



CARDINIS
Your Governance Solutions

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Ingegneria del Software

Padova, 10 Maggio 2005



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Definizione di software

The programs, procedures, rules and all
associated documentation
pertaining to the operation of a
computerised system



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Ingegneria del software

L'insieme di regole, procedure, metodi e standard finalizzati alla assicurazione della soddisfazione dei requisiti utente in funzione del livello qualitativo richiesto

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Tema dell'incontro

Presentazione dei due migliori standard a livello mondiale per la contemporanea assicurazione della bontà del software e la soddisfazione dei requisiti di qualità imposti dalle norme in fase di contratto

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Standard in esame



European Space Agency

PSS – 05 (Febbraio 1991)

U.S. Department of Defense

MIL-STD 498 (Dicembre 1994)

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PSS-05



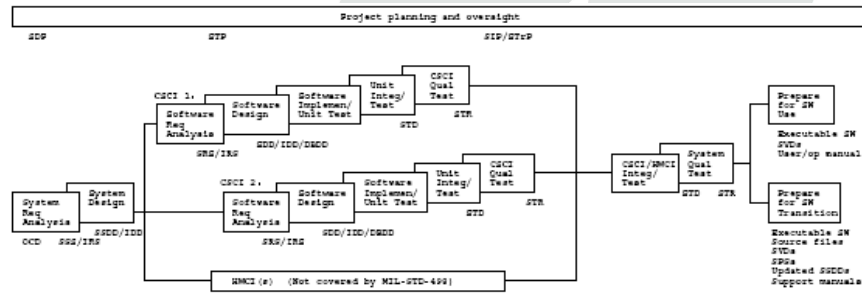
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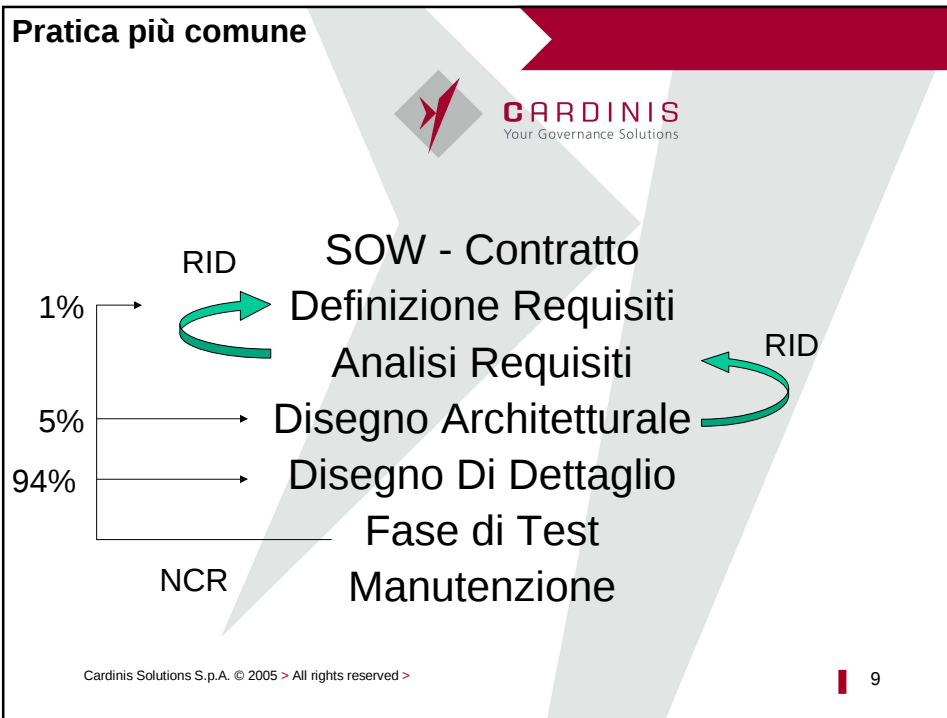
PHASES	UR	UR/R	SR	SR/R	AD	AD/R	DD	DD/R	TR	OM
ITEMS	USER REQUIREMENTS DEFINITION		SOFTWARE REQUIREMENTS DEFINITION		ARCHITECTURAL DESIGN		DETAILED DESIGN AND PRODUCTION		TRANSFER	OPERATIONS AND MAINTENANCE
MAJOR ACTIVITIES	- determination of operational environment - identification of user requirements		- construction of logical model - identification of software requirements		- construction of physical model - definition of major components		- module design - coding - unit tests - integration tests - system tests		- installation - provisional acceptance tests - operations - maintenance of code and documentation	final acceptance tests
DELIVERABLE ITEMS	User Requirements Document arrow implies under change control	URD	SRD		ADD		DDD Code SUM Software User Manual		STD	PHD
REVIEWS		+	+.+	+	+.+	+	+.+	+		
MAJOR MILESTONES		URD approved	SRD approved		ADD approved		code/DDD/SUM approved		STD delivered provisional acceptance	PHD delivered final acceptance

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SOW - Contratto
Definizione Requisiti
Analisi Requisiti
Disegno Architettuale
Disegno Di Dettaglio
Fase di Test
Manutenzione



Non conformità

The diagram illustrates the non-compliance of project phases and the frequency of RID and NCR reports. The phases are listed in a central column: SOW - Contratto, Definizione Requisiti, Analisi Requisiti, Disegno Architettuale, Disegno Di Dettaglio, Fase di Test, and Manutenzione. To the left, a vertical axis shows the percentage of reports: 1% for RID, 5% for Disegno Architettuale, and 94% for Disegno Di Dettaglio. To the right, a vertical axis shows the percentage of reports: 1% for RID, 5% for Disegno Architettuale, and 94% for Disegno Di Dettaglio. The RID label is also placed next to the first two phases. The NCR label is placed at the bottom of the list.

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1% → RID

5% → Disegno Architettuale

94% → Disegno Di Dettaglio

SOW - Contratto

Definizione Requisiti

Analisi Requisiti

Disegno Architettuale

Disegno Di Dettaglio

Fase di Test

Manutenzione

NCR

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Valutazione di impatto delle variazioni



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Definizione

Implementazione

Δ request



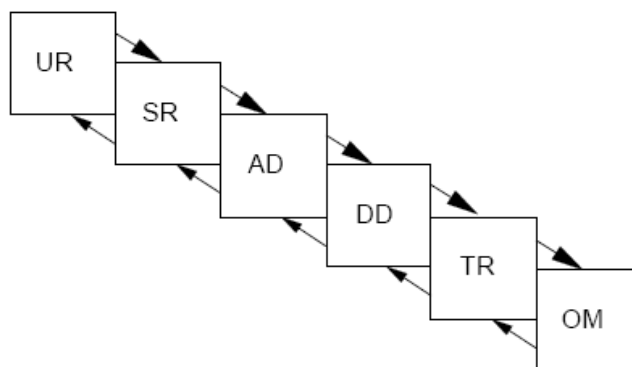
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Approccio a cascata



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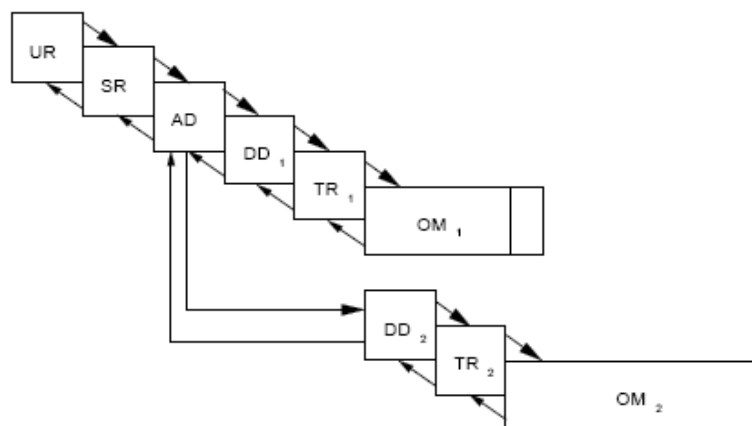
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Approccio incrementale



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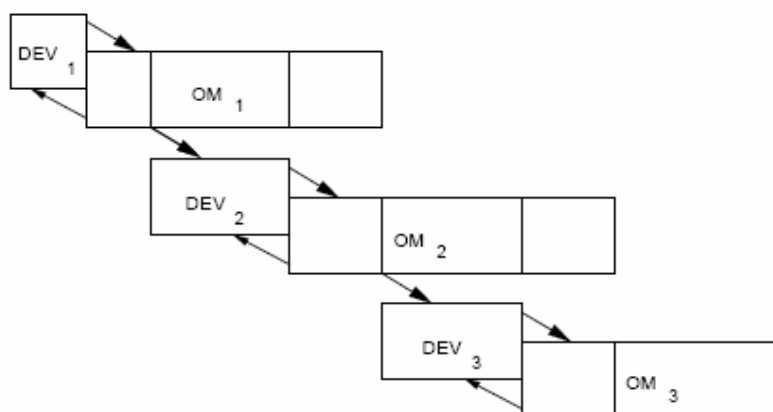
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Approccio evolutivo



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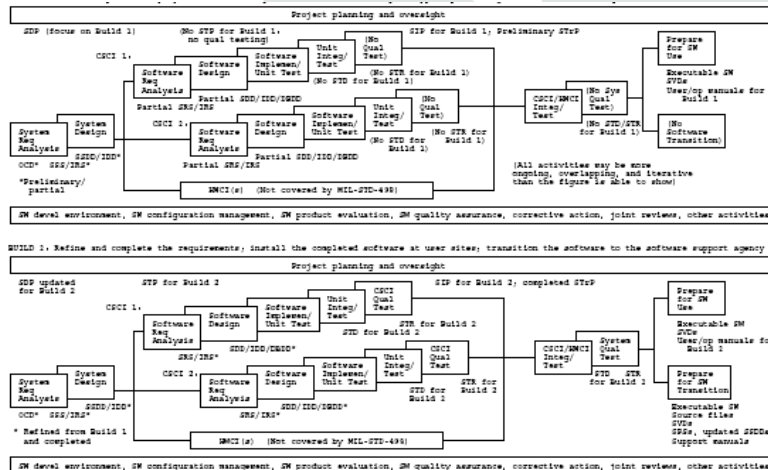
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Approccio evolutivo



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User requirements



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The UR phase can be called the 'problem definition phase' of the life cycle.

The purpose of this phase is to refine an idea about a task to be performed, using computing equipment, into a definition of what is expected from the computer system.

The definition of the user requirements **shall** be the responsibility of the user.

The expertise of software engineers, hardware engineers and operations personnel **should** be used to help define and review the user requirements.

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I/O for UR phase



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INPUT

No formal inputs are required, although the results of interviews, surveys, studies and prototyping exercises are often helpful in formulating the user requirements.



OUTPUT

- > URD
- > Plans for the SR phase.

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Software requirements



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The SR phase can be called the 'problem analysis phase' of the life cycle.

The purpose of this phase is to analyse the statement of user requirements in the URD and produce a set of software requirements as complete, consistent and correct as possible.

The definition of the software requirements is the responsibility of the developer.

Participants in this phase **should** include users, software engineers, hardware engineers and operations personnel.

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I/O for SR phase



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INPUT

User Requirements Document
Software Project Management Plan
Software Configuration Management Plan
Software Verification and Validation Plan
Software Quality Assurance Plan



OUTPUT

- SRD
- Plans for the AD phase.
- Progress reports, configuration status accounts, and audit reports.

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Architectural design phase



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The AD phase can be called the 'solution phase' of the life cycle.

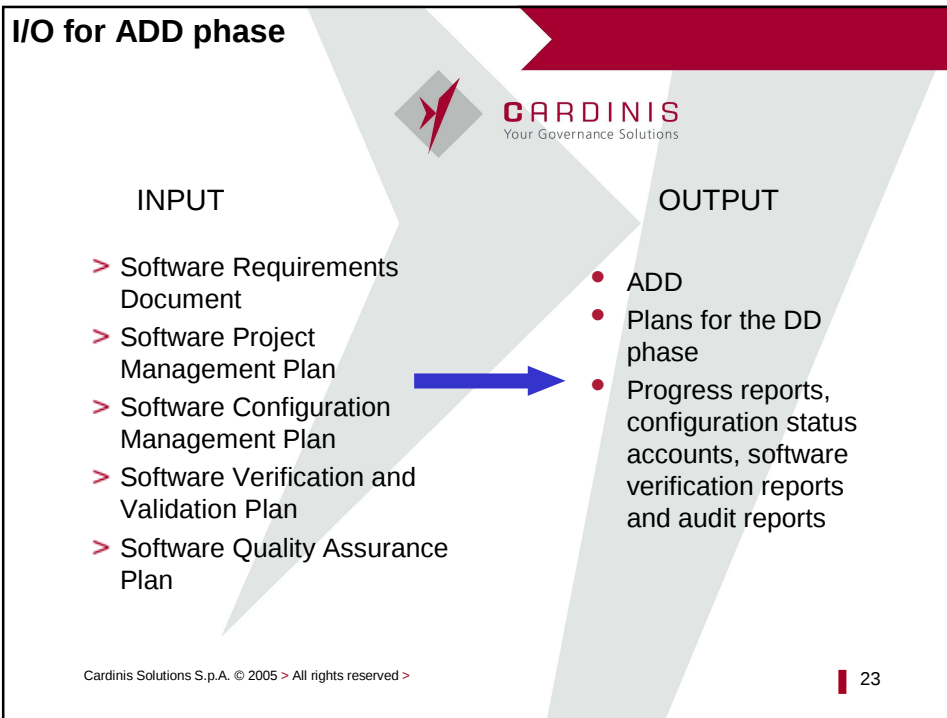
The purpose of this phase is to define a collection of software components and their interfaces to establish a framework for developing the software.

This is the 'Architectural Design', and it must cover all the requirements in the SRD.

The architectural design definition is the responsibility of the software engineers

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Detailed design phase

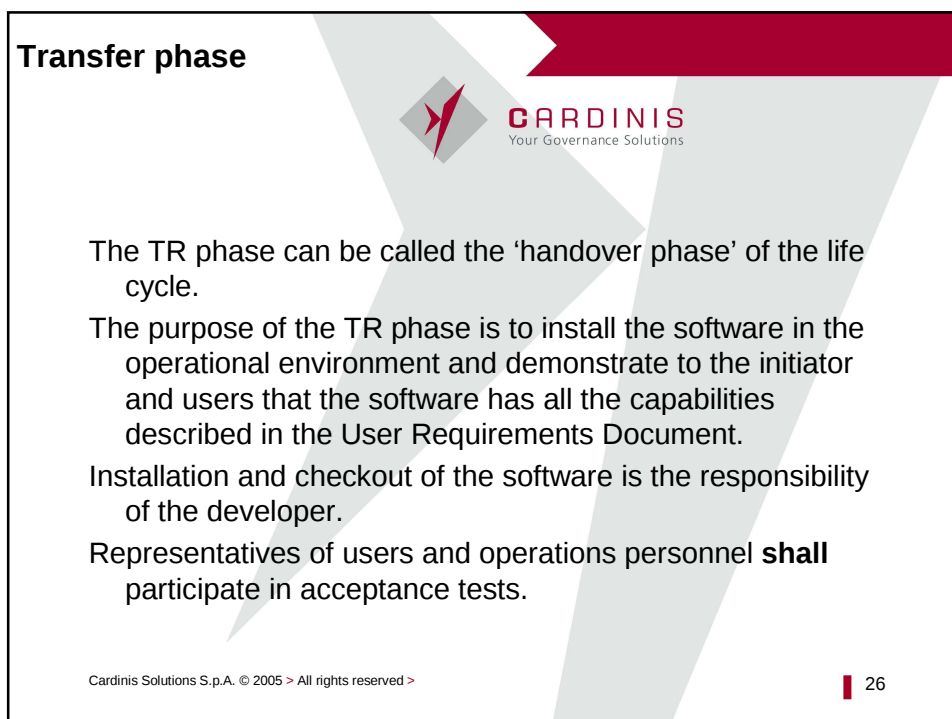
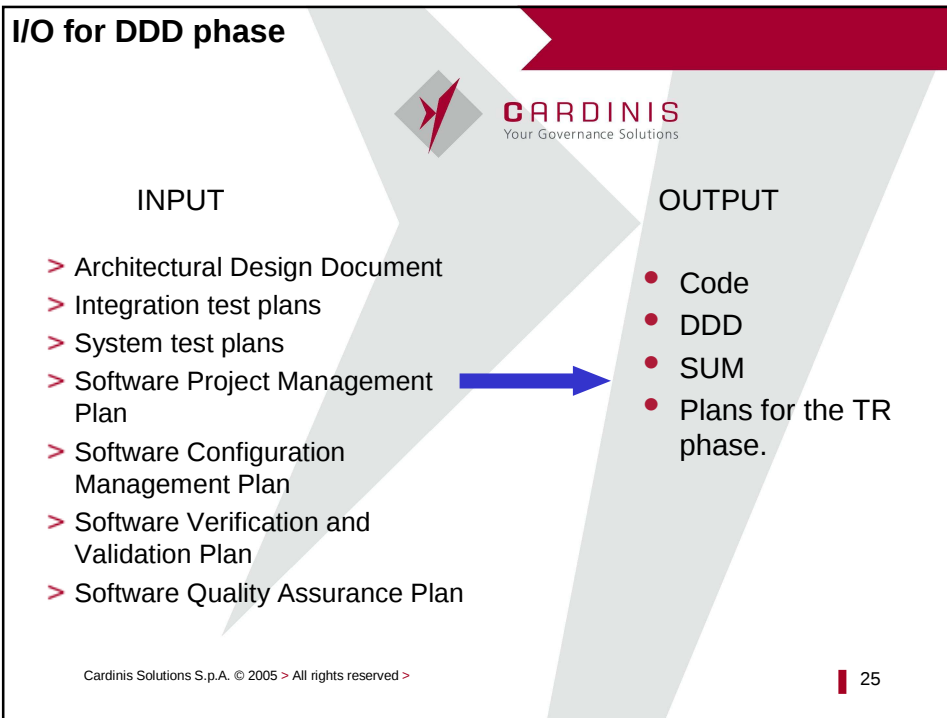
The DD phase can be called the 'implementation phase' of the life cycle.

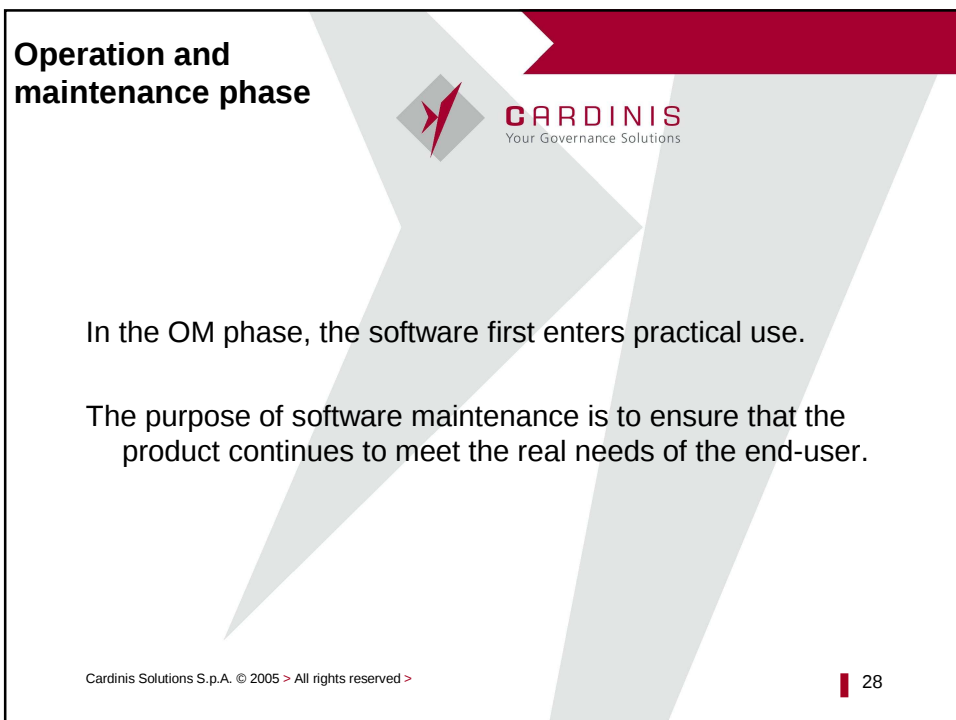
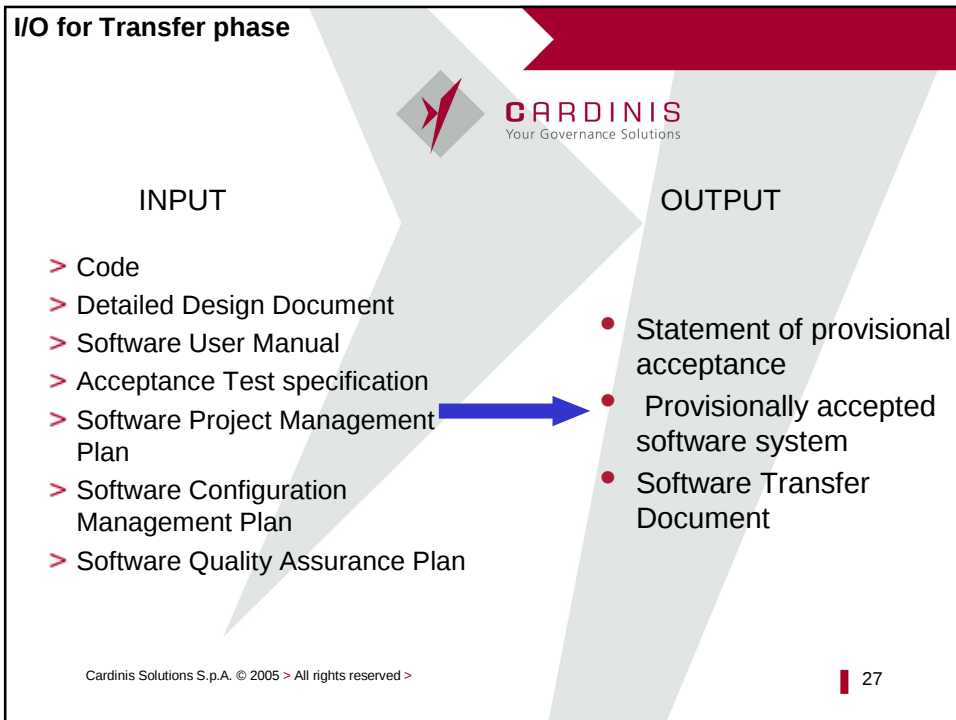
The purpose of the DD phase is to detail the design outlined in the ADD, and to code, document and test it.

The detailed design and production is the responsibility of the software engineers.

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I/O for Operation and maintenance phase



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INPUT

- > Statement of provisional acceptance
- > Provisionally accepted software system
- > Software Transfer Document



OUTPUT

- Statement of final acceptance
- Project History Document
- Finally accepted software system
- Plans for the TR phase.

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RISK Management

- > quality and stability of user requirements;
- > level of definition and stability of external interfaces;
- > adequacy and availability of resources;
- > availability and quality of tools;
- > staff training and experience;
- > definition of responsibilities;
- > short time scales;
- > technical novelty of the project.

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Quality

- > Adherence to all standards, practices and conventions
- > Notes of Deviations and non-conformance
- > Use of 'metric' as a quantitative measure of the degree to which a system, component, or process possesses a given attribute.
- > Metrics for measuring quality, particularly reliability, and maintainability, (e.g. if a software component exhibits more than three failures in integration testing then it will be reinspected).
- > Many kinds of reviews are possible (e.g. technical, inspection and walkthrough). It **should** be verified that the review mechanisms are appropriate for the type of project.

MIL-STD Approach



- | | |
|---|---|
| <ul style="list-style-type: none">> Project planning and oversight> Establishing a software development environment> System requirements analysis> System design> Software requirements analysis> Software design> Software implementation and unit testing> Unit integration and testing> CSCI qualification testing> CSCI/HWCI integration and testing | <ul style="list-style-type: none">> System qualification testing> Preparing for software use> Preparing for software transition> Integral processes:<ul style="list-style-type: none">> 1) Software configuration management> 2) Software product evaluation> 3) Software quality assurance> 4) Corrective action> 5) Joint technical and management reviews> 6) Other activities |
|---|---|