



TAMTAM Project

*Exploiting the TIPTOE pIAforM by transferring ECVET and EQF
semAntic tools in a Multi-sectoral perspective
2011-1-IT1-LEO05-01969 CUP G12F11000600006*

R7.WP3 Re-structured knowledge base

July 2012



Exploiting the TIPTOE pIAforM by transferring ECVET and EQF semAntic tools in a Multi-sectoral perspective (2011-1-IT1-LEO05-01969 CUP G12F11000600006) Website: www.tamtam.polito.it

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Result:	7	Re-structured knowledge base
Work package:	3	Technological adaptation
Description:	The structure of the knowledge base underlying the semantic platform reorganized in such a way to allow for simultaneously handle qualifications from different sectors expressed in different languages. Moreover, the possibility of establishing links with ECVET concepts and ECVET tools will be integrated. Potential beneficiaries are VET actors from the educational and occupational domains, ECVET users and operators, political decision makers and authorities at the regional, national and European level.	
Edited by:	P0. POLITO	
Contributing partners:	Other partners according to the work programme	
Public/Confidential:	The re-structured knowledge base is hidden behind the adapted TAMTAM platform and it is essential for its functioning. Since in a preliminary phase the platform will be open only to project partners, the knowledge base will be treated as confidential. In the testing and/or exploitation phase/s the platform (and, hence, the knowledge base) will be opened to stakeholders. However, independent of the access granted to the platform/knowledge base, the present document, that describes the adaptation activities that have been carried out in the frame of the work package concerned, can be considered as public.	

1. Introduction

In order to deal with the requirements associated with the new linguistic, geographic, systemic and sectoral target, a technological adaptation of the TIPTOE platform is required. In this view, the methodological update provided in WP2 should be considered in order to identify suitable changes to be applied to the structure of the knowledge base. These modifications should satisfy the following conditions:

- a) the TAMTAM platform should allow the data entry as well as the semantic processing of profiles belonging no more to a single sector (as in the case of the TIPTOE project), but to a variety of them;
- b) the knowledge base should store both profiles in original language, and their translations in the other languages of the consortium;
- c) because of the diversity of qualifications' structure, the TAMTAM platform should provide end-users with a more flexible tool for the insertion of related descriptions (e.g., by foreseeing the possibility to link units/subunits to professional activities, to specify a hierarchy of units, to make information regarding ECVET and other European tools explicit, etc.);
- d) the structure of the knowledge base should allow to consider either single knowledge, skill and competence element, or combinations (rows) of them.

In the following, the structure of the TIPTOE knowledge base, together with its characteristics will be first presented. In particular, special attention will be devoted to the identification of its particular limitations and to the strategies to overcome them that have been considered during the design of the TAMTAM knowledge base. Finally, methodologies for migrating profiles gathered during the TIPTOE project in the TAMTAM knowledge base will be presented.

2. The starting point: the TIPTOE knowledge base

The main objective of the TIPTOE project was to investigate and to compare at the European level both the labor and the training domains, with the aim of identifying the core elements (knowledge, skills and competences) characterizing a profession in a specific sector (namely, the trade one), which were then exploited to build a European-wide profile. As a consequence, the TIPTOE knowledge base were structured to host, on the one hand, qualifications, and, on the other, working profiles belonging to the selected context.

According to the guidelines defined in the first phases of the project, both training and working profiles had to be expressed in terms of tasks, subtasks and linked knowledge, skill and competence elements. Then, for each learning outcome, a set of concepts characterizing their meanings, was identified; these concepts were then structured in a hierarchical form, thus allowing the platform to perform the semantic-based comparison. The corresponding EQF level should be then assigned. The data collection was based upon the template reported in Figure 1.

Based on such template, the structure of the knowledge base capable of supporting the electronic storage of the above data was designed. An excerpt of the Entity-Relationship diagram is depicted in Figure 2. In particular, tables devoted to record qualifications, professional figures and linked concepts are shown. The right portion of Figure 2 displays the working dimension: the *ProfessionalFigure* table contains general information about a working profile, such as the country of origin, its name and a short description (attributes *Country*, *ProfessionalFigure* and *Description*, respectively), as well as a unique identifier, *ProfessionalFigureid*. Each profile should be declined in one or more tasks, collected in the table *TaksPF*: here, each task is uniquely identified through *Taskid*, it is referred to a *ProfessionalFigure* by means of *ProfessionalFigureid*, and it is further described by exploiting the *TaskName* and *Description* attributes. The *SubtaskPF* table stores information concerning subtasks: subtasks are identified by means of the *SubTaskId* attribute, they refer to a Task through *Taskid*, while their name and description are recorded by *SubtaskName* and *Description* attributes, respectively.

Description of Occupation:
remarks/adaptations from survey score results:

Part A	Knowledge	Skills	Competence
	theoretical and/or factual knowledge	cognitive and practical skills	responsibility and autonomy
List of core fields of activity and possible subtasks	Description / comments for clarification of KSC-items. Please extend the space in the cells if you need more room.		
	score	score	score
Task / Activity:			
Subtask:			

Figure 1. Template for data collection used in the TIPTOE project.

Each subtask is then composed of one or more knowledge, skill or competence items, whose details are stored in the *KSCPF* table; here, *KSCid* and *SubtaskId* attributes show, respectively, the unique identifier of a learning outcome and the referenced subtask, while the name is reported in *KSCName* column, the type (either knowledge, skill, or competence) is recorded through the *KSCType* attribute, and finally, an EQF level as well as a score (defining how important is a given learning outcome) is collected, through the *EQFLevel* and the *Score* attributes. Each knowledge, skill or competence is then expressed by one or more concepts; table *ConceptsPF* shows concepts (*Concept* attribute) that are linked to a KSC, defined through the *KSCid* attribute. The whole set of concepts identified in the knowledge base is then organized in a taxonomy; table *Taxonomy* collects relations among concepts: here, for each *Concept*, the concept it is linked to (*UpperLevel*) is specified. Qualifications, on the left part of the Figure 2, have a symmetrical structure: in fact, they are characterized by a *Qualificationid* and, for each training course, details such as the *Country*, the name (*QualificationName*) and the *Description* are provided.

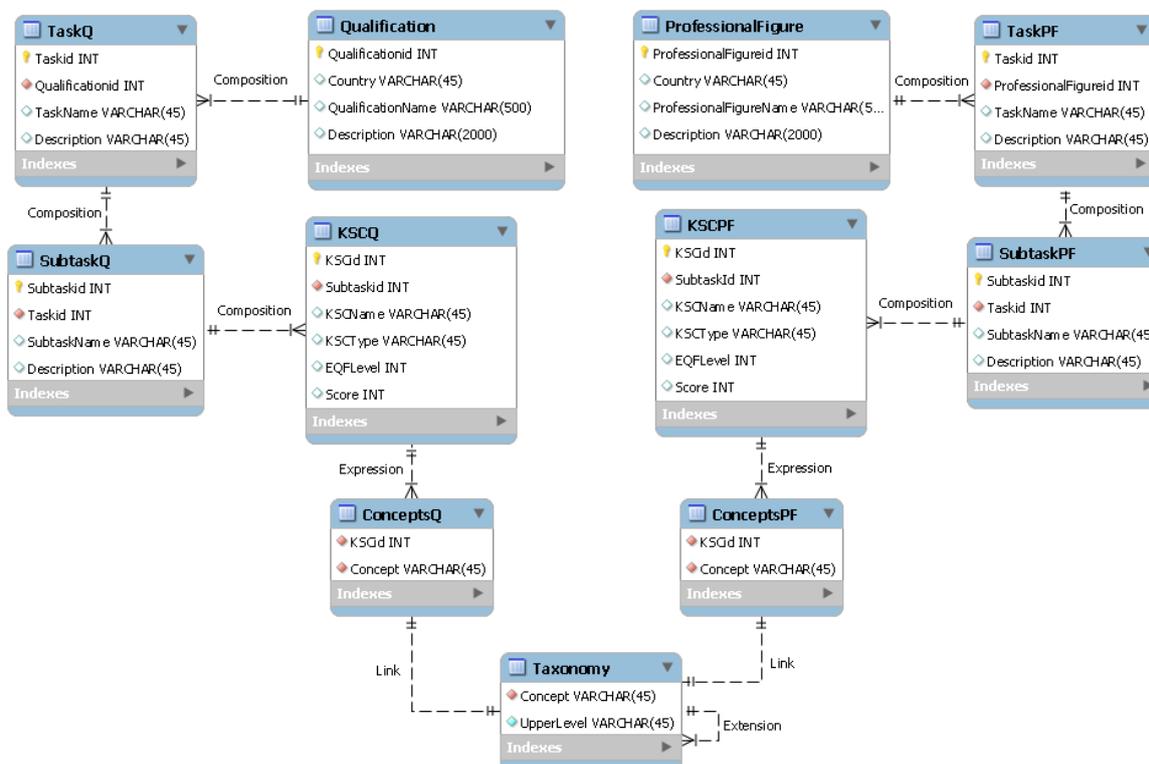


Figure 2. Entity-Relationship diagram for the TIPTOE knowledge base.

Qualifications are then declined in one or more tasks (table *TaskQ*), which are identified through the *Taskid* attribute; moreover, each task refers to a qualification by reporting the identifier of the qualification in the *Qualificationid* column, while its name and description are stored in *TaskName* and *Description* columns. Similarly to the working dimension, also task composing qualifications are divided in one or more subtasks (table *SubtaskQ*), and they are defined by the *Subtaskid*, the identifier of the task they are linked to (*Taskid*), and a name (*SubtaskName*) as well as a *Description*. Each subtask is composed of a group of knowledge, skill and competence elements, stored in table *KSCQ*, which reports the identifier of the KSC (*KSCid*), the identifier of the upper-level subtask (*Subtaskid*), the name and the type of the KSC (*KSCName* and *KSCType*, respectively) and, finally, the *EQFLevel* together with a *Score*. Concepts expressing knowledge, skill and competence elements are then reported in table *ConceptsQ*, in which both the identifier of the KSC and the *Concept* are memorized. Finally, each concept is then linked to the taxonomy. The just depicted structure presents several limitations. First of all, the structure of qualifications and job profiles is rigid, in the sense that it is not possible to correctly record profiles that are not organized according to the schema task-subtask-KSC. Secondly, the TIPTOE knowledge base is devised to work with a single sector, i.e., the trade one. Moreover, the TIPTOE platform is able to deal with only one language (English) and it does not allow users to record translations of profiles. Finally, for what it concerns learning outcomes, it is not possible to consider rows of knowledge, skills and competences, since these elements are only related to the subtask they are linked to and since there are no connections among them. By treasuring the TIPTOE experience, the TAMTAM knowledge base, presented below, has been designed by taking into account the just depicted limitations.

3. The TAMTAM knowledge base

The main objective of the TAMTAM project is to operate a sectoral and geographic transfer of the TIPTOE project and its tools. In this view, the TIPTOE platform has to be adapted, in order to comply with such new requirements. According to the above needs and to the ones emerged during WP2 on methodological adaptation, the platform should be able to work in a multi-sectoral as well as multilingual environment. Moreover, it should be able to deal with a number of different profile structures, in order to be used in a variety of contexts. Then, it should consider single knowledge, skill and competence elements, on the one hand, or groups of them, on the other. Finally, it should memorize additional information, such as the type of learning activity, the EQF/NQF level, or the ECVET points, for units. Hence, a new template (referred to Annex D in result R6 “Guide on the adapted methodology”) has been designed, with others, to support the partners in the collection of qualification descriptions. The novel template is reported in Figure 3.

ANNEX D					
Description of Qualification					
Name Qualification					
Professional activities/tasks	[name [3-10] activities of the occupation, for which the qualification is meant] 1. 2. 3. etc.				
Professional activity/tasks 1: [name]					NQF – EQF [if applicable]
(Sub)units	1a ... 1b ... 1c ...				
(1a) (Sub)unit	Competences (max 1)	Skills (max 3)	Knowledge (max 5)	ECVET or ECTS	Learning activities (more answers possible)
	[has professional competences based on responsibility and autonomy] - ... [has personal and social competences] - ...	[is able to apply their knowledge to practical applications as...] - ... - ... - ...	[has knowledge and understanding of...] - ... - ... - ... - ...	ECVET in % ECTS in points	o Courses o Internships o Theses o Practical experimentations o On-the-job-training o ... o ... o ...

Figure 3. Template for collecting qualification descriptions defined for the TAMTAM project.

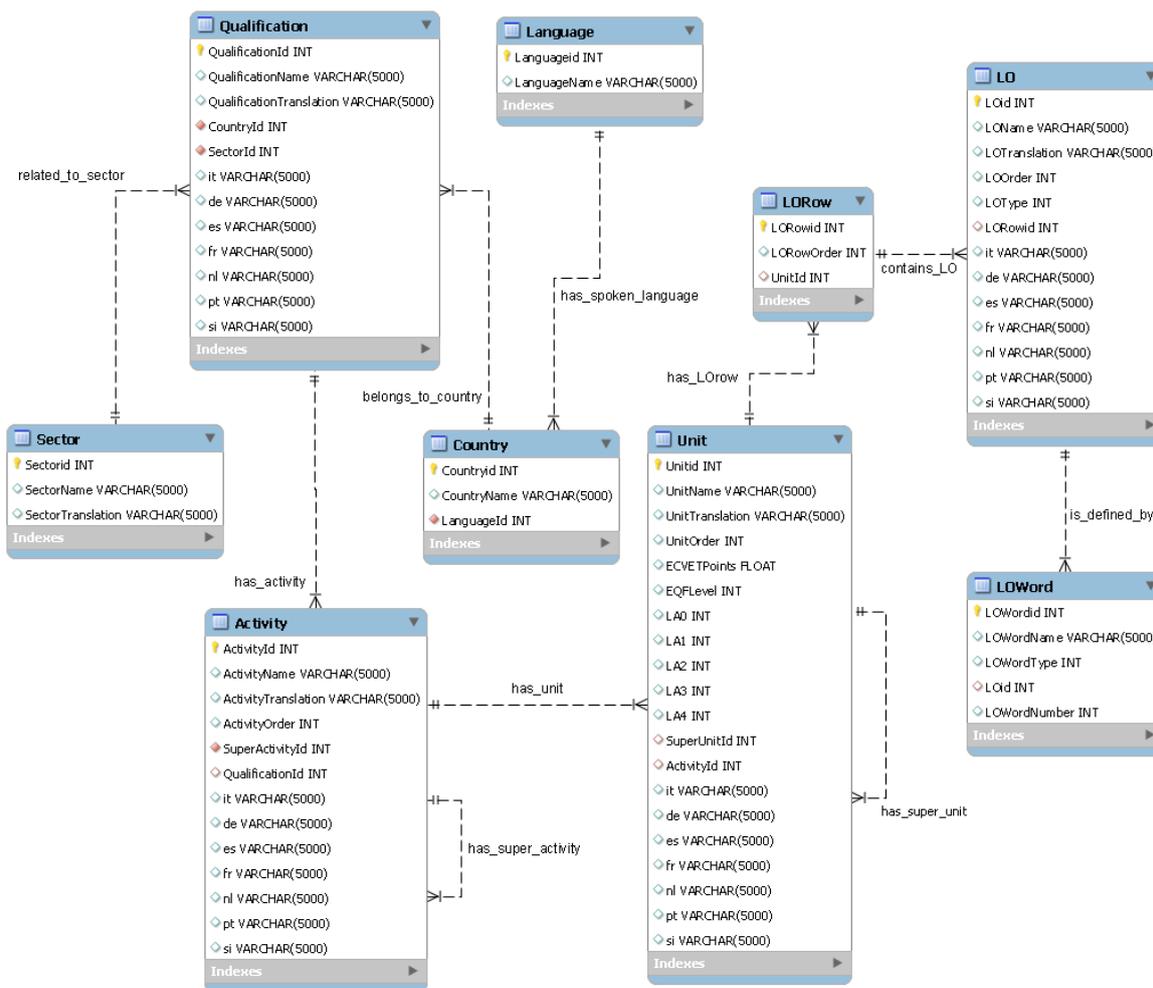


Figure 4. Entity-Relationship (ER) diagram for the TAMTAM knowledge base.

Based on the above template, the TIPTOE knowledge base has been re-designed for TAMTAM. Figure 4 shows the portion of the Entity-Relationship model of the TAMTAM knowledge base devoted to recording qualifications. First of all, the *Language* table collects a number of languages characterized by *Languageid* and *LanguageName* attributes, spoken in the countries to which a qualification refers to, and that are reported in table *Country*, which shows the identifier of the Country (*Countryid*), its name (*CountryName*) and the identifier of the main spoken language (*LanguageId*). The table *Sector* contains sectors investigated within the TAMTAM project: each one is characterized by a unique identifier (*Sectorid*), and it has an English name (*SectorName*) as well as a translation (*SectorTranslation*). Information about qualification is stored in the table *Qualification*: here, the attributes *QualificationId*, *QualificationName* and *QualificationTranslation* provide the unique identifier, the English name and the name in the original language; in addition, the *CountryId* and *SectorId* attributes link this table to tables *Country* and *Sector*. Moreover, for this table, seven other columns (namely, *it*, *de*, *es*, *fr*, *nl*, *pt*, *si*) have been devised, in order to host the automatic translation of the qualification name.

Each qualification could be divided in one or more activities, which, in turn, could be hierarchically arranged. In order to do so, table *Activity*, besides containing attributes reporting the identifier of the activity (*ActivityId*), its English name (*ActivityName*) and translation in original language (*ActivityTranslation*), the identifier of the qualification to which it is referring (*QualificationId*) and automatic translation (*it*, *de*, *es*, *fr*, *nl*, *pt*, *si*), has also two attributes for recording the order according to which an activity is expressed in a curriculum (in case of more than one activity, in a qualification description) – the *ActivityOrder* – and the identifier of the higher-level activity (in case of activities hierarchically structured) – the *SuperActivityId*. Activities could be linked to one or more units. Table *Unit* has several attributes: *UnitId*, *UnitName* and *UnitTranslation*, which, like activities

and qualifications, give information about the English name and the name in the original language, as well as its unique identifier. Likewise, columns for automatic translation (*it, de, es, fr, nl, pt, si*), for recording the order of the unit (*UnitOrder*, in case of more than one unit), for storing the identifier of the higher-level unit (*SuperUnitId*), and for identifying the activity to which a unit is linked to (*ActivityId*) are foreseen. Additional columns (*ECVETPoints*, *EQFLevel* and *LA0, LA1, LA2, LA3, LA4*) record the number of ECVET credits, the EQF/NQF level as well as learning activities assigned to a unit. Knowledge, skill and competence elements are then organized in rows: table *LORow* lists all the rows linked to a unit (through the *UnitId* attribute) and defines them through an id (*LORowid*) and their order (*LORowOrder*), in case of more than one row linked to a unit. For each learning outcome, described in table *LO*, a *LORow* to which it is linked to is provided (attribute *LORowid*); moreover in addition to its identifier, to the English name, to the name in the original language, and to the translation in foreign languages (respectively, attributes *LOId*, *LOName*, *LOTranslation*, *it, de, es, fr, nl, pt, si*), the type of the learning outcome – *LOType* (“1” for competence, “2” for skills and “3” for knowledge) is provided, together with the order according to which it will be displayed (*LOOrder*), in case of more than one learning outcome contained in a row. Finally, each learning outcome is then split into single words, stored in table *LOWord*: here, a unique id (*LOWordid*) defines the word recorded in column *LOWordName*, while *LOWordType* specifies its type, *LOId* communicates to which learning outcome it is linked to, and *LOWordNumber* column is used to identify whether the word is relevant for the semantic search (in fact, here, articles and other non-relevant nouns are set to *NULL*). It is worth observing that, for the sake of simplicity, the WordNet database structure the TAMTAM knowledge base is related to has not been reported in Figure 4; however, it should be reminded that each word of the table *LOWord* is linked to this semantic dictionary. Additional details will be provided in result R8 “TAMTAM Platform” that will be developed in this work package too. By adopting the just depicted structure, it is possible to overcome the main limitation characterizing the TIPTOE platform and knowledge base: in particular, the schema of the TAMTAM knowledge base allows the insertion of profiles with present different structures. In fact, it is possible to a) record profiles that contain both activities and units, only units or only activities; b) manage activities and units hierarchically structured; c) consider either single learning outcomes, or rows of them. Moreover, this structure allows the exploitation of the TAMTAM platform in different sectors and with different languages.

4. Adaptation and migration of TIPTOE profiles

The TAMTAM platform has been enriched with profiles gathered during the TIPTOE project¹. All the profiles, except for the ones coming from Lithuania (since this country is not included in the TAMTAM consortium) have been checked and eventually adapted, before their insertion in the knowledge base. The rules followed for the adaptation are:

- since in the TIPTOE platform there was no difference between units and activities, because only tasks were defined, it has been decided to consider each task as an activity, linked to a unit having the same name;
- since some of the TIPTOE learning outcomes were defined according to descriptions such as “basic factual knowledge”, “knowledge, of fact, principles, etc.”, it has been necessary, depending on the circumstances, either to ignore the description and consider only the learning outcome (e.g., in the case of “Basic factual knowledge of: - sources of general business information; - ICT”, only knowledge “sources of general business information” and “ICT” have been considered), or to rewrite them (e.g., from “Responsibility: For the completion of tasks in implementing - company business policy; - analysing” to competences “Responsibility for the completion of tasks in implementing company business policy” and “Responsibility for the completion of tasks in analysing”);
- since in all the cases it was impossible to clearly identify rows of learning outcomes, a single row, collecting all the knowledge, skills and competences related to a unit or subunit has been created.

¹ Found in the Research section of the TIPTOE website (http://www.evta.net/tiptoe/home_tiptoe/index.html)

In order to insert in a quicker way the adapted profiles, a feature for the population of the knowledge base has been developed and integrated in the adapted TAMTAM platform; by using it, it has been possible to scan .csv files containing profiles, to identify the composing elements and to automatically insert the qualifications into the re-structured knowledge base. Additional insights about the outcomes of the procedure depicted above can be gathered by considering Figure 5 and Figure 6, where two screenshots from the adapted platform are reported.

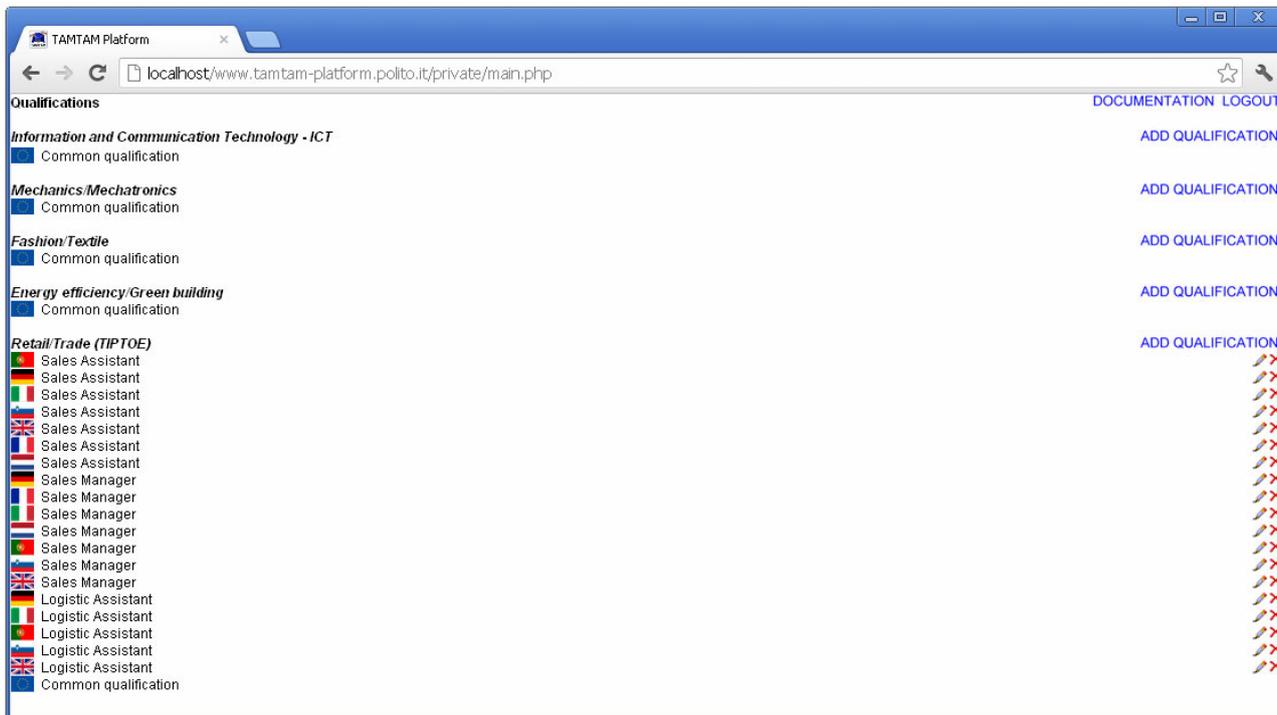


Figure 5. Profiles imported from the TIPTOE to the TAMTAM re-structured knowledge base.

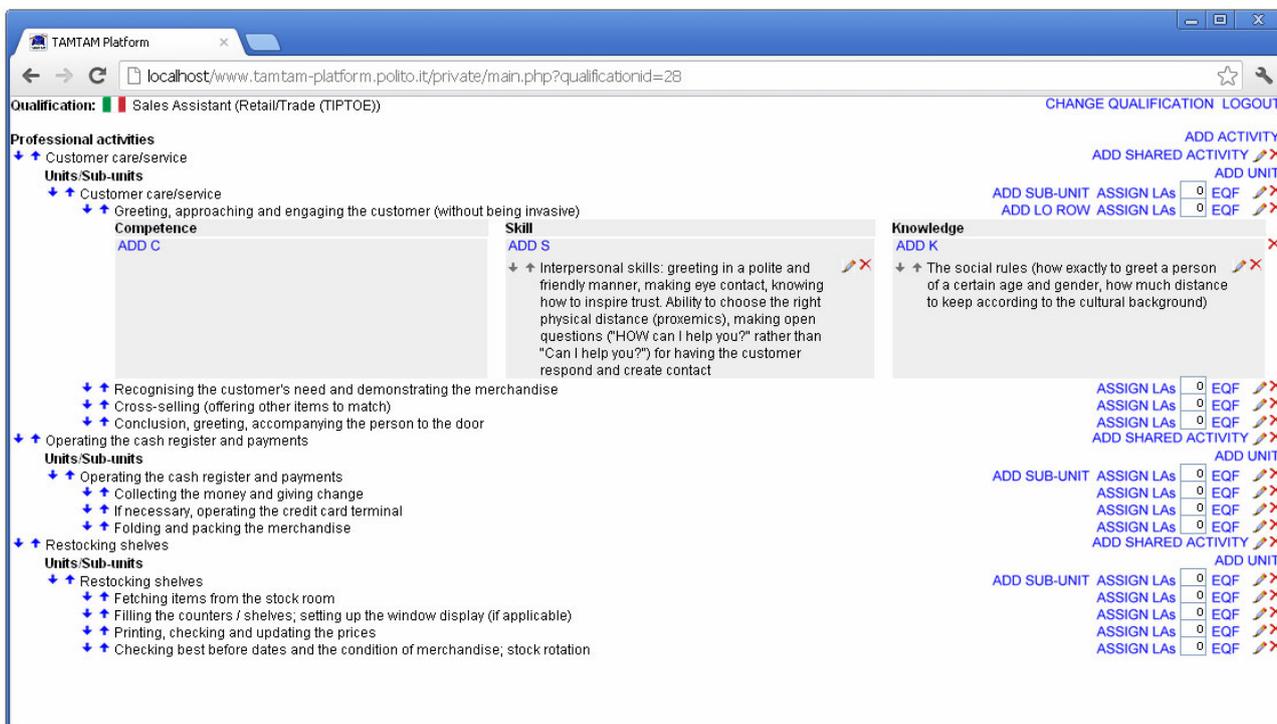


Figure 6. Details of a qualification collected in TIPTOE navigated in the new format designed for the TAMTAM project (adapted platform).