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W O R K I N G P A P E R 2 0 0 7 / 1 7

A Statistical Information System  
in Support of the Italian  
Competence System Governance

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Governance**

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## ***Abstract***

Flexible work patterns require rigorous plans on adult education and life long learning, based on worker's personal competence profile. To achieve this point, at European and national level, official competences certification systems are proposed and, in some cases, realized. The paper discusses the role that administrative data on competences could play in the context of economic statistical sources.

## ***Keywords***

Statistical Information systems; competences; life long learning;

## **1. Introduction**

Work organisation is deeply changing: in the context of an increased international competitiveness employers need a more flexible and adaptable workforce, while workers seek job security as well as more flexible working arrangements (Committee on Techniques for the Enhancement of Human Performance, 1999; EU Research in Social Science and Humanities, 2003).

Politics must face these new necessities: flexible work patterns, in fact, impact not only on work and employment condition but also on quality life in general (Gershuny, 2000). They can be positive for all parties - companies, workers and their families – only if they are the subject of negotiation and if provisions are made to make them socially acceptable.<sup>1</sup>

To cope with the problems rising from these new and multifaceted work organizations, actions are recommended to EU Members in several areas with a particular regard to: (i) improving knowledge on flexibility practices ; (ii) facilitating flexible workers access to competence training/career paths.

These two aspects are deeply linked together and they probably represent one of the main European goals, as emerged in Lisbon Council (March 2000). Europe is in fact expected to move towards a lifelong learning approach, while politics is requested to assist workers and, in general, the whole society toward a knowledge-based economy.

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<sup>1</sup> (<http://www.eurofound.eu.int/ewco/balance/flexibility/index.htm>)

This challenge must be supported by a robust system of public statistical information, but up to now we are far from sharing a common and harmonized set of concepts, indicators and measures: for instance, the concept of flexibility is defined by EU Member States with several different definitions, as emerged by a research focused on 15 case studies (Goudswaard and De Nanteuil, 1998), covering both industry and services across seven different states.

In this perspective, this work is focused on the economic statistical information system necessary to support this political process. The role of administrative data sets will be discussed: in this sense particular attention will be paid to the new administrative protocols set up in support to life long learning politics.

## **2. Competences in a knowledge based economy**

In a knowledge based economy everybody needs continuous professional updating. In this context two concepts are particularly significant: *lifelong learning* and *competence development*, as they usually identify the main way to support workers professional development and to protect them from the consequences of *flexibility* intended (or realized) as *insecurity*. (Evers *et al.*, 2000).

Concrete access to lifelong learning facilities is often frustrated by the practical organization of traditional educational system: till now, at least in Italy, the access to formal training opportunities is often regulated by the highest educational level attained. In the event of work loss, workers are able to certify only what they were at the beginning of their career, while they don't have any official instrument, in support to educational facilities access, which guarantees what they have become thanks to their professional experiences. In some cases, coming back to an adequate formal educational context is impossible for workers whose professional profile is based on working experiences more than on formal education.

An official certification of individual competences is the answer to this problem.

According to international studies, "competence" is defined as a combination of knowledge, skills and attitudes appropriate to a particular situation. "Key competences" are those that support personal fulfilment, social inclusion, active citizenship and, in the prospective of this work, *employment*. ( <http://europa.eu/scadplus/leg/en/cha/c11090.htm>): workforce knowledge, skills and attitudes are, in fact, a major factor in innovation, productivity and competitiveness, and they contribute to the motivation and job satisfaction of workers and the quality of work.

In November 2004, the High Level Group on the Lisbon Strategy made it clear that "far from enough is being done in Europe to equip people with the tools they need to adapt to an evolving labour market, and this applies to high- and low-skilled positions." It has been estimated that almost a third of the European labour force (80 million people) is low skilled. Furthermore, a 2004 report by Cedefop (European Centre for the Development of Vocational Training) suggested that, by 2010, only 15% of newly created jobs will be suitable for people with only basic schooling, whereas 50% will require highly skilled workers. In this sense the European Parliament and the Council of the European Union recommend the Member States: (i) to ensure that initial education and training offer all young people the means to develop the key *competences* to a level that equips them for adult life; (ii) to ensure that adults are able to develop and update the key *competences* throughout their lives, and that there is a particular focus on target groups identified as priorities; (iii) to use the "*Key Competences*" as a reference tool to facilitate peer learning and the exchange of good practice.

An official certification of competences implies a good organization, able to describe personal working experiences in the perspective of their identification and certification: personal competences ought to be formed, certified and recognized by all the different actors involved in the system, because workers expect to retain and expose their competency profiles to multiple stakeholders and actors throughout their professional life. Moreover, a competency model should support the worker's career progression in an evolving assessment system, also in the perspective of European workers mobility across national boundaries: individual lifelong competence development and the multi-institutional vocational training that it implies will have a serious impact on education systems. The organizational architecture, the pedagogic approach and the supporting systems to student's choices must deeply change, while the link between work demand and offer will be focused ever more to the central concept of certified competence, and not only on habilitations or job titles.

*For the high complexity of this challenge, competency modelling should be the shared responsibility of governments, educational institution, and businesses, and, in this sense, economic statistical information systems are solicited on the whole in order to answer to these new governance needs.*

### *2.1. European directives on professional standards and competencies recognising*

In the perspective of a full realization of the EU Parliament and Commission recommendations, the European Union has created two types of regulations, viz. the EU Directives, setting out the general conditions for recognition of professionals:

The “Sectorial or Specific Directives”, provide for a given profession automatic recognition based on minimum coordination of national education and training requirements.

The “General Directives” provide a general system of recognition for a wide range of professions following varying levels and duration of education and training.<sup>2</sup> The general directives do not necessarily provide immediate and automatic recognition of different qualifications, since a limited test period or supervised internship can be required as part of the recognition process.

Over the last years, the EU Commission and EU Parliament planned new actions to update and review the current recognition systems in order to increase the recognition of individuals in a European free market area: in 1999, the so-called SLIM-Directive simplified current regulations based on the experience of the last ten years. In March 2002, the Commission launched a new proposal of Directive on the recognition of professional qualifications. Among the others is particularly relevant Decision No 2241/2004/EC of the European Parliament and of the Council (15 December 2004) for the transparency of qualifications and competences (Europass): this Decision establishes a single Community framework for achieving the transparency of qualifications and competences by means of the creation of a personal, coordinated portfolio of documents, to be known as ‘Europass’, which citizens can use on a voluntary basis to better communicate and present their qualifications and competences throughout Europe.

## 2.2. Italian legislation on competence

Following European directive on recognition and comparability of qualifications and long-life learning approach, Italy, both at central and regional level, has created regulations and institutions.<sup>3</sup> In particular, some Italian regions have found an agreement to find some form of coherence in their specific politics<sup>4</sup>. The point is not easy to accomplish. Also due to the application of subsidiarity principle, which states that matters ought to be handled by the smallest (or, the lowest) public competent authority, the concept of *competence* has in practice assumed a very wide set of

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<sup>2</sup> General Directive CEE/89/48 on a general system for the recognition of higher education diplomas awarded on completion of professional education and training of a least three years duration from 21th December 1988; D.CEE 92/51, on a second general system for the recognition of professional education and training to supplement Directive 89/48/EEC; General Directive CEE/ 99/42 establishing a mechanism for the recognition of qualifications in respect of the professional activities covered by the Directives on liberalisation and transitional measures and supplementing the general systems for the recognition of qualifications

<sup>3</sup> D.M.L.P.S. 174/01 focused on a general framework for competence certification in vocational education and training system; Regional document (08/2002) and agreement between Central Administration and Regional Governments (15/01/2004) on the definition of competence minimum standards; Law n<sup>o</sup> 131/2003; Law n<sup>o</sup> 30/2003; Law 53/2003; Agreement in the context of *Conferenza Unificata* (28/10/04) for intermediate and final certification; Agreement in the context of *Conferenza Unificata* (14/07/2005) for the definition of citizen’s personal portfolio.

<sup>4</sup> Agreement between Central Administration and Regional Governments (18/02/2000) for the constitution of a national system oriented to competences certification.

meanings. Moreover, as it has briefly highlighted in the previous paragraph, it may be depicted as a typical multidimensional concept: to find an agreement implies to ask all the involved actors to release a significant part of their language (with all the organizational consequences that this choice involves) to adopt someone's else substantial labour and economic concepts.

*However, when competence politics will be active, a rich amount of administrative data will be produced.* These data will be generated along with administrative processes aimed to certificate personal competences, to finance professional courses, to accord work demand to education: in other words a precious mine of administrative sources will be generated by these data sedimentation.

In which condition these archives will generate public statistical and systemic information oriented to describe economy, labour and training?

### *2.3. Competence oriented politics: first Italian local proposals*

Some Italian regions have already pronounced on competences, on their characteristics and on their certification. Without any assumption of exhaustiveness, and only in the perspective of focusing on their implications in statistical economic systems, some examples, drawn from Italian regional experiences, will be proposed.

Tuscany,<sup>5</sup> for instance, has organized a multiple steps process to achieve to a clear definition of competence: (i) the most relevant economic sectors for Tuscan regional economy have been selected; (ii) professionals, particularly skilled in the selected sectors, have been consulted; (iii) descriptions, in terms of competences, of the most relevant professional standards for the selected sectors have been produced by the experts.

In the Tuscan experience a particular attention has been paid also to the linguistic aspect of the survey, and a particular training has been focused on survey form filling: the experts, in fact, adopting a very structured linguistic frame, have filled a common grid in which, for each professional standard, they have communicated the following items: (i) General description of the profession; (ii) *production processes in which the profession acts*; (iii) competences that the profession must have to operate in the process. Every competence is described in terms of elements of knowledge and capacity. At the moment an official repertory of Tuscan competencies<sup>6</sup> has been published.

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<sup>5</sup> Regulation Act of Tuscan Regional Law July 26 2002, n. 32;

<sup>6</sup> Tuscan Region, General Direction for Vocational Education Politics , *Regional Standard for description, formation, recognition and certification of competencies, release 04.02.08*

In the following table a partial description of the repertory structure is reported.

<b>Professional standard title</b>	Professional standard title proposed by the consultants
Regional activity sector	It represents a partition of the Tuscan economic system. It has been derived by a selection of NACE sectors
Activity context	It represents the functional structure of regional activity sectors. Every regional activity sector is classified in : administration and management; business, communication and selling; planning, development and research; supply , logistic; maintenance; goods and services production.
Complexity level	It represents the duties complexity and the responsibility level of the professional standard
Description	Professional standard extended description
Contractual tipology	
ISCO1988	In this section the professional standard is referred to the most important international and national classification systems
Nace	
Other national classifications (Excelsior, Isfol,...)	
<i>For each process</i>	Every professional standard is described in terms of the production processes in which it is competent. Every process is described in the following terms
Process Description	Productive process extended description
Knowledge	What the professional knows
Abilities	What the professional is able to perform

**Table 1 Example of Tuscany repertory structure**

The exigency of defining professional competencies in the context of production processes has been presupposed also in other regional statements. The Friuli Region, for instance, in a document oriented to rule professional standard for apprentice<sup>7</sup> has focused the competence as a concept which *derives from production processes analysis*, and denotes the set of activities that a worker must be able to perform to get the result of the process.

The production process final description is extremely detailed. In practice, every process is broken down in main phases that the standard profession must be able to perform. Each one of these main phases is structured in sub-processes. The final perspective of these assumptions is the codification (for administrative purposes) of production processes, cross cutting the different activity sectors. Some first administrative data coding efforts are actually in progress.

### **3. Competences in the context of standard statistical sources.**

Economic statistical sources are not yet fully adequate to the complex information needs of modern labour market: while they are asked to describe a deeply evolving interrelated network of relationships, actors, economic and production processes, they are often still linked to hierarchical information structures (Professions, Economic Activity Sectors, Educational Levels). A concept like *competence*, on the contrary, is transversal respect to economic activity sectors, professions and

<sup>7</sup> Regione Autonoma Friuli Venezia Giulia- Direzione Centrale Lavoro, Università e Ricerca. Apprendistato professionalizzante- repertorio dei profili formativi Guida alla lettura degli standard regionali., Luglio 2006



educational levels: the same competence can be, in fact, expressed in different professional profiles, with diverse educational qualifications, in distinct economic sectors. It is just because of its being transversal that the idea of *competence* is the base for lifelong learning politics: investing on his/her competencies portfolio (provided it has been adequately certified) a worker could be able to re-qualify and move from a sector to another, from a professional profile to another. As a consequence of this multidimensional feature, at the moment, most of economic indicators usually adopted in labour and economic analysis (for instance specific for standard activity sectors) don't help national or local administrators who want to support politics of competences empowerment, in terms, for instance, of capital investment for training and education.

To get these type of information usually *ad hoc* surveys are performed. These sources are typically focused on local areas and oriented to support decisions on specific and sectorial objectives. On the contrary, statistical administrative sources could be very promising under the aspect of their generality, continuity and economic cost; administrative processes have in fact already understood the hierarchical limits of official data structure. It is not infrequent, in fact, to find in administrative archives (for instance belonging to public administrations and local governments) *ad hoc* codification for economic sectors expressly made to overcome Naces' hierarchical limits: this fact happens every time that an administrative action is extended to actors (individuals or enterprises) operating in processes which are transversal to different sectors. It is important to stress that, if not adequately conceptualized, these choices may seriously compromise the statistical informative value of the administrative collected data.

The organization of political and administrative agendas around the new work organization priorities and the consequent introduction of the concept of competence, is asking for an adequate statistical information system, able to act like a real semantic network, where, with this term, a knowledge representation in terms of a collection of nodes (objects) and associations is intended. The potentialities that such an abstraction will bring to statistical information systems will be discussed in §4.1.

### *3.1. Competence administrative data archives in the perspective of their statistical usage*

Italian official statistics is promoting the statistical usage of administrative data sets for economic and labour market analysis. The first experiences of integration between economic administrative archives and statistical surveys began, in Italy, at the end of the years '80, following the Scandinavian countries experiences. (Martini, 1995; Martini 2001).

Starting from these original experiences the actual approach is oriented to promote the coordinated treatment of administrative sources: by this point of view, moreover, Italian legislation, following European regulation (CEE Directive n. 322/97; CEE Directive n. 2186/93 and CEE Directive n.58/97) obliges Public Administrations (d.lgs. 322/89; d.lgs. 39/93) to fulfil the link between their informative systems with the national statistical system in the prospective of a more diffused usage of statistical archives (d.p.r. 445/2000).

### *3.2. Competence statistical registers between legislative and administrative drafting*

The concept of competence is still not yet formally defined among the statistical economic standard concepts, even if it appears in *ad hoc* surveys oriented to explore employer's needs and workforce characteristics<sup>8</sup>. In practice, till now, it is used in a way that inhibits any form of comparability.

The problems that statisticians usually enface when they create statistical registers from administrative archives are principally referred to difficulties in linking and in contextualizing the collected data in more general statistical official frames. The concepts adopted in the two different sources (administrative and statistical) may be, in fact, quite often incoherent: for instance the way in which, persons, enterprises, etc are identified, defined and coded could be very different.

*The statistical usage of competence oriented administrative data sets could be different.*

At the moment, in fact, the legislative process is passing, in Italy, from legal to administrative drafting. Many reflections have been developed on this practice in which administrations translate laws contents in concrete acts: attention is usually focused on simplicity of adopted language and on administrative procedures coherence. Life long learning politics involve the production of strategic and precious data: passing from legal to administrative draft, a particular attention must be paid to the concepts that administrative system will introduce and adopt. The objective is that they will remain, as more as possible, coherent in every step of their usage: from managing to statistics.

*In other terms: statisticians are usually obliged to adapt heterogeneous concepts (originated in administrative culture and language) to ensure statistical comparability and consistency. In the case of the competence information system, the new administrative concepts could be taken from statistics, wherever it is possible and suitable.*

This language harmonization process must, anyhow, be twofold: in fact, on one side administration could adopt, whenever it is possible and convenient, statistical concepts and classifications, and on the other side statisticians could face the statistical potentialities of new administrative and

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<sup>8</sup> EBNA ( National board of Artisans) National Survey on Artisans Formation Needs <http://www.indagineffa.ebna.it/>  
OBNF (National Board on Formation in Industry) National Inquiry on Formation Needs of Italian Industry. [www.obnf.it](http://www.obnf.it)

transversal concepts, often useful to highlight new and evolving aspects of economic reality: the statistical interest to the concept of competence is an emblematic example of this latter case.

#### 4. The concept of competence as a statistical multidimensional object

Before focusing on the characteristics that the concept of competence is expected to have to be successfully inserted in an economic statistical information system, it is important to reflect on the typology of users that will adopt this element in their decisional and cognitive processes.

Starting from user's view is not only a prudent choice, but a strict consequence of having adopted a statistical information system perspective.

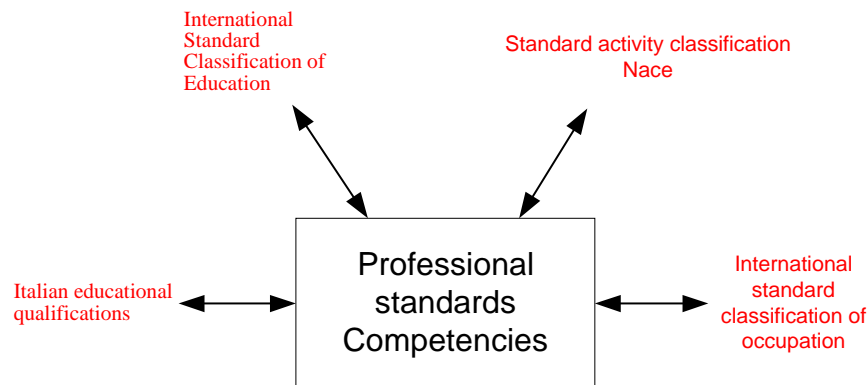
*A Statistical Information System originates in its different components from responsibilities and informative needs of entities and institutions acting as observers and actors in the reality they want to be informed about. Usually a Statistical Information System has a clear and defined institutional identity. It will be formed by different elements interacting between themselves sharing data and information and in its organization it must be designed in order to facilitate this cooperative aspect.*

The following table exemplifies the context in which some entities, acting in their professional role, could look for appropriate statistical indicators: for instance, managers operating in a local government could want to individuate industrial processes, services, etc to promote occupation in emerging professions.

<i>Entities</i>	<i>Context</i>	<i>Processes</i>	<i>Sources to be integrated with the concept of competence</i>	<i>Main information or indicators</i>
Managers	Local administration governments	<ul style="list-style-type: none"> <li>▪ socio-economic analysis</li> <li>▪ Individuation of political intervention areas</li> <li>...</li> </ul>	Istat	Labour market and employment and unemployment statistics
			Associations of Chambers of Commerce	Occupational needs on geographical and sectorial base.
Education and training professionals	Schools, Training agencies, e	Planning, designing, organization of training courses	Sectorial organization surveys, networks of associations registers, trade unions studies	Economic trends
Employees, subjects offering jobs	Public administrations, companies, enterprises	Job offerings focused to specific competencies.	Local government administrative sources	Job offers
Persons looking for jobs	Students, families, adults in mobility persons looking for jobs or planning their training for skills converting	Job seeking on the base of personal competences Training planning	<ul style="list-style-type: none"> <li>▪</li> </ul>	Training offers

It is important to note that, at the moment, no one of the sources represented in the table uses and diffuses data on competences: the consequences on governance are evident.

Next picture shows the axes that the new concept of competence ought to (at least) have to be successfully inserted it in the context of existing statistical indicators

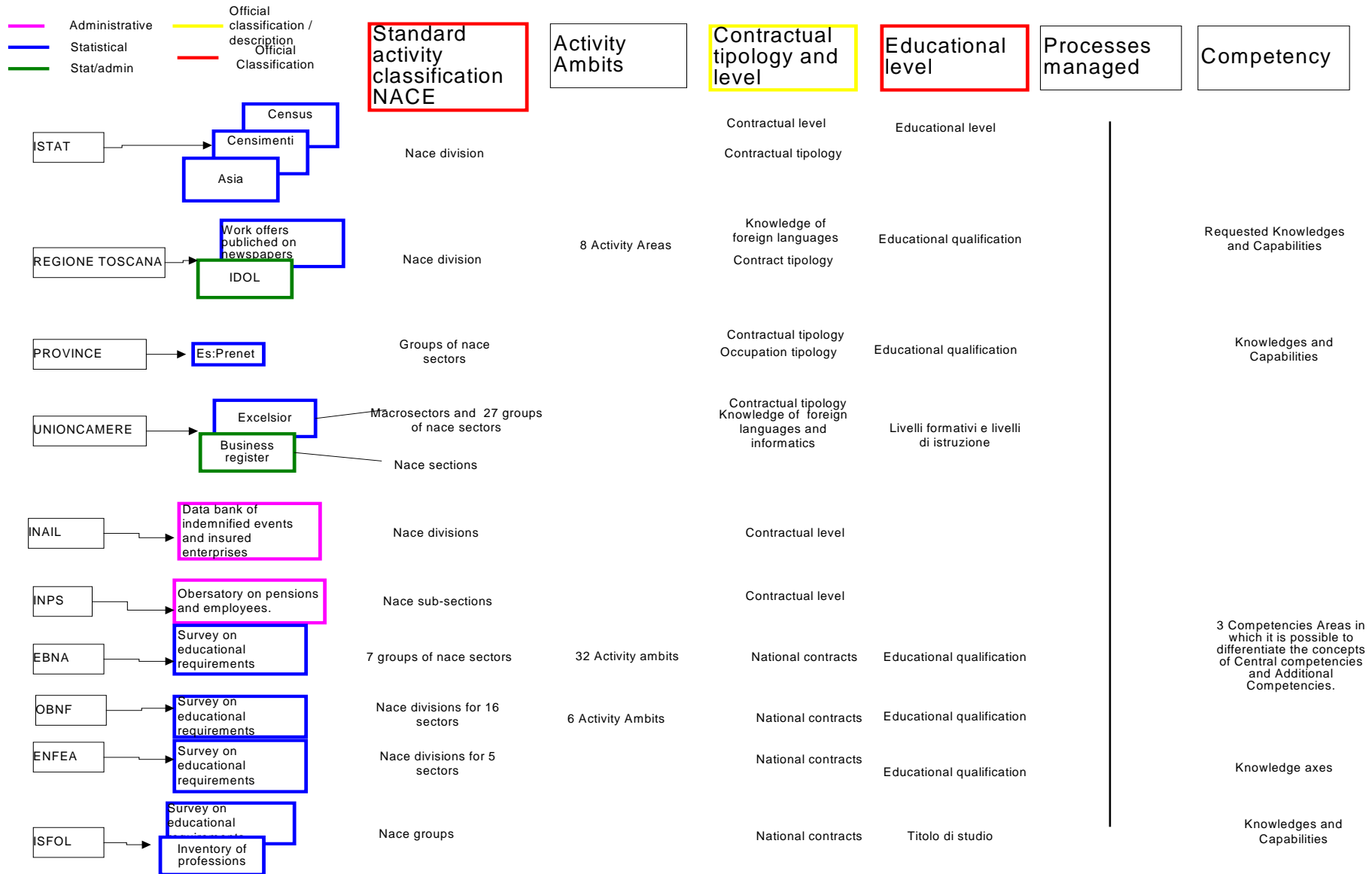


**Picture 1 Dimensional axes of the concept of competence**

Following this schema, for every competence definition proposed by administrative services, the standard classifications to which it belongs ought to be indicated. The double arrow means that, for instance, a certain competence belongs to several standard activity sectors and for every sector several competences operate. The hierarchical informative structures inherent to the standard classifications “surrounding” the competence is partially overcome by the new concept that operates as a node between them.

It is important to note that this coding schema is necessary but, perhaps, not sufficient, because, for instance, it is however impossible to describe and identify the case in which the same competence acts in different production processes. This problem has already been understood by administrative systems (cfr. §2.3), that, in fact are moving towards a classification of production processes.

The following picture shows a further example of the rich informative context in which the competence concept will be inserted thanks to the proposed standard specification, even without a special description focused on production processes.



#### 4.1. Competence: a statistical object in a semantic network

In the perspective of the statistical characteristics that the concept of competence is expected to have to be successfully inserted in an economic statistical information system, the proposal is to formally conceptualize it as a statistical object in a semantic network.

Semantic networks come in a such variety of forms that it is difficult to pinpoint what it is common to all of them. In its basic form, however, a semantic network represents knowledge in terms of a collection of nodes (objects) and associations, the former standing for individuals (or concepts of some sort) and the latter standing for n-ary relations over these. According to this view, a knowledge base is a collection of objects and relations over them, and modifications to the knowledge base occur through insertion/deletion of objects and by relations manipulation.

A crucial issue of network schemes is the organizational axes they offer for structuring a knowledge base. Some of the axes are discussed briefly below.

##### *Classification*

According to classification, an object (e.g: particular competence)) should be associated with its generic type(s) (e.g. standard professions who have that certain competence). Including this organizational axis in a network scheme forces a distinction between *tokens* (e.g. the competence) and *types* (e.g. standard profession). Some network schemes are classified recursively to define (meta) types with *instance types* (e.g national contract for classes of professions).

##### *Aggregation*

This axis relates an object (e.g. the single competence) to its components or parts. For example, the parts of a competence, viewed as a physical object, could be its knowledge, its capacities, its attitudes. As with classification, aggregation can be applied recursively so that one can represent the components of the components of an object. Thus, aggregation defines a second organizational dimension of network schemes.

##### *Generalization*

Generalization relates a type (e.g. standard profession) to more generic ones. The generalization relation between types is a partial order of organization types into a generalization or *hierarchy*, this is the structure that is acting, in the informative structure actually in use.

##### *Partition*

Another method of organizing network knowledge methods involves grouping objects and elements of relation into *partitions* that are organized hierarchically, so that partition if A is below partition B

every thing visible or present in B is also visible in A, unless specified. Partitions have been found useful in representing time, hypothetical worlds and belief space

Due to their nature, network schemes directly address issues of statistical information retrieval, since the association between objects define access paths for traversing a network knowledge base.

In this sense they represent a formal answer to the need of transversality in labour ed economic descriptions that was presented at the beginning of this work.

#### *4.2. Further practical applications of the competence object- oriented approach*

An object oriented approach applied to the statistical and administrative concept of competence may facilitate its displacing on training and vocational education.

The individual lifelong competence development and the multi-institutional and episodic nature of this learning are not reflected in today's mainstream learning and knowledge technologies and in their associated architectures: if life in modern society involves ever-increasing demands for knowledge and competence the way we usually intend training and education must deeply change.

In this sense a constructivist approach organized around the concept of learning object may be an interesting answer. Such an approach to teaching and learning is based on the basic premise that an individual learner must actively "build" knowledge and skills (Bruner, 1990) and that information exists within these built constructs rather than in the external environment. Learning objects (Wiley, 2000) are small instructional components that can be integrated and manipulated to create knowledge and to form larger components or courses; usually in digital format, typically to be used in an e-learning context. Examples of learning objects include digital images, text, live data feeds, video/audio and animation files, small web-based applications, and web pages that integrate any or all of above smaller components

An educational approach organized around learning objects, specular to the competence objects that are the targets of the transfer of knowledge and skills, may contribute to build a solution to the problem of workers professional update.

Regard to this objective, the Learning Object Metadata may play a fundamental role. "Learning Object Metadata" are the minimal set of attributes needed to allow these Learning Objects to be managed, located, and evaluated. (IEEE, LTSC Home | WG12 ). Relevant attributes of Learning Objects to be described include type of object, author, owner, terms of distribution, and format. Where applicable, Learning Object Metadata may also include pedagogical attributes such as; teaching or interaction style, grade level, mastery level, and prerequisites.

*In the hypothesis of a strong integration between educational and professional systems, the adoption of the same metadata in the two typology of objects (competence and LO) will allow for an important interoperability. For instance: social services in support to workers re-qualification, after having analyzed the statistical indicators describing economical perspectives may focus some pertinent competences (cfr. Picture n°1). To improve or re-qualify the needed competences the worker may individuate through the same metadata the corresponding learning objects .*

## **Conclusions**

Flexible work patterns oblige to pay a particular consideration to adult education and worker's competence profile empowerment.

As long as traditional relationships between persons and firms are deeply transformed by new work organization, politics is called to face the social and economic consequences of these new working arrangements: the deal is to match job security and personal empowerment with economic system competitiveness.

Economic statistical sources are requested to expand their informative context to answer to these new governance demands: in this sense a great opportunity is coming from new administrative systems set up at national and European level to recognize, certify and give contractual and legal power to workers' personal competencies. The role that these administrative data could play in the context of economic statistical sources goes far beyond the simple exploitation of a rich, appropriate and non expansive source: these systems are in fact planned to support re-qualification between different professional profiles and production processes. A methodological reflection focused on the transversal features of these new administrative sources could help in overcoming the hierarchical informative limits of usual statistical economic classification structures. The modelling perspective is object-oriented, that seems to be the most adequate to describe reticular and complex systems.



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