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WHICH SECURITY CATALOGUE IS BETTER FOR NOVICES?

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SESAR JOINT UNDERTAKING

UNIVERSITY OF TRENTO

EMFASE

The Problem

- Several methodologies and standards to identify threats and possible security requirements are available
  - Standards: ISO 27005, US NIST 800-53, UK's IAS
  - Methods: STRIDE, SABSA, COBIT, Eurocontrol or SESAR's SecRAM
- Any risk assessment needs expertise in domain and security

Where to find expertise?

- Experts are expensive and busy
- Non security experts + catalogue → does it work?
  Maybe, yes. [REFSQ'15]
  - Non-experts + general or domain-specific catalogue ~ Security experts without a catalogue
    - Domain-general: BSI IT-Grundschutz Catalogue
    - Domain-specific: Eurocontrol's ATM Security Risk Management Toolkit
- But which catalogue is better for novices with no domain and no security expertise?
  - Domain-general vs. domain-specific

Catalogues' Scales

- BSI IT-Grundschutz Catalogue
  - Introduction → 40 pages
  - Assets → 375 pages
  - Threats → 723 pages
  - Security Controls → 3078 pages
- Eurocontrol's ATM Security Risk Management Toolkit
  - Guidance Material → 100 pages
  - ATM specific Threats → 57 pages
  - Pre-event ATM controls → 72 pages
  - Post-event ATM controls → 27 pages
- Remotely Operated Tower Scenario
  - Operational Focus Area Description → 100+ pages
  - Essential scenario description → 24 pages

Research Method

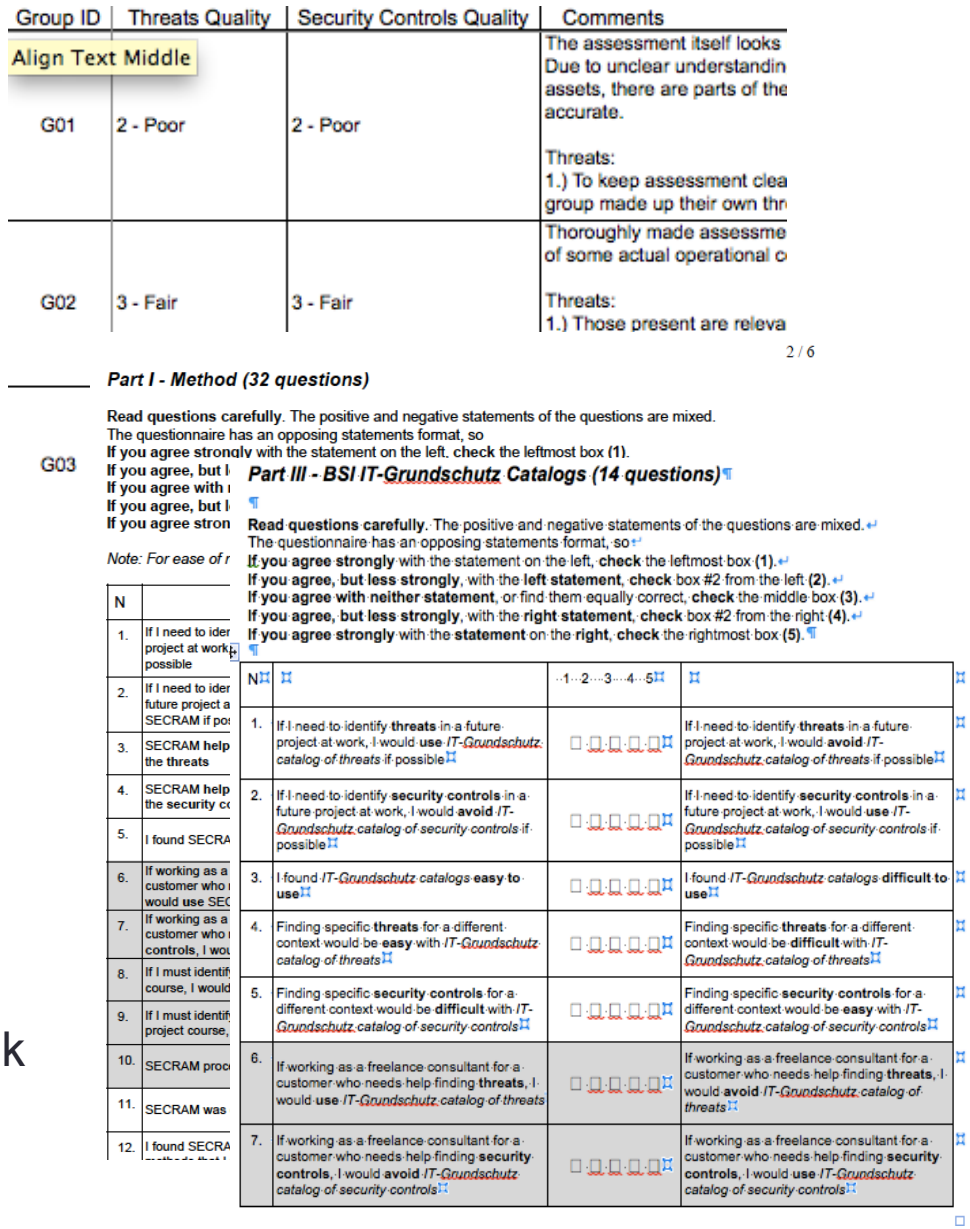
- Goal
  - Evaluate the effect of using domain-general vs. domain-specific catalogues on the *actual efficacy* and *perception* of a security risk assessment method applied by novices
- Treatments
  - Novices with a domain-general catalogue (GENCAT)
  - Novices with a domain-specific catalogue (DOMCAT)
- Context
  - ATM Domain – Remotely Operated Tower Scenario
  - Security Method – SESAR Security Risk Assessment Method
  - Catalogues
    - GENCAT: BSI IT-Grundschutz Catalogues
    - DOMCAT: Eurocontrol's ATM Security Risk Management Toolkit
  - Participants: 18 MSc students in Computer Science

Metrics

- Actual Efficacy (AE)
  - whether the treatment improves performance of the task
- Perceived Efficacy (PE)
  - Perceived Ease Of Use – PEOU
    - the degree to which a person believes that using a treatment would be free of effort
  - Perceived Usefulness – PU
    - the degree to which a person believes that a treatment will be effective in achieving its intended objectives
- AE Null Hypothesis
  - No difference between the treatements in identified threats/controls
- PE Null Hypothesis
  - No difference between the perceived efficacy (PEOU, PU) by the participants

Measurements

- Actual Efficacy
  - Quantity (num of threats and security controls reported by groups)
    - counted by authors
  - Quality of threats and security
    - 3 independent experts in ATM security
- Perceived Efficacy
  - Perceived Ease of Use + Perceived Usefulness
    - Measured by mean of post-task questionnaires on 1-5 Likert scale



Group ID	Threats Quality	Security Controls Quality	Comments
Align Text Middle			
G01	2 - Poor	2 - Poor	The assessment itself looks Due to unclear understandin assets, there are parts of the accurate. Threats: 1.) To keep assessment clea group made up their own thr
G02	3 - Fair	3 - Fair	Thoroughly made assessme of some actual operational c Threats: 1.) Those present are releva
G03			

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Part I - Method (32 questions)

Read questions carefully. The positive and negative statements of the questions are mixed.
The questionnaire has an opposing statements format, so
If you agree strongly with the statement on the left, **check** the leftmost box **(1)**.
If you agree, but l
If you agree with
If you agree, but l
If you agree stron

Note: For ease of r

N	
1.	If I need to ider project at work, possible
2.	If I need to ider future project a SECRAM if pos
3.	SECRAM help the threats
4.	SECRAM help the security co
5.	I found SECRA
6.	If working as a customer who would use SEC
7.	If working as a customer who controls, I wo
8.	If I must identif course, I would
9.	If I must identif project course,
10.	SECRAM proc
11.	SECRAM was
12.	I found SECRA

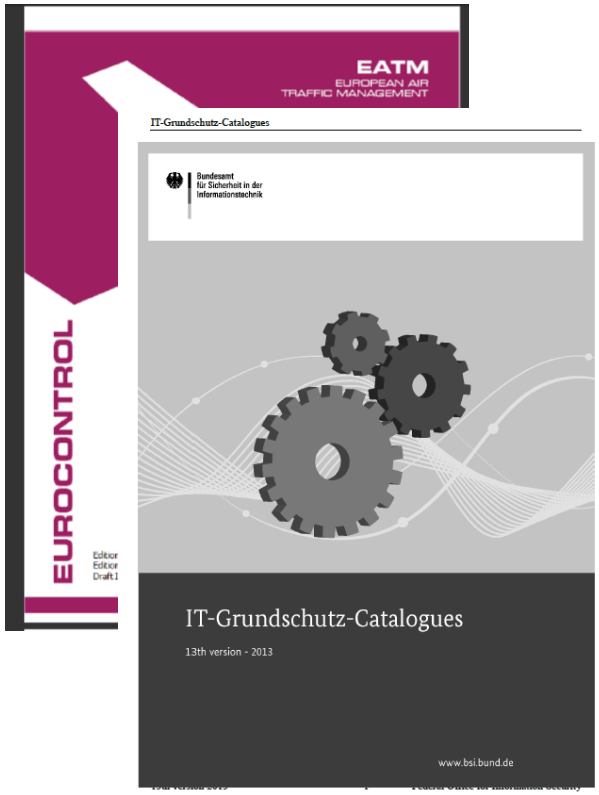
Part III - BSI IT-Grundschutz Catalogs (14 questions)

Read questions carefully. The positive and negative statements of the questions are mixed.
The questionnaire has an opposing statements format, so
If you agree strongly with the statement on the left, **check** the leftmost box **(1)**.
If you agree, but less strongly, with the **left statement**, **check** box #2 from the left **(2)**.
If you agree with neither statement, or find them equally correct, **check** the middle box **(3)**.
If you agree, but less strongly, with the **right statement**, **check** box #2 from the right **(4)**.
If you agree strongly with the **statement** on the **right**, **check** the rightmost box **(5)**.

N		1 2 3 4 5	
1.	If I need to identify **threats** in a future project at work, I would **use** *IT-Grundschutz catalog of threats* if possible	☐ ☐ ☐ ☐ ☐	If I need to identify **threats** in a future project at work, I would **avoid** *IT-Grundschutz catalog of threats* if possible
2.	If I need to identify **security controls** in a future project at work, I would **avoid** *IT-Grundschutz catalog of security controls* if possible	☐ ☐ ☐ ☐ ☐	If I need to identify **security controls** in a future project at work, I would **use** *IT-Grundschutz catalog of security controls* if possible
3.	I found *IT-Grundschutz catalogs* **easy to use**	☐ ☐ ☐ ☐ ☐	I found *IT-Grundschutz catalogs* **difficult to use**
4.	Finding specific **threats** for a different context would be **easy** with *IT-Grundschutz catalog of threats*	☐ ☐ ☐ ☐ ☐	Finding specific **threats** for a different context would be **difficult** with *IT-Grundschutz catalog of threats*
5.	Finding specific **security controls** for a different context would be **difficult** with *IT-Grundschutz catalog of security controls*	☐ ☐ ☐ ☐ ☐	Finding specific **security controls** for a different context would be **easy** with *IT-Grundschutz catalog of security controls*
6.	If working as a freelance consultant for a customer who needs help finding **threats**, I would **use** *IT-Grundschutz catalog of threats*	☐ ☐ ☐ ☐ ☐	If working as a freelance consultant for a customer who needs help finding **threats**, I would **avoid** *IT-Grundschutz catalog of threats*
7.	If working as a freelance consultant for a customer who needs help finding **security controls**, I would **avoid** *IT-Grundschutz catalog of security controls*	☐ ☐ ☐ ☐ ☐	If working as a freelance consultant for a customer who needs help finding **security controls**, I would **use** *IT-Grundschutz catalog of security controls*

Is Quantity Useful?

- Quantity of threats/controls makes no sense with catalogue



XX threats

YYY controls


Security Engineering Report on Remotely Operating Tower

nt 1: Ted Mosby

nt 2: Robin Scherbatsky

RGET OF EVALUATION

IMARY OF FINDINGS

Experimental Protocol

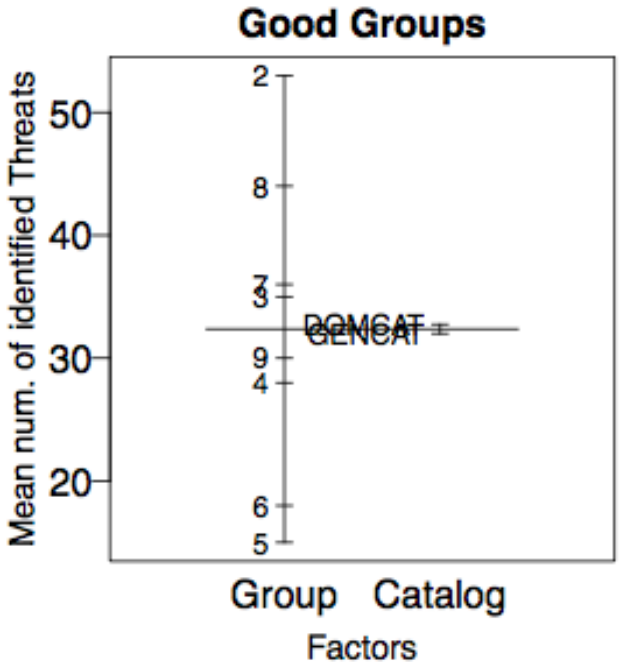
- Training
  - Application scenario
    - 1 hour training by ATM domain expert
  - Method
    - 8 hours tutorial by EUROCONTROL expert
- Application
  - 6 hours to revise the security risk assessment
  - 2 post-task questionnaires to collect participants' perception of:
    - the method
    - the catalogues
- Evaluation
  - 3 ATM security experts evaluated the quality of threats and security controls

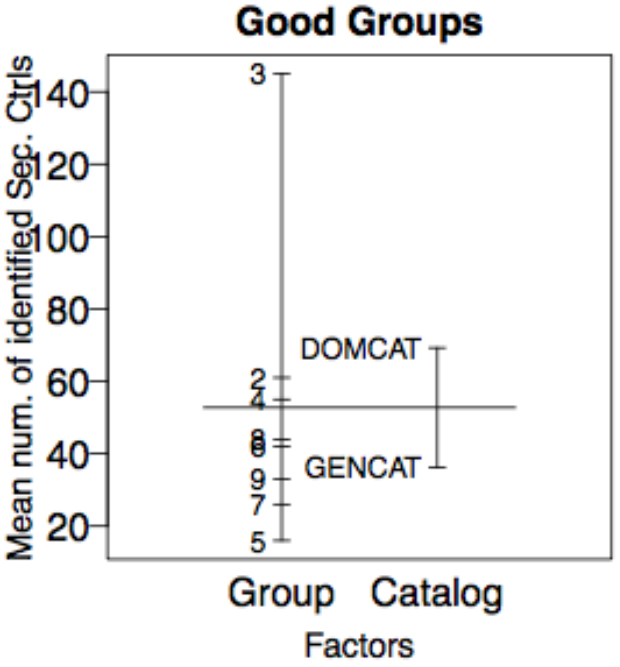
Results: Actual Efficacy

- Quantity
  - # threats: DOMCAT ~ GENCAT
  - # sec. controls: DOMCAT > GENCAT
    - No statistical significance
- Quality (median values)

	DOMCAT	GENCAT
Threats	3.33	3
Sec. controls	3.33	3.67

  - No statistical significance
  - We would need
    - Threats quality: 38 groups
    - Sec. controls quality: 101 groups





Results: Perceived Efficacy

- Method with Catalogues

	DOMCAT	GENCAT	Req. # participants
Median PEOU	4	3	2968
Median PU	4	3	**10 (we had 18)**

- Catalogues

	DOMCAT	GENCAT	Req. # participants
Median PEOU	4	3.5	35
Median PU	4	3	746

- We would need or bigger difference (2.5 vs. 4.5) in the results OR more participants

Summary

- Conclusions
  - Which catalogue is better for novices? – Both may work
  - Method + domain-specific catalogues → higher PU
  - Quantitative metrics do not work for catalogues comparison
- Open questions
  - Comprehensibility of the results
  - Replication on a large risk assessment
- Ads
  - Want to join the effort? → we are looking for replications
  - More Info? → http://securitylab.disi.unitn.it