Further streamlining of PPs and STs

An old hand’s time to kick (out) some new ideas
XXX For internal reference.

Version d.d. 2008-10-19
Author and course maintainer: DJ/Wouter.
Please feed back changes to him.

Biggest changes since N/A:
☐ New version

See notes for trainer information

Additional improvements to do:
☐ DJ discussie
Presentation Targets

- It was not clear what pass/fail for TOE was
- SFRs was the answer
- SFRs are also not so clear
- Now we made a full circle

Unfortunately this presentation is not in the proceedings. To receive it, email me at slegers@brightsight.com
ST structure in CCv2.3

- Threats
- Organizational Security Policies
- Assumptions
- SARs
- Sec. Objectives for the TOE
- Sec. Objectives for Environment
- Assurance Measures
- Security Functions
- SFRs
- SFRs for IT Environment

TOE Evaluation
What is used in TOE evaluation in CCv2.3?

- Threats
- Organizational Security Policies
- Assumptions
- SARs
- Sec. Objectives for the TOE
  - Security Functions
  - SFRs
- Security Measures
- SFRs for IT Environment

TOE Evaluation
Reason for this:  
Definition of ‘fail’ in CCv2.3?

Threat: Virus X infects TOE  
The well-known virus Y can destroy the TOE.

Objective: Prevent Virus X from infecting TOE  
Does this fail the evaluation?

Requirement: FPT_SEP.1  
(TSF shall protect itself)
Answers from experienced people

- The evaluation fails because the ST is inconsistent
- The evaluation fails because FPT_SEP.1 is not met
- The evaluation passes, because infection from virus Y is not a threat
- The evaluation passes, because it is not a security objective to stop virus Y

Conclusion:
Fail is being determined based on different parts of the ST (and more)
So the PP/ST structure changed to this in CC3.x

- **Threats**
- **Organizational Security Policies**
- **Assumptions**
  - **Sec. Objectives for the TOE**
  - **Sec. Objectives Operational Environment**
- **TOE Evaluation**
  - **Assurance Rationale**
    - **SARs**
  - **SFRs**
Essential place where pass/fail of TOE is defined

- Threats
- Organizational Security Policies
- Assumptions
  - Sec. Objectives for the TOE
  - Sec. Objectives Operational Environment
  - TOE Evaluation
  - SFRs
  - SARs
  - Assurance Rationale
SFRs are central:
defines *pass/fail of evaluation* in vulnerability analysis

Attack is successful and *fails the TOE* if:
- Attacker is in the operational environment
- Effort is within Attack Potential
- SFR(s) are broken
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So how are SFRs used in practice?

Let’s take examples from the PP where we have the most experience with:
The “EuroSmart PP” on IC hardware (BSI-PP-0002/BSI-PP-0035)
SFRs in use:
Does not express exactly what is needed

FCS_RNG.1.1
The TSF shall provide a physical random number generator that implements total failure test of the random source [assignment: list of additional security capabilities].

FCS_RNG.1.2
The TSF shall provide random numbers that meet [selection: independent bits with Shannon entropy of 7.976 bits per octet, Min-entropy of 7.95 bit per octet, [assignment: other comparable quality metric].
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SFRs in use:
Does not express exactly what is needed

Attack:
Drive a nail through chip

☐ Attacker is in the operational environment
   ■ Yes: smartcards are evaluated with no objectives for the environment when the end-user has them

☐ Effort is within Attack Potential
   ■ Yes: a hammer, one hit, clearly within even AVA_VAN.1

☐ SFR(s) are broken
   ■ Yes: The TSF shall provide random numbers

Conclusion: Fail (!?!?)
In practice

Look very hard for a rationale to fit the common understanding

FPT_PHP.3

Application Note 18:
The Security Target shall describe the automatic response of the TOE. All security functional requirements are defined to protect the User Data stored on the Security IC. Therefore, the security functional requirements are e.g. enforced if the TOE stops operation or does not operate at all if a physical manipulation or physical probing attack is detected.

Verdict: Pass
SFRs in use: Are also not complete

FDP_ITT.1 Basic internal transfer protection
The TSF shall enforce the Data Processing Policy to prevent the disclosure of user data when it is transmitted between physically-separated parts of the TOE.

FPT_ITT.1 Basic internal TSF data transfer protection
The TSF shall protect TSF data from disclosure when it is transmitted between separate parts of the TOE.

FDP_IFC.1 Subset information flow control
The TSF shall enforce the Data Processing Policy on all confidential data when they are processed or transferred by the TOE or by the Security IC Embedded Software.
SFRs in use:
Does not express exactly what is required

Attack:
Read persistent memories when smart card is not powered

☐ Attacker is in the operational environment
  ■ Yes: smartcards are evaluated with no objectives for the environment when the end-user has them

☐ Effort is within Attack Potential
  ■ Yes (for sake of argument)

☐ SFR(s) are broken
  ■ No: The TSF protects during transport and operation

Conclusion: Pass (!?!?)
In practice

The following Security Function Policy (SFP) Data Processing Policy is defined for the requirement "Subset information flow control (FDP_IFC.1)"

User Data and TSF data shall not be accessible from the TOE except when the Security IC Embedded Software decides to communicate the User Data via an external interface. The protection shall be applied to confidential data only but without the distinction of attributes controlled by the Security IC Embedded Software.

Verdict: Fail
Summary SFRs as decision argument

“A TOE fails if an attack is possible with
☐ Attacker is in the operational environment

☐ Effort is withinin Attack Potential

☐ An SFR(s) are broken”

Leads to situations where
☐ It formally fails (but we pass it), and
☐ It formally passes (but we fail it)

[which shows] how illogical logical thinking can be
Terry Pratchett
We put everything in one egg in one basket, but the egg is broken

The current SFRs are (used in a way) that is

- Not sufficiently precise
- Not sufficiently complete

Also

- SFRs are not orthogonal (there are many ways with different SFRs to express the same requirements)
- Consistency of SFRs is not at all easy to determine
- ... And this sofar ignores all further distortion due language / culture / product domain / personal opinions / paper communication / ...
Interpretations to be decided

- What does FPT_PHP mean, especially if present?
- What do FDP_ITT and FDP_SDI mean, especially if absent?
- Does FCS_COP imply DPA/DFA mechanisms need to be in ADV_ARC?
- FCS_RND imply AIS20/31 requirements?

Interpretation by TOE-type the way to go (smartcards: JIL/ISCI)
What to do with this problem?

- Ignore the problem
  - Do nothing
  - Make small changes to CC Part 2

- Change something to fix the problem
  - New SFRs (CC 3.0)
  - Going to SFRs only was a mistake: bring back Security Functions
  - Going to SFRs was a mistake: use Objectives for the TOE
  - Make a new language...

- Acknowledge the problem, seek the solutions elsewhere
  - Accept the differences
  - Create community surrounding a PP to align interpretations
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New SFRs (or any other language) is not going to work...
An old hand’s time to kick

☐ CC 3.0 trial of new SFRs
☐ Package was designed to strongly encourage:
  - Precise requirements
  - Only necessary requirements
  - Split of requirements in
    - What the TOE does internally
    - What the TOE does in interaction to the outside world
  - Avoidance of technology / solution specific requirements
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☐ SFR-language was
  ☐ Concise
  ☐ Orthogonal
  ☐ Abstract
  ☐ I.e. Logic-language like
New SFRs (or any other language) is not going to work...
An old hand’s time to kick

Reasons not to adapt (as seen by the author):
- Some constructs previously possible, now not possible
- Some constructs previously not possible, now also not possible
- Some constructs require more SFRs
- It is too abstract
- ...

It was too big a change
To make an omelet without breaking an egg...

Any real solution to this in the Common Criteria will require big changes to the SFRs (or whatever language replaces it)

Big changes are not acceptable

No real solution to this is viable
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Solution direction

First there was nothing.
And God said: “Let there be light”, and there was light
and there still was nothing, but at least you could see it
Terry Pratchett

- Accept that the SFRs are not the stand-alone truth

- Seek solution in interpretation, choose between:
  - Accept that there are interpretation differences
    - or
  - Create and maintain consensus interpretation
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  or

☐ Create and maintain consensus interpretation
Create and maintain consensus on interpretation

- Gather stakeholders
  - Users
  - Developers
  - Evaluators
  - Certifiers

- Discuss, compare, improve, align, make (mandatory) guidance....
Create and maintain consensus on interpretation
Example: smart card community with EuroSmart, ISCI,…

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  - Users
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Summary

- It was not clear what pass/fail for TOE was
- SFRs was the answer
- SFRs are also not so clear
- Now we made a full circle
Questions?
Contact information

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