
Towards a More Mature Test Process

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Towards a More Mature Test Process

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Mrs. Anne Mette Jonassen Hass, M.Sc.C.E., has more than 20 years experience in IT. She has been involved in all aspects of software development: analysis, design, coding, test, quality assurance, and management. Mrs. Hass has worked in various types of business such as hospitals, the oil industry, telecommunication, hardware producers, and the space industry, in Denmark, Norway, England, and France.

Since 1995 she has worked as a consultant in Software Process Improvement, assessments, configuration management, and test. Mrs. Hass has been involved in several process improvement projects in different companies. She also performs third party test and validation of software, especially safety critical software. Mrs. Hass is a certified BOOTSTRAP V.3.0 lead assessor, having performed more than 30 BOOTSTRAP assessments in Denmark, Poland, and Canada for companies of all sizes and in many different branches.

Mrs. Hass has resently published a book about professional configuration management.





Towards a more Mature Test Process: Configuration Management

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What is it all about?

Configuration management is

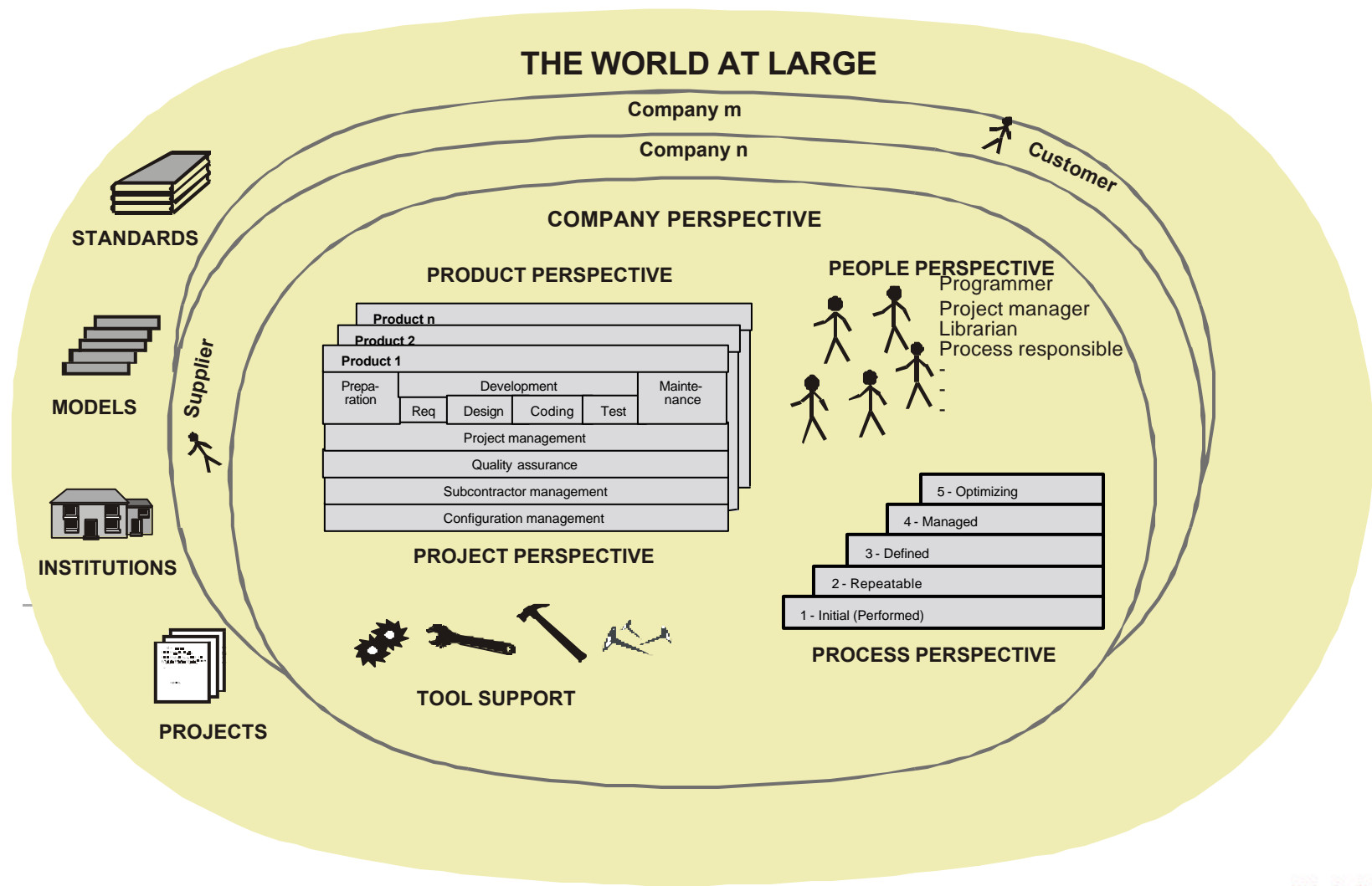
- reportable identification,**
- controlled storage, and**
- control of all changes**

of the items that a (software) system is

- produced on the basis of and**
- consists of**

through the entire lifecycle of the system.

Configuration Management from a Bird's View



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Contents

- Configuration Management in the Light of CMM
- A Definition of Configuration Management
- Configuration Management Data
- The Tester's Role in Configuration Management
- Implementation and Improvement of Configuration Management
- Configuration Management Tools
- Conclusion
- Useful Web-sites

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Configuration Management in the Light of CMM - 1

- CMM (Capability Maturity Model) version 1.1
 - staged
 - Configuration Management at level 2
- Software Configuration Management according to CMM:
 - Goal 1 Software configuration management activities are planned.
 - Goal 2 Selected software work products are identified, controlled, and available.
 - Goal 3 Changes to identified software work products are controlled.
 - Goal 4 Affected groups and individuals are informed of the status and content of software baselines.

10 activities are defined for fulfillment of goals in the model.

www.sei.cmu.edu/cmm/obtain.cmm.html

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Configuration Management in the Light of CMM - 2

- CMMI (Capability Maturity Model Integration)
 - staged
 - Configuration Management at level 2
 - continuously
 - Configuration Management is a process area in its own right with goals and activities (almost) as for CMM V1.1
 - part of level 2 for all process areas

Level 5: Optimizing

Level 4: Managed

Level 3: Defined

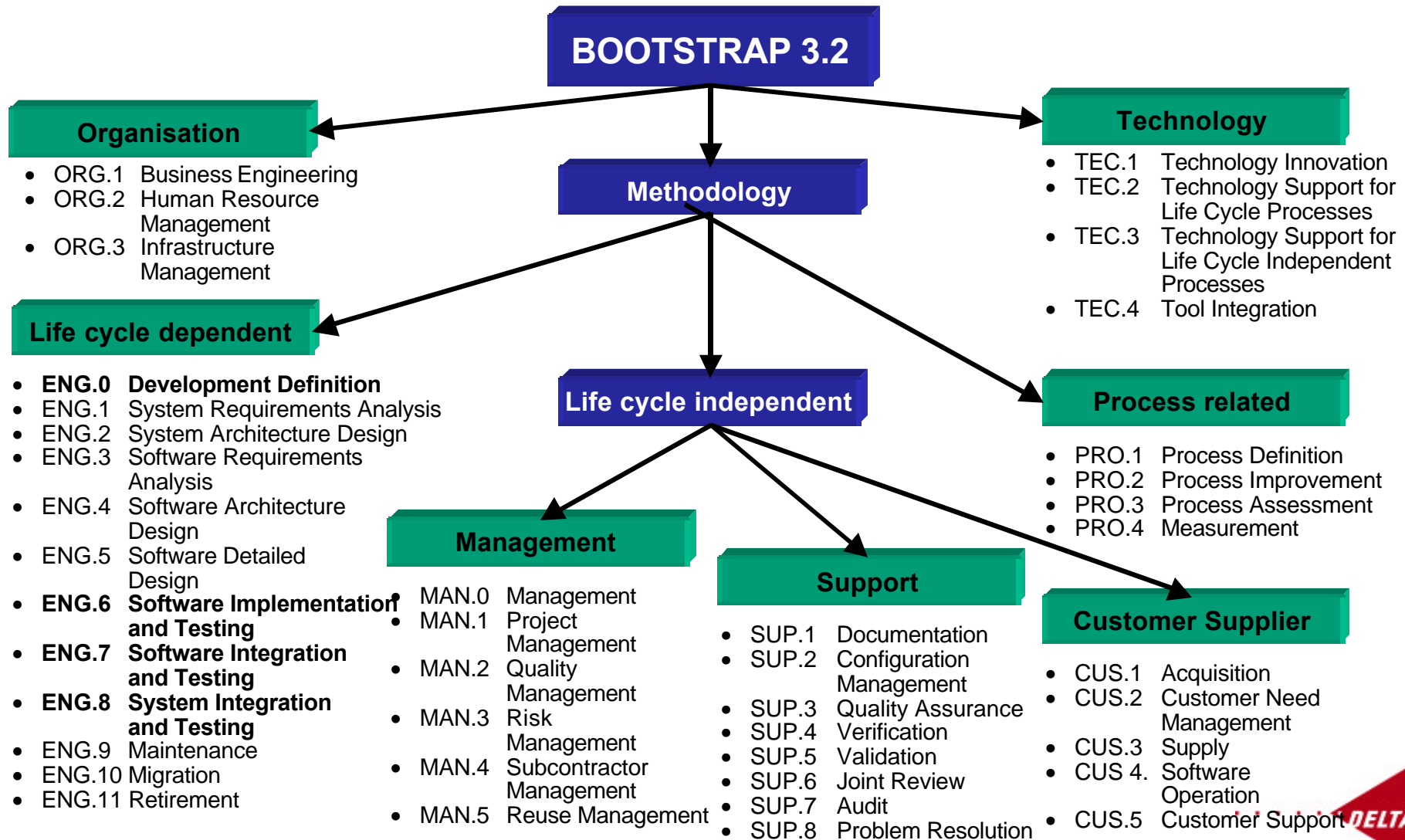
Level 2: Repeatable

Level 1: Initial (Performed)

www.sei.cmu.edu/cmmi/products/models.html

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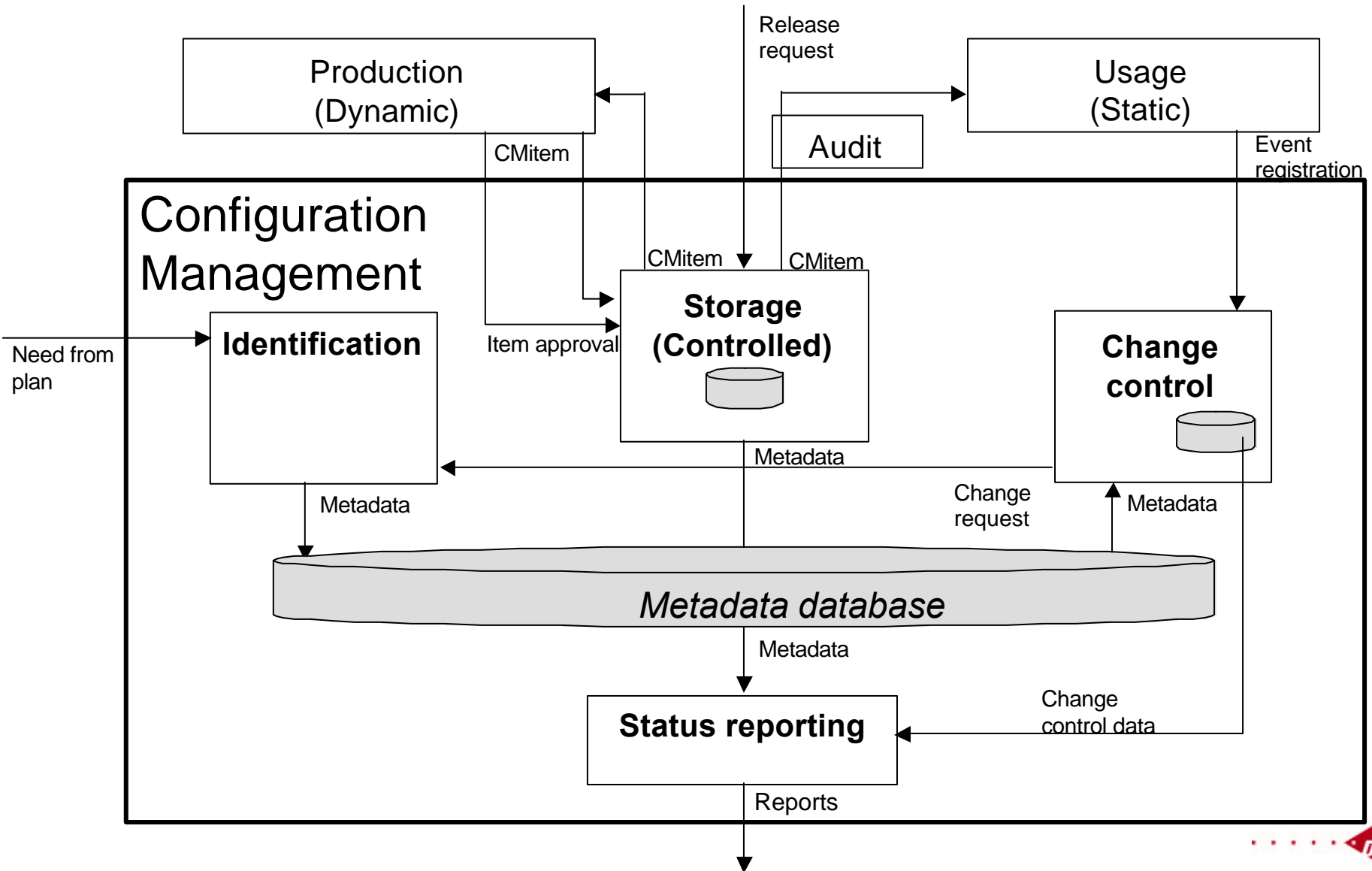
SPICE Compatible Model - BOOTSTRAP v. 3.2



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A Definition of Configuration Management



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Detailed Definitions

- Identification
Unambiguous definition of a configuration item and its relations to the outside world and to other configuration items.
- Storage
Ensurance that a configuration item can be found at any time and delivered in the condition you expect to find it; and control of who has been given what.
- Change Control
Full control of all change requests for a product and of all implemented changes in each configuration item relative to its predecessors.
- Status Reporting
Making the information necessary for effective management of the development and maintenance of a product, available in a usefull way.

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Configuration Management Data

- What may be placed under configuration management
- For configuration items:
 - What do you need to know
 - description of metadata
 - What do you need to register
 - list of 'forms'
 - What information is available
 - examples of status reports

What may be placed under CM for test

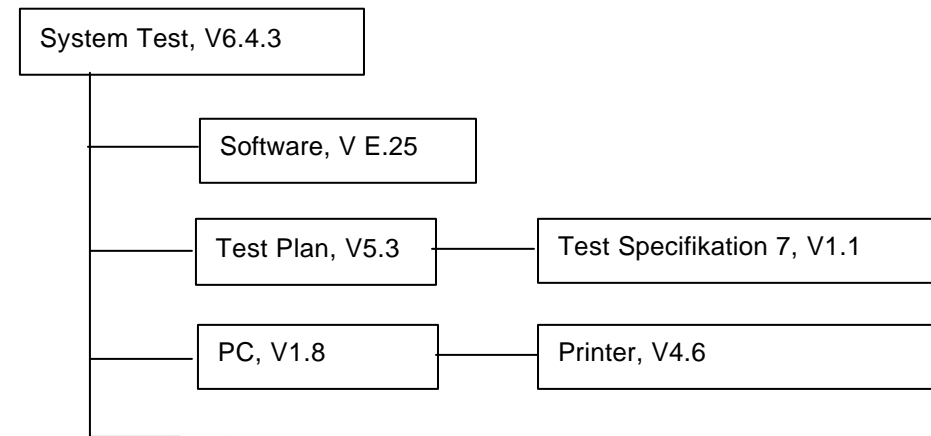
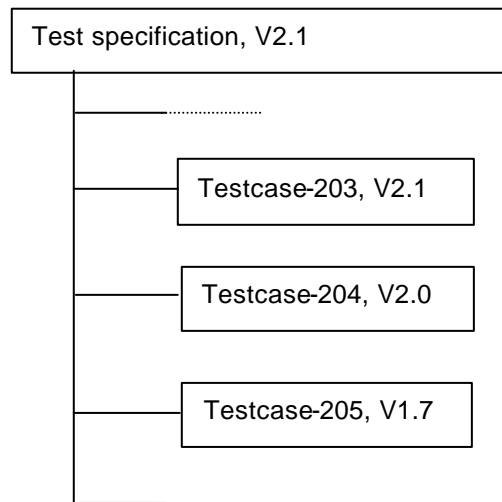
- **administrative documents**
letters, contracts, process description, sales material, templates, standards etc.
- **hardware**
cables, mainframe, PC, workstation, network, storage, peripherals etc.
- **code**
header files, include files, source code, system libraries, object files etc.
- **environments**
compilers, linkers, operating systems, tools, word processors etc.
- **project documentation**
user manuals, build scripts, data, event registrations, installation procedures, plans etc.
- **technical documentation**
requirements (all levels), design (all levels), technical notes
- **test material**
drivers, stubs, test data(base), test reports, test specifications and test procedures

The scope must be tailored to the individual project and company. 

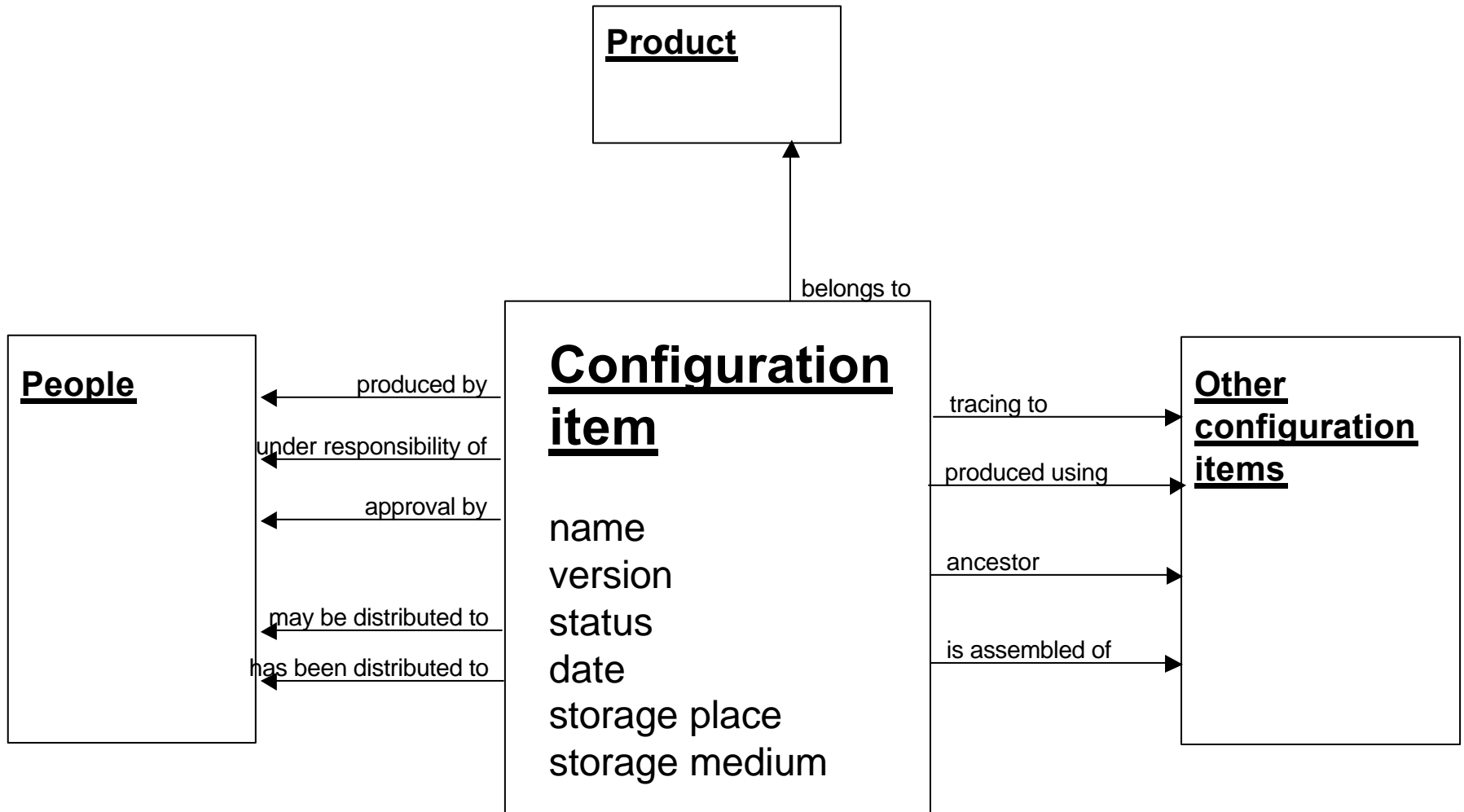
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Releases

- Individual configuration items may be assembled in releases, which may and should be configuration items in their own right
- Releases are hierarchies of configuration items.



What do you need to know - Description of Metadata



What do you need to register - List of 'forms'

- Item approval

configuration item concerned, dated signatures by producer, responsible, and approver, condition(s) for approval, and related metadata

- Release request

configuration item concerned, dated signature(s) by orderer or orderes, possibly dated signature by responsible, reason for release request, and release medium and/or destination

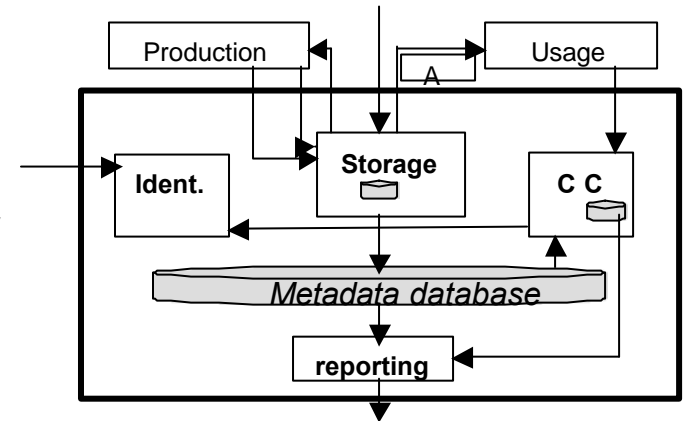
- Event registration

configuration item concerned, for the event: identification, type, and short title
phase information for the event: phase, time, name of responsible, name(s) of other involved, description, and classification

- Change request

the change: identification, identification of the underlying event, configuration item concerned and priority

phase information for the change: phase, time, name of responsible, description



What information is available - examples of status reports

- **Release note**
Date, configuration item concerned, description, release composition etc.
- **Item list: status**
Date, configuration item concerned, released to, open event registrations, open change requests
- **Item list: history**
Date, configuration item concerned, for each related version: id, status, date, responsible, released to, event registrations, change requests
- **Item list: composition**
Date, configuration item concerned, for each included c.i.: name, version, status, date, responsible - this may be recursive
- **Trace report**
Date, releases concerned, detailed To <-> From traces, missing traces either way

Configuration management is a valuable supplier of project metrics.

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Roles in Configuration Management

- A (software) project is like a play, where all roles must be filled in order for the play to be performed.

IMPORTANT: Roles are filled by people!

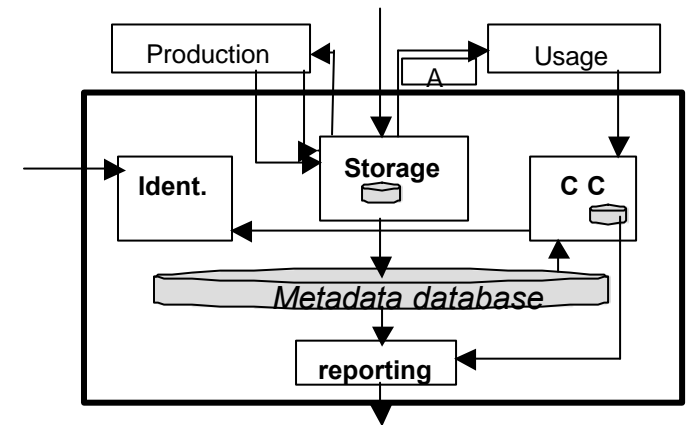
- Configuration management is an everyday tool for testers.
- Personal requirements for testers to benefit from and contribute to configuration management:
 - some attention to detail
 - some disciplin
 - interest in contributing to adding common value
 - some knowledge of existing configuration management processes

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Role in relation to configuration management - Tester 1

- Responsibility - general:
 - to test a system according to the applicable test plan
 - to be able to re-perform already performed tests in connection with later re- or regression tests in the entire lifetime of the product
- Responsibility - configuration management:
 - to use the appropriate configuration management system in connection with the performance of all test activities, such as planning, performance, and reporting



Role in relation to configuration management - Tester 2

- Contribution
 - identifying relevant configuration items, e.g. test plans, test descriptions, test scripts and test data, and releases in terms of an entire test including test environment etc.
 - placing these configuration items in storage after appropriate approval
 - produce event registration for relevant configuration items in connection with performance of test, e.g. for source code or (sub-)systems

Role in relation to configuration management - Tester 3

- Advantages
 - extract related configuration items as the basis for the testing work, e.g. individual configuration items or, more importantly, releases in terms of integrated (sub-) systems
 - getting information about the status and history of these configuration items
 - getting information about relevant event registrations and their progress

Configuration Management in Practise - 1

- Development phases (live cycle dependent)
specifications, design, coding, integration, test, production, and maintenance;
including emergency changes
- Support functions (life cycle independent)
e.g. project management, configuration management, quality assurance,
subcontractor management
- Special conditions
e.g. frequent builds, iterative development, multi-platform, multi-site, multi-
variants, parallel development, composite systems, safety critical products, size
of product, Web
- Cross-organizational products
company infra-structure, internal and external reuse-components' development,
quality system, documents

The art is to tailor the configuration management activities to support each phase, function, special condition, product, and business.

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Configuration Management in Practise - Test 1

Possible test configuration management items:

- test plans
- test specifications, comprised of:
 - test cases
 - test procedures
- test environment, including:
 - drivers
 - stubs
 - test data(base)
 - tools
 - machines and other hardware
- test reports

From a configuration management point of view the differences between test levels and test types are not significant, and configuration management for test may therefore be described in one go.

Configuration Management in Practise - Test 2

- Releases
 - documents with e.g. test cases
 - test object and the associated test configuration items, e.g. software module + test specification + test environment
- Connections to other process areas
 - test performed on products from other phases
 - test performed on the basis of products from other phases
 - test planning may relate to project management

Configuration Management in Practise - Test 3

- Identification
 - mostly as for documents and code
 - tracing is very important!
- Storage
 - as and with associated configuration items
 - possibly entire isolated test environments, including data
- Change Control
 - should be in place for test objects (e.g. modules, system)
 - don't forget test configuration items (e.g. test cases and data)
- Status Reporting
 - must be comprehensive and fast
 - a means for test management and follow-up

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Configuration Management in Practise - Test 4

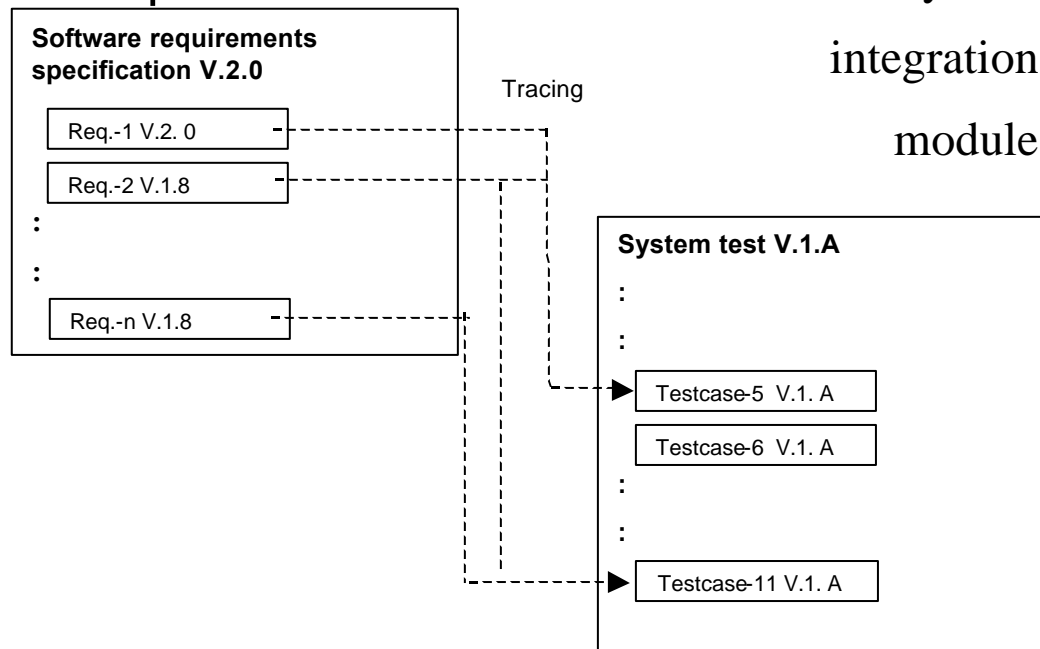
Tracing:

The ability to determine why a configuration item exists, e.i. what it is based on.

For test typically:

acceptance test	<-->	user requirements
system test	<-->	software requirements
integration test	<-->	architectual design
module test	<-->	detailed design

Example:



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Configuration Management in Practise - Test 5

Benefits to testing from tracing:

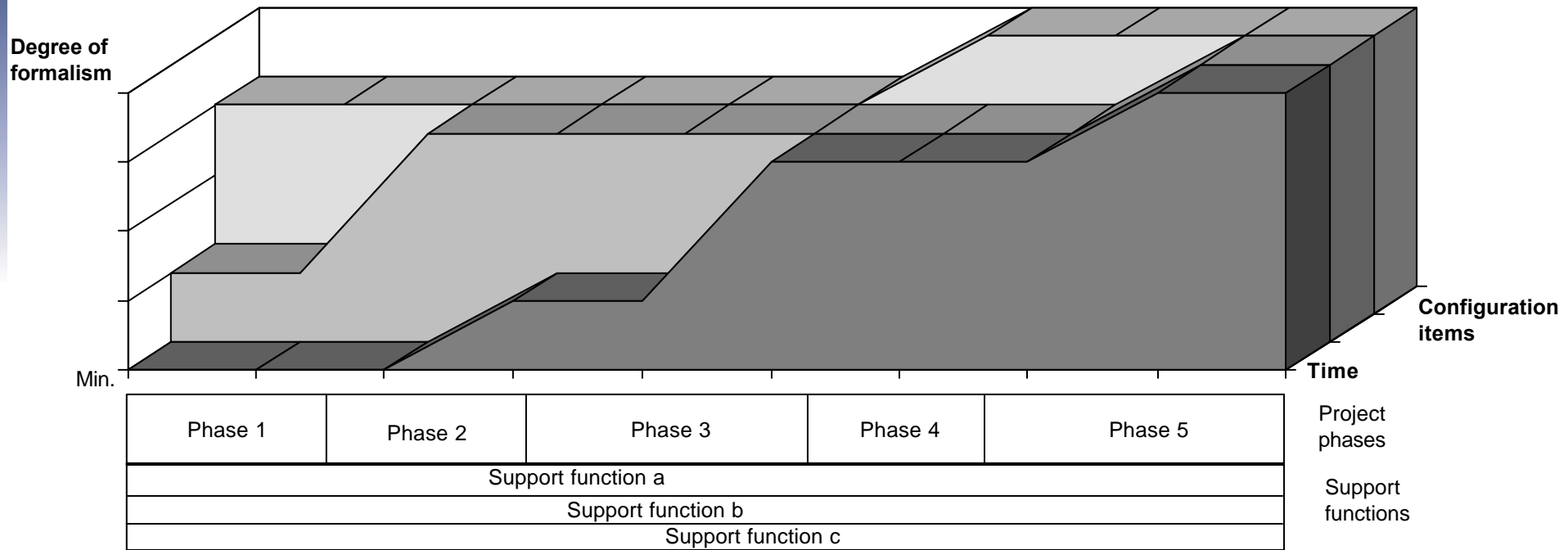
- early initiation of test planning, test case definition, and environment preparation
- extra review of requirements or design in view of testability
- notification of testers when requirements or design change
- requirement/design coverage reports ensuring everything covered by test cases (or other activities)
- test case status report showing traceability of all test cases (no unnecessary test cases)

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Implementation and Improvement of CM - 1

Scoping of the configuration management task - cost/benefit analysis



The total cost of c.m. is a function of the shaded volume.

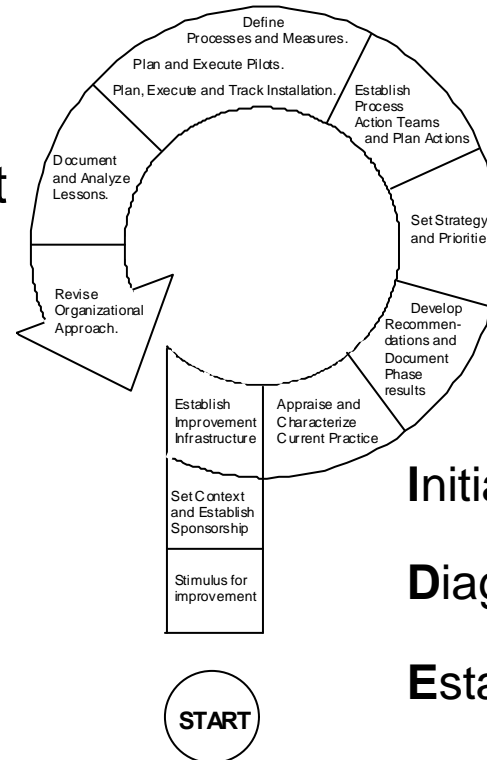


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Implementation and Improvement of CM - 2

From level 1 and onwards:

- Planning
- Configuration management
- Process description
- Metrics - statistical control
- On and on and on



Initialise - get going

Diagnose the current state

Establish a plan

Act according to the plan

Learn from the experience

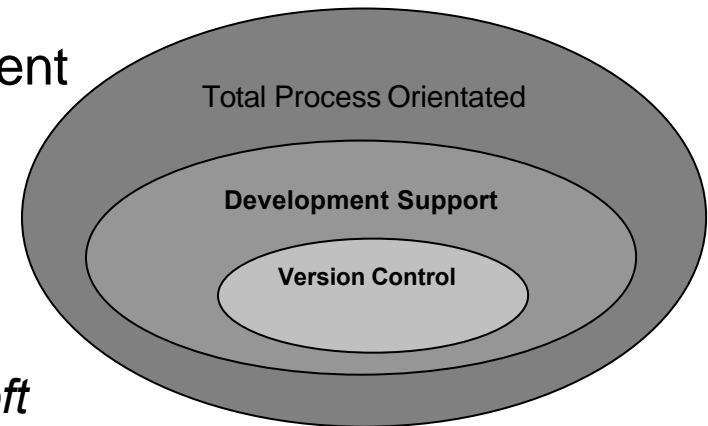
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Configuration Management Tools

- Types of tools for configuration management
 - Version Control - most primitive:
storage, simple forms of control
 - *PVCS from Intersolv*
 - *Visual SourceSafe from Microsoft*
 - Development Support - version control + create, merge, change, and release products in a distributed environment
 - *ClearCase from Rational*
 - Total Process Oriented - automate total process models, i.e. support workflow, roles, and responsibility in an integrated configuration management system
 - *Harvest fra Computer Associates*



Conclusion

Configuration management is:

- very complex
- very easy
- difficult to live with
- impossible to live without
- hard work
- easing work
- a pain (if you hate it)
- fun (if you don't)

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Web-sites

- "Yellow pages" www.cmtoday.com/yp/configuration_management.html
- BOOTSTRAP Institute www.bootstrap-institute.com/
- CMII – brugergruppe www.cmiug.com
- CMM version 1.1 www.sei.cmu.edu/cmm/obtain.cmm.html
- CMMI www.sei.cmu.edu/cmmi/products/models.html
- European Software Institute www.esi.es www.esi.es/VASIE/
- Institute of CM www.icmhq.com
- Ovum www.ovum.com
- Software Engineering Institute www.sei.cmu.edu/sei-home.html
- Standarder <http://computer.org/standards/sesc/survey0.htm>
- Tool – ClearCase www.rational.com/products/clearcase/index.jsp
- Tool – Harvest ca.com/products/ccc_harvest.htm
- Tool – PVCS www.intersolv.com/products/pvcs/
- Tool – StarTeam www.starbase.com/products/starteam/
- Tool – Visual SourceSafe www.microsoft.com/catalog/display.asp?subid=22&site=606

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