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Preliminary Study on target jobs for the ONTOHR pilot project

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Index

| | |
|---|----|
| 1. ICT job role selection | 2 |
| 1.1 ICT in Italy | 2 |
| 1.2 Standardization | 3 |
| 1.3 Definition of Knowledge, Skill and Competence..... | 4 |
| 1.4 EUCIP model..... | 4 |
| 1.5 Job profiles | 5 |
| 1.6 EUCIP in Italy | 8 |
| 2. ICT, VET, Job Market, access requirements in Italy | 8 |
| 2.1 INFORMATION SYSTEM ANALYST | 8 |
| 2.1.1 Typical activities of the profile | 8 |
| 2.1.2 Behavioral competences | 10 |
| 2.1.3 Technical Skills..... | 10 |
| 2.1.4 Job role access' requirement | 11 |
| 2.2 SYSTEMS ANALYST | 11 |
| 2.2.1 Type of job..... | 12 |
| 2.2.2 Job role access' requirement | 13 |
| 2.2.3 Career prospects | 13 |
| 2.2.4 Similar professions | 13 |
| 2.2.5 Employment levels | 14 |
| 2.2.6 Information Sources | 14 |
| 2.2.7 Meeting with stakeholder | 15 |



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3. ICT, VET, Job Market, access requirements in THE NETHERLANDS..... 16

3.1 Vocational Education system in the Netherlands..... 16

3.1.1 Lower vocational education..... 16

3.1.2 Higher vocational education..... 16

3.2 ICT study programmes in the Netherlands 17

3.2.1 ICT labour market 17

3.2.2 Business case Logica “Working tomorrow” 17

4. Conclusions 18

ICT' job roles selection process..... 18

4.1 I step: the IT administrators..... 18

4.2 II step: the System Analyst 19

4.3 III step: the Information System Analyst (ISA)..... 19

1. ICT JOB ROLE SELECTION

1.1 ICT in Italy

The theme of innovation and competitiveness in Italy is on the agenda of debate about the economic and industrial policies. Institutional initiatives are promoted to support innovation in order to favour a larger contribution of research at university and private sector. Even the European Union pushes on innovation, particularly on the role that ICT can play both in the industrial systems and governance systems. So EU has promoted a common framework of ICT competencies, consistent with as provided by the EQF - European Qualification Framework - approved by the European Union in 2006.

The ICT profession can be considered as a new type of work if compared with those of oldest tradition as the lawyer, the mechanical engineer or doctor, because of innovation pace of technologies and applications. Even the perception of what the ICT profession depends on the various contexts in which it is inserted: changes the meaning ascribed to that term depending on whether you talk about a corporate employee or consultant of an operational role or a managerial, technical expertise or behavioral, and so forth. Lacking in other words a common basis of

understanding about what the ICT profession and what the body of shared knowledge. ICT technologies are in fact subject to constant change and evolution due to the explosion of innovation in digital technologies and shortening of the life cycle of this technology and therefore the professional ICT is also subject to constant change and requires a systematic updating of prior knowledge about to apply and the ability to use them in different contexts: it is necessary can refer to a common system of ICT skills within a qualification structure, to be considered as a prerequisite for the development of a environment in a professional environment so changeable.

1.2 Standardization

The construction of a reference standard for the industry and professional groups ICT requires a rigorous analysis, aimed at defining what a competent performance in a specific role is. It's important also to focus the attention on the influences of the market for each profile in order to obtain the required results.

Compared to technological developments and changes in the related applications, the skills based profile acquired a considerably higher level in flexibility and adaptivity to new products and services, new processes and new goals of the firm or public organization. It should be emphasized that the skills are not a new concept, since in the working world has always counted on the job experience and the individual know how, and the steps required by the needs of management knowledge society is what allows to associate to each profile professional skills that are proper to it. The novelty of a new "management skills" lies rather in the skills to become an organizational fact, a reality that is significant not only for the professional who works, but also for the organization where he works. From the perspective of the management of human resources skills, this means that:

- leaders of an organization are convinced that the know-how possessed by people is also part of the organizational assets;
- heritage skills must be known, valued, widely developed;
- basically you need to act to protect the heritage of skills.

The implication of this new organizational approach is the need to combine the management skills of both profiles: in fact, while the set of skills describes the skills requirements needed (ie expected and required) for a process or a service, role or function, a team work or project, the profile shows rather explicitly, but very briefly, what knowledge an organization needs in terms of skills, of course referring to the organizational position or role, that regardless of the person who physically play that role. The importance of having a shared standard for ICT skills is even more decisive role in the specificity of the sector, where certification Vendor Dependent developed over the past 10 years at an increasing pace. These certifications automatically identify specific technological standards of reference.

One of the aims of the European Union at the beginning 2008, was to allow the identification of three classes of certificates and related bodies knowledge behind:

1. Certifications of major suppliers (Vendor Dependent). These make up the majority of certification adopted by the market today: Microsoft, Cisco etc;

2. Some, limited, experience of Vendor Neutral Certification, related to software Open Source and support the interoperability between different vendors;
3. Vendor Independent certifications, which are developing very high speed, classified into three types:
 - a. Certifications of vertical development of skills for specific job profiles (Information Security, Project Management, Web Management, Data Base Administrator, Network Designer, etc..). Some of these have been very successful and promote high specialization clearly oriented to meet the needs existing industry in the ICT sector;
 - b. Quality development on ICT best practices in processes such as ITIL, even latter to great success in over 30 countries all over the world;
 - c. Certificates of horizontal development of skills related to specific processes ICT for occupational profiles, such as those ISEB / SFIA in the UK, those CIGREF for large companies in France, those with APO / ITTS in Germany and finally those CEPIS / EUCIP adopted in Italy and another dozen or so medium and small countries Europeans.

1.3 Definition of Knowledge, Skill and Competence

Compared to the model of professionalism adopted, the standard EUCIP provides the answer to the first of the pillars identified: the system of competences based on a body of essential knowledge.¹ The following definitions allow us to move from knowledge to the job description:

- Knowledge are the set of facts, principles, theories and practices related to a field of study or work;
- Skills expressing the ability to ad hoc complete technical, organizational or managerial tasks. Capacities could be also cognitive, behavioral and relational;
- Competence is the set of knowledge and abilities into action, allowing the subject to achieve the desired goals within a specific context;

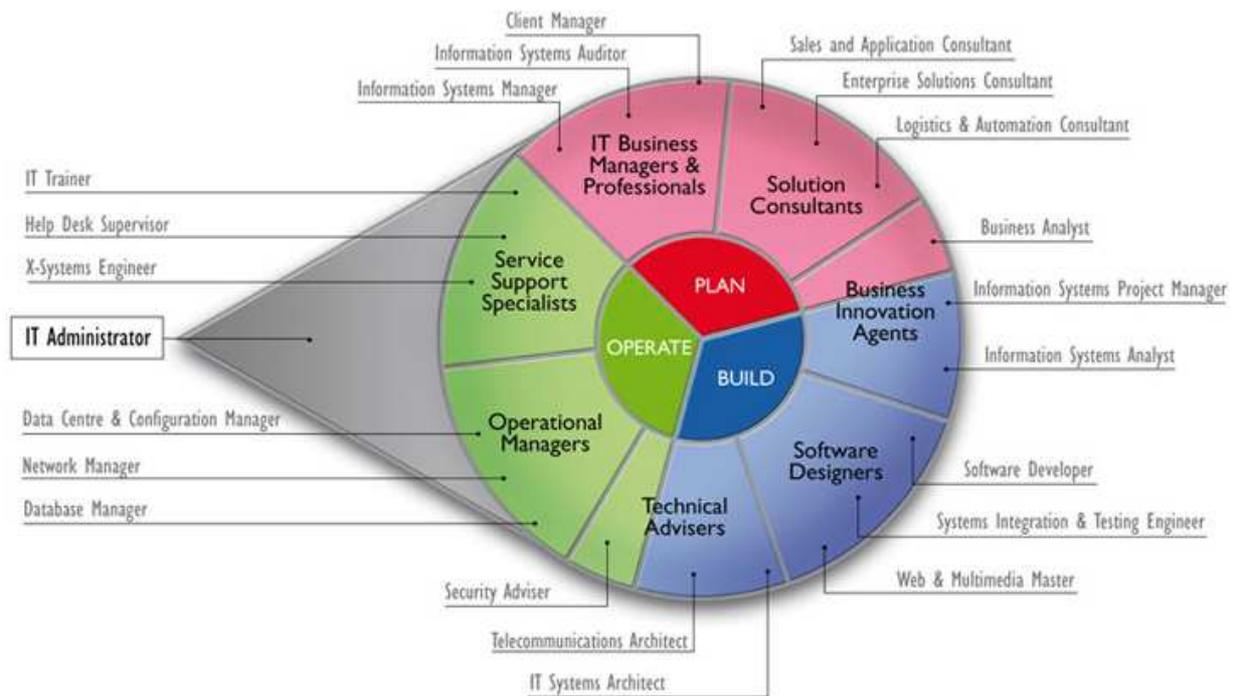
Skills-based job description (job profile) is the set of skills that enable it to produce a desired result in a stable organization or project.

1.4 EUCIP model

EUCIP is a European model of skills management in digital technology that is built around 4 pillars: the Standard, the Services, the Certification process, the Centers of Competence. The heart of the model is constituted by Standard EUCIP, a structured set of 3,000 elementary units of knowledge, organized into syllabi for the Core modules (Plan, Build, Operate) and into detailed specifications of the 156 categories of expertise (know-how) that give form to each of the 21 Elective profiles and the IT Administrator. The EUCIP Model is an important reference for anyone who wants to design and manage initial or further training in information, therefore both the

¹ Hughes and Thompson, 2007. The essential elements of professionalism are three-fold: 1) Competence; 2) Integrity, responsibility and accountability; 3) Recognition

vocational institutes and universities, for both the Vocational Training Centers and for companies. But it is also a tool for the individual who, in a logic of Lifelong Learning, should build their own curriculum. A key aspect of the EUCIP Model is to recognize other certifications, both “neutral” (ITIL, PMI, ...) and from vendors (Microsoft, Cisco, IBM, ...).



1.5 Job profiles

The following are the 21 EUCIP profiles

PLAN

1. Information Systems Manager

An EUCIP Information Systems Manager is expected to have a broad competence both in ICT and in organisational issues related to an effective and efficient use of information in a business environment. Skills of planning and innovating must be combined with a steady service-oriented approach and the ability to react and solve practical problems using available resources.

2. Information Systems Auditor

A EUCIP Information Systems Auditor provides an independent assurance of security, quality, compliance and value contribution of information systems to a specific organisation (reporting to the highest corporate or board responsibility). An IS Auditor is expected to demonstrate sound technical competence, independence of opinion, compliance to the Code of Professional Ethic.

3. Enterprise Solutions Consultant

A EUCIP Enterprise Solutions Consultant is expected to combine business analysis skills with a specific effectiveness in customising and configuring the features of business software packages like CRM suites and the administrative modules of ERP systems. Professional consultancy skills and a general competence in the integration of enterprise applications are also vital.

4. Business Analyst

A EUCIP Business Analyst is expected to be very effective in understanding business cases, eliciting requirements, modelling business processes and identifying the appropriate type of ICT solutions. For this role, a high level professional attitude and the ability to communicate are as vital as a wide and thorough ICT competence.

5. Logistics & Automation Consultant

A EUCIP Logistics and Automation Consultant is expected to combine process analysis skills with a specific effectiveness in identifying and implementing IT solutions for industrial operations. This requires a thorough competence on CIM architectures, MES, packages for SCM and the logistic modules of ERP systems. Professional consultancy skills and a general competence in systems development are also vital.

6. Sales and Application Consultant

A EUCIP Sales and Application Consultant is expected to combine competence in a specific technology (context-dependent, e.g. CAD) with advanced marketing concepts and a general knowledge of typical client needs. Effectiveness in persuading when presenting solutions, practical demonstrations and commercial proposals is a must.

7. Client Manager

A EUCIP Client Manager is expected to combine a broad knowledge of ICT and information systems with advanced marketing, planning and account management concepts. Essential skills include the ability to negotiate and convince, as well as to monitor the quality of products and services provided to the client, either in single projects or in ongoing service contracts, up to ASP.

8. Information Systems Project Manager

A EUCIP Information Systems Project Manager is expected to be very effective in organising people and technical resources to achieve essential project goals in compliance with agreed constraints on quality, time and costs. This requires a specific competence in project management techniques (both in case of packaged solutions and custom development) and a broad knowledge of ICT and Information Systems.

BUILD

1. IT Systems Architect

A EUCIP IT Systems Architect is expected to play a key role in designing performing and secure IT systems - with a special focus on software architectures - integrating and upgrading them; besides a thorough competence in ICT (all domains: software, hardware and networks), this requires specific design techniques and the ability to describe a system in terms of components and logical flows.

2. Information Systems Analyst

A EUCIP Information Systems Analyst is expected to be very effective in identifying requirements for ICT systems and defining models of information flows and business objects. A wide and thorough ICT competence has to be combined with the ability to interact with users and colleagues.

3. Web & Multimedia Master

A EUCIP Web & Multimedia Master is expected to combine design, development and administration skills for multimedia applications and websites; all aspects benefit from a thorough understanding of web systems and technologies, but creativity required for finding nice graphics and animation must be balanced by assessments on usability and accessibility, and a structured approach to publishing and administration.

4. Systems Integration & Testing Engineer

A EUCIP Systems Integration and Testing Engineer is expected to be very effective in several different areas of systems development: preparing end-user documentation, setting up IT systems, testing their functionality as a whole and as single component modules, identifying anomalies and diagnosing possible causes. Requirements include a specific knowledge on how interfaces between software modules are built.

5. Software Developer

A EUCIP Software Developer is expected to play a considerable technical role in information systems design and to be very effective in carrying out the creation and maintenance of complex software modules that typically need to be integrated into a wider information system. Different specialisations are possible, either in the field of applications and web services or in system-level software.

6. Database Manager

7. A EUCIP Database Manager is expected to play a key role both in designing data structures and in daily DB administration; therefore, skills requirements include a deep competence in all aspects of database technologies, a team working approach to project environments, proficiency in data modelling techniques, but also effectiveness in defining and applying procedures and organising routine operations.

OPERATE

1. X-Systems Engineer

A EUCIP X-Systems Engineer is expected to have a specific competence on various operating systems and related troubleshooting methods, performance tuning, system-level programming and cross-platform integration; diagnosing and problem solving attitudes are required in order to provide support both on proprietary and open systems, including hybrid configurations.

2. Telecommunications Architect

A EUCIP Telecommunication Architect is expected to combine telecommunication skills with a specific effectiveness in identifying and implementing IT solutions for digital convergence. This requires a thorough competence on wireless digital communications over analogue media as on transfer of analogue signals over digital networks. Professional consultancy skills and a general competence in systems development are also important.

3. Security Adviser

A EUCIP Security Adviser is expected to be very effective in identifying security requirements for ICT systems and defining reliable and manageable solutions. A wide and thorough ICT competence has to be combined with the ability to interact with other ICT functions to foster the integration of security technologies within the ICT infrastructure.

4. Network Manager

A EUCIP Network Manager is expected to be very effective in managing a networked information system of medium complexity, and improving its performances. Should also be proficient in interactions with network architects and possible external suppliers across all phases of a network's lifecycle.

5. Data Centre & Configuration Manager

A EUCIP Data Centre and Configuration Manager is expected to have a structured approach to design, set-up and maintenance of an IT-enabled working environment, both in case of a development environment and in case of a "live" system for end-users; this requires specific competences on quality procedures and on workflow management systems and tools.

6. Help Desk Supervisor

A EUCIP Help Desk Supervisor is expected to be effective in providing technical support; this requires competence in a specific technology (context-dependent e.g. web services), but also familiarity with SLA contracts, awareness on client business operational priorities and on typical user issues, as well as a positive attitude to problem response and customer relations.

7. IT Trainer

A EUCIP IT Trainer is expected to be very effective in communicating IT concepts, training users and motivating them to make the most of IT systems; requirements include a broad ICT culture, a focus on a specific technology (context-dependent, e.g. groupware products), excellent presentation skills and proficiency in training techniques, including design and preparation of effective courseware.

1.6 EUCIP in Italy

The system of skills and certifications EUCIP is establishing itself in Italy as standard:

1. CNEL (National Council for Economy and Labour) has identified EUCIP as market standards with regard to ICT professions;
2. Innovative and Technological Services of Confindustria (Italian union of industry) in the proposals sent to Government (Planning Document for 2009-2013), has suggested the adoption of EUCIP as a standard for VET policy and the development of ICT skills connected with the business world;
3. CNIPA (National Centre for IT in Public Administration) indicated Eucip profiles as reference profiles for the PA;
4. CRUI Foundation (Conference of Rectors of Italian Universities) and CINI - National Interuniversity Consortium for Information Technology - have launched a project to disseminate EUCIP in Italian universities.
5. some Regional Institutions like BCNL (National Labour stock exchange), with regard to ICT, refer to the EUCIP system for the definition of computer professional profiles.

2. ICT, VET, JOB MARKET, ACCESS REQUIREMENTS IN ITALY

2.1 INFORMATION SYSTEM ANALYST

This profile corresponds to the EUCIP profile of Information systems analyst.

An Information Systems Analyst must be very effective in identifying the requirements for ICT systems and defining models of information flows and objects to manage. A wide and thorough ICT competence must be accompanied by the ability to interact with users and colleagues.

This profile shows many similarities with the business analysts with whom he shares a number of categories of knowledge. Differ but the activities that typically are engaged. In the context of government takeovers may be the most common request for a professional who combines the skills of these two profiles.

2.1.1 Typical activities of the profile

- Assist in defining, planning and justification (in business terms) of projects to develop or implement automated and non-automated components of new or modified processes.

- Acceptance of responsibility for the various phases of the life cycle of software development systems, including: investigation, analysis, user acceptance testing, deployment and maintenance.
- Produce written reports and documents of high quality, on topics of organizational and / or technician with a clear and concise style, takes account of standards, methods and tools applicable, including prototyping tools where appropriate.
- Contribute to project plans and quality, taking into account the requirements of functionality to meet the constraints of time, cost and quality.
- Prepare or contribute to analysis of costs, benefits and risks.
- Plan and manage effective communication sessions (such as various types of formal and informal meetings, trainings, presentations, demonstrations, brainstorming, etc..) Demonstrating strong interpersonal skills, results oriented, ability to solve problems and mastered the techniques of corporate communication.
- Assist in ensuring quality of the data structures developed within the project and associated components.
- Review the projects logical system in which they are presented, for example: processes, objects, data streams, input and output data stored. Assists in the identification of common processes.
- As part of a project environment, assist in the investigation of the data requirements of an application, documenting the required standards using the methods and tools required.
- As part of a project environment, apply analytical techniques and data modeling, based on a general understanding of the business process, to establish, maintain or modify data structures and their associated components (entity descriptions, descriptions of relationships, attribute definitions).
- Review the specific schema system covering eg objectives, contents and constraints (such as performance, resources etc..) Hardware, networks and software environments, the main system functions and information flows, data load and implementation strategies, stages development requirements are not met and the alternatives considered.
- Assist in the evaluation and selection of software packages to suit all or part of the requirements specified. Provides competent advice on the integration of commercial software packages and suites (eg ERP, CRM, SCM, BI) that support administrative processes, and operational decisions.
- Operate within client organizations (both as an employee or as outside vendor) to design and optimize business processes, functions, procedures and workflows through modeling

techniques consistent, including comparisons (benchmarking) compared to best practice business processes in areas relevant economic.

- Work with other specialists (such as Business Analyst, Project Manager, Systems Designers, etc..) To analyze operational requirements and issues the client organization to define the way in which improved information systems can improve business operations.
- Assist clients / users in defining acceptance tests for automated systems and takes full responsibility for its proper implementation.

2.1.2 Behavioral competences

The role of Information Systems Analyst requires good general knowledge, ability, excellent oral and written expression, and a range of more specific behavioral skills. They need excellent listening skills, ability to gather information and organizational sensitivity to quickly understand customer needs. Requires a strategic vision, analytical and synthetic intelligence, imagination and proactivity to formulate and validate solutions. To get effective results are required attention to detail, a logical approach and results-oriented, flexibility, determination, attitude to planning and control, ability to build a group.

2.1.3 Technical Skills

1. Engineering of Requirements
2. Techniques and tools for information modeling
3. Life cycles of system development
4. Analysis and user-centered development
5. Selection and deployment lifecycle of an application package
6. Estimates of the development of a system
7. RAD approaches for life cycle development of systems
8. Tools and techniques for developing, testing and implementation of IT systems
9. Design and implementation of systems
10. Object-oriented approach to systems analysis
11. Accounting and financial management
12. Business activity and business process models
13. Information systems in business environment

14. Organizational strategies and selection of their IT system
15. Opportunities of new technologies and their correspondence with business needs
16. Principles of testing
17. Provision of IT services
18. Fundamentals of Project Management
19. Development and use of websites
20. Business risks and IT security

2.1.4 Job role access' requirement

In Italy the figure of the Information Systems Analyst, in relation to employment has two quite distinct types. In one case required a more detailed level of knowledge and possibly a good experience. But there is also the professional Information Systems Analyst that does not require any previous work experience, but a solid knowledge of basic technical skills. This last category of the professional profile in question can be considered as entry level into the world of work.

In the list presented in the paragraph above, about technical skill, the skills marked in red represent just this basic knowledge for an entry level professional.

2.2 SYSTEMS ANALYST

The software world is divided into two main parts: the so-called application software and the basic software. This distinction is probably not so well known and natural for the end user, although it is obvious to the specialist, particularly in relation to the various skills and operating procedures with which it moves in these two spheres. The software comes in contact with the user is, in almost all cases, those applicative software. These are the so-called "packages", or packets, such as classical management programs: accounting, VAT, Stock, payroll, etc..

Such software is normally produced in Italy, because, due to different regulations in force in different countries, it looks very little exportable and importable. Rarely it happens that an application requires direct dialogue between the user and the base software. The latter consists of the set of programs and routines which enable the system to run application software and the software comes in contact with the hardware or with the physical development and application software. This architecture enables programs-user applications to disengage from all the problems related to the physical structure of the machine, with a drastic simplification of the complexity of programming. The basic software is provided, in principle, from hardware supplier; this because, as mentioned, his writing requires knowledge of the machine even physically, and then a very large part of the software is imported mostly from America. Most programmers concentrates on development and maintenance of application software.

The Systems Analyst, is thus not primarily a programmer in the sense that, usually, he does not

produce more than occasional, basic software. He is rather one who knows and administers it, combining a deep knowledge of the physical structure of the machine and the nature of the main applications that are deployed on it. Its tasks are those prevailing to support and advice to users, where user means not only the end users of application software, but also programmers who develop it.

In particular, the system analyst will have among its tasks:

- analyzing and evaluating the system in case of malfunction or failure of some importance, and he have also the responsibility to decide what action to maintain it;
- occasional advice to programmers and analyst programmers developing software on the machine;
- the design, and sometimes the writing of specific procedures related to system requirements to appropriate management of the machine;
- management system architecture, including its connections with peripheral and / or other computers

2.2.1 Type of job

The system analyst is an employee normally in a medium - large company. This is mainly due to the fact that only high-level computer requires the presence of the professional in question; when the complexity of the machine grows, exponentially grow the demands of systematic interventions. So if we start from the staff, we understand that the management of the machine is, in ordinary use, relatively trivial.

Going up to the level of mini multi-user system, there is already a need to manage system functions, to design and build the connection between terminals and peripherals in general, and possibly address the problem of interconnection with other machines present in the company. However, on a small system, it is rare that these needs give rise to the identification of a professional who plays full-time the system analyst role. System Analyst functions are then typically covered with an experienced programmer, that occasionally engages on issues not strictly related to its competence, addressed the implementation of application software. The typical environment in which we find the presence of a system analyst is therefore that of the EDC, data processing center (CED in Italian), usually with a mainframe or large computers, which can be supplied with other machines, mini or supermini, mainframe or other.

The system analyst's job usually takes place in an office, but with at least one terminal and therefore not in direct contact with the console operator or with the physical parts of machinery. This is because the management of routine is not his responsibility. He is ready to be consulted if a problem occurs. A good part of his time is spent in the study of machine manuals in data centers, and literature update, highly specialized. The software he produces is relatively small and casual, but at least he is the only one who knows exactly what happens in the machine when certain processes are active.

Its activity follows extremely uneven rhythms, because marked the onset of problems or the need to keep abreast of news on its machines, mainly due to new decisions of the house providing the hardware. At the release of a new operating system version, for example, the analyst must quickly update the system by studying the news and by tests appropriate to ensure the conservation and

functionality of existing applications. Similarly, in case of system failure or major problems, its activities may take place in breathlessness. In those periods if they can switch to other relative peace. Of his work, he reports directly to the head center or EDP managers, who usually has a less technical expertise and he did not specify his hand, direct employees, or responsibility of individuals, but works relatively isolated.

2.2.2 Job role access' requirement

The kind of competence that the system analyst has is strongly oriented to a specific machine. In fact, every high-level computer is a whole world, often complex, within which, going in depth study should be significant and specific guidance. So the figure in question cannot simply acquire its expertise in concrete work on that computer, which means that the training courses related to professional can be functional to provide a wealth of basic notions that are indeed a prerequisite for 'work, but are far from exhausting the cognitive needs. The systems analyst and then, usually, a degree in technical disciplines, typically electronic engineering, or, more rarely, an expert in computer or electronic materials. He also has experience of programming, and usually has in his resume, at least two years of work in that profession. Finally, experience has made and sustained on the machine under his care, or a closely related model. For these reasons, we understand well that cannot be, in principle, a young person such as a new graduate. This type of figure is therefore created on the intersection of a variety of experiences. Often, the systems analyst has been trained by organized home hardware upon which specializes, is not frequently the case that he comes from the same supplier of home hardware.

2.2.3 Career prospects

The work of systems analysts, we said, is normally as employees, because it assumes the presence of a large computer. This implies a very limited scope for freelance work, just for the poor marketability of the spectrum of professional experience. This makes the task of system analyst essentially "locked" and linked to the existence of a specific computer. Indeed, the change of computer from the company can be a serious problem for the system analyst and he is obliged to recycle his expertise on the new machine or go back to the labor market, following the fate of the type of machine which is a specialist. On the other hand, in terms of career development in-house, the chances are not many. A system can become the head center, or in charge of EDP division, but only if present, in addition to purely technical competence of its typical function, a propensity for managerial and human resource management which in itself is detached from his resume. Other steps to figures and computer specialist would be perceived as a setback. These characteristics of poor career opportunities and lack of mobility on personal choice are the main drawbacks of the profession.

2.2.4 Similar professions

As mentioned, in the small companies in Italy the system analyst functions are carried out by programmer analyst or senior programmer, or by the new job profile of IT Administrator. In a very large company can be introduced the distinction between two distinct level in the systems analyst role, whereby the first one performs the duties of a higher level, such as the choice of configuring a

new mainframe architecture, and second acts as user assistance, intervention in case of failures or errors. This distinction, however legitimate from a technical point of view, from an economic point of view is justified only in a very large company.

2.2.5 Employment levels

According to best estimates, in Italy, the analyst figure is present in the 60 % of EDP divisions. Except in very rare cases in the large computing centers the figure is always present. If, however, instead of the figure of pure systems analyst, we take into account the programmer who carry out the functions of the systems analyst in small companies, there is a more widespread employment. Given the connotations of this figure mixed in small businesses, and the fact that it is sometimes sent back to the generic title of "employee" in various fields, it is very difficult to provide a precise quantification of its presence in the country. We will try to give two ratings, one for what concerns the profession of pure systems analyst, the other for mixed situations. In the first case, the number of employees is about the 3 / 4 thousand units while in the second, we have 20/25 thousand units.

2.2.6 Information Sources

This profile corresponds to the **X-Systems Engineer** EUCIP profile, published by AICA as *Platform System Administrator*. Must have a particular expertise in various operating systems and their methods for addressing the problems, optimizing performance, programming at system-level and integration between multiple platforms. Ability to diagnosis and troubleshooting is required to provide support on open or proprietary systems and hybrid configurations.

According to the American System (from *ONET Center*) this is the list of the task:

1. Expand or modify system to serve new purposes or improve work flow.
2. Test, maintain, and monitor computer programs and systems, including coordinating the installation of computer programs and systems.
3. Develop, document and revise system design procedures, test procedures, and quality standards.
4. Provide staff and users with assistance solving computer related problems, such as malfunctions and program problems.
5. Review and analyze computer printouts and performance indicators to locate code problems, and correct errors by correcting codes.
6. Consult with management to ensure agreement on system principles.
7. Confer with clients regarding the nature of the information processing or computation needs a computer program is to address.

8. Read manuals, periodicals, and technical reports to learn how to develop programs that meet staff and user requirements.
9. Coordinate and link the computer systems within an organization to increase compatibility and so information can be shared.
10. Determine computer software or hardware needed to set up or alter system.
11. Supervise computer programmers or other systems analysts or serve as project leaders for particular systems projects.
12. Assess the usefulness of pre-developed application packages and adapt them to a user environment.
13. Analyze information processing or computation needs and plan and design computer systems, using techniques such as structured analysis, data modeling and information engineering.
14. Define the goals of the system and devise flow charts and diagrams describing logical operational steps of programs.
15. Train staff and users to work with computer systems and programs.
16. Recommend new equipment or software packages.
17. Use object-oriented programming languages, as well as client and server applications development processes and multimedia and Internet technology.
18. Prepare cost-benefit and return-on-investment analyses to aid in decisions on system implementation.
19. Utilize the computer in the analysis and solution of business problems such as development of integrated production and inventory control and cost analysis systems.
20. Specify inputs accessed by the system and plan the distribution and use of the results.
21. Interview or survey workers, observe job performance or perform the job to determine what information is processed and how it is processed.

2.2.7 Meeting with stakeholder

The OntoHR partners have met during the workshop organized in Rome on April 9 2010, the Adecco agency and in particular the director of Adecco Benevento unit, Michele Tremigliozi. During the meeting he has spoken about the Adecco general activities, underling the recruitment one. In particular the Adecco director has highlighted that there is a growing demand for both flexibility and skills on the part of the workforce. For positions that require general skills, Adecco offers specialised solutions, focusing on industry know-how and cost leadership. This also means ensuring continuity and nurturing long-term relationships with our internal and external colleagues. Attracting professional skills requires "experts". Their in-depth professional knowledge amongst Adecco employees enables to find and provide challenging consecutive assignments which offer attractive perspectives for career development. Adecco is aware that traditional patterns of employment will continue to evolve in the years to come. For this reason Adecco wants to encourage the present and future generations to see change as opportunity in myriad forms.

The Adecco stakeholder is highly interested in the outcomes of the OntoHR project and in particular, taking in account the services delivered to own users, as training, recruitment and work

guidance, wants to collaborate with the OntoHR partnership, signing also a letter of intent, to experiment the OntoHR environment and services with own user, willing to stay in close contact with the project consortium.

3. ICT, VET, JOB MARKET, ACCESS REQUIREMENTS IN THE NETHERLANDS

3.1 Vocational Education system in the Netherlands

One of the selection criteria is the linkage between the job role and a certain vocational education programme (within the field of ICT) in the Netherlands. The first suggestion of the project group is to focus on the job role of IT administrator. This paper will discuss the impact of this selection within the educational and labour market environment of the Netherlands.

Three different educational levels prepare students in the Netherlands for entry on the labor market: lower vocational-, higher vocational- and academic education. The comparable European Qualification Framework (EQF) levels are level 4-5 for lower vocational education, level 6 for higher vocational education and level 7 university graduates. The three education system levels are strictly separate in offered knowledge and acquired competences. Students of lower levels can only enter a higher education level after successfully obtaining a lower-level degree.

3.1.1 Lower vocational education

Lower vocational education programmes are divided in four sublevels which confer to the knowledge level and independence that can be obtained within a job role. Vocational experience plays a key part within the education programme. Students may have a permanent part-time position at a company or will follow several internships during their study.

Since 2009 the national lower vocation counsel (MBO Raad) is aiming to implement the EQF to allow for more international comparison. Furthermore, a second initiative relevant to the scope of the ONTO-HR project is the federation of 17 knowledge centres (COLO). Each knowledge centre functions as a bridge between social partners, labour market, education institutes and central government. The aim of Colo is contribute to high quality and attractive lower vocational education. In 2010 competence-based learning will be introduced in the lower vocational study programmes. The knowledge centres work together with the stakeholders to develop qualification dossiers that describe the professional skills and competences that are needed to be successful at the labour market. The educational institutes will use these qualification dossiers as input in the development of lower vocational study programmes.

3.1.2 Higher vocational education

The Netherlands was one of the first countries to introduce the Bachelor-Master structure as agreed on in the Bologna treaty. The binary structure is implemented in both the higher vocational education as in the academic field. A central institute (NVAO) is responsible for the accreditations of the bachelor and master study programmes. The difference between higher vocational education and academic university level is best described that despite of the overlap, academic students are

stronger in analyzing (knowing why) and developing new knowledge (research), while higher vocational students are stronger in applying existing knowledge (knowing how).

ONTO-HR

First of all, relevant for the ONTO-HR project is the contribution of the higher education council (HBO-raad) to adhere to the standards of the EQF. No publications are yet available on the website of the council. Secondly, research (November 2008-april 2009) commissioned by the conglomerate of SME's in Netherlands (MKB-Nederland) and the Confederation of Netherlands Industry and Employers (VNO-NCW) showed that two-third of the participating companies were dissatisfied by their participation in higher vocational internships. Within the top-5 of most heard complaints is mentioned the disappointment in expertise and competences of the students and the difference in quality between educational institutes. Thirdly, last December the two labour market representatives presented an agenda to stimulate a stronger cooperation between higher vocation education and the labour market on a national level.

3.2 ICT study programmes in the Netherlands

A wide range of ICT study programmes are available in the Netherlands. The study programme needed to become a IT Administrator is available in both levels of vocational education system in the Netherlands. It's a high-level study (4) within the lower vocational education programme and is offered by various regional education centres (ROC's). The higher vocational education field offers one study programme named "System Administration". However, several comparable study programmes can be identified which are called "Network, infrastructure & design" and "System and Network Engineer".

There appears to be no reason for the project group not to focus on the study field of ICT.

3.2.1 ICT labour market

The position of ICT graduates on the labour market has been good in recent years, and even during the current economic downfall is expected to remain strong by educational institutes and employees in the Netherlands. As part of the preliminary research a telephone interview was conducted with the project manager of the Logica graduation programme "Working Tomorrow". After a short introduction of the Logica programme, the main insights of the job role "IT Administrator" will be discussed.

3.2.2 Business case Logica "Working tomorrow"

Logica started the graduation programme "Working Tomorrow" in cooperation with educational institutes in Rotterdam and Utrecht in 2005. More than 500 students with a higher vocational or academic study have conducted their thesis/graduation project under supervision of Logica. The student projects are mostly focused on ICT innovations. The projects are not sales-driven and 'proof of concept' is central in finalizing the graduation. In 2009 Logica was awarded "Internship

| Drivers | Critical dimensions | OntoHR Focus | Pilot |
|---|--|--|--|
| Diversity of Job role description | Certifications – Reference standard: EQF | Selection criteria | VET institutions |
| Diversity of Entry levels | Levels <ul style="list-style-type: none"> • Low level; • High level; • Experience; • Specific competences. | Relations between VET systems companies and job market | ADECCO (Institution working as interface with the companies context) |
| Diversity of companies as learning places | HR systems integration degree | Selection/recruitment Integration within people development and HR policies | Companies |

Company of the Year” by the Hogeschool Rotterdam.

To enter the Logica graduation programme the students have to pass a strict selection procedure. The selection focus of the applicant interviews are on technologic skills, knowledge level and IQ assessment. The motto “any doubt, your out” is followed. According to the project manager the quality of ICT graduates in the Netherlands is highly variable. Main factors according to Logica are a lack of consistent practical skills due to reliance on internship opportunities and too much dependence on group work instead of individual achievements.

4. CONCLUSIONS

ICT' job roles selection process

The preliminary study of Dida Network (15 December 2009) used the EUCIP model to describe the IT job profiles in Europe. The 21 EUCIP profiles can be divided in three groups:

- planning role,
- building role
- operating role.

The progressive process of Job role definition has been strongly challenged by diverse difficulties in identifying of a common profile among the different National scenarios of partners related both to the classification systems and to the dynamic dialogue among educational and VET systems, Job market, companies. The critical dimensions of the Job role definition process are reported in the following chart, **also highlighting OntoHR foci and choices:**

4.1 I step: the IT administrators

The term “IT Administrator” appears to be very ambiguous. The appropriate educational entry level

is dependent on the interpretation of the job role. A system administration position that mainly requires reactive maintenance or stability of the network environment is expected to be more appropriate for lower vocational students. A position with a more dynamic, changing environment or (multiple) system integration challenges is expected to set higher vocational education as an entry level. Comparable function names for higher vocational positions are “network manager”, “system analyst” or “network architect”.

The selected job role of IT administrator is part of the operating group. Secondly, the American job profile database O*Net is used as a comparative measure. The function description of Network and Computer System Administrator appears for a large part to be operational. Combining this overview with the opinion of Logica on the appropriate education level, it seems that the entry level for the selected job role adheres to the lower vocational education in the Netherlands.

A selected job role with a higher vocational education entry level might require more competence development of the applicant. Analytic, managerial competences and other soft skills might be a contributor to the success of the employee within the job role.

4.2 II step: the System Analyst

Comparing Italy and Holland in reference to the labour market and VET system, it is clear that the profile of System Analyst presents pros and cons. First of all, the positive factors of this profile are:

1. CORE ICT - The essential component of the Competence for this profile is technical.
2. EU / USA perfect alignment. The American job profile database O*Net is used as a comparative measure.

The negative aspects of this profile are related to the fact that the starting point (the level of entry into the labour market) is not a degree. It 'an essential certification path, but also a good experience.

4.3 III step: the Information System Analyst (ISA)

The selected job profile is: the Information System Analyst. The professional Information Systems Analyst does not require any previous work experience, and it can be considered as entry level into the world of work. This allows us to work for our pilot, with the young graduates. The EUCIP standard is an important reference point both in Italy and Holland and it has the job profile that we have chosen. The syllabus of ISA job profile is a good point of start.