INF5181: Process Improvement and Agile Methods in Systems Development

Lecture 11:
Process Assessment, Process Improvement Frameworks, Course Review

UNIVERSITET I OSLO

Dr. Dietmar Pfahl

email: dietmarp@ifi.uio.no

Fall 2011

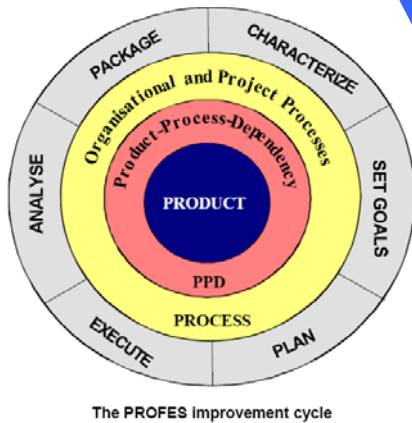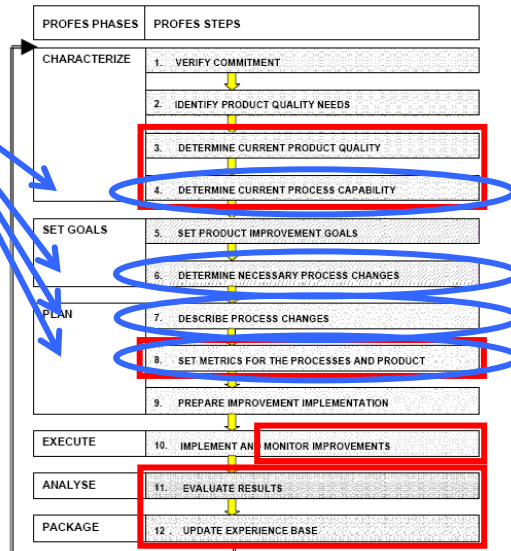## Structure of Lecture 11

- Hour 1:
  - Process Assessment Origins: CMM & CMMI ⬅
- Hour 2:
  - Process Assessment Standard: ISO 15504 (SPICE)
  - Other Process/Quality Improvement Frameworks
- Hour 3:
  - Project & Final Exam
  - Course Review

UNIVERSITET I OSLO

Where do Measurement in SPI ?

Process

The PROFES improvement cycle

PROFES PHASES	PROFES STEPS
CHARACTERIZE	1. VERIFY COMMITMENT
	2. IDENTIFY PRODUCT QUALITY NEEDS
	3. DETERMINE CURRENT PRODUCT QUALITY
	4. DETERMINE CURRENT PROCESS CAPABILITY
SET GOALS	5. SET PRODUCT IMPROVEMENT GOALS
	6. DETERMINE NECESSARY PROCESS CHANGES
PLAN	7. DESCRIBE PROCESS CHANGES
	8. SET METRICS FOR THE PROCESSES AND PRODUCT
	9. PREPARE IMPROVEMENT IMPLEMENTATION
EXECUTE	10. IMPLEMENT AND MONITOR IMPROVEMENTS
ANALYSE	11. EVALUATE RESULTS
PACKAGE	12. UPDATE EXPERIENCE BASE

Phases and steps of the PROFES improvement methodology

I OSLO

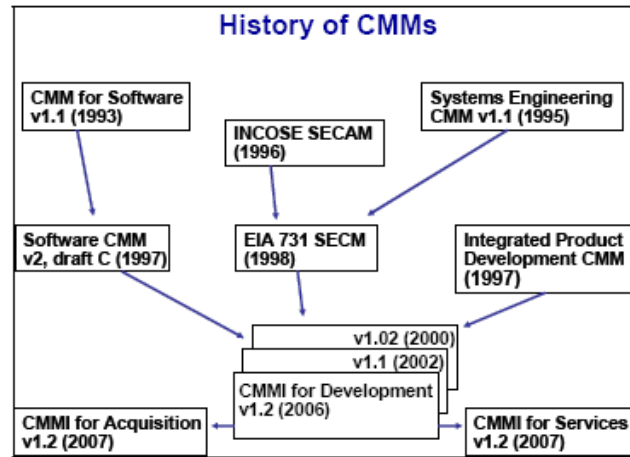
Origins of Capability Maturity Model (CMM)

- DoD** decided in the 80s to do something about the many problems in its expensive software projects (often involving suppliers).
  - Ada didn't solve the problems (as many had thought/hoped)
  - Appraisals showed that there was a management problem
- 1986: Watts Humphrey left IBM, joined SEI (Software Engineering Institute, Carnegie Mellon University) and began developing CMM
- 1989: "Managing the Software Process" published by W. Humphrey
- 1993: CMM Version 1.1 published – still often used
- CMMI first published in 1999, version 1.2 published in 2006.

CMM(I) = Capability Maturity Model (Integrated)
DoD** = Department of Defense

UNIVERSITETET
I OSLO

CMM(I) History

Source: CMMI® for
Development, Version 1.2
(CMMI-DEV, V1.2), CMU/SEI-
2006-TR-008, ESC-TR-2006-
008, August 2006

http://www.sei.cmu.edu/cmmi/

History of CMMs

CMM for Software
v1.1 (1993)

Systems Engineering
CMM v1.1 (1995)

INCOSE SECAM
(1996)

Software CMM
v2, draft C (1997)

EIA 731 SECM
(1998)

Integrated Product
Development CMM
(1997)

v1.02 (2000)
v1.1 (2002)
CMMI for Development
v1.2 (2006)

CMMI for Acquisition
v1.2 (2007)

CMMI for Services
v1.2 (2007)

UNIVERSITETET
I OSLO

CMMI Family

- 4 different models - for different application scopes:
  - **CMMI-SE/SW/IPPD/SS**
  - **CMMI-SE/SW/IPPD**
  - **CMMI-SE/SW**
  - **CMMI-SW**
  - All models have a continuous and staged representation.
- Definitions:
  - SS: Supplier Sourcing
  - IPPD: Integrated Product and Process Development
  - SE: Systems Engineering
  - SW: Software Engineering

- Assessment is done via
  - document inspection,
  - questionnaires, and
  - interviews

UNIVERSITETET
I OSLO

Software Process Assessment with CMMI

Staged

ML5
ML4
ML3
ML2
ML 1
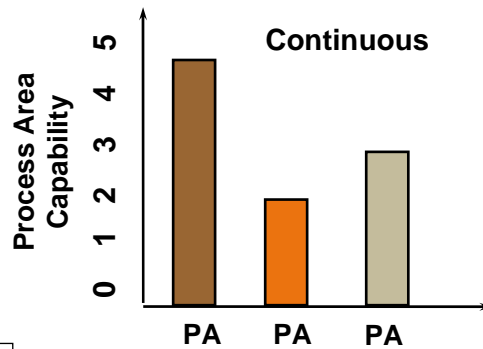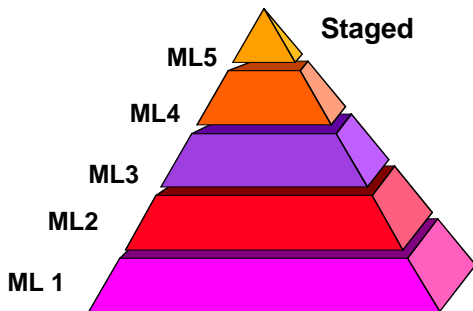
Defines 5 maturity levels (MLs); in order to achieve a maturity level all process areas associated to this level, plus all process areas associated with levels below must have a certain minimal capability.

Continuous

Process Area Capability

5
4
3
2
1
0

PA   PA   PA

A maturity profile is established based on the capabilities of individual process areas

UNIVERSITETET I OSLO

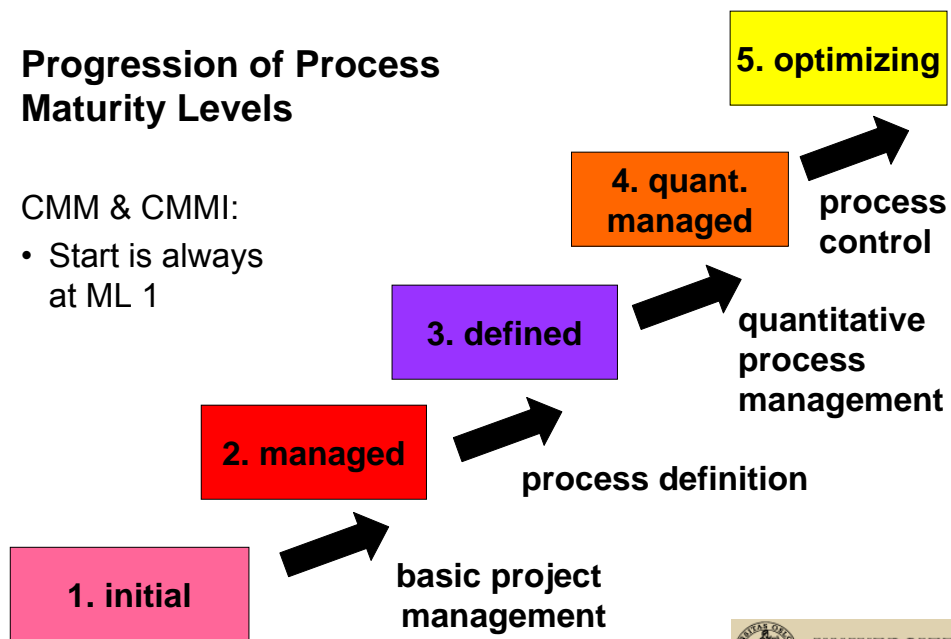---

CMMI Levels and Process Areas (staged)

CMMI ®

* Integrated Product/Process Development (IPPD) – add-on to the Engineering processes
** Acquisition – add-on to the Engineering processes

Level	Process Areas
5 Optimizing	Causal Analysis and Resolution Organizational Innovation and Deployment
4 Quantitatively Managed	Quantitative Project Management Organizational Process Performance
3 Defined	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Risk Management Integrated Project Management (for IPPD*) Integrated Teaming* Integrated Supplier Management** Decision Analysis and Resolution Organizational Environment for Integration*
2 Managed (Repeatable)	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Performed	

UNIVERSITETET I OSLO

Progression of Process Maturity Levels

CMM & CMMI:
- Start is always at ML 1

5. optimizing

4. quant. managed

process control

3. defined

quantitative process management

2. managed

process definition

1. initial

basic project management

UNIVERSITETET
I OSLO

Stage "Managed"

input (requirements)

control (budget, schedule, standards)

construct the system

output (code, documentation)

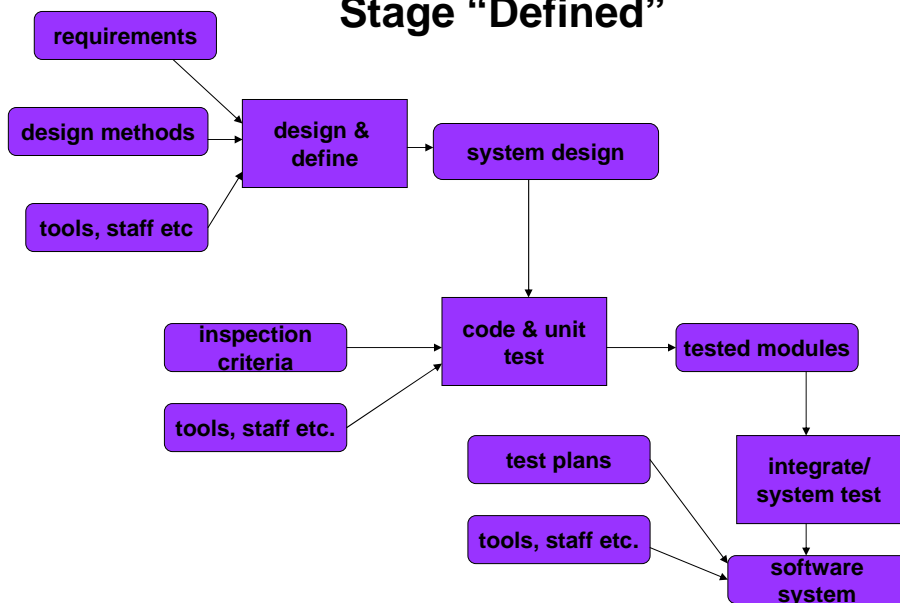resources (staff, tools)

UNIVERSITETET
I OSLO
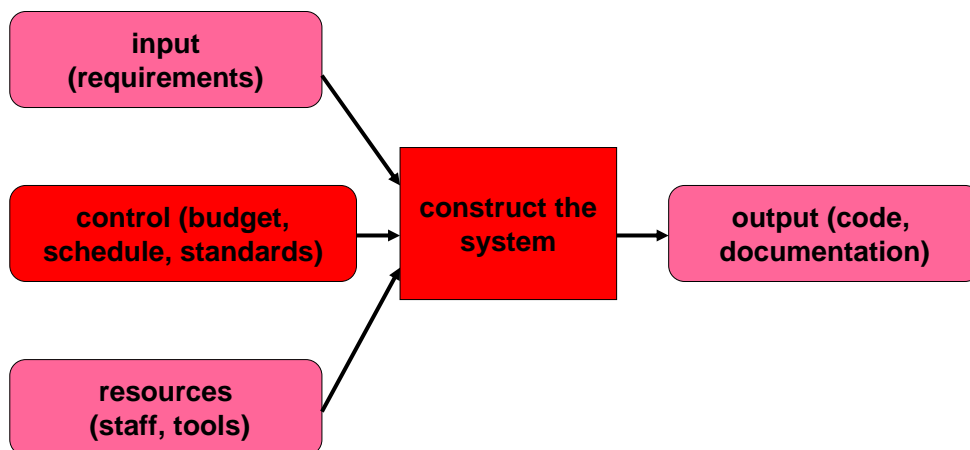
PAs – "Managed"

To move to this maturity level focus is on process areas:

- Configuration management
- Quality assurance
- Sub-contract management
- Project planning
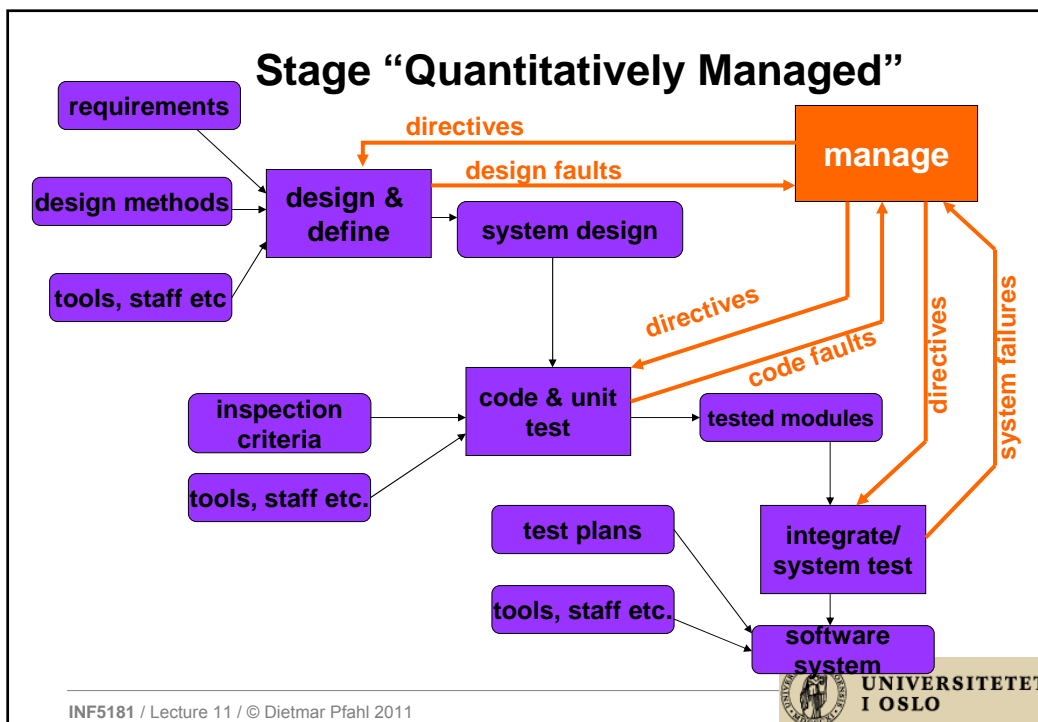- Project tracking and oversight
- Measurement and analysis

UNIVERSITETET
I OSLO

Stage "Defined"

UNIVERSITETET
I OSLO

PAs – "Defined"

To move to this maturity level focus on process areas:

- Requirements development and technical solution
- Verification and validation
- Product integration
- Risk management
- Organizational training
- Organizational process focus (function)
- Decision analysis and resolution
- Process definition
- Integrated project management

UNIVERSITETET I OSLO

Stage "Quantitatively Managed"

requirements

design methods

tools, staff etc

design & define

system design

directives

design faults

manage

directives

code faults

inspection criteria

tools, staff etc.

code & unit test

tested modules

test plans

tools, staff etc.

integrate/ system test

directives

system failures

software system

UNIVERSITETET I OSLO

PAs – "Quantitatively Managed"

To move to this maturity level focus on process areas:
- Organizational process performance
- Quantitative project management

UNIVERSITETET
I OSLO

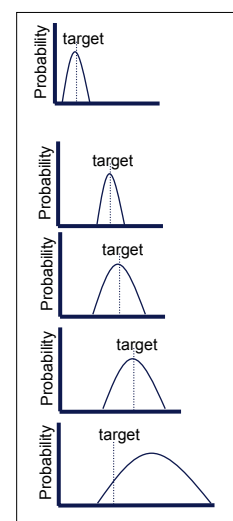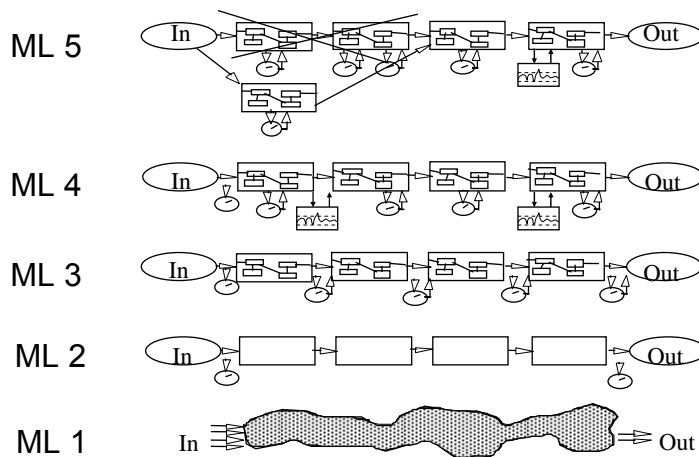
Stage "Optimizing"

UNIVERSITETET
I OSLO
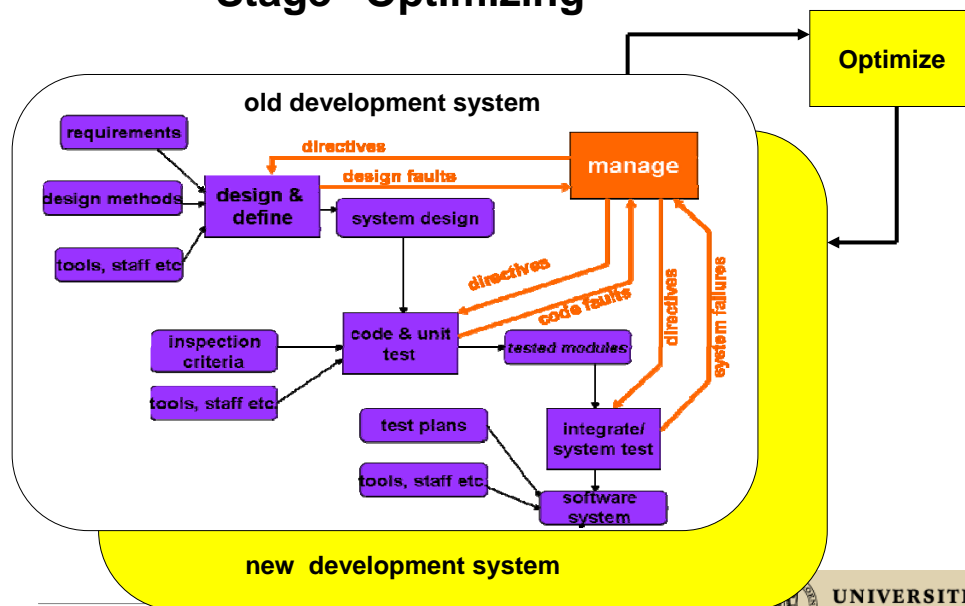
PAs – "Optimizing"

To move to this maturity level focus on process areas:

- Causal analysis and resolution
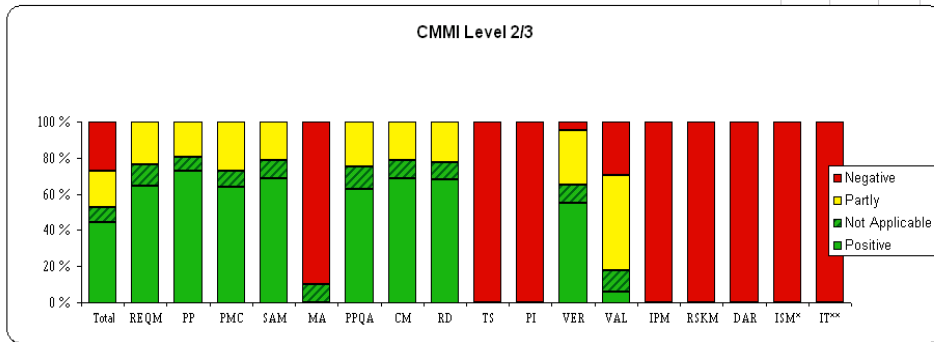- Organizational innovation and deployment

UNIVERSITETET
I OSLO

CMMI – What we now about the projects

ML 5

ML 4

ML 3

ML 2

ML 1

I OSLO

CMM Assessment Results (continuous)

Total CMMI Complience:	63 %		Tailoring: Use of Not Appliccable:	8 %
CMMI Level 2 complience:	77 %		CMMI Level 3 complience:	22 %

CMMI Level 2/3

Legend: Negative, Partly, Not Applicable, Positive

X-axis: Total, REQM, PP, PMC, SAM, MA, PPQA, CM, RD, TS, PI, VER, VAL, IPM, RSKM, DAR, ISM×, IT××

UNIVERSITETET I OSLO

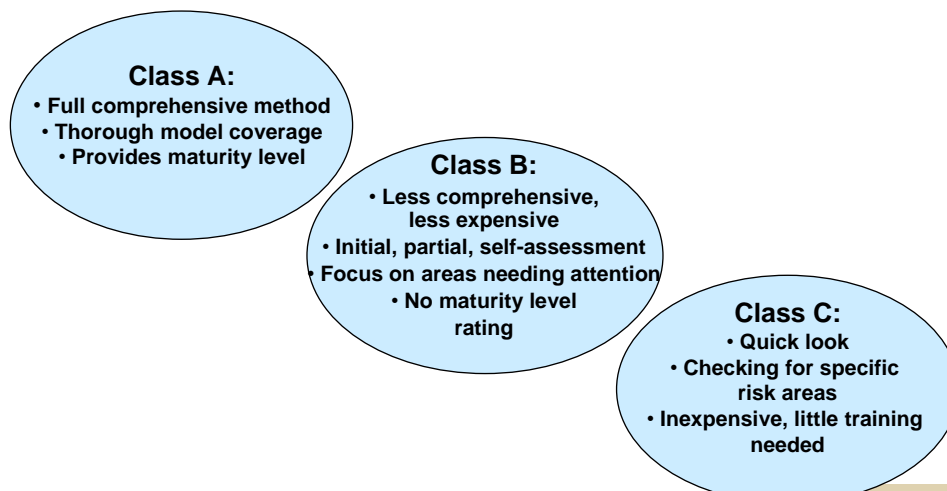# CMMI Assessment Follow-Up Activities

- Action plan – generated by SEPG, assessment team, and key personnel from organization/projects
  - Address findings (how to address weaknesses)
  - Strategy for addressing additional KPAs
  - Detailed actions, responsibilities, budget, and schedule
  - Reviewed/approved by management

Scatter plot axes: Importance (low, medium, high) vs. Lack of Compliance (Maturity Gap) (low, medium, high). Items plotted: KPA x1, KPA x2, KPA x3, KPA x4, KPA x5, KPA x6

UNIVERSITETET I OSLO
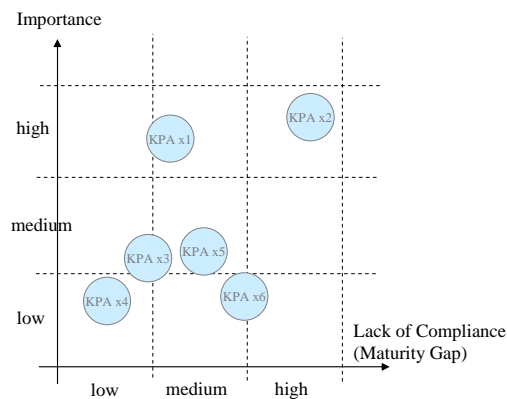
SCAMPI^{SM}

- **Standard CMMI Appraisal Method for Process Improvement**
  - Is a group of evaluation methods, suitable
    - to monitor progress of SPI programs
    - for reliable benchmarking of organizations
  - Complies with ISO 15504

SCAMPI^{SM} – 3 Classes of Appraisal Methods

Class A:
- Full comprehensive method
- Thorough model coverage
- Provides maturity level

Class B:
- Less comprehensive, less expensive
- Initial, partial, self-assessment
- Focus on areas needing attention
- No maturity level rating

Class C:
- Quick look
- Checking for specific risk areas
- Inexpensive, little training needed

Appraisal Method Comparison

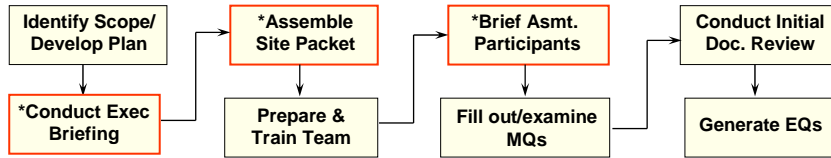|	Class A	Class B	Class C
*Resources: - # team members - team member time (plan, prep, conduct) - # participants - participant time (prep, conduct)	**6-8** **110-130 hrs.** **50-60** **4-8 hrs.**	**4-6** **48-60 hrs.** **30-40** **2-5 hrs.**	**4** **14-20 hrs.** **8-10** **1-3 hrs.**
Team training (CMM and assessment method)	**5 days**	**1.5-2 days**	**4-6 hrs.**
Pre On-Site schedule (calendar time)	**2-3 months**	**3-4 weeks**	**1 week**
On-Site schedule (consecutive work days)	**7-9 days**	**4-5 days**	**1.5-2 days**
Formality (briefings, plans, reports, paperwork)	• **Formal** • **Maximum doc. review**	• **Informal** • **Moderate doc. review**	• **Very informal** • **Minimal doc. review**

*Times are per person; Typical figures for an organization with size 100 SW staff, covering Levels 2 & 3. Total time includes planning, preparing, and conducting.

UNIVERSITET I OSLO

Appraisal Method Comparison (cont.)

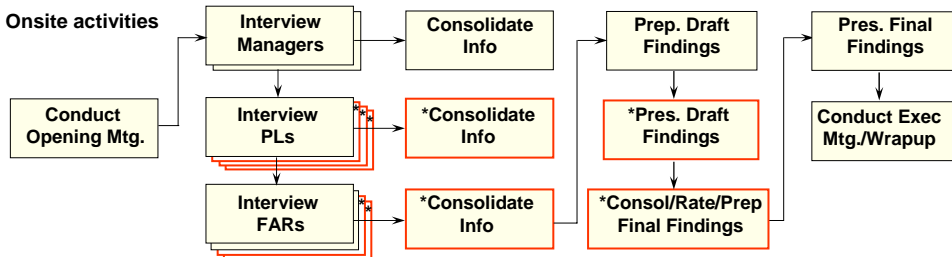|	Class A	Class B	Class C
Outputs	• **Findings briefing:** - Global findings - KPA findings (strengths & weaknesses) - Maturity Level - KPA ratings • **Final Report** • **Data/results to SEI**	• **Findings briefing:** - Global findings - KPA findings (strengths & weaknesses) • **Color chart (opt)**	• **Findings briefing:** - Global findings - KPA weaknesses
Pros	• **Very comprehensive / accurate** • **Supports detailed action plan**	• **Comprehensive** • **Reliable predictor of CBA IPI results** • **Less time, $, participants, tension**	• **Minimal time, $, participants** • **Participants more at ease; interactive**
Cons	• **Expensive** • **Time consuming** • **Schedule difficulties** • **Tension due to ratings**	• **Schedule difficulties**	• **Some weaknesses may be missed** • **Does not provide organizational view**

UNIVERSITET I OSLO

Class A Appraisal

Pre-Onsite activities

Identify Scope/ Develop Plan	→	*Assemble Site Packet	→	*Brief Asmt. Participants		Conduct Initial Doc. Review

*Conduct Exec Briefing		Prepare & Train Team		Fill out/examine MQs		Generate EQs

Onsite activities

	Interview Managers	→	Consolidate Info		Prep. Draft Findings	→	Pres. Final Findings

Conduct Opening Mtg.	Interview PLs		*Consolidate Info		*Pres. Draft Findings		Conduct Exec Mtg./Wrapup

	Interview FARs		*Consolidate Info		*Consol/Rate/Prep Final Findings		

*Asterisked (red items) are omitted during a Class B appraisal.
EQs = Exploratory Questions   MQs = Maturity Questionnaires
PL = Project Leader   FAR = Functional Area Representative

UNIVERSITETET I OSLO

Structuring the Process Areas

Process Area

Implementation   **Institutionalization**

Specific Goals   Generic Goals

Common Features

Activities Performed

Commitment to Perform	Ability to Perform	Directing Implementation	Verification

Specific Practices   Generic Practices

Subpractices Amplifications Elaborations   Subpractices Amplifications Elaborations

UNIVERSITETET I OSLO
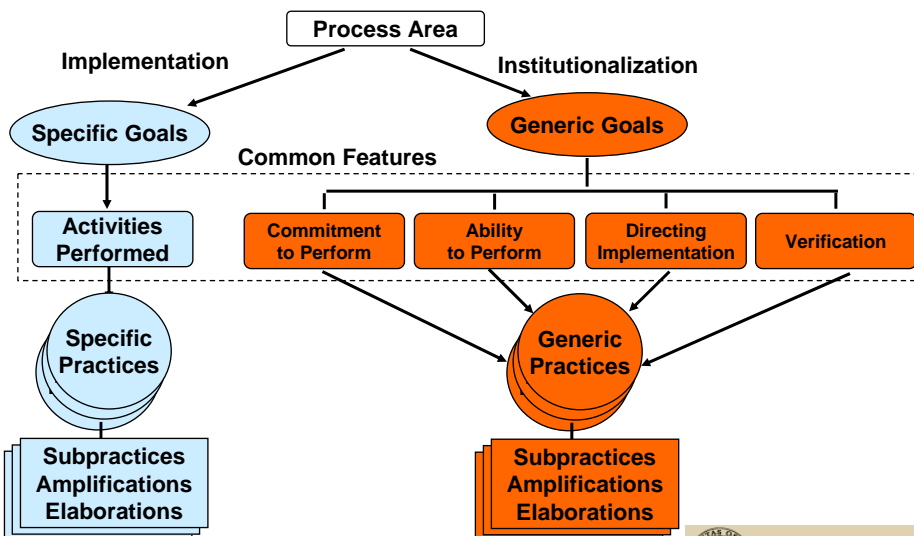
Specific versus Generic Goals

- Addresses one process area
- Describes activities used to **implement** the process area

- Addresses all process areas
- Describes activities that **institutionalize** the process area

SG 1 Manage Requirements
    SP 1.1 Obtain an Understanding of Requirements
    SP 1.2 Obtain Commitment to Requirements
    SP 1.3 Manage Requirements Changes
    SP 1.4 Maintain Bidirectional Traceability of Requirements
    SP 1.5 Identify Inconsistencies between Project Work and Requirements

Example: Requirements Mgmt.

GG 1 Achieve Specific Goals
    GP 1.1 Perform Base Practices
GG 2 Institutionalize a Managed Process
    GP 2.1 Establish an 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 Manage Configurations
    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
GG 3 Institutionalize a Defined Process
    GP 3.1 Establish a Defined Process
    GP 3.2 Collect Improvement Information
...

CMMI Evaluation – Questionnaire Example

- **Related to Requirements Development**
- Note: This example refers to the SPICE model, process ENG.2.2 - Analyze Software Requirements
- Similar questionnaires exist for CMMI (and other process assessment approaches)
- These questionnaires are NOT standardised

Questions about CMMI

- Are appraisal results reliable?
  - It's subjective measurement, after all.
- Is there really a positive correlation between business success and high maturity levels?
  - Several long-term studies provide supportive evidence
- Is CMMI suitable only for large organizations?
  - I.e., need for special quality assurance and process improvement groups?
- Can one jump levels? (HP level 5 in India, China)
- Is level 5 always the best for an organisation?

UNIVERSITETET
I OSLO

Structure of Lecture 11

- Hour 1:
  - Process Assessment Origins: CMM & CMMI
- Hour 2:
  - Process Assessment Standard: ISO 15504 (SPICE) ←
  - Other Process/Quality Improvement Frameworks
- Hour 3:
  - Project & Final Exam
  - Course Review

UNIVERSITETET
I OSLO

Other Process Assessment Approaches

- BOOTSTRAP (originating from an EU research project)
- Company-specific assessment methods:
  - Nortel, Siemens, Trilium, …
- "Light-weight" assessment methods (incl. self-assessment)
  - Developed by SEI
  - Developed by consulting companies
- SPICE (ISO 15504)
  - Different structure of processes than in CMMI (roughly following ISO 12207)
  - 6 Maturity levels (beginning at Level 0)

UNIVERSITET
I OSLO

Assessment Method SPICE

Software Process Improvement and Capability Determination

(ISO 15504)

UNIVERSITET
I OSLO

ISO/IEC 15504 IT process assessment

- To provide guidance on the assessment of software development processes

- Process Reference Model:
    - Needs a defined set of processes that represent good practice to be the benchmark
    - ISO 12207 is the default process reference model
    - Could use others in specific environments

UNIVERSITETET
I OSLO

Process Categories ISO 15504

- *Customer-supplier (CUS)*
- Engineering (ENG)
- Project (PRO)
- Support (SUP)
- Organizing (ORG)

Customer-supplier process category:
- **CUS.1**   Acquire software product and/or service
- **CUS.2**   Establish contract
- **CUS.3**   Identify customer needs
- **CUS.4**   Perform joint audits and reviews
- **CUS.5**   Package, deliver, and install the software
- **CUS.6**   Support operation of software
- **CUS.7**   Provide customer service
- **CUS.8**   Assess customer satisfaction

http://www.rad.fr/spice1.htm

UNIVERSITETET
I OSLO

Process Categories ISO 15504

- Customer-supplier (CUS)
- *Engineering (ENG)*
- Project (PRO)
- Support (SUP)
- Organizing (ORG)

Engineering process category:
- **ENG.1** Develop system requirements and design
- **ENG.2** Develop software requirements
- **ENG.3** Develop software design
- **ENG.4** Implement software design
- **ENG.5** Integrate and test software
- **ENG.6** Integrate and test system
- **ENG.7** Maintain system and software

http://www.rad.fr/spice1.htm

UNIVERSITETET I OSLO

Process Categories ISO 15504

- Customer-supplier (CUS)
- Engineering (ENG)
- *Project (PRO)*
- Support (SUP)
- Organizing (ORG)

Project process category:
- **PRO.1** Plan project life cycle
- **PRO.2** Establish project plan
- **PRO.3** Build project teams
- **PRO.4** Manage requirements
- **PRO.5** Manage quality
- **PRO.6** Manage risks
- **PRO.7** Manage resources and schedule
- **PRO.8** Manage subcontractors

http://www.rad.fr/spice1.htm

UNIVERSITETET I OSLO

Process Categories ISO 15504

- Customer-supplier (CUS)
- Engineering (ENG)
- Project (PRO)
- *Support (SUP)*
- Organizing (ORG)

Support process category:
- **SUP.1   Develop documentation**
- **SUP.2   Perform configuration management**
- **SUP.3   Perform quality assurance**
- **SUP.4   Perform problem resolution**
- **SUP.5   Perform peer reviews**

http://www.rad.fr/spice1.htm

UNIVERSITETET I OSLO

Process Categories ISO 15504

- Customer-supplier (CUS)
- Engineering (ENG)
- Project (PRO)
- Support (SUP)
- *Organizing (ORG)*

Organizing process category:
- **ORG.1   Engineer the business**
- **ORG.2   Define the process**
- **ORG.3   Improve the process**
- **ORG.4   Perform training**
- **ORG.5   Enable reuse**
- **ORG.6   Provide software engineering environment**
- **ORG.7   Provide work facilities**

http://www.rad.fr/spice1.htm

UNIVERSITETET I OSLO

SPICE Levels and Performance Attributes

CMMI Level	Spice Level	Attribute	Comment
	0. Incomplete		The process is not implemented or is unsuccessful
1. Performed	1. Performed	1.1. Process performance	The process produces its defined outcomes
2. Managed	2. Managed	2.1. Performance Management	The process is properly planned and monitored
		2.2. Work product management	Work products are properly defined and reviewed to ensure they meet requirements
3. Defined	3. Established	3.1. Process definition	The processes to be carried out are carefully defined
		3.2. Process deployment	The processes defined above are properly executed by properly trained staff
4. Quantit. Managed	4. Predictable	4.1. Process measurement	Quantitatively measurable targets are set for each sub-process and data collected to monitor performance
		4.2. Process control	On the basis of the data collected by 4.1 corrective action is taken if there is unacceptable variation from the targets
5. Optimizing	5. Optimizing	5.1. Process innovation	As a result of the data collected by 4.1, opportunities for improving processes are identified
		5.2. Process optimization	The opportunities for process improvement are properly evaluated and where appropriate are effectively implemented

UNIVERSITETET
I OSLO

IS0 15504 Process Assessment

• For each process in the relevant Process Reference Model:
   – For each set of attribute level criteria
   Assess whether:

   N: not achieved 0-15%

   P: partially achieved >15%-50%

   L: largely achieved >50%-85%

   F: fully achieved >85%

UNIVERSITETET
I OSLO

Structure of Lecture 11

- Hour 1:
  - Process Assessment Origins: CMM & CMMI
- Hour 2:
  - Process Assessment Standard: ISO 15504 (SPICE)
  - Other Process/Quality Improvement Frameworks ⬅
- Hour 3:
  - Project & Final Exam
  - Course Review

ISO Standards

- **ISO 9000: 1994 (ISO 9001-3)**
- **ISO 9001: 2000**

ISO 9000 Series – What is it?

- It is an international **quality management system standard** applicable to organizations **within all type of businesses.**

- It addresses:
  internally an organization's processes and methods, and
  externally the quality of delivered products and services.

- It is a process oriented approach towards quality management, i.e., it proposes designing, documenting, implementing, supporting, monitoring, controlling and improving each of the following processes:

  – Quality Management Process
  – Resource Management Process
  – Regulatory Research Process
  – Market Research Process
  – Product Design Process
  – Purchasing Process
  – Production Process
  – Service Provision Process
  – Product Protection Process
  – Customer Needs Assessment Process
  – Customer Communications Process
  – Internal Communications Process
  – Document Control Process
  – Record Keeping Process
  – Planning Process
  – Training Process
  – Internal Audit Process
  – Management Review Process
  – Monitoring and Measuring Process
  – Nonconformance Management Process
  – Continual Improvement Process

UNIVERSITETET I OSLO

ISO 9000:1994 Standard Family (1)

- **ISO 9001: Quality systems -- Model for quality assurance in design, development, production, installation and servicing**

- ISO 9002: Quality systems -- Model for quality assurance in production, installation and servicing

- ISO 9003: Quality systems -- Model for quality assurance in final inspection and test

- ISO 9004: Guidelines for Quality Management and Quality System Elements

UNIVERSITETET I OSLO

ISO 9000:1994 Standard Family (2)

- ISO 9000-1: Guidelines for Selecting and Using ISO 9000 Concepts and Standards
- ISO 9000-2: Guidelines for applying the ISO 9001:1994, ISO 9002:1994, and ISO 9003:1994 quality management standards
- **ISO 9000-3: Guidelines for Applying ISO 9001:1994 to Computer Software**
- ISO 9000-4: Guidelines for Designing and Managing Product Dependability Programs

---

ISO 9000:2000 Standard Family

- Since 2000, the ISO 9000 family consists of a core of three International Standards plus many associate quality standards, technical reports and guides (two of which are mentioned below).
- The family consists of:
  - ISO 9000: 2000 Quality management systems – Fundamentals and vocabulary
  - **ISO 9001: 2000 Quality management system – Requirements***
  - ISO 9004: 2000 Quality management system – Guidelines for performance improvement
- Associated with the above are:
  - ISO 10012 Quality assurance requirements for measuring equipment – Metrological confirmation system for measuring equipment
  - ISO 19011 Auditing quality and environmental management systems

    * An update was issued in 2008 with clarifications but no new requirements.

Overview ISO 9000-3: 20 Topics

Guiding Principle: "Describe what to do, do it, document it, and control that it was actually done"

4.1 Management responsibility ▶
4.2 Quality system ▶
4.3 Contract review
4.4 Software development and design ▶
4.5 Document and data control
4.6 Purchasing requirements
4.7 Customer-supplied products
4.8 Product identification and tracing
4.9 Process control requirements
4.10 Product inspection and testing ▶

4.11 Control of inspection equipment
4.12 Inspection and test status of products
4.13 Control of nonconforming products
4.14 Corrective and preventive action ▶
4.15 Handling, storage, and delivery
4.16 Control of quality records
4.17 Internal quality audit requirements
4.18 Training requirements ▶
4.19 Servicing requirements
4.20 Statistical techniques ▶

http://www.praxiom.com/iso-9000-3.htm ▶

UNIVERSITET I OSLO

ISO 9000-3: Management Responsibility (1)

Quality policy

- Define a policy that describes your organization's attitude towards quality. Your quality policy should:
    – State a clear commitment to quality.
    – Recognize customer needs and expectations.
    – Be actively supported by senior management.
    – List the quality objectives you want to achieve.
    – Be understood by everyone in the organization.
    – Be consistent with your organization's goals.
    – Be maintained throughout your organization.
    – Be applied throughout your organization.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITET I OSLO

ISO 9000-3: Management Responsibility (2)

Organization
- Define the organizational structure that you will need in order to manage a quality system.
  - Responsibility and authority: Define quality system responsibilities, give quality system personnel the authority to carry out these responsibilities, and ensure that the interactions between these personnel are clearly specified. And make sure all of this is well documented.
  - Resources: Identify and provide the resources that people will need to manage, perform, and verify quality system work.
  - Management representative: Appoint a senior executive to manage your quality system and give him or her the necessary authority. This senior executive must ensure that your quality system is developed and implemented.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITETET I OSLO

ISO 9000-3: Management Responsibility (3) ◀

Management review
- Define a procedure that your senior managers can use to review the effectiveness of your quality system.
- Quality system reviews should be:
  - Carried out on a regular basis.
  - Documented and records should be maintained.
- Quality system reviews should ensure that your:
  - Quality system requirements are being met.
  - Quality objectives are being achieved.
  - Quality policy is being applied.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITETET I OSLO

ISO 9000-3: Quality System

General
- **Develop a quality system and a manual that describes it.**
  – Your quality system should ensure that your products conform to all specified requirements.
  – Your quality manual should: state your quality policy; list your quality objectives; provide an overview of your quality system; describe the structure of your organization; discuss your quality system procedures; introduce your quality documents and records; teach people about your quality system; control quality system work practices; guide the implementation of your quality system; explain how your quality system will be audited.

Quality system procedures
- Develop and implement quality system procedures that are consistent with your quality policy.

Quality planning
- Develop quality plans that show how you intend to fulfill quality system requirements. You are expected to develop quality plans for products, processes, projects, and customer contracts.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITET I OSLO

ISO 9000-3: Quality System – Quality planning for software ◀

- **Develop quality plans to control your software development projects.**
- **Your quality plans should control:**
  – **Project implementation.**
  – **Project schedules.**
  – **Project resources.**
  – **Project approvals.**
  – **Project phases.**
    - **When a phase can begin.**
    - **When a phase has been completed.**
- **Your quality plans should define:**
  – **Quality requirements.**
  – **Responsibilities.**
  – **Authorities.**
  – **Life cycle model.**
  – **Review methods.**
  – **Testing methods.**
  – **Verification methods.**
  – **Validation methods.**

- **Develop detailed quality plans and procedures, and define specific responsibilities and authorities to control:**
  – **Configuration management.**
  – **Product verification.**
    - **Verification of your developed products.**
    - **Verification of your purchased products.**
    - **Verification of your customer-supplied products.**
  – **Product validation.**
    - **Validation of your developed products.**
    - **Validation of your purchased products.**
  – **Nonconforming products.**
  – **Corrective actions.**

- **Your quality plans may include or refer to:**
  – **Generic project, product, or contract procedures.**
  – **Special project, product, or contract procedures.**
- **Your quality plan can be a separate document or it can be part of another larger document. Or, it can be made up of several specific documents.**
- **Your quality plan should be updated and refined as your software development plan is implemented.**
- **Make sure that all participating groups and organizations get a chance to review and approve the quality plan before it is implemented.**

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITET I OSLO

ISO 9000-3: Software Development and Design ◀

General
- Develop and document procedures to control the product design and development process. These procedures must ensure that all requirements are being met.

Design and development planning
- Create design and development planning procedures.

Organizational and technical interfaces
- Identify the groups who should be routinely involved in the product design and development process, and ensure that their design input is properly documented, circulated, and reviewed.

Design input
- Develop procedures to ensure that all design-input requirements are identified, documented, and reviewed; and that all design flaws, ambiguities, contradictions, and deficiencies are resolved.

Design output
- Develop procedures to control design outputs.

Design review
- Develop procedures that specify how design reviews should be planned and performed.

Design verification
- Develop procedures that specify how design outputs, at every stage of the product design and development process, should be verified.

Design validation
- Develop procedures that validate the assumption that your newly designed products will meet customer needs.

Design changes
- Develop procedures to ensure that all product design modifications are documented, reviewed, and formally authorized before the resulting documents are circulated and the changes are implemented.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITETET I OSLO

ISO 9000-3: Product Inspection and Testing (1)

General
- Develop procedures to inspect, test, and verify that your products meet all specified requirements.
  - Develop procedures to inspect, test, and verify that incoming products meet all requirements.
  - Develop procedures to inspect, test, and verify that in-process products meet all requirements.
  - Develop procedures to inspect, test, and verify that final products meet all requirements.
- Ensure that appropriate product inspection and testing records are developed and that these records are properly maintained.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITETET I OSLO

ISO 9000-3: Product Inspection and Testing (2)

Receiving inspection
- Develop procedures that ensure that incoming products are not used until you have verified that they meet all specified requirements.
- Inspection of incoming products
  - Your procedures should ensure that incoming products are inspected and approved before they are used or processed. All incoming products must conform to specified requirements.
- Inspections done by subcontractors
  - If your subcontractors (your suppliers) carry out some of the required inspections and if they provide you with recorded evidence which demonstrates that their products are, in fact, acceptable, then your procedures should not ask you to repeat these inspections.
- Use of products prior to inspection
  - If products must be used prior to inspection, your procedures should tell you to identify and record them so that they can be quickly recalled and replaced if they subsequently do not meet all requirements.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITET I OSLO

ISO 9000-3: Product Inspection and Testing (3)

In-process inspection and testing
- Develop procedures that ensure that work in process meets all requirements before work is allowed to continue.

Final inspection and testing
- Develop procedures to ensure that final products meet all requirements before they are made available for sale.

Inspection and test records
- Develop a record keeping system that your staff can use to document product testing and inspection activities.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITET I OSLO

ISO 9000-3: Corrective and Preventive Action (1)

General
- Develop procedures to correct or prevent nonconformities.
  - Corrective or preventive actions should eliminate the causes of nonconformity.
  - Corrective or preventive actions should consider how big the problem is and how much risk is involved.
  - When corrective or preventive actions indicate that systemic or procedural changes should be made, make sure that these changes are implemented.
  - Make sure that corrective and preventive actions and changes are properly documented.
  - Corrective actions may affect:
    - Software items and products.
    - Software life cycle processes.
  - Use configuration management procedures to control corrective actions that affect software items and products.
  - Use document and data control procedures to control corrective actions that affect software life cycle processes.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITETET I OSLO

ISO 9000-3: Corrective and Preventive Action (2) ◀

Corrective action
- Develop procedures to ensure that nonconformities are identified and corrected without delay. Ensure that:
  - Nonconformity reports are handled properly.
  - Customer complaints are handled effectively.
  - Causes of nonconformity are investigated and recorded.
  - Corrective actions are promptly implemented.
  - Corrective actions eliminate causes.
  - Corrective actions are effective.
- Preventive action
- Develop procedures to ensure that potential nonconformities are routinely detected and prevented.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITETET I OSLO

ISO 9000-3: Training Requirements (1)

Develop training procedures

- Develop quality-training procedures. These procedures should be properly documented, and must ensure that:
  - Quality system training needs are identified.
  - Quality training is provided to those who need it.
  - People are able to perform quality system jobs.
  - People have the qualifications they need to do the work.
  - Accurate and appropriate training records are kept.
  - Everyone understands how your quality system works.

  http://www.praxiom.com/iso-9000-3.htm

UNIVERSITET
I OSLO

ISO 9000-3: Training Requirements (2) ◄

Address software development & management training needs

- Identify the training that will be needed:
  - To develop software products.
  - To manage software development projects.
- Identify your training needs by studying how software will be developed and managed.
  - Study the tools, techniques, methods, and resources that will be used during software development.
  - Study the field or area that will be the focus of your software product (e.g., accounting, petrochemicals, health care, manufacturing, insurance, etc.).
- Document the training needs that must be met.
- Document the qualifications that must be met.
- Deliver the training that will be needed:
  - To develop your software products.
  - To manage your software development projects.

  http://www.praxiom.com/iso-9000-3.htm

UNIVERSITET
I OSLO

ISO 9000-3: Statistical Techniques (1)

Identification of need
- Select the statistical techniques that you will need in order to establish, control, and verify your:
  - Process capabilities.
  - Product characteristics.

Procedures
- Develop procedures to:
  - Explain how your techniques should be applied.
  - Monitor and control how these techniques are used.
- Make sure that:
  - All statistical procedures are documented.
  - Statistical records are kept.

http://www.praxiom.com/iso-9000-3.htm

ISO 9000-3: Statistical Techniques (2)

Analyze process and product qualities
- Use statistical techniques to:
  - Analyze software development process characteristics.
  - Analyze software product characteristics.
- Use statistical data to evaluate process and product quality.
  - Evaluate software process characteristics (qualities).
    - Evaluate process maturity.
    - Evaluate process outputs.
    - Evaluate output defects.
    - Evaluate defect resolutions.
    - Evaluate milestone slippage.
    - Evaluate other process characteristics.
  - Evaluate software product characteristics (qualities).
    - Evaluate product testability.
    - Evaluate product usability.
    - Evaluate product reliability.
    - Evaluate product suitability.
    - Evaluate product availability.
    - Evaluate product upgradeabilty.
    - Evaluate product maintainability.
    - Evaluate other product characteristics.

http://www.praxiom.com/iso-9000-3.htm

ISO 9000-3: Statistical Techniques (3) ◀

Select useful metrics
- Use effective metrics (measurable characteristics).
  - Use metrics that are clearly defined.
  - Use metrics that apply to software.
    - Use metrics that apply to software development.
    - Use metrics that apply to software products.
  - Use metrics that are appropriate to your situation.
    - Use metrics that apply to your development process.
    - Use metrics that apply to your software products.
  - Use metrics that measure quality improvement.
    - Use metrics to measure process quality improvement.
    - Use metrics to measure product quality improvement.
  - Use metrics that add value to process and products.
    - Use metrics that add value to software development.
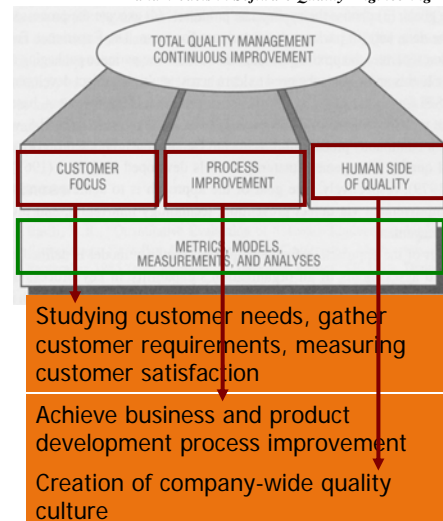   - Use metrics that add value to software products.

http://www.praxiom.com/iso-9000-3.htm

UNIVERSITETET I OSLO

"Total Quality"

- **Total Quality Management (TQM)**
- **EFQM**

UNIVERSITETET I OSLO

TQM: Total Quality Management

Figure from Stephen H. Kan's Book "Metrics and Models in Software Quality Engineering"

* TQM is a style of management aiming at achieving "long-term" success by linking quality with customer satisfaction

* Other names:
  – Total Quality Control (HP)
  – Market Driven Quality (IBM)
  – Experience Factory (Vic Basili)

TOTAL QUALITY MANAGEMENT
CONTINUOUS IMPROVEMENT

CUSTOMER FOCUS | PROCESS IMPROVEMENT | HUMAN SIDE OF QUALITY

METRICS, MODELS, MEASUREMENTS, AND ANALYSES

Studying customer needs, gather customer requirements, measuring customer satisfaction

Achieve business and product development process improvement

Creation of company-wide quality culture

I OSLO

TQM

* General "philosophy" to meet the customer's needs (not specially focused on Software Engineering)

  Philip B. Crosby: "Quality is free: it's the missing quality of products, services and processes which cost"

* Addresses these issues:
  – Quality as strategic business area
  – Active participation in quality management by the top management
  – Sufficient training and engagement at all levels
  – Long-term change of the organizational culture
  – Organizing around processes, not around functions
  – Customer satisfaction
  – Continuous improvement

UNIVERSITET I OSLO

EFQM: European Foundation for Quality Management

- Is based on TQM-principles
  - Can be taken as a practical example of TQM
- Used for internal and external evaluations of organizations
- Used as a means to identify improvement areas
- Used as "benchmarking"-tool
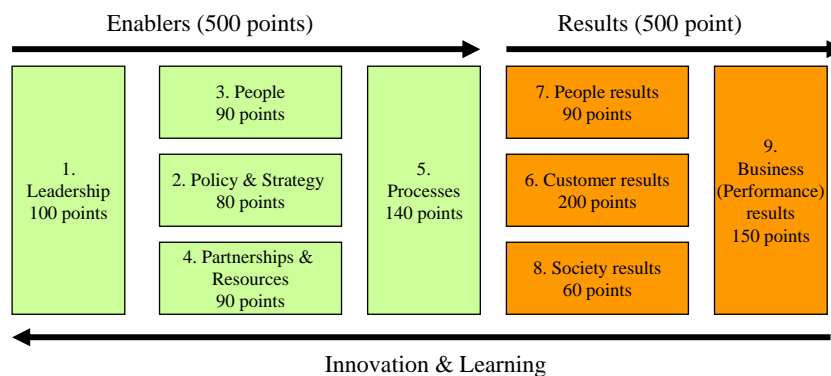 - In its extreme form as "competition", i.e., to win the EFQM award

UNIVERSITETET
I OSLO

EFQM Framework

- **EFOM is a non-prescriptive framework** that recognizes there are many approaches to achieving sustainable excellence.
- Within this non-prescriptive approach there are **some fundamental concepts which underpin the EFQM Model:**
  - <u>Results Orientation</u>: achieving results that satisfy all of the organization's stakeholders.
  - <u>Customer Focus</u>: creating sustainable customer value.
  - <u>Leadership & Constancy of Purpose</u>: visionary and inspirational leadership, coupled with constancy of purpose.
  - <u>Management by Processes & Facts</u>: managing the organization through a set of interdependent and interrelated systems, processes and facts.
  - <u>People Development & Involvement</u>: maximizing the contribution of employees through their development and involvement.
  - <u>Continuous Learning</u>, Innovation & Improvement: challenging the status quo and effecting change by using learning to create innovation and improvement opportunities.
  - <u>Partnership Development</u>: developing and maintaining value-adding partnerships.
  - <u>Corporate Social Responsibility</u>: exceeding the minimum regulatory framework in which the organization operates and to strive to understand and respond to the expectations of their stakeholders in society.

UNIVERSITETET
I OSLO

EFQM Business Excellence Model

- Based on nine criteria.
  - Five of these are 'Enablers' and four are 'Results'.
  - The 'Enabler' criteria cover what an organization does.
  - The 'Results' criteria cover what an organization achieves.
  - 'Results' are caused by 'Enablers' and feedback from 'Results' helps to improve 'Enablers'.
- Recognizes there are many approaches to achieving sustainable excellence in all aspects of performance
- Is based on the premise that excellent results with respect to Performance, Customers, People and Society are achieved through Leadership driving Policy and Strategy, that is delivered through People Partnerships and Resources, and Processes.
- Is one of the most widely used organizational frameworks in Europe.

UNIVERSITETET I OSLO

EFQM Business Excellence Model

Enablers (500 points)   Results (500 point)

Enablers			Results	
1. Leadership 100 points	3. People 90 points	5. Processes 140 points	7. People results 90 points	9. Business (Performance) results 150 points
	2. Policy & Strategy 80 points		6. Customer results 200 points	
	4. Partnerships & Resources 90 points		8. Society results 60 points	

Innovation & Learning

UNIVERSITETET I OSLO

EFQM Model – Definitions and Sub-Criteria (1)

1) LEADERSHIP

Definition

- Excellent Leaders develop and facilitate the achievement of the mission and vision. They develop organisational values and systems required for sustainable success and implement these via their actions and behaviours. During periods of change they retain a constancy of purpose. Where required, such leaders are able to change the direction of the organisation and inspire others to follow.

Sub-Criteria

- **(1a)** Leaders develop the mission, vision, values and ethics and are role models of a culture of Excellence
- **(1b)** Leaders are personally involved in ensuring the organisation's management system is developed, implemented and continuously improved
- **(1c)** Leaders interact with customers, partners and representatives of society
- **(1d)** Leaders reinforce a culture of Excellence with the organisation's people
- **(1e)** Leaders identify and champion organisational change

2) POLICY AND STRATEGY

Definition

- Excellent Organisations implement their mission and vision by developing a stakeholder focused strategy that takes account of the market and sector in which it operates. Policies, plans, objectives, and processes are develop-ed and deployed to deliver the strategy.

Sub-Criteria

- **(2a)** Policy and Strategy are based on the present and future needs and expectations of stakeholders
- **(2b)** Policy and Strategy are based on information from performance measurement, research, learning and external related activities
- **(2c)** Policy and Strategy are developed, reviewed and updated
- **(2d)** Policy and Strategy are communicated and deployed through a framework of key processes

3) PEOPLE

Definition

- Excellent organisations manage, develop and release the full potential of their people at an individual, team-based and organisational level. They promote fairness and equality and involve and empower their people. They care for, communicate, reward and recognise, in a way that motivates staff and builds commitment to using their skills and knowledge for the benefit of the organisation.

Sub-Criteria

- **(3a)** People resources are planned, managed and improved
- **(3b)** People's knowledge and competencies are identified, developed and sustained
- **(3c)** People are involved and empowered
- **(3d)** People and the organisation have a dialogue
- **(3e)** People are rewarded, recognised and cared for

EFQM Model – Definitions and Sub-Criteria (2)

4) PARTNERSHIPS AND RESOURCES

Definition

- Excellent organisations plan and manage external partnerships, suppliers and internal resources in order to support policy and strategy and the effective operation of processes. During planning and whilst managing partnerships and resources they balance the current and future needs of the organisation, the community and the environment.

Sub-Criteria

- **(4a)** External partnerships are managed
- **(4b)** Finances are managed
- **(4c)** Buildings, equipment and materials are managed
- **(4d)** Technology is managed
- **(4e)** Information and knowledge are managed

5) PROCESSES

Definition

- Excellent organisations design, manage and improve processes in order to fully satisfy, and generate increasing value for, customers and other stakeholders.

Sub-Criteria

- **(5a)** Processes are systematically designed and managed
- **(5b)** Processes are improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders
- **(5c)** Products and Services are designed and developed based on customer needs and expectations
- **(5d)** Products and Services are produced, delivered and serviced
- **(5e)** Customer relationships are managed and enhanced

6) CUSTOMER RESULTS

Definition

- Excellent organisations comprehensively measure and achieve outstanding results with respect to their customers

Sub-Criteria

- **(6a)** Perception Measures
  These measures are of the customers' perceptions of the organisation (obtained, for example, from customer surveys, focus groups, vendor ratings, compliments and complaints).
- **(6b)** Performance Indicators
  These measures are the internal ones used by the organisation in order to monitor, understand, predict and improve the performance of the organisation and to predict perceptions of its external customers.

EFQM Model – Definitions and Sub-Criteria (3)

7) PEOPLE RESULTS

Definition

- Excellent organisations comprehensively measure and achieve outstanding results with respect to their people

Sub-Criteria

- **(7a)** Perception Measures

  These measures are of the people's perception of the organisation (obtained, for example, from surveys, focus groups, interviews, structured appraisals).

- **(7b)** Performance Indicators

  These measures are the internal ones used by the organisation in order to monitor, understand, predict and improve the performance of the organisation's people and to predict their perceptions.

8) SOCIETY RESULTS

Definition

- Excellent organisations comprehensively measure and achieve outstanding results with respect to society

Sub-Criteria

- **(8a)** Perception Measures

  These measures are of the society's perception of the organisation (obtained, for example, from surveys, reports, press articles, public meetings, public representatives, governmental authorit-ies). Some of the measures contained in the guidance for Perception Measures may be applicable to Performance Indicators and vice versa

- **(8b)** Performance Indicators

  These measures are the internal ones used by the organisation in order to monitor, understand, predict and impro-ve the performance of the organisation and to predict perceptions of society.

9) KEY PERFORMANCE RESULTS

Definition

- Excellent organisations comprehensively measure and achieve outstanding results with respect to the key elements of their policy and strategy.

Sub-Criteria

- **(9a)** Key Performance Outcomes

  Depending on the purpose and objectives of the organisation some of the measures contained in the guidance for Key Performance Outcomes may be applicable to Key Performance Indicators and vice versa.

- **(9b)** Key Performance Indicators

  These measures are the operational ones used in order to monitor and understand the processes and predict and improve the organisation's likely key performance outcomes.

EFQM Evaluation
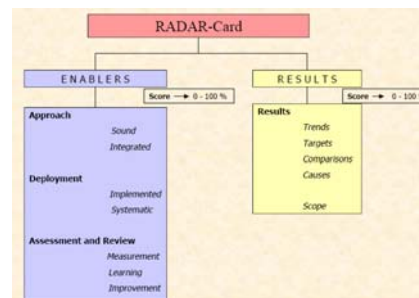
Procedure:

- Each criterion is evaluated independently
- Based on questionnaires and interviews

Mode:

- Internal: self-evaluation
- External: accredited experts (site visit)

Tools:

- RADAR Scoring Matrix

- PATHFINDER Card (→ a self-assessment tool)

EFQM Evaluation – RADAR Scoring Matrix

- **Approach** – This covers what an organization plans to do and the reasons for it.
  In an excellent organization the approach will be sound – having a clear rationale, well-defined and developed processes and a clear focus on stakeholder needs, and will be integrated – supporting policy and strategy and linked to other approaches where appropriate.
- **Deployment** – This covers the extent to which an organization uses the approach and what it does to deploy it.
  In an excellent organization the approach will be implemented in relevant areas, in a systematic way.
- **Assessment and Review** – This covers what an organization does to assess and review both the approach and the deployment of the approach.
  In an excellent organization the approach, and deployment of it, will be subject to regular measurement, learning activities will be undertaken, and the output from both will be used to identify, prioritize, plan and implement improvement.
- **Results** – This covers what an organization achieves.
  In an excellent organization the results will show positive trends and/or sustained good performance, targets will be appropriate and met or exceeded, performance will compare well with others and will have been caused by the approaches.
  Additionally, the scope of the results will address the relevant areas.

UNIVERSITET I OSLO

EFQM Evaluation – RADAR Scoring Matrix

- Scoring Matrix for Results

Elements	Attributes / Score	0%	25%	50%	75%	100%
Results	**Trends:** • trends are positive AND/OR • there is sustained good performance	No results or anecdotal information	Positive trends and/or satisfactory performance for about ¼ of results over at least 3 years	Positive trends and/or sustained good performance for about ½ of results over at least 3 years	Positive trends and/or sustained good performance for about ¾ of results over at least 3 years	Positive trends and/or sustained good performance for all results over at least 3 years
	Targets: • targets are achieved • targets are appropriate	No results or anecdotal information	Achieved and appropriate for about ¼ of results	Achieved and appropriate for about ½ of results	Achieved and appropriate for about ¾ of results	Achieved and appropriate for all results
	Comparisons: • results compare well with others AND/OR • results compare well with acknowledged 'World Class'	No results or anecdotal information	Favourable comparisons for about ¼ results	Favourable comparisons for about ½ results	Favourable comparisons for about ¾ results	Favourable comparisons for all results
	Causes: • results are caused by approach	No results or anecdotal information	Cause and effect visible for about ¼ results	Cause and effect visible for about ½ results	Cause and effect visible for about ¾ results	Cause and effect visible for all results
	Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

Elements	Attributes / Score	0%	25%	50%	75%	100%
Results	**Scope:** • results address relevant areas • results are appropriately segmented e.g. by customer, by business	No results or anecdotal information	Results address ¼ of relevant areas and activities	Results address ½ of relevant areas and activities	Results address ¾ of relevant areas and activities	Results address all of relevant areas and activities
	Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100
Overall Total		0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

UNIVERSITET I OSLO

EFQM Evaluation – PATHFINDER Card (1)

Do the results

- Cover all appropriate stakeholders

- Measure all the relevant approaches and deployment of approaches using both perception and performance indicators

- Show positive trends or sustained good performance. If yes, for how long

- Have targets. If yes, are the targets achieved

- Have comparisons with others, for example competitors, industry averages or 'best in class'

- Compare well with others

- Show a cause and effect link to approaches

- Measure a balanced set of factors both for now and the future

- Give a holistic picture

UNIVERSITET I OSLO

EFQM Evaluation – PATHFINDER Card (2)

Approach

Is the approach:
- Soundly based
- Focused on stakeholder needs
- Supporting policy and strategy
- Linked with other appropriate approaches
- Sustainable
- Innovative
- Flexible
- Measurable

Deployment

Is the deployment of the approach:
- Implemented in all potential areas across the organisation
- Implemented to its full potential / capability
- Achieving all the planned benefits
- Systematic
- Understood and accepted by all stakeholders
- Measurable

Assessment & Review

Is the approach and its deployment:
- Measured for effectiveness regularly
- Providing Learning opportunities
- Benchmarked with others, e.g. competitors, industry averages or best in class
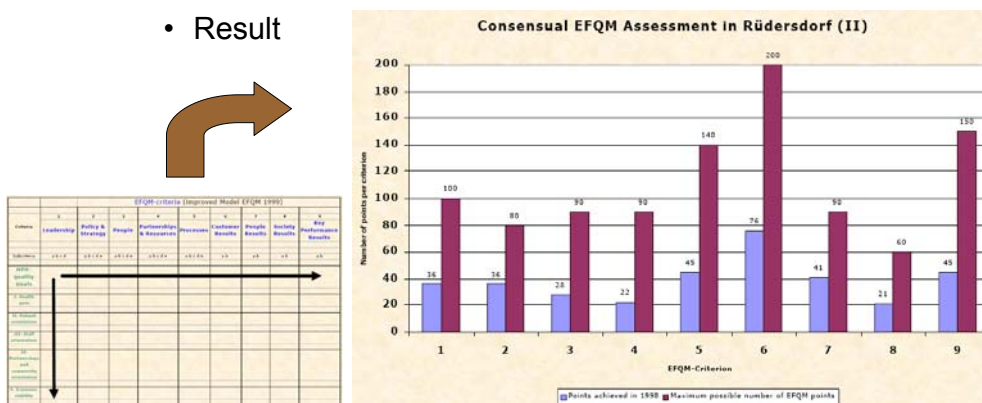- Improved based on the outputs from learning and performance measures

UNIVERSITET I OSLO

EFQM Evaluation – Example

• Schedule
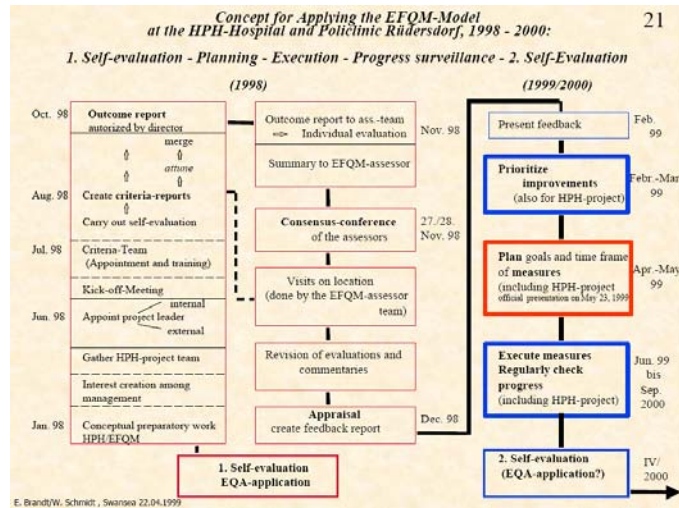
EFQM Evaluation – Example

• Result

Structure of Lecture 11

- Hour 1:
  - Process Assessment Origins: CMM & CMMI
- Hour 2:
  - Process Assessment Standard: ISO 15504 (SPICE)
  - Other Process/Quality Improvement Frameworks
- Hour 3:
  - Project & Final Exam ←
  - Course Review

UNIVERSITETET
I OSLO

This is (not yet) the end …

- The lecture is over:
  - Thanks for your interest and participation!

- For you still to do:
  - Complete and submit project report (final) by email to dietmarp@ifi.uio.no at the latest on 6th December 19:59. Only PDF files will be accepted.
  - Prepare for oral exam (15th & 16th December)
  - Fill in online feedback form (managed by IfI)

UNIVERSITETET
I OSLO

Project & Exam Schedule

- 06-Oct-2011: **Student Presentation** (5 min, mandatory)
  - Should cover Section 1 of Report Template
- 20-Oct-2011: **Draft Report** (mandatory)
  - Should cover Sections 1 to 3 of Report Template
  - Deliver by email to dietmarp@ifi.uio.no no later than 13:30
  - You will receive feedback (by email) within 2 weeks
- 06-Dec-2011: **Final Report** (mandatory)
  - Should cover all Sections of Report Template
  - Deliver by email to dietmarp@ifi.uio.no no later than 19:59
- 15&16-Dec-2011: **Oral Exam** (15-20 min)

UNIVERSITET
I OSLO

Course Evaluation, Marking, and Grades

Part 1: Project / 80% of grade [40 marks]

Final Project Report (max. 15 pages incl. cover)

Evaluation criteria:
- Content [24 marks]
- Consistency [12 marks]
- Language and formality (title, captions, referencing, etc.) [4 marks]

Note:
- A mandatory short presentation and draft report is required
- Failing to do the oral presentation or to submit the draft report in time will automatically generate a penalty of 2 marks each!
- Not submitting the draft report at all (or more than 1 week after the deadline) will generate a penalty of 4 marks (instead of 2 marks for late submission)!

Part 2: Oral Exam / 20% of grade [10 marks]

Duration: approximately 15-20 minutes

Subject:
  Questions about the course and about your project

Evaluation criteria:
- Correctness and completeness [6 marks]
- Clarity and conciseness [2 mark]
- Relevance (→ is the answer to the point?) [2 mark]

UNIVERSITET
I OSLO

Mapping of Total Marks to Grades (Tentative!)

Grade	Description	General, qualitative description of evaluation criteria	
A	Excellent	*An excellent performance, clearly outstanding. The candidate demonstrates excellent judgment and a high degree of independent thinking.*	≥45
B	Very good	*A very good performance. The candidate demonstrates sound judgment and a very good degree of independent thinking.*	≥40
C	Good	*A good performance in most areas. The candidate demonstrates a reasonable degree of judgment and independent thinking in the most important areas.*	≥35
D	Satisfactory	*A satisfactory performance, but with significant shortcomings. The candidate demonstrates a limited degree of judgment and independent thinking.*	≥30
E	Sufficient	*A performance that meets the minimum criteria, but no more. The candidate demonstrates a very limited degree of judgment and independent thinking.*	≥25
F	Fail	*A performance that does not meet the minimum academic criteria. The candidate demonstrates an absence of both judgment and independent thinking.*	

UNIVERSITET I OSLO

Project Assignment – Report Template

Cover Page

INF5181 – Process Improvement and Agile Methods in Systems Development

Title:

Date:

Author:

E-mail:

Status:
Draft report: ___
Final report: ___

Table of Contents

UNIVERSITET I OSLO

Project Assignment – Evaluation /1

- Content: 24 marks (60% of total project marks)
  - Relates to completeness, depth and clarity of information given in Project Report Sections 1 to 6 (as defined in the report template).
  - The split per section is as follows:
    - Section 1: 2 marks
    - Section 2: 6 marks
    - Section 3: 6 marks
    - Section 4: 2 marks
    - Section 5: 4 marks
    - Section 6: 4 marks

UNIVERSITET
I OSLO

Project Assignment – Evaluation /2

- Consistency: 12 marks (30% of total project marks):
  - Consistency between issues (1.3) and goals (1.4): 1 mark
  - Consistency between goals (1.4), performance of baseline process (2.3), and measurement plan (5.1): 4 marks
  - Consistency between elements (2.1) and descriptive model (2.2) of baseline process: 4 marks
  - Consistency between elements and descriptive model of target process (3): 2 marks
  - Consistency between target process (3) and implementation of target process (4): 1 mark

UNIVERSITET
I OSLO

Project Assignment – Evaluation /2

- Formality: 4 marks (10% of total project marks)
  - Correct formatting (cover page with complete information, table of contents, page numbers, headings, table and figure captions, table and figure referencing, literature referencing, font size, etc.): 2 marks
  - Correct referencing style (in Section 7); also: each document listed in the reference section must be referenced from the text at least once: 1 mark
  - Language: no spelling/grammar errors, clarity of expression, appropriateness of expression (no slang!), correct usage of terminology: 1 mark
  - Observe page limit (14 pages): no penalty but I will stop reading after page 14 (excluding cover page and table of contents)

UNIVERSITETET
I OSLO

Structure of Lecture 11

- Hour 1:
  - Process Assessment Origins: CMM & CMMI
- Hour 2:
  - Process Assessment Standard: ISO 15504 (SPICE)
  - Other Process/Quality Improvement Frameworks
- Hour 3:
  - Project & Final Exam
  - Course Review ←

UNIVERSITETET
I OSLO

Detailed Teaching Plan /1

http://www.uio.no/studier/emner/matnat/ifi/INF5181/h11/undervisningsplan.xml

- **Lecture 1:** Introduction into Process Improvement
- **Lecture 2:** Processes and Process Modeling (Section A)
- **Lecture 3:** Processes and Process Modeling (Section B)
- **Lecture 4:** Flow-based Agile Development (KANBAN)
- **Lecture 5:** Student Presentations
- **Lecture 6:** SPI & Measurement
--------------> Draft report due on 20-Oct-2011 at 13:30 (via email)
- **Lecture 7:** Problem Solving and Improvement - by Individuals and in Groups

INF5181 / Lecture 11 / © Dietmar Pfahl 2011

UNIVERSITETET
I OSLO

Detailed Teaching Plan /2

http://www.uio.no/studier/emner/matnat/ifi/INF5181/h11/undervisningsplan.xml

- **Lecture 8:** Industry Presentation: SPI at Skatteetaten (Cost Estimation)
- **Lecture 9:** SPI & Empirical Research Methods
- **Lecture 10:** Learning from Experience
- **Lecture 11:** Process Assessment, Process Improvement Frameworks, Course Review
--------------> Final report due on 06-Dec-2011 at 19:59 (via email)
--------------> Oral exam on 15&16-Dec-2011

INF5181 / Lecture 11 / © Dietmar Pfahl 2011

UNIVERSITETET
I OSLO

Good Luck for the Final Exam!

UNIVERSITETET
I OSLO