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Protection Profiles – Expressing your security needs

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The Common Criteria

- The Common Criteria (CC) is an internationally recognised IT security evaluation standard:
  - A framework for independent evaluation of IT security products and systems
  - Developed by many nations and many experts over many decades
  - International standard (ISO 15408)

- The CC comprises the following main parts:
  - A common structure & language for expressing product/system IT security requirements (Part 1)
  - A catalogue of standardised IT security requirement components & packages (Parts 2 & 3)
  - Common methodology for gaining assurance that IT security requirements have been satisfied (CEM)

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Common Criteria Recognition Arrangement

- The CC is governed by the Common Criteria Recognition Arrangement (CCRA):
  - Established in May 2000
  - Provides the basis for mutual recognition of evaluation results
  - Evaluation completed in any authorizing nation is recognised across all participating countries

- There are 2 types of CCRA membership:
  - **Certificate Authorizing Members** – Operate CCRA compliant Common Criteria certification schemes that produce certificates under the rules of the CCRA
  - **Certificate Consuming Members** – Recognise the results of evaluations and certificates of all Certificate Authorising Participants

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Why is this important to Malaysia

In September 2011 Malaysia was accepted as a CCRA Certificate Authorizing Member

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The stakeholders

- CCRA governs the CC and mutual recognition through the following:
  - Management Committee
  - Executive Subcommittee
  - Development Board
- Certification Bodies:
  - National authorities that govern an approved scheme
  - Certify the evaluation results of evaluations performed under the scheme
- Evaluation Facilities:
  - Licensed by a scheme to perform IT Security Evaluation using the Common Criteria
  - Accredited against ISO 17025
- Developers:
  - Develop IT products or systems with IT security functionality
  - Submit products to evaluation facilities to undertake CC evaluations
- Consumers:
  - Select and use CC evaluated products
  - Can specify requirements or needs through **Protection Profiles**

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The assurance paradigm

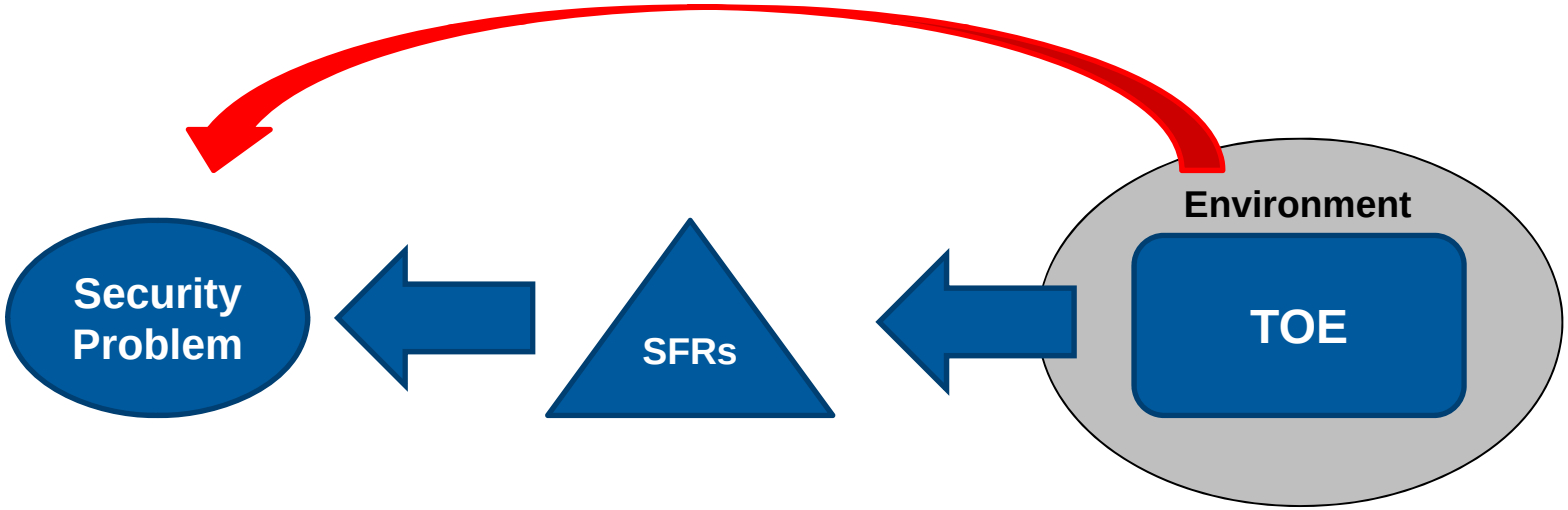
Assurance is the grounds for confidence that:

a Target of Evaluation (TOE)

in it's operational environment

implements a suite of security functional requirements

that solves a specified security problem



Consumers can specify a Security Problem through a **Protection Profile**

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The role of the Protection Profile

- Common Criteria Protection Profiles are:
  - An implementation independent statement of security requirements
  - Designed to specify a specific security problem through threats and organisational policy statements

- The development of a PP is appropriate when:
  - Consumer groups wish to specify security requirements for a specific product or application type
  - Government wishes to specify security requirements for a class of security products
  - An organization wishes to purchase an IT system to address its security requirements

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Three general kinds of Protection Profiles

Acquisition focused:

- Developed as binding procurement guidance for a specific need
- Needs to be achievable by today's technology
- Usually accompanied by additional technical specifications and designs

Establishment of a security baseline:

- Provides the minimum standard for a product set (often policy based)
- Establishes a baseline for vendors to attain providing a pool or suitable candidates
- Requirements are specified in a broad manner

Advancement of technology or capability:

- Developed to influence the development of new technology
- Could be developed to improve the features and functionality of existing technologies (raise the bar)
- Focused on future needs and implementation

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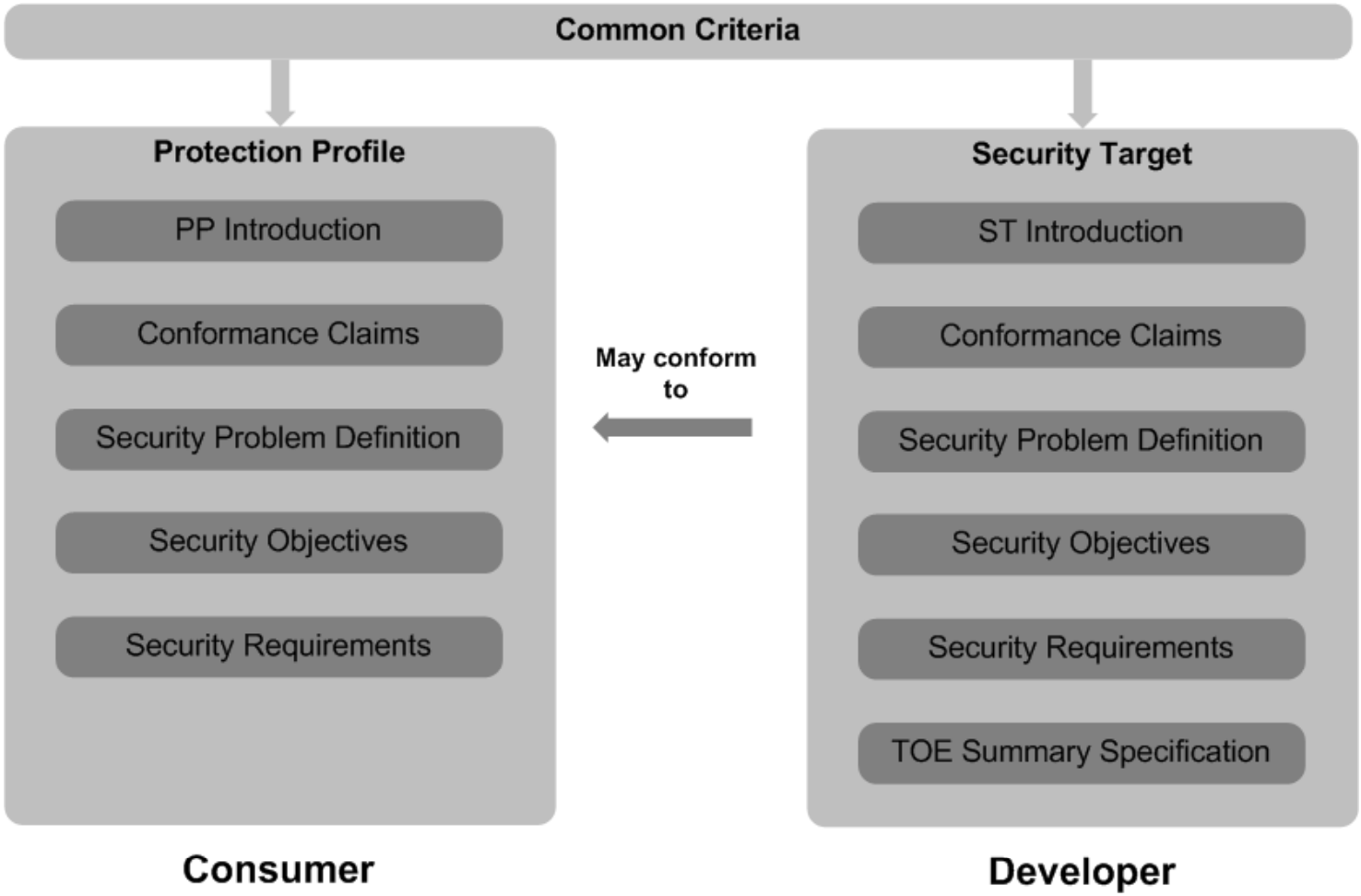
Protection Profile versus a Security Target



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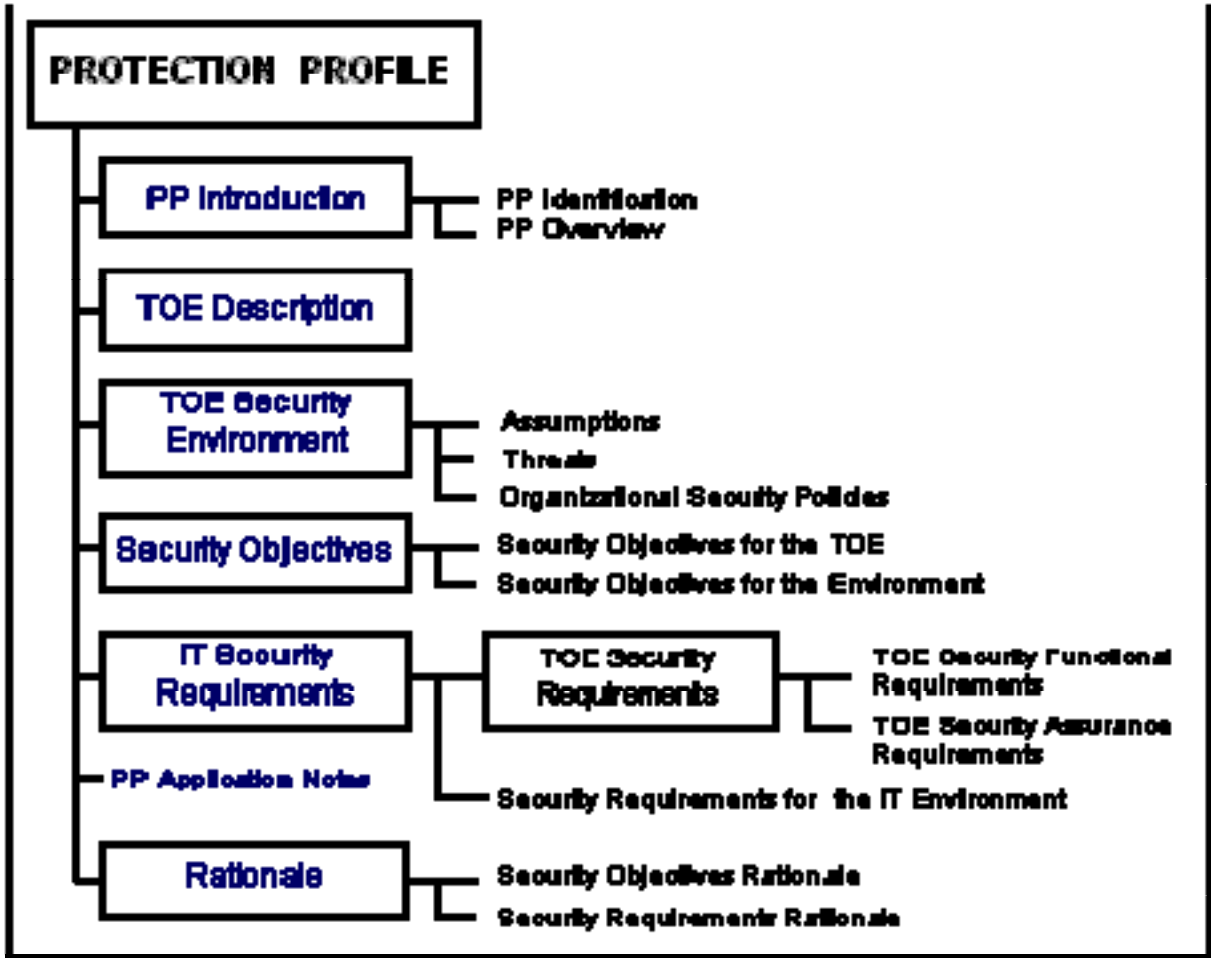
Contents of a Protection Profile



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Example PP content (threats)

- Protection Profile for Full Disk Encryption

  Mitigating the risk of a lost or stolen hard disk
- Threat statements (the security problem)

T.KEYING_MATERIAL_ COMPROMISE	An attacker can obtain unencrypted key material (the KEK, the DEK, authorization factors, submasks, and random numbers or any other values from which a key is derived) that the TOE has written to persistent memory and use these values to gain access to user data.
T.KEYSPACE_EXHAUST	An unauthorized user may attempt a brute force attack to determine cryptographic keys or authorization factors to gain unauthorized access to data or TOE resources.
T.TSF_ COMPROMISE	A malicious user or process may cause TSF data or executable code to be inappropriately accessed (viewed, modified, or deleted) to gain access to key material or user data.
T.UNAUTHORIZED_DISK_ACCESS	An unauthorized user that has access to the lost hard disk may gain access to data for which they are not authorized according to the TOE security policy.
T.UNSAFE_AUTHFACTOR_VERIFICATION	An attacker can take advantage of an unsafe method for performing verification of a user-entered authorization factor, resulting in exposure of the KEK, DEK, or user data.

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Example PP content (security objectives)

- Stated security objectives (how we solve the security problem)

O.AUTHORIZATION	The TOE must obtain the authorization factor(s) from a user to be able to decrypt the data on the hard disk.
O.CORRECT_TSF_OPERATION	The TOE will provide the capability to test the TSF to ensure the correct operation of the TSF in its operational environment.
O.ENCRYPT_ALL	The TOE will encrypt all data that are stored on a hard drive. (Note that this may exclude the MBR and the bootable partition that it points to.)
O.EXTERNAL_AUTH_FACTOR_PROTECTION	The TOE shall ensure that an external token authorization factor is inaccessible after it is used for authorization.
O.DEK_SECURITY	The TOE will mask the DEK using a key encryption key (KEK) created from one or more submasks (which in turn are derived from the authorization factors) so that a threat agent who does not have authorization factor(s) will be unable to gain access to the user data by obtaining the DEK.

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Example PP content (security functional requirements)

FCS_CKM_EXT.4 Cryptographic Key Zeroization

FCS_CKM_EXT.4.1 The TSF shall zeroize all plaintext secret and private cryptographic keys and CSPs when no longer required.

FCS_COP.1(1) Cryptographic operation (Disk Encryption)

FCS_COP.1.1(1) **Refinement:** The TSF shall perform **encryption and decryption** in accordance with a specified cryptographic algorithm **AES used in [selection: CBC, CCM, CFB128, CTR, OFB, XTS] mode** and cryptographic key sizes **[selection: 128 bits, 256 bits]** that meet the following: **FIPS PUB 197, "Advanced Encryption Standard (AES)" and *selection: NIST SP 800-38A, NIST SP 800-38C, NIST SP 800-38E]**.

FCS_COP.1(4) Cryptographic operation (Key Masking)

FCS_COP.1.1(4) **Refinement:** The TSF shall perform **key masking** in accordance with a specified cryptographic algorithm **[selection: XOR; AES used in ECB mode]** and the cryptographic key size **[selection: 128 bits, 256 bits]** that meet the following: [**selection: "None" for XOR; "FIPS PUB 197, *Advanced Encryption Standard (AES)* and NIST SP 800-38A" for AES+.**

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Recent updates within the CCRA

- The CCRA Management Committee (CCMC) September 2012, agreed on a vision statement for the future direction of the application of the CC and the CCRA.
- This vision statement has the CCRA moving to a more PP-centric way of using the criteria
- Standardisation is to be increased by building Technical Communities (TC) developing collaborative Protection Profiles (“cPPs”) and supporting documents,
- Mutual recognition will be based on the achievable common level of the cPPs.
- TCs will be defined and cPPs will be developed for all product classes where multiple manufacturers provide individual STs for similar products

- What does this all mean?

Protection Profiles are going to play an even more prominent role in the assurance paradigm and the Common Criteria!

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More information

- Protection Profiles:
  - Common Criteria Certified Protection Profiles
    http://www.commoncriteriaportal.org/pps/
  - US Government Approved Protection Profiles:
    http://www.niap-ccevs.org/pp/

- Malaysian MyCC Scheme:
  http://www.cybersecurity.my/mycc/