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Survey: Italian Formal Training Offering on ICT Security

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This survey aims at assessing existing Italian bachelor and/or master level university curricula with respect to the field of ICT security, using knowledge and competences frameworks published by international bodies.

It is a joint effort of C.I.N.I. National Laboratories: CFC (digital Competences, Formal training and Certification) and Cyber Security (https://www.consorzio-cini.it/index.php/it/). All data collected from the participating institutions will be used in anonymous way.

Currently, the survey uses definitions from the "The European Foundational ICT Body of Knowledge v1.0" (http://www.ictbok.eu/proposedFramework.html), EUBoK in the following, and the "European Competence Framework eCF 3.0" (http://www.ecompetences.eu/it/), eCF in the following. Each of these frameworks will be briefly described in the survey.

The survey is split into the following sections:
Section 2: description of the course/institution
Section 3: description of the EUBoK
Section 4: assessment of the EUBoK vs Curriculum
Section 5: description of eCF
Section 6: assessment of EUBoK vs eCF vs Curriculum
Section 7: final consideration of possible curriculum re-design

*Campo obbligatorio

Description of the curriculum
This section collects data on the curriculum being assessed, including details of the Institution offering it, global effort (in Italian CFU), specific effort of the subject matter of the survey (in Italian CFU), lab requirements (if any), project work (if any). The assessment can be carried out on any curriculum, provided it has "some" offering in the ICT security domain. For the purpose of this survey, a "curriculum" is any track, either a formally approved one, or part thereof, even if it is not labelled "Security".

1. **Institution** *
   University / Foundation / other training body

   ....

2. **Name of the curriculum** *

   ....

3. **Type of degree** *
   Contrassegna solo un ovale.

   (**1**) Bachelor (L3)

   (**8**) Master (LM)

   (**2**) Post-degree first level master (ML3)

   (**2**) Post-degree second level master (MLM)

   (**1**) PhD

4. **Curriculum total effort in ICT (in CFU)** *

....

5. **Curriculum total effort in ICT Security (in CFU)** *

....

6. **Number of modules/courses on ICT Security** *

Quote number of modules/courses that cover to ANY extent ICT security.

....

7. **Laboratory total effort (hours)**

Practical learning activities carried out in institution premises (quote hours for the whole curriculum)

....

8. **Project work**

Quote total number of project work assignements in ICT security modules/courses

....

9. **Contact person** *

Please, leave contact info of the person who took care of this survey (name and family name)

....

10. **Contact e-mail** *

Please, leave e-mail address of contact person

....

EU Foundational Body of Knowledge (EUBoK)

This section briefly describes the EU Foundational Body of Knowlegde (EUBoK in the folllowing) and specifically assesses the curriculum against the "Security Management" knowledge area of that BoK (SM in the following).
A complete description can be downloaded here (http://www.ictbok.eu /proposedFramework.html).

EUBoK has been designed as a "generic, industry-oriented, permissive" body of knowledge that captures "the base-level knowledge that ICT professionals require". "Generic" as opposed to domain specific; "Industry-oriented" in that "the ultimate objective is to provide the foundational knowledge people need to approach the ICT profession in a way that meets industry needs, ... it includes both managerial and technical knowledge covering the ICT business process, from planning to design to developing and to managing

Description of the curriculum

This section collects data on the curriculum being assessed, including details of the Institution offering it, global effort (in Italian CFU), specific effort of the subject matter of the survey (in Italian CFU), lab requirements (if any), project work (if any). The assessment can be carried out on any curriculum, provided it has "some" offering in the ICT security domain. For the purpose of this survey, a "curriculum" is any track, either a formally approved one, or part thereof, even if it is not labelled "Security".

| Type of curriculum (CdS)	Total ICT CFU	Security CFU	# modules	Lab hours	Project hours
Master (LM)	120	90	10	200	200
Bachelor (L3)	117	42	6	240	0
Post-degree first level master (ML3)	60	38	8	396	250
Master (LM)	120	12	2	0	30
PhD	32	12	3	36	3
Post-degree second level master (MLM)	60	40	9	20	6
Master (LM)	120	12	2	32	1
Master (LM)	120	18	3	36	4
Master (LM)	66	30	5	150	70
Post-degree second level master (MLM)	60	60	21	40	1
Master (LM)	60	48	8		
Master (LM)	69	21	3	12	1
Master (LM)	120	20	4	0	0
Post-degree first level master (ML3)	60	51	8	84	400

technologies"; "permissive" in that not all the knowledge it describes has to be part of the background of all ICT professionals.

Version 1.0 of EUBoK consists of a taxonomy of 12 KNOWLEDGE AREAS (KA in the following): each KA is structured into:
i) a short description;
ii) a list of Knowledge Items (KI in the following);
iii) a list of references to eCF (see section 5);
iv) a list of possible job profiles;
v) a list of examples of specific Bodies of Knowledge, certification schemes pertaining the KA.

This survey ONLY covers KA "SECURITY MANAGEMENT" (SM). In the following section, you will be presented with the definition of this KA and will be asked to assess it, with reference to the curriculum of your institution.

EUBoK 12 Knowledge Areas
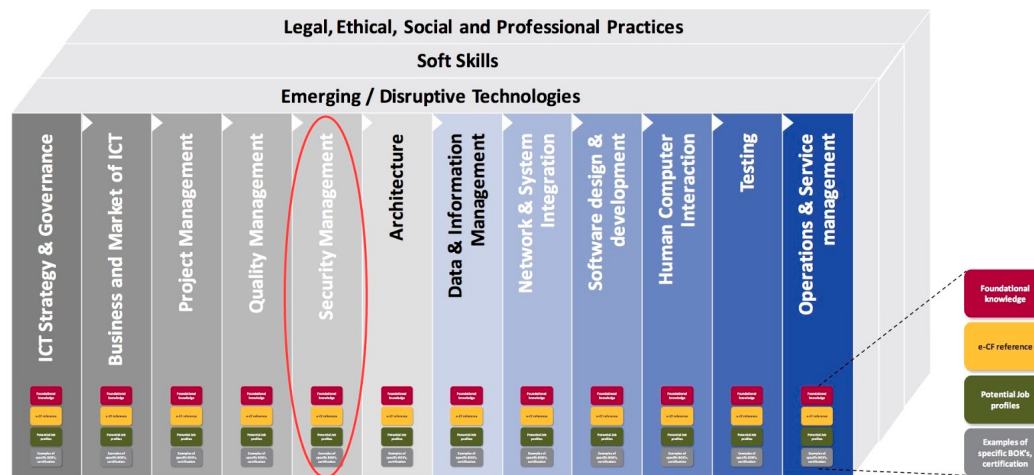
Security Management (SM) Knowledge Area
This section shows the break-down of this EUBoK KA into its constituents parts, and then collects feedback on the match/mismatch between them and the curriculum being assessed.

1) Short description

Information Security Management aims to ensure the confidentiality, integrity and availability of an organisation's information, data and IT services. It specifies requirements for the implementation of security controls customised to the needs of individual organisations or parts thereof[xxiii]

11. **Short description assessment** *
    Evaluate the overall correspondence between this "short description" and the curriculum contents, as far as ICT Security is concerned.
    Seleziona tutte le voci applicabili.

	poor match
3	moderate match
11	good match

2) Foundational Knowledge Items

Here is the list of the "coarse-grain" knowledge items proposed as "foundational" for the "Security Management" KA:

Foundational knowledge required

- Introduction to security principles and concepts
- IT Security controls, plans and procedures
- Computer security (including firewalls and intrusion prevention systems, malicious software, cryptography, etc)
- Network security
- Computer forensics
- Business continuity management (e.g. security audit)
- Human behaviour / psychology

12. **Foundational Knowledge items coverage** *

Please, assess each KI vs the curriculum (consider all contributions from the modules/course as a whole and rate overall coverage/effort CFU). Use the following grid.
Contrassegna solo un ovale per riga.

	No coverage	≤ 5 CFU	6 ÷ 15 CFU	>15 CFU
Introduction to security principles and concepts	1	7	5	1
IT Security controls, plans and procedures	1	7	6	
Computer security (firewalls, intrusion prevention systems, malicious software, cryptography)		5	4	5
Network security		5	8	1
Computer forensics	4	7	3	
Business continuity management (e.g. security audit)	6	7	1	
Human behaviour / psychology	10	5		

13. **Foundational Knowledge items suggestions**

If you feel that some "basic knowledge items" are missing, please list them. Also, if you believe that any of the above KI is not pertinent to your curriculum, please tell why.

....
....
....
....
....

14. **Project work**
    Say if any project work is assigned in any of the KI above, and if so, which one(s)

....

....

....

....

....

3) Examples of job profiles envisioned

EUBoK envisions a number of job profiles that are "close" to this KA. 1) rate how much these profiles do match the KA; a2) rate how much your curriculum helps in preparing for these profiles.

15. **Job profiles Assessment vs KA** *
    Contrassegna solo un ovale per riga.

	no matches (KA)	poor match (KA)	moderate match (KA)	good match (KA)
ICT security manager			5	9
ICT Operations Manager	1	4	3	6
Systems Administrator		3	7	5
ICT security Specialist		1	4	9

16. **Job profiles Assessment vs curriculum** *
    Contrassegna solo un ovale per riga.

	no match (CURR)	poor match (CURR)	moderate match (CURR)	good match (CURR)
ICT security manager			5	9
ICT Operations Manager	1	4	6	3
Systems Administrator		2	7	4
ICT security Specialist		2	2	10

4) Examples of specific Bodies of Knowledge & Certification Schemes

1) if you know any of the following certification schemes, state your opinion about their relevance; 2) tell whether you have used any of them during the DESIGN PHASE of your curriculum; optionally mention alternative/additional schemes that you have used or consider worth looking at.

17. **Specific Bodies of Knowledge and Certification schemes vs KA** *

Contrassegna solo un ovale per riga.

	don't know	poor relevance	moderate relevance	good relevance
CISM (Certified Information Security Management- ISACA)	5	2	3	4
ISM (Information Security Management – ITILv3)	7	1	6	
CREST (http://www.crest-approved.org/)	6	2	5	
EnCASE certification (https://www.guidancesoftware.com/#)	7	3	4	
CISSP (Certified Information Systems Security Professional)	5	1	4	4

18. **Specific Bodies of Knowledge and Certification schemes vs CURRICULUM DESIGN** *

Contrassegna solo un ovale per riga.

	not considered	considered, not used	considered, used for hints	considered, used consistently
CISM (Certified Information Security Management- ISACA)	6	5	3	
ISM (Information Security Management – ITILv3)	10	3	1	
CREST (http://www.crest-approved.org/)	12	1	1	
EnCASE certification (https://www.guidancesoftware.com/#)	12	1	1	
CISSP (Certified Information Systems Security Professional)	7	4	2	1

19. **If you consider other specific BoKs or Certification schemes useful for SM, please quote them:**

....

....

....

....

....

e-Competence Framework (eCF)

This section offers a very short description of another reference for completing the definition of a BoK and possibly for the design of curricula. The interested reader can refer to the eCF web site (quoted in section 1) for reading and downloading all eCF documentation: in what follows, only the basic notions will be presented, in order to gain an assessment on the usefulness of a competence-based approach.

• eCF is a scheme to define COMPETENCES rather than KNOWLEDGE. Drawing from the eCF web site:

'Competence is a demonstrated ability to APPLY knowledge, skills and attitudes for achieving observable results';

• eCF version 3.0 encompasses overall 40 competences;

• a competence can be a component of a job role, but it cannot be used as a substitute for similarly named job titles;

• competence is not to be confused with process or technology concepts;

• e-CF is structured from 4 DIMENSIONS: dimension 1 (PLAN, BUILD, RUN, ENABLE and MANAGE) and 2 (COMPETENCES LIST) are presented from the organisational perspective, dimension 3 defines e-competence PROFICIENCY LEVELS related to the European Qualifications Framework (EQF), dimension 4 references KNOWLEDGE ITEMS and SKILL, with examples that are NOT assumed to be exaustive.
The picture available here graphically represents the eCF framework (https://drive.google.com/file/d/0B3FwZcq-NKq5b3U3WDVZZUgxWHM/view?usp=sharing).

In the following sections of this survey, 1) you will be presented with the list of e-competences that, according to the EUBoK, rests on the Security Management KA; and 2) you will be asked to assess each such competence with respect to your curriculum.

eCF competences and EUBoK Security Management KA (SM)

EUBoK considers the following eCF competences as pertaining to the Security Management KA (SM):

• A6 Application Design
• B1 Application Development
• B6 Systems Engineering
• C1 User Support
• D10 Information and Knowledge Management

Please rate each of them both with respect to the EUBoK KA (SM) and with respect to your curriculum: 1) eCF competence benefits for its knowledge dimension from SM; 2) your curriculum helps to develop eCF competence.

20. **eCF A6 Application Design** *

eCF A6 Application Design: a short description below, for a full description see (https://drive.google.com/file/d/0B3FwZcq-NKq5ZEpBc1EwZ0xqMmM/view?usp=sharing).

Dimension 1 e-Comp. area	A. PLAN
Dimension 2 e-Competence: Title + generic description	**A.6. Application Design** Analyses, specifies, updates and makes available a model to implement applications in accordance with IS policy and user/customer needs. Selects appropriate technical options for application design, optimising the balance between cost and quality. Designs data structures and builds system structure models according to analysis results through modelling languages. Ensures that all aspects take account of interoperability, usability and security. Identifies a common reference framework to validate the models with representative users, based upon development models (e.g. iterative approach).

Contrassegna solo un ovale per riga.

	Not relevant	Possibly relevant	Relevant	Mandatory
SM vs eCF A6 Application Design		4	8	2
Curriculum vs eCF A6 Application Design	1	2	8	3

21. **eCF B1 Application Development** *

eCF B1 Application Development full description here (https://drive.google.com/file/d/0B3FwZcq-NKq5QjdxRjdScUZpaE0/view?usp=sharing). Rate the relevance of: 1) SM; 2) your curriculum vs the eCF B1 Application Development competence.

Dimension 1 e-Comp. area	B. BUILD
Dimension 2 e-Competence: Title + generic description	**B.1. Application Development** Interprets the application design to develop a suitable application in accordance with customer needs. Adapts existing solutions by e.g. porting an application to another operating system. Codes, debugs, tests and documents and communicates product development stages. Selects appropriate technical options for development such as reusing, improving or reconfiguration of existing components. Optimises efficiency, cost and quality. Validates results with user representatives, integrates and commissions the overall solution.

Contrassegna solo un ovale per riga.

	Not relevant	Possibly relevant	Relevant	Mandatory
SM vs eCF B1 Application Development		6	7	1
Curriculum vs B1 Application Development	1	4	8	1

22. **eCF B6 Systems Engineering** *

eCF B6 Systems Engineering full description here (https://drive.google.com/file/d/0B3FwZcq-NKq5SmFBVINNUTByZzQ/view?usp=sharing). Rate the relevance of: 1) SM; 2) your curriculum vs the eCF B6 Systems Engineering competence.

Dimension 1 e-Comp. area	B. BUILD
Dimension 2 e-Competence: Title + generic description	**B.6. Systems Engineering** Engineers software and/or hardware components to meet solution requirements such as specifications, costs, quality, time, energy efficiency, information security and data protection. Follows a systematic methodology to analyse and build the required components and interfaces. Builds system structure models and conducts system behavior simulation. Performs unit and system tests to ensure requirements are met.

Contrassegna solo un ovale per riga.

	Not relevant	Possibly relevant	Relevant	Mandatory
SM vs eCF B6 Systems Engineering		1	11	2
Curriculum vs B6 Systems Engineering		1	10	3

23. **eCF C1 User Support** *

eCF C1 user support full description here (https://drive.google.com/file/d/0B3FwZcq-NKq5R21TR2R2ZzNMX0U/view?usp=sharing). Rate the relevance of: 1) SM; 2) your curriculum vs the eCF C1 User Support competence.

Dimension 1 e-Comp. area	C. RUN
Dimension 2	**C.1. User Support**
e-Competence: Title + generic description	Responds to user requests and issues, recording relevant information. Assures resolution or escalates incidents and optimises system performance in accordance with predefined service level agreements (SLAs). Understands how to monitor solution outcome and resultant customer satisfaction.

Contrassegna solo un ovale per riga.

	Not relevant	Possibly relevant	Relevant	Mandatory
SM vs eCF C1User Support		6	8	
Curriculum vs C1 User Support	4	9	1	

24. **eCF D10 Information and Knowledge Management** *

ECF competence D10 Information and Knowledge Management full description here: https://drive.google.com/file/d/0B3FwZcq-NKq5TmQ0S0Y0c0FGTVE/view?usp=sharing. Please, rate the relevance of: 1) SM; 2) your curriculum vs the eCF D10 Information and Knowledge Management competence.

Dimension 1 e-Comp. area	D. ENABLE
Dimension 2	**D.10. Information and Knowledge Management**
e-Competence: Title + generic description	Identifies and manages structured and unstructured information and considers information distribution policies. Creates information structure to enable exploitation and optimisation of information. Understands appropriate tools to be deployed to create, extract, maintain, renew and propagate business knowledge in order to capitalise from the information asset.

Contrassegna solo un ovale per riga.

	Not relevant	Possibly relevant	Relevant	Mandatory
SM vs eCF D10 Information and Knowledge Management		3	10	1
Curriculum vs eCF D10 Information and Knowledge Management	1	6	6	1

eCF Further Competences on Security

eCF has two more competences related to Security:
• D1 Information Security Strategy Development
• E8 Information Security Management

We ask you to assess them with reference to your CURRICULUM

25. **eCF D1 Information Security Strategy Development assessment** *

eCF D1 Information Security Strategy Development full description here (https://drive.google.com/file/d/0B3FwZcq-NKq5TmQ0S0Y0c0FGTVE/view?usp=sharing). Rate your curriculum vs this eCF competence.

Dimension 1 e-Comp. area	D. ENABLE
Dimension 2 e-Competence: Title + generic description	**D.1. Information Security Strategy Development** Defines and makes applicable a formal organisational strategy, scope and culture to maintain safety and security of information from external and internal threats, i.e. digital forensic for corporate investigations or intrusion investigation. Provides the foundation for Information Security Management, including role identification and accountability. Uses defined standards to create objectives for information integrity, availability, and data privacy.

Contrassegna solo un ovale per riga.

	Not relevant	Possibly relevant	Relevant	Mandatory
Curriculum vs eCF D1 Information Security Strategy Development	1	4	5	4

26. **eCF E8 Information Security Management assessment** *

eCF E8 Information Security Management full description here (https://drive.google.com/file/d/0B3FwZcq-NKq5RWJyUnhzbkZDS1k/view?usp=sharing). Rate your curriculum vs this eCF competence.

Dimension 1 e-Comp. area	E. MANAGE
Dimension 2 e-Competence: Title + generic description	**E.8. Information Security Management** Implements information security policy. Monitors and takes action against intrusion, fraud and security breaches or leaks. Ensures that security risks are analysed and managed with respect to enterprise data and information. Reviews security incidents, makes recommendations for security policy and strategy to ensure continuous improvement of security provision.

Contrassegna solo un ovale per riga.

	Not relevant	Partially relevant	Relevant	Mandatory
Curriculum vs eCF E8 Information Security Management		2	7	5

Final assessement

In this last section, we ask you to consider the process of DESIGN and UPDATING of your curriculum in view of the frameworks just outlined, and we solicit suggestions and constructive criticism on the frameworks themselves, with reference to "security" domain.

27. **Design and updating a curriculum through EUBoK**

Contrassegna solo un ovale per riga.

	useless	partially usefull	usefull	very usefull
Overall, do you rate the EUBoK KA SM definition usefull, should you design from scratch a curriculum on ICT security"	1	3	10	
And what about UPDATING your current curriculum on the basis of EUBoK KA (SM)	1	9	4	

28. **Design and updating a curriculum through eCF**

    Contrassegna solo un ovale per riga.

	useless	partially usefull	usefull	very usefull
Overall, do you rate the eCF competence definition usefull, should you design from scratch a curriculum on ICT security"	1	2	11	
And what about UPDATING your current curriculum on the basis of the eCF comptences	1	7	6	

29. **Suggestion for DESIGN and UPDATING curricula**

    If you have rated the EUBoK and/or eCF competences useful to some degree either for DESIGNING or for UPDATING or both, explain why:

    ....

    ....

    ....

    ....

    ....

30. **Finally, we appreciate any other suggestion on the survey and or on the frameworks.**

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    ....

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    ....

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