

The slide is titled **Innhold** and features a red horizontal line below the title. A small circular logo is in the top-left corner. The table of contents consists of the following items:

- Bakgrunn for CMM-familien
- Hvorfor Modenhetsmodell?
- Struktur
  - Spesifikke og generiske mål
  - Spesifikke og generiske praksiser
- Nivå for nivå
  - prosessområdene på 5 nivåer
- CMMI Evaluering
- Organisasjonsendring og kontinuerlig prosessforbedring
- Dokumentasjon og resultater

At the bottom of the slide, the text **INF5180** is on the left and the number **2** is on the right.



## Bakgrunn

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- DoD bestemte seg i 80-årene å gjøre noe med alle de feilslåtte og dyre programvareprosjektene sine.
  - Ada løste ikke problemene (som mange trodde)
  - Evalueringer viste at det var et ledelsesproblem.
- Watts Humphrey gikk fra IBM til SEI og begynte utviklingen av CMM i 1986
- *Managing the Software Process* av W. Humphrey kom i 1989
- Versjon 1.1 kom i 1993 – er fremdeles den mest brukte modellen
- CMMI publisert i 1999, versjon 1.1 kom i 2002.



## Slogan fra SEI

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“The Capability Maturity Model for Software (CMM) is a framework that describes the elements of an effective software process.

The CMM describes an evolutionary path from an ad hoc, chaotic process, to a mature disciplined process”



## Tankegods

- Prosessforbedring kun av forretningsmessige grunner – aldri for sin egen del.
- CMM er TQM i en systemutviklingskontekst (?)
- **Forbedring** kan bety svært ulike ting i forskjellige organisasjoner
- **Forbedring** er en langsiktig, strategisk aktivitet
  - Forventet betydning for bunnlinjen?
  - Hvordan følge opp utviklingen?



**“In God we trust,  
all others bring data.”  
E.W.Deming**

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## Programvarebransjen...

- Estimeringsproblemer
  - Budsjett overskrides
  - Tidsfrister overskrides
- Kvalitetsproblemer
  - Sliter med feilretting (fremfor utvikling)
  - Sliter med misfornøyde kunder
- Har ingen veldefinert prosess
  - Starter “fra scratch” i hvert prosjekt
  - God praksis ofres under stress
- Suksessfaktorer
  - Helter
  - Overtid
  - Brannslukking



... og det samme gjelder nok for systemutvikling

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**COMPUTERWORLD** 20 år  
 Nr. 44 - Uke 42  
 Fredag  
 17. oktober  
 2003  
 21. årgang  
 Lesesalg kr. 40

# Derfor går det så galt

Endelig er det vitenskapelig bevis: It-prosjekter blir i snitt 35 prosent dyrere og tar 25 prosent lenger tid enn planlagt. Prosjektene er nesten alltid langt mer komplekse enn antatt, hevder forskere ved Simula-senteret. – Halvparten av alle prosjekter går riktig galt. Som regel på grunn av en sterk undervurdering av risiko, sier professor Magne Jørgensen.

**VANN OVER HODET:** It-prosjekter blir alltid mer omfattende enn man tror i utgangspunktet, fastslår Kjetil Moløkken og Magne Jørgensen ved Simula-senteret.

SIDE 10 OG 11

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## Det er menneskelig å feile

- Overvurderer egne ferdigheter
  - "Alle" er over gjennomsnittelig gode sjåførere...\*
  - Undersøkelse på Simula viser lignende tendens for utviklere
- Vi estimerer "internt"
  - Glemmer å se på prosjektet fra utsiden.
    - ☒ Hvilke erfaringer finnes ved lignende prosjekter?
    - ☒ Er det i det hele tatt gjort lignende før?
- Vi "glemmer" å håndtere risiko
  - Lite lystbetont aktivitet
  - "Ikke vær så negativ da"

Referanse:  
 Magne Jørgensen et.al.(2003) "Better sure than safe? Overconfidence in judgment based software development effort prediction intervals"

\*) Gjelder kun menn

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## Modenhhet

### Umodne organisasjoner

#### Prosjektleder opplever:

- Må starte fra scratch
- Vanskelig å få oversikt
- Overraskelser
- Konstant endringshåndtering
- Mye overtid!
- Ta igjen det tapte – fra dag 1
- Dårlig nattesøvn...

#### Kunden opplever:

- Upålitelige løfter
- Dårlig kvalitet
- Forventningene ikke innfridd

#### Linjeledelsen opplever:

- Dårlig oversikt over ressurser
- Mye omarbeiding
- Vanskelig å tjene penger

### Modne organisasjoner

#### Prosjektleder opplever:

- Kommer til dekket bord
- Endringer tas høyde for
- Overtid, men kun i perioder
- Estimater holder
- Yrkesstolthet! Sover godt!

#### Kunden opplever:

- Estimater holder bedre
- God kvalitet
- Forventningene blir innfridd

#### Linjeledelsen opplever:

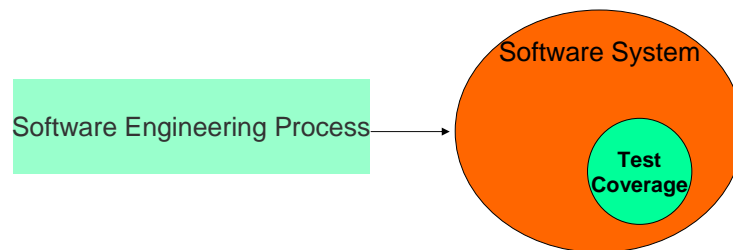
- God ressursutnyttelse
- Mulig å planlegge fremover
- Tjener penger !

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## En utfordring!



**"The quality of a system is highly influenced by the quality of the process used to acquire, develop, and maintain it." (W.Humphrey)**

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## Hvordan gjenta god praksis?

"Kvalitets modeller"

CMM, ISO, Bootstrap ...

Modenhets/kvalitets-modeller gir støtte til

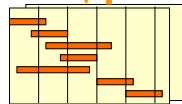
- å evaluere behov og forbedring
- organisasjonsendring
- kulturendring
- kunnskapsutvikling
- målinger

Metode, Prosess

Basert på:  
RUP, XP,  
EVO, DSDM,  
MSF....

Mye god praksis er beskrevet i ferdige utviklingsmodeller. Men man må **velge riktig** og **tilpasse** til egne behov

Prosjekter



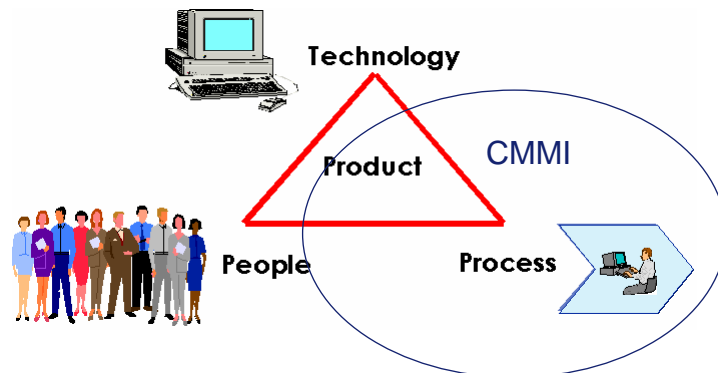
Læring og identifisering av god praksis foregår i prosjektene. Oppdater prosessmodellen etter hvert prosjekt!

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## CMMI scope



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## OPPBYGGING OG STRUKTUR

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## Valgmuligheter

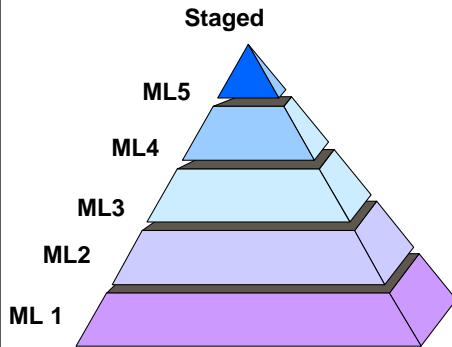
- 4 modeller (kun små forskjeller)
  - **CMMI-SE/SW/IPPD/SS**
  - **CMMI-SE/SW/IPPD**
  - **CMMI-SE/SW**
  - **CMMI-SW**
  - Alle modellene har en kontinuerlig og en trinnvis representasjon.
- Definisjoner:
  - SS: Supplier Sourcing
  - IPPD: Integrated Product and Process Development
  - SE: Systems Engineering
  - SW: Software Engineering

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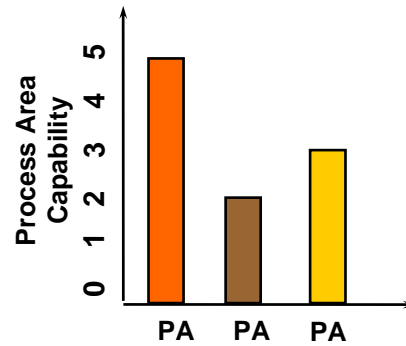


## Trinnvis eller kontinuerlig representasjon?



... som for SW-CMM definerer denne 5 modenhetsnivåer der alle prosessområdene for et nivå, pluss alle under må være oppfylt

## Continuous



... gjør det mulig å stige i modenhet for ett eller flere prosessområder og dermed ende opp med en modenhetsprofil

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## Nivåer og prosessområder (trinnvis)

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	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Performed	

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

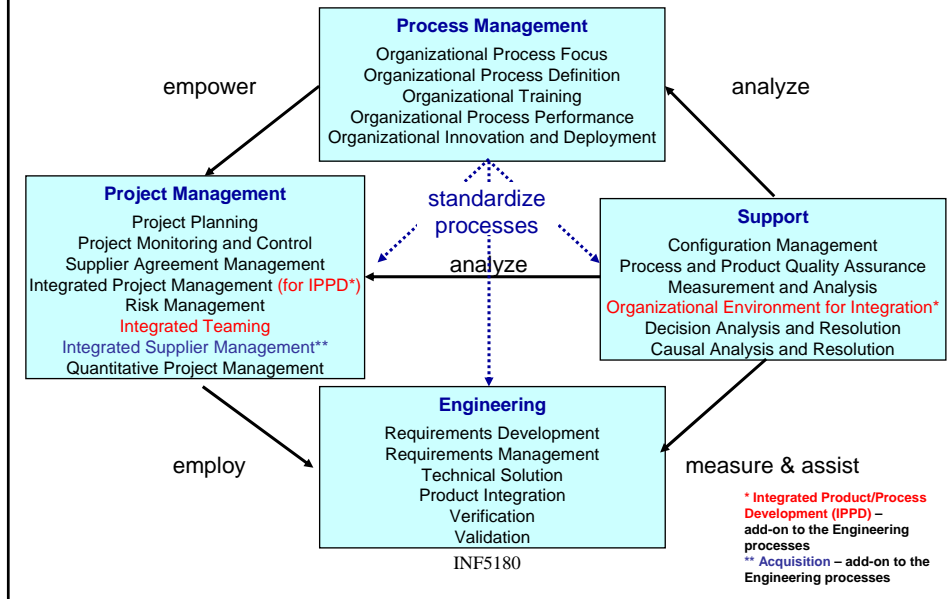
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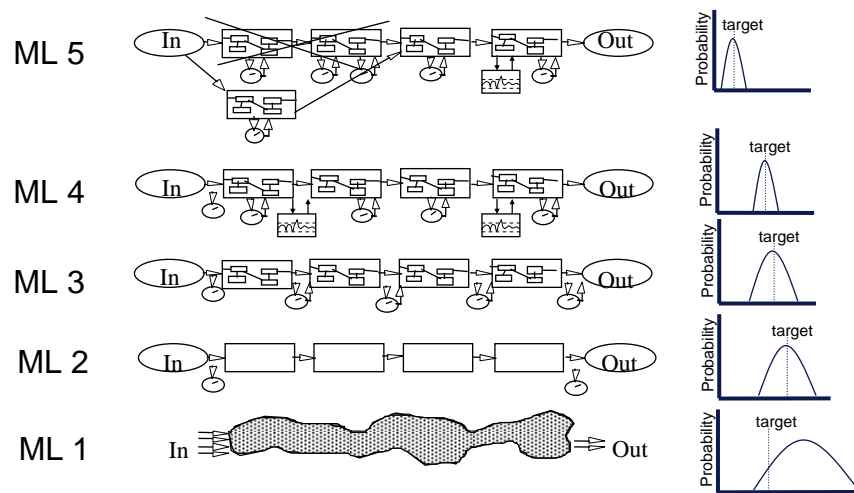




## Strukturering av prosessområder (kontinuerlig)



## CMMI - Hva skjer i prosjektene?

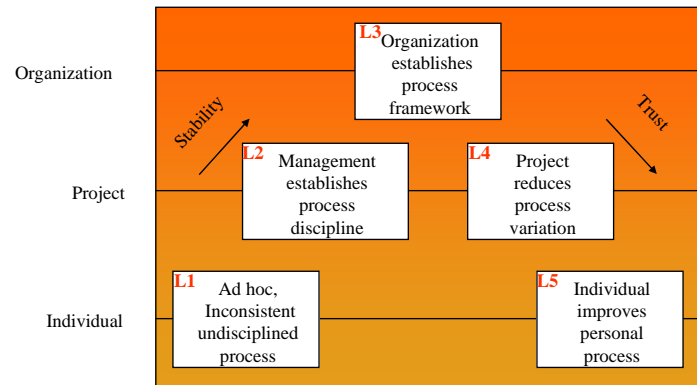


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## Organisasjonsendringer



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## Kulturendringer

- Level 5**      **Culture of empowerment and innovation**
- Level 4**      **Culture of performance excellence**
- Level 3**      **Culture of engineering**
- Level 2**      **Culture of commitment**
- Level 1**      **Imported culture**

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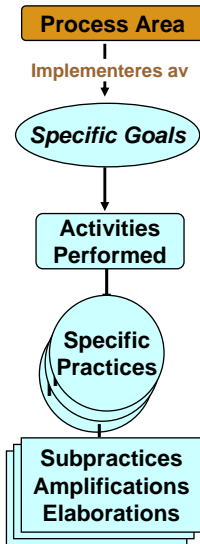
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## Implementasjon av prosessområde

### ~~Eksempel: Requirement Management~~

The purpose of Requirements Management is to manage the requirements of the project's products and product components and to identify inconsistencies between those requirements and the project's plans and work products.



SG1: Requirements are managed and inconsistencies with project plans and work products are identified.

SP 1.1 Obtain an Understanding of Requirements

....

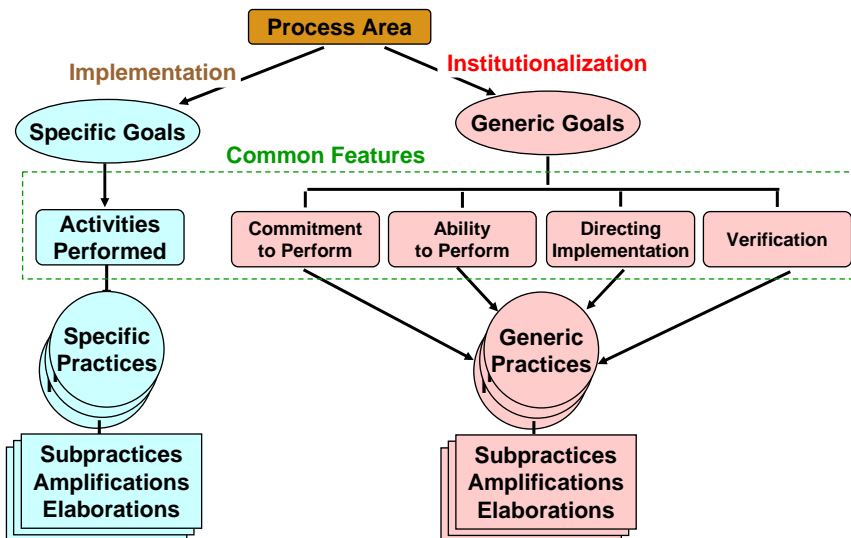
1. Establish criteria for distinguishing appropriate requirements providers.
2. Establish objective criteria for the acceptance of requirements.

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## Strukturering av prosessområder



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## Spesifikke kontra Generiske

- Adresserer ett prosessområde
- Beskriver aktiviteter for å **implementere** prosessområdet
- Adresserer alle prosessområdene
- Beskriver aktiviteter som **institusjonaliserer** prosessområdet

Eksempel: Requirements Mgmt.

### 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

### 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

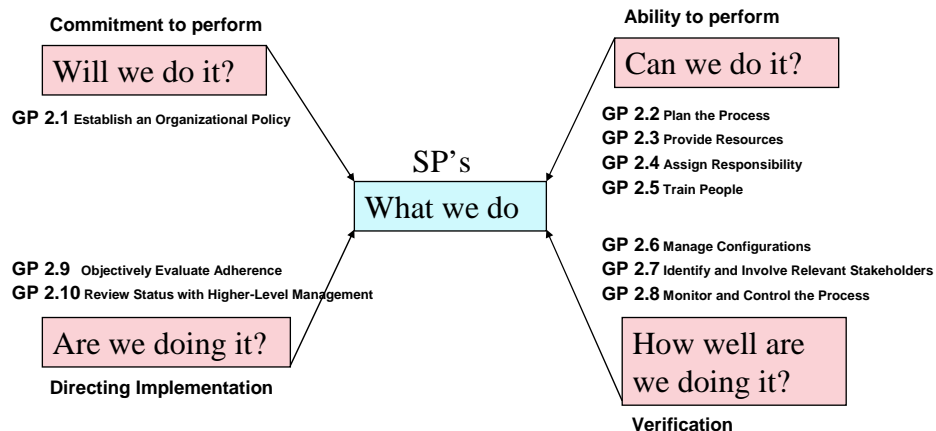
### GG 3 Institutionalize a Defined Process

- GP 3.1 Establish a Defined Process
- GP 3.2 Collect Improvement Information

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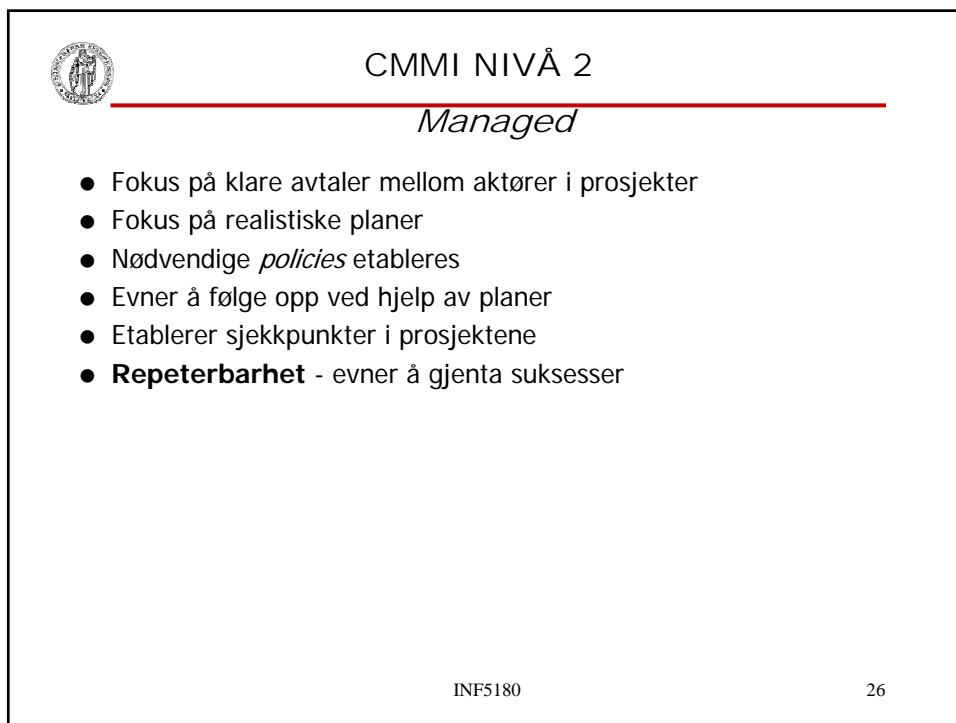
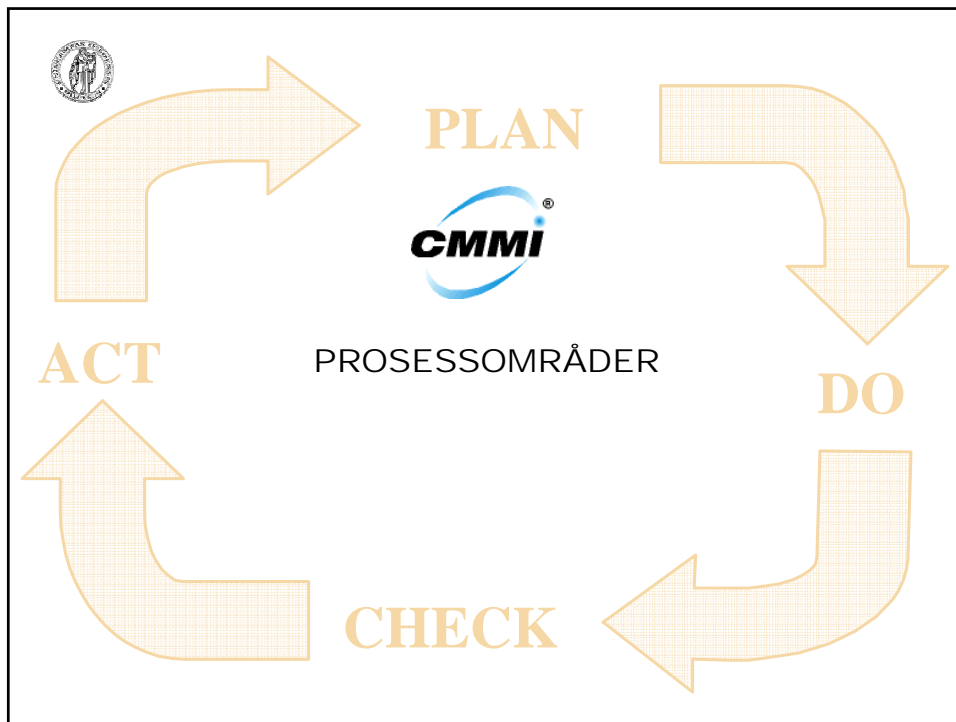


## Basis for institusjonalisering



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The diagram shows the CMMI NIVÅ 2 Managed level. It features a central title "CMMI NIVÅ 2" with the word "Managed" in italics below it, separated by a horizontal red line. To the left of the title is a small circular logo. Below the title is a bulleted list of characteristics for this maturity level. At the bottom of the diagram, the text "INF5180" and "26" are displayed.

CMMI NIVÅ 2  
*Managed*

- Fokus på klare avtaler mellom aktører i prosjekter
- Fokus på realistiske planer
- Nødvendige *policies* etableres
- Evner å følge opp ved hjelp av planer
- Etablerer sjekkpunkter i prosjektene
- **Repeterbarhet** - evner å gjenta suksesser

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## CMMI NIVÅ 2

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### Process Areas

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

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## REQUIREMENTS MANAGEMENT - REQM

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### Purpose

The purpose of Requirements Management is to manage the requirements of the project's products and product components and to identify inconsistencies between those requirements and the project's plans and work products.

#### **SG 1 Manage Requirements**

***Requirements are managed and inconsistencies with project plans and work products are identified.***

#### **GG 2 Institutionalize a Managed Process**

***The process is institutionalized as a managed process.***

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## PROJECT PLANNING - PP

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### Purpose

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

#### **SG 1 Establish Estimates**

*Estimates of project planning parameters are established and maintained.*

#### **SG 2 Develop a Project Plan**

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

#### **SG 3 Obtain Commitment to the Plan**

*Commitments to the project plan are established and maintained.*

#### **GG 2 Institutionalize a Managed Process**

*The process is institutionalized as a managed process.*

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## PROJECT MONITORING AND CONTROL – PMC

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### Purpose

The purpose of Project Monitoring and Control is to provide understanding into the project's progress so that appropriate corrective actions can be taken when the project's performance deviates significantly from the plan.

#### **SG 1 Monitor Project Against Plan**

*Actual performance and progress of the project is monitored against the project plan.*

#### **SG 2 Manage Corrective Action to Closure**

*Corrective actions are managed to closure when the project's performance or results deviate significantly from the plan.*

#### **GG 2 Institutionalize a Managed Process**

*The process is institutionalized as a managed process.*

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## SUPPLIER AGREEMENT MANAGEMENT - SAM

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### Purpose

The purpose of Supplier Agreement Management is to manage the acquisition of products and services from suppliers external to the project for which there exists a formal agreement.

#### **SG 1 Establish Supplier Agreements**

*Agreements with the suppliers are established and maintained.*

#### **SG 2 Satisfy Supplier Agreements**

*Agreements with the suppliers are satisfied by both the project and the supplier.*

#### **GG 2 Institutionalize a Managed Process**

*The process is institutionalized as a managed process.*

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## MEASUREMENT AND ANALYSIS - MA

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### Purpose

The purpose of Measurement and Analysis is to develop and sustain a measurement capability that is used to support management information needs.

#### **SG 1 Align Measurement and Analysis Activities**

*Measurement objectives and practices are aligned with identified information needs and objectives.*

#### **SG 2 Provide Measurement Results**

*Measurement results that address identified information needs and objectives are provided.*

#### **GG 2 Institutionalize a Managed Process**

*The process is institutionalized as a managed*

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## PROCESS AND PRODUCT QUALITY ASSURANCE - PPOA

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### Purpose

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

**SG 1 Objectively Evaluate Processes and Work Products**  
*Adherence of the performed process and associated work products and services 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.*

**GG 2 Institutionalize a Managed Process**  
*The process is institutionalized as a managed process.*

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## CONFIGURATION MANAGEMENT - CM

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### Purpose

The purpose of Configuration Management 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 and maintained.*

**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.*

**GG 2 Institutionalize a Managed Process**  
*The process is institutionalized as a managed process.*

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## CMMI NIVÅ 3

### *Defined*

- Etablerer **standard utviklingsprosess** som er
  - **veldefinert** på organisasjonsnivå
  - **i bruk** i vid forstand
  - basis for all læring og lagring av erfaringer (*best practice*)
  - et godt egnet utgangspunkt for spesialtilpasninger (*tailoring*)
- Organisasjonen viser tydelig at prosessen skal brukes:
  - oppretter prosessgrupper ("SEPG")
  - sørger for erfaringsmekanismer ("de-briefing", prosjektevaluering etc)
  - knytter erfaringsdata til prosessen
  - tilbyr opplæring i prosessen
  - og knytter teknisk opplæring til prosessen
  - definerer tydelige grensesnitt mellom grupper

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## CMMI NIVÅ 3

### Process Areas

- Requirements Development
- Technical Solution
- Product Integration
- Verification
- Validation
- Organizational Process Focus
- Organizational Process Definition
- Organizational Training
- Integrated Project Management
- Risk Management
- Decision Analysis and Resolution

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## REQUIREMENTS DEVELOPMENT - RD

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### Purpose

The purpose of Requirements Development is to produce and analyze customer, product, and product component requirements.

#### **SG 1 Develop Customer Requirements**

*Stakeholder needs, expectations, constraints, and interfaces are collected and translated into customer requirements.*

#### **SG 2 Develop Product Requirements**

*Customer requirements are refined and elaborated to develop product and product component requirements for the product life cycle.*

#### **SG 3 Analyze and Validate Requirements**

*The requirements are analyzed and validated, and a definition of required functionality is developed.*

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## TECHNICAL SOLUTION - TS

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### Purpose

The purpose of Technical Solution is to develop, design, and implement solutions to requirements. Solutions, designs and implementations encompass products, product components, and product related processes either singly or in combinations as appropriate.

#### **SG 1 Select Product Component Solutions**

*Product or product component solutions, including applicable product related processes, are selected from alternative solutions.*

#### **SG 2 Develop the Design**

*Product or product component designs are developed.*

#### **SG 3 Implement the Product Design**

*Product components, and associated support documentation, are implemented from their designs.*

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## PRODUCT INTEGRATION - PI

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### Purpose

The purpose of Product Integration is to assemble the product from the product components, ensure that the product, as integrated, functions properly, and deliver the product.

#### **SG 1 Prepare for Product Integration**

***The strategy for conducting product integration is established and maintained.***

#### **SG 2 Ensure Interface Compatibility**

***The product component interfaces, both internal and external, are compatible.***

#### **SG 3 Assemble Product Components and Deliver the Product**

***Verified product components are assembled and the integrated, verified, and validated product is delivered.***

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## VERIFICATION - VER

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### Purpose

The purpose of Verification is to assure that selected work products meet their specified requirements.

#### **SG 1 Prepare for Verification**

***Preparation for verification is conducted.***

#### **SG 2 Perform Peer Reviews**

***Peer reviews are performed on selected work products.***

#### **SG 3 Verify Selected Work Products**

***Selected work products are verified against their specified requirements.***

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## VALIDATION - VAL

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### Purpose

The purpose of Validation is to demonstrate that a product or product component fulfills its intended use when placed in its intended environment.

#### **SG 1 Prepare for Validation**

*Preparation for validation is conducted.*

#### **SG 2 Validate Product or Product Components**

*The product or product components are validated to ensure that they are suitable for use in their intended operating environment.*

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## ORGANIZATIONAL PROCESS FOCUS - OPF

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### Purpose

The purpose of Organizational Process Focus is to establish and maintain an understanding of the organization's processes and process assets, and to identify, plan, and implement the organization's process improvement activities.

#### **SG 1 Determine Process Improvement Opportunities**

*Strengths, weaknesses, and improvement opportunities for the organization's processes are identified periodically and as needed.*

#### **SG 2 Plan and Implement Process Improvement Activities**

*Improvements are planned and implemented, process assets are deployed, and process-related experiences are incorporated into the organization's process assets.*

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## ORGANIZATIONAL PROCESS DEFINITION - OPD

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### Purpose

The purpose of Organizational Process Definition is to establish and maintain a usable set of organizational process assets.

#### **SG 1 Create Organizational Process Assets**

*A set of organizational process assets is available.*

#### **SG 2 Make Supporting Process Assets Available**

*Process assets that support the use of the organization's set of standard processes are available.*

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## ORGANIZATIONAL TRAINING - OT

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### Purpose

The purpose of Organizational Training is to develop the skills and knowledge of people so they can perform their roles effectively and efficiently.

#### **SG 1 Identify Training Needs and Make Training Available**

*Training to support the organization's management and technical roles is identified and made available.*

#### **SG 2 Provide Necessary Training**

*Training necessary for individuals to perform their roles effectively is provided.*

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## INTEGRATED PROJECT MANAGEMENT - IPM

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### Purpose

The purpose of Integrated Project Management is to establish and manage the project and the involvement of the relevant stakeholders according to an integrated and defined process that is tailored from the organization's set of standard processes.

#### **SG 1 Use the Project's Defined Process**

*The project is conducted using a defined process that is tailored from the organization's of standard processes.*

#### **SG 2 Coordinate and Collaborate with Relevant Stakeholders**

*The project coordinates and collaborates with the relevant stakeholders.*

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## RISK MANAGEMENT - RM

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### Purpose

The purpose of Risk Management is to identify potential problems before they occur, so that risk-handling activities may be planned and invoked as needed across the life cycle to mitigate adverse impacts on achieving objectives.

#### **SG 1 Prepare for Risk Management**

*Preparation for risk management is conducted.*

#### **SG 2 Identify and Analyze Risks**

*Risks are identified and analyzed to determine their relative importance.*

#### **SG 3 Mitigate Risks**

*Risks are handled and mitigated, where appropriate, to reduce adverse impacts on achieving objectives.*

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## DECISION ANALYSIS AND RESOLUTION - DAR

### Purpose

The purpose of Decision Analysis and Resolution is to make decisions using a structured approach that evaluates identified alternatives against established criteria.

### SG 1 Evaluate Alternatives

*Decisions are based on an evaluation of alternatives using established criteria.*

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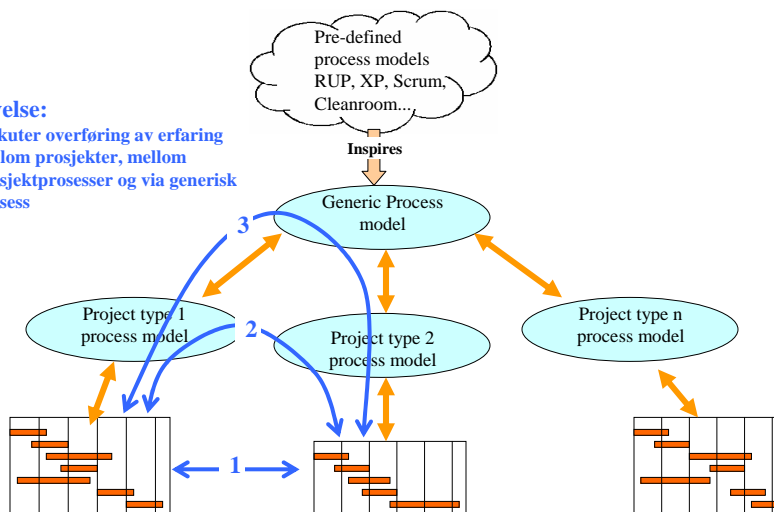


## Prosess og erfaringslæring (CMMI nivå 3-5)

Prosessmodeller på 3 nivåer: "Globalt nivå", organisasjonsnivå og prosjektnivå

### Øvelse:

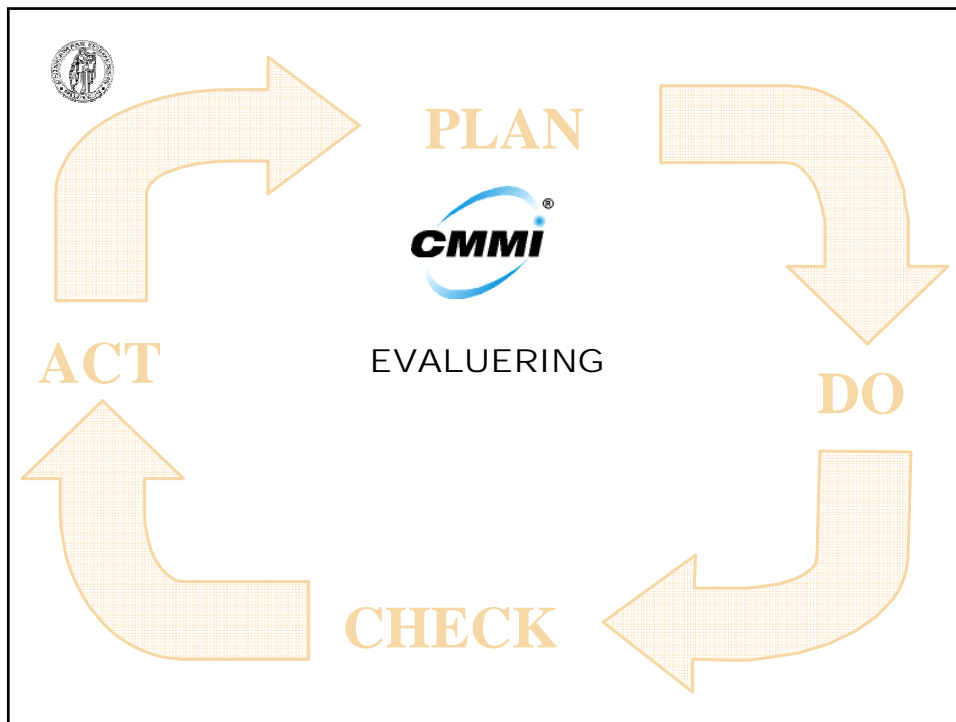
Diskuter overføring av erfaring mellom prosjekter, mellom prosjektprosesser og via generisk prosess




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 **CMMI Evaluering**

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- En lang rekke modeller, skjemaer og formalismenivåer
- Offisiell *appraisal*: SCAMPI overtar for CBA IPI og SCE
- Light assessments
- Ultra-light assessments
- Self-assessment
- Interim-evaluering / Mini-assessment
- Basert på åpne intervjuer
- Basert på lukkede/struktureerte intervjuer
- Basert på spørreskjemaer

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## SCAMPI<sup>SM</sup>

- **Standard CMMI Appraisal Method for Process Improvement**

- Er en familie av evalueringsmetoder, både egnet til å monitorere fremgang underveis og til sikker benchmarking av organisasjoner
- Er laget for å kunne brukes sammen med ISO 15504



## SCAMPI<sup>SM</sup> familien

<b>Name:</b>	<b>Class A</b>	<b>Class B</b>	<b>Class C</b>
Type:	Benchmark	Mini-appraisal	Pulse Taking
Objectiveness:	High	Medium	Low
Evidence required:	Document Review Interviews Instrument	Document Review Interviews Instrument <i>(pick two)</i>	Document Review Interviews Instrument <i>(pick one)</i>
Rating:	Formal Rating	Not formal	Not formal
Responsible:	Lead Appraiser	Lead Appraiser <i>(preferred)</i>	Trained Leader
Team:	Appraisal Team <i>(large)</i>	Appraisal Team <i>(medium)</i>	Appraisal Team <i>(small)</i>



## Appraisal Team Members (ATM) - krav

### Appraisal Team must

- have a total of 25 years of field experience with an average of 6 years
- have a total of 10 years of management experience and at least one ATM with at least 6 years experience as a manager
- have experience in the life cycles in use by the organizational unit
  - At least two ATMs should have experience as practitioners

### ATMs should

- not be managers of **any** of the selected projects
- not be in the direct supervisory chain of **any** of the interviewees
- have good written and oral communication skills
- have the ability to facilitate the free flow of communication
- have the ability to perform as team players and negotiate consensus
- have participated (at least 50%) in a previous process appraisal
- be perceived by the appraisal sponsor as credible



## Practice Implementation Indicator Descriptions

PIID Type	Description	Examples
Direct	Tangible output resulting directly from implementation of a practice	Typical work products
Indirect	Artifacts that are a side-effect or indicative of performing a practice	Typical work products, meeting minutes, reviews, logs, reports
Affirmation	Oral or written statements confirming or supporting implementation of the practice	Interviews, questionnaires, briefings, demonstrations



## SCAMPI prosessen

### Plan and Prepare for the SCAMPI

- Analyze Requirements
- Develop SCAMPI Plan
- Select and Prepare Appraisal Team
- Obtain and Analyze Initial Objective Evidence
- Prepare for Collection of Objective Evidence

### Conduct the SCAMPI

- Examine Objective Evidence
- Verify and Validate Objective Evidence
- Document Objective Evidence
- Generate Appraisal Results

### Report the SCAMPI Results

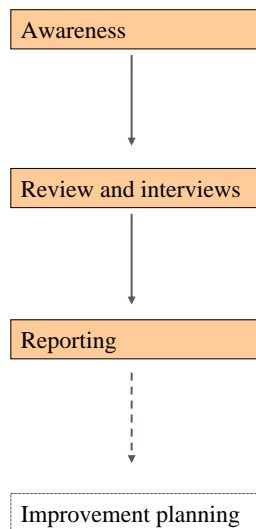
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## En enkel assessment-prosess



1. Present CMMI overview and discuss the CMMI potential with management team. Get commitment!
  2. Define scope of assessment.
    - Define additional scope (outside CMMI) if needed.
  3. Define assessment team and ensure that the team gets full CMMI training.
  4. Give one-day course on the CMMI model to everybody
1. Document review
  2. Decide on interview technique:
    - Questionnaire send-out
    - Individual
    - Group
  3. Perform Interviews
  4. Summarise results
1. Make Findings report based on interviews:
    - General, overall findings
    - PA specific findings
    - Quick-win candidates
  2. Discuss findings in assessment team
  3. Present findings to everybody:
    - Discuss findings
    - Resolve conflicts

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## Interim evaluering – CMM-Mini

- En lettvekts-evaluering for prosjekt og for linjeorganisasjonen utviklet av KDA
- Er støttet av et regneark der alle relevante KPAer med relevante praksiser er lagt inn
- Alle praksiser gis score
  - y – Yes
  - p – Partly
  - n – Not
  - na – Not Applicable
- Baserer seg på at mapping til prosedyrer og dokumenter (PIID'er) er gjort på forhånd.
- Prosjekt:
  - Alle KPAer og alle praksiser som er relevant for prosjekt (alle på nivå 2 pluss et utvalg på nivå 3)
  - Gjennomføres jevnlig (hver eller annenhver måned)
  - Baserer seg på 1 full gjennomgang (< 8 timer), mens de andre er fokuserte (< 2 timer)
- Linje: Et utvalg av KPA'er på nivå 3 der ansvaret ligger på linja. 57



## Eksempel: Requirement Management

### Requirements Management

Goals for the RM Key Process Area:

Goal 1: System requirements allocated to software are controlled to establish a baseline for software engineering and management use.

Goal 2: Software plans, products and activities are kept consistent with the system requirements allocated to software.

Key practices Maturity	Assess the status in the "Values" column; y=yes, p=partly, n=no	How is it handled within the project?	Solutions provided from the line organization	Action required to achieve compliance?
c	1 y	The project follows a written organizational policy for managing the allocated system requirements.		KDA Quality Manual, part I SE-process and INS 0234
ah	1 y	For each project, responsibility is established for analysing the system requirements and allocating them to HW, SW, and other system components	Responsibility (Role) defined and allocated to a person or group.	KDA Roles: SE-Manager responsible for allocating requirements to SW, HW etc. SW architect responsible for writing the SRS.
ah	2 y	The allocated requirements are documented.	Technical, Non-technical requirements and acceptance criteria are defined and documented!	SE-process: User Requirement specification (URS), System Segment Specification (SSS), Interface requirement specification (IRS), Software Requirement Specification (SRS), Hardware development specification (HDS), Statement of Work (SOW) INS 0234
ah	3 y	Adequate resources and funding are provided for managing the allocated requirements.	An agreement written between the line and project for the allocated RM resources. Hours for RM planned. Necessary tools available.	AZDS tool: Rational Requisite Pro
ah	4 y	Members of the engineering group and other related groups are trained to perform their requirements management activities.	Training in RM activities: both technical application, methods and tools. Example Prephase training.	
ac	1 y	The engineering group reviews the allocated requirements before they are incorporated into the project.		PRO-0017 Review Process, SRS checklist in PRO-0016. AZDS Requirements to projects: Requirements handling.
ac	2 y	The engineering group uses the allocated requirements as the basis for plans, work products, and activities.		Project management process, Initial planning PRO-0015 Software Engineering Management, Plan the SW development uses SRSs as input to planning. AZDS Task descriptions?



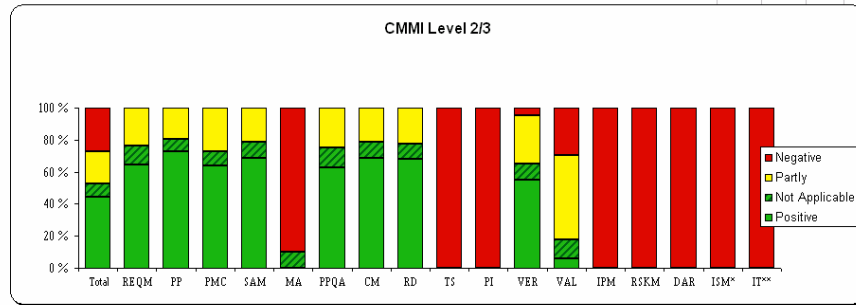
## CMM-Mini resultater (prosjekt)

Total CMMI Compliance: 63 %

Tailoring: Use of Not Applicable: 8 %

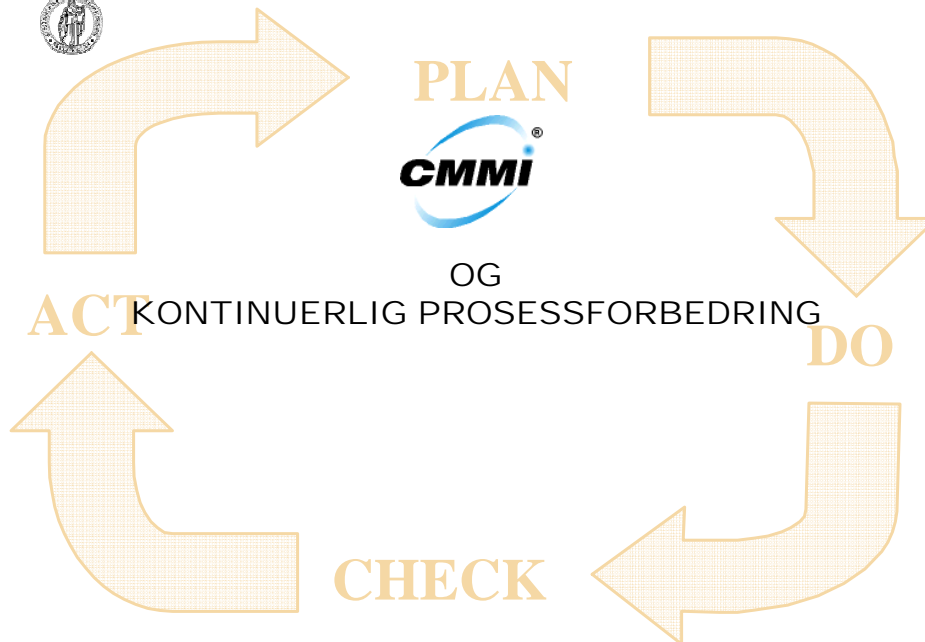
CMMI Level 2 compliance: 77 %

CMMI Level 3 compliance: 22 %



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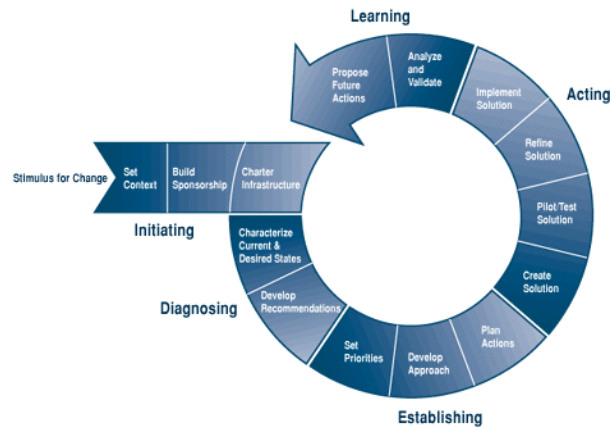
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## Prosessforbedring: IDEAL

SEI sin prosessforbedringsprosess:



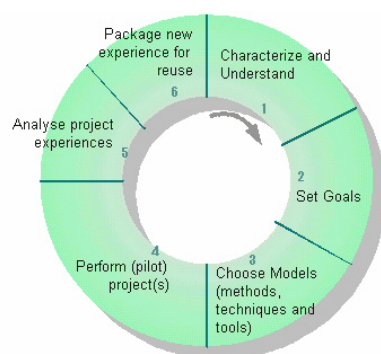
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## CMM og QIP

- CMM er godt egnet til å brukes sammen med Quality Improvement Paradigme på organisasjonsnivå



1. Gjennomfør en CMM-assessment. Kombiner resultatene med forretningsmessige målsetninger og identifiserte problemer.
2. Bruk "Findings" fra assessmenten til å sette forbedringsmål
3. Velg tiltak som antas å føre fram mot målsetningene
4. Gjennomfør ett eller flere prosjekter med de nye modellene, verktøyene og metodene. Samle data underveis
5. Analyser erfaringene fra prosjektene
6. Oppdater standard prosessmodell og erfaringsdatabase

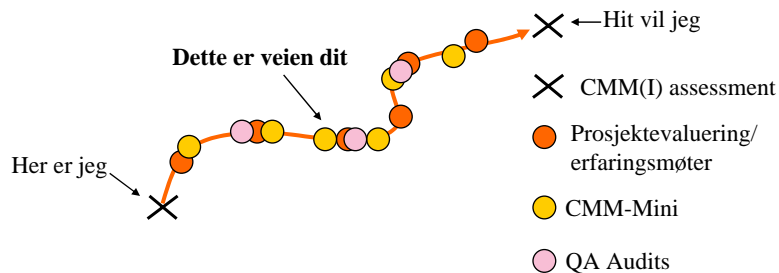
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## CMM som veikart

- Det er ikke vanskelig å komme frem til en lang liste med gode forslag til forbedringer.
- Langt vanskeligere er det å prioritere det viktigste og å lage en realistisk fremdriftsplan.
- Det aller vanskeligste er å håndtere de nødvendige endringene i organisasjonen - arbeidsmåte og ikke minst kultur.



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## Ulike fremgangsmåter for prosessforbedring

- De fleste som bruker CMM(I) i dag bruker den internt som et forbedringsrammeverk – dvs at de ikke har til hensikt å utnytte markedsverdien gjennom en CBA IPI eller SCAMPI.
- De mest aktive CMM-profilene (Mark Paulk og Bill Curtis) advarer sterkt mot å følge modellen blindt. *Bruk modellen med sunn fornuft, paret med forståelse av egne behov og problemområder.*

Modelløs SPI  
(f.eks. QM)

CMM(I) brukt veiledende  
(kombinert med GQM/QIP el.l.)

”Hard-core CMM”  
(SCAMPI)



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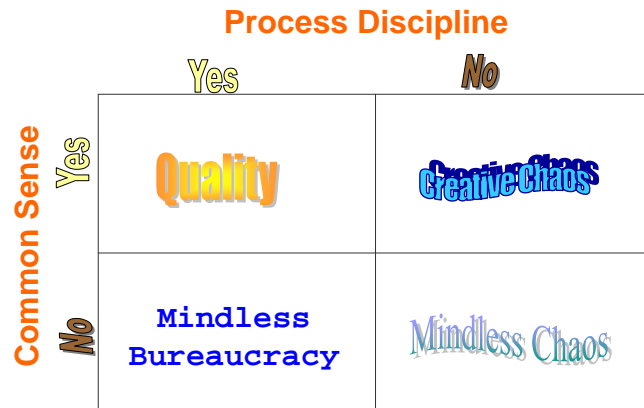
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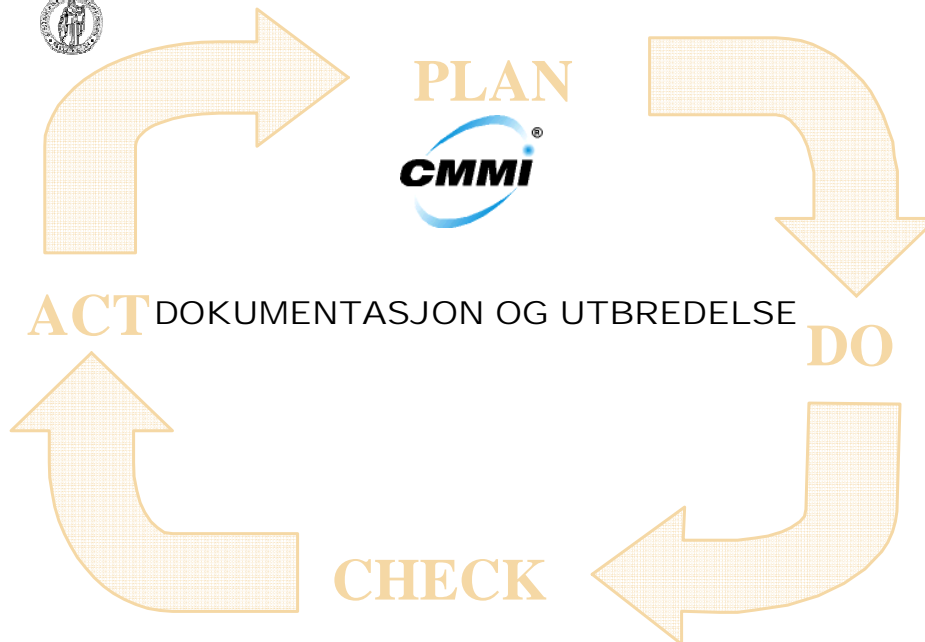
## Bruk sunn fornuft...

- Mark Paulk, SEI:



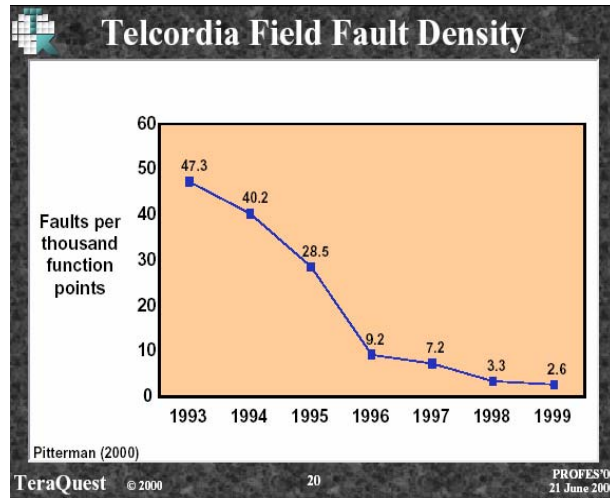
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## Virker det ? (I)

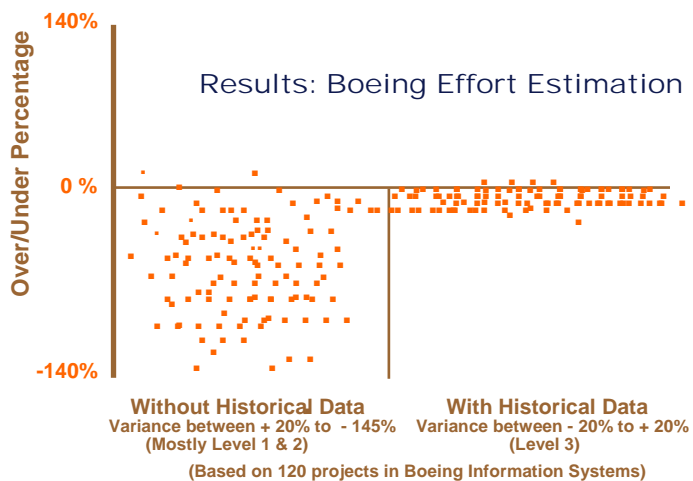


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## Virker det ? (II)



Reference: John D. Vu. "Software Process Improvement Journey: From Level 1 to Level 5." 7th SEPG Conference, San Jose, March 1997.

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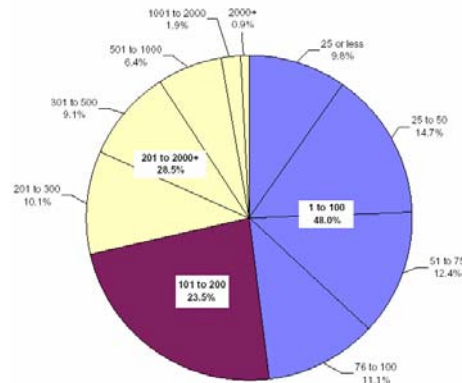
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## Status og utbredelse SW-CMM

- Offisielle SEI-assessments utført fra 1998 til August 2002:
  - 1124 organisasjonsenheter
  - 388 selskaper
  - 5538 prosjekter
  - 42,3 % utenfor USA

Se <http://www.sei.cmu.edu/sema/profile.html> (oppdateres halvårlig)



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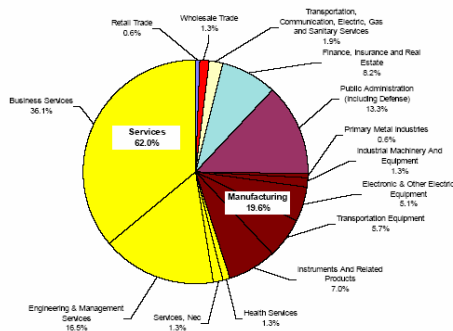


## Status og utbredelse CMMI

- SCAMPI v1.1 Class A appraisals conducted from its April 2002 release through and reported to the SEI by July 2004
  - 367 appraisals
  - 333 organizations
  - 176 participating companies
  - 28 reappraised organizations
  - 1.368 projects
  - 46,2 % Non-USA organizations

### Organization Type

Based on Primary Standard Industrial Classification (SIC) Code



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## Referanser

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- Offisiell CMMI hjemmeside hos SEI:  
<http://www.sei.cmu.edu/cmmi/cmmi.html>