gemalto

Advantages and drawbacks to use CC for private schemes

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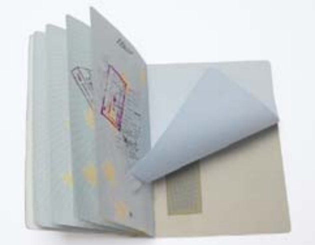
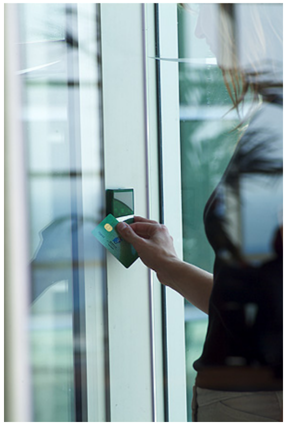
Gemplus & Axalto merge into Gemalto

- €1.7 billion in combined pro-forma 2005 revenue
- 11,000 employees,1500 R&D engineers
- 21 production sites, 32 personalization and 9 R&D centers





Gemalto delivers secure personal devices, platforms and services, enabling its clients to offer trusted and convenient digital services to billions of individuals

Gemalto experience in security evaluations

- Mastering Standard schemes for smart cards
  - More than 25 CC certificates (From EAL1+ to EAL5+)
  - More than 10 FIPS 140-X and FIPS 201 certificates
  - More than 20 ITSEC certificates
  - 7 sites certified ISO 27001 (some in progress)

PREMIER MINISTRE

Schéma français d'évaluation et de certification de la sécurité des technologies de l'information

CERTIFICAT 2003/08

Carte Multima Classic
Composant ST19XS08C masqué avec l'application CB-EMV V1
[illegible]
Développeurs : Schlumberger Systèmes, STMicroelectronics

Critères Communs
EAL4 Augmenté
[illegible]

Commanditaire : Schlumberger Systèmes
Centre d'évaluation : CEA-LETI

Le [illegible]

Le Directeur Central de la Sécurité des Systèmes d'Information
[illegible]

[illegible]

FIPS 140-2 Validation Certificate

The National Institute of Standards and Technology of the United States of America

The Communications Security Establishment of the Government of Canada

Certificate No. 677

The National Institute of Standards and Technology, as the United States FIPS 140-2 Cryptographic Module Validation Authority; and the Communications Security Establishment, as the Canadian FIPS 140-2 Cryptographic Module Validation Authority; hereby validate the FIPS 140-2 testing results of the Cryptographic Module identified as:

GemCombiXpresso R4 E72 PK – FIPS with ActivIdentity Digital Identity Applet Suite v2 by Gemplus Corp. and ActivIdentity Inc.
(When operated in FIPS mode)

in accordance with the Derived Test Requirements for FIPS 140-2, Security Requirements for Cryptographic Modules. FIPS 140-2 specifies the security requirements that are to be satisfied by a cryptographic module utilized within a security system protecting Sensitive Information (United States) or Protected Information (Canada) within computer and telecommunications systems (including voice systems).

Products which use the above identified cryptographic module may be labeled as complying with the requirements of FIPS 140-2 so long as the product, throughout its life cycle, continues to use the validated version of the cryptographic module as specified in this certificate. The validation report contains additional details concerning test results. No reliability test has been performed and no warranty of the products by both agencies is either expressed or implied.

This certificate includes details on the scope of conformance and validation authority signatures on the reverse.

Bundesamt
für Sicherheit in der
Informationstechnik

- Leader to provide products in private schemes in markets:

  (Banking, MobileCom, PayTV, ID, Transportation, Health, IT,…)

MasterCard

VISA

GSM Association

> We spend near 10 M€ per year for product and site evaluations

Setting the problem

- As developer,some private schemes with divergent requirements.
- We have to manage an adaptative process for product development and site security in order to be compliant with new set of requirements. <u>It is not effective and not security relevant.</u>
- Customer would like more security proofs to be confident in product & site security but keeping flexibility and lost costs for evaluation.
- So we would like to promote <u>reuse of best items of CC</u> <u>to integrate in private schemes</u> in order to make <u>more effective evaluations</u> and to obtain more <u>easily customer confidence</u>.

Sponsor requests for security evaluations

Sponsors	Requirements
Governement agencies for Public sector (ID, Health, Transport) Private organizations for banking or Pay-TV market	CC with dedicated PP
Organization representatives for IT and ID market	FIPS
Organization representatives for banking market	Well defined private schemes including product and site evaluations
"The Target" Customers (Mobile com, Pay-TV, IT)	Simple private schemes with black box or grey box testing and optional production site evaluation

Why customers are reluctant in use of CC ?

- Complex to manage (evaluation, certification, acceptance)
- Complex language to understand
- Not enough specific to answer to their needs
- Not enough flexible (standard EAL package)

=> CC: a tool made by expert for experts

- Costly
- Long duration
- Less efficient than black box or grey box testing approach

- We often miss the target : obtaining customer confidence
  - Lack of knowledge of context (real product usage, hacker profiles),
  - Attack paths used by labs are complex versus real hacking scenarios,
  - No shared risk analysis between actors.

Reuse of results : CC vs Private scheme

- A CC evaluation is performed for one product to address one or several customers.
  - The product certificate is reusable for composition in some cases.

  - CC results for a product evaluation :
    - A security target (ST lite is public for recognition)
    - Evaluation technical report (not public)
    - certification report and a certificate (public on demand)
    - Mutual recognition (applicable between CB)

- A private scheme evaluation is performed for one product to address one customer.
  - Usually there is a testing report (not public), no public requirements, no public certificate.

=> In Private scheme, there is no way to reuse evaluation result.

Common « New » customer request

- « We would like you perform testing of your product to convince me that our product is secure ».

- That means select a lab, perform a 2-month testing campaign on a specific set of requirements to obtain my confidence.

- Then, this is the beginning of a long story.

  - How to convince ?
  - How to obtain confidence ?
  - What kind of confidence ?
  - What is the security problem ?
  - What is the context?
  - What is the customer acceptance of risk ?
  - **Who pays for that?**

Confidence = Effectiveness* Objectivity * Independence

- Effectiveness

  (scope * requirements* consistency * correctness * robustness * expertise * evolutive)

  - Clear **terminology** and definition of **requirements** with work packages and tasks
  - Identified **scope** with coverage rationale
  - **Correctness** with selection of scope, depth, rigor
    - work definition, application, evidences and rationale, checks
  - **Robustness** with shared methodology and attack quotation
    - Context analysis and attacker profile definition
    - Vulnerability search, Product analysis, attack quotation table
  - **Evolution** of CC covers changing environmental and technical factors
  - **Re-usability** Appropriateness including previous evaluation results
- Laboratory competency requirement
  - Laboratory accreditation scheme (competency check)
  - Sharing of Knowledge Attack through CB control
- Objectivity and Independence
  - External labs and Certification body control
  - Definition of State of the art managed by CB

CC evaluation process / Principles

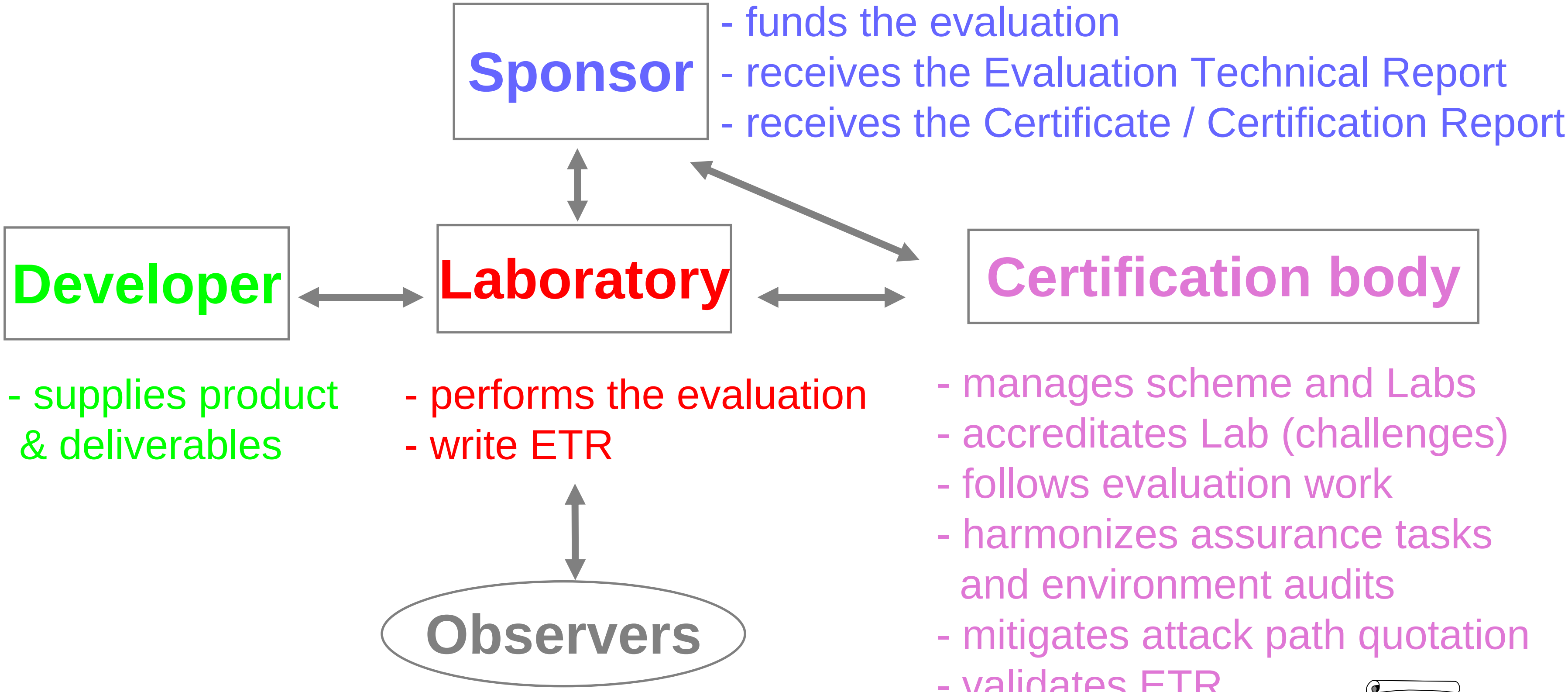
- Objectivity
  - Evaluation results are deduced from factual evidence, independent of a personal opinion
- Impartiality
  - When subjective judgment is required, the evaluation results are unbiased
- Reproducibility
  - An evaluator action carried out on a given set of evaluation deliverables, should always yield the same result.
- Correctness
  - The evaluation actions provide an accurate technical assessment.
- Sufficiency
  - The evaluation activities carried our meet all of the requirements for confidence
- Appropriateness
  - Each evaluator action provides assurance benefits at least proportional to the expended effort.

- **Clear definition of evaluation requirements for developer and evaluator**
- **Clear definition of evaluation methodology for evaluator minimizing interpretations & issues**

Evaluation methodology

- Scope of evaluation (what part of product is evaluated)
- Functional requirements (which functions are evaluated)
  - Security by construction (defined security function)
  - Security by design (consistency between SF)
- Assurance requirements (what evidences are evaluated)
  - by documentation inspection
  - by product testing
  - by product vulnerability assessment
  - by usage environment analysis
  - by development and production environment analysis
- Evaluation Methodology (how evidences are checked)

CC scheme : Roles & Responsibilities



Sponsor

- funds the evaluation
- receives the Evaluation Technical Report
- receives the Certificate / Certification Report

Developer

- supplies product & deliverables

Laboratory

- performs the evaluation
- write ETR

Certification body

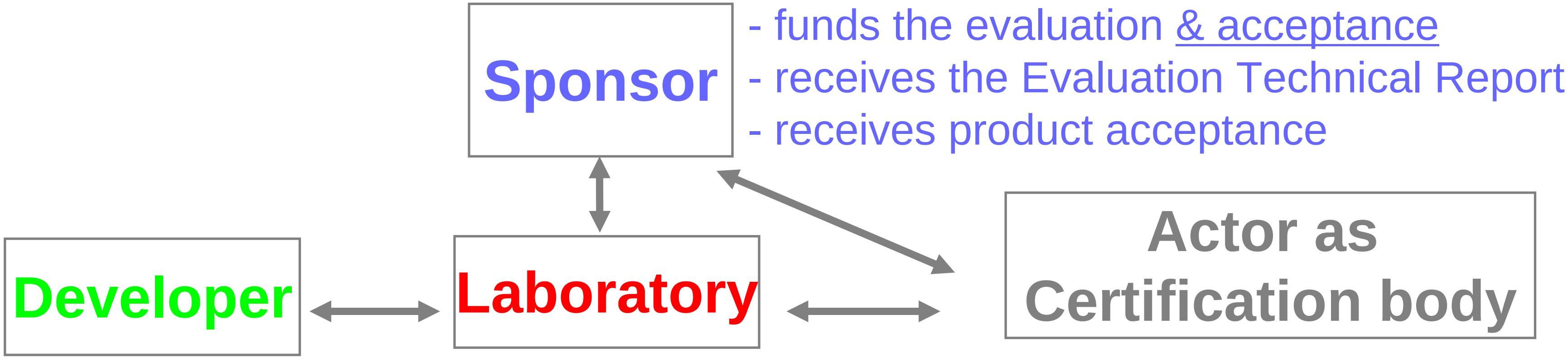
- manages scheme and Labs
- accreditates Lab (challenges)
- follows evaluation work
- harmonizes assurance tasks and environment audits
- mitigates attack path quotation
- validates ETR
- issues certificate

Observers

Represent final customers & organisms
- validates product usage (acceptance)

After certification, observers performs risk assessment and acceptance

Private Scheme : Roles & Responsibilities



Sponsor

- funds the evaluation & acceptance
- receives the Evaluation Technical Report
- receives product acceptance

Developer

Laboratory

Actor as Certification body

- supplies product & deliverables

- performs the evaluation
- write ETR

- manages scheme and labs
- selects labs
- follows evaluation work
- harmonizes assurance tasks and environment audits (if any)
- mitigates attack quotation
- validates ETR
- issues acceptance list (not public)

After evaluation, ACB performs risk assessment and acceptance

3 common kinds of issues

- Product acceptance (for developer & sponsor)
  - Spend money for development & evaluation and miss the market
  - Perform a weak risk assessment leading to issues with customer after deployment

- Product evaluation (for laboratory)
  - Perform more work than planned in evaluation contract
  - Miss a weakness in product or environment leading to lost of image

- Product acceptance (for Customer)
  - Perform a weak risk assessment leading to issues on FIELD

Risk Analysis : Balance risks vs Benefits

Risks :

Money

Image

Durability of company

Employee & Customer security

Benefits :

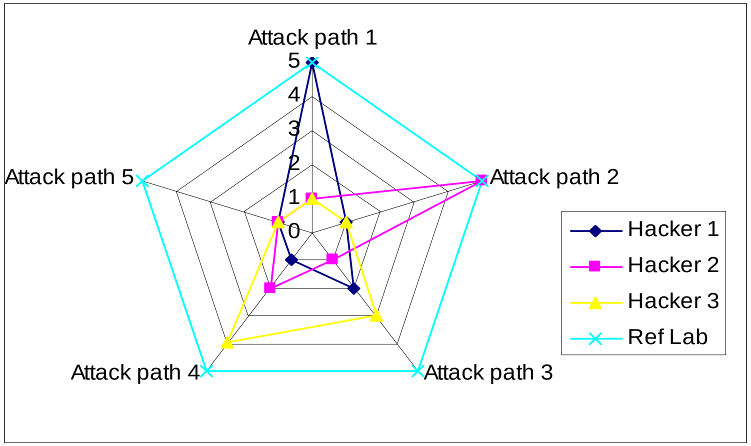
Money

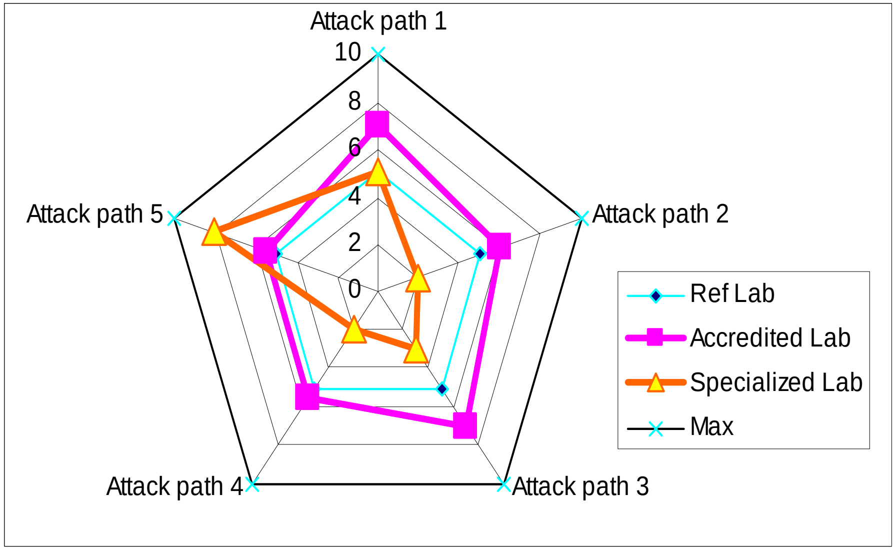
Market share

Competitors

Business opportunity

Issue in attack quotation according to expertise profile





Hacker profiles defining reference lab profile

Accredited & specialized Lab profiles vs reference lab profile

Even if same attack quotation table is used, different attack quotations may appear according to lab expertise.
CB are able to leverage quotation better than customers

Cost of product security

- Cost of definition including business case study
- Cost of development
- Cost of manufacturing
- Cost of transportation
- Cost of deployment
- Cost of administration (update, renewal,…)
- Cost of revocation

- Cost of fraud

- Cost of Product & Process evaluation

Cost of confidence with Common Criteria

CC evaluation is costly if you want a complete confidence :

- Product / Process / Environment / Delivery => (EAL4)

- It is possible to use specific packages to use CC items aligned to Private Scheme scope:
- Level 1: Functional testing, Black box testing, VLA.2
- Level 2: Functional testing, Grey box testing

What activities for customer confidence ?

- Confidence in Product Security may be obtained through:
  - Risk Management
  - Shared Evaluation Methodology
  - Checks on Product security
  - Checks on Process (Dev, Manufacturing, Perso,Installation, Admin, usage)
  - Checks on Environment (Dev, Manu, Perso, IT)
  - Checks on delivery (roles, procedures, Logical & Physical)

- Confidence increases with the scope of evaluation (balance for confidence increase and cost & delay)

CC assurance classes & risk coverage

	APE	ASE	ADV	AGD	ALC	ATE	AVA
Assurance on Product resistance	X	X	X				X
Assurance on Product correctness	X	X	X	X	X	X	
Assurance on Product Devt Process	X	X	X		X	X	X
Assurance on Product Manufacturing Process	X	X			X		
Assurance on Product Personalization Process	X	X			X		
Assurance on Final Delivery	X	X			X		
Assurance on Guidance for operation	X	X		X			
Assurance on Environment Development	X	X			X		
Assurance on Environment Manufacturing	X	X			X		
Assurance on Environment Personalization	X	X			X		

Private schemes cover only parts of assurance for product correctness and robustness
(optionally environment manufacturing)

Assurance classes and Life cycle coverage

The CC EAL4 assurance components supply requirements for all the phases in TOE life cycle and all activities.

Life cycle	Activities	Assurance class
Requirements	Need definition	APE&ASE
Construction	Development	ADV&ALC_LCD
	Test	ATE
	Vulnerability analysis	AVA
	Development environment	ALC_CMx, ALC_TAT& ALC_DVS
Delivery to user	Development environment	ALC_DEL
Installation and start up	Exploitation environment	ADO_IGS
Operation	Exploitation environment	AGD
End of Life	Exploitation environment	AGD

Private scheme requirements focuses only on operational phase

Private scheme contents and CC proposal (1)

	Level 1 (Black Box)	CC Items & Methodology
Objectives	Focused on major customer issues Service availability, Key confidentiality No theft of valued services	Aligned but including CC terminology added value
Risk Management	Not shared	Context shared (threat, attacker profile, asset, objectives) & SF & vulnerabilities
Evaluation Methodology	Poorly described and no sharing of attack paths and quotation	Described and shared
Product dependant scope	Weak definition of scope and requirements	Simple security target reading (Reuse) + CC Terminology
Product dependant Correctness	Functional specification reading (subset) Independent Functional Testing	ADV_FSP + Functional spec reading ATE_IND + Functional Testing
Product dependant Robustness	Penetration testing & Potential Basic on a limited scope & Customer acceptance	AVA_VAN.1* on a ST scope Customer acceptance
Process	No checks	Few checks
Environment	No checks	No checks
Duration	1 + 2 months	# 1 + 2 Months

Private scheme contents and CC proposal (2)

	Level 2 (Grey Box)	CC Items & Methodology
Objectives	Focused on major customer issues Service availability, asset protection No theft of valued services	Aligned but including CC added value
Risk Management	Idem level 1	Idem (1)
Eval Methodology	Idem level 1	Idem (1)
Product dependant scope	Weak definition of scope and requirements	Simple security target reading (Reuse) + CC Terminology
Product dependant Correctness	Functional specification, design reading Developer & Independent functional Testing	ADV_FSP.1 + Functional spec reading ADV_TDS.1, ADV_ARC.1, ADV_IMP.1 ATE_IND + Functional Testing
Product dependant Robustness	Penetration testing & Potential enhanced Basic on a limited scope & Customer acceptance	AVA_VAN.3* on a ST scope CB certificate & Customer acceptance
Process	No checks	ALC_CMS, ALC_LCD
Environment	Visit	ALC_DVS
Duration	1+ 3 months	#2+ 4 months

Proposal objectives & assumptions

Alignment of CC requirements on actual work items:

1. To introduce CC terminology and rigor
2. To decrease effort on correctness and process consistency
3. To focus effort on Robustness testing and Functional testing

These proposals are based on assumptions :

1. Developers have repeatable development & manufacturing process (ISO 9001)
2. Developers manage security environment (ISO 27001)

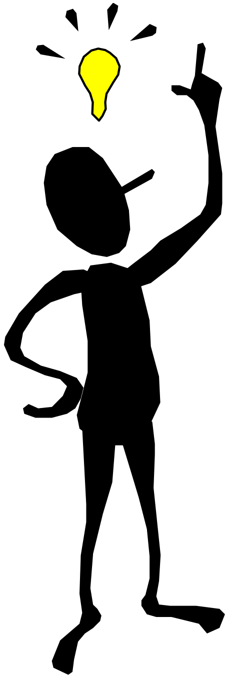
My proposal

- Explain customer interest of using CC
- Train Customer to CC terminology
- Share Risk methodology with Customer to leverage cost of evaluation vs cost of security

- Define assurance package aligned with risk assessment with a narrow scope than standard EAL.

- Write customer oriented packages of security objectives to include in security targets

Questions



Thank you for your attention