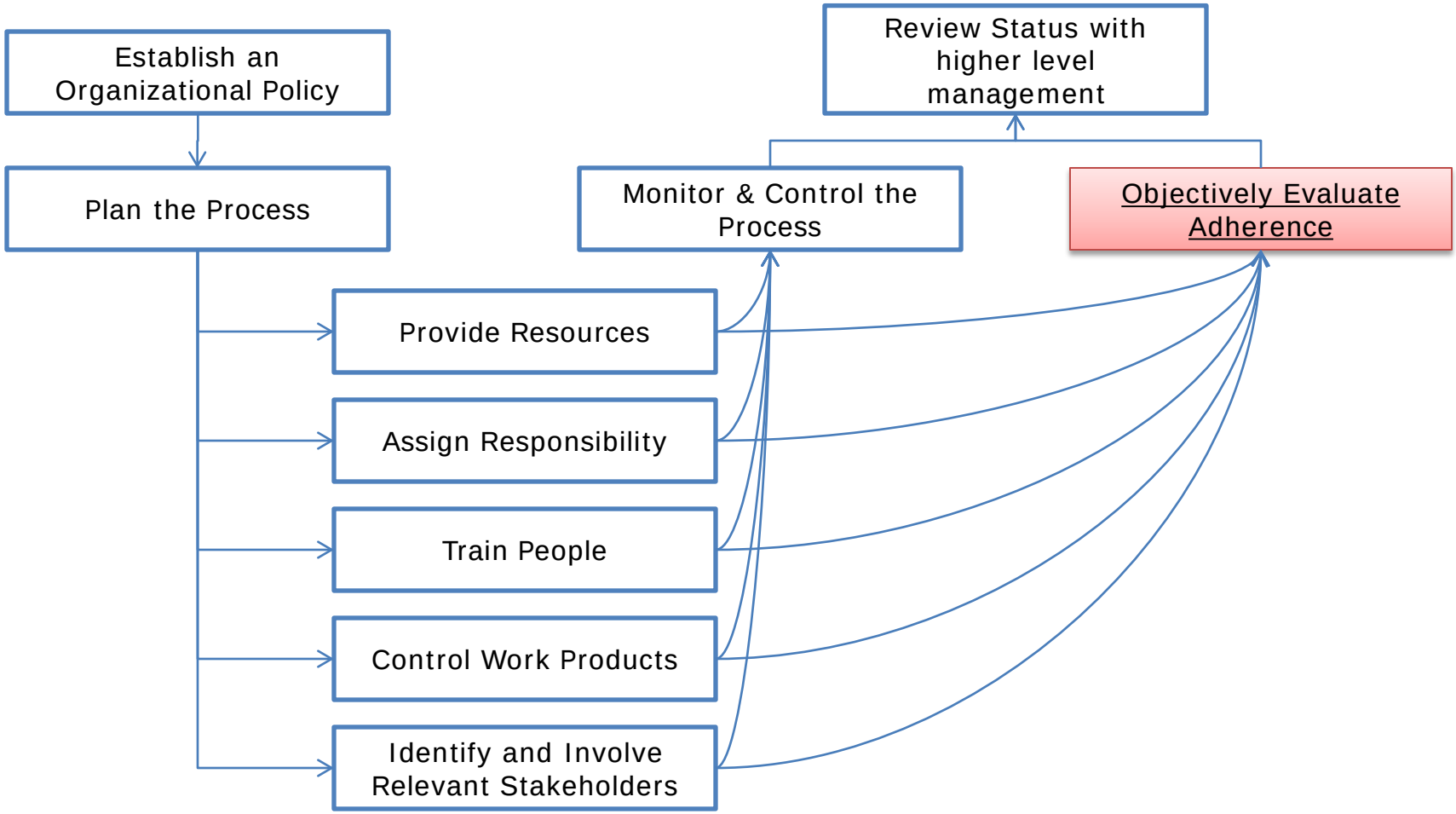
Process and Product Quality Assurance - Context



PPQA Practices translated:

- Are QA evaluations performed on processes/workproducts according to predefined criteria?
- Performed processes adhere to the standards, process descriptions and procedures?
- Non-compliance identified during the QA evaluations of processes/work products?
- Lessons learned collected?
- Non-compliances resolved within the project/escalated?
- Relevant stakeholders aware of the results of the QA evaluations?
- Management reviews on non-compliances on periodic basis?
- Non-compliances tracked until closure?
- QA activities documented in sufficient detail?
- QA status and results known?

How PPQA relates to Generic Practices?



Source: Kiril Karaatanasov, ESI Center Bulgaria

Analyze that (2)

Statement:

If programing is “creative” & **fun**,

Why the software engineering is a **job**?

Analyze that (3):

What's wrong?

PAs
SPs
GPs
..
we?

Supporting PAs (overview)

Process and Product Quality Assurance (PPQA)

- SG 1: Objectively Evaluate Processes and Work Products
- SG 2: Provide Objective Insight

Configuration Management (CM)

- **SG 1: Establish Baselines**
- **SG 2: Track and Control Changes**
- **SG 3: Establish Integrity**

Measurement and Analysis (MA)

- SG 1: Align Measurement and Analysis Activities
- SG 2: Provide Measurement Results

Configuration Management (CM)

The purpose of Configuration Management (CM) is to establish and maintain the integrity of work products using configuration identification, configuration control, configuration status accounting, and configuration audits.

SG 1: Establish Baselines
Baselines of identified work products are established.

SG 2: Track and Control Changes
Changes to the work products under configuration management are tracked and controlled.

SG 3: Establish Integrity
Integrity of baselines is established and maintained.

What does CM Provide?

State of components is known and there is confidence what and when can be released

When needed baselines can be recovered

Changes from baseline are identifiable

Past product releases can be rebuilt

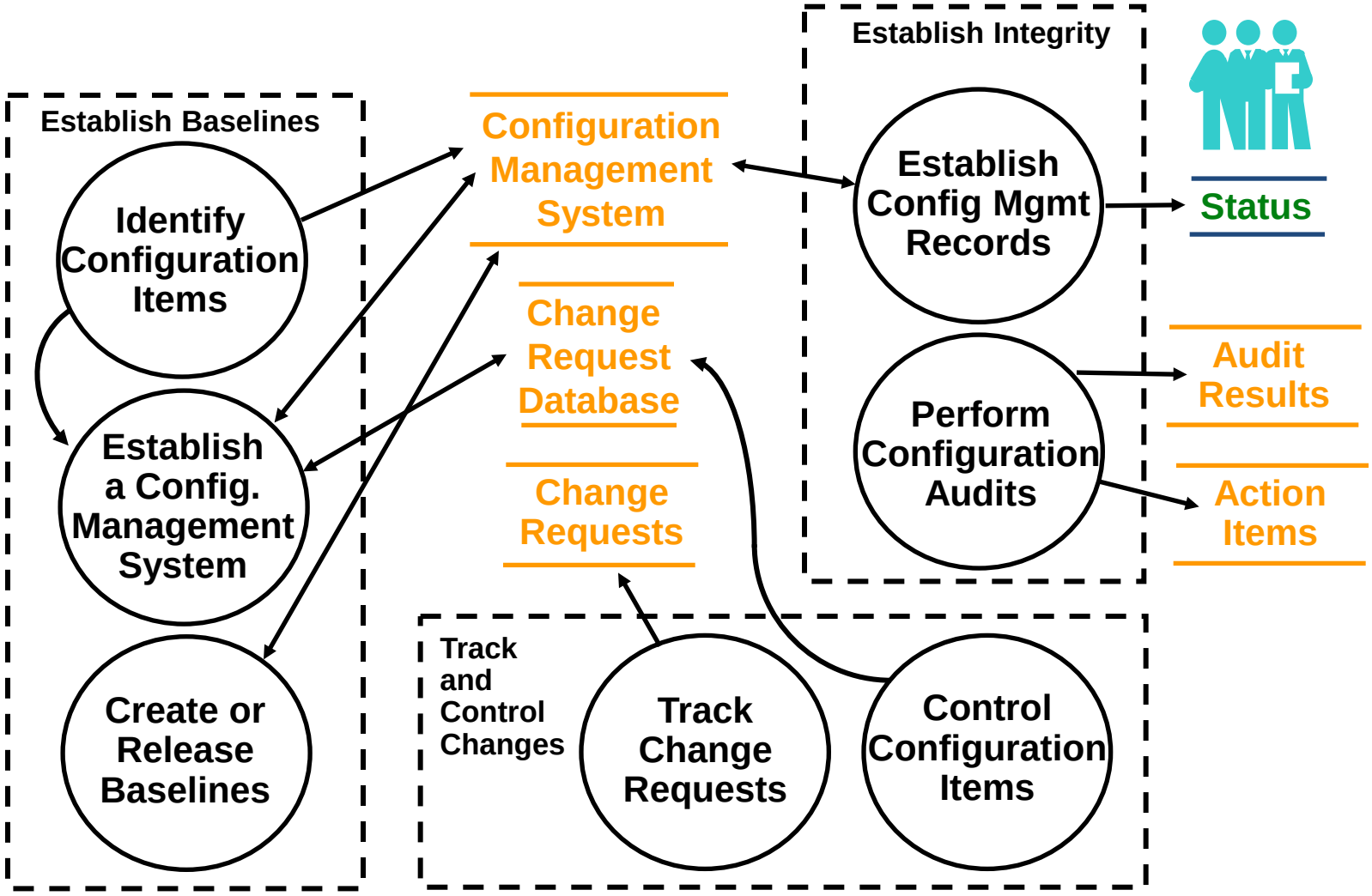
Reasons for changes to plans are clear

Terminology CM

Baseline

- A set of specifications or work products that has been formally reviewed and agreed on, which thereafter serves as the basis for further development, and which can be changed only through change control procedures. (See also “configuration baseline” and “product baseline.”)

Configuration Management - Context



The essence of CM

CM Involves:

- Identifying the configuration of work products that compose the baselines
- Controlling changes to configuration items
- Building work products from the configuration management system
- Maintaining the integrity of baselines
- Providing status / configuration data to developers, end users, and customers

Work products placed under configuration management:

- products delivered to the customer
- internal work products
- acquired products
- tools

Configuration item may be:

- configuration component
- configuration unit

Baselines:

- provide a basis for evolution of configuration items
- added to the configuration management system as they are developed
- Changes to, are systematically controlled/monitored

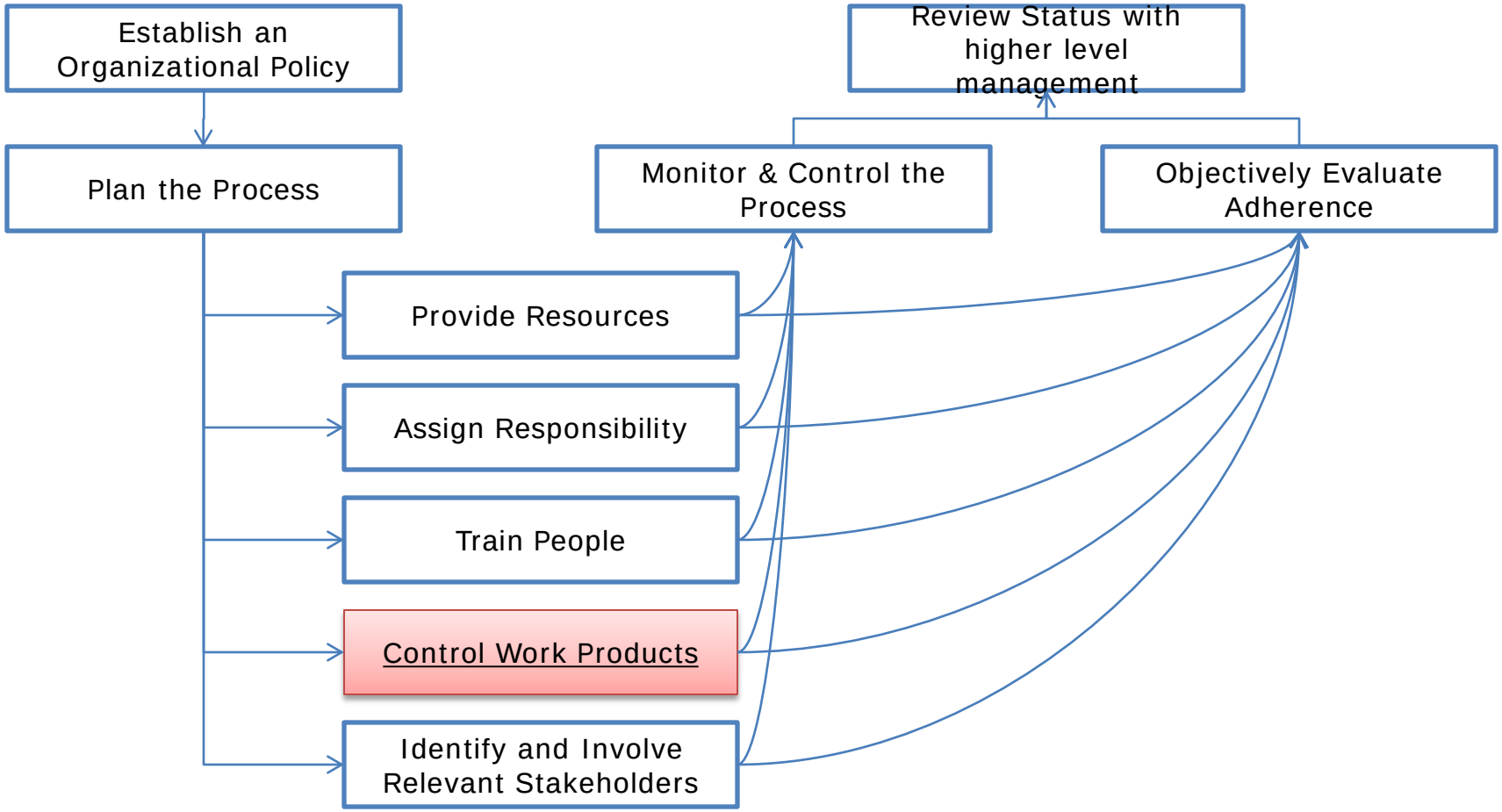
This PA applies not only to **projects, but also to organization work products** (standards, procedures, etc)

This PA is applicable to all work products that are placed under configuration management.

CM practices

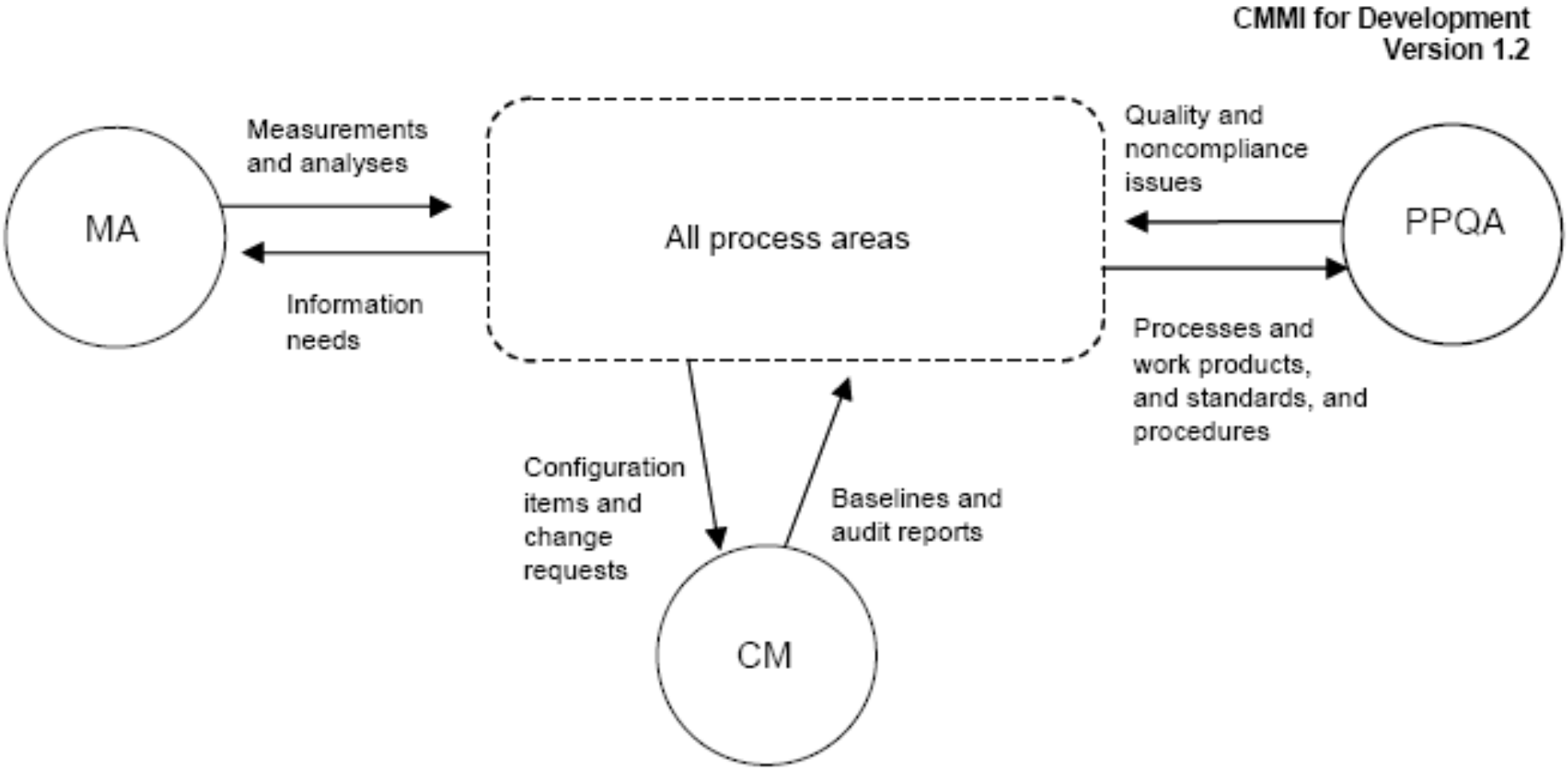
- Configuration items/work products selected in the initial planning of the project?
- An owner responsible for each CI?
- Configuration management system supports multiple control levels?
- Employees can store and recover the different versions of CI's in the CMS?
- Team members store, update and retrieve CM Records in the CMS?
- CMS supports the creation of CM Reports?
- Contents of CMS's preserved?
- Baselines built and released from CI's kept in the CMS?
- Descriptions about the set of CI's that comprise each baseline?
- Change requests initiated and recorded, their impact analyzed?
- Current set of baselines available in the CMS?
- Change requests reviewed with the affected people?
- Changes tracked to closure, in order to check that all changes have been incorporated?
- Changed CI's entered into the CMS only after obtaining authorisation?
- After each CM action, are CI's content and status updated and is it possible to recover previous versions of CI´s?
- Is the CI's records' correctness/CMS structure and integrity verified/reviewed through audits?

How CM relates to Generic Practices?



Source: Kiril Karaatanasov, ESI Center Bulgaria

Summary: How support process areas fit?



MA = Measurement and Analysis
CM = Configuration Management
PPQA = Process and Product Quality Assurance