Introduction to the Common Criteria and the Underlying Concepts of Trust in Computer Systems

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DECISIVE ANALYTICS

Tutorial Objectives

Understanding

- Security concepts and the principles behind establishing trust in security functions
- The contents and concepts of the Common Criteria
- The philosophy behind the CC and the resultant limitations of the CC

Tutorial Objectives

Recognition

- The similarities and differences in establishing assurance for security critical and other critical application domains
  - Concepts vs. terminology
  - Development and verification processes

Discussion Topics

- Security Concepts & the CC
- CC Document Conceptual Walk-through
  - CC Part I – Introduction & General Model
  - CC Part II – Functional Requirements
    - Requirements Organization, Overview, Operations
  - CC Part III – Assurance Requirements
    - Requirements Organization, Overview, Operations

What Is the CC?

"Common Criteria for Information Technology Security Evaluation"

- Common Criteria
  - Meta-standard containing constructs and criteria used to develop security specifications
    - Specification constructs
      - Protection Profile (PP)
      - Security Target (ST)
    - Requirements criteria
      - Functional
      - Assurance

… in support of the evaluation of products and systems

CC Functional Criteria

- Specify the security properties of IT products and systems that address
  - Unauthorized disclosure (confidentiality, privacy)
  - Unauthorized modification (integrity)
  - Loss of use (availability)
  - Verification of identity (Identification and Authentication (I&A))
  - Accountability for operations (audit, non-repudiation)
- Provides a basis for comparison of different design or implementation solutions

CC Assurance Criteria

- Specify the properties for verification of development life-cycle activities
- Specify the properties for accumulation and verification of a continuity of knowledge as systems evolve
  - Continuity of knowledge ~ maintenance
- Provides a basis for comparison of the results of independent evaluations

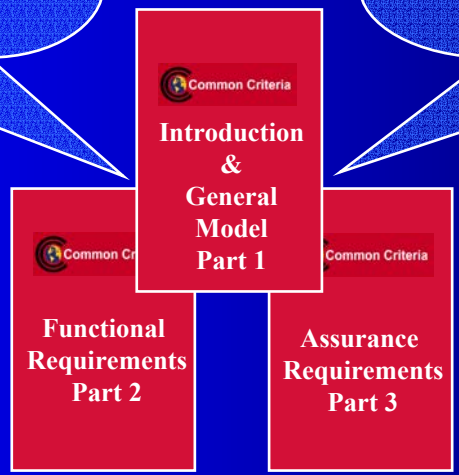
Application of the CC

Process Independence

CC constructs may be integrated with existing system life-cycle processes

Technology Independence

CC requirements are independent of technology and implementation – hardware, software, firmware



Functionality Independence

CC criteria is independent of requirements specific to any business or mission case

Goal Independence

Originally developed to support formal evaluation

Being applied in new and diverse contexts

CC Terms

- Target of Evaluation (TOE)
  - An IT product or system and its associated administrator and user guidance documentation that is the subject of an evaluation
  - Differentiation between product and system is not clear - think components
    - Single component TOE
    - Multi-component TOE
    - System TOE

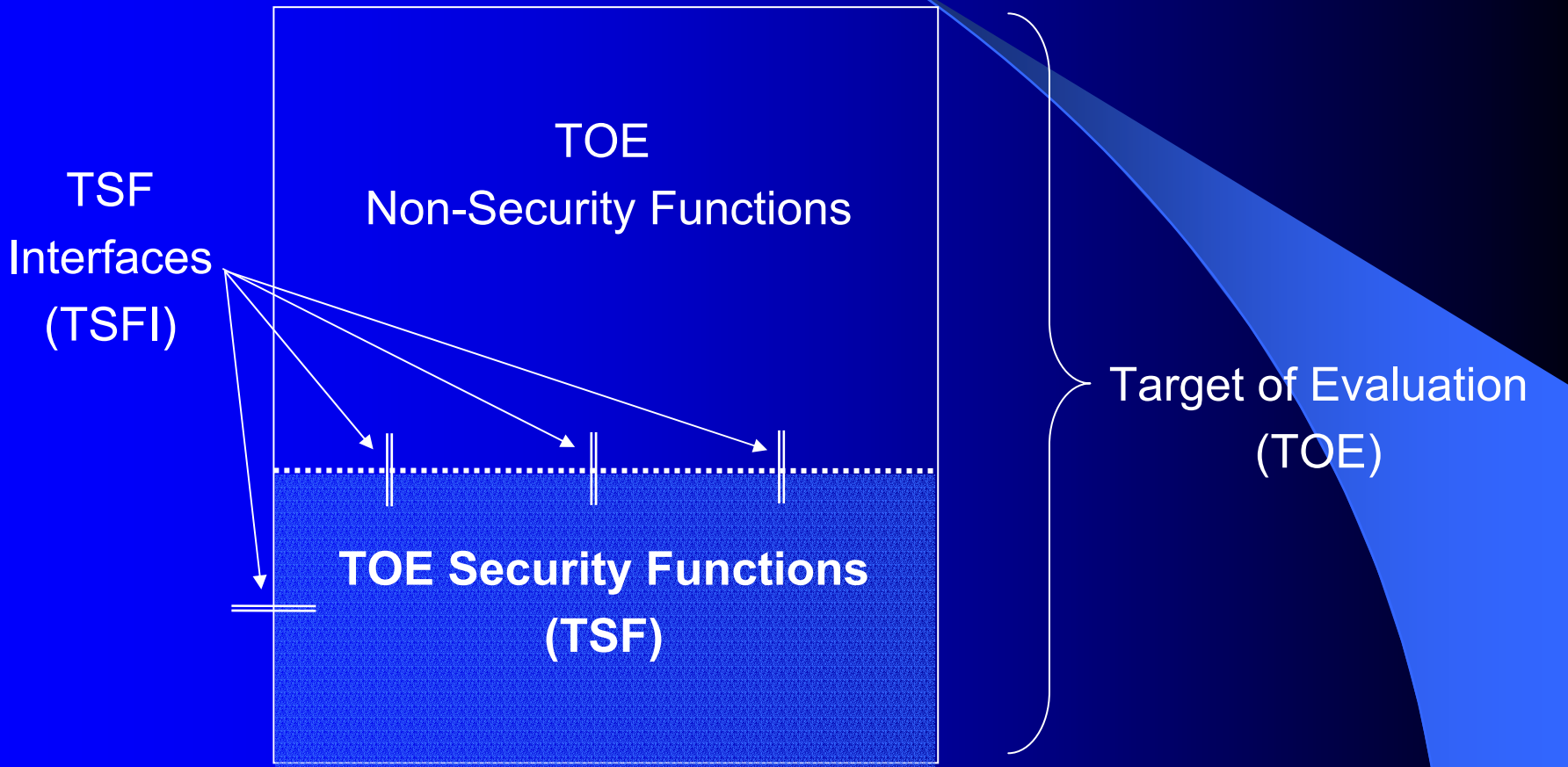
CC Terms

- TOE Security Policy (TSP)
  - Set of rules that define how resources are managed, protected and distributed by the TOE
- TOE Security Functions (TSF)
  - The parts of the TOE implementation that are relied upon for the correct enforcement of the TOE Security Policy (TSP)
- TSF Interfaces (TSFI)
  - Interfaces to the TOE security functions
    - internal to the TOE
    - external to the TOE

CC Terms

- IT Environment
  - IT components that are not part of the TOE but with which the TOE shares a trusted relationship
    - Trust relationship – authentication of communication participants and secure methods to transfer information
- Non-IT Environment
  - The physical aspects of the location(s) in which the TOE is placed and operates

Illustration
TOE, TSF, TSFI



DECISIVE ANALYTICS

Illustration
Non-IT Environment

Non-IT environment consists of the physical aspects of the location(s) in which the TOE is placed and operates.

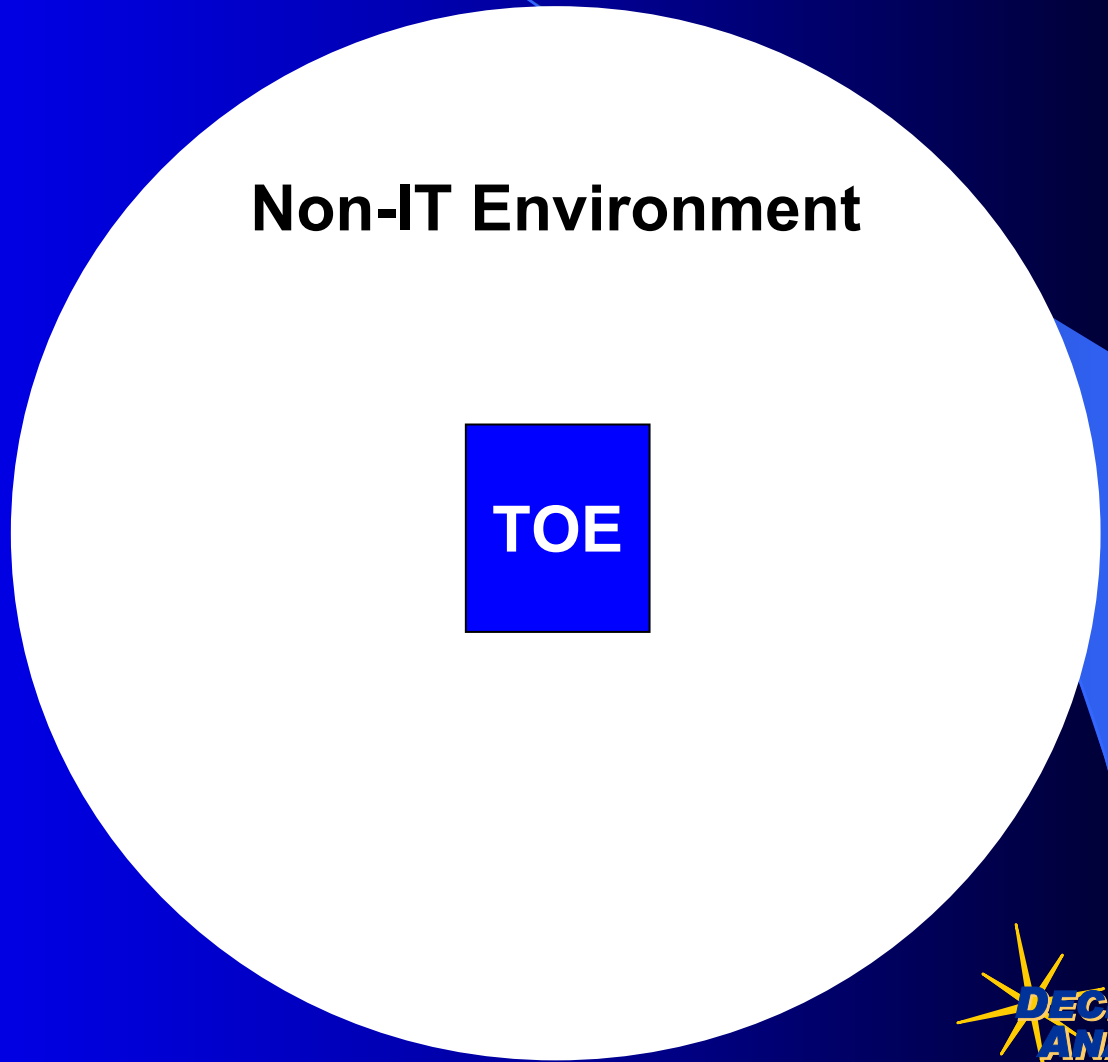


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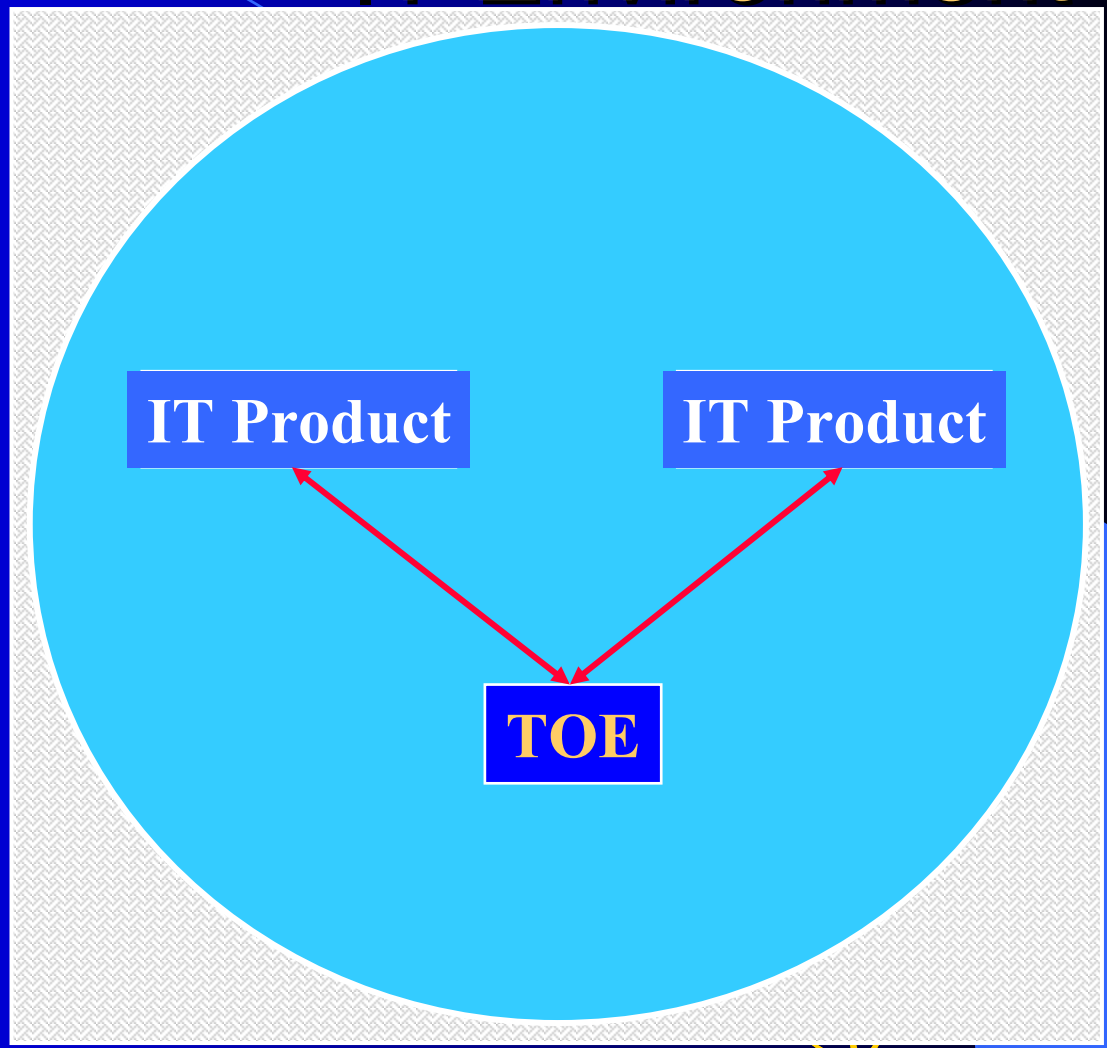
Illustration IT Environment

The general environment is enclosed inside the square, i.e., the 'world'

- TOE Environment is enclosed inside the circle

Non-IT environment implemented by the physical world

IT Environment implemented by IT capabilities



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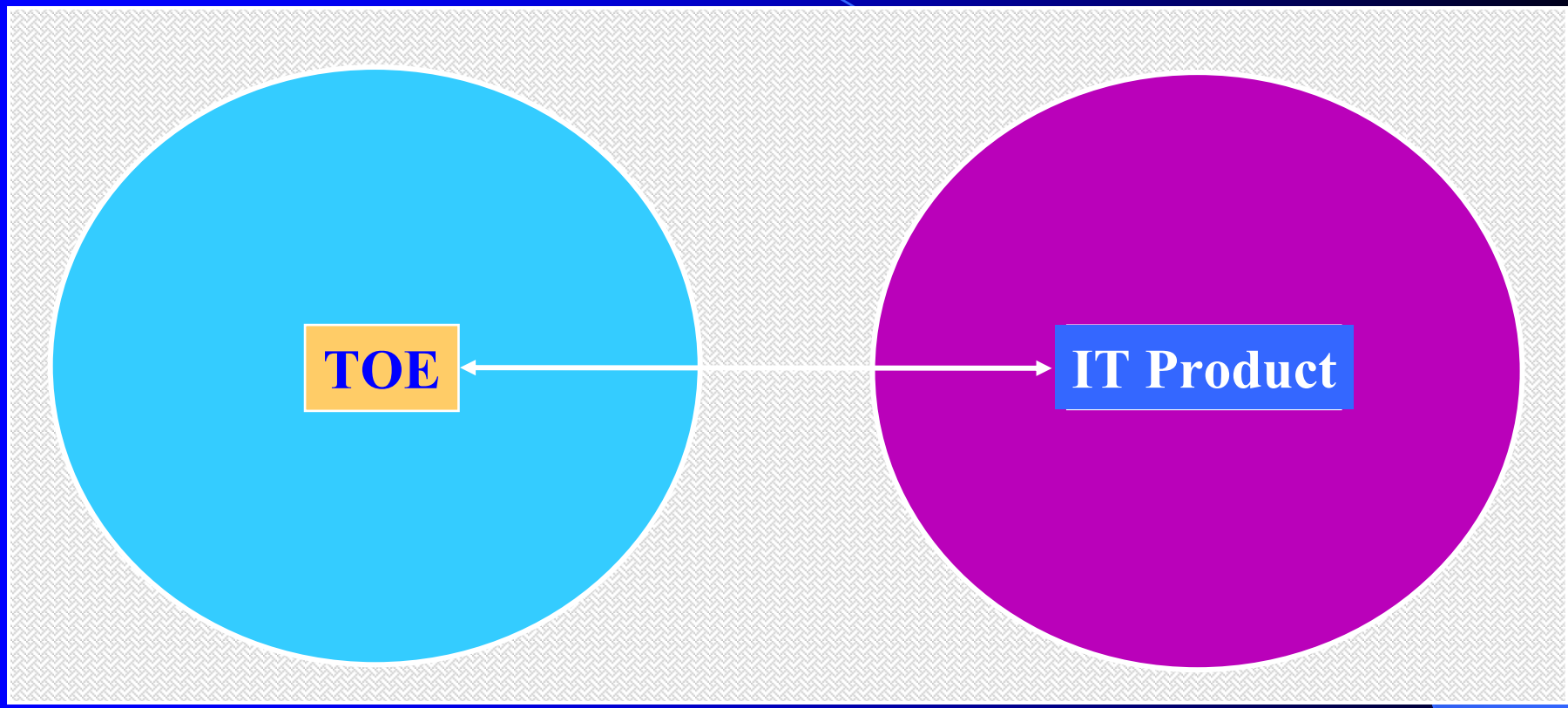
Practical Illustration

Web Server (TOE) - Certificate Server (IT Environment)



Non-IT environment of the Web Server (TOE)

Non-IT environment of the Certificate Server (IT environment of the TOE)

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Interfaces

- Rules for interaction between components
- Typically specified independent of functionality
  - message interface
  - programming interface (API)
  - services interface
  - plug-in interface
- May be internal or external

Trust Relationships

- Rules for secure interaction between components
  - special form of interface
  - subset of interface specification
- From the CC perspective
  - internal to the TOE
  - between the TOE and a remote trusted component
    - the IT environment

Establishing Trust Relationships

- Trusted channels provide mechanism for trust relationships between security components
  - authentication of endpoints
  - secure communication protocol
    - integrity, confidentiality, recovery
- Trusted channels provide mechanism for trust relationship between user and TSF

CC Trust Relationship Terms

- Trusted Channel
  - the means by which the TSF communicates securely with another part of the TSF or with a remote trusted IT product
- Trusted Path
  - the means by which a user communicates securely with the TSF
  - trusted paths are built on trusted channels

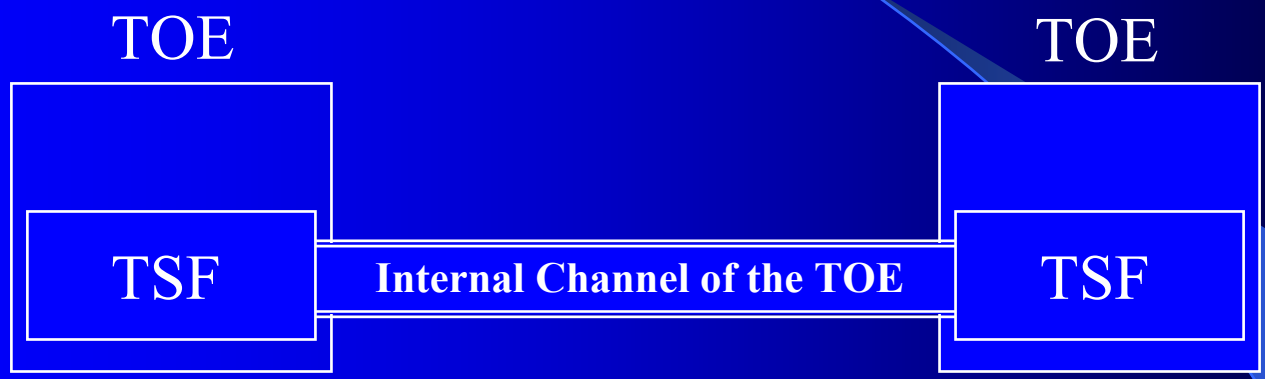
Trusted Relationship Concept

TOE & IT Environment

- Trust relationship between TOE and IT environment requires
  - establishment of trust between the communicants via two-way authentication
  - protecting information from modification and disclosure

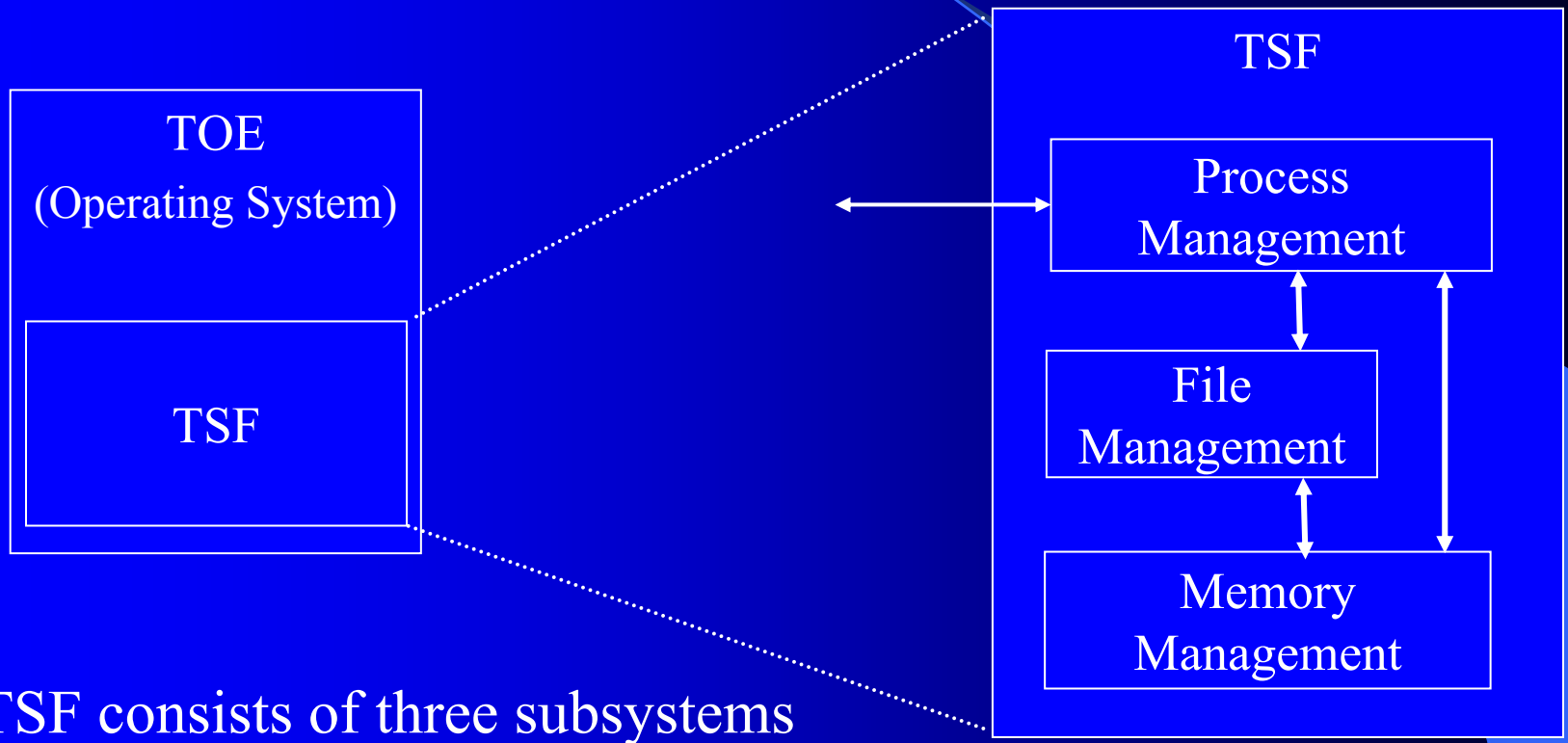
Trusted Relationship Concept

Networked/Distributed TOE



- No IT Environment - the TSF is a single logical entity although the parts are physically distributed
- Regardless, the requirements remain
  - establishment of trust between the distributed TSF components
  - protecting information from modification and disclosure

Security Evaluation Issues



- TSF consists of three subsystems
  - one external interface to TSF
  - three internal subsystem interfaces

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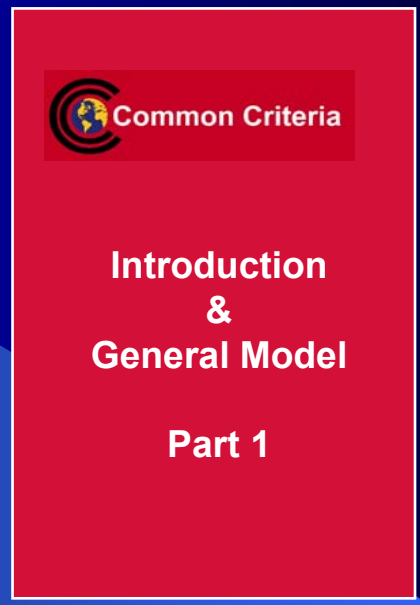
Descriptive Walkthrough of the Common Criteria

Common Criteria Part I

Introduction & General Model



DECISIVE ANALYTICS

The CC Requirements Specification Framework

Specification Constructs

- *Protection Profiles*
- *Security Targets*
- *Packages*

Specification Framework Purpose

- Present a "Security Case"
  - Context problem statement
    - Introduction
    - TOE Description
    - Environment information
      - Assumptions, Threats, Policies
  - Statement of solution
    - Objectives
    - Functional and assurance requirements
  - Rationale to substantiate the solution

CC Specification Constructs

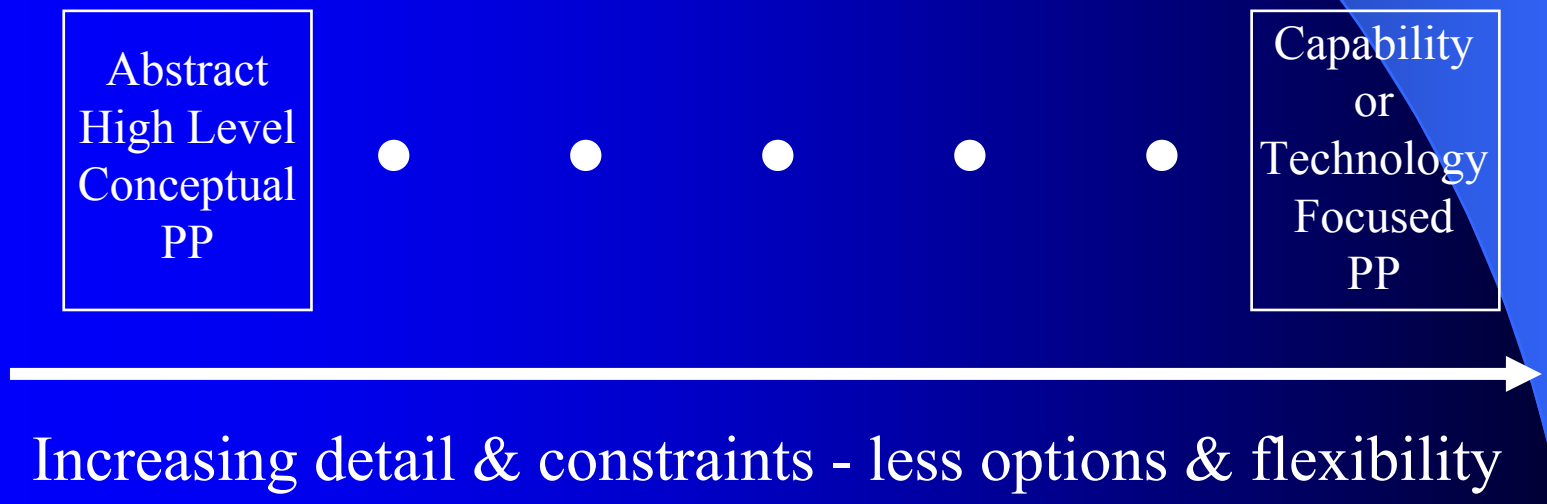
- Protection Profile (PP)
  - An implementation-independent characterization of required security capabilities and verification activities
- Security Target (ST)
  - A implementation-dependent statement of security capabilities and verification activities used as the basis for the TOE evaluation
    - Complete requirement and implementation detail
- Package
  - Reusable set of functional and/or assurance requirements

Purpose of the PP

- To provide a means for statement of security requirement needs
  - for acquisition
  - for development
  - for certification & accreditation
  - for any unique security documentation requirement
- PPs establish ...
  - a basis for ST development
  - a common reference for ST comparison and assessment

Protection Profile Granularity

- Requirement detail granularity is the discretion of the PP author



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Purpose of the ST

- To provide a means for developers and system integrators to state the security requirement of a component, product or system
  - in response to a PP
  - independent of a PP
- STs establish
  - the basis for a TOE evaluation

PP/ST Contents/Comparison

Protection Profile

- Identification
- Overview
- TOE Description
- Security Environment
  - Assumptions, Threats, Policies
- Security Objectives
- Security Requirements
  - Functional, Assurance (EAL)
- Rationale

Security Target

- Identification
- Overview
- TOE Description
- Security Environment
  - Assumptions, Threats, Policies
- Security Objectives
- Security Requirements
  - Functional, Assurance (EAL)
- Rationale
- TOE Summary Specification
- CC Conformance Claim
- PP Claims

PP Evaluation

- Verifies that the PP meets the criteria defined by the APE assurance class
  - Technical correctness vs. applicability
- Establishes an approved specification repository from which compliant components may be developed or verified
  - Often referred to as a registry
  - Managed by a controlling [regulatory] organization

ST Evaluation

- Verifies that the ST serves as a suitable basis for the TOE evaluation
  - Technical correctness
- Verifies that the ST is an accurate instantiation of each profile to which it claims compliance
  - PP compliance claim is optional
- The ST is typically evaluated with the TOE

ST & TOE Evaluation

- TOE evaluation includes ST, TOE and evaluation evidence
- ST must be evaluated first to establish a basis for the TOE evaluation
- ST evaluation is not complete until the TOE evaluation completes
  - ST must be ***sufficiently complete*** to enable the TOE evaluation

PP/ST Relationship

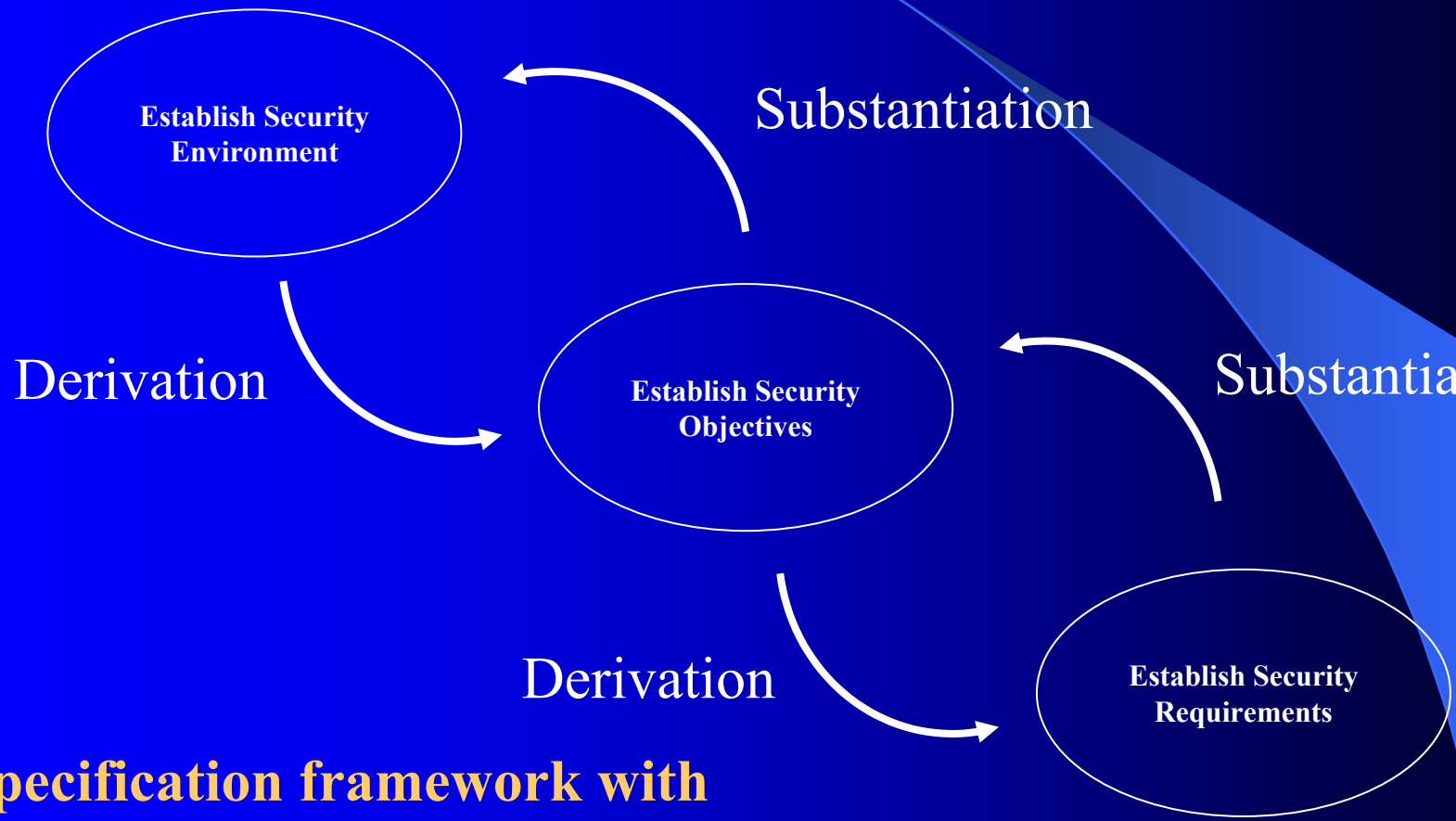
- A ST may be derived from a PP
- A ST may be developed independent of a PP
- The ST author has the option to establish the relationship between the ST and a PP
  - referred to as a PP Claim
  - one ST may be related to multiple PPs
  - each PP claim must be substantiated by the ST author

CC Requirements Specification Framework (PP/ST) Contents

Basis for Requirements

ALL TOE security requirements ultimately arise from consideration of the **purpose of the TOE** and the **context in which the TOE operates**

PP/ST Development Activities



A specification framework with checks and balances to provide end-to-end correctness

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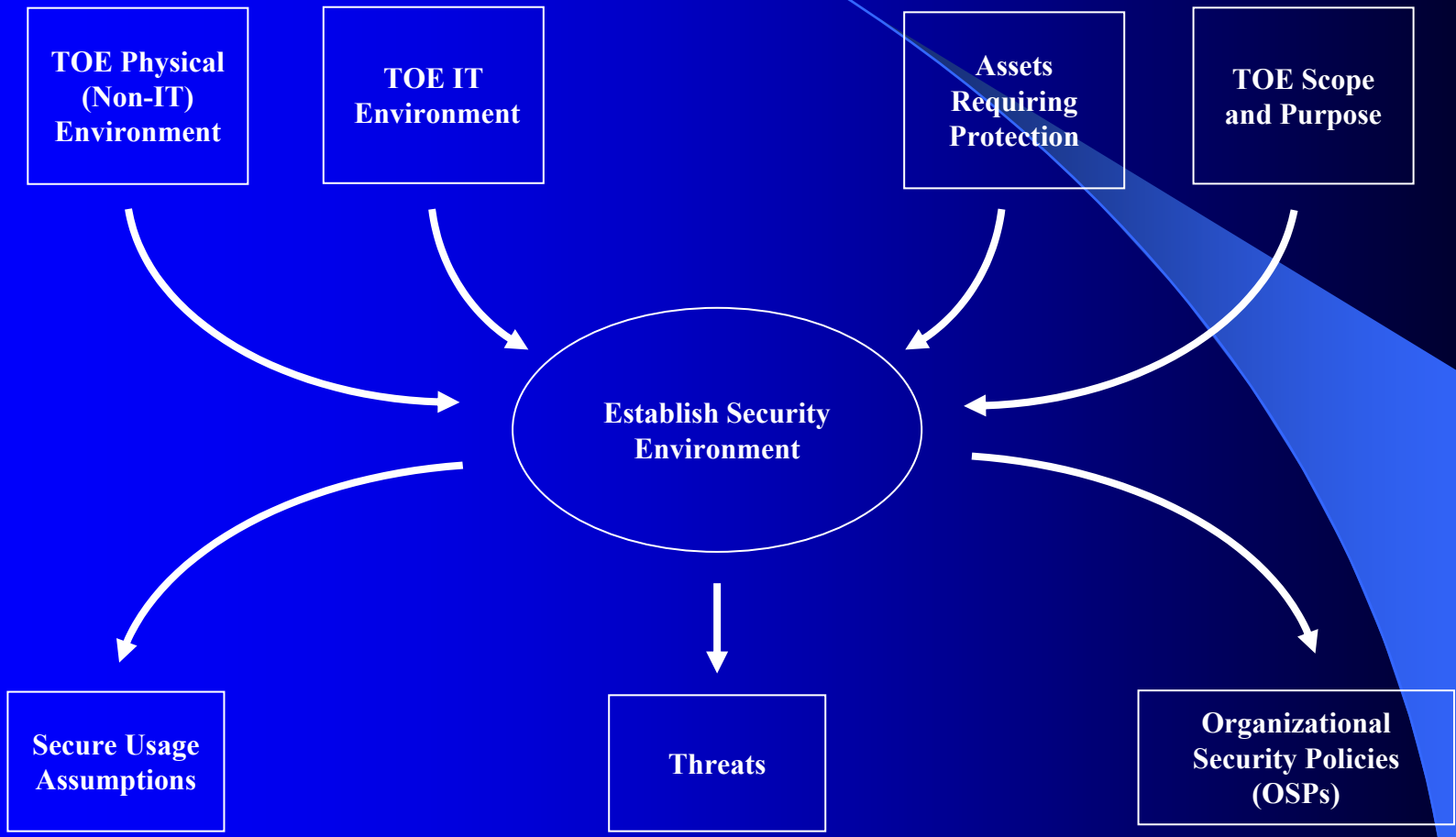
PP/ST Development Activities

Establish Security Environment



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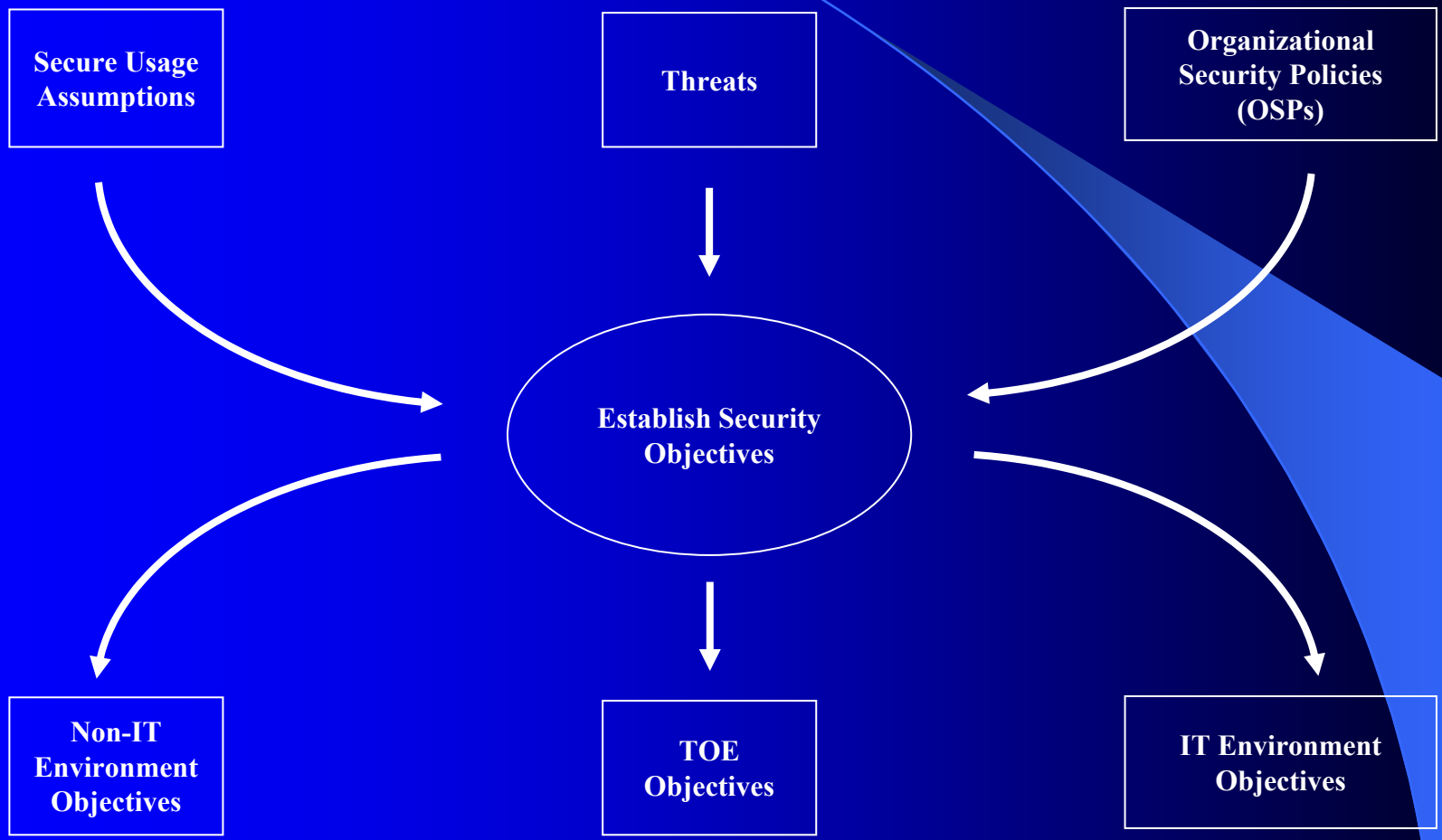
PP/ST Development Activities

Establish Security Objectives



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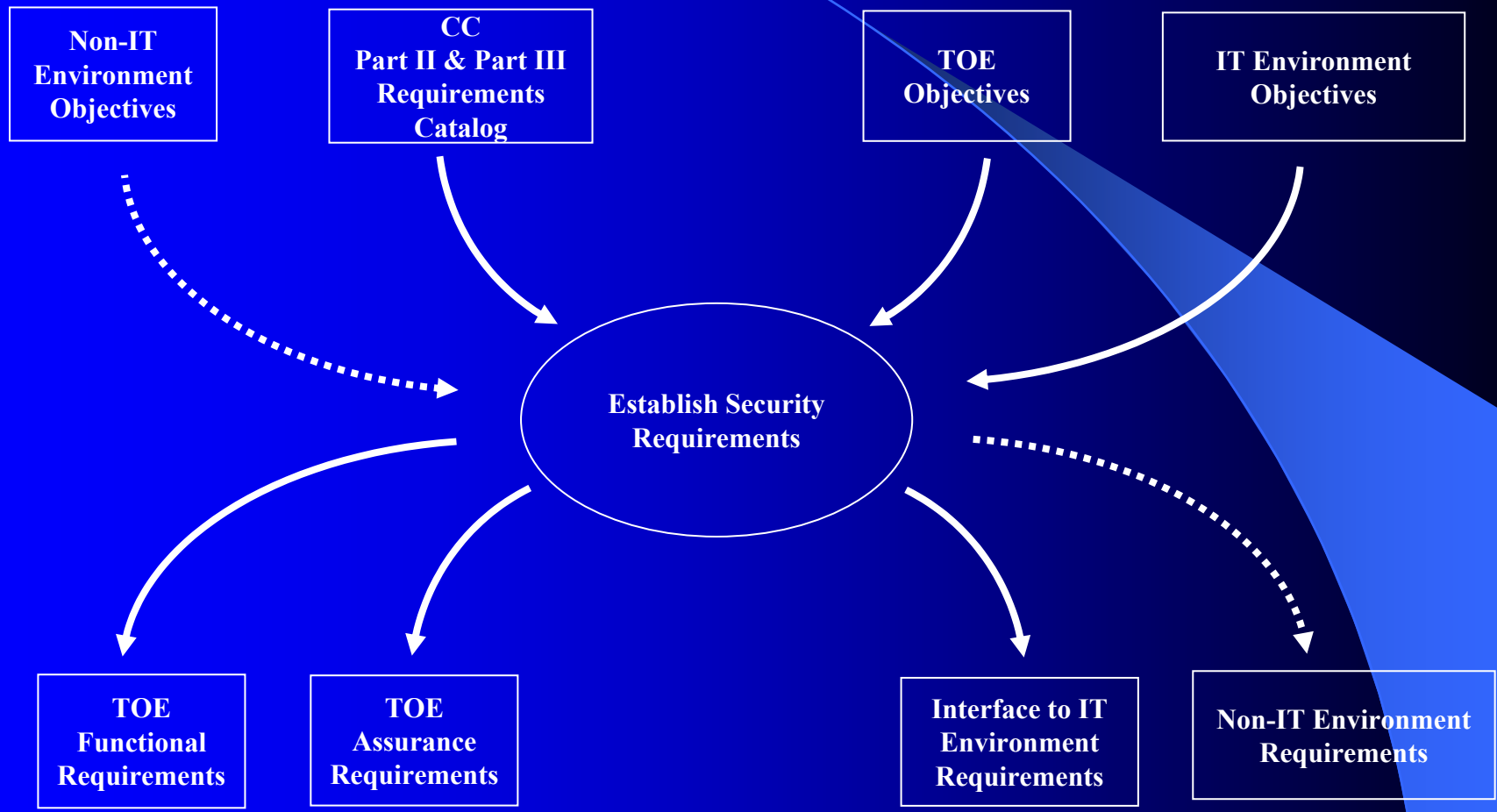
PP/ST Development Activities

Establish Security Requirements



DECISIVE ANALYTICS

The Security Environment

Secure Usage Assumptions

Threats

Organizational Security Policy (OSP)

Security Environment Components

- Assumptions
  - The security aspects of the environment in which the TOE will be used or is intended to be used
- Threats
  - The ability to exploit a vulnerability by a threat agent
- Organizational Security Policies (OSPs)
  - A set of rules, procedures, practices, or guidelines imposed by an organization upon its operations

Assumptions

"The security aspects of the environment in which the TOE will be used or is intended to be used"

- Assumptions are "assertions of expectations" regarding
  - secure usage of the TOE
  - scope and boundary of the TOE
  - placement of the TOE in its environment
    - interaction with other IT (IT environment)
    - interaction with people (Non-IT environment)
- Assumptions establish context for all that follows in the PP/ST

Using Assumptions

- Assumptions must not
  - impose requirements on the TOE or on its IT environment
  - have IT aspects of objectives mapped to them
  - be used to mitigate legitimate threats that are to be countered by the TOE or its IT environment
- Assumptions must
  - be considered as requirements for the Non-IT environment
- Assumptions always
  - result in objectives for the Non-IT environment

Assumption Examples

- A.Physical_Protection
  - The TOE is installed in a restricted and controlled access area sufficient to prevent unauthorized physical access to the TOE.
- A.Dedicated_Network
  - The TOE is installed on an isolated network that is dedicated to the TOE and that is not connected to any other network.

Threats

"The ability to exploit a vulnerability by a threat agent"

- Threat definition is accomplished through a Vulnerability Analysis that give insight to the threats
  - against the TOE
  - against the environment of the TOE (IT & Non-IT)
  - inherent to technology/personnel/operations
- Threats are countered
  - by the TOE
  - by the IT environment of the TOE
  - by the Non-IT environment of the TOE

Focus of Threat Statements

- Threats provide a basis for statement of countermeasures
- Threats SHALL address
  - the attack
  - the attacker
  - the assets
  - the implications of the successful attack
- Threats SHOULD address
  - attacker motivation, expertise
  - risk of threat being realized

Threat Examples

T.Intercept

An individual obtains unauthorized access to controlled information by intercepting information transmitted to/from the TOE.

T.Authentication

An individual obtains unauthorized access to the TOE by

a. impersonating an authorized user of the TOE,

b. replaying a successful authentication session,

c. unauthorized use of an authorized users existing session

Organizational Security Policy

"A set of rules, procedures, practices, or guidelines imposed by an organization upon its operations"

- PP/ST author discretion to include/exclude policy
  - Policy required
    - If some aspect of the policy is to be enforced by the TOE or by the IT environment of the TOE
  - Policy optional
    - If no aspect of the policy is to be enforced by the TOE or by the IT environment of the TOE

OSP Example

P.Dedicated_Network

All mission-critical systems shall be installed on dedicated networks that are isolated from non-mission-critical systems in accordance with OPSEC 123.4.

Assumptions and OSPs

- Assumptions vs. Policy
  - it's a style/preference issue
  - assumptions are mapped to non-IT objectives, and an equivalent policy statement will also be mapped to a non-IT objective

  - A.Dedicated_Network

    The TOE is installed on an isolated network that is not connected to any other network.

  - P.Dedicated_Network

    All mission-critical systems shall be installed on dedicated networks that are isolated from non-mission-critical systems in accordance with OPSEC 123.4.

The Security Objectives

Security Objectives for the TOE

Security Objectives for the IT Environment

Security Objectives for the Non-IT Environment

Security Objectives

- Objectives establish the basis for the selection of security requirements (functional & assurance)
- Objectives exist only to address the problem statement per the security environment section
  - Support Assumptions
  - Counter Threats (eliminate, minimize, monitor)
  - Enforce OSPs
- Justified by rationale

Types of Security Objectives

- TOE Objectives
  - Implemented by security requirements allocated to the TOE
- IT Environment Objectives
  - Implemented by security requirements allocated to the IT systems that interact with the TOE
- Non-IT Environment Objectives
  - Implemented by personnel and procedural means
  - Outside the scope of the CC
  - Statement of non-IT environment requirements is not required

Objective Example - Non-IT

(from Assumption)

- OE.Physical_Protection

  Those responsible for the TOE shall ensure that the TOE is installed in a restricted and controlled access area that prevents unauthorized physical access to the TOE.

- **A.Physical_Protection**

  The TOE is installed in a restricted and controlled access area sufficient to prevent unauthorized physical access to the TOE.

Objective Example - TOE

(from Threat)

- O.Impersonate

  The TSF shall provide two-factor authentication employing hardware token technology and a unique identification attribute.

  Note: O.Impersonate addresses only one aspect of T.Authentication.

- T.Authentication

  An individual obtains unauthorized access to the TOE by

  a. impersonating an authorized user of the TOE,

  b. replaying a successful authentication session,

  c. unauthorized use of an authorized users existing session

Objective Example - Non-IT

(from Policy)

- OE.Network

  Those responsible for the TOE shall ensure that the TOE is connected to a dedicated network that is isolated from non-mission-critical systems.

- P.Dedicated_Network

  All mission-critical systems shall be installed on dedicated networks that are isolated from non-mission-critical systems in accordance with OPSEC 123.4.

The Security Requirements

Security Functional Requirements

Security Assurance Requirements

Functional and Assurance Requirements

- Selected from the CC
  - Functional Requirements - Part 2
  - Assurance Requirements - Part 3
- May be explicitly stated
- Justified by rationale

Rationale

Security Objectives

Security Requirements

TOE Summary Specification (ST only)

Security Objectives Rationale

- Justifies statement of security objectives through demonstration of
  - Necessity - coverage of security environment
    - through traceability to specific aspects of the environment
  - Sufficiency - suitability to
    - support the assumptions
    - counter the threats
    - enforce the OSPs

Security Requirements Rationale

- Justifies each security requirement through
  - Necessity - coverage of security environment
    - traceability to specific aspects of the objectives
  - Sufficiency
    - suitability to implement specific aspects of the objectives

TOE Summary Specification (TSS)

- Definition and mapping of
  - security functions to functional requirements
  - assurance measures to assurance requirements
- Rationale (necessity/sufficiency)
  - security functions meeting the security requirements
  - assurance measures meeting the assurance requirements

Reusable Constructs

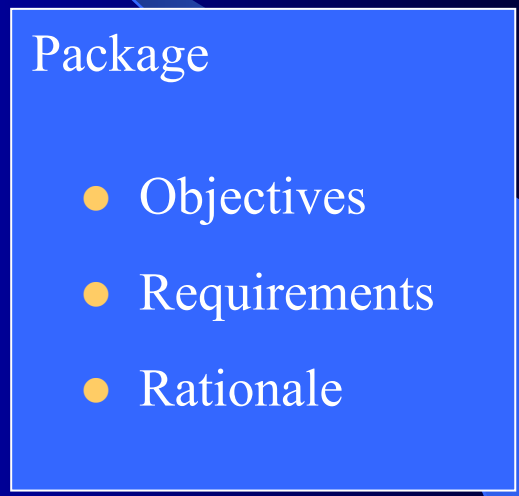
Packages

Package Construct

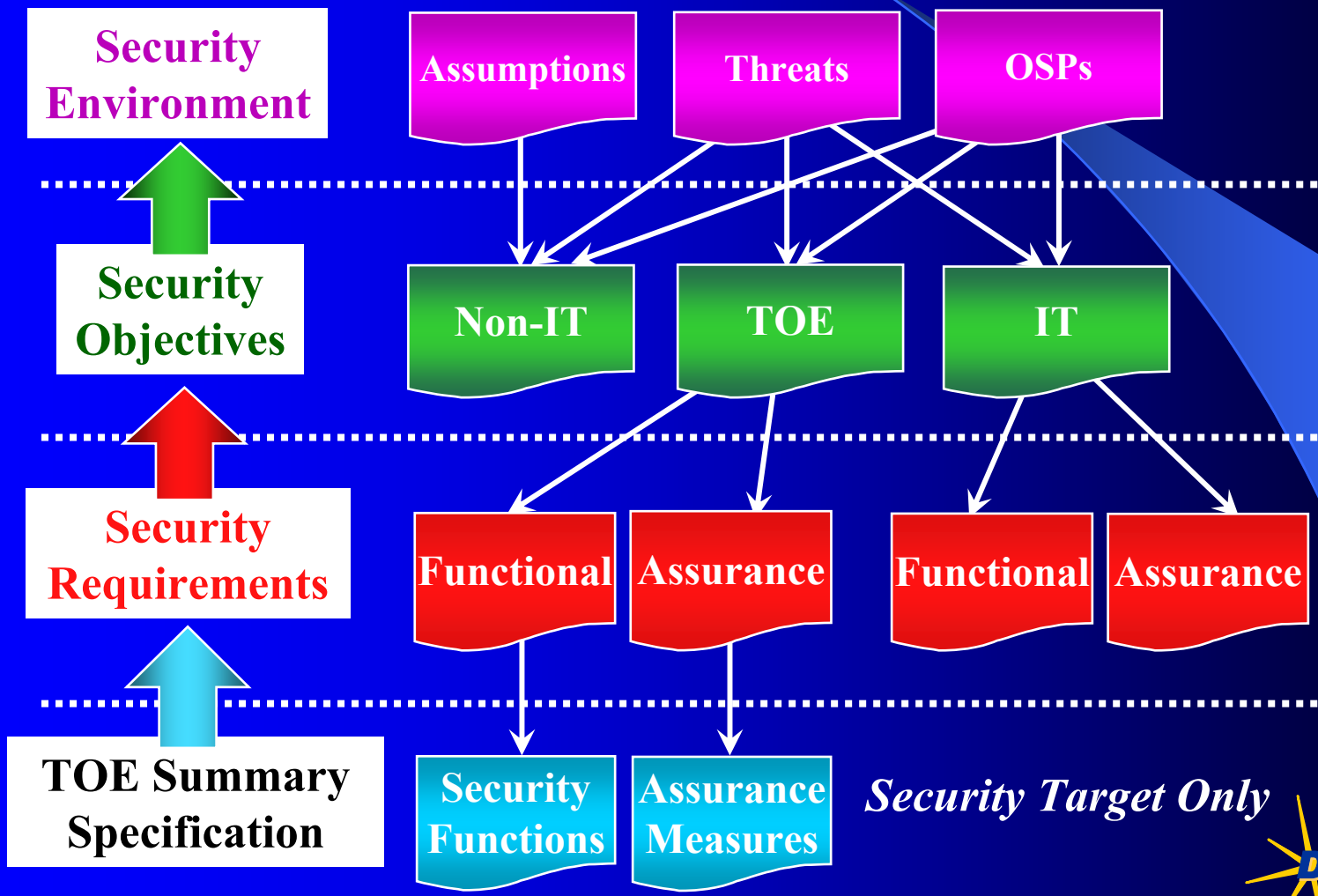
- Reusable set of either functional or assurance components combined together to satisfy a set of identified security objectives
- CC provides no explicit criteria for evaluation of packages

Package Contents

- Objectives
  - establish context for requirements
- Requirements
  - implement objectives
- Rationale
  - presents informal argument to justify requirements in terms of the stated objectives

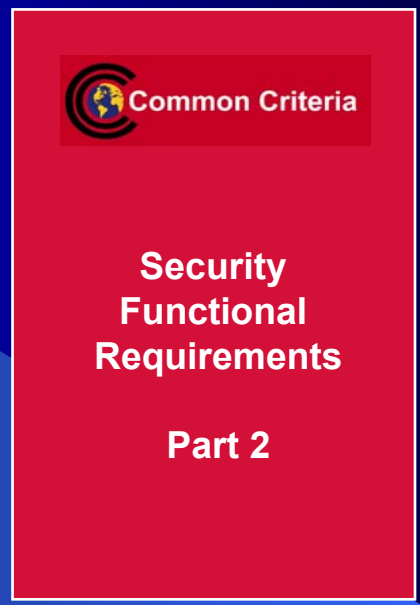


PP/ST Section Relationships



Common Criteria Part II

Security Functional Requirements

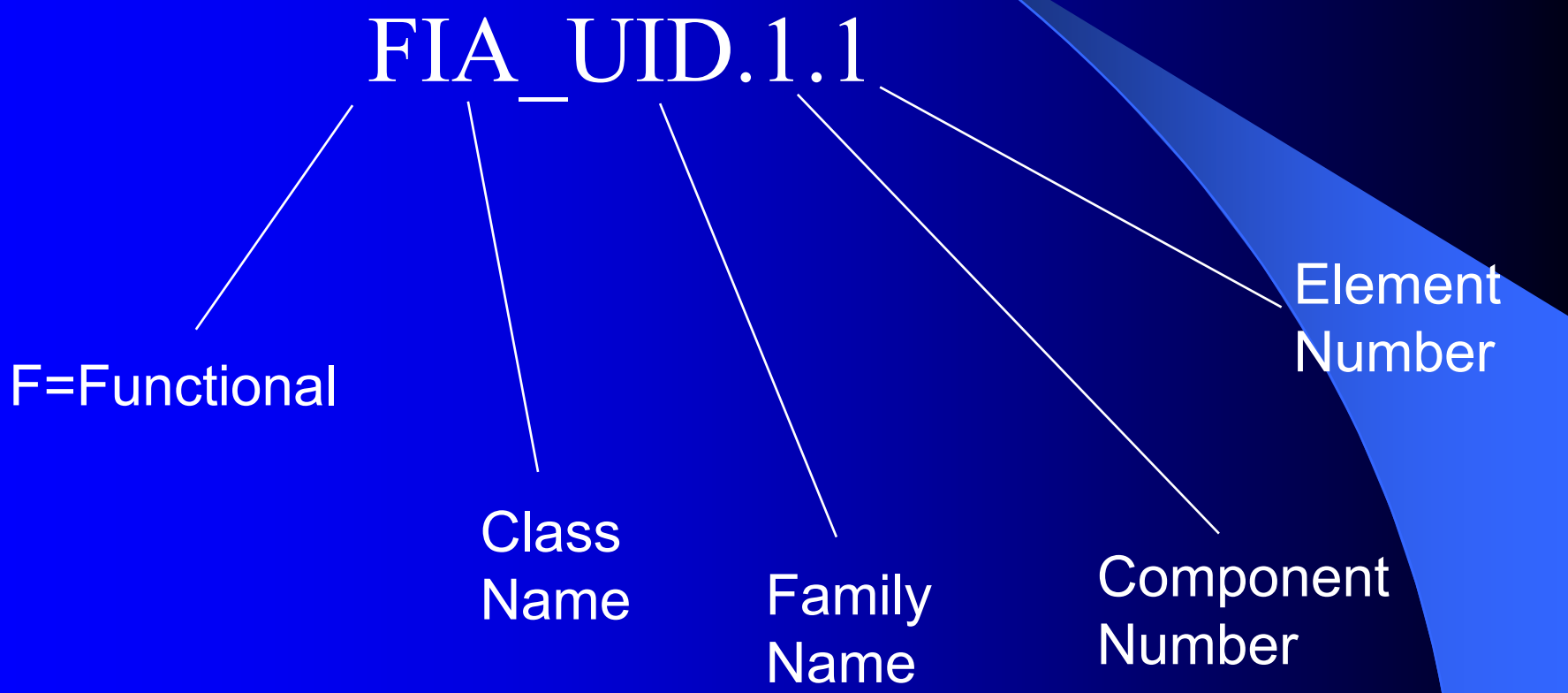


DECISIVE ANALYTICS

Functional Requirements Organization

- Class - organizational purposes
  - all members share a common focus (e.g, Audit, I&A)
- Family - organizational purposes
  - all members share security objectives but may differ in emphasis (e.g., Audit event definition, Audit event review)
- Component - smallest selectable requirement set
  - contains a set of elements
- Element - “shall” statements
  - members of a component
  - elements cannot be selected individually

Interpreting Functional Requirement Names



Operations on Requirements

- Assignment
- Selection
- Refinement
- Iteration

Functional requirements have placeholders indicating where Assignment and Selection operations are allowed

Refinement and iteration may be performed on any functional requirement

Assignment Operation

- Specification of a parameter filled in when component is used
- “Fill in the Blank” operation
- Allows PP/ST writer to provide information relating to application of the requirement
- The PP writer may defer completing assignments, but the ST writer must complete all assignments

Assignment Operation Example

As Written in the Common Criteria:

- **FMT_SMR.1.1** The TSF shall maintain the roles: [assignment: *the authorized identified roles*].

After Assignment Operation:

- **FMT_SMR.1.1** The TSF shall maintain the roles: [assignment: *authorized administrator, security officer, operator*].

Selection Operation

- Specification of elements selected from a list given in the component
- “Multiple Choice” operation
- Allows PP/ST writer to select from a provided list of choices
- The PP writer may defer completing selections, but the ST writer must complete all selections

Selection Operation Example #1

As Written in the Common Criteria:

- **FTA_TAH.1.1** Upon successful session establishment, the TSF shall display the [selection: *date, time, method, location*] of the last successful session establishment to the user.

After Selection Operation:

- **FTA_TAH.1.1** Upon successful session establishment, the TSF shall display the [selection: *date, time, and location*] of the last successful session establishment to the user

Selection Operation Example #2

As Written in the Common Criteria:

- **FTP_TRP.1.3** The TSF shall require the use of the trusted path for [selection: *initial user authentication,* [assignment: *other services for which trusted path is required*]].

After Selection Operation:

- **FTP_TRP.1.3** The TSF shall require the use of the trusted path for [selection: *initial user authentication* [assignment: *and password changes*]].

Combined Selection and Assignment Example

As Written in the Common Criteria:

- **FMT_MTD.1.1** The TSF shall restrict the ability to [selection: *change_default, query, modify, delete, clear,* [assignment: *other operations*]] the [assignment: *list of TSF data*] to [assignment: *the authorized identified roles*].

After Selection Operation:

- **FMT_MTD.1.1** The TSF shall restrict the ability to [selection: *delete*, [assignment: *and create*]] the [assignment: *user authentication database*] to [assignment: *the authorized administrator*].

Refinement Operation

- A mechanism to tailor a requirement by specifying additional detail in order to meet a security objective
- Rules for refinement:
  - the refinement shall only restrict the set of possible acceptable functions used to implement the requirement
  - the refinement may not levy completely new requirements
  - the refinement may not increase the list of dependencies of the requirement being refined

Refinement Operation Example

As Written in the Common Criteria:

- **FAU_SAA.1.1** The TSF shall be able to apply a set of rules in monitoring the audited events and based upon these rules indicate a potential violation of the TSP.

After Refinement Operation:

- **FAU_SAA.1.1** The Server-TSF shall be able to apply a set of rules in monitoring the audited events and based upon these rules indicate a potential violation of the TSP.

Iteration Operation

- Repetitive use of the same component to address different aspects of the requirement being stated (e.g., identification of more than one type of user).
- Can be performed on any functional component

Iteration Operation Example

As Written in the Common Criteria:

- **FMT_MTD.1.1** The TSF shall restrict the ability to [selection: *change_default, query, modify, delete, clear*, [assignment: *other operations*]] the [assignment: *list of TSF data*] to [assignment: *the authorized identified roles*].

After Iteration Operation:

- **FMT_MTD.1.1** The TSF shall restrict the ability to [selection: *modify*] the [assignment: *password file*] to [assignment: *the authorized administrator*].

- **FMT_MTD.1.1** The TSF shall restrict the ability to *backup/restore* the *password file* to *the authorized operator.*

Explicitly Stated Requirements

"Rolling Your Own Requirements"

- CC component catalogues are extensive but not comprehensive
  - Requirements evolve over time
- CC does not mandate exclusive use of component catalogues
- CC contains criteria for correctness of extended requirements
- CC terms
  - Extensibility ~ Extended requirements ~ Explicitly stated requirements

CC Part II
Functional Requirement Classes

Functional Requirement Classes

- Security Audit (FAU)
- Communication (FCO)
- Cryptographic Support (FCS)
- User Data Protection (FDP)
- Identification & Authentication (FIA)
- Security Management (FMT)
- Privacy (FPR)
- Protection of the TOE Security Functions (FPT)
- Resource Utilization (FRU)
- TOE Access (FTA)
- Trusted Path/Channels (FTP)

Class FAU: Security Audit

- The 6 families in this class address...
  - recognizing and responding to (FAU_ARP)
  - recording (FAU_GEN, FAU_SEL)
  - storing and protecting (FAU_STG)
  - review and analysis of (FAU_SAA, FAU_SAR)

  ... security-relevant events and activities.

Class FCO: Communication

- The 2 families in this class address …
  - proof of origin (FCO_NRO)
  - proof of receipt (FCO_NRR)

  … of transmitted information.

Class FCS: Cryptographic Support

- The 2 families in this class address ...
  - generation, distribution, access, and destruction (FCS_CKM)
  - operational use (FCS_COP)

  ... of cryptographic keys.

Class FDP: User Data Protection

- The 13 families in this class address ...
  - security function policies (FDP_ACC, FDP_IFC)
  - access control and information flow control functions (FDP_ACF, FDP_IFF)
  - authenticity and integrity (FDP_DAU, FDP_ITT, FDP_SDI)
  - reuse and rollback (FDP_RIP, FDP_ROL,)
  - import/export (FDP_ETC, FDP_ITC)
  - inter-TSF communications (FDP_UCT, FDP_UIT)

  ... for protection of user data.

Class FIA: Identification & Authentication

- The 6 families in this class address …
  - establishing (FIA_ATD, FIA_SOS, FIA_USB)
  - verifying (FIA_UAU, FIA_UID)
  - failures when authenticating (FIA_AFL)

  … claimed user identity.

Class FMT: Security Management

- The 6 families in this class address …
  - management of TSF data (FMT_MTD)
  - management of security attributes (FMT_MSA, FMT_REV, FMT_SAE)
  - management of the security functions (FMT_MOF)
  - security roles (FMT_SMR)

  … of the TOE.

Class FPR: Privacy

- The 4 families in this class address ...
  - discovery and misuse (FPR_ANO, FPR_PSE, FPR_UNL, FPR_UNO)

  ... of an individual's identity or activities by others.

Class FPT: Protection of the TOE Security Functions

- The 16 families in this class address ...
  - testing (FPT_AMT, FPT_TSF)
  - physical/anti-tamper protection (FPT_PHP)
  - secure TSF data transfer (FPT_ITA, FPT_ITC, FPT_ITI, FPT_ITT, FPT_RPL, FPT_TDC, FPT_TRC)
  - failure and recovery (FPT_RCV, FPT_FLS)
  - state and timing (FPT_SSP, FPT_STM)
  - reference mediation and domain separation (FPT_RVM, FPT_SEP)

  ... of the TSF mechanisms and data.

Class FRU: Resource Utilization

- The 3 families in this class address ...
  - availability (FRU_FLT)
  - allocation (FRU_PRS, FRU_RSA)

  ... of resources.

Class FTA: TOE Access

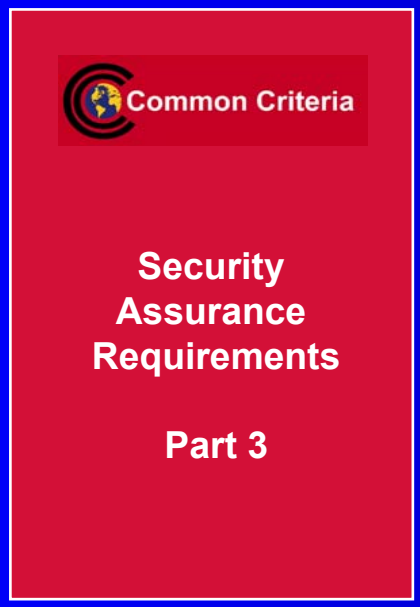
- The 6 families in this class address ...
  - attributes (FTA_LSA, FTA_TAB, FTA_TAH)
  - establishment (FTA_MCS, FTA_SSL, FTA_TSE)

  ... of a user session.

Class FTP: Trusted Path/Channels

- The 2 families in this class address ...
  - trusted communication paths (FTP_TRP)
  - trusted communication channels (FTP_ITC)

  ... between users and the TSF and between the TSF and other trusted IT products, respectively.



CC Part 3
Security Assurance Requirements

DECISIVE ANALYTICS

What is Assurance?

- Grounds for confidence that implemented countermeasures meet their security objectives
  - CC focus is the IT countermeasures
  - Comprehensive approach includes the environment
- Assurance measures
  - Provide a basis for a security argument
  - Do not add functionality to the TOE
- Assurance is subjective

Why Assurance is Needed?

- To address vulnerabilities arising from
  - Requirements
    - Incorrect, insufficient, ineffective
  - Design and Implementation
    - Incorrect design decisions
    - Errors in implementation
  - Operational Controls
    - Inadequate or overly complicated
    - Poorly documented

Where Assurance is Needed

- Verification and Validation of the Specification
  - Protection Profile
  - Security Target
- Verification of the implementation (TOE)
- CC defines 3 evaluations
  - Protection Profile (PP) evaluation
    - mandatory criteria
  - Security Target (ST) evaluation
    - mandatory criteria
  - Target of Evaluation (TOE) evaluation
    - criteria as specified in the Security Target

Concept of TOE Evaluation

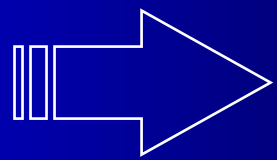
CC Approach to Verification

- Analysis of processes and procedures
- Checking that processes and procedures are being applied
- Analysis of the correspondence between TOE design representations
- Analysis of the TOE design representations against the requirements
- Verification of mathematical proofs
- Analysis of guidance documents
- Analysis of functional tests and results
- Independent functional testing
- Analysis for flaws
- Penetration testing

CC Assurance Argument Scale

- Balance 3 variables
  - Scope - how much is assessed
  - Depth - to what degree is it assessed
  - Rigor - in what manner is it assessed

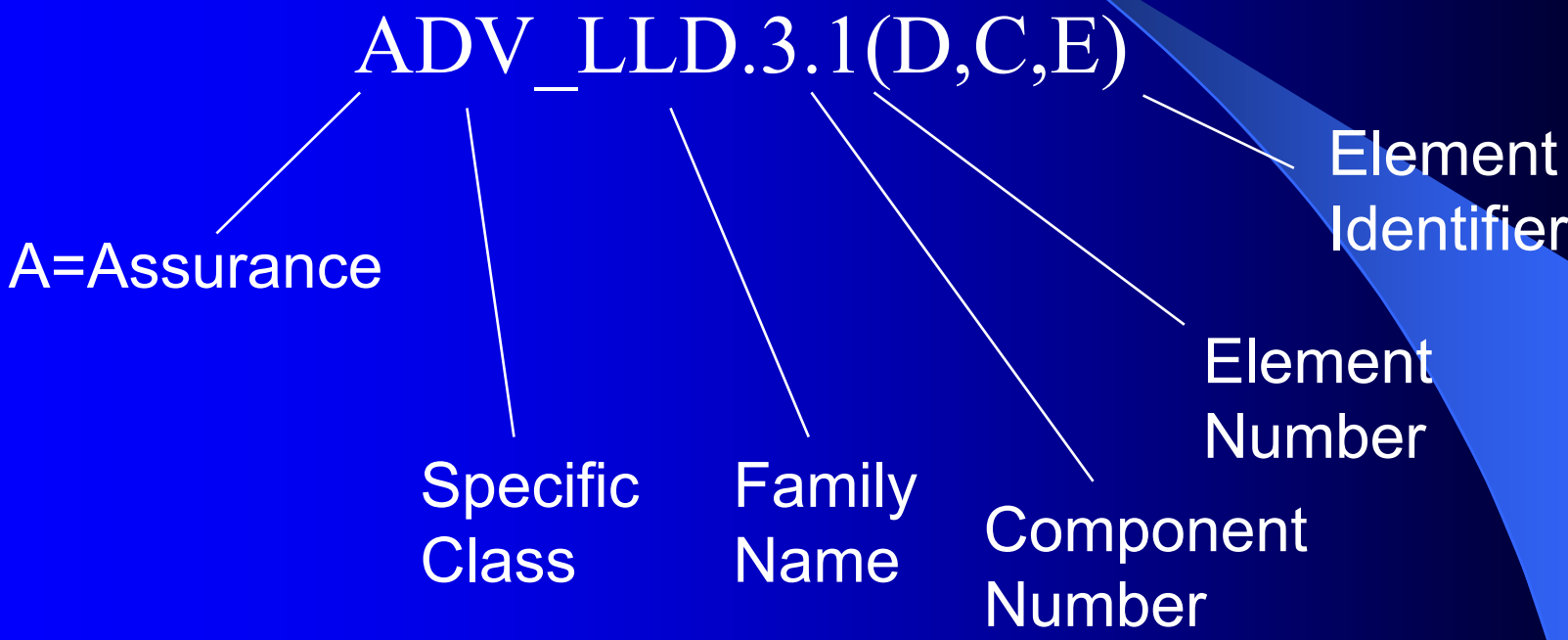
Greater Evaluation Effort (Scope, Depth, Rigor)



Greater Assurance

DECISIVE ANALYTICS

Interpreting Assurance Requirement Names



DECISIVE ANALYTICS

Security Assurance Classes

TOE Evaluation:

- Configuration Management (ACM)
- Delivery and operation (ADO)
- Development (ADV)
- Guidance documents (AGD)
- Life Cycle Support (ALC)
- Maintenance of Assurance (AMA)
- Tests (ATE)
- Vulnerability assessment (AVA)

PP Evaluation:

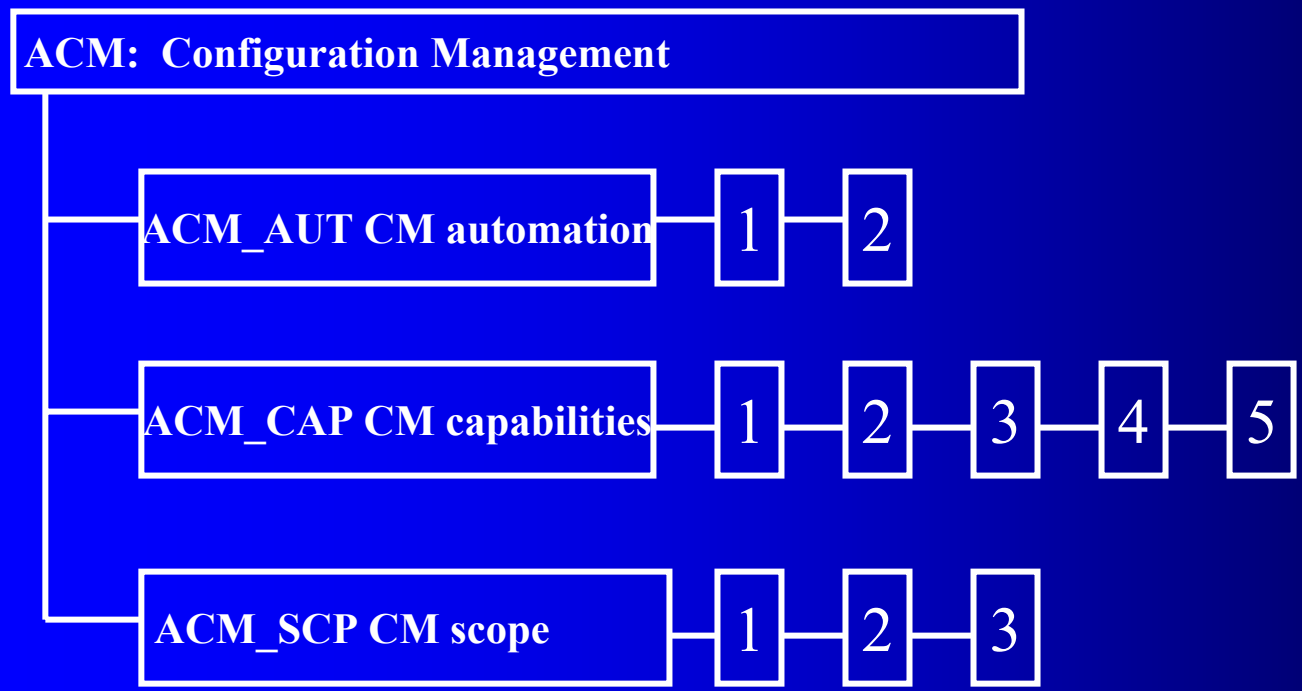
- PP Evaluation (APE)

ST Evaluation:

- ST Evaluation (ASE)

Class ACM: Configuration Management

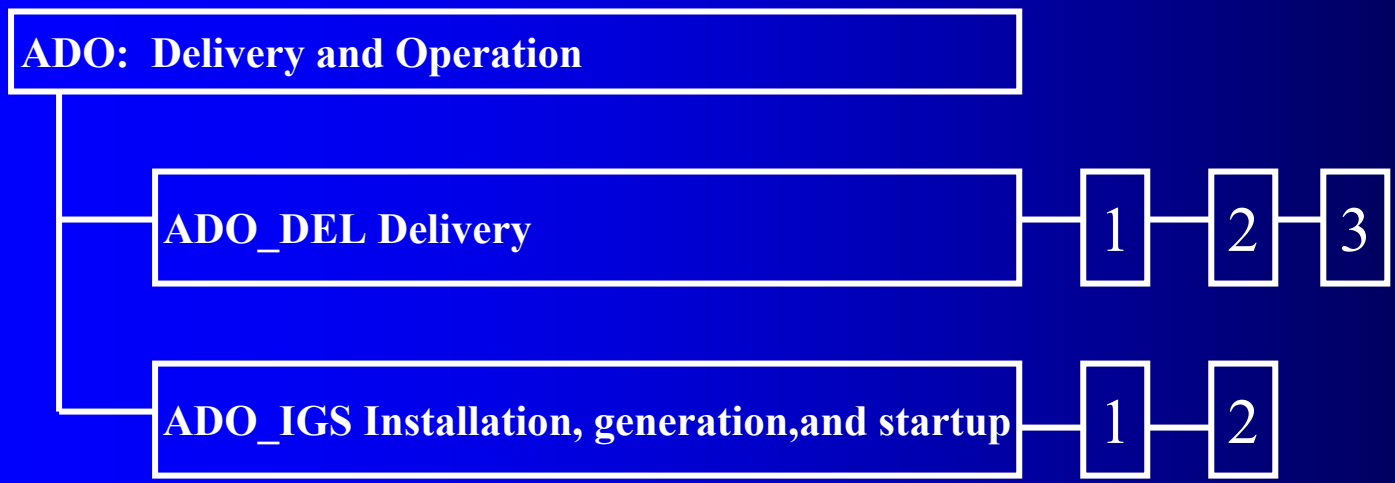
The families in this class address the CM system used in the development of the TOE



DECISIVE ANALYTICS

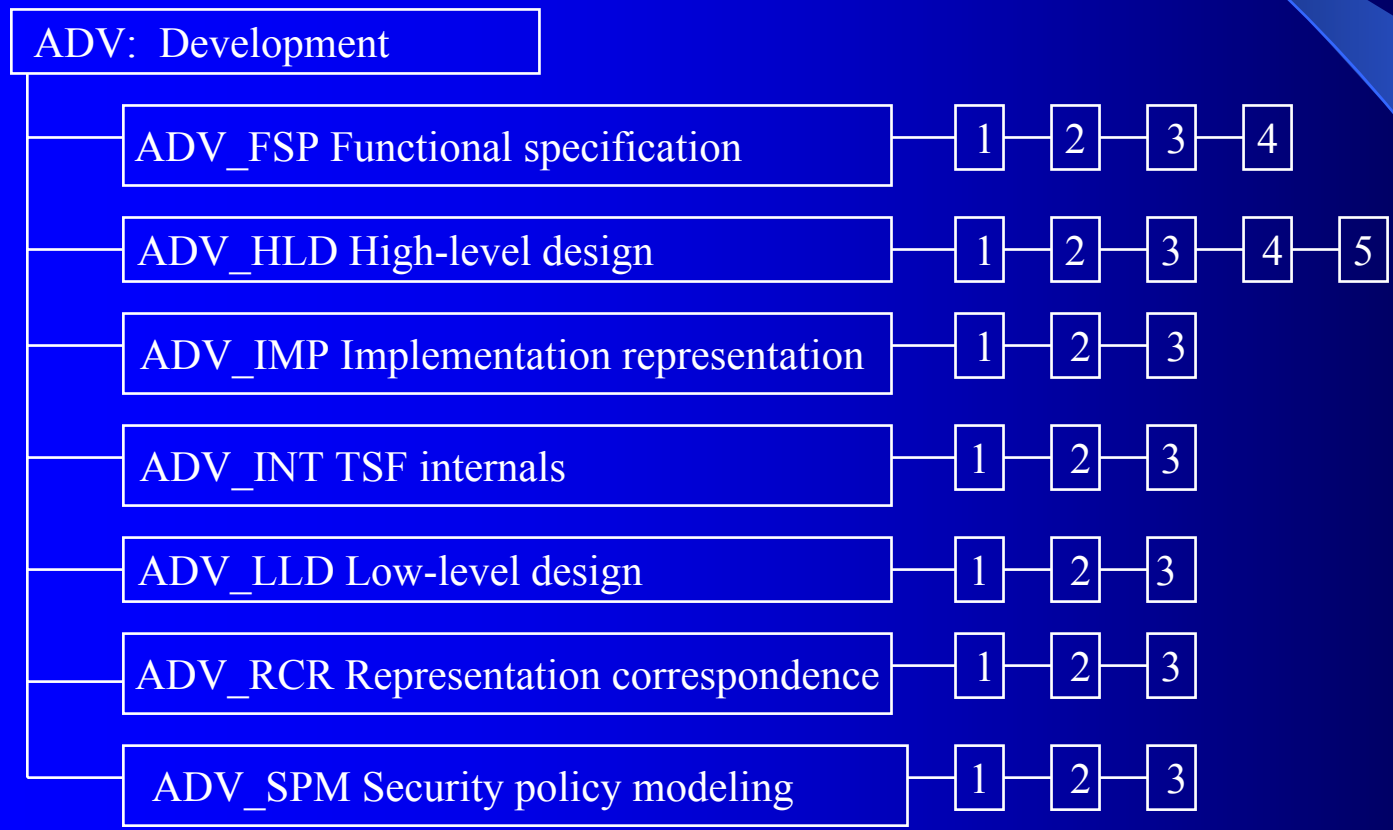
Class ADO: Delivery and Operation

The families in this class address documentation focused on correct delivery, installation, generation, and start-up of the TOE



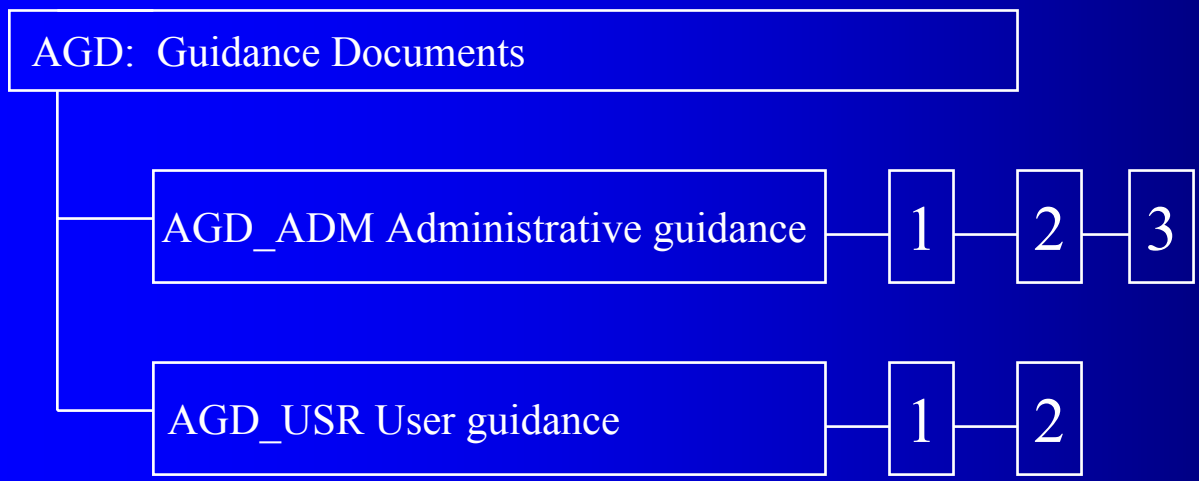
Class ADV: Development

The families in this class define requirements for the design documentation of the TOE security functions at various levels of abstractions.



Class AGD: Guidance Documents

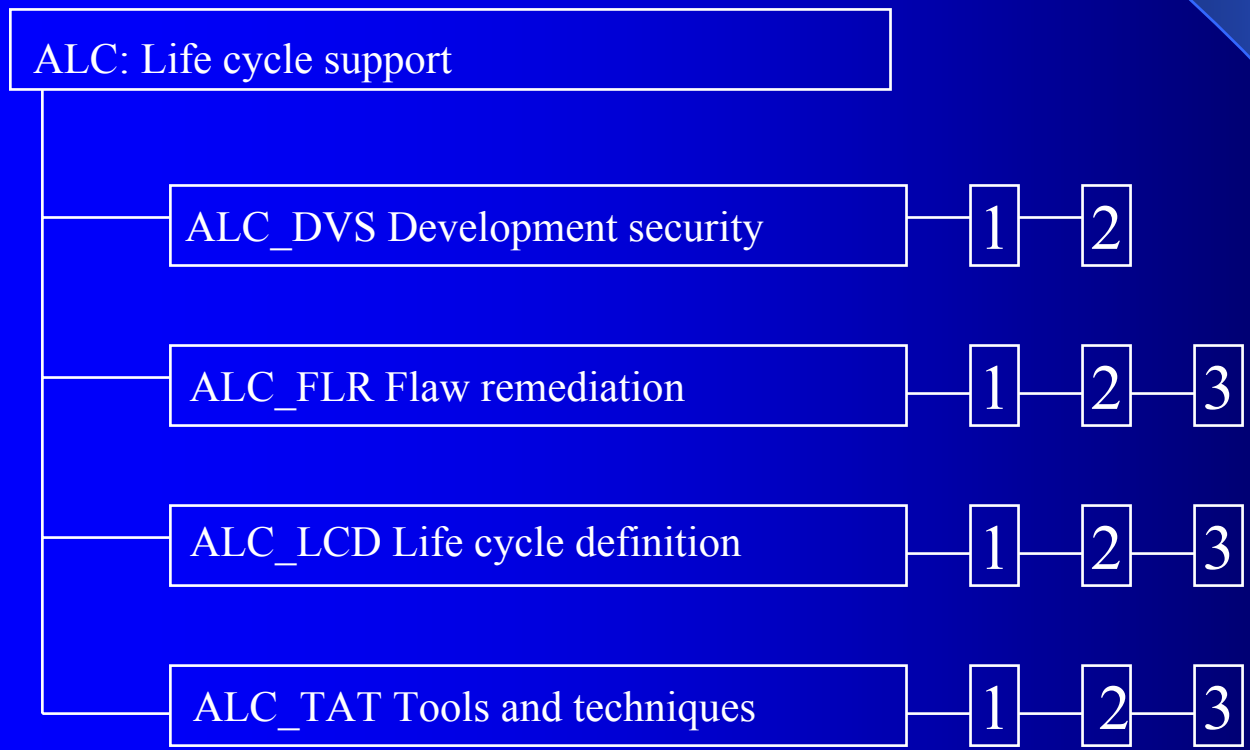
AGD defines requirements for the coherency, coverage, and completeness of the user and administrative guidance documentation.



DECISIVE ANALYTICS

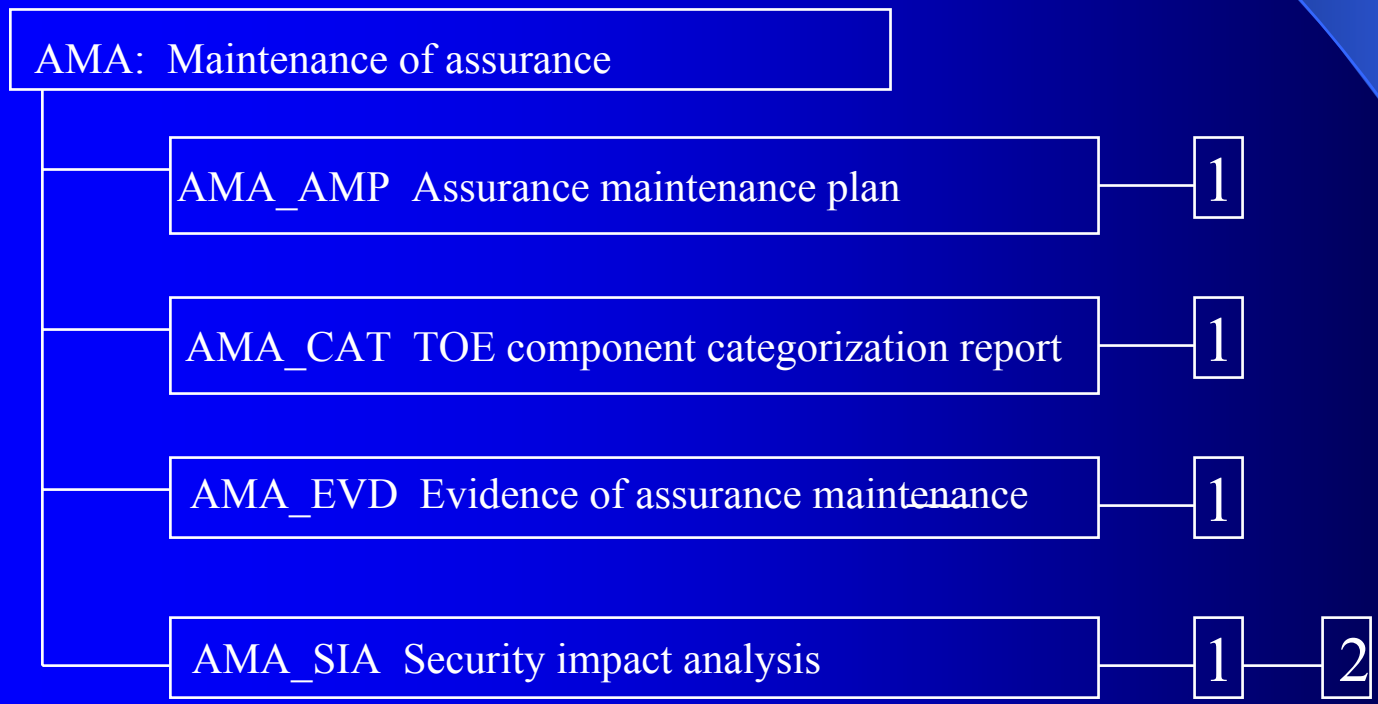
Class ALC: Life Cycle Support

ALC defines requirements for the establishment of discipline and control in the process of TOE development and maintenance.



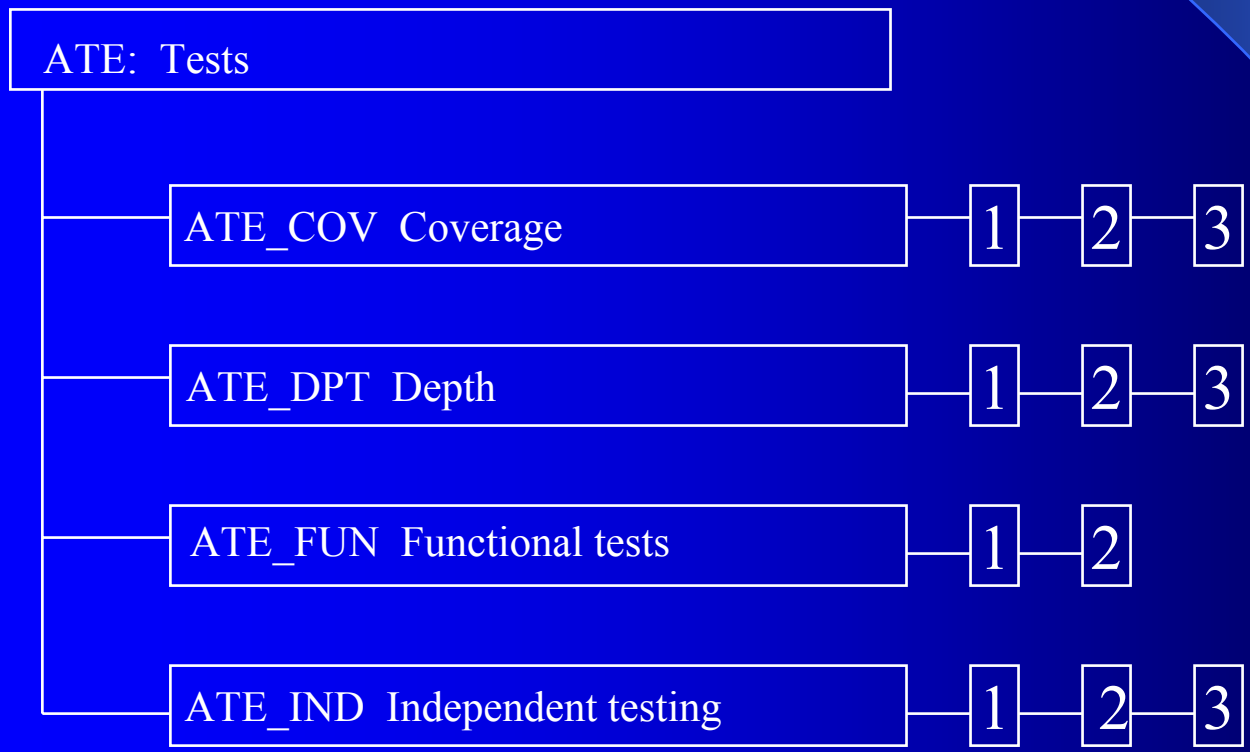
Class AMA: Maintenance of Assurance

AMA defines requirements for the maintenance of the level of assurance that the TOE will continue to meet its security target as changes are made to the TOE or its environment.



Class ATE: Tests

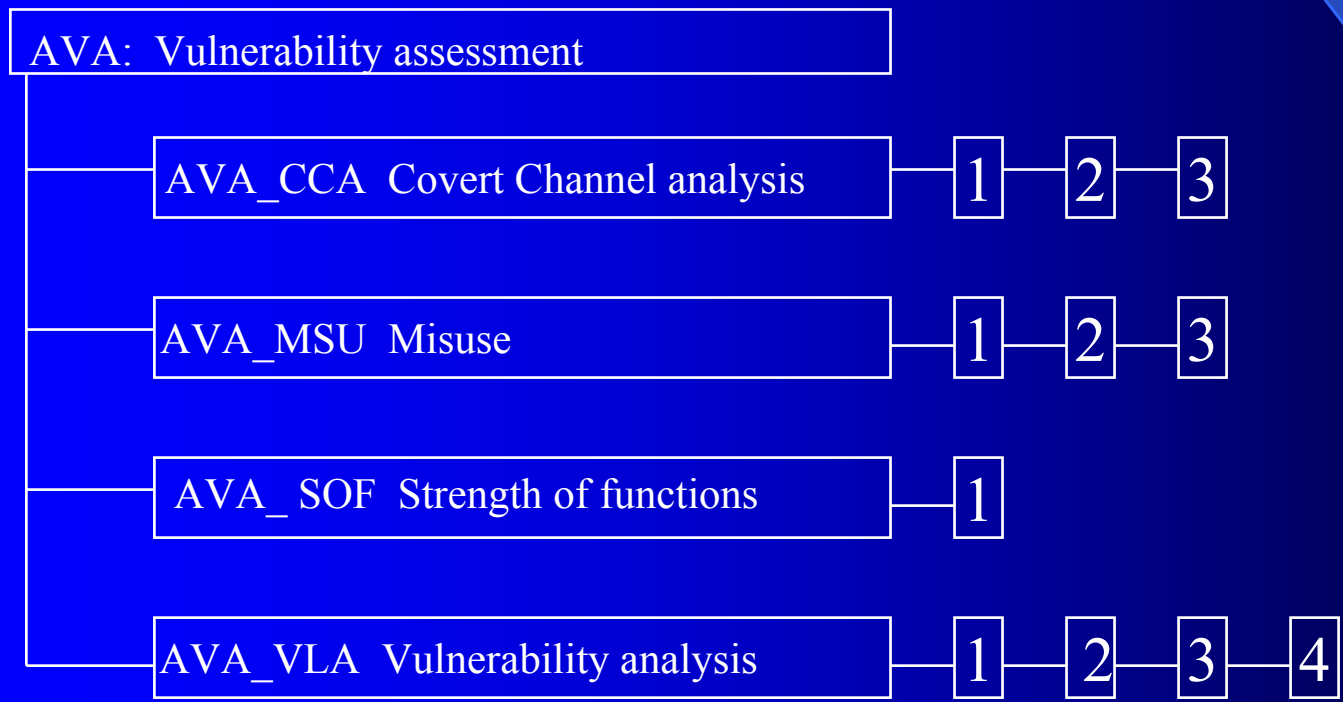
ATE defines testing requirements that demonstrate the TOE satisfies its functional requirements.



DECISIVE ANALYTICS

Class AVA: Vulnerability Assessment

AVA defines requirements for the identification of exploitable vulnerabilities introduced in the construction, operation, misuse, or incorrect configuration of the TOE.



DECISIVE ANALYTICS

Operations on Assurance Requirements

Iteration

Refinement

Assurance Iteration and Refinement

- As stated in the CC …
  - ADV_FSP.1.3C The functional specification shall describe the purpose and method of use of all external TSF interfaces, providing details of effects, exceptions and error messages, as appropriate.

- After applying iteration for software and hardware …
  - ADV_FSP.1.3C;1 *For software implementations*, the functional specification shall describe the purpose and method of use of all external TSF interfaces, providing details of effects, exceptions and error messages, as appropriate.

  - ADV_FSP.1.3C;2 *For hardware implementations*, the functional specification shall describe the purpose and method of use of all external TSF interfaces, providing details of effects, *input and output signal levels, error indications and reset conditions*, as appropriate.

Assurance Refinement

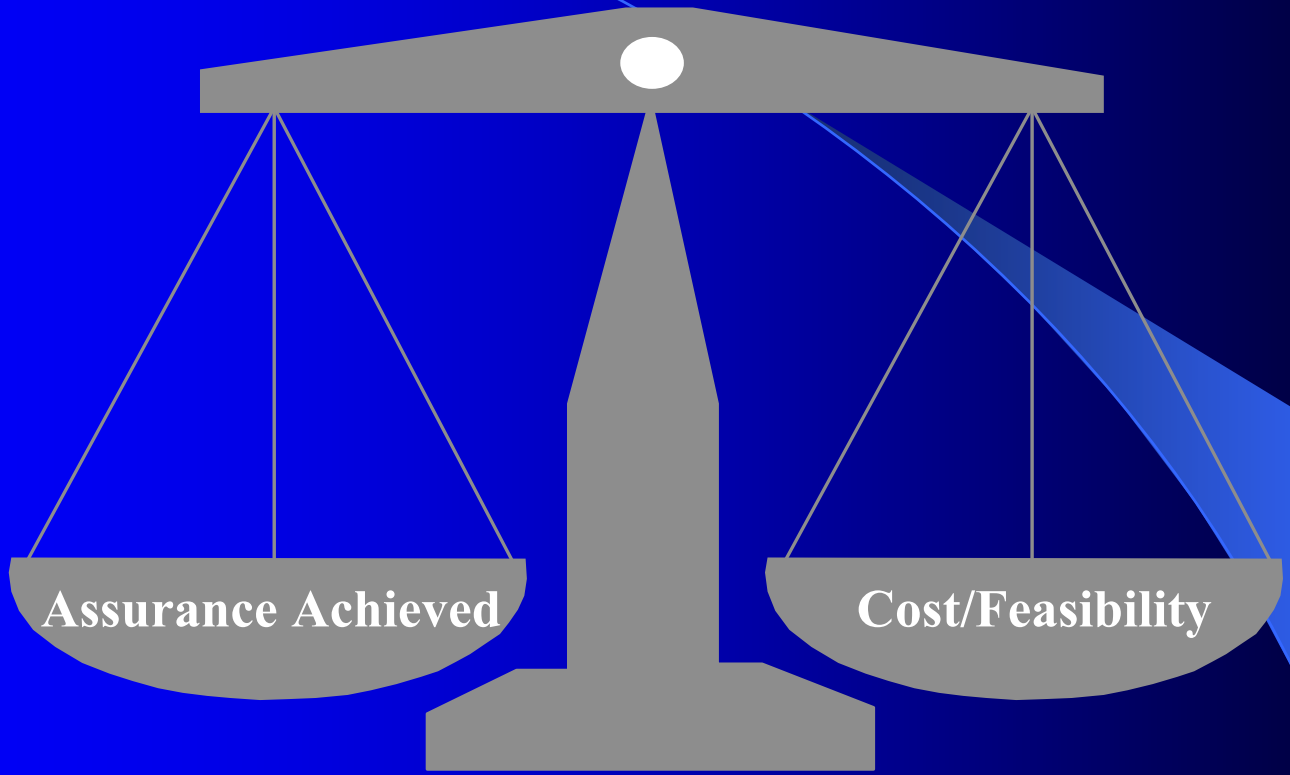
- As stated in the CC …
  - ADV_SPM.1.2C The TSP model shall describe the rules and characteristics of all policies of the TSP that can be modeled.

- After applying iteration for software and hardware …
  - ADV_SPM.1.2C The TSP model shall describe the rules and characteristics of all policies of the TSP *as a finite state machine to include the following:*
    - *definition and transition from non-secure to secure initialization state*
    - *definition and transition from secure operational state to secure fail-state*
    - *recovery transition from fail-secure to operational secure state*
    - *definition of transition to known insecure fail states*

Assurance Packages

- Reusable set of functional or assurance components combined together to satisfy a set of identified security objectives
- Currently, there are 7 assurance packages called Evaluation Assurance Levels (EAL1 - EAL7)

Evaluation Assurance Levels



Provide an increasing scale that strives to maintain a balance

Assurance Component to EAL Mapping

Assurance Class	Assurance Family	Assurance Components by Evaluation Assurance Level						
		EAL1	EAL2	EAL3	EAL4	EAL5	EAL6	EAL7
Configuration management	ACM_AUT				1	1	2	2
	ACM_CAP	1	2	3	4	4	5	5
	ACM_SCP			1	2	3	3	3
Delivery and operation	ADO_DEL		1	1	2	2	2	3
	ADO_IGS	1	1	1	1	1	1	1
Development	ADV_FSP	1	1	1	2	3	3	4
	ADV_HLD		1	2	2	3	4	5
	ADV_IMP				1	2	3	3
	ADV_INT					1	2	3
	ADV_LLD				1	1	2	2
	ADV_RCR	1	1	1	1	2	2	3
	ADV_SPM				1	3	3	3
Guidance documents	AGD_ADM	1	1	1	1	1	1	1
	AGD_USR	1	1	1	1	1	1	1
Life cycle support	ALC_DVS			1	1	1	2	2
	ALC_FLR							
	ALC_LCD				1	2	2	3
	ALC_TAT				1	2	3	3
Tests	ATE_COV		1	2	2	2	3	3
	ATE_DPT			1	1	2	2	3
	ATE_FUN		1	1	1	1	2	2
	ATE_IND	1	2	2	2	2	2	3
Vulnerability assessment	AVA_CCA					1	2	2
	AVA_MSU			1	2	2	3	3
	AVA_SOF		1	1	1	1	1	1
	AVA_VLA		1	1	2	3	4	4
Assurance maintenance	AMA_AMP							
	AMA_CAT							
	AMA_EVD							
	AMA_SIA							

EAL Augmentation

The Tailoring of an Existing Evaluation Assurance Level (EAL)

- Allowed augmentation operations
  - Replace an existing component in the EAL with a higher component
  - Add additional component(s) from other EALs
  - Add additional component(s) not in any EAL
  - MRA does not recognize augmentation with components not in EAL1-4
- Disallowed augmentation operation
  - Remove a component from an EAL definition

Questions?

Thank you

for your attention.

Please do not hesitate to follow-up with any questions are issues that arise subsequent to this session.

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