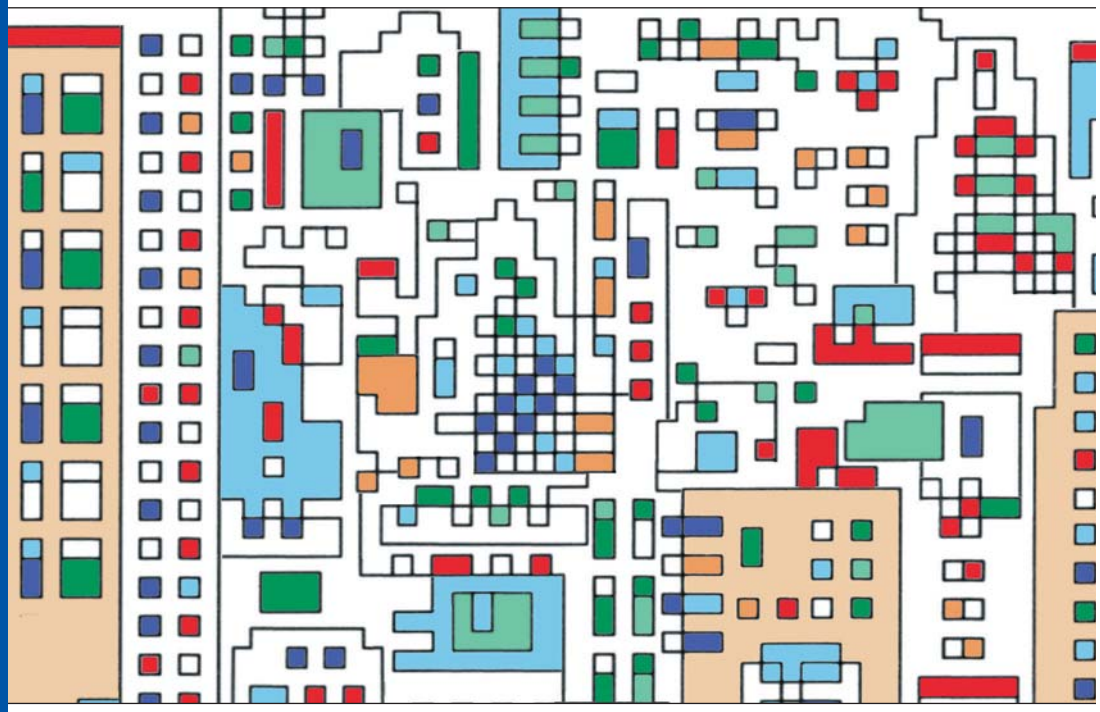
PAOLO SCHGÖR
RAFFAELE BRAMBILLA, FABRIZIO AMARILLI

# THE ALL-ROUND IT PROFESSIONAL

## Part A. Plan Knowledge Area: Use and Management of Information Systems



AICA
Associazione Italiana per l'Informatica ed il Calcolo Automatico

EUCIP
European Certification of Informatics Professionals
Core Component

FrancoAngeli

PAOLO SCHGÖR
RAFFAELE BRAMBILLA
FABRIZIO AMARILLI

# THE ALL-ROUND IT PROFESSIONAL

**Part A**
**Plan Knowledge Area: Use and Management of Information Systems**

**FrancoAngeli**

**This publication is based on:**

Schgör, P., Brambilla, R. and Amarilli, F., *Professione informatica, Vol. I – Pianificazione, uso e gestione dei sistemi informativi. Competenze interdisciplinari per l'applicazione delle tecnologie dell'informazione e della comunicazione nel mondo del lavoro*, FrancoAngeli, Milano, 2004

This publication is a **working translation** of the above text in the English language and do not pretend to do credit to the original Italian text. It has been prepared for the following purpose and target groups:

- Trainers and Lecturers: to allow them to prepare didactic material and courseware for the EUCIP Core training courses.
- Candidates for EUCIP Core certification: to be used as learning material to supplement EUCIP Core training.

**Development:**

The EUCIP Core Syllabus at [www.eucip.com] specifies the content of the EUCIP Core certification domain. This English language working translation can be used in conjunction with the EUCIP Core Syllabus as a basis to prepared further courseware in any language and in particular English language courseware.

ISBN: 978-88-464-8561-8

# Summary

# Introduction

## The Need for Common Competences and References

The spread of IT has brought a very wide public to face arguments (ranging from the concept of *bit* to the JPEG format) which were, up to not too many years ago, a prerogative of a few specialists.

The growing IT literacy that characterizes advanced societies does not mean however that specialized competences are not needed anymore. On the contrary, the demarcation line between “users” and “professionals” is thicker and thicker, and the differences between distinct professional specializations are such that a network administrator for a large company has very little in common with a Java programmer involved in the integration of information systems at some other company or with a pre-sale consultant working for a company that develops and commercializes CAD systems.

The risk that exists in this context is a great confusion, in which many individuals think they have good IT competences, but they are unable to communicate (due to language issues to begin with) with other groups of theoretically analogous people, who are also specialists in fields that may differ from the IT sector only for some marginal details.

The task of assessing IT competences turns out to be even more difficult (maybe) for those who are alien to the field. Suffice it to think of those who are called to promote learning initiatives in order to favour social development, or of human resource managers attempting to select candidate employees or to establish criteria for internal appraisal and stimulations of professional excellence.

It is therefore important to define a reference outline for helping one to identify some firm points of cross-sectional competences

common to all IT professionals, that is those who do not simply use IT for their work, but are instead IT craftsmen themselves. All the technicians who work for companies of the IT industry as well as all the staff dedicated to IT support at companies and organizations operating in other industries fall into this category.

The definition of such a reference outline for IT competences is the objective that has carried in 2000 to the formation of an international working group promoted by CEPIS (the Council of European Professional Informatics Societies). The outcome is the EUCIP (European Certification of Informatics Professionals) program, described in the last two sections of this introductory chapter.

## Book Structure

The contents of this book correspond, also in the organization of arguments, to the Syllabus (included as an appendix) that defines the basic competence requirements necessary to get the EUCIP certification. Due to the vastness of the arguments which are dealt with, it has been chosen to subdivide the book in three volumes. Such a subdivision, in addition to corresponding to the EUCIP base level structure (which consists of three distinct examinations in the “Plan”, “Build” and “Operate” areas), also reflects a logical distinction between discipline contexts.

This first volume deals with topics relating to the planning, to the use, and to the management of information systems and it therefore exposes a number of elementary concepts on information processing service “clients”. An overview is thus given on organizations, on business process management, on project management, on legal and economic implications of IT investments, often from a “consulting” point of view, in the conviction that IT specialists must understand the real requirements and the context to which technology is intended.

The second volume deals with arguments related to the realization of information systems, with particular emphasis on software, meant as a development object.

Finally, the third and last volume of the series deals with problems related to operation and operating support of the information systems, emphasizing hardware components, operating systems, communication

networks, and the delivery modalities of a support service oriented to a customer-supplier logic, which is already indicated as necessary in this first volume.


## Acknowledgements

Many people have contributed with several suggestions and comments to writing this text: Giuseppe Zerbi, Giovanni Franza, and Marina Cabrini. Authors also wish to acknowledge the entire AICA (Italian Association for IT and Automated Processing) structure, for sponsorship and support. A particularly warm thanks goes to AICA president Giulio Occhini, who has the merit of having been the first to realize the necessity of defining reference criteria for IT competences and of having constantly and tenaciously devoted energies and resources to the EUCIP project, as well as to several projects which have led to the definition of the ECDL (European Computer Driver Licence) certification, and up to the IT Administrator level, which is synergic to many of the contents of EUCIP certification itself.


## EUCIP Certification Structure

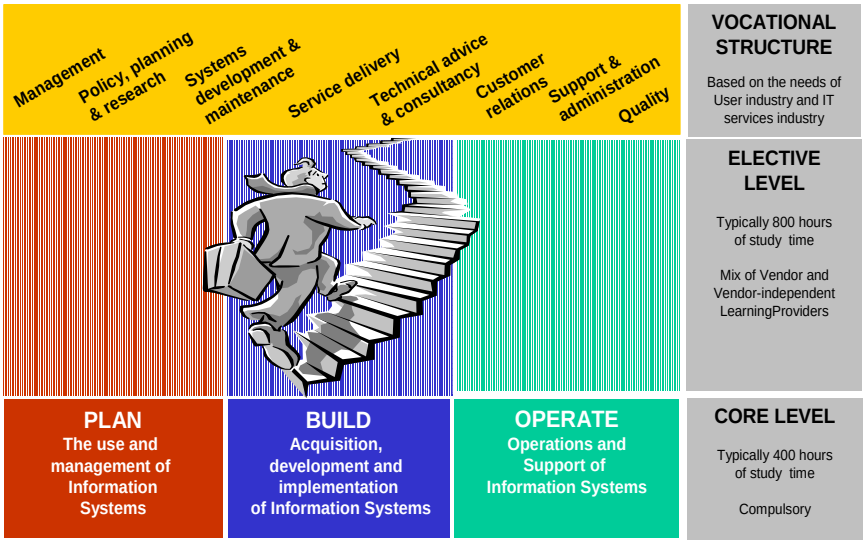



***fig.I.1 –EUCIP conceptual structure***

The EUCIP programme includes two certification levels, the second of which refers to a vocational structure.

- **Core level**: includes necessary competences, common to all of the paths, and covers the three fundamental processes: plan, build, and operate. A 60 minute exam corresponds to each of these three areas with multiple choice questions extracted from a question and test base (QTB). Preparation for the core level exam is estimated to require about 400 study hours, equally distributed among the three processes cited, for a university level student.
- **Elective level**: the elective level permits the choice of a specialised competence. The student has the power to arrange, with some level of freedom, elements of different areas of competence, including vendor modules as well as independent courses and modules. The overall path is expected to take about 800 hours of study, and the final exam for the certification is taken in the presence of an EUCIP examination board. The candidate provides the board with documentation that certifies the path studied and the realized projects prior to the exam. The combination of courses chosen by the student must correspond to one of the prescribed curricula (see the next point), thus guiding the candidate to a determined professional IT category.
- **Vocational structure**: the elective profiles, like, for example, Business Analyst, Information Systems Project Manager, Software Developer or Network Manager, correspond to typical profiles within businesses of the IT industry or other sectors. This structure of the EUCIP elective profiles aims to define the correspondence between the professional figures and the concrete requirements on various areas of knowledge and within the described elective level. The form is typically that of a study curriculum that describes how one can combine available modules to satisfy the requirements of the chosen position. For example, the profile of Network Administrator requires various education modules in the “Operate” area.

## The Three Knowledge Areas

A. **Plan** – It refers to requirements analysis and the planning of the use of information technologies, and it is therefore strictly connected to the management processes and to the definition of the business needs in the ICT sphere put into the context of a strategic perspective. Important elements within this area are, for example, the traditional notions of business organization, return of investments, financing, risk, etc.
B. **Build** – Includes the processes of specification, development and integration of IT systems. The central node of the area is represented by traditional aspects of development, implementation, and integration of IT systems.
C. **Operate** – This area regards the installation, supervision and maintenance of IT systems. It is characterized by arguments like network management, change management, service and delivery support, etc.

# Part A

# Plan Knowledge Area: Use and Management of Information Systems

# A.1. Organizations and Their Use of IT

## A.1.1.Organizational Types and Structures

Organizations are structured systems whose key component is people working to achieve **common objectives**, according to a coordinated plan. These objectives represent the first element, which characterizes an organization collectively referred to as the business mission. Secondly, it is also possible to identify an organization based on its historical dimension, consisting of a body of knowledge, a network of relationships, and property, all of which influence the strategy and behaviour of the organization.

From a legal viewpoint, organizations which have been formally established are legal entities.

An exhaustive list of legal company forms is beyond the scope of this book, but in general terms, we should keep in mind that different legislation share the same basic criteria (see examples reported in fig. A1.01) including:

- the target of an organization may be either profit or charity;
- the constituent parts of the organization may be individuals (physical people) or other organizations (e.g. financial enterprises), whose involvement in day-to-day activities may range between personally assuming full civil and penal liability (e.g. general partnership), to merely a financial involvement (e.g. joint-stock company).

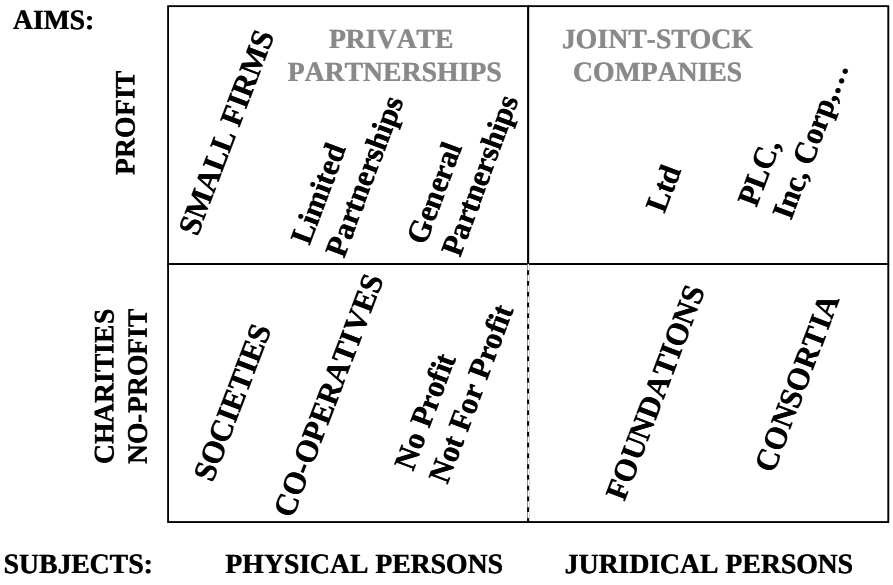



***fig.A1.01 - Categorization of organization types and their legal forms***

Another characteristic of organizations is their size, which can be measured in the following ways:

- economic parameters (e.g. business volumes or "sales revenue", gross operating margin or EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization);
- employment parameters (e.g. number of employees, collaborators);
- other parameters, related to the area of activity (e.g. number of customers, patients, students, etc.).

The typical distribution of companies classed by size is often represented as a pyramid, since it consists of a relatively small number of large groups (usually multi-national) at the top, a middle layer represented by several medium-large companies, and a base, composed of numerous *Small* and *Medium Enterprises* (also referred to as SMEs).

A study conducted in 2002 on the German economy points out that SMEs (with yearly sales < 50M€) account for 99.7% of

registered companies (excluding microscopic enterprises, with sales < 15K€); however, large organizations (0.3%) account for more than half of the total business volume. In Italy, **proportions** are even more biased towards small enterprises.

The size factor also impacts on the hierarchical structure. As a general rule (subject to exceptions):

- More formal and structured organizations are typical of lager companies (which is also due to the need of guaranteeing transparency to a wide share-holding population);
- More agile organization structures are typical of smaller size companies. It is quite common that in SMEs the founder / owner / entrepreneur / sole share-holder or majority share-holder "rules" the company directly, with other higher managing profiles almost absent.

Classical organization theories, based on Frederick Winslow Taylor's thought[1], define the following management objectives:

- increased efficiency;
- increased specialization, which improves efficiency. Taylor stiffly applies the specialization concept to intellectual activities also, which are relevant to managers and not to workers;
- increased organization size, which is a necessary consequence of an ever increasing specialization.

As an additional consequence, larger organizations lean towards formal regulations and structures, which result in organizational charts that have a hierarchical structure consisting of several well defined levels, reminiscent of that found in the military.

[1] Taylor F.W. (1911), *The Principles of Scientific Management*, Harper & Row, New York

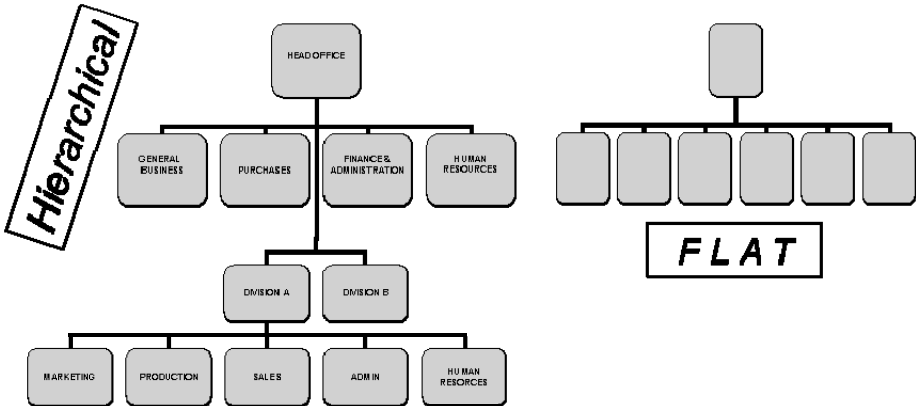



***fig.A1.02 - Comparison between a traditional hierarchical structure and a flat one***

Nowadays, organization tendencies underline the importance of flexibility (as opposed to specialization), of responsibility delegation at all levels (*empowerment*), and **of flatter organization charts** (fig. A1.02) where hierarchical differences are replaced by collaboration oriented approach, which exploits internal communication and common target sharing.

Finally, an organization may be considered as a set of individuals who develop procedures (or processes) by using and modifying information resources. To carry out their job, people may use, if necessary, facilities and machinery, which may even be related to information technology. The majority of the definitions given so far are quite general, but in practice all structured organizations make massive use of tools for information storage and processing. Therefore, the key role played by IT - defined as a set of technologies for automated processing of information - is obvious.

Work can also be represented graphically – as a set of workflows involving distinct entities. The flow can be physical (if material objects are transferred) or purely information-based (as in the case of an order received through a phone or through the Internet).

The example in figure A1.03 represents in a very simplified way a set of flows related to a transaction for a purchase between client company A and its usual supplier B:

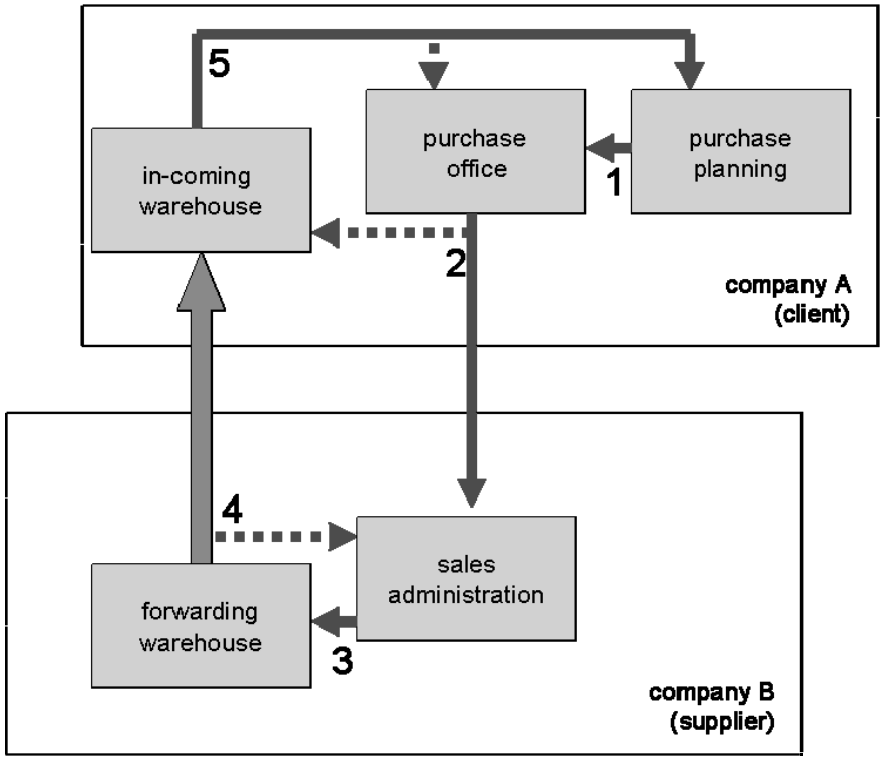



***fig.A1.03 – Diagram representing individual organizational units and work, information, and physical flows (workflow diagram)***

1. the purchase planning function sends a purchase request to the procurement office (specifying the item code, quantity and date);
2. the company A procurement office issues a purchasing order addressed to B. It also reports this event to the company warehouse department, which will receive the goods;
3. company B sales administration records the sales order and transmits it to the forwarding warehouse;
4. the forwarding warehouse packs the requested goods, dispatches them to client A (physical flow) and reports to the sales administration that the goods have been dispatched;
5. on receiving the goods, the company A in-coming warehouse records a purchase receipt transaction (causing an increase in inventory balance of the item involved). Such a transaction is

visible to both the purchase planning function and to the procurement office.

In the real world, the flows might be more numerous and tangled, and the purchase cycle may even be preceded by a supplier selection phase. In addition, the process would only be complete after billing and payment take place.

Nevertheless, this example is enough to highlight that information is an essential factor:

- in determining the processes and the correct development of physical flows at a logistic level;
- in services and financial management (payments);
- in decision making support.

The availability of information systems support in the main organization processes can bring a great increase in management efficiency, a higher quality in the supplied service, more interesting working conditions for the employees and a wider view over the activities trend. This last condition is essential to management for both short term and strategic decisions.

Over the years, information technology has gradually been adopted by companies (in paragraph A.3.1. we will make a more careful study of the following classification):

- in the first period, between 1960 and about 1985, **EDP** (Electronic Data Processing) centres appeared. While EDP centres were mainly devoted to the semiautomatic processing of accounting documents, the first **industrial automation systems** (*Computer-Aided Design, Computer-Aided Engineering, Computer-Aided Manufacturing*) started in the production department. Industrial automation systems would later turn into the more advanced integrated concept of CIM (*Computer Integrated Manufacturing*);
- the second period, between about 1985 and 2000, started with the unification of the two streams, EDP and CIM, towards **information system** models able to offer integrated support at an overall company

level, exploiting the ever growing potentials of information and communication technology (ICT);
- finally, the most recent phase, beginning around year 2000, is represented by the **e-business** concept, see paragraph A.4.2. for a more detailed study.

Information systems management often reflects the characteristics of the organization that they support. Big multinational organizations like the "**prescriptivity**" of integrated managing systems, which often demand rigid but consistent operational procedures. On the other hand, smaller and more dynamic organizations tend to formalise just a few basic procedures, and use a number of general purpose technologies (from spread sheets to e-mail), this method helps to guarantee higher flexibility and adaptability to changing internal and external conditions, even though they have many limits when compared to dedicated managing systems.

***Syllabus Items***

- Define major organizational types, their characteristics and corresponding internal structures (e.g. hierarchical vs "flat"), addressing aspects of legal status (e.g. charity vs. partnership), size (SME vs corporation);
- Describe the role IT plays in an organization;
- Show, using diagrams, the workflow within a number of different organizational structures;
- Identify the purpose of IT within an organization;
- Identify the impact differing structures have on the management of IT.