

МУК 2015/2016:

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

Software Quality Models
[CMMI based course]

Project Planning (PP)

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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

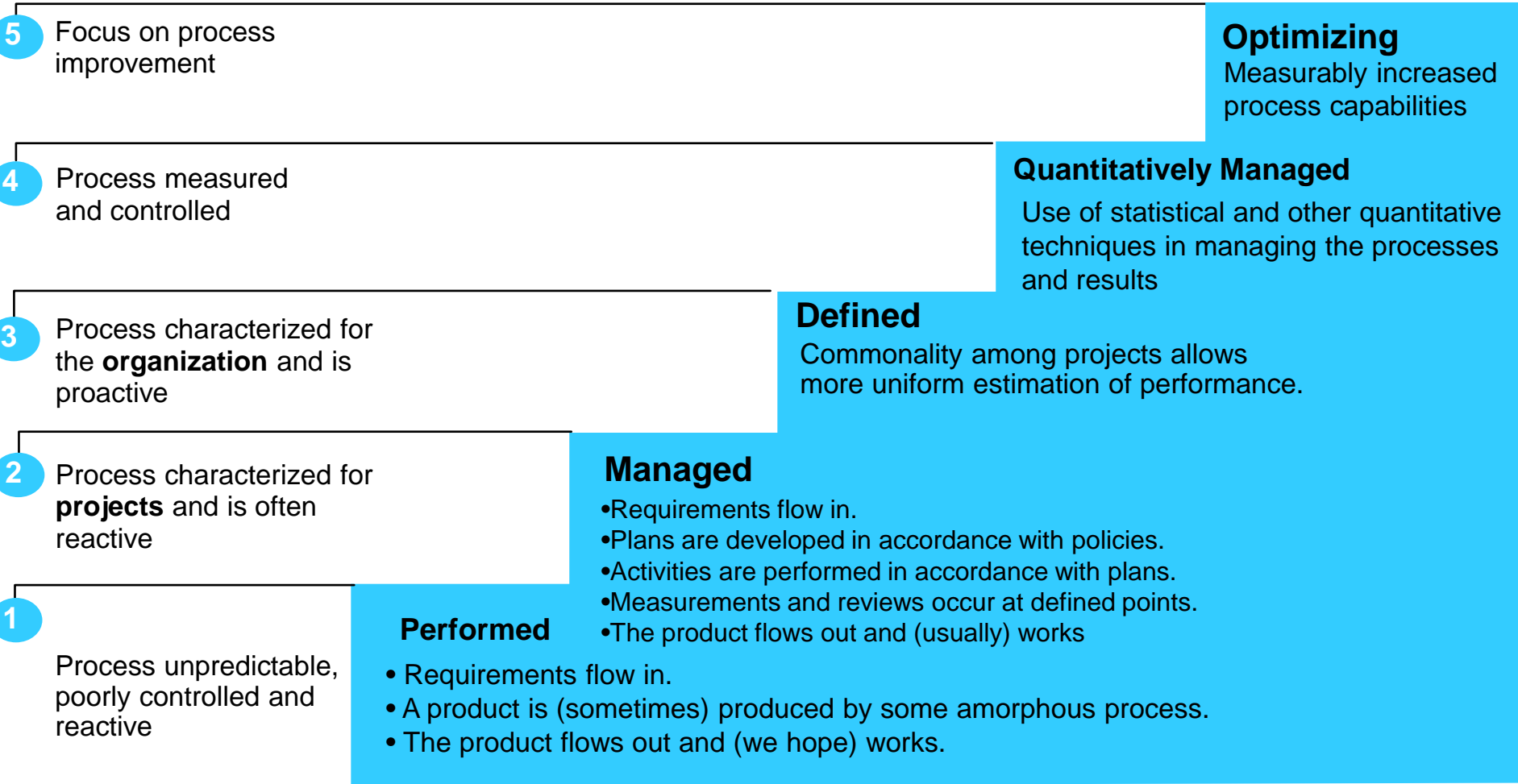
www.cmmiinstitute.com

Къде сме?

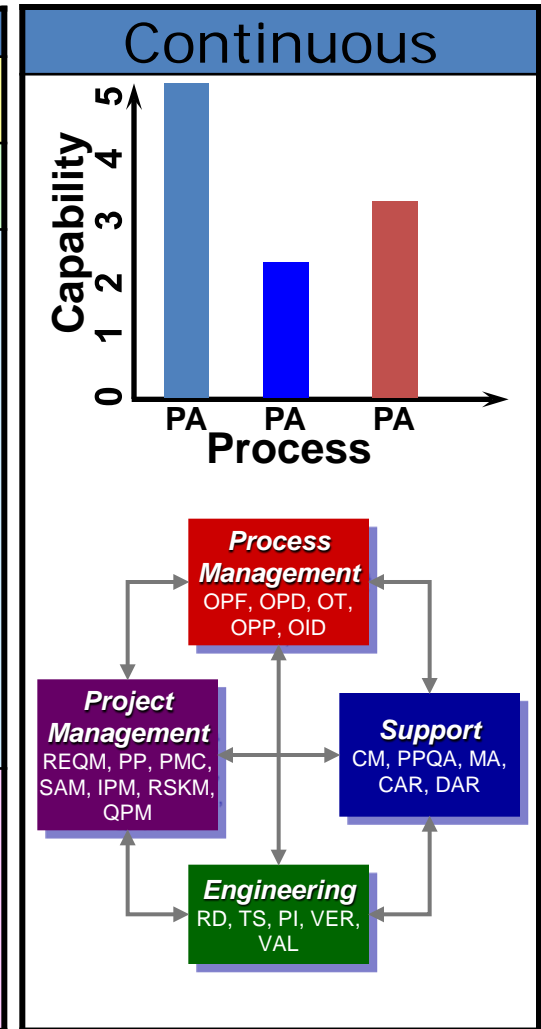
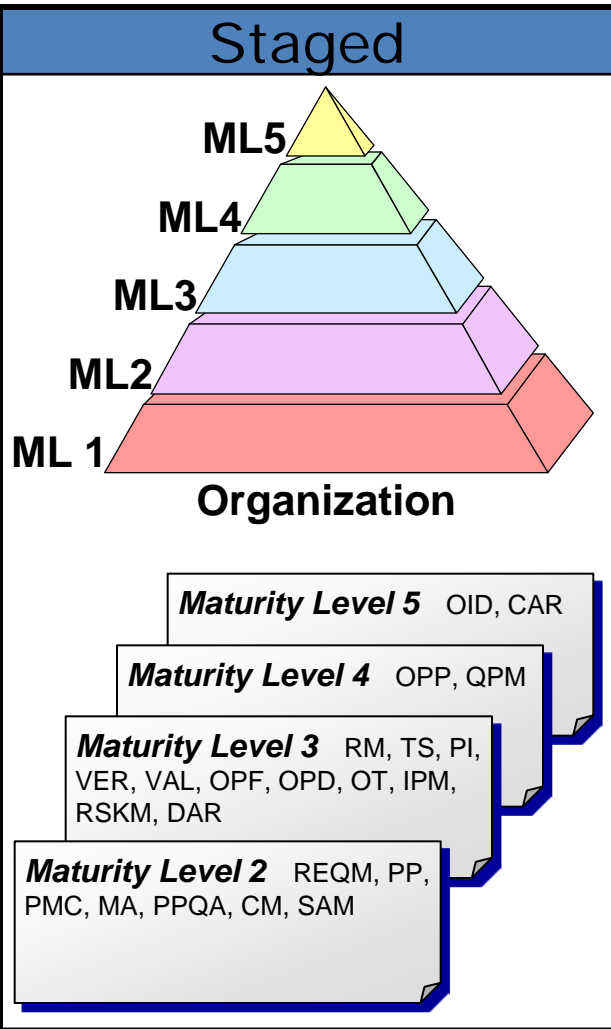
1	Увод в управление на качеството. Компоненти и цена на качеството. Процеси. Преглед на моделите за управление на качеството и подобряване на процесите. Методи за оценка на зрелостта на ИТ-интензивни и софтуерни организации. Стратегически карти/Балансирана система от показатели (balanced ScoreCards).
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. Компоненти 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



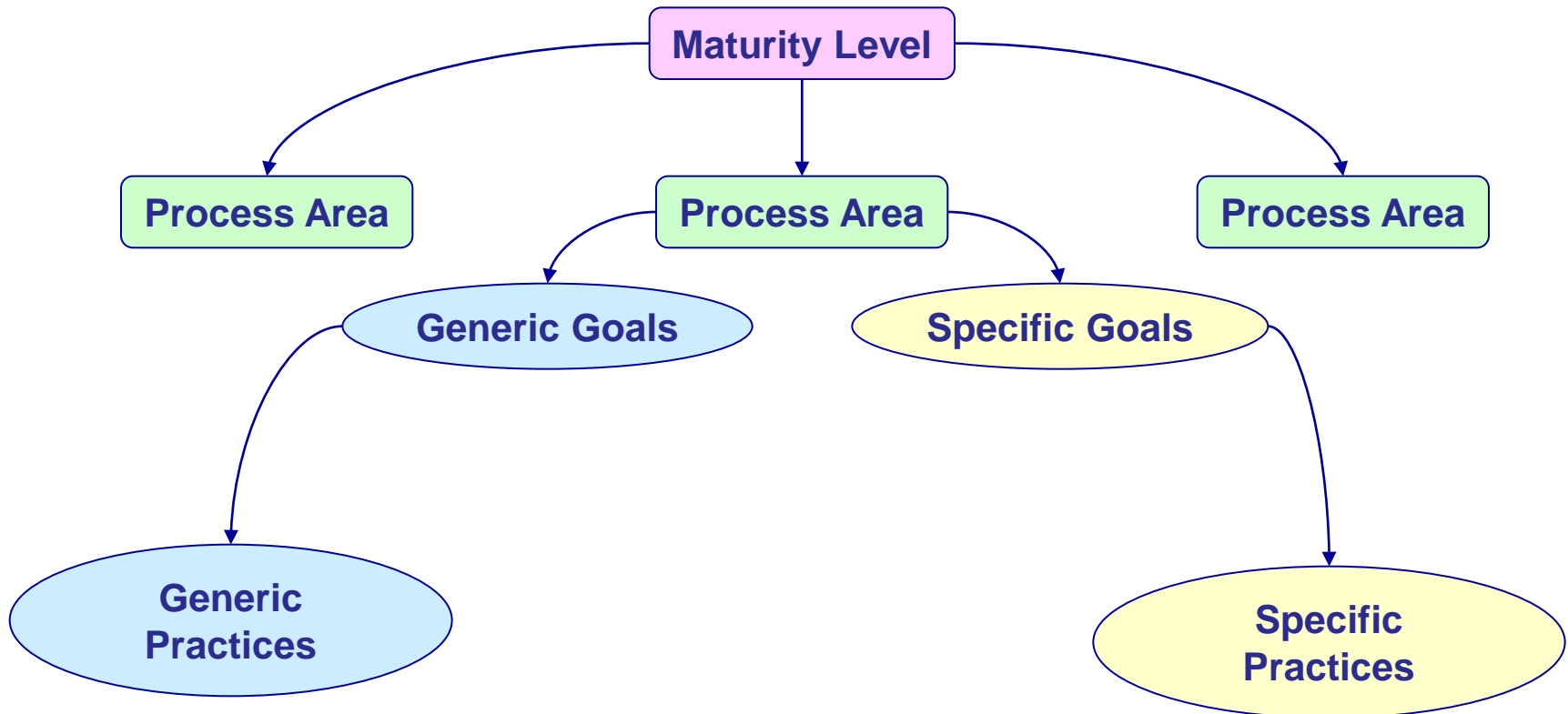
Remember: CMMI Representations



Remember: Evolution of Process Capability

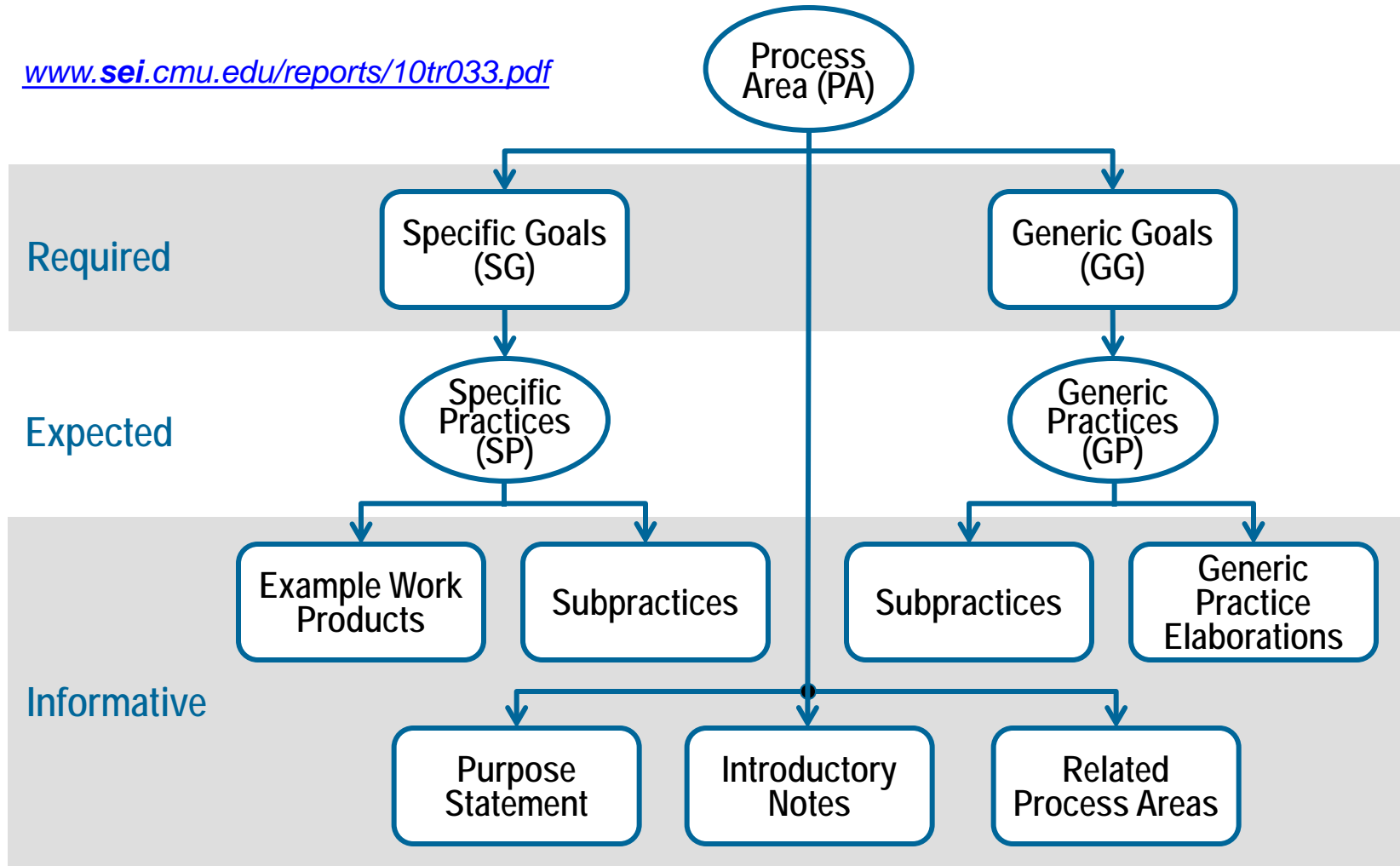
Level	Process Characteristics	Predicted Performance
5 Optimising	Process improvement is institutionalised	
4 Quantitatively Managed	Product and process are quantitatively controlled	
3 Defined	Software engineering and management processes are defined and integrated	
2 Managed	Project management system 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

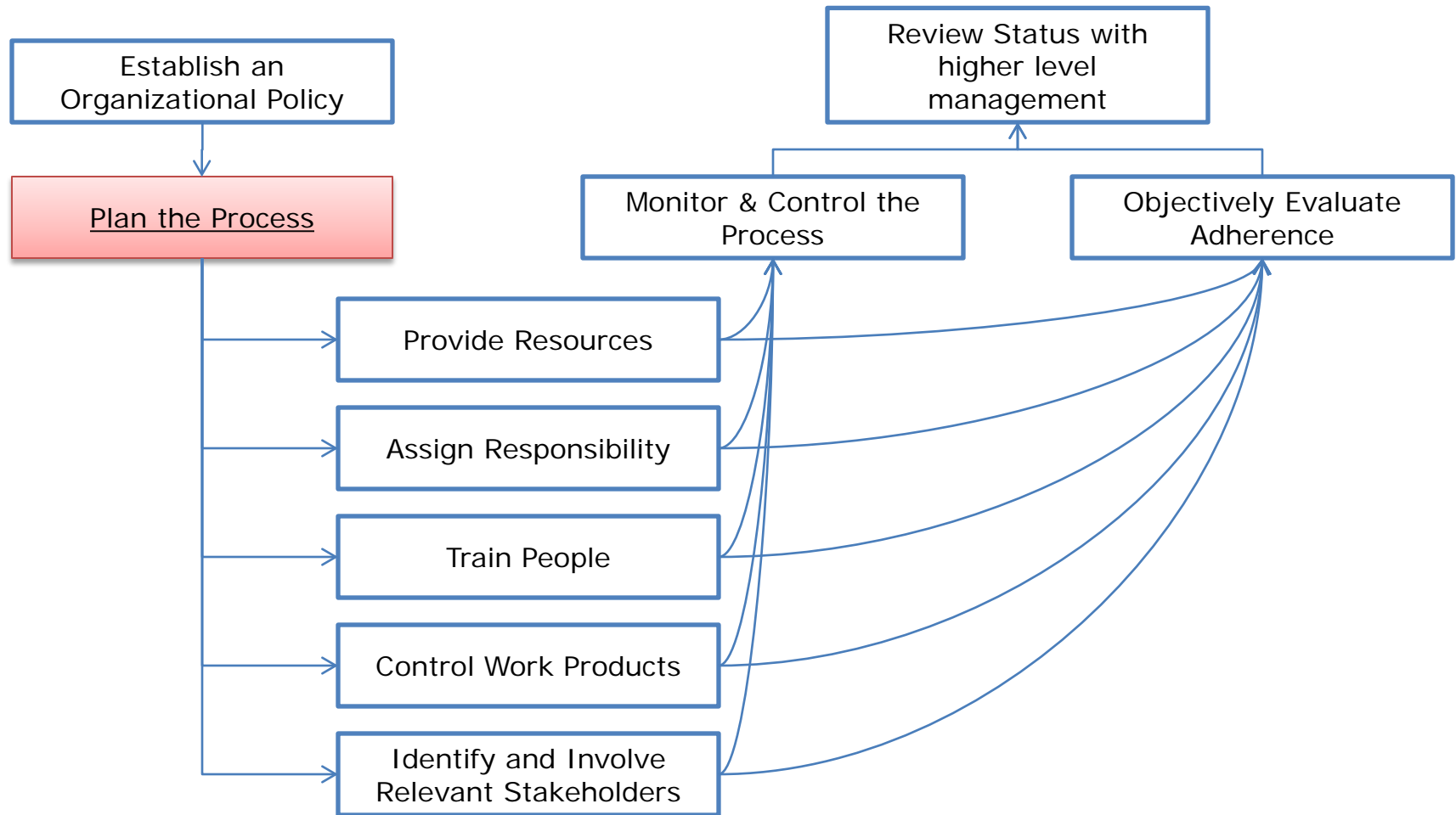
GP2.7: Identify and Involve Relevant Stakeholders

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

ML2: **Управлението на проектите** **ВКЛЮЧВА**

Разбиране и спазване на **изискванията**

Оценка на работа, която трябва да се извърши

Разработване на **механизми**, които спомогнат за идентифициране на продуктите

Разработване на **план на проекта**

Предприемане на стъпки за **спазване на плана**

Работа с **доставчиците**, за да установим идентифицираните продукти

Мониторинг на прогреса спрямо плана

Определяне и анализ на **риска**

Предприемане на действия за справяне със **значителни отклонения** от плана

Предприемане на адекватни действия за **намаляване на риска**

ML2: **Управлението на проектите**

ВКЛЮЧВА

В случай, че даден проект се управлява с помощта на специфичните практики, свързани с конкретната процесна област, екипът разбира как и защо проектът е успешен. Това позволява на бъдещите подобни проекти да имат добри шансове за успеваемост като осигурява и повтаряемост на дейностите. Най-добрите практики за управление започват на нулево ниво от разработката на един проект и след това идеята е да се превърнат в рутина.

Процесните области от ML2 са свързани с управлението на проекти (project management).

Дисциплината управление на проекти води до разделянето на проекта на ясно определени етапи от жизнения цикъл на продукта, и до много по-голяма прозрачност в това управление, в границите на всеки етап.

Project Management PAs (overview)

Requirements management (REQM)

- SG1: Manage requirements

Project Planning (PP)

- **SG1: Establish Estimates** (*Създаване на оценките*)
- **SG2: Develop a project plan** (*Разработка на плана*)
- **SG3: Obtain Commitment to the plan** (*Осигуряване на ангажиментите към плана*)

Project Monitoring and Control (PMC)

- SG1: Monitor Project Against Plan
- SG2: Manage Corrective action to closure

Think about: What a typical Project Plan includes?

- Resources
- Budget
- Schedule (Milestones)
- Stakeholders
- Commitments – dependencies, deliverables
- Data Plan
- Knowledge and skills - Training
- Risks

PP: Project Planning

*The purpose of Project Planning (PP) is to **establish and maintain plans** that define project activities.*



SG1: Establish Estimates

Estimates of project planning parameters are established and maintained.

SG2: Develop a Project Plan

A project plan is established and maintained as the basis for managing the project.

SG3: Obtain Commitment to the Plan

Commitments to the project plan are established and maintained.

PP: Project Planning

... Как се определя обхвата на работа с помощта на WBS

... Как се установява размера на усилията, които ще се изискват за изпълнение на плана и цената, която трябва да се заплати

... За какво се използва жизненият цикъл на продукта

... Как се разработва project plan-а (бюджет, графици, рискове, адекватна информация, ресурси, нужди от знания и умения, включени участници)

... Как се осигурява спазването на ангажиментите към плана (reviews, reconciling work and resource levels)

... Какви критерии се използват за установяване на коригиращите действия (corrective actions), нужни за отстраняване на съществени отклонения от плана (significant deviations)

When Project Planning Is Not Done Well...

Оценките на различните части от проекта са неточни.

Трудно е да се **идентифицират отклонения** от лошо документирани планове.

Ресурсите не са на разположение/използвани, когато са необходими.

Бъдещите проекти не могат да се поучат от готови проекти, тъй като **няма направени изводи**.

Да помислим...

... Какво може да се случи, когато планирането на проекта не се изпълнява добре?

... Собствен опит при подобни отклонения от плана?

... Какви са ползите от доброто планиране на проекта за организацията?

Специализирана терминология

Project

A managed set of interrelated resources which delivers one or more products to a customer or end user. A project has a definite beginning (i.e., project startup) and typically operates according to a plan. Such a plan is frequently documented and specifies what is to be delivered or implemented, the resources and funds to be used, the work to be done, and a schedule for doing the work. A project can be composed of projects.

Program

(1) A project. (2) A collection of related projects and the infrastructure that supports them, including objectives, methods, activities, plans, and success measures.

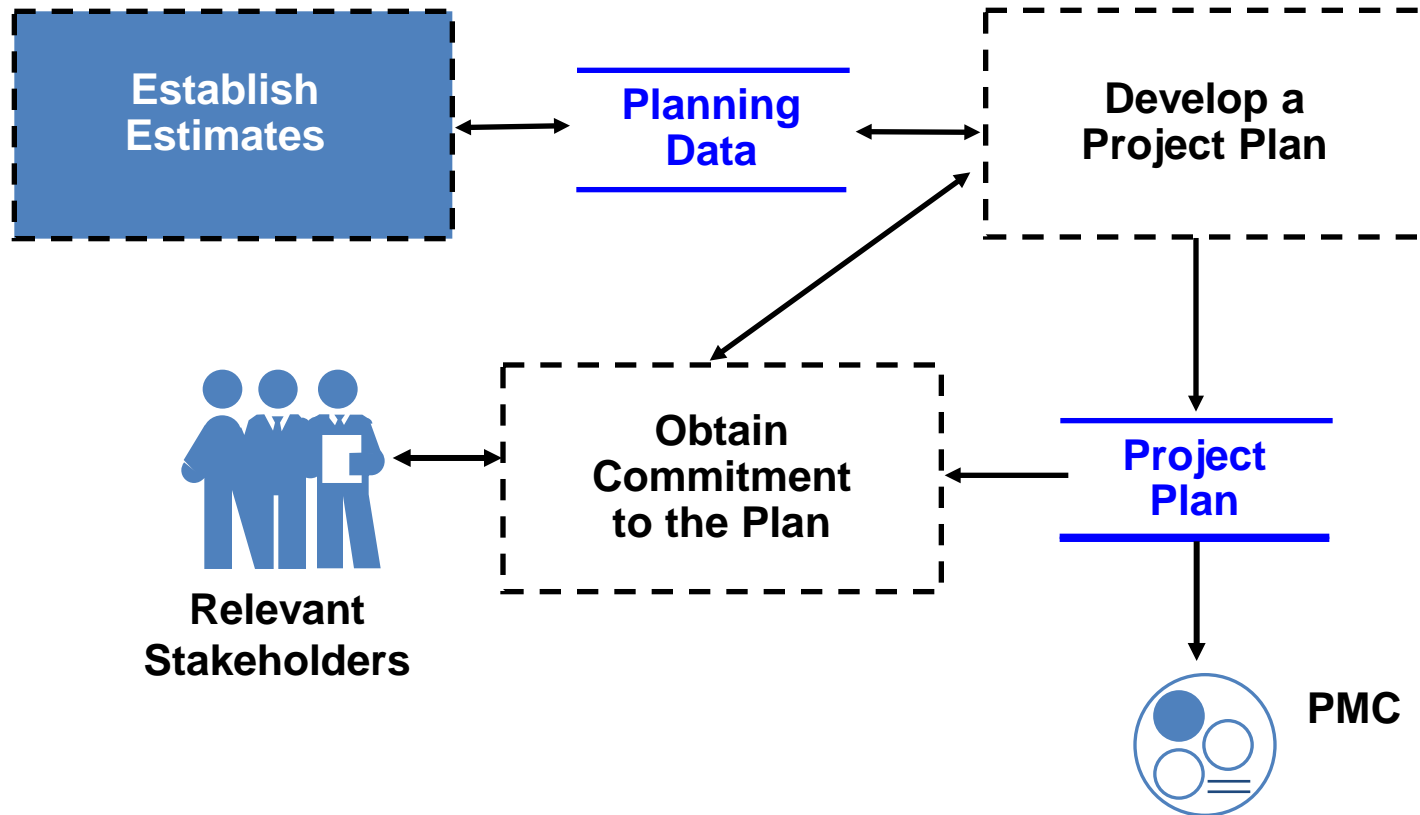
Work breakdown structure (WBS)

An arrangement of work elements and their relationship to each other and to the end product.



WBS

Project Planning Context -1



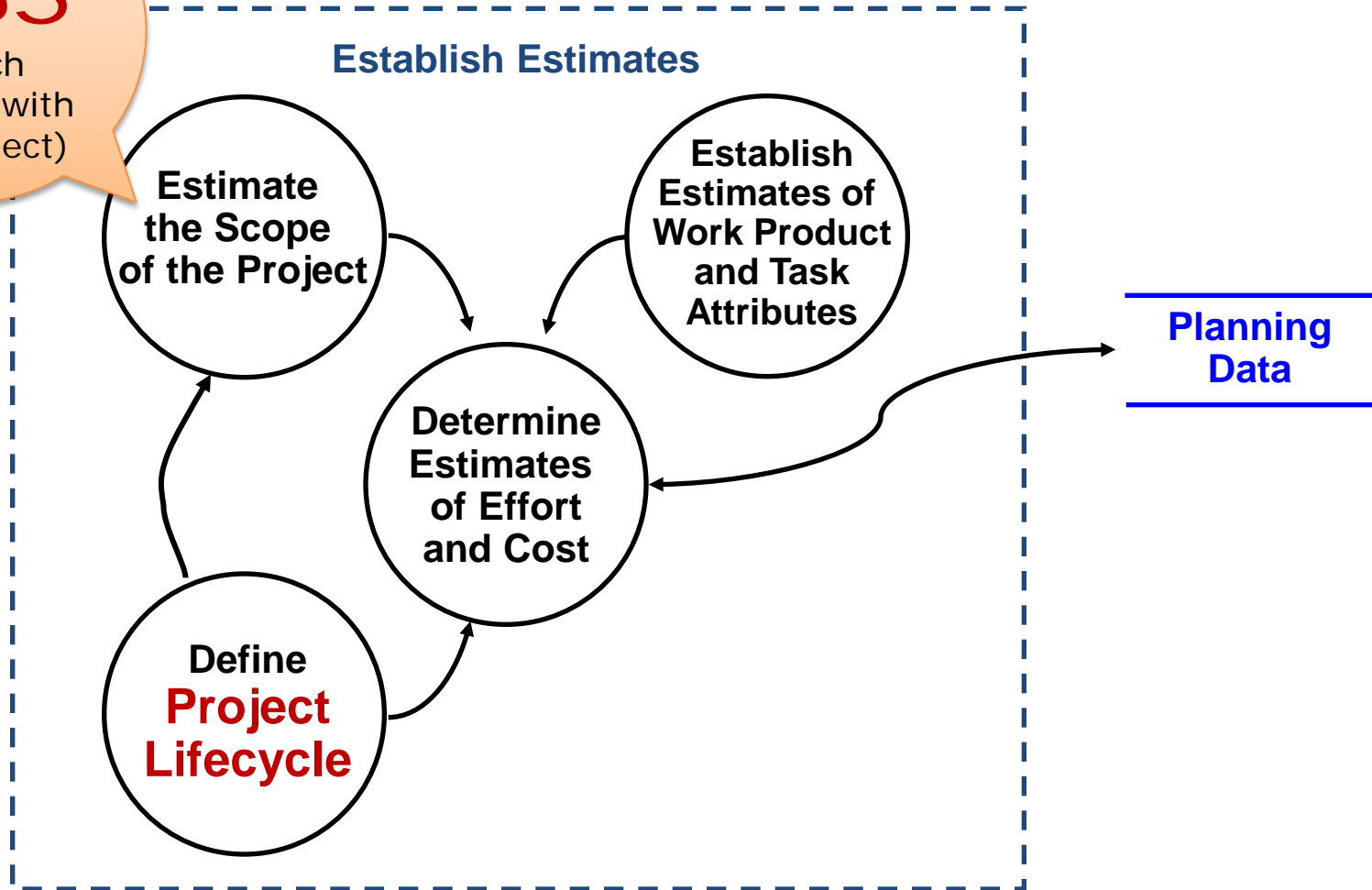
Показаните три кутийки директно отговарят на трите специфични цели на Project planning. На следващия слайд е показано кои специфични практики се използват за осъществяването на всяка цел. Последващите класациите ще подчертаят специфичните практики, които да съответстват на всяка цел / афинитет кутия. Имайте предвид, че полето в сиво е този, който ще бъде разгледан по-нататък.

Project Planning Context -2

Starts with

WBS

(which evolves with the project)



Project Planning Context -2

SP 1.1 “Estimate the Scope of the Project” - Estimating the scope of the project involves establishing work breakdown structures (WBSs) that divide the overall project into work packages. A work package represents a single work unit that can be separately assigned, performed, and tracked. The WBS provides a reference and organizational mechanism for assigning effort, schedule, and responsibility. It is used as the underlying framework to plan, organize, and control the work done on the project. The WBS evolves with the project.

SP 1.2 “Establish Estimates of Work Product and Task Attributes” - Product and task attributes include parameters such as size and complexity. Estimating attributes involves both determining the technical approach of the project and using appropriate methods to determine the work product and task attributes that will be used to estimate resource requirements.

Project Planning Context -2

SP 1.3 “Define Project Lifecycle” - The project lifecycle phases need to be defined depending on the scope of requirements, the estimates for project resources, and the nature of the project. Larger projects may contain multiple phases such as concept exploration, development, production, operations, and disposal. Within these phases, sub-phases may be needed. A development phase may include subphases such as requirements analysis, design, fabrication, integration, and verification. Emphasize that phases in the lifecycle should be of manageable size and the boundaries between phases should represent logical decision points during which course corrections and determinations of future scope and cost can be made.

Project Planning Context -2

SP 1.4 “Determine Estimates of Effort and Cost” - Determining estimates of effort and cost involves using planning parameters, models, and historical data to develop estimates for cost, schedule and effort. Models and historical data are applied to the size, activities, and other planning parameters to determine effort and cost. Historical data include the cost, effort, and schedule data from previously executed projects plus appropriate scaling parameters to account for differing project sizes and complexities. Unprecedented efforts present more risk, require more research to develop a reasonable basis of estimate, and require more management reserve.



ADAM SAVAGE'S WORKSHOP

Step One: Make a List

If you think any detail is too small to write down in your initial project plan, you're going to get it wrong.

I love lists. Always have. When I was 14, I wrote down every dirty word I knew on file cards and placed them in alphabetical order. I have a thing about collections, and a list is a collection with purpose.

Lists are how I parse and manage the world. I make lists for fun (I have more than 17,000 palindromes) and to relax (I can eliminate distractions and focus on what's important). But mostly I make lists for projects. This can be daunting. Breaking something big into its constituent parts will help you organize your thoughts, but it can also force you to confront the depth of your ignorance and the hugeness of the task.

That's OK. The project may be the lion, but the list is your whip.

The first thing I write down is whatever I hope to end up with—a Maltese Falcon, a Hellboy hand, or a map of all of Middle-earth (at the end of the Third Age, of course). That used to be the header in a notebook. Now it's generally the name of a folder on my computer, and the list of tasks will be a series of subfolders and sub-subfolders.

When I want to build something, I'll start collecting images, drawings, and information in the main folder. After a few weeks or months, I'll parcel this raw info into subfolders. If I'm building a spacesuit, I'll make separate subfolders for the helmet, gloves, boots, front control module, backpack, and so on. Unforeseen challenges—the checklists on the wrists of NASA's Apollo-era suits, for instance—will get even more subfolders.

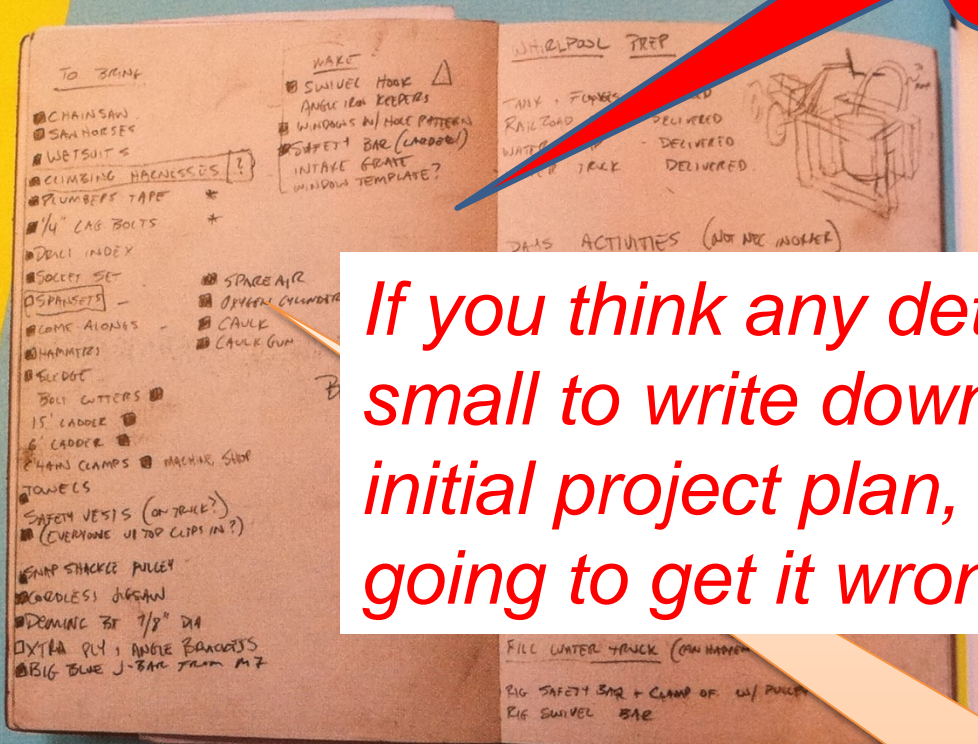
Eventually I'll create a folder called Adam's Progress. As I chug along, I take photos with my phone and drop them into this folder for a quick reference of how far I've come. These images provide inspiration and momentum. A list

of what I've already done makes the list of what's left to do a bit more manageable. And when I'm finished, this folder will be my diary of the project. It's something I'll keep forever.

Just like that collection of dirty words.

ADAM SAVAGE (adamsavage.com) is a sculptor, special-effects fabricator, and cohost of Discovery Channel's MythBusters.

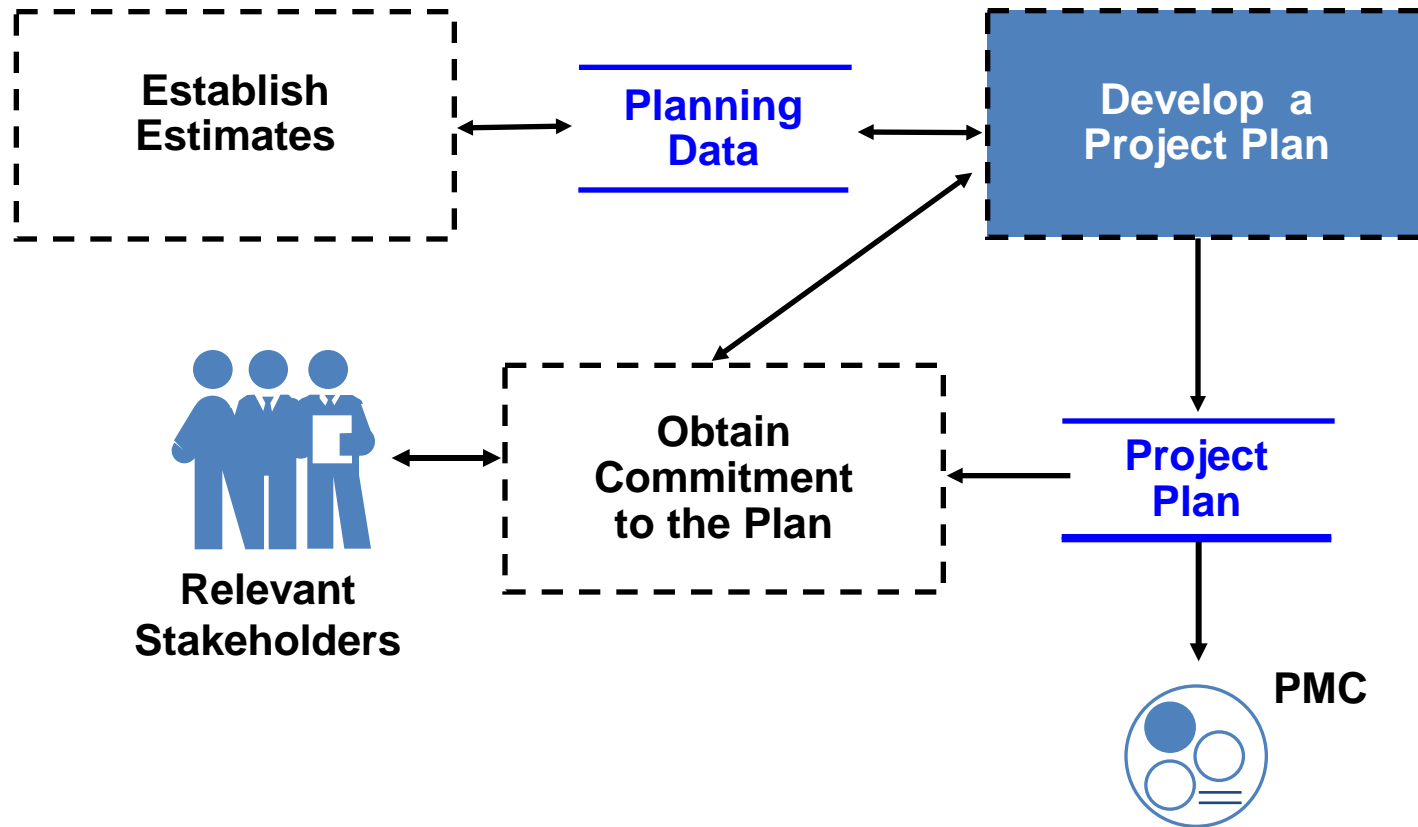
What is this?



If you think any detail is too small to write down in your initial project plan, you're going to get it wrong.

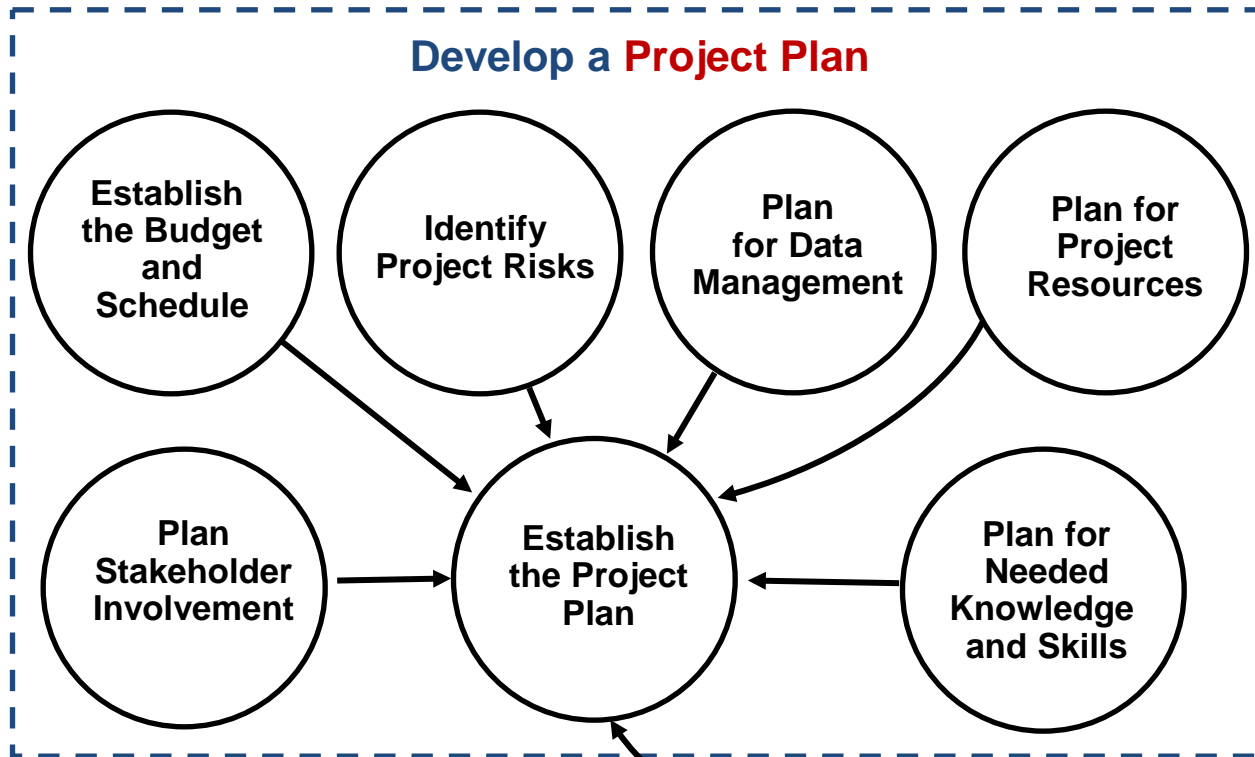
WBS ?

Project Planning Context -3



Project Planning Context -4

Planning Data



Project Plan

PMC



Project Planning Context -4

SP 2.1 “Establish the Budget and Schedule”

Schedule attaches the key lifecycle decision points to actual calendar dates based on factors such as the availability of resources and dependencies on other efforts. The criteria for determining when a schedule or budget item is in trouble are also developed at this time based on timing constraints, history, project assumptions, and work to be accomplished. Corrective actions may require replanning, which may include revising the original plan, establishing new agreements, or adding mitigation activities to the current plan.

Project Planning Context -4

SP 2.2 "Identify Project Risks"

Risks are identified or discovered and analyzed to support project planning, and then are handed off to risk management activities. Project planning risk identification and analysis includes eliciting risks with the associated contextual information, documenting the risks, obtaining agreement on the completeness and correctness of the documented risks from relevant stakeholders, prioritizing risks, and revising the risks as appropriate. The risks are identified and prioritized in this practice. Tracking and mitigation risks is done in the Risk Management PA.

Project Planning Context -4

SP 2.3 “Plan for Data Management” - Planning for data management involves establishing the requirements and procedures to ensure privacy and security of the data; establishing a mechanism to access archived data; and determining the project data to be identified, collected, and distributed. Document the reasons for collecting the data along with the master list of data to be managed. Note: Data Management may be a new concept to many attendees. You may want to brainstorm about what the differences are between the items that go into data management vs. configuration management. Can some go in both?

SP 2.4 “Plan for Project Resources” - The top-level WBS developed earlier as an estimation mechanism is expanded by decomposing the top-level tasks into work packages that represent singular work units that can be separately assigned, performed, and tracked.

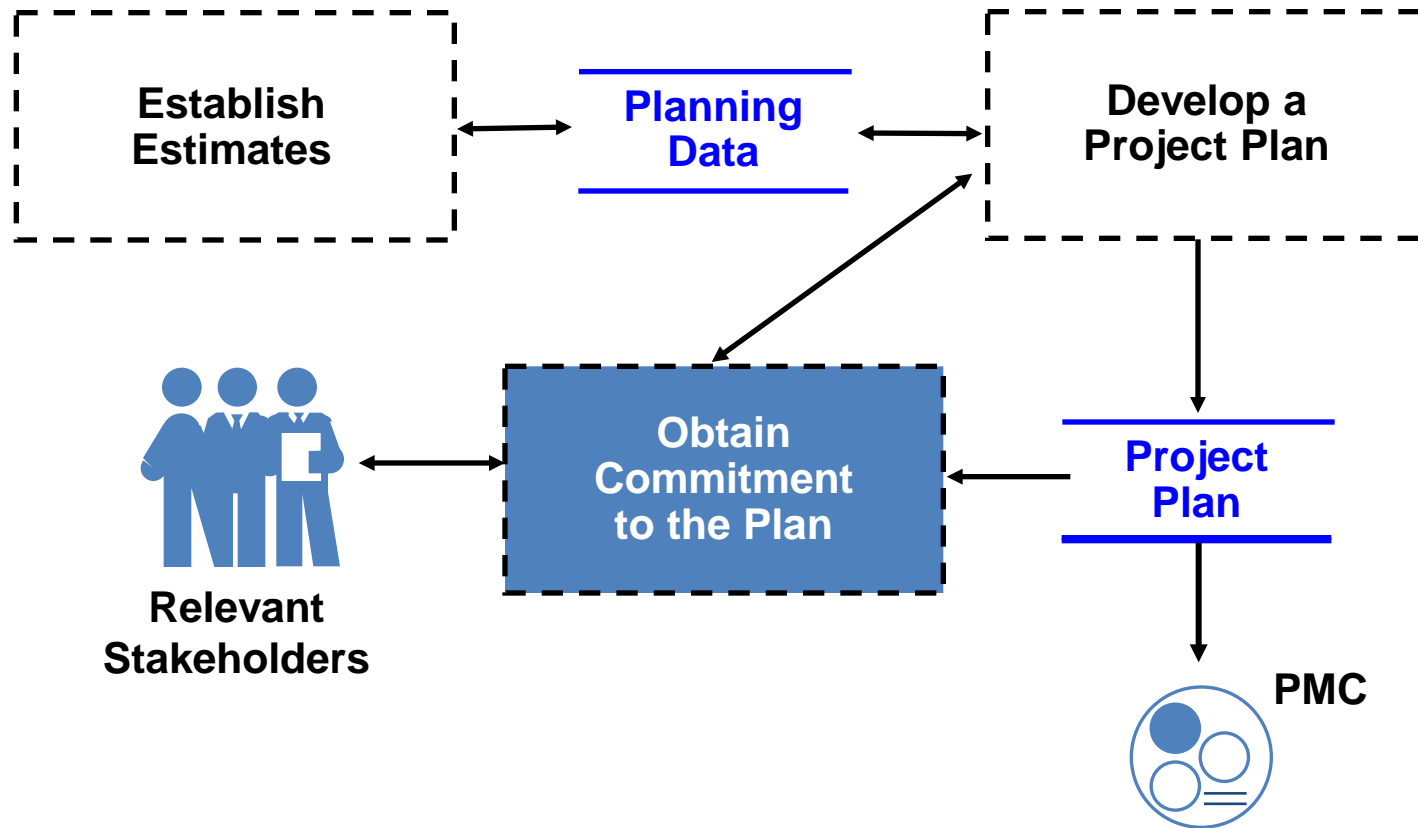
Project Planning Context -4

SP 2.5 “Plan for Needed Knowledge and Skills” - Knowledge and skills include domain knowledge and technical skills. Knowledge delivery to projects involves both training project personnel and acquiring knowledge from outside sources.

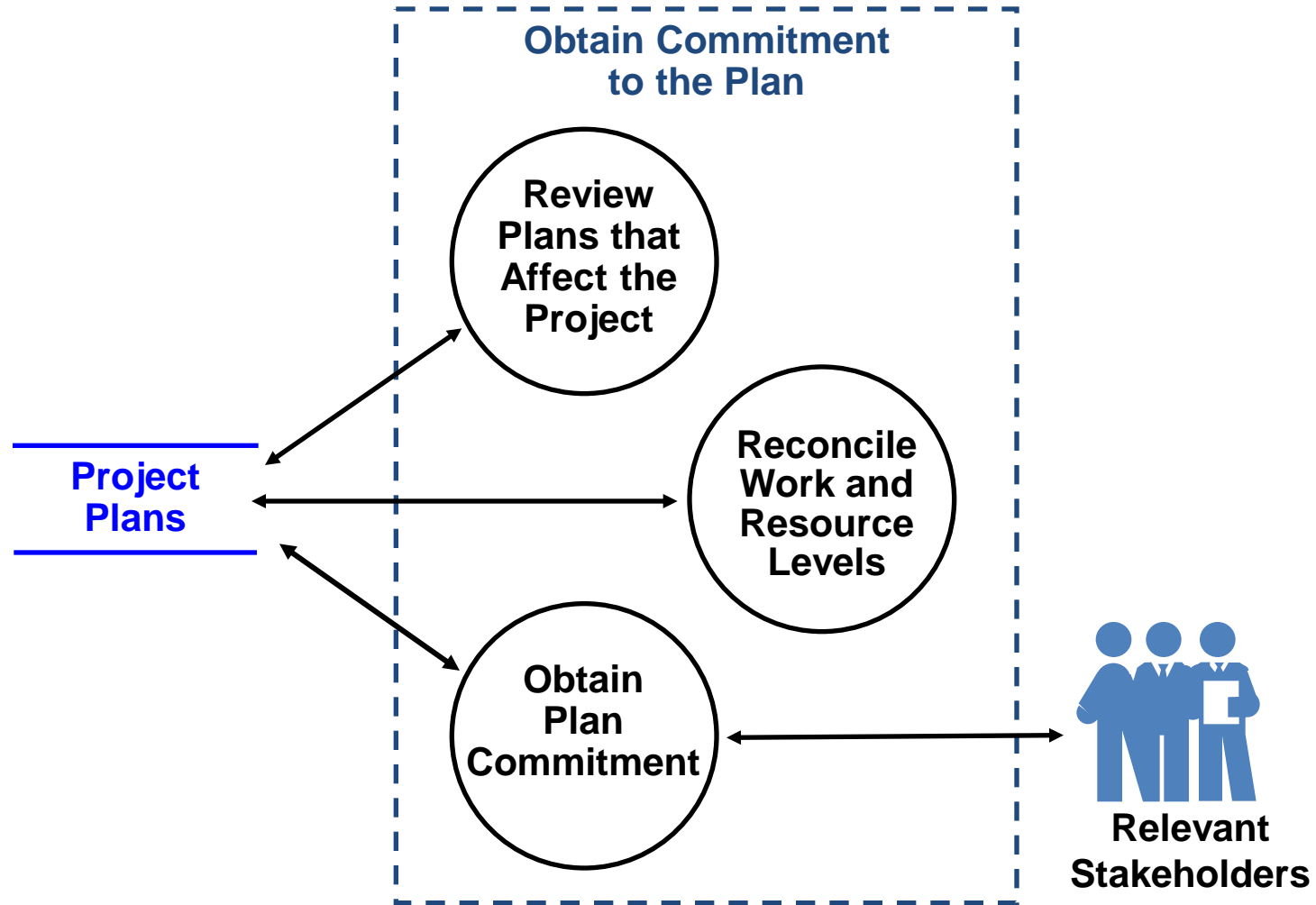
SP 2.6 “Plan Stakeholder Involvement” - This specific practice focuses on identifying the stakeholders for each phase of the product lifecycle and developing a plan for their involvement. Discuss the concept of stakeholders. A stakeholder is a group or individual that is affected by or in some way accountable for the outcome of an undertaking. Stakeholders include senior managers, project managers, project members, functional managers (e.g., systems engineering, software engineering, other disciplines), engineering staff, subcontractors, suppliers, customers, and end users. A stakeholder that is identified for involvement in a plan to perform specified activities or to receive certain kinds of information are called relevant stakeholders. Relevant stakeholders are defined in Project Planning.

SP 2.7 “Establish the Project Plan” – Reference the model for a list of elements typically included in the plans established.

Project Planning Context -5



Project Planning Context -6



Project Planning Context -5

SP 3.1 “Review Plans that Affect the Project” - Other plans would normally be prepared for specialized disciplines and supporting activities such as quality assurance plans, configuration management plans, measurement and analysis plans, and discipline-specific subordinate plans for hardware, software, and systems engineering. Many of these plans are described by the Plan the Process generic practice in each of the PAs.

SP 3.2 “Reconcile Work and Resource Levels” – To establish a project that is feasible, obtain commitment from relevant stakeholders and reconcile differences between the estimated resources required for the project and the actual available resources. Where there are shortfalls, reconciliation is typically accomplished by lowering or deferring technical performance requirements, negotiating more resources, finding ways to increase productivity, adjusting the staff skill mix, revising schedules, etc.

Project Planning Context -5

SP 3.3 "Obtain Plan Commitment"

- *Obtaining Plan Commitment involves*
- *A two-way exchange (The individual or group making a commitment must have confidence that the work can be performed within cost, schedule, and performance constraints. Often, a provisional commitment is appropriate to allow the effort to begin and for research to be performed to obtain the confidence necessary to make a formal commitment. Commitment should be obtained from both organizations and the individuals responsible for accomplishing the work.)*
- Documenting all organizational commitments, both full and provisional to ensure the appropriate level of signatories
- Reviewing internal commitments with senior management as appropriate
- Reviewing external commitment with senior management as appropriate
- Identifying commitments regarding interfaces between elements of the project and interfaces with other projects and organizational units for monitoring

Sampling the Generic Practices

GP 2.2: Plan the Process

Establish and maintain the plan for performing the project planning process.

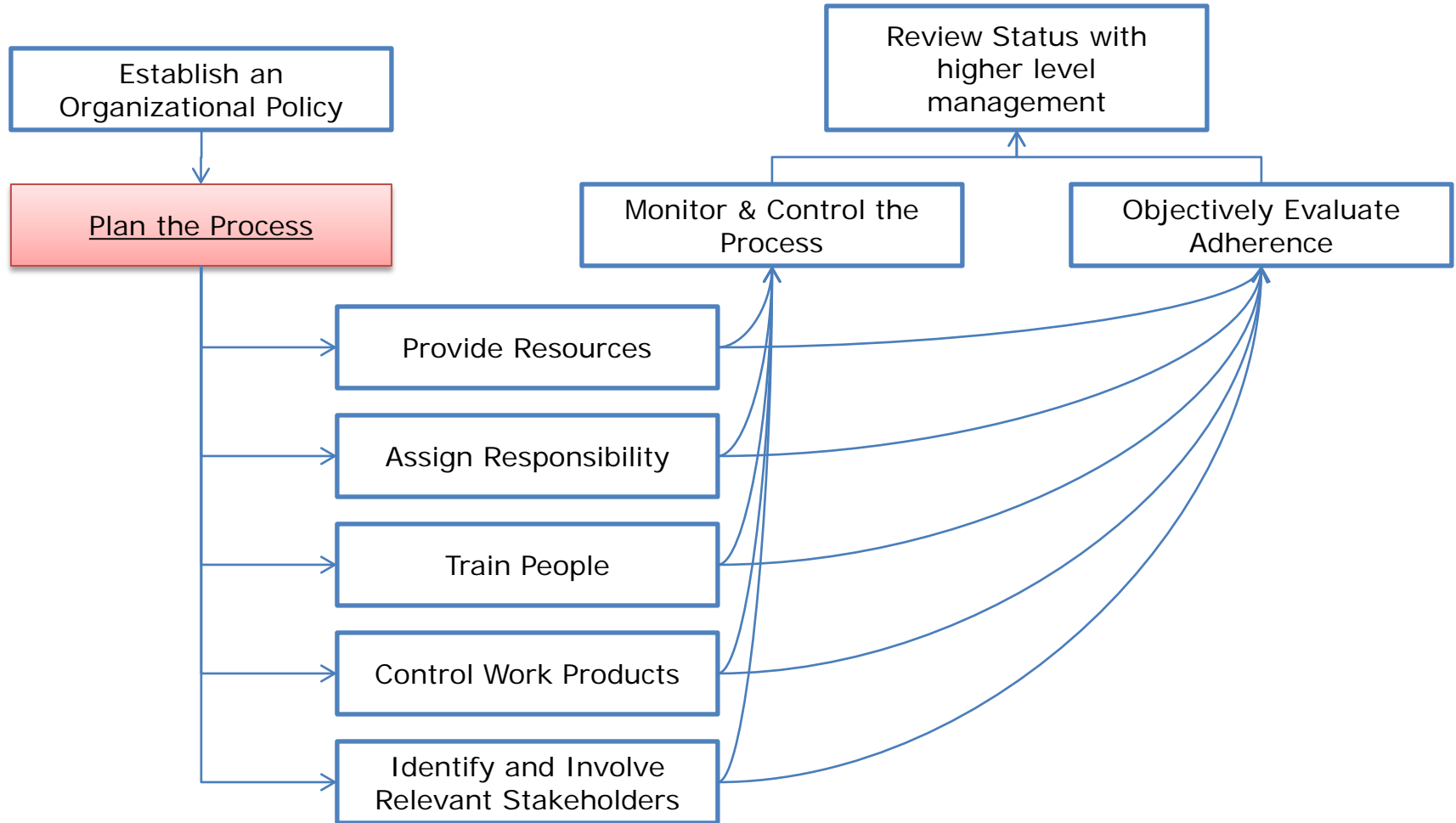
Or PLAN THE PLAN !!!

Elaboration for Project Planning

Refer to Table 6.2 in Generic Goals and Practices in Part Two for more information about the relationship between generic practice 2.2 and the Project Planning process area.

Генеричните практики (Generic practices = GP) осигуряват институционализацията на процесите и по този начин гарантират, че дейностите от съответната процесна област ще бъдат ефективни, повтаряеми и дълготрайни.

How PP relates to Generic Practices?



Source: Kiril Karaatanasov, ESI Center Bulgaria

Project Planning "translated":

- **The Project Planning involves:**
 - Developing the project plan
 - Getting commitment to the plan
 - Maintaining the plan
- **Planning begins with requirements that define the product/project.**
- **Planning includes:**
 - Estimating the attributes of the work products/tasks
 - Determining the resources needed
 - Negotiating commitments
 - Producing a schedule
 - Identifying and analyzing project risks
- **The project plan will usually need to be revised to address:**
 - changes in requirements/commitments
 - inaccurate estimates
 - corrective actions
 - process changes
- **"Project plan" - the overall plan for controlling the project.**

Project Planning actions (elaborate):

- Is there **WBS/Project work packages** based on project's workproducts?
- Work products to be **externally acquired/reused** identified?
- Technical approach of work products determined?
(Development strategy – client-server/distributed, technologies)
- Duration, people, knowledge, inputs, outputs, infrastructure, etc. for the project determined and **how (what methods)?**
- Resources required estimated?
- Project life cycle/phases determined?
- **Project schedule and budget established?**
- Risks that can affect to the project **identified, documented and revised?**
- Project data management issues addressed?
- **Knowledge and skills** requirements identified and addressed?
- **Stakeholders** identified, and project tasks related to them **according their expertise?**
- Project plan established and **commitments to it identified and documented?**
- Is the project plan **reviewed and actualized?**

Planning example:

sampling **Gantt Charts**

Critical Path Analysis – CPA

PERT - Program Evaluation and Review
Technique:

shortest, most likely, longest
(optimistic, realistic, pessimistic)

SW Project Plan – example - 1

Figure 1. Gantt Chart Example: Planning a custom-written computer project

Task	Earliest start	Length	Type	Dependent on...
A. High level analysis	Week 0	1 week	Sequential	
B. Selection of hardware platform	Week 1	1 day	Sequential	A
C. Installation and commissioning of hardware	Week 1.2	2 weeks	Parallel	B
D. Detailed analysis of core modules	Week 1	2 weeks	Sequential	A
E. Detailed analysis of supporting modules	Week 3	2 weeks	Sequential	D
F. Programming of core modules	Week 3	2 weeks	Sequential	D
G. Programming of supporting modules	Week 5	3 weeks	Sequential	E
H. Quality assurance of core modules	Week 5	1 week	Sequential	F
I. Quality assurance of supporting modules	Week 8	1 week	Sequential	G
J. Core module training	Week 6	1 day	Parallel	C,H
K. Development and QA of accounting reporting	Week 5	1 week	Parallel	E
L. Development and QA of management reporting	Week 5	1 week	Parallel	E
M. Development of Management	Week 6	1 week	Sequential	I

Step 1. List all activities in the plan

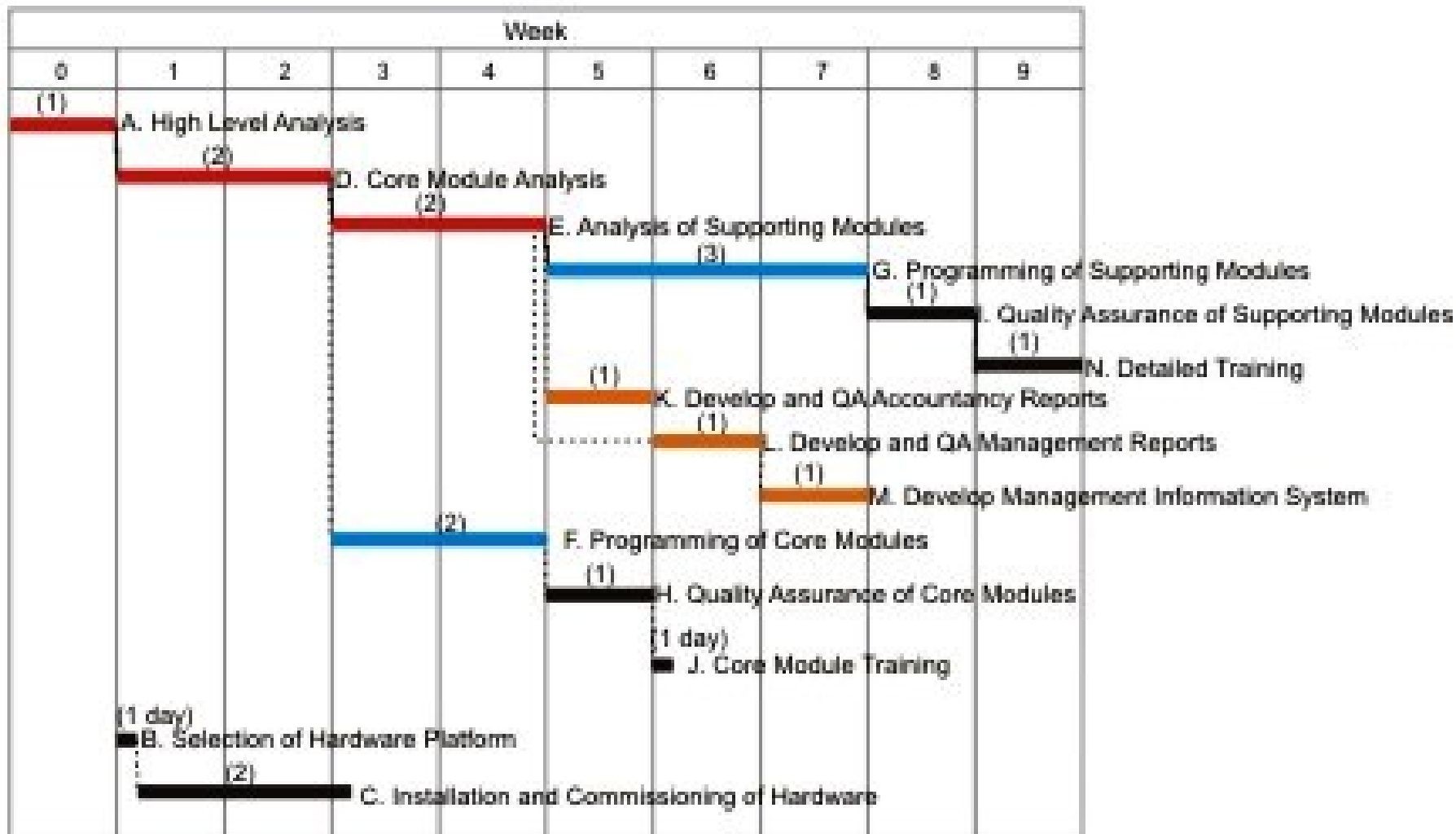
Sequential and parallel activities

Courtesy to www.mindtools.com

SW Project Plan – example - 2

Gantt Chart

Figure 3: Critical Path Analysis: Activities Scheduled on a Gantt Chart



Key:

- █ Analyst resource
- █ Programming resource
- █ Programming/QA resource
- Critical path
- Non-critical path

SW Project Plan – example - 3

Critical Path

http://www.mindtools.com/pages/article/newPPM_03.htm

By drawing this example Gantt Chart, you can see that:
If all goes well, the project can be completed in 10 weeks.
If you want to complete the task as rapidly as possible, you need:

- 1 analyst for the first 5 weeks.

- 1 programmer for 5 weeks starting week 4.

- 1 programmer/QA expert for 3 weeks starting week 6. Note: Activities L and M have been moved back a week. This does not affect the critical path, but it does mean that a single programming/QA resource can carry out all three of activities K, L and M.

Analysis, development and testing of supporting modules are essential activities that must be completed on time.

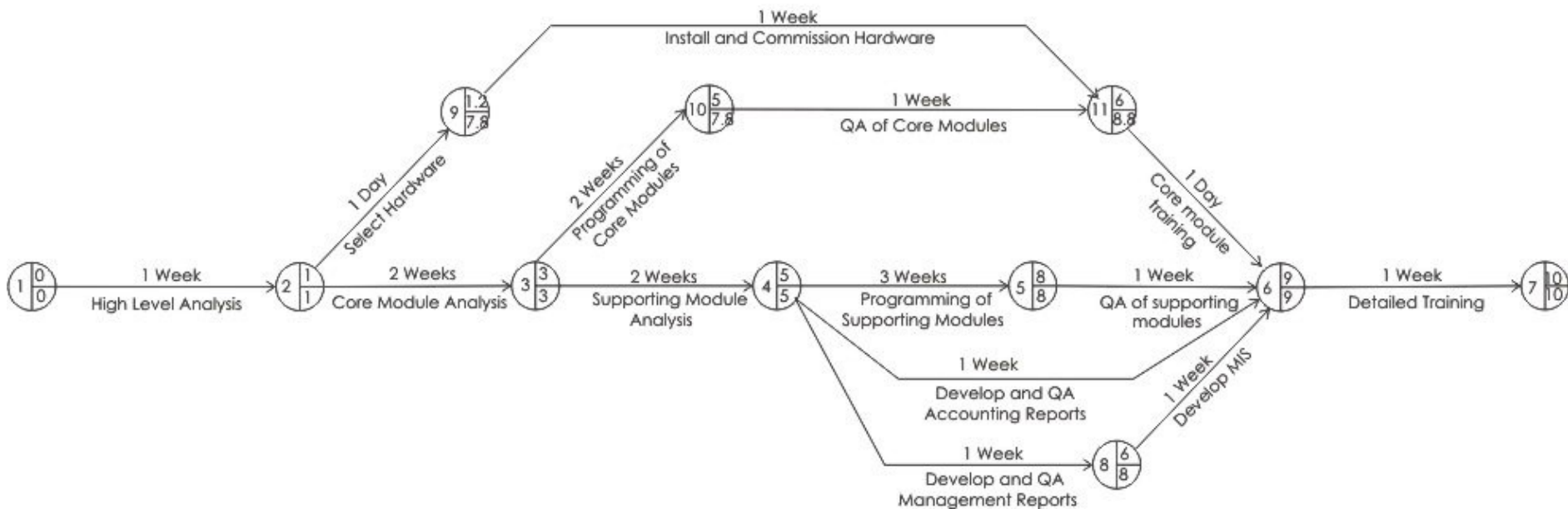
Hardware installation and commissioning is not time-critical as long as it is completed before the Core Module Training starts.

Courtesy to www.mindtools.com

SW Project Plan – example - 4

Critical Path Analysis

Figure 5: Critical Path Analysis for Example Computer Project



Courtesy to www.mindtools.com

SW Project Plan – example - 5

CPA and PERT

Critical Path Analysis (CPA) - method of assessing:

- What tasks must be carried out.
- Where parallel activity can be performed.
- The shortest time in which you can complete a project.
- Resources needed to execute a project.
- The sequence of activities, scheduling and timings involved.
- Task priorities.
- The most efficient way of shortening time on urgent projects.

PERT (Program Evaluation and Review Technique) is a variant of Critical Path Analysis that takes a more skeptical view of the time needed to complete each project stage:

shortest, most likely, longest

or ***optimistic, realistic, pessimistic***

Courtesy to www.mindtools.com