# Information Technology (IT) experts
# In
# Flexible Forms of Employment

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I declare that this thesis is my own work.

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*To my parents, for a lifetime of love and devotion*

*Acknowledgment*

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**ABSTRACT**

This research is concerned with the study of the conditions that govern the proliferation and diffusion of non-standard employment relationships in knowledge intensive sectors of the economy (i.e. the subcontracting of highly-skilled workers in the IS sector). It aimed at identifying and exploring the technological and socio-economic conditions that pave the way for IT freelancing to blossom and spread. In other words, the objective of this study has been to investigate the possibilities that technological infrastructure and social and institutional conditions create in regard to the proliferation of IT freelancing. To achieve this research objective, the study explored how the asymmetrical relationship between client-firms and highly-skilled IT contractors is enacted and sustained in practice.Previous studies on IT freelancing have usually examined the reasons that justify such a decision, focusing on the contactor or the client-firm's perspective. Little attention has been paid to the technological factors and the functional base of the work which potentially renders this kind of work amenable to freelancing practices. In this regard, the current research is distinguished by the attention it pays to the way the task infrastructure of IT work and information and communication technologies are associated with the contingent employment pattern. To this end, thirty "ethnographic" interviews with highly-skilled IT contractors were conducted in Greece. An analysis of the findings suggests that the exchange of highly-skilled IT services between the IT contractor and the client-firm, instead of simply being subject to the rules of supply and demand governing spot markets, tends to be highly contingent on the technological infrastructure and socio-economic conditions which govern the current workplace. In other words, the particular technological tools that the contractors possess along with concrete social and institutional conditions that rule the IT sector appear to partly account for the spread and maintenance of IT freelancing techniques.

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# CHAPTER 1: INTRODUCTION

## 1.1 Background

Over the last few decades, the overall landscape of work and employment has undergone tremendous transformations that the current academic and business discourse struggles to grasp or describe. The notions of 'flexibility', 'malleability', 'resilience' and 'adjustability', widely used to illustrate various occasions of individual and social life, denote the advent of a new era where *change* and *discontinuity* prove to be the only constants.

Within the contemporary working environment, the globalization of production and the openness of markets have dramatically increased competitiveness, challenging the way work has been traditionally organized and performed. The new social and economic order breaks sharply with the tenets of bureaucracy and modernity (Bell, 1973; Kallinikos, 2003) and thus promotes the flexibilization of production, the individualization of work, and the fragmentation of society (Carnoy and Castells, 1997; Carnoy, 2000). Non-standard employment arrangements are on the rise, to the detriment of permanent employment and salaried work (Hoque and Kirkpatrick, 2003; Kalleberg, 2000), while individual forms of workers' participation and involvement are largely encouraged.

It is noteworthy that the use of time-limited contracts and the adoption of non-standard employment arrangements are not something new in the labor market. They have been repeatedly used by organizations to accommodate the needs of low-skilled work and enhance organizational flexibility. Yet, nowadays, contracting and sub-contracting tend to be increasingly associated with the employment of so-called knowledge and highly-skilled workers. This particular category of workers have been traditionally hired in a permanent basis and used to have life-long careers within particular organizations (Cohany, 1996).

The current thesis seeks to bring to the fore issues related to the contingent relationship between highly-skilled information technology (IT) contractors and their client-firms. It is concerned with the study of contracting practices adopted by highly-skilled software engineers. In particular, it explores how the asymmetrical

employment relationship between the highly-skilled IT contractor and her/his client-firm is sustained, spread and enacted in practice. To do that, it pays particular attention to the special conditions that frame the execution and organization of specialized IT work.

The significance of this study lies in the fact that the contracting of highly-skilled IT individuals constitutes an exemplary case for understanding new forms of organizing in knowledge-intensive sectors of the economy. A thorough understanding of the terms and conditions by which individuals are tied to organizations may provide insights with regard to the present and future configuration of the workplace. The aforementioned claim can be justified by acknowledging the following five conditions underlying the modern workplace and referring to the nature of IT work:

a) the new economy is characterized by the prevalence of knowledge-intensive services and is largely populated by knowledge workers (Castells, 1996; Bell, 1973; Beck. 2000),
b) an increasing proportion of knowledge workers is classified under the category of contingent workforce (Abraham and Taylor, 1996, Cohany, 1996),
c) the occupational category of knowledge workers and professionals displays certain characteristics which deviate from the traditional notion of the 'typical' employee. The superiority of their knowledge challenges the hierarchical authority of managerial positions (Abbott, 1988) and poses a question with reference to the legitimacy of power and control,
d) IT experts are considered knowledge workers and 'semi-professionals' (Scarbrough, 1999). Highly-skilled IT workers are software experts who are mainly responsible for the production of sophisticated IT products and services. They possess particular skills and competencies which allow them to perform technically complex tasks in a way that few people could claim to understand, and,
e) IT experts epitomize today's ephemeral employment arrangements. They appear to always develop loose ties with the organizations which employ them. When they work as contractors, they strike up ephemeral acquaintances with a number of prospective client-firms. When they are employed as permanent salaried workforce, they still move frequently among various organizations in an attempt to increase

their revenue; rather than being accidental, they display a rate of turnover which usually exceeds 20% (Carnoy et al., 1997; Joseph et al. 2007).

### 1.2 Motivation and scope of the research

Previous studies on IT freelancing examine the reasons which justify such a decision (i.e. the decision to outsource the IT functions of the firm or the decision to become an IT freelancer) or analyze the implications of such a decision for the organization or the contractor. In other words, the studies adopting the employer's perspective tackle the question of whether a firm should outsource a part or the sum of its IT functions, or analyze the impact of such a strategic endeavor on the overall performance of the organization (Lacity and Hirscheim 1993; Mayer and Nickerson 2005; Wang et al., 1997). On the other hand, the studies adopting the contractor's perspective present the perceived expectations and discuss the lived experiences related to the IT freelancing reality (Barley and Kunda, 2004; Kunda *et al.*, 2002). In sum, prior research on IT freelancing practices addresses the two following concerns: a) what triggers the beginning of such an employment arrangement (i.e. the motivation behind the decisions and activities of individuals and organizations), and b) what is the final effect of such an employment arrangement on the employing organization and the contracting individual.

Strangely enough, the existing literature seems to largely ignore or underplay the particular conditions which allow for the employment relationship between the highly-skilled contractor and his/her client-firm to sustain and spread. After the decision to embrace a flexible employment arrangement is made, and before its implications on organizational affairs or individual lives are considered, what does hold the two parties together and ensure the smooth running and diffusion of the contingent employment relationship?

The answer to the above question becomes highly disputable and controversial, once the idiosyncratic characteristics of knowledge work are taken into consideration. First, knowledge work is not easily amenable to traditional methods of control and supervision. Knowledge work entails a high degree of critical judgment and

discretion. It involves the activation of particular "skills and expertise which are equivalent to the 'rules of thumb' that human experts refer to when they are asked how to solve problems" (Dreyfus *et al.*, 1986, p. xii). Quite often, these rules of thumb cannot be articulated verbally and are acquired through contextual learning and in situ observations. They resist conceptual rationalization and reside in the individual's tacit or esoteric knowledge. Therefore, the degrees of freedom a knowledge worker possesses in carrying out a task and the power s/he enjoys in defining both the problem and the solution involved (Perrow, 1967) are expected to be high and at the expense of her/his supervisor group. The above remarks are indeed applicable in the case of highly-skilled IT workers where managers are not always able to explicitly articulate or describe the IT service they ask for (Barley and Kunda, 2004). It is up to the highly skilled IT individual to decide not only what needs to be done and how this will be done, but also what is asked to be done. Knowledge IT workers usually have to translate the blurring organizational needs and business imperatives into specific IT solutions, since managers often lack even the basic technical knowledge.

Second, the knowledge worker is expected to perform better, the longer s/he stays within a particular organizational context or business sector and the more s/he interacts with fellow-peers (Abbott, 1988; Hilton, 2001). In line with the above argument, findings from relevant studies (Barley and Kunda, 2004) suggest that hands-on experience or contextual knowledge might have greater impact on IT experts' performance than formal education has. Good knowledge of the application domain is considered a necessary prerequisite for successful software systems design (Guindon et al., 1987). Furthermore, IT workers who are able to build communication ties with experienced workers in their field, increase their possibilities to display more successful job performance (Hilton, 2001).

Taking this into consideration, it can be argued that the on-spot economic endeavor between the highly-skilled IT contractor and her/his client firm is not expected to run without friction. (Goldthorpe, 1998; Williamson, 1975). On the one hand, asymmetries of information and unequal allocation of power between the two parties involved raise concerns of control which cannot be easily overlooked. Taking for granted that IT work resists the possibility of managerial supervision and

control, how can the manager be sure that the highly-skilled contractor will act according to the terms and conditions of the contract without cheating or shirking? Is there any guarantee or filter or control mechanism which ensures that the interests of both parties will be aligned and the balance will be achieved? On the other hand, taking for granted that IT contractors are doomed to carry the burden of professional isolation and are rather deprived of contextual knowledge specific for the client-firm (Barley and Kunda, 2004), how can s/he deliver high-performing services tailored to the needs of the particular client-firm? How does the contractor tackle the lack of contextual knowledge (i.e. knowledge which is specific to the particular firm) if s/he has no prior acquaintance with the specific client-firm? How does the contractor cover the need for peer-to-peer learning (i.e. opportunities of learning through informal discussions among peers)? Taking this into consideration, it can be argued that the sustainability and diffusion of the contingent relationship between the IT expert and her/his client-firm is neither a simple nor a straightforward process which can occur effortlessly. Many questions remain to be answered and concerns to be tackled.

The current research aims at filling this gap in the literature, investigating the various kinds of mechanisms that may partly account for the proliferation and diffusion of highly-skilled IT contracting services in contemporary workplace. It seeks to identify and explore the technological and socio-economic conditions which are implicated in the blossoming of the contingent relationship between the highly-skilled contractor and her/his client firm. In other words, the objective of the study is to investigate the technological infrastructure and the socio-economic edifice which allow or facilitate such a controversial –at first glance- employment arrangement to flourish and spread.

The main research question of the study may be articulated as such:
"*What are the particular (i.e. technological and socio-economic, material and institutional) conditions that account for the provision of highly-skilled IT services on a spot basis? How can we explain and understand the sustainability, proliferation and diffusion of non-standard employment arrangements in knowledge-intensive sectors of the economy, and in particular in the IT sector?*"

The decision to explore the role of technological conditions and socio-economic edifices in the restructuring of work arrangements can be justified as follows: A brief look at the history of work indicates that changes in the way work is organized and performed usually relates to changes in technology and shifts in customs, traditions and laws which govern society at certain points of time (Barley, 1996; Iacono and Kling, 2001; Zuboff, 1987).

More precisely, new technological tools mediate organizational tasks and create new potentials and constraints for organizational players. From the era of the industrial revolution until today the computerization or informatization of the workplace has promoted a standardized way of dealing with the complexity of organizational affairs. The introduction of information technology has been predicated upon a detailed division of labor which in turn paved the way for the rationalization of the production (Kallinikos, 2006). A number of tasks which had been traditionally performed by individuals, were now undertaken by machines and computers (Iacono and Kling, 2001), while the rest of the tasks have been depicted in abstract symbols and been broken into their constituent parts which in their turn have been assigned to various individuals (Kallinikos, 2003; Zuboff, 1987). Thus, the allocation of human effort to the various steps of production has been split into independent modules and became increasingly systematized. The output of the production process has been decoupled from the particular individual effort and the immediate context of practice. But such a standardization and abstraction allows for the exchangeability and transferability of human labor (i.e. mostly factory work and routine office work) across time and space.

It is worth questioning to what extent we can identify a sort of correlation between the use of new digital technologies and the contingent provision of highly-skilled IT services. Interestingly enough, new digital information and communication technologies differ from traditional ones in the sense that they are modular, recombinable and multi-purpose (Pentland and Feldman, 2007). Thus, it could be assumed that there are potential analogies between the cognitive organization of technology and the organization of the work tasks which are mediated by these technologies.

On the other hand, no matter how important the impact of technology on the restructuring of work tasks and organizational arrangements may be, it is inadequate to fully explain the transformation taking place in the current workplace. "The role of non-technological factors in shaping when and with what effect technological and organizational changes are adopted and to what extent they are linked" is strikingly important and needs to be carefully highlighted (Yates and Van Maanen, 2001, p. 3). Prior research on the history of work reveals that there are social, political, legal and economic factors that operate as enablers of the emerging organizational structures and employment trends (Winter and Taylor, 1996). In this spirit, it is plausible to investigate the existence of potential social triggers and economic contingencies which co-exist (i.e. favor/are favored, or support/ are supported) with technological trends and are commonly involved in configuring and structuring the contingent employment relationship between the highly-skilled expert and her/his client firm.

To address the aforementioned concerns and follow the tradition of similar studies which investigated the transformation occuring in the workplace, this study adopts a qualitative research approach. The original framing of the study lies against the background of Rational Action Theory and Transaction Cost Theory (Coase, 1937; Goldthorpe, 1998; Williamson, 1975) and employs the basic concepts of a theoretical model, developed by the British sociologist, John Goldthorpe (1998). The model links together types of *work contracts* with particular *work roles* and - *work tasks* that employees are expected to fulfill and perform, respectively. Differences in the types of labor contracts are associated with the special conditions of work that the contract accommodates (Kallinikos and Hasseldbladh, 2003). Strategies of employee motivation and commitment (i.e. strategies anticipated and accommodated by long-term contracts) along with the lengthy *in-situ* training of the employee, prove to be necessary for the effective management and performance of knowledge workers.

In this respect, the study is grounded on the following premise: the attempt to understand the phenomenon of IT contracting in the highly-skilled segment of the IS sector brings forward two basic issues: a) the issue of monitoring and control of the highly specialized IT work, and b) the issue of contractor's ability to perform

efficiently in an organizational context s/he has no acquaintance with. Both considerations invite us to question the terms and conditions by which IT work is currently practiced and organized.

In an attempt to investigate the aforementioned considerations, thirty "*ethnographic*" interviews (Evans et al., 2004; Kunda et al., 2002) with highly-skilled IT contractors were conducted in Greece. The selection of the informants followed the logic of a snowball sampling, i.e., respondents were asked to provide details of others whose working profile matched the unit of analysis of the current study (Evans *et al.*, 2004; Faugier and Sargeant, 1997).

Each contractor was considered as a single case-study, revealing certain aspects related to perceived realities of IT contracting. The selection of multiple cases aimed at replicating the findings stemming from the first case. Triangulation and juxtapositions of the respondents' views with regard to the same phenomenon intended to allow a rich variety of topics and perspectives to emerge. The intention of the study was not to prove the prevalence of a phenomenon to a stated population, but rather "to understand the deeper structure of a phenomenon, which is believed can then be used to inform other settings" (Orlikowski and Baroudi, 1991, p. 5).

The topics discussed in the course of the interviews evolved around the contractors' career histories, the conditions which frame their everyday working lives, their work practices, their business ethics, the construction of their professional identities, the management of their relationships with client-firms, and their overall experiences and perceptions with regard to IT freelancing practices. Some informants were interviewed twice (when the initial transcription made a second round of interviews necessary), and in some cases ad hoc observations in the respondents' workplaces were made.

In conclusion, the analysis of the findings suggests that the exchange of highly-skilled IT services between the IT contractor and the client-firm, instead of being simply subject to the rules of supply and demand governing spot markets, is highly contingent on the technological infrastructure and socio-economic conditions which govern the current workplace; particular technological tools alongside the concrete

social and institutional conditions that rule the IT sector prove to partly account for the spread and maintenance of IT freelancing techniques.

### 1.3 Significance and Contributions of the Study

This research promotes the view that an understanding of employment forms cannot be fully achieved without the serious consideration of both the technical and social/institutional conditions which underpin and mediate the material production of goods and services. Under this scope this study puts into the center of analysis the functional base and the intrinsic and extrinsic characteristics of work: the way work is currently practiced and organized is considered a basic enabler of today's contracting practices.

In this sense, the research pays special attention to the way both particular *technological tools* which mediate the production of software, and specific *social* and *institutional formations* which frame the provision of IT services, are involved in the reconfiguration of current work settings and employment forms. In particular, the research findings suggest that there are two conditions which are inextricably intertwined with the feasibility and diffusion of IT contracting practices.

First, the technical functionalities which are embedded within the particular programming languages allow for the codification and transferability of IT knowledge across organizational settings. The increased modularity of code and the relative standardization of the software development process bring about particular programming tools that create the possibility of easier recombinability, scalability and integration of independently developed software modules.

More precisely, object-oriented programming languages (i.e. the programming languages which appear to dominate the contracting world) consist of increasingly independent, modular and homogenous components which are linked together by considerably explicit combinatorial rules. Each object is a self-sufficient whole which remains a black-box for the rest of the system. It employs its own methods to

manipulate its own data and perform operations specific to itself. The communication or linkage among the various objects is relatively formalized and is realized through the exchange of simple messages via carefully designed interfaces. Similarly, the inherent structure and incremental production of slightly or strongly differentiated objects have been homogenized and standardized, following particular patterns of classification and deductive logic (i.e. the concept of inheritance). A great part of the IT engineer' s discretional choices with reference to what data should be manipulated by what function and how re-usability of code is practically enacted has been codified and encapsulated within the structural principles of object-oriented programming techniques. And such a codification of IT knowledge opens the door to its subsequent transferability.

The increased modularity and the adoption of standardized combinatorial rules have had the following immediate effects which were significantly involved in the provision of contracting services:

a) an object can be transferred from one application to another without significant semantic alterations or distortions, since its operations are specific to itself and independent of the rest of the system,

b) various parts of the system can be easily reshuffled, combined and separated, allowing the system to be easily decomposed and recomposed anew according to the imperatives dictated by the business objectives potentially undertaken by a particular contractor, and

c) various parts of the system can be assigned to contractors and then can be easily integrated, since the work output of each individual is independent and autonomous from the effort allocated by the rest the people on the team.

d) reusability of code is anticipated and increased since brand new classes of objects can be created just by abstracting out common attributes and behaviors. The variability and the spectrum of the produced code is supported.

In sum, it can be argued that "The potential significance of new ICTs arises not just from their individual function, but from their potential of recombination" (McAfee, 2006; O'Reilly, 2005; Pentland and Feldman, 2007, p. 783). The potentials of recombinations of modular software along with the codification and abstraction of IT knowledge allowed a new spectrum of possibilities for the organization of

business and work arrangements to emerge (Andal-Ancion *et al.*, 2003; Pentland and Feldman, 2007).

Second, the emergence of specific communities and social networks appear to support and decisively frame the provision of IT contracting services. Informal professional networks and virtual communities, largely enabled by the use of internet technologies, counterbalance the negative aspects of IT freelancing and ensure the viability of the contingent employment relationship. They diminish information asymmetries between the two parties of the transaction, by promoting the visibility of market conditions and invoking normative mechanisms of control.

In particular, the IT contractors' membership into informal professional networks (Laubacher and Malone, 1997) (i.e. networks with ex-peers and friends who share the same professional interests and diverse kinds of virtual IT communities available in the Internet) appeared to be a strong moderator of contracting life. They constituted the contractors' resources for: a) maintaining long-term employability in a shifting and volatile occupational labor market (Osnowitz, 2006), and b) updating their knowledge and enjoy the benefits of traditionally co-located collegiality (Barley and Kunda, 2004).

The informal professional networks seemed to provide the credentials about the professional ethos and subsequent dexterities of their members. In the absence of an institutionally established professional body, these networks operated as an informal guarantor of the contractor' s trustworthiness, reliability and effectiveness (Osnowitz, 2006). The increased transparency of the members' professional conduct which was heavily based on internet technologies became a safety net to the benefit of the potential client-firm. Retaining a good reputation and displaying a reliable professional conduct within the aforementioned social groups increased the contractor' s possibilities of employability (Barley an Kunda, 2004). Through the activation of their contacts in the network the contractors have been able to delimit their professional isolation and decreased the insecurity of finding the next contract. For them, the membership in these informal communities has been particularly important, since they operated as a source of professional identification and medium for getting easily access to the market.

Similarly, these virtual and professional networks become a great source of easily accessible, timely and up-to-date information and a locus where contractors with similar interests could gather and exchange opinions about their work concerns. Through these networks, the contractors were able to gain access to the lived experience and cumulative knowledge of an expert community. This capability is crucially important, since expert knowledge, apart from its reliance on formal education, it also depends upon the ongoing interaction of members of the same profession (Barley and Kunda, 2001).

In conclusion, the research findings indicate that current employment trends, such as the contracting of highly-skilled IT services, should not be conceptualized as neutral ways of organizing labor, largely prescribed by functionalistic criteria or utilitarian motives. They appear to be complex mechanisms for coordinating work, which usually coincide with the emergence of particular technological conditions and social contingencies. Subsequently, their substantial understanding necessitates the parallel consideration of the material and non-material circumstances which allow them to flourish and prevail.

### 1.4 Structure of the thesis

The thesis consists of eight chapters. After this introduction chapter, Chapter 2 provides a synopsis of the basic trends which characterize the modern workplace and ground the relevance and distinctiveness of the research subject with regard to the prior research conducted in the field. More precisely, it discusses the notion of workplace flexibility, individualization and technological/organizational transformation and pays particular attention to the contracting practices of professional and knowledge workers. After providing an overview of the research conducted to date on IT freelancing and outsourcing, it introduces the research question which constitutes the pillar of the current research.

Chapter 3 presents the basic characteristics of highly specialized IT work as discussed in the relevant literature. Drawing upon particular theoretical concepts largely used in organizational analysis (Perrow, 1967), it analyzes the content and

task structure of this work. It presents how highly-skilled IT employees organize their resources and act upon the 'raw material' to perform their job. A brief discussion about the 'professionalization' of the IT occupation is also hinted.

Chapter 4 presents the theoretical framework which has been used to frame the research problem and guide the overall conduct of the research. It introduces the main vocabulary in regard to employment relationships and contractual arrangements. It provides a critical presentation of Goldthorpe's model, the theoretical basis of the research. And, finally, it associates the theoretical constructs of the model with aspects of IT freelancing presented in the literature.

Chapter 5 presents the epistemological premises that guided the selection of the particular methodology, as well as the significance and appropriateness of this methodology for the study of the subject matter. It overviews the literature on constructivism and tackles its appropriateness for the social study of technology and employment relationships. It further presents the selected research methodology; defines the unit of analysis and describes how the fieldwork took place, as well as how the narrative of the research was constructed.

Chapter 6 presents a narrative-based perspective of IT contractors' perceived experiences and work practices. It summarizes the particulars of the interviews and displays the generic characteristics of the respondents. Furthermore, the main axis around which the narrative has evolved is demonstrated and the corpus of the narrative is presented.

Chapter 7 analyzes the respondents' recounted stories and view points. It sheds light on the conditions which govern the diffusion of non-standard employment relationships in knowledge intensive sectors of the economy and provides some answers to the concerns raised by the relevant literature. To do that, first it analyzes the functional basis of IT work: the programming methods and tools. And second, it describes the economic and social edifice, as well as the organizational dynamics which delineate the context within which the employment relationship between the IT contractor and the client-firm is embedded.

Chapter 8 provides an overview of the research, by providing an overall picture of its successive stages and discusses its subsequent contribution for Information Systems and Organizational Theory Research.

# CHAPTER 2: LITERATURE REVIEW

## 1.1 Introduction

Today's workplace breaks sharply with the basic tenets of the industrial era and modern society. Bureaucracies seem to be fading away, giving their place to network-like forms of organizing. Buzzwords like the 'boundaryless' organization (Arthur and Rousseau, 1996), 'virtual' organization (Mowshowitz, 1997) and 'network enterprise' (Castells, 1996) are used to describe the advent of a new socio-economic era, where the trends of the 'salarization of work' and the 'socialization of production' are successively substituted by trends towards the 'desegregation of labour' and 'flexibilization of production' (Carnoy, 2000).

Over the last few decades, flexible employment patterns have been growing faster than any other form of work (Beck, 2000, p. 84; Kalleberg, 2000). "The traditional form of work, based on full-time employment, clear-cut occupational assignments, and a life-long career pattern is being slowly but surely eroded away" (Castells, 1996, p. 290). Current organizations are no longer solely populated by full-time, permanent hourly or salaried employees; they increasingly utilize contingent workforce (Polivka and Nardone, 1989), such as temporary workers, independent contractors, consultants and part-time workers.(Lawler III and Finegold, 2000).

The flexibilization of the terms and conditions of employment has particular implications on the way individuals experience, interpret and perceive the world of work; a shift in the premises according to which individuals are tied to organizations redefines the balance between distinct spheres of social life (Kallinikos, 2003). The new economic and social order aims at "decentralizing management, individualizing work, and customizing markets, thereby fragmenting labor and segmenting societies" (Carnoy and Castells, 1997, p. 9).

Drawing upon the academic literature, the current chapter has a twofold aim: a) to provide a brief synopsis of the basic trends which characterize the current workplace and the distinctive role of technology into it, and b) to ground the relevance and distinctiveness of the subject matter with regard to the prior research conducted in this field. The remaining structure of the chapter is organized as follows. Section 2.2

presents the basic characteristics of the contemporary workplace. Section 2.3 reviews the literature on technology and the restructuring of work. Section 2.4 stresses the significance of the occupational category of *highly-skilled information technology (IT) contractors* and section 2.5 reviews the literature on IT contracting and outsourcing practices.

## 2.2 Trends in the current workplace

### 2.2.1 Flexibility

Over the last few decades, western countries have experienced a steady growth in atypical or 'non-standard' forms of employment (Carnoy, 2000; Castells, 1996; Felstead *et al.*, 1999; Hoque and Kirkpatrick, 2003, p. 668; Kalleberg, 2000; Mayne *et al.*, 1997). Castells, summarizing the transformations underlying current social and economic relations, argues that "the most important transformation in employment patterns concerns the development of flexible work, as a predominant form of work arrangements" (Castells, 2000, p. 11). Despite the differences in national legislations, context-specific labor market arrangements and cultural traditions "there is a clear and largely consistent trend among European companies to start taking initiatives in terms of flexible pay systems and flexible work practices in order to increase competitiveness" (Kufidu and Michail, 1999, p. 486).

In the literature, the notion of flexibility has several connotations and is used to label or signify several trends in the organization of work and employment (Atkinson, 1984; Hunter *et al.*, 1993; Kalleberg, 2001; Reilly, 1998; Smith, 1997). In particular, a burgeoning part of the literature tackles the notion of flexibility as being synonymous with the 'flexible firm' and studies the parallel utilization of core and peripheral workforces, as well as their implications for the organization (Atkinson, 1984; Clegg, 1990; Hakim, 1990; Hunter *et al.*, 1993; Nesbit, 2005). Under this research agenda, the use of a core-periphery model of work is seen as an *employment strategy* which allows the firm to better address concerns of adaptability and high performance in unstable working environments. (Abercromble *et al.*, 2000)

Another part of the literature focuses on how flexible forms of production, initiated and supported by the introduction of new technologies can better serve the shifting needs of a heterogeneous market (Castells, 1996; Gil-Moltó and Poyago-Theotoky, 2008; Lash and Urry, 1987; Mathews, 1989). In this sense, flexibility is viewed as the employer's attempt to "improve competitiveness and reduce operating costs" in a highly turbulent, unstable and globalized working environment (Gunnigle *et al.*, 1998, p. 431; Harrison and Kelley, 1993). For the aforementioned scholars, flexibility is considered a *strategic choice* which impinges upon the rationale of efficiency.

Furthermore, other scholars are concerned with the impact of flexible production on workforce and labor markets (Goldthorpe, 1998; Harvey, 1991; Kalleberg, 2000; McAlester, 1998; Smith, 1998; Warren and Walters, 1998). The focus of this research lies in the study of work conditions and power relations that emerge within non-standard employment relations; this type of research often delineates a somber picture of non-standard employment with regard to the benefits traditionally enjoyed by employees.

Generally speaking, a broad categorization of the various meanings and connotations ascribed to flexibility is as follows:

*Numerical or external* flexibility refers to the capability of the organization to adjust the size of its workforce "quickly in line with the fluctuations in business demand" (Gunnigle *et al.*, 1998, p. 430; Kalleberg, 2003) by using external labor, such as part-time work, sub-contractors, and contingent or temporary employees.

*Functional or internal* flexibility refers "to the ability of employers to redeploy workers from one task to the other" (Kalleberg, 2003, p. 154) in an attempt to enhance performance and increase the efficiency of the organization; it "includes organizational mechanisms and work flow innovations that 'build in' employee involvement: new technologies, inventory methods, job enlargement schemes, self-managed teams and quality circles" (Smith, 1997, p. 316). It is widely associated with the concept of Business Process Re-engineering (often referred to as BPR), which impinges upon methods such as Employee Involvement and Total Quality

Management. Functional flexibility was touted to create the fertile conditions for "the promulgation of a new ethos of participation" (Smith, 1997, p. 319) and a new pattern of power delegation which would guarantee continuous improvement and long-term viability.

*Temporal flexibility* refers to the flexibilization of working time and includes a variety of time-related arrangements for non-conventional forms of employment (Evans *et al.*, 2004; Glass and Estes, 1997; Perlow, 1999; Presser, 1999). Research on temporal flexibility addresses concerns related to the balance that employees can potentially achieve among distinct spheres of social life.

*Locational flexibility* refers to the capability of the organization to use employees who work outside the conventional workplace; this category of employees includes teleworkers, partly home-based employees and employees who spend most of their time outside the conventional office (Reilly, 1998).

And, finally, *financial flexibility* refers to the capability of the organization to adjust the wages and economic benefits provided according to the economic conditions of the market (Reilly, 1998).

In other words, the basic characteristics that flexible work arrangements display can be summarized as such (Carnoy, 2000; Castells, 1996, p. 282): a) the flexibilization of working time, i.e. when the working schedule is not longer as fixed as it once used to be; b) the disassociation of work from fixed locations. An increasing proportion of workers perform their tasks at home, on the move, or in the premises of the client-firm; c) the organization of work around independent and self-sufficient projects. Where work has been divided into its simplest components and has been organized into modules consisting of sub-tasks "that can be easily detached from particular contexts and be assigned to people with small or no particular acquaintance with specific organizations" (Kallinikos, 2003, p. 598); d) the destandardization of the labor contract, i.e. as the model of the full-time salaried employee who enjoyed a predictable career ladder, guaranteed level of compensation and a series of social benefits declines in importance, whilst time-limited contracts are on the rise.

It is noteworthy that "in most OECD countries, the fastest growing category of work is 'part-time'" (Carnoy and Castells, 1997, p. 16) and approximately, almost 30 percent of the labor force of the aforementioned countries has been employed in flexible, non-traditional work arrangements. In the relevant literature the term *contingent labor* has become synonymous with "a wide range of short-term employment arrangements, including part-time work, temporary employment, self-employment, contracting, out-sourcing and home-based work" (Carnoy *et al.*, 1997; Kunda *et al.*, 2002, p. 235). "The contingent workforce consists of independent contractors; individuals brought in through employment agencies; on-call or day labor; and workers on the site whose services are provided by contract firms" (Matusik and Hill, 1998, p. 680). Alternatively, it is defined as "any job in which an individual does not have an explicit or implicit contract for long-term employment" and implies a variability and unpredictability in the settings and hours worked (Polivka and Nardone, 1989, p.11).

Of particular interest is also the fact that although the notion of temporary or contingent labor has been traditionally associated with the employment of low-skilled employees or workers (Tilly, 1996), it is now used to describe the employment patterns of managers and professionals (Abraham and Taylor, 1996; Cohany, 1996). Subcontracting and consulting is a fast growing form of employment particularly linked to professional work (Castells, 2000; Cohen and Mallon, 1999; Hoque and Kirkpatrick, 2003; Laubacher and Malone, 1997; Mallon, 1998; Matusik and Hill, 1998; Millward *et al.*, 2000; Tilly and Tilly, 1998). In knowledge-intensive sectors of the economy, such as high technology and entertainment, skilled workers operate outside the framework of traditional employment arrangements, as independent contractors establish ongoing relationships with a number of different firms (Laubacher and Malone 1997). "Stable employment is declining and contingent work is on the rise even among professionals and managers" (Barley 1996).

The majority of prior studies conducted on non-standard work arrangements explores the reasons - both economically and organizationally -- that legitimatize the use of contingent work in an organization. More precisely, a number of scholars

look at contingent work as an opportunity which enables firms to reduce their overhead and administrative costs, reducing or expanding their workforce accordingly to the changing market conditions and the staffing needs of internal projects, and thus respond successfully to the competitive economic environment (Abraham and Taylor, 1996; Davis-Blake and Uzzi, 1993; Harrison and Kelley, 1993; Nollen and Axel, 1996; Slaughter and Ang, 1996; Welsh and Nayak, 1992). Others focus on the impact of contingent work on the knowledge stock of the firm, its ability to create value and its long-term competitive position (Matusik and Hill, 1998).

Conclusively, it could be argued that no matter what the justification or reason that legitimizes the spread of flexible work may be, non-standard employment patterns appear to constitute a fundamental shaping force of the labor market in the years to come. The flexibilization of the terms and conditions according to which both low-skilled and professional work are organized bears evidence of a significant socio-economic trend which needs to be further investigated and understood.

### 2.2.2 Individualization & self-management

Within the current work environment, labor loses its collective identity and becomes increasingly individualized in the majority of its manifestations (Castells, 1996; Deery and Mitchell, 1999). Personal contracts become the dominant form of labor contract and the focus of economic activity is the individual employee him/herself (Beck, 1992; Beck, 2000; Carnoy, 2000);

More precisely, organizations promote and encourage individual forms of employee involvement, in an attempt to achieve organizational flexibility, cost reduction and enhanced performance (Lawler III and Finegold, 2000). As they can no longer guarantee a secure and lengthy employment, they display a clear preference towards the use of time-limited contracts; contracts of fixed duration which can be renewed or terminated after the completion of the assigned task. In other words, a shift is observed in the organization of work "from permanent stable collections of 'jobs' to individualized, flexible employment defined human capital portfolios. Individual

'flexible' workers move between workplaces filling particular positions on demand, or are self employed, providing labor services on demand" (Carnoy et al., 1997, p. 27; Handy, 1994).

In an increasingly individualized economy, human agents are seen as autonomous, enterprising economic agents; they view themselves as the center of their own life and pursue their personal interests through the exchange of services and goods (Abercromble *et al.*, 2000; Beck, 1992). They sell their services in a spot market and delineate their employment prospects according to the portfolio of marketable skills and competencies they possess. The employment relationship is no longer based on expectations of commitment and loyalty in exchange for long-term employment and continuous training; it rather builds upon monetisable and quantifiable types of exchange (Rousseau, 1996; Van Maanen and Barley, 1984). The emergence of the 'boundaryless'(Arthur and Rousseau, 1996), 'post-entrepreneurial' and 'portfolio career' aim at capturing "the notion of fluidity, self-management and independence" (Mallon and Duberley, 2000, p. 35) which characterizes the conditions and trends of the contemporary labor market. Individuals move freely in and out of the employment relationship according to the size, variety and supply of projects available in the market.

Enterprising individuals or self-programmable labor (Castells, 2000) are responsible for the present and future situation they will find themselves in, since it is they who make the decisions about the portfolio of their competencies and the final configuration of their career paths. "This in turn implies human agents capable of easily moving between varying and shifting roles, that is divisable and mobile humans" (Kallinikos, 2003, p. 605). That is. individuals who are able to invoke selectively and in a piecemeal fashion a set of transferable skills and malleable behavioral characteristics which address the varying and shifting demands of a heterogeneous and volatile market.

The literature suggests that this emerging category of entrepreneurial workers is supposed to enjoy more freedom and have more autonomy and control over their working conditions (Fraser and Gold, 2001; Kunda *et al.*, 2002), yet the full

responsibility over their career management comes with the burden of professional isolation, economic insecurity and personal training (Barley and Kunda, 2004).

It is noteworthy that the trend of individualization leaves its mark on the management of salaried workers, too. According to the rationale of Human Resource Management (HRM), an employee's performance is expected to increase, if his/her distinctive needs, abilities and expectations are handled in an appropriate and, often, distinct way (Jenkins, 1998; Welsh and Leighton, 1996). Once more, the labor contract loses its universal character and uniform form and becomes tailored to the particular needs and competences of each employee. Job designs become more malleable, while career paths and trajectories are solely based on the employee's assessed performance (Jeckins, 1998). Basic pay is no longer determined by the "job held" but by the portfolio of skills and competences that the employee possesses. Just like part-time employees and contingent workers, salaried employees "focus on accomplishing individual deliverables and on doing high visibility work which brings personal advancement and rewards" (Gephart, 2002, p. 335; Perlow, 1997a, p. 34).

It could be argued that a great part of the responsibilities in regard to the conditions and content of work, traditionally held by the employing organization, is now transferred to the individual employee. The notion of 'monad' – regardless of whether it refers to the notion of the individual agent or the notion of the individual work project -- is rendered the main axis around which economy, work and employment are organized and evolved.

### 2.3 Technology, organization and the new world of work

A brief look in the literature reveals that although technology mediates every facet of working life, the role of technology as an integral component of organizational affairs appears to be underplayed or largely ignored. Orlikowski and Scott's analysis (2008) of four leading journals in the field confirms that over the past decade, over 95% of the articles published in top journals do not tackle the role of technology in organizational practices and functions. Similarly, Zammuto *et al.* (2007) report that

"between 1996 and 2005, only 14 of 1.187 (1.2%) articles published in three of the field' s top journals, ASQ, AMJ, and the Academy of Management Review(AMR) focused on technology's relationship to organizational form an function" (Zammuto *et al.*, 2007, p.750).

Whatever the reasons that justify the decline in organizational theorists' interest in technology, technology does mediate the processes of communication, coordination and control and subsequently becomes a fundamental component of organizational life (Yates, 1989; Yates and Orlikowski, 1992; Zammuto *et al.*, 2007). Technology supplants and reinforces the role of hierarchy in coordinating and controlling activities and thereafter becomes unavoidably involved in the creation of potentials for new forms of organizing work (Fulk and DeSanctis, 1995; Zammuto *et al.*, 2007). Prior research in the field shows that innovations in the organization of work are usually accompanied by fundamental changes in technology as well as shifts in the way people perceive and interpret work (Barley, 1996; Zuboff, 1988).

And although technology has not been alone in triggering the transformation taking place in the current workplace and post-industrial society -complex social and institutional factors have co-contributed to the emergence and formation of work and society (Iacono and Kling, 2001)- the involvement of technological artifacts appears to be significant in the changes manifested during the last few decades. "If technology per se does not create or destroy employment, it does profoundly transform the nature of work and the organization of production" (Carnoy and Castells, 1997, p. 9). In other words, even if the variety of changes that the new work place undergoes cannot be fully attributed to technological evolution, new information and communication technologies do offer "occasions" for restructuring and enriching the spectrum of possibilities for change (Barley, 1986).

### 2.3.1 Technology and the organizational fabric: processes and relationships

*-Reframing the functional base of work: skills set and power relations*

A large part of the literature suggests that ICTs are implicated not only in the way work activities are experienced and performed by individual agents, but also in

redefining the conditions under which work and production are organized in particular socio-economic and institutional contexts. In this sense, the literature describes and analyzes how the introduction of new technologies is related to shifts in the premises by which individuals perform their tasks and are tied to organizations: how the structure of the job tasks is redefined, the labor is de-skilled or up-skilled, the effort is weaken or intensified, the control is decentralized, the organizational structures are put under scrutiny and undergo subsequent changes, the governance mechanisms are challenged and the delegation of power between the management and employees is significantly altered.

In particular, several studies are concerned with the impact of ICTs on the workforce (Barley, 1988; Ettlie, 1986; Iacono and Kling, 2001; Mankin, 1983; Ranney and Cardner, 1984; Spenner, 1995; Walsham, 1998; Zuboff, 1988). These studies describe the way the introduction of new technologies in the manufacturing and service industries contributes to the elimination of semi-skilled and unskilled jobs, and the up-skilling and re-skilling of jobs that remain. For instance, several studies refer to the impact of new technologies on low and mid- level employees: the introduction of computers implies that the clerical and secretarial employees have to learn new skills and undertake additional responsibilities (Buchanan and Boddy, 1982; Mumford, 1983). In the same way, the first-line supervisors are expected to take more initiatives, taking advantage of the newly enabled decentralized decision making (Ranney and Cardner, 1984). Contrariwise, factory workers who used fully automated systems seemed to experience a feeling of alienation and resentment towards their job (Ettlie, 1986). Massively computerized settings implied for some workers and employees reductions in the quality of the work performed (Kling and Iacono, 1989). In some cases, mid-managers experience a similar feeling of their work depreciation, since a large part of the activities traditionally performed by them have been now embedded with the pre-programmed functions of computer hardware and software (Jackson and Humble, 1994; Winter and Taylor, 1996).

Other studies on tele-working show that employees, drawing upon the possibilities of distant working enabled by the extended and low cost use of ICTs, aimed at gaining more flexibility, but were soon faced with concerns related to issues of

power and identity (Brocklehurst, 2001; Graham and Wilkinson, 1992; Gray *et al.*, 1993; Martino and Wirth, 1990).

Along the same lines, several studies are concerned with the impact of technology on professional workers and reflect on the power relations occasioned in organizational settings. Barley (1986) documents how technology might trigger the emergence of particular organizational structures by altering institutionalized roles and patterns of interaction among individuals; while others (Lamb and Davidson, 2005; Walsham, 1998) focus on the way new ICTs challenge the construction of scientific and professional identity.

Generally speaking, there is little or no consensus on the very way advances or changes in technology are implicated in the particular transformation in the sphere of work and employment (Barley, 1988; Orlikowski and Scott, 2008b). Orlikowski (1992) notes that "while technology has been a central variable in organizational theory since the late fifties, there is little agreement about the nature and the definition of technology, and no compelling evidence of its distinctive role in and implications for organizational affairs" (Orlikowski and Scott, 2008a, p.14).

Drawing upon the literature and adopting the basic distinctions of the role of technology presented in Zuboff's seminal research (1988), the following table summarizes the relation between ICTs and various dimensions of the work process:

Table: Dimensions of work and the duality of ICTs

| *Work dimensions* | *The dual role of ICTs* | |
|---|---|---|
| Functional base of work-Restructuring of organizational processes and functions | ICTs automate work (automation and rationalization of routine and quasi-routine cognitive tasks) | ICTs informate work: generate new streams of data and introduce the dimension of reflexivity |
| Information content of the tasks | ICTs decrease the information content of the task | ICTs increase the information content of the task |
| Nature of work | ICTs favor the meticulous standardization and mechanization of the work | ICTs contribute to the abstraction and modularization of work |
| Work Intensity | ICTs favor the intensification of effort-alienation and resentment towards the job | ICTs liberate labor from the constraints of tedious work and allow more space for Empowerment and job enrichment |
| Nature of Skills | ICTs de-skill work: less talent is needed | ICTs up-skill work (abstract and intellective skills-increases the information content of the tasks) |
| Power relations and legitimization of authority | ICTs support organizational transparency | ICTs pose new choices for the organizational terrain |
| Codification and embeddedness of this knowledge into the technology of knowledge | Erodes a group's power | Allow for transferability and re-usability |
| Time and space constraints | Isolation, uncertainty and identity related issues | Flexibility and freedom of choice |

Zuboff addresses the *duality* of information technology, by arguing that technology *automates,* as well as *informates* the production process; it automates by coding routine and clear-cut tasks and informates by generating streams of data about the underlying patterns of work task itself and its relationship to the overall production

of the organization. In the same respect, Bell (1973) distinguishes two basic categories of technological infrastructure: a) *intellectual technology* which aims at supporting management to make complex decisions and more effectively rule the organization, b) *machine technology* which automates routine and repetitive tasks and allows continuity, consistency and control over the tasks performed.

Let me present how this dual character of technology is related to particular occasions or possibilities of transformation in the work sphere.

#### 2.3.1.1 Automation and information technology

Broadly speaking, the introduction of information technology in organizations has been regarded as a way to increase productivity, by automating the existing operations and intensifying the internal mechanisms of control (Iacono and Kling, 2001). New technological tools mediated organizational tasks and created new potentials and constraints for organizational players. In many factories and offices, managers chose to employ technology as an attempt to reduce staffing and save operational costs. Reduced numbers of lower paid workers were expected to perform more work with the aid of technological tools (Iacono and Kling, 2001, p. 117).

For early organizational theorists technology was a mechanical medium which substitutes the hands of labor and routine office work; it overcomes the vulnerabilities of the human body and amplifies the capabilities of the human mind. Contrary to the recalcitrant nature of human agents, technical artifacts are repetitive and unwaveringly precise (Zuboff, 1987); the way machines and computers participate in the production of the final product or service is more detectable and controllable than the immediate (non-discernible) participation of the labor body (Zuboff, 1987). Drawing upon a set of rational, well-specified and unvarying principles, technology always delivers a standardized, unvarying and homogenous outcome which can be easily controlled and evaluated. The accuracy, consistency and speed of the execution of work tasks brought about by the introduction of new technologies increased the managers' sense of control over the production process

and reframed the role of human intervention in this process.

In particular, the programmability of computers and machines reflected and implicitly or explicitly promoted a standardized way of dealing with the complexity of organizational affairs. From the era of industrial revolution until today the computerization or informatization of the workplace has both presupposed and implied the rationalization of the production process. "The technologies... which firms and informal organizations have deployed for the management and control of the labor process in industrial capitalism have been extensively predicated upon the standardization of physical and mental labor" (Kallinikos, 2006, p. 28). The rationalization of routine tasks and standardization of many work processes has been achieved through the detailed description of the sequential steps which constituted organizational tasks and work processes; the task has been broken into its constituent parts which in their turn can be developed independently and potentially allocated to various individuals unrelated to one another (Kallinikos, 2003). A number of tasks which had been traditionally performed by individuals, were now undertaken by machines and information technology and the role of organizational actors was thus challenged.

The way the individual acts upon the material and participates in the overall process of producing a service or product is rendered increasingly visible, while the area of responsibility of each individual node of the production circuit is more clearly delineated. In other words, the allocation of human effort to the various steps of production is split into independent modules and becomes increasingly systematized so as to be easily susceptible to scrutiny and control. Under this working climate, both factory and office workers felt that they are loosing the control over the production, their tasks and talents are increasingly de-codified and their present skills are rendered obsolete (Jackson and Humble, 1994; Winter and Taylor, 1996; Zuboff, 1987). The cognitive analyzability of the work tasks contributed to the erosion of the individual's power and significantly challenged the functional base of the work.

Thus, it can be argued that the effects of automation stepped beyond the acceleration, programmability and controllability of the production process,

challenging decisively the traditional way of doing things and conceiving oneself. Apart from simply being a tool for automating existing processes and a tool for improving and accelerating existing organizational activities, IT has been proved to be a potential enabler of organizational change (Barley, 1986; Yates, 1989; Yates and Orlikowski, 1992), a dynamic condition which may significantly challenge the established order of things. Thereafter, organizational actors, coping with advanced technologies, were soon faced with a new reality: apart from the fact that they had to learn how to cope with and operate new machinery in order to perform their tasks, they also had to reconsider their role in the organization and redefine their everyday working practices.

#### 2.3.1.2 Informative capacity of information technology and the abstraction of work

Apart from the immediate and explicit impact of automation on both the factory and office work, the introduction of technology contributed towards the abstraction of work (Zuboff, 1987). And such an abstraction paved the way for the organization of production and the conceptualization of work in ways which have not been possible before. It can be argued that the abstraction of work had three immediate consequences: a) the output of the production process was decoupled from the particular individual effort and personal characteristics, b) the production process was detached from the immediate context of action, and c) the production process is decoupled from the production outcome; radically new possibilities of organizing and conceptualizing work emerged.

In brief, information technology transformed sentient-based and action-centered work to abstract, electronically mediated work. The worker's or employee's performance was no longer dependent upon his/her ability to act upon raw material; it was dependent almost solely on his/her ability to manipulate and make sense of particular symbols which stood for particular variables of production and were presented on a two-dimensional computer screen (Kallinikos, 1999; Zuboff, 1988).

The employee's discretional choices and sentience experience which used to be reflected in rules of thumb and non-verbalized knowledge were now embodied in

the logic governing the computing machine; individual's knowledge lost its tacit character and context specificity, while the necessary skills and competences to perform the job became to a great extent analyzable and formalized (Dreyfus and Dreyfus, 1986; Zuboff, 1987). In other words, workers were cut off from the particular context of practice and their already acquired sentience-based knowledge was rendered almost useless; their experiential, context-specific knowledge was substituted by the need for referential reasoning, analytical skills and theoretical knowledge (Kallinikos, 1999; Zuboff, 1988). As a natural corollary, the production process eliminated its dependence on contextual idiosyncrasies and individual proclivities, since its running relied upon the manipulation of abstract, commonly agreed symbols.

But such a reliance upon abstract symbols and the informatization of the content of work set into motion a series of changes in the way work was conceived, understood and practiced (Kallinikos, 1999). As long as administrative functions and organizational processes are amenable to symbolic-numerical representation, they automatically become increasingly homogenized, reducible to a common logic of understanding and interpretation. Various organizational activities can be juxtaposed, evaluated against one another and progressively gain a new momentum regarding their overall significance for the organizational terrain (Kallinikos, 2006).

The abstraction-digitalization of the production process allows a radically different and dynamic understanding and visualization of the production process to occur (Zammuto *et al.*, 2007; Zuboff, 1988). Increased clarity and enhanced visibility of the various components of the work system reveals information about the underlying patterns of productive and administrative processes (Zuboff, 1988). The potential of interdependencies and supplementarity among organizational processes may be identified (Barki and Pinsonneault, 2005) and possibilities of integration within the same business unit and across organizational boundaries may emerge.

In other words, the overall view of the entire work system and the holistic representation of work flows and production variables sheds light on activities which had been partially unknown or completely opaque.... "these new artifacts could provide information that was previously unavailable or inaccessible to

organizational members" (Leonardi, 2007, p. 813). The abstraction of the work and the digitalization of production brought together and juxtaposed a large variety of information items and sources that traditionally remained unrelated and irreducible one to another (Kallinikos, 2006; Lilley *et al.*, 2004; Shiller, 2003).

At this point, it would be useful to point out that the effects of computerization on the way work is currently organized and performed "would never have been possible without the deep and continuing segmentation of tasks and operations produced over the course of industrial capitalism" (Kallinikos, 2006, p. 109). Nevertheless, the spread of digital technologies all over the work sphere transcends the effects traditionally associated with the effects of specialization, division of labor and process standardization (Kallinikos, 2006; Mowshowitz, 2002) and led to an almost dissolvability of organizational life.

Unlike traditional technologies, new information and communication technologies are modular, recombinable and multi- purposed (Pentland and Feldman, 2007). "The potential significance of new ICTs arises not just from their individual function, but from their potential of recombination" (McAfee, 2006; O'Reilly, 2005; Pentland and Feldman, 2007, p. 783). For instance, through the potentials of recombination of alternative information sources and digital media, traditional organizational processes and functions can be transformed (Andal-Ancion *et al.*, 2003; Pentland and Feldman, 2007). Increased interoperability of structural technological tools opens a new spectrum of possibilities for the organization of business functions, such as logistics, sales and customer services.

Organizational tasks and processes are mediated by the digital technologies which are composed of independent modules. These modules which support particular phases or parts of the production process, can be separated, combined and redistributed in a global scale according to the needs of a particular project (Knorr-Cetina and Bruegger, 2002; Sassen, 2001). The same production process can be served by combining different modules with specific functionality, while the same module can be used selectively and in a fragmented way for the purposes of different organizational procedures. For instance, software components that support particular applications of a bank or services offered in financial markets can be

decomposed, recomposed, integrated or recombined across the globe in an attempt to create a real-time or flexible product or service easily adjustable to the needs of individual customers (Andal-Ancion *et al.*, 2003). Under the same scope, "Service-oriented architectures (SOAs) refer to the notion of breaking up the software in a firm in its various services that can then be reused to rapidly create new applications" and innovative services (Zammuto *et al.*, 2007, p. 754).

In conclusion, it can be argued that material features and properties of new modular technology drew upon the heritage of the division of labor and specialization, favored the abstraction, digitization and dissolvability of work processes, and thus allowed for new possibilities of organizing to emerge. In this sense, new technologies "opened the door to new ways of dealing with complexity and uncertainty because they created opportunities for emergent patterns of interaction, in other words, new forms of organizing." (Zammuto et al., 2007, p.752).

#### 2.3.1.3. Possibilities of communication, interaction and collaboration: networks and distributed forms of work

It has been common place in the literature to correlate the current trends occurring in the workplace with particular technological innovations or changes. According to some organizational theorists, the advent of the post industrial society (Bell, 1973) and the constitution of the information economy (Castells, 1996) cannot be adequately understood without consideration of the communication and coordination opportunities brought about the spread of new technologies.

The trends such as "1) a flattening of the hierarchy; 2) the disaggregation of functions or outsourcing; 3) an increased use of flexible dynamic networks or partnerships; and 4) decentralization of the location of work" (Castells, 1996; Malone, 2004; Winter and Taylor, 1996, p. 5) appear to be strongly associated with the introduction and diffusion of information and communication technologies. Particular material and functional features of these technologies, such as "the dramatic increase in the speed of communication, ..the dramatic reduction in the costs of communication, ...the sharp rise in communication bandwidth, ..vastly

expanded connectivity, ...the integration of communication with computing technologies" (Fulk and DeSanctis, 1995, p. 338) have moved the role of ICTs in organizational affairs well beyond the organizational theorists' and technologists' predicated scenarios.

Rather than being accidental, the new modes of communication, interaction and collaboration at a distance (Castells, 2001; Davidow and Malone, 1992; Malone *et al.*, 1987; Schmidt and Bannon, 1992; Schmidt and Simone, 1996) facilitated by the use of information technology, broke with the cornerstone of industrialism, and redefined the key-barriers around which organizational forms have been traditionally designed (Fulk and DeSanctis, 1995). The production of goods and services did not need to take place in a particular location, nor did it need to be completed "under fixed time schedules and long term employment contracts" (Kallinikos, 2001, p. 104). A need for a "new social, spatial, temporal and technical division of labor" (Cornford and Pollock, 2003, p. 112) was born and forcefully challenged the way societal institutions and work practices have been traditionally practiced and organized.

Generally speaking, the massive diffusion of technology and the rise of the 'mobile' internet resulted in the following two major circumstances: a) they abolished spatial and temporal constraints and allowed the connection of distributed people and organizations, and b) they enabled the functional decomposition, subsequent allocation and easy integration of distributed tasks (Iacono and Kling, 2001). The clear delineation of formal organizational boundaries has been blurred and organizational membership in terms of people being 'outside' or 'inside' the organization became increasingly disputable (Kakihara and Sørensen, 2002a). The need for redesigning work arrangement and operational processes within and across organizational boundaries came as striking as ever before (Sinha and Van de Ven, 2005).

The possibility of real time communication and low cost connectivity between geographically dispersed agents redefines the way work is actually performed and organized. "Work in relation to specific tasks and places (can now be divided, allocated to different agents and then recombined respectively) at any time and

space" (Beck, 2000, p. 85). Information and Communication Technologies facilitate the decentralization of work tasks and allow "their co-ordination in an interactive network of communication in real time, be it between continents or between floors of the same building" (Carnoy and Castells, 1997, p. 9)

New technologies allow organizational actors to overcome the constraints of time and distance and new types of coupling among the business units of a particular firm or among various firms to emerge. A blossoming part of the literature focuses on the new forms of organizing prioritizing the significance of cross-functional teams, strategic partnerships and alliances decisively enabled and supported by new internet and information technologies, such as "intra- and extranets, electronic communities, Web-based conference tools, and desktop videoconferencing" (Davidow and Malone, 1992; Iacono and Kling, 2001, p. 124; Malone *et al.*, 1987; Mowshowitz, 1997).

In a sense, individual agents and organizations have been depicted as nodes of dynamic networks or members of temporary partnerships tied together through the use of multiple electronic threads. These electronic networks come to existence and dissolve, grow and shrink, according to the imperatives of particular business projects (Castells, 2000; Malone, 2004; Malone *et al.*, 1987). The enduring or transient character of these networks aims at addressing in the best way possible the shifting demands of an heterogeneous pool of customers, exploiting the emerging opportunities of a volatile market all over the world or serving the needs of a particular collective. Innovation and learning stem from the interaction of organizational members across organizational boundaries (Nooteboom, 2000).

This possibility of collaboration across organizational roles and business unit boundaries paved the way for the emergence of virtual teams and online electronic networks of practice. Financially affordable technologies enabled people from various backgrounds, different expertise and common interests to come together and collaborate (or just exchange advice and ideas) gaining advantage from the associated economies of experience and specialization (Kallinikos, 2006; McLure Wasko and Faraj, 2005; Nardi *et al.*, 2002; Sassen, 2001; Sinha and Van de Ven, 2005).

These virtual teams and social networks appear to challenge significantly the economic assumptions of self-interest and profit maximization (Benkler, 2007) and implicitly disdain the importance of "hierarchical mechanisms of control based on proximity, supervision and normative compliance" (Kallinikos, 2006, p. 92). Their reason of existence is often related to open knowledge sharing, knowledge maintenance and updating and finding job opportunities (Barley and Kunda, 2004; Osnowitz, 2006; Zammuto *et al.*, 2007).

Still many questions that referred to the nature and dynamic of these social formations remain under-investigated and open to multiple interpretations: How virtual communities encourage people to participate voluntarily to common goals (Fleming and Waguespack, 2007; Hars and Ou, 2002; Lakhani and Wolf, 2005; McLure Wasko and Faraj, 2005), the issue of trust and power (Jarvenpaa and Leidner, 1998), the drive for participation as opposed to the actual practice (Handley *et al.*, 2006),

In conclusion, it can be noted that the abstraction and informatization of work content, along with the communicative and collaborative capabilities of digital technologies "set into motion a series of dynamics that changed the nature of the work itself and the social relations among the people doing it" (Zammuto *et al.*, 2007, p. 752). The modularization and detachment of the production process from fixed locations, particular time frames and individuals' competences and inclinations challenged the premises according to which work has been traditionally performed (i.e. the shift in the functional base of work) and organized (i.e. network - like forms of organizing). Armed with the new possibilities of action, individuals and organizations have now been brought vis-à-vis with the dilemma of choosing how they would finally appropriate technology and what this choice would mean about their work practice.

#### 2.3.1.4 Interpretive flexibility

To conclude this subsection it is useful to note that a large part of the studies and

theories used to explain the relationship between technology and transformations of work are based on the tenets of technological determinism. Technological determinism prioritizes technology and considers technology as a decisive determinant of social and cultural transformations. Yet, this framing of technology as a principal force in shaping the transformations occuring in the current workplace proved to be inadequate under particular circumstances. Under this scope, social constructivism opposed the dogma of technological determinism, highlighting the fact that the implications of IT for organizational life are not known a priori and can rarely be predicated; according to the premises of the social construction literature, the meaning and appropriation of technology is solely rooted in people's interaction.

In particular, after the advent of a particularly optimistic discourse about the role of technology in organizational life, numerous studies proved that increased investment in new machinery and information technology does not necessarily lead to increased rates of productivity- this is the *productivity paradox* (Dunlop and Kling, 1991; Kling and Iacono, 1984); while others reported that IT is indeed an enabler of organizational change only when certain conditions are met (Winter and Taylor, 1996). In the same respect, researchers found that technological systems were not always used as originally intended, according to the vision of their designers (Orlikowski, 1993), while Bijker (1997) suggested that different social groups not only see and use different aspects of the same technology, but also attribute different meanings and end up dealing with the same artifacts in a significantly different way. In her seminal study, Zuboff (1987) argued that the ways in which managers will respond to new possibilities of action facilitated by the introduction of new technologies in the work place will determine the particular effects of the technology of the work sphere; and Yates et al. (1999) note that the final use of electronic media is shaped by existing norms and practices.

New technology disposes certain "useful properties" which are embedded within its materiality and are originally destined towards particular modes of use. Yet, the interplay between the material features of technology and the intended and unintended actions of humans emerge and make itself real only through action and within the constraints and enabling factors of specific contextual settings (Orlikowski and Scott, 2008a, p.13). The same scholars draw upon the notion of

sociomateriality (Suchman, 2007) to point out that the entangled relations between humans and technologies can be better understood as they become performed interactively and reciprocally.

In the same spirit, Zammuto et al. (2007) choose to explain "the increasingly symbiotic relationship between IT and organization ...through the lens of affordances" (Zammuto et al., 2007, p. 752). The affordance perspective recognizes that the materiality of an object is enacted from an evolving and unanticipated human agency, but at the same time it favors, invites, shapes or constraints the crystallization of particular uses and practices.

In an attempt to unpack the inherent complexity that characterize technology and organizational transformation, a number of studies indicate that the impact and the role of technology is related to external social forces and social movements. According to the findings of these studies, particular kinds of discourses, which support the development and spread of specific technologies, legitimize new forms of work and employment practices. "Technological action frames are built up in public discourses and can be persuasive to broad audiences. They can mobilize similarly situated organizations to reject old cultural models and to identify with new ones, for example, by getting connected to the Internet restructuring work around these technologies." (Iacono and Kling, 2001, p. 93). The media, government, and scientific disciplines develop and cultivate a discourse which legitimatizes and explains the appropriation and spread of particular technologies.

Even if there are common trends in the unfolding and evolution of the work life, there is significant historical variation in the way work is organized and performed, according to the specific institutions, culture and political environments (Rubery and Grimshaw, 2001).

Taking into account the above, it could be argued that the effects of technology on the organization and the structuring of work are not straightforward nor do they possess a pregiven fixed meaning. They are crystallized in action and strem from the an on-going entanglement of human agency with the technological proclivities of particular artifacts and other forces which shape the current workplace.

## 2.4 Information Technology experts and contractors

Highly-skilled IT employees or IT experts -- individuals who possess abstract and technical knowledge and "have direct control over the application of this knowledge to the production of -IT- goods and services" (Carnoy *et al.*, 1997, p.33) -- demonstrate a great rate of *turnover* and *mobility* among various firms and organizations (Bartol and Martin, 1982; Hilton, 2001). "Information Technology professionals have demonstrated a persistently high level of turnover that often exceeded 20%, -which is translated- to changes in almost half the computer staff every two years" (Joseph *et al.*, 2007; Lee, 2000, p. 101). According to the findings of a study in Silicon Valley (Carnoy *et al.*, 1997), the majority of the highly-skilled engineers usually stays with the same company for two years or less, because there are so many offerings from new workplaces that staying within the very same organization for long is highly unappealing.

Furthermore, technical experts and professionals appear to be the most rapidly growing segment of the temporary staffing industry (Lawler III and Finegold, 2000, p. 4). There is evidence that more and more IS functions are being outsourced to and handled by external independent vendors (Bureau of Labor Statistics, 1995).

*Highly-skilled IT contractors* sell their services to a range of firms, and work on a flexible project basis, for a short-time frame and in exchange for an hourly rate or fixed remuneration (Ang and Slaughter, 2000; Barley and Kunda, 2004; Kunda *et al.*, 2002). "They perform their jobs independently and bring their distinct skills and expertise to organizations on an ad-hoc basis" (Kakihara and Sørensen, 2002b, p. 2) In other words, IT labor is rendered a commodity freely exchanged in a market: the client-firm buys the professional knowledge the IT contractor sells according to the prescription of a well-defined, time-limited, spot contract. Complex tasks, which until recently were performed solely by the permanent staff of the organization (Lepak and Snell, 1999; Mayer and Nickerson, 2005; Slaughter and Ang, 1996) are now assigned to contractors, individuals without any prior acquaintance to the particular firm.

Taking into consideration the above, it can be argued that understanding the use of independent contractors is particularly important not only because they have been

increasing in numbers (Mayer and Nickerson, 2005) and are expected to be among the fastest growing occupations in the coming decades (Captez, 2003), but also because their work practices and employment arrangements appear to epitomize important characteristics of the highly-skilled workforce in general. Carnoy and Castells (1997, p. 37) remark that "one of the most profound transformations of the information age workplace is its increased opportunities for self-employment, especially for people with concrete, high-level service skills". To put it in other words, investigating highly-skilled IT contractors can contribute to the understanding of the wider conditions and problems associated with the flexible work arrangements of knowledge workers - a trend which appears to make its presence more and more prevalent in the configuration of future employment arrangements.

## 2.5 Contracting and IT contracting

The contracting of IT services "has become an essential strategy for organizations in light of corporate downsizing and restructuring, volatile and competitive environments, and rapid advances in information technology" (Ang and Slaughter, 2001, p. 332)

Previous studies on IT freelancing have usually examined the reasons that justify such a decision, addressing the question of when and why a firm should outsource part of its IT functions (Gurbaxani, 1996; King, 2004; Kumar and Eickhoff, 2005-2006; Levina and Ross, 2003; Quinn, 1999; Willcocks *et al.*, 1996), or why and when an IT employee decides to become a freelancer (Barley and Kunda, 2004; Kunda *et al.*, 2002).

In particular, researchers who have mostly focused on the employer's perspective, have studied the performance implications of contracting independent, highly-skilled IT contractors versus hiring permanent, highly-skilled IT personnel (Mayer and Nickerson, 2005), 'insourcing' versus outsourcing strategies (Ang and Slaughter, 2002), IS contracting as a "buy-in" sourcing strategy (Willcocks and Lacity, 1998, p. 5), the dynamics of internal politics which led to IS outsourcing

(Lacity and Hirschheim, 1993), the reasons for IS outsourcing from a "labor market" or a "game theory" economic perspective (Slaughter and Ang, 1996; Wang *et al.*, 1997; Whang, 1992), the management of IT outsourcing alliances (McFarlan and Nolan, 1995) or the structure of the contract governing IS outsourcing (Richmond and Seidmann, 1993).

Scholars focusing on the contractor's perspective have explored the diversity of contractor employment relations (Newton *et al.*, 2007), the IT contractor's perceived benefits and lived realities of contracting life (Kunda *et al.*, 2002), the occupational norms and networking of IT professionals (Osnowitz, 2006), the temporal capital and structure of IT contracting (Evans *et al.*, 2004) and the economic, social and institutional edifices which support this employment arrangement and influence agents' behavior (Barley and Kunda, 2004).

Taking into consideration the above it can be argued that little or no attention has, however, been paid to the particular mechanisms which practically allow for the provision of highly specialized IT services on a spot basis; little or no attention has been paid to the special conditions which render such an economic endeavor feasible, sustainable and spread over time and across organizational boundaries. In this respect, the current study seeks to alleviate this lack of research by exploring those conditions which account for the blossoming and diffusion of freelancing in the highly-skilled cohort of the IT sector. Alternatively, the research questions which constitute the backbone of the study may be articulated as such:

"*What are the conditions that account for the provision of highly-skilled IT services on a spot basis?*

*How can we explain and understand the sustainability, proliferation and diffusion of non-standard employment arrangements in knowledge-intensive sectors of the economy, and in particular in the IT sector?*

How is the employment relationship between highly-skilled IT contractors and their client-firms enacted and sustained in practice?"

# CHAPTER 3: "IT PROFESSIONALS" AND THE NATURE OF IT WORK

## 3.1 Introduction

Previous studies on the organization and the historical evolution of work reveal that the way work is organized is closely related to the available technological infrastructure and people's perceptions and interpretations about this work (Barley, 1996; Zuboff, 1988). In this sense, it could be assumed that the emergence of a new occupational category or a new employment pattern could not fully be understood without taking into consideration the technological factors involved, as well as the perceived articulation of work.

The aim of this chapter is to present the basic characteristics of highly specialized IT work as they have been discussed in the relevant literature. In this sense, the chapter analyzes the content and the structure of this work, by focusing upon the way IT experts organize and act upon the required resources to perform their job. An investigation into the way IT work is functionally articulated and performed is expected to enrich our understanding with regard to its potential forms of provision and patterns of organization.

## 3.2 Definition of 'IT experts'

The label "IT experts" or software specialists refers to software engineers -- web developers, software programmers, web designers, software architects -- who are responsible for the development, maintenance and improvement of information and communication technologies, as well as the creation of innovative and pioneered technological solutions in the Information Systems (IS) field. "Computer software specialists design, write and modify the instructions which make computer work" (Kraft and Dubnoff, 1986, p. 184).

Based on a review of the relevant literature, we can identify five general job categories dominating the IT industry (Lee *et al.*, 1995, p. 320; Nunamaker *et al.*, 1982): a) *"programmers"*: people who mostly deal with software development, coding, etc., b) *"technical specialists"*: people who are specialized on a particular

piece of technology, such as a specific piece of hardware, operating system, communication system, database management system, network, etc., c) *"business analysts/systems analysts"*: people who are assigned the planning, analysis, designing and implementation process of a business application, d) *"end-user support consultants"*: people who provide end-user computing support such as information centers, hotlines, help-desk and data retrieval and e) *"computer operators and data entry clerks"*.

"IT experts" or "IT professionals", the subject-matter of the current study, are included to the first three aforementioned job categories, since they mostly engage in high-level technical work. In contrast to the other two occupational categories that deal with routine and rather standardized technical tasks, IT experts are responsible for tasks of high complexity and significance for the organization; they "can be involved in strategically important activities" (Ang and Slaughter, 2001, p. 322) and may have a word on how information technology can be used to support and improve business processes (Dennis and Wixom, 2003). "Skilled work balances the physical and the mental, the conception and the execution of a task" (Spenser, 1990, p. 400). Thanks to their special expertise, they are in position to design, implement, modify or maintain an entire component of a firm's information system (Barley and Kunda, 2004), discovering unique solutions to the IT problems encountered by the firm. They are considered to understand technology and deploy technical knowledge in ways that the majority of IT people finds difficult both to conceive and understand. Interestingly enough, once highly-skilled IT people are given some sort of specifications about the final product, it is up to them to decide which is the most efficient way to proceed in the development of it (Gunnigle *et al.*, 1998; Rebitzer, 1995).

In conclusion, it can be argued that IT experts -- independently of whether they are assigned the analysis and design of a whole business application or the development of a particular software program -- are well-trained and experienced individuals who have direct control and explicit responsibility "over the application of their knowledge to the production of -IT- goods and services" (Carnoy *et al.*, 1997, p.33). Their distinct skills on technical issues make them indispensable for the continuous updating and maintenance of the information infrastructure of the organization.

### 3.3 Definition of IT Skills/Knowledge

Generally speaking, the concept of skill itself refers to the individual' s capacity or degree of dexterity to bring about a desirable impact onto an object or raw material; it can be defined as knowledge that derives from action and displays itself in the course of action (Zuboff, 1988). It is the individual's ability to turn his/her wide experience and formal knowledge into competence and adroitness within the context of practical action. In the IS literature, there are numerous arguments and discussions about the necessary skills that an IT expert should possess (Bailey and Mitchell, 2006/2007; Bourque *et al.*, 1999; Fang *et al.*, 2005; Lee, 2005; Lee *et al.*, 1995; Leitheiser, 1992; Lerouge *et al.*, 2005; Nakayama and Sutcliffe, 2001; Prabhakar *et al.*, 2005; Tan, 1994; Todd and McKeen, 1995; Vitalari, 1985; White and Leifer, 1986).

In particular, Nunamaker (1982) distinguishes four broad categories of critical IS skills that an *IS professional* should possess in order to be able to develop IT solutions aligned with organizational goals and the volatile work environment. Successful IS professionals should display the following skills: a) *technical specialties skills*, b) *technology management skills*, c) *business functional skills* and d) *interpersonal and communication skills*. Similarly, a relevant study (Todd and McKeen, 1995, p. 3) analyzing the content of advertisements for IT expert positions, identifies three broad categories of skills: a) *'technical'* skills which refer to knowledge related to the development and use of a particular software or hardware, b) *'business'* skills which refer to knowledge related to the overall functioning of the firm, such as organizational and administrative competencies and communication skills, and c) *'problem-solving'* skills related to analytical and modeling skills. White and Leifer's (1986) study reported the top competencies project team members should have in order to ensure systems development success, such as: business knowledge, communication skills, technical expertise and organizational skills; while Nakayama and Sutcliffe's (Bailey and Mitchell, 2006/2007; 2001, p. 28) research findings suggest that "employees want IT professionals who are more knowledgeable of their industry, have business acumen and management expertise and possess human relations and behavioural skills". Furthermore, there are several studies which seek to weigh and estimate the importance of each skill or category of

skills in the successful performance of IT professionals (Bailey and Mitchell, 2006/2007; Fang *et al.*, 2005; Vitalari, 1985).

In conclusion, it can be argued that the literature suggests that systems development is not a merely technical problem which can be solved through the simple use of technical knowledge referring to the use of a particular piece of hardware or software. Rather, successful systems development is a complex activity which requires the parallel cultivation and triggering of skills related to the way the businesses function, make sense and frame their work problems.

### 3. 4 Processes of Knowledge Acquisition

As already stated in the previous section, IT experts need to be equipped with particular skills and types of knowledge in order to be able to successfully perform their job. The acquisition of the relevant knowledge and the cultivation of the necessary competencies can be found both in the formal processes of education, as well as in everyday, on-the-job training.

*Formal knowledge* refers to the acquisition of scientific and technical knowledge related to the use and development of computer hardware and software; it refers to the subsequent development of relevant skills and competencies that take place through the attendance of training courses in the context of educational programs. Quoting Bourque *et al*'s (1999) report, Mathiassen and Purao (2002) note that software engineering curricula include "knowledge elements such as general design concepts, design processes, architectural structures, quality analysis and evaluation, design notations, design strategies and methods, design tools and standards (Mathiassen and Purao, 2002, p. 86). For instance, IT experts draw upon particular techniques and scientific methods they have been taught through training seminars and classes, in order to write code for particular software, to build a model or develop a database, for example. Formally standardized methodologies of system development "help in structuring the development process, they offer a set of modeling techniques and tools and they constitute a common language for communicating across activities and projects" (Mathiassen and Purao, 2002, p. 84).

Consequently, the software engineer's ability to identify and make sense of some basic features of a particular technology and have a general idea about how to deal with it, is largely supported and cultivated through the formal training courses s/he has periodically attended.

On the other hand, although formal education provides a solid ground and a general roadmap about the general practices of software programming, it is proved to be inadequate for tackling peculiar or exceptional cases or problems. It is the *hands-on experience* or *day-to-day working experience* that equips the software engineer with the capability to come up with theoretical and practical solutions which deviate from the basic body of formally institutionalized knowledge. Experienced systems developers retain a rich repertoire of past experiences, which can be combined, juxtaposed and refined in order to better address the particulars of current problems (Guindon *et al.*, 1987).

In support of the above statement, findings from a relevant study (Hilton, 2001) suggest that hands-on experience or day-to-day work experience might have greater impact on the IT experts' performance than formal education has. The familiarity gained through the lengthy occupation with a particular technology enables IT expert to make sense of subtle details and insightful distinctions that otherwise would not be possibly observed or detected. "Microcomputer technicians sometimes identified problems by attending to the sequence in which error messages occurred rather than the messages' denotations" (Barley, 1996).

*Experimental knowledge* and *rules of thumb* derived from everyday practice entails modes of behavior that are driven by the mobilization of both conscious and unconscious resources and processes whose depiction cannot always be articulated or documented in an explicit and formalized language (Wood, 1987). Experiential approaches to diverse IT problems involve the internalization and absorption of routines and procedures as well as particular modes of conduct and reaction that are obtained within a particular context. Furthermore, it is common sense that until an IT agent applies and tests the abstract knowledge in practice, little understanding is gained in terms of how to actually perform a real work task (Hilton, 2001).

Adding to the above remarks, Barley and Kunda (2004) note that technical work, such as writing a module of code, writing a subroutine, altering the structure of a database or even testing a software application, unavoidably involves a significant amount of contextual knowledge. Contextual knowledge refers to the awareness and comprehension of special conditions and peculiarities that portray a time and space-specific domain of activity. In order for the IT person to produce an IT solution, even a trivial one, s/he has to become familiarized with the larger theoretical and practical system to which her/his work contributes. Good knowledge of the application domain is considered a necessary prerequisite for successful software systems design (Guindon *et al.*, 1987). This kind of contextual knowledge is achieved through a long-term process and friction within a particular business environment and safeguards against common business-related mistakes and misinterpretations (Barley and Kunda, 2004).

Finally, a last source of IT-related knowledge acquisition constitutes the informal discussions and exchange of opinions between peers or colleagues. Encoded bits of knowledge about particular instruments, materials or procedures usually circulate among technicians as stories or snippets of advice (Barley, 1996). Narratives about difficulties encountered and subsequent explanations of the exceptions that emerge constitute an extremely valuable treasure of knowledge that books and files can never include. A recent study on information technology workers informs us that nowadays young IT professionals spend about half of their work time talking with others and seeking information, since "those IT professionals who were able to build communication ties with experienced workers in their field had the most successful job performance" (Hilton, 2001, p.42).

In conclusion, it can be argued that both the formal and practice-based sources of knowledge are found to be complementary to each other and equally important for the successful provision of highly-skilled IT services. The following section presents how the aforementioned processes take place in practice, focusing upon the activities the IT expert is engaged with, in order to perform his/her job. By unpacking the intrinsic characteristics of IT work, it shows how the aforementioned types of knowledge and categories of skills are intertwined and enacted in practice in the context of IT business activities.

### 3.5 Knowledge application, power relations and the nature of the IT work

The current section describes the nature and practice of IT work, by drawing on some basic organizational concepts which refer to the structure of the task and the emerging interactions among people who participate in the execution of this task (Perrow, 1967).

In particular, three characteristics of the raw material (object of the work task) - "analyzability", "understandability" and "variability" (Perrow, 1967, p. 197) - are introduced in order to: a) delineate how a highly-skilled IT agent performs her/his work, i.e. how s/he acts upon an object in order to make a change upon that object, and b) stress how the agent's involvement with the tasks impacts upon her/his relationship with the rest of the members of the potential work-team (Perrow, 1967). The three theoretical concepts are defined as such:

*Variability* of the problem (or raw material) refers to the number of exceptional cases encountered in the course of work; the degree of variability defines whether a problem can "be treated in a standardized fashion or... continual adjustment to it is necessary" (Perrow, 1967, p. 197).

*Analyzability* of the problem refers "the nature of the search process that is undertaken by the individual when exceptions occur" (Perrow, 1967, p. 196).

*Understandability* of the nature of the problem refers to the degree an individual is able to control the problem dimensions and achieve predictability and efficiency in their handling (Perrow, 1967). The more uniform and stable the dimensions of the problem are, the more understandable the problem under resolution is and the greater the chances for guaranteed success are.

#### 3.5.1.Unravelling the complexity of the nature of IT work

Applying Perrow's theoretical constructs in the way an expert IT employee performs a given task in everyday practice, the following can be argued: As far as the *variability/uniformity* of a highly specialized IT task is concerned, it can be argued that the IT task appears to be particularly *complex and unpredictable.* The IT individual often encounters theoretical and technical puzzles which s/he is not

completely familiarized with. Although s/he is particularly specialized on a particular technology or an IS field, the need for generating tailored solutions, according to the specific idiosyncrasies of the employing organization, can imply unpredictable problems and difficulties.

First, the managers are not always able to explicitly articulate or describe the IT service they ask for (Barley and Kunda, 2004) and it is up to the highly skilled IT individual to translate the blurring organizational needs and business imperatives into specific IT solutions. Highly-skilled IT workers are expected to adapt the technical community's knowledge and products to the contextually specific needs of users, customers or clients. They are "with one foot in the material world and the other in the world of representations" (Barley, 1996, p. 418). They employ technologies, techniques and knowledge to transform material identities into signs, symbols and indices which in their turn will make computer work and support business functions.

Second, the problem of analyzing the task domain (the operationalization of the problem: what needs to be done) has at its conception "ill-defined boundaries, structure and a sufficient degree of uncertainty about the nature and makeup of the solution" (Vitalari and Dickson, 1983, p. 949). In addition, it is usually dynamic, multi-dimensional and can be treated in many different ways (Vitalari and Dickson, 1983). Therefore, there are no pre-defined courses of actions and well-specified technical methods that can guarantee the success of any problem. The IT expert has to experiment and to try out various possible analytical trajectories and approaches, since s/he does not know a priori which one will lead to the desired solution. Mathiassen and Purao (2002), drawing upon several studies on the way methods are used in systems development, suggest that "methods do play several important roles as guidelines for practice, -yet their role- is in many ways limited" (Mathiassen and Purao, 2002, p.84 ).

The practice of systems development suggests that the solutions to the diverse problems rely upon the triggering of mechanisms and approaches which largely deviate from the ones presented in the relevant textbooks. Any standardized method cannot guarantee the resolution of potential problems, since it is the particulars of

each situation which dictate how the systems should be developed (Ciborra, 1993). "Success is intrinsically related to the analyst's ability to understand, deal with and actively form relationships with users, dictated by the specifics of the situation in question" (Fayad, 1997; Mathiassen and Purao, 2002, p. 84). In this respect, an IT professional who is considered to be successful or gifted at his/her job, has to go well beyond or sometimes even deviate from what is prescribed by the rules and procedures of a particular method (Bansler and Bødker, 1993; Mathiassen and Purao, 2002). Bansler and Bødker (1993, p. 189) report that successful developers "pick and choose among the various formalisms given in the method, adapt them for their own purposes and integrate them into their own design processes". Trial-and-error practices, creative combination, "bricolage" of the existing components of knowledge, past experiences, as well as continuous interaction and the sharing of experiences with peers of the same occupational community can be considered "fixed" tactical behaviors of high-performers. Their expertise consists of a process of analytical decomposition and recombination of various bits of knowledge which cannot easily be articulated and specified. "an expert' s knowledge is often ill-specified or incomplete because the expert himself doesn' t always know exactly what it is he knows about his domain" (Deyfus, 1986, p. 106).

Nevertheless, the *nature of the search process* that the individual adopts in order to write the data streams and construct the algorithms could be characterized as "though non-routine..., logical, systematic and analytical" (Perrow, 1967). Although the individual is entitled to perform "exceptional actions", which deviate from the standard way of doing things, s/he follows a sequence of steps that can be described and presented in a logical, analytical basis. Her/his search undertaken is not conceptualized in terms of intuition, chance and guess-work (Perrow, 1967), but in terms of a mathematical logic which can be analyzed, challenged, questioned and improved. "The proficient performer, while intuitively organizing and understanding his task, will still find himself thinking analytically about what to do" (Dreyfus *et al.*, 1986, p. 29). The aforementioned analytic techniques can be depicted in symbols and signs and can be verbally articulated and – to a great extent -- practically applied. For instance, software analysts "structure an abstract problem,

process diverse information, and develop a logical and internally consistent functional set of specifications" (Vitalari and Dickson, 1983, p. 949).

As far as the *understandability* of the nature of the raw material is concerned, it could be argued that increased knowledge and deep understanding of a coding language, a database management system, or a specific operation system often entails significant control and manipulation over it. Theoretically, the more the IT person is conscious of the potentials and limitations related to the software application s/he is working with, the more s/he can predict its "behavior" and manipulate the emergence of exceptional cases.

Yet, in practice increased knowledge about a software application does not always guarantee efficiency in the handling of the software material. This is particularly true in the case of the software industry where the existence of black boxes and the development of obscure interactions between the different parts and modules of the software is a common regularity. Commenting on the consisting pats of a software entity, Brooks Jr. (1987, p. 11) notes: "the elements interact with each other in some non-linear fashion and the complexity of the whole increases much more than linearly". Such increased complexity and conceptual confusion are considered inherent properties of the essence of modern software systems that no IT specialist can really escape or avoid. The more an IT expert is a connoisseur of a software artifact, the more conscious s/he is of the unavoidable obscurity, variability and insignificance that accompany diverse practical aspects of the specific software and make his/her choices even more difficult and doubtful.

### 3.5.2 Power relations between the IT expert and his/her supervisory groups

Taking into account the above, it could be argued that more craft, art or esoteric skills are involved in the execution of technically complex tasks (Barley, 1996; Perrow, 1967). When the 'raw material' that each person works on is 'reactive', recalcitrant, or 'self-activating', as in the case of software development, the way the transformation process takes place is closely related to the personal characteristics and the idiosyncrasy of the individual who performs the specific task.

As has already been mentioned, because of the successive and unanticipated interactions between the constitutive elements of software, software programming is a mentally complex and demanding task. In the course of software development, the IT expert devises innovative solutions, non-existent before, and opens conceptual paths that are not always easy for a third person to follow.

Each IS application which has been developed by a particular IT engineer has its own logic and history of development; such a logic, although depicted through the symbols of a specific alphanumerical notation, is not easily read, perceived and understood by another engineer (Barley and Kunda, 2004). Obscurity in the way the IT expert performs his/her work raises important questions with reference to issues of power, control and the supervision of knowledge work.

The analysis conducted so far suggests that the degree of *discretion* an IT expert possesses in carrying out a task and the power s/he has to control the definition of the IT solution produced (Perrow, 1967) are expected to be high and at the expense of his/her supervisor group. The exertion of direct control over the application of their knowledge to the final configuration and production of the final product or service (Carnoy *et al.*, 1997) allows knowledge IT workers to claim superiority and increased power over management.

More precisely, the emergence of many unexpected cases and the increased complexity characterizing software development necessitate the mobilization of scarce knowledge resources that only few people are able to activate. Judgments about the logic of the "transformation process", decisions about the sequence of tasks which need to be completed and the number of sub-tasks which need to be divided, anticipations of potential interdependencies and interactions, are all bound to the IT expert's area of responsibility. The manager's possibility of having a clear view about how work is currently done, or how it should be done, is rather limited to the minimum. The "invisible and unvisualizable" interactive character of the structures which underlie the functioning of the software make the nature of IT work resistant to easy control, managerial supervision and rationalization. "Despite the

progress in restricting and simplifying software structures, they remain inherently unvisualizable and thus do not permit the mind to use some of its most conceptual tools" (Brooks Jr., 1987, p. 12). As long as the process of software development remains significantly abstract and inherently complex, IT work constitutes a black box for people deprived of the particular technical knowledge and expertise.

In conclusion, it can be argued that the degree of control that the IT expert has upon the construction of software fundamentally challenges the traditional organizational equilibrium, which has been based on the authority of hierarchical positioning (Barley, 1996) and the separation of execution from cognition. The maintenance of highly specialized and tacit knowledge preserved in IT experts' hands leaves managers with little to say about the execution of IT work. Not being able to apply the common mechanisms of supervision and accountability, supervisors are usually forced to turn to other managerial strategies that will allow them to regain control and ensure subordinates' reliability (Barley and Kunda, 1992). Issues of power and control between the IT expert and his/her supervisory team constitute a fundamental parameter of the contingent employment relationship and will be further addressed in the following chapter.

### 3.6 Professionals or just experts?

From the earliest days of computer development, when no formal educational curriculum about computer scientists, engineers and analysts existed, IT personnel came from a variety of disciplinary backgrounds. "The first American programmers were recruited largely on the basis of their enthusiasm, not their credentials" (Kraft and Dubnoff, 1986, p.184). Sixty-five years after the emergence of software jobs as distinct occupations, numerous efforts have been made to delineate the "border lines" of a computer science curriculum and the related job content (Leitheiser, 1992; Noll and Wlikins, 2002; Todd and McKeen, 1995).

Denning (2001), commenting on the extent to which IT craft meets certain criteria for being considered a profession, concludes the following. That a) IT has a significant contribution in today's world, b) IT has established a body of principles

which is represented through the conceptual knowledge codified in the curricula of IS degrees, c) there are some global professional associations (mainly ACM and IEEE) which have articulated some codes of ethics, but they are not really in position to enforce them, and d) there is no licensing organization that certifies the body of practices and technical competence displayed by IT people.

In the same respect, Scarbrough (1999) claims that IT specialists could be regarded as a watered down version of *"professionals"*, as "semi-professionals", members of an occupation that has some but not all the characteristics of a formal profession. He argues that although these IT groups lack the formal power of classic professions in the sense that their organizational bodies are weak or non-existent and exercise much less control over their work supply conditions and entry accessibility, they do display certain attributes of the professional model. For instance, although they cannot be considered as autonomous, self-reliant and independent from the employing organization as doctors or lawyers are, it can be argued that they enjoy a considerable degree of autonomy compared to other organizational work groups.

As has already been mentioned, the exertion of discretion and value-dependent judgments by them entails the enjoyment of a relative freedom and independence that few salaried employees really possess. Although a significant part of their knowledge is "highly practical, specialized and unique to a particular piece of hardware and software and typically non-transferable across other IS installations" (Orlikowski and Baroudi, 1988, p.12), we cannot ignore the fact that the unpredictable and complex nature of their work presupposes the parallel mobilization and combination of multiple esoteric, contextual and analytical skills that few outsiders could claim to possess or understand (Scarbrough, 1999; Barley, 1996).

On the other hand, "the professional agent not only determines what needs to be done and how to do it but also draws upon extraprofessional sources of credibility and legitimacy to decide whether certain minimum standards of practice have been met" (Sharma, 1997, p. 769). Although there are some IT associations established worldwide (EPE for Greece, BCS for Britain, etc.) which prescribe a code of conduct and aim at setting out the professional standards of practice for this

occupation, they do not seem to possess the universality of power the professional associations traditionally enjoy. They are far less powerful and significant than the formally established accreditation bodies that provide formal certifications of expert knowledge and technical competence, which "can exercise self-regulation and can discipline members by threatening expulsion and loss of associated privileges" (Sharma, 1997, p. 780).

Furthermore, there are some objections with reference to the social role of IT experts in society. Although there is no doubt that IT has a significant contribution in today's world (Denning, 2001), the meaning of software engineering as a career "seems to be more personally than socially defined and the occupational self-definition of engineer does not necessarily correspond to a person' s work activities" (Bailyn and Lynch, 1983, p. 264).

In conclusion, it is safe to say that IT engineering, as an occupation, is characterized by a number of controversies and cannot be explicitly defined as a typical profession. Although it based on technical expertise, it appears to be mostly subject to organizational rather than occupational control stemming from formally established accreditation bodies (Bailyn and Lynch, 1983; Child and Fulk, 1982; Kerr and Vonglinow, 1977). In the context of the current study, the term IT professional will be treated as equal to the term IT expert and will be used to connote the superiority of the technical expertise possessed by the individual and not the traditional role and identity of the professional worker.

## CHAPTER 4: CONCEPTUAL FRAMEWORK

### 4.1 Introduction

The current study explores the relationship between highly-skilled IT contractors and their client-firms. By unpacking the socio-technical conditions framing this relationship, it aspires to bring to the fore the mechanisms that account for its sustainability and spread over time and space. In this sense, the study aspires to analyze the contractors' working practices, experiences and perceptions with reference to the freelancing phenomenon in the IS sector.

The empirical investigation of the study is framed by a conceptual model, developed by the British sociologist, John Goldthorpe (1998). The model is rooted in the Rational Action Theory approach and builds upon the tradition of economics based upon the assumption of utility maximization (Perrow, 1986). More specifically, the model links together types of **work contracts** with particular **work roles/work tasks** that employees are expected to fulfill/perform.

Drawing on rational action theory and in particular on the way it is deployed to inform Transaction Cost Economics (Coase, 1937; Williamson, 1975), Goldthorpe's (1998) analysis seeks to address the following theoretical puzzle: how the *differences* observed in various *labor contracts* are associated with the special *conditions of work* that the contract itself seeks to accommodate (Kallinikos and Hasselbaldh, 2003). The underlying logic that governs the argumentation is based on the **concept of *efficiency***. The focus is on how the total value of the contract can be further increased to the benefit of all parties involved, if we take into account the special conditions and restrictions that form the context of the employment relationship.

Assuming that the employer acts *rationally*, the model shows how the different forms that the contracts may take can be understood as the employer's response to the perceived "contractual hazard" inherently found in the employment relationship (Goldthorpe, 1998); in other words, it presents the alternative strategies the

employer can follow in order to improve the efficiency of the prospective work contracts (Eisenhardt, 1989; Ouchi, 1978; Sharma, 1997).

The structure of this chapter is organized as follows: Section 4.2 introduces the basic tenets of contractual relationships from the employer's perspective. Section 4.3 presents and analyzes the basic assumptions and limitations of Rational Action Theory. Section 4.4 presents Goldthorpe's theoretical model. Section 4.5 seeks to link the theoretical constructs of the model with aspects of IT freelancing presented in the literature.

## 4.2 The governance of contractual relationships - the employer's perspective

Any system of contract law has the purpose of facilitating the exchange of goods or services, by promoting the explicitness of the terms and conditions which regulate the relationship between the parties involved (Williamson, 1979). According to the basic premises of economic theories, an individual agent is considered a self-interested agent who seeks to maximize her/his perceived utility. S/he does so by calculating the costs and the benefits stemming from a particular decision or action s/he is called to make. For instance, rational individuals would be expected to calculate the inducements versus contributions related to the work task to be performed, and thereafter decide whether they should work, shirk or avoid joining the organization (March and Simon, 1958). Under this scope, the conjecture that the contracts may be violated is not an "occasional dilemma", but an inherent feature of the organizational life and a permanent concern of organizations (Perrow, 1986).

Generally speaking, a *contract* can be defined as the promise or set of promises made by one party to the other which the law seeks to safeguard (Goldthorpe, 1998). In particular, the *employment or labor contract* is a "contract through which the employees agree, in return for remuneration, to place themselves under the authority of the employer or the employer's agents" (Goldthorpe, 1998, p. 211).

On the one hand, the employers buy the right to tell the employees what they are expected to do in order to perform their task. Employers give to the employees

specific guidelines and orders regarding the number of hours employees are supposed to work, the working methods and procedures employees are supposed to employ, the rules and norms they are supposed to follow, etc. On the other hand, employees, accepting the authority relation in exchange of some kind of compensation, are expected to conform with the orders and instructions provided to them.

Interestingly enough, while some aspects of the employee's behavior can be specified in the employment contract (e.g. the wage rate or the hours of work) and brought within the authority of the employer (i.e. specific tasks that the employee is expected to perform), some others are unavoidably left to the *employee's discretion* (Goldthorpe, 1998). Highly-skilled employees, such as knowledge workers, work under blurry work conditions which are not easily subject to control and evaluation. The employers "do not possess the technical knowledge (i.e. *knowledge asymmetry*) to evaluate the effort invested or the outcome accomplished by professional agents" (Sharma, 1997, p. 768). It is worth noting that the employers are not often in a position to identify or verify whether the prospective candidate possesses the skills required, "either at the time of hiring or at the time of work execution" (Eisenhardt, 1989, p.61). Qualitative dimensions of the work process, such as the appropriate level of effort needed to invest in the work task cannot be actually estimated and incorporated in the contract, leaving it incomplete (Williamson, 2002).

On the assumption of "*bounded rationality*" (Simon, 1997), the two parties of the employment relationship, the employer and the employee, will act in a *relatively rational* manner. No matter how much they wish to maximize their own welfare, their ability to estimate, calculate and process the information needed to make a decision is rather limited. Under this scope, the employer will attempt to find ways to enforce the compliance of employees and induce their maximum effort (Goldthorpe, 1998), while employees will aim at gaining the greatest possible material and non-material compensation, diminishing the amount of the effort provided. The bilateral relationship will carry on as long as the *inducements* offered to the employee are perceived to be as great or greater than the *contributions* s/he is asked to make (March and Simon, 1958).

Taken as granted that the "employees will always have some non-negligible amount of *discretion*" (Goldthorpe, 1998, p. 212) to exert while performing their tasks, it is necessary for the employer to ensure that this kind of discretion will be used in favor of the organization. Employees do not often share a selfless devotion to the organizational objectives (Barnard, 1968; March and Simon, 1958) and as a result they may pursue objectives which are partially overlapping or are divergent from the goals set by the employing organization. Therefore, the employer needs to consider the appropriate strategy for finding and selecting the "proper" candidate, as well as the inducement strategy which will curb the possibility of the employee's opportunistic inclinations.

The "proper" candidate is the one who possesses not only the necessary skills to accomplish the assigned task, but also the will to display a reliable behavior aligned to the organizational norms and demands. According to the theoretical premises of Rational Action Theory, there is always the possibility that a candidate may lie about her/his actual knowledge, and even if s/he does possess all the knowledge needed by the firm, s/he may shirk or cheat.

Goldthorpe's analytical approach (1998) draws upon the postulates of Rational Action Theory (RAT) and suggests specific courses of action the employer may take to manage the potential "contractual hazard" - an inherent characteristic of the employment relationship. If the employer cannot completely verify the prospective employee's abilities, s/he should think carefully about how s/he should incorporate the employee's services into the overall functioning of the organization. The type of contract that will finally seal the employment relationship is not usually an easy decision; it rather presupposes an array of explicit and implicit decisions which aim at weighing the various contingencies that influence the nature and scope of the particular employment arrangement.

The following section introduces Goldthorpe's analysis (1998) and presents a critical view of Rational Action Theory. The presentation of both the limitations and the strengths of the aforementioned theory aims at clarifying its appropriateness for framing the present study.

### 4.3 A critical view of Rational Action Theory

The Rational Action Theory (RAT) or Rational Choice Theory (RCT) has known a high degree of both wide acceptance and acute criticism (Boudon, 1998; Perrow, 1986).

Boudon (1998), quoting Coleman (1986) and Hollis (Hollis, 1977), gives some first explanation of the widespread appeal and attractiveness of Rational Action Theory. The theory seems to be particularly attractive as a basis of analysis, since it provides such a complete conception of action that we do not need to ask any more questions about it. Knowing that the subject X has done Y instead of Y', because the former set of activities has been more advantageous than the latter, is adequate as an explanation. But how are the perceived advantages or the superiority of perceived alternatives defined?

The postulates of the theory revolve around the idea that human action is always instrumental, in the sense that it has to be explained by the actor's will to reach certain goals (Boudon, 1998; Elster, 1989). Concomitantly, the primary goal and the real cause that seem to trigger every type of human behavior is the *pursuit of self-interest.* Beliefs, decisions and patterns of action are seen as an attempt on the part of the individual to maximize some cost-benefit balance. Individuals are viewed as a rational agents who are capable of calculating the expected consequences of the options available and choosing the best of them.

The rational employee seeks to maximize his/her perceived utility, as the trade-off between money and leisure. S/he is expected to sign and adhere to the contract, as long as the perceived *inducements* gained by the contingent relationship are as great or greater, measured in terms of her/his values and in terms of the alternatives open to her/him, than the perceived *contributions* s/he is asked to make (March and Simon, 1958). Perceived *alternatives* of action are interpreted in terms of their *expected consequences*, which in turn are evaluated according to an individual's *personal preferences* (March, 1994).

In other words, the employee is viewed as a selfish and self-interested agent (*homo economicus*) who continuously probes the surrounding environment in search of ways to maximize its welfare and optimize its general state (Elster, 1989); its choices are made on the basis of its internal preferences and are not affected by the decisions or behaviors of others (Fusfeld, 1989). As a result there is nothing intrinsic in the meaning of self-interest that precludes the development of guileful or deceitful behavior (Williamson, 1975).

Under this perspective, the employee could be equated to "a rational cheater" (Nagin *et al.*, 2002) who anticipates the consequences of his/her actions and shirks when the perceived marginal benefit of doing so exceeds the marginal cost. Accordingly, whenever surveillance and control mechanisms are relatively loose or reduced, given the fact that employment relationship continuity and duration is not jeopardized, employees will be expected to be highly prone to shirk or cheat (Nagin *et al.*, 2002).

It could plausibly be argued that this simplistic approach to explaining human motivation is considerably limited or flawed. The assumptions of rational choice - prior existence of a set of existing goals, capability to evaluate the alternative courses of action and commitment to purposeful action - are unrealistic. "In effect, we are asked either to specify a set of super-goals in terms of which alternative goals are evaluated, or chose among alternatives now in terms of the unknown set of values" (March, 1988, p. 259). In the first case, we assume a fixed set of values and in the second case, our sense of temporal order is violated.

"Individuals are not monolithic agents" (Benkler, 2007, p. 98). They are complex entities driven and influenced by multiple and often conflicting goals and vague values. They cannot easily represent their preferences to themselves, nor can they easily rate or compare these preferences in such a way that will allow them to see which one is the optimal or satisfactory one (March and Simon, 1958). Apart from economic motives, there are driving forces that seem to lie beneath the surface of individual choice and self-interest. Need for sociability, need for approval and reward, ethical rules, educational or professional standards, threads of punishment,

selective membership in particular groups, etc. are some of the many motivating factors that partially and jointly comprise human behavior.

March (1994) argues that human conduct is seen as resulting from the fulfillment of an identity. When individuals and organizations adopt particular identities, they follow rules or procedures considered to be appropriate to the situation in which they find themselves. Neither preferences as they are normally conceived nor expectations of future consequences are taken into account indeed (March, 1994). The concept of appropriateness is tightly associated with the general conditions within which the decision is made and the human activity is taking place. The content of an *"appropriate" decision* or an *"appropriate" action* has not a stable and universal connotation but gains its meaningfulness out of the particular circumstances taking place.

Individuals build their own understanding of themselves in reference to their relative position within a group and are accustomed to turn to others for confirmation of their perceptions, beliefs and attitudes. Reasonable or sensible meanings are usually those for which there is "social support, consensual validation and shared relevance" (Weick, 2001). Guidelines of proper behavior and subsequent social norms are always shared by other people and partly shaped through their approval/disapproval.

Benkler (2007), quoting Bruno Frey's work, notes that individuals have intrinsic and extrinsic motivations. "Extrinsic motivations are imposed on individuals from the outside, when individuals fail or comply with specifically prescribed behavior. Intrinsic motivations are reasons for action that come from within the person, such as pleasure or personal satisfaction." (Benkler, 2007, p.94). These motivations evolve over time, interact among themselves, competing against or supplementing one another, and result in forming a culturally contingent behavioral pattern.

It is worth noting that Goldthorpe (1998) mentions that his analytical framework refers to a renewed, water-down version of Rational Action Theory that is built upon the admission that the idea of objective rationality gives way to that of subjective or *bounded rationality*. The notion of rationality is re-conceptualized through the

incorporation of diverse, social and individual constraints that come to inhibit the availability and accessibility of the information needed to make decisions.

Yet, he does not sufficiently include in his analysis or explain how this kind of constraint intervenes, operates and shapes the context within which perceptions are developed and decisions are made. Like most rational theorists, he still ignores the processes by which social rules, systemic imperatives and individual identities are created, maintained, interpreted, changed or erased (March, 1994). "Rather than seen as inherent forces that shape the context of work and the very choices of social agents, social traditions and institutions are considered as exogenous (i.e. unexplainable) factors" (Kallinikos and Hasselbladh, 2003, p. 8). Rules and social norms are treated as the outcome of a higher-order rational process (Boudon, 1998; March, 1994). Individual action is always instrumental. Even if it appears to be non-instrumental, it is instrumental at a deeper level (Boudon, 1998). Norms and rules are viewed as complex rationalizations of self-interest.

Nevertheless, even if the flaws underlying the Rational Action Theory cannot be underestimated or overlooked, they do not reduce the considerable analytical merits and the descriptive power that the theory displays. "While the assumption of rational action must always be problematic, it is a good working hypothesis that should not be easily abandoned" (Granovetter, 1985). "While simplistic, this highly tractable model of human motivation has enabled policy prescriptions that have proven far more productive than prescriptions that depended on other models of human motivation" (Benkler, 2007, p. 92).

As far as the present study is concerned, Rational Action Theory allows me to frame my research problem clearly and address straightforwardly universal questions of coordination, control and performance of work that have long occupied the academic community. Thereafter, the degree to which the economic assumptions can explain the dynamics of contingent employment relations is something which will be presented in the following chapters."When philosophers attempt to characterize scientific arguments, they usually start from the model and standards of purely logical arguments. This isn't to say that they expect that science can be

completely described in logical terms, but those are starting points from which science deviates" (Sismondo, 1993, p. 523).

### 4.4 Goldthorpe's analytical framework

As already stated in the previous section, Goldthorpe's analysis draws on Rational Action Theory and in particular on the way it is deployed to inform Transaction Cost Economics (Coase, 1937; Williamson 1975). According to the premises of the aforementioned theories, the contractual problems arise from the hypothesis that employees might behave opportunistically whenever their interests are not aligned with the employers' interests. Goldthorpe (1998) identifies two main sources of contractual danger or "contractual hazard" the employer may encounter:
-the degree of *difficulty* the employer has to *monitor* the work performed by the employee in terms of quantity and quality
-the degree of *specificity of the human assets* used by the employee to perform his/her job. Asset specificity refers to "the degree to which an asset can be redeployed to alternative uses and by alternative users without sacrifice of productive value" (Williamson, 1989).

Goldthorpe (1998) uses the dimension of "*measurement-monitoring*" and that of "*work specificity*" to arrive at a four-fold matrix into which he places the following types of work arrangements: the *Labor Contract* (low-skilled work associated with short-term contracts) and the *Service Relationship* (high skilled work associated with long-term contracts) (Kallinikos and Hasselbaldh, 2003).

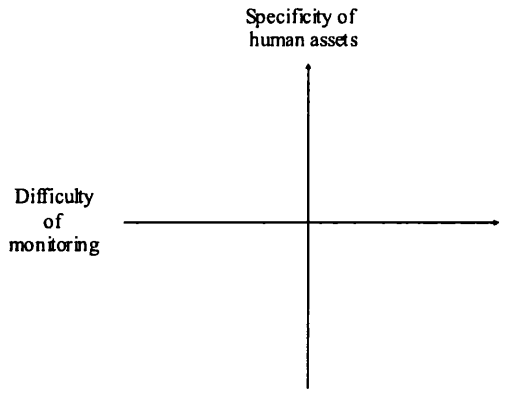


Fig. 1 Dimensions of work as sources of contractual hazards (Goldthorpe, 1998, p. 214)

Goldthorpe (1998) argues that work which is performed under transparent and measurable work conditions is subject to severe control and supervision and is associated with piece-related or time-related payment schemes. The *Labor contract* is usually short-term and refers to routine, manual, administrative or service work which is simple, straightforward and does not imply the possession of special skills. While the labor contract "may in fact be many times repeated, there is nothing in the contract itself, explicit or implicit that is aimed at securing the relationship between employer and employee on a long-term basis (Goldthorpe, 1998). Strategies of employee motivation and commitment could be considered costly and superfluous (Kallinikos and Hasselbaldh, 2003), since the pace of the work is easily observable – it is largely determined by the technology and it is not dependent on the employee's discretion. Furthermore, investment in training is rather unnecessary, since skills needed to perform the job are to a great degree commoditized and the need of the "asset specificity" dimension is absent.

On the other hand, the *Service Relationship* is an open contract which seeks to accommodate the peculiarities of highly skilled work. The rationale of Service Relationship lies on the *"principal-agent"* relationship (Eisenhardt, 1989): "the principal (the employer) engages an agent (the employee) to act in the principal's interest, in circumstances in which the principal cannot observe the agent's actions, nor share in all of the information guiding those actions" (Goldthorpe, 1998, p. 217).

In the principal-agent relationship, the discretion used and the autonomy held by the agent to perform the task are so crucial for the overall success of the project, that any attempt of the principal to define specific performance indicators or direct monitoring mechanisms seems fruitless. In their attempt to sort out the abstract and technical puzzles they encounter, the highly-skilled agents extract the necessary knowledge from a large pool of abstract knowledge components and past work experiences which remain considerably inaccessible to other members of the organizational hierarchy. As far as expert work is concerned, the relationship between allocation of effort and quality of the work output remains increasingly blurry.

Concomitantly, it becomes important for the employer to find alternate strategies that will allow him to ensure the commitment and devotion of highly-skilled employees to the organization's goals. Linking employee compensation to the economic success of the enterprise, through the provision of perceived benefits (Goldthorpe, 1998) (i.e. stock options and profit sharing schemes, long-term contacts, good pension schemes, a lengthy and secure career ladder, multiple kinds of incentives, etc.,) is some of the policies that employers use from time to time to induce an employee's dedication to the organization's objectives and goals. Therefore, it seems to be through complex monitoring strategies that 'buy' devotion, or governance structures that the exertion of opportunism is well attenuated and constrained. Promoting the piecemeal and long-term identification of the employee with the organizationally approved models of behavior seems an attainable way of controlling the employee's discretion and behavior.

Additionally, Goldthorpe notes that the highly-skilled employee's performance tends to be positively related to the familiarity s/he displays with regard to the firm-specific organizational context. The more "deepened and specialized" (Williamson, 1989) to the organizational context the employee's skills are, the better her/his performance is. But in order to engage and invest in firm-specific training, the employee has to be assured that s/he will be employed in a long-term basis by the firm; otherwise, there is nothing that could induce her/him to do so (Kallinikos and Hasselbaldh, 2003).

The development of skills which are specific to the hiring firm, are learnt *in situ* and acquired over time, ties both the principal and the agent in a strongly bilateral relationship; a bilateral relationship which is beneficial for both parties. On the one hand, the firm's position is empowered, because the acquisition of firm-specific skills does not constitute a marketable asset for the agent (employee); these skills are completely irrelevant and indifferent to another potential employer. On the other hand, the present employer has to consider carefully whether s/he would fire or refuse a requested salary raise to a skilled employee, well immersed in the organizational culture (Perrow, 1986).

Conclusively, it could be argued that a long-term employment relationship which ensures effort continuity and encourages contextual learning can potentially invoke the employee's commitment and affiliation. The cultivation of a relationship based on trust seems to counteract the possibilities of opportunism, deriving from the nature of the professional work.

Nevertheless, taking into account the above argumentation which links the particularities of work conditions with the variability of work contracts, one comes across the following dilemma: How can we explain or justify current trends with reference to the increased use of highly-skilled labor on a contingent basis? How can we comprehend and interpret the decisions of contemporary organizations to "buy in" professional IT services instead of providing them in-house?

Apart from the Labor Contract and the Service Relationship, Goldthorpe (1998) remarks that the business world also accommodates some "mixed" forms of employment arrangements. These employment forms combine elements of both contractual categories identified in the previous analysis (the Labor Contract and the Service Relationship) and "represent varying combinations of work specificity and difficulties of monitoring" (Kallinikos and Hasselbaldh, 2003).

Looking back at Goldthorpe's four-fold matrix, it could be argued that the IT expert work seems to fall in the lower-right quadrant of Figure 1; such work "could be expected to lead to a form of contract, in which features entailing some departure from the exchange of discrete amounts of money and effort, characteristic of the labor contract would be more apparent than ones directed towards furthering long-term relationship" (Goldthorpe, 1998, p. 222). Nevertheless, IT expert work seems very different from the routine non-manual work in administration and commerce that Goldthorpe identifies as falling in this quadrant.

In the following pages, I will attempt to describe and analyze highly-skilled IT work in terms of the "difficulty of monitoring" and "asset specificity" dimensions, respectively. The presentation of the special conditions and characteristics of highly-skilled IT work is believed to enrich our understanding of how this work is produced and organized today.

## 4.5 IT experts and short-term contracts

The relationship between "difficulty of monitoring" and the nature of highly-skilled IT work appears to be the following: although the process by which highly-skilled IT work is performed is regarded as logical, systematic and analytical (Chapter 3), it appears to resist standardization and managerial rationalization. The amount of effort that the specialized IT agent invests in the production process of software is not amenable to easy measurement and control. The degree of discretion (Perrow, 1967) and tacit knowledge needed for the completion of the work task cannot be rationally objectified and consistently estimated. The way the knowledge agent performs each task remains considerably opaque and unknown to the client-firm (Sharma, 1997).

As far as the assumption of asset specificity is concerned, the relationship between the highly-skilled IT contractor's performance and the lengthy, context-embedded forms of learning is something which needs to be investigated. Let us try to see how the literature has so far tackled the aforementioned assumptions with respect to the nature of IT work.

### 4.5.1 The dimension of "asset specificity"

The set of skills and competences required by an IS professional has always been a concern for both the academic and the business worlds. Current views and perceptions on the topic vary considerably. White and Leifer (1986) identify five core competencies that are perceived to lead to success: business knowledge, good communication skills, technical expertise, analytical skills and good organizational skills. Along with these findings, Lee et al. (1995), in their attempt to identify the critical skills of IS professionals, emphasize the knowledge related to technology, business operations, management issues and interpersonal skills. Guindon et al. (1987) also report that the lack of application domain knowledge and technical knowledge (system design knowledge) seems to be negatively related to the success of the IS design process. On the other hand, a study based on recruiters' perceptions about the competences that computer programmers should possess reports that the

programmers' interpersonal skills are proved to be more important than technical and IS-related knowledge skills (Fang *et al.*, 2005).

Regardless of the contradictory views presented in the literature, one may argue the following about the factors that shape IT professional's performance: "Even though applications development usually requires firm-specific knowledge and software systems are expected to show growing impact on a firm's competitive edge, software development is nonetheless one of the most outsourced IS functions" (Collins and Millen, 1995; Patane and Jurison, 1994, p.154; Wang, 2002). Thus, taking for granted that the contractor has no prior acquaintance with the prospective client-firm, it is reasonable to assume that s/he must find alternative ways to counterbalance this initial lack of contextual knowledge and thus assure the success of the assignment given.

Interestingly, Goldthorpe (1998) adds a footnote to his analytical diagram, stating that professional employees possess *cultural assets*, while managers and administrators possess *organizational assets*. These "cultural assets" possessed by professionals are considered to be "less specific than organizational assets, and therefore more *storable*: that is more readily accumulated in transferable form" (Goldthorpe, 1998, p. 221).

As was presented in the third chapter of the thesis, substantial understanding of a coding language, a database management system, or a particular operation system automatically implies significant control and manipulation over it. The more the IT agent is conscious of the possibilities and limitations related to the software application s/he is working with, the more s/he can predict its "behavior" under unfamiliar circumstances and alternative contexts. Correspondingly, the IT worker's deep knowledge of the technology's material malleability and adaptability allows him to adjust the technical features of the software application to the idiosyncratic needs of the client.

"No matter how unique a firm's business operations are, it still needs certain standard information systems, e.g. financial accounting or inventory control, which may be outsourced" (Wang, 2002, p. 161). It might be reasonable to assume that a

software developer who has expertise in making on-line reservation systems could easily undertake projects of similar content across different firms and even industries. Although specific parameters are needed to be changed and tailored to the needs of the firm-client, the "kernel" or the "scaffolding" of the software program remains the same and can be used and re-used. Accordingly, for a web designer who is an expert on state-of-the art graphic design, it does not really make any difference in terms of conceptual difficulty and effort allocation, if the graphics are going to be used in a hotel web site or a university website. Although the very same technological artifact can be conceptualized and appropriated in many different ways, the rationale that underlies its **mechanical functionality** remains, at least to a certain degree, clearly defined and concrete (Orlikowski, 2000). The IT engineer acts upon the "material" in a series of improvisatory steps; his or her actions are shaped by prior knowledge about the technology and by the predefined options embedded within the technology itself (Kallinikos, 2002b). Standardized, coded and structured ways of acting upon the object constitute a necessary prerequisite of flexibility, transferability and exchangeability of software applications among diverse firms and industries (Kallinikos, 2003).

Wang (2002) draws attention to the fact that since the unit of analysis in highly specialized outsourcing is the customized software project, it might be reasonable to assess the "asset specificity" dimension in terms of the uniqueness of skills, functions and business knowledge required for completing the particular, highly demanding outsourced project. Asset specificity, needed by the employee to perform his/her job adequately, might be possibly defined at the project level rather than at the firm level. The aforementioned conjecture seems to be supported by the fact that it is the "cutting edge" skills about specific hardware and software that make IT experts so sought-after and constitute the basis of the contingent relationship. It seems to be their dexterity and familiarity with a particular technological artifact that gives them the "order of precedence" over the permanent employees of the client-firm.

To conclude, it is reasonable to argue that regardless of the plausibility of the above arguments and conjectures, the relationship between the asset specificity assumption

and the IS contracting reality remains relatively obscure and under-investigated, and, thus, should be elaborated further.

### 4.5.2 The dimension of "difficulty of monitoring" in the IS sector. Constraints over the possibility of opportunism

#### 4.5.2.1 The assumption of "difficulty of monitoring"

Although there is a burgeoning literature about the reasons which justify the decision of the firm to outsource part or the sum of its IT functions (Gurbaxani, 1996; King, 2004; Kumar and Eickhoff, 2005-2006; Levina and Ross, 2003; Quinn, 1999; Willcocks *et al.*, 1996), there are few studies which explicitly focus on the effects of hiring independent IT contractors (Kunda *et al.*, 2002; Mayer and Nickerson, 2005).

Drawing upon the existing literature and some preliminary findings stemming from a pilot study conducted prior to the main fieldwork, it can be argued that an organization tends to hire an IT contractor to accomplish a highly demanding technical task when its in-house "expert human capital" is not in a position to undertake it. "Using contractors is often desirable because of possible gaps in the firm's internal skill base, a lack of available internal resources" (Mayer and Nickerson, 2005, p.227). Generally speaking, there are two possible alternative conditions related to this decision: 1) the organization does not have the required expertise to accomplish the task, or it is not interested in acquiring expertise in this particular domain. The client-firm needs to develop a specific, technically complex application in that particular moment in time to supplement or support an organizational function or operation. Or 2) the organization does not have the specific expertise but it intends to invest in the development of that in the near future. Yet, due to competitive pressure, it needs the technical contribution of an IT expert contractor as soon as possible. Organizations have always used contractors to absorb industry fluctuations or to work in highly specialized areas (Pierce, 1993). A relevant report from Dataquest, topping the list of reasons for outsourcing IT

processes, cites the following: lack core competencies, pursue of enhanced IT effectiveness and need for supplementing the IT staff (Vijayan and Hoffman, 1997).

On the assumptions that: 1) IT experts have some non-negligible amount of *discretion* to exert while performing their tasks (principal-agent relationship), and 2) their goals are not necessarily aligned to the organizational goals, it would be reasonable to assume that the client-firm is potentially open to the exertion of opportunistic behavior. "The agent may simply not put forth the agreed-upon effort" (Eisenhardt, 1989, p. 61). As already stated previously, opportunism refers to the economic actor's tendency to pursue his/her self-interest at the expense of the client-firm's interest. "Principal-professional exchanges are inherently those in which professionals have power over lay principals by virtue of their expertise, functional indispensability and intrinsic ambiguity associated with the services they provide" (Sharma, 1997, p. 768).

Difficulties in prescribing the IT specifications, defining strict time frames and estimating in detail the costs involved make short-term contracts significantly incomplete. "In the context of software outsourcing, even though the contract typically specifies the contractor's responsibilities, the system's completion date, the cost and the client's responsibilities, they are likely to become disputable as unforeseen contingencies unfold" (Wang, 2002, p. 156). Moreover, many interdependencies and the lack of clear-cut effort allocation patterns – inherent features of software engineering projects – often make it impossible to identify a valid and clear correlation between the work input and work outcome. It is difficult to specify clearly either the outcome or the true contribution of the IT contractor's effort on the observed outcome (Sharma, 1997). Consequently, the client-firm has great difficulty in ascertaining adherence to contractual agreements and evaluating the impact of IT experts' opaque behavior on the final outcome.

Yet, the dominance and spread of outsourcing and contracting practices in the IS industry mark the existence of diverse forces that operate as regulators of the controversial relationship between the IT contractor and the client-firm. To investigate the nature of these factors, Rational Action Theory assumptions and axioms about human conduct seem to be, at least to some extent, conceptually

restrictive. For instance, to have a clear picture of the study matter, questions such as a) under what conditions will the individual maximize her/his own utility regardless of the potential impact s/he might have on others, and b) when will it suffer a potential loss because of her/his behavioral impact on others? (Perrow, 1986) need to be addressed. To this end, the conceptual model (Sharma, 1997) presented in the following section introduces us to a more complex view of the dynamics that govern the employment relationship.

4.5.2.2. Sharma's analytical model

Sharma' s analytical model (1997) presents specific conditions under which the likelihood of contractual hazards is reduced and organizational equilibrium is ensured. More specifically, it identifies four conditions/factors that curb opportunistic behavior and operate as stabilizers of the principal-agent relationship: 1) self-control, 2) community control, 3) bureaucratic control and 4) client control. The aim of this section is to explore the extent to which the aforementioned control mechanisms of individual behavior are met in the contingent relationship between the IT contractor and his/her client-firm.

**-self-control and identity**

Sharma (1997) questions the assumption of self-interest and remarks that professional agents "are driven by a complexity of motives that include not only self-preservation but also pride in the craft and a calling to serve the public" (Sharma, 1997, p. 775). As has been discussed in the third chapter of the thesis, although IT people cannot be characterized as "professionals" in the narrow sense of the term, they may display some traits similar to those of professionals' behaviors.

Generally speaking, it can be argued that human behavior is driven by a complexity of motives that include the satisfaction of material and non-material needs. Yet, people attached to the IS profession seem to have some extreme differences in comparison with other occupational groups (Scarbrough, 1999; (Couger *et al.*, 1979).

They are said to display an inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, and to chase learning opportunities. Satisfaction of self-esteem and self-actualization needs (Maslow, 1943) and the possibility to perform a fulfilling and pleasant job seem to play a crucial role in their decision to choose among different jobs and employment contracts available in the market. A survey on the career progression of IS professionals reports that IS jobs that are characterized by creativity and challenge, that allow individuals to make their own technical decisions, that are capable of providing "a sense of accomplishment and that allow one to do a variety of tasks and to see them through to the completion with reasonable autonomy, have a strong appeal for high achievers" (Smits *et al.*, 1993, p. 114). Along with the aforementioned findings, Barley and Kunda (2001) commenting on IT contractors' behavior, note that whenever the latter seek or decide to accept a contract, "the identity of the organization in which the project is located, is generally secondary to personal and professional considerations, ranging from hourly rates to opportunities for learning new skills, to the intrinsic challenge of work itself" (Barley and Kunda, 2001, p. 79).

IT experts are also said to be characterized by a high need for feedback, recognition and autonomy (Scarbrough, 1999). It is important for them to know that their efforts are vital in achieving outcomes and that their ideas and actions are instrumental in performing the overall job well. Due to the fact that managers lack the specialized knowledge that would allow them to give IT subordinates directions about how to perform their job, it is extremely important for employees to have the autonomy and freedom to act as they wish.

Autonomy and responsibility induce employees to become more committed to the work assigned (Mowday *et al.*, 1982). Consistency between the supervisory practices and the employee's desire for independence reduces the conflict between job characteristics and individual self-image (March and Simon, 1958), encouraging employees to behave in a responsible and honest way.

Recent studies on IT contractors' behavior and working experience (Kunda *et al.*, 2002) reveal that there is a significant amount of perceived benefits that induce IT experts to enter the contingent labor market. The sense of autonomy felt at work, the

opportunity to develop new marketable skills and experience diverse working environments, the increased control over one's working time and work-life balance, high pay rates, and the possibility of escaping from the politics and inequalities of organizational life (Kunda *et al.*, 2002) make contracting seem appealing to IT experts.

Furthermore, individual employees and, in particular, highly educated employees create their self image and estimate their worth on the basis of some projection of past achievement (March and Simon, 1958). "Immediate performance in a career path bears on the crucial issue – for the individual – of earning the opportunity to continue" (Atkinson and Raynor, 1974, p. 372; Wynekoop and Walz, 1998). Opportunistic and malevolent behavior that could endanger and blacken the professional image of an IT expert and would contribute to the detriment of his/her self-confidence, would be rather undesirable and unreasonable. Moreover, reviewing the relative literature on psychological contracts, Rousseau (1995) observes that there is, for many reasons, an unusually strong tendency among individuals to keep their promises, and not to behave opportunistically to the detriment of the contracting partner.

Thus, it could be argued that the greater the conformity of the job characteristics to the self-characterization held by the individual, the higher the level of satisfaction and the less the possibility of shirking behavior (March and Simon, 1958).

**-community control**

Another restraint on a potential opportunistic behavior could be the acknowledgement that any devious and deceitful course of action undertaken by the professional agent might bring about incorrigible damage in his/her reputation within the broader market and the professional community. "Unless an agent does not intend to remain in business beyond one transaction, or unless the principal has a short memory or is of a forgiving kind, concern about reputation and potential for future business inhibits opportunistic behavior" (Sharma, 1997, p. 778).

As already discussed in the chapter three, IT engineering as an occupation is characterized by many heterogeneous conditions. Although it is based on technical

expertise, IT engineering cannot be considered as a typical "profession", since its members could not "claim a distinctive and valued social identity, share a common perspective toward the mission and the practices of the occupation, and take part in a sort of interactive fellowship that transcends the work place (Van Maanen and Barley, 1984). Although world-wide there are IT associations which prescribe a Code of Conduct and aim at setting out the professional standards for this occupation, these associations do not seem to possess the universality of power and control that professional associations traditionally enjoy.

Nevertheless, even if there is not a typical "professional" community in the IS sector, as in the case of lawyers and doctors, IT experts tend to form networks of relationships with ex-peers and friends who share the same professional interests and participate in virtual IT communities. These networks constitute the main safety net which allows IT freelancers to protect themselves from the unpleasant aspects and unanticipated contingencies of freelancing. By developing and maintaining these networks of relationships with professional peers, IT engineers are protected against social and economic insecurity - an inherent feature of the contracting world. Through their participation in them, contractors build their reputation and enhance their possibility of staying continuously employed. The ease of finding the next job is proved to be directly associated with the size and diversity of the networks to which they belong (Barley and Kunda, 2004). Interestingly, experienced contractors believed that if one's reputation within a network of practitioners was sufficiently strong, it could even overcome the lack of specific skills (Barley and Kunda, 2004).

In other words, the contractor's ability to keep him/herself continuously employed (the concept of employability is particularly popular in the free-lancing world where people are always on the move, trying to find the next job when the current one tends to its end) is a function of her/his specialized, marketable skills, her/his reputation in the market and the personal networks and informal relationships that s/he has built over time (Kunda et al., 2002). Notification about a contractor's low quality work output or unprofessional conduct would be quickly spread in the network and might seriously and incorrigibly damage her/his reputation.

**-bureaucratic control**

Apart from individual motives and concerns about reputation within the market and peer communities, "restraints on opportunistic inclinations also arise from the nature of the internal structure and systems" of the client-firm (Sharma, 1997, p. 781). Drawing upon the notion of "administrative elite", initially introduced by Freidson (Freidson, 1986), Sharma (1997) assumes that the professional agent will behave less opportunistically, as long as the client-firm hires expert-superordinate supervisors. Alongside this argument, Eisenhardt (1989) states that the board of directors might be used as a monitoring device which ensures the alignment of the stockholders' interests with the knowledge workers' interests.

As already quoted before, due to the nature of IT engineering work, the employing organization -- including managers who belong to the upper levels of the hierarchy -- is not usually in a position to estimate and evaluate the specialized contractor's work. The possibility of monitoring and the ease of control are much more dependent upon the type of work project outsourced.

**-client control**

Whenever the client-firm is "unable even to design agreements in which agents' compensation is based on the outcome of efforts" (Sharma, 1997, p. 783), it has to find alternative ways to curve the problems arising from knowledge asymmetries. Sharma (1997) argues that one might identify two possible strategic choices that would protect the firm from an agent's opportunism: a) the client-firm could fragment the project into very small sub-projects and assign each one of them to independent contractors or b) the client-firm could hire external specialists who are quite knowledgeable about the contractors' work and could exert significant control over it. This is how the firm attempts to internalize specialized knowledge and lessen its vulnerability to agents' opportunism. Nevertheless, such a utilization of these "external specialists" would raise the monitoring costs of the contract and might possibly trigger a sequence of questions regarding their utility to the overall efficiency of the project.

In the IT industry, the practice of "project management" (i.e. definition of "milestones" and well-specified "deliverables") seems to be widespread among

organizations which have frequent interactions with IT contractors. Moreover, the terms of the contract regarding how the contractor will be paid might possibly be used as a medium to curve the contractor's opportunistic inclinations. Mayer and Nickerson (2005, p. 229) argue that if the contract compensates the contractor "with a predetermined fee in exchange for his or her services, the contractor will have incentives to get the job done as quickly and inexpensively as possible, so as to increase their profit margin. If the contractor is compensated with a cost-plus or hourly wage contract, then the incentives to shrink might be weaken.

In addition to the above explanations about factors and conditions that limit an agent's opportunistic inclinations, recent "research on organizational commitment and citizenship behavior suggests that organizational membership alone does not lead to involvement" (Pierce, 1993). A study conducted by Pierce (1993) reports that there was no significant difference in the organizational commitment of employees and contractors. "Since contractors did not want to face social ostracism at work, they tended to adopt the behaviors of good team members" (Pierce, 1993). Finally, it should not be ignored that contractors seem to have strong incentives to perform professionally and reliably in order to "induce the firm for which they are working to utilize them in the future" (Mayer and Nickerson, 2005, p. 227).

In conclusion, closer scrutiny of the dynamics which delineate the transient employment relationship between the contractor and his/her client-firm brings to the fore contingencies and conditions whose explanation goes beyond the assumptions sustained by the utilitarian tradition. These contingencies and conditions require further investigation.

# CHAPTER 5: METHODOLOGY

## 5.1 Introduction

The particular tools and methodologies science appropriates in order to reveal truth and describe reality have long been a controversial and disputable topic. In Ancient Greece, "Greeks chose to classify knowledge into two types: 'doxa' (what was believed to be true) and 'episteme' (what was known to be true). Science, they believed, was the process of inquiry which transformed 'doxa' into 'episteme'" (Hirschheim, 1992, p. 29). Since then, scientific inquiry has gone a long way to establish its criteria of validity and reliability.

Historically, there has been an emphasis on positivistic approaches and quantitative research techniques (Guba and Lincoln, 1994; Orlikowski and Baroudi, 1991). The epistemological underpinnings of Western science prioritized the idea of an objective reality - a reality which could be accurately described and analyzed through the deployment of appropriate methods of inquiry. The term "appropriate" - methods of inquiry- usually referred to the verification or falsification of hypotheses; these hypotheses were particular statements which could be easily converted to mathematical formulas and usually represented relationships between dependent and independent variables; "formal propositions, quantifiable measures of variables, hypothesis testing and the drawing of inference from the sample to a stated population" (Orlikowski and Baroudi, 1991, p. 5) have constituted the scientific tools of positivist studies.

Nevertheless, when human beings or social groups were put at the centre of scientific inquiry, the quantitative research methods were proved partially inadequate for addressing the degree of complexity underlying social phenomena. The analysis of individual human behavior or the exploration of social dynamics could not take place without reference to the meanings individual agents ascribe to their activities (Guba and Lincoln, 1994). Qualitative or interpretive studies aim at increasing or deepening our understanding about a particular phenomenon by: a) bringing to the fore the contextual settings within which the phenomenon is

embedded, and b) prioritizing the view of the participants (Orlikowski and Baroudi, 1991).

Whether quantitative or qualitative, every method of inquiry masks the choice of specific philosophical premises which delineate the relationship between the researcher and his/her object of study. The philosophical stance which lies behind the chosen research methodology provides the general platform upon which the diverse parts of the research are linked together and make sense as a consistent whole. It provides the ground which allows specific theoretical assumptions to emerge, appropriate research methods to be chosen and valid conclusions to be inferred (Crotty, 1998). According to Maynard "epistemology is concerned with providing a philosophical grounding for deciding what kinds of knowledge are possible and how we can ensure that they are both adequate and legitimate" (Crotty, 1998, p. 10; Maynard, 1994). It provides "the criteria by which valid knowledge about a phenomenon may be constructed and evaluated" (Orlikowski and Baroudi, 1991, p. 8).

The aim of the current chapter is to present the epistemological premises that guided the selection of the particular methodology, and discuss the significance and appropriateness of this methodology for the study of the subject matter.

### 5. 2 Constructivism

Constructivism has always been a disputable philosophical stance; many divergent opinions and controversial issues are linked with it. Sismondo (1993) acknowledges a wide range of ways according to which the notion of constructivism is appropriated and used by the current social studies of science literature. "Constructivism is composed of a number of distinct types of claims, any history of that bundle is likely to be extremely complex" (Sismondo, 1993, p. 517). Sismondo (1993) identifies four prominent perspectives on constructivism: Berger and Luckman refer to the construction of institutions. Knorr-Cetina is pre-occupied with the construction of scientific theories which constitute the scientific knowledge and constrain scientists' behaviours. Latour and Woolgar display a more idealistic view

of constructivism and talk about the mutual construction of both the natural and the social world, and Bijker and Pinch focus on how technology is socially constructed.

The scaffolding of the present thesis embraces a "mild" or "weak" version of constructivism. Such a version of constructivism is fully compatible with a realistic ontology (Knorr-Cetina, 1983; Orlikowski and Baroudi, 1991), and builds upon the legacy bequeathed by both Berger and Luckmann (1966), and Bijker, Hughes and Pinch (1987). This kind of constructivist approach does not exclude the possibility of an objective reality and an objective world, existing independently of the human consciousness (Berger and Luckmann, 1966); in fact, it is knowledge about this reality -- the meaning of this world -- which is bound to human consciousness and is socially constructed.

More precisely, according to the constructivist premises, there is a distinction between *social objects*, (e.g. institutions, traditions, etc.), which are products of human effort and whose constitution depends on the presence of human agents, and *material objects* or brute facts, (e.g. water, mountains, etc.), which are independent of human representation (Searle, 1995; Sismondo, 1993). "Brute facts require the institution of language in order that we can state the facts, but the brute facts themselves exist quite independently of language or any other institution" (Searle, 1995, p. 27). On the other hand, the meaning of reality is impossible to be conceived independently of the social agents who construct and make sense of this reality. Knowledge about society, the institutions that govern and regulate social life, and the meaning people ascribe to communal events, are constructed through the recurrent actions and the interactions of people who populate and attempt to master the world. "Individuals act toward things on the basis of the meanings that things have for them, that meanings arise out of social interaction, and that meanings are developed and modified through an interpretive process" (Boland, 1979, p. 260).

The above argument could be illustrated by the project of institutionalization (Berger and Luckmann, 1966). Institutions could be conceived as socially constructed *templates of actions* that are generated and maintained through the recurrent interaction of individuals (Meyer and Rowan, 1977). They define the way things are or should be done; they provide blueprints of appropriate conduct, by

specifying the way individuals should act and interact among themselves, in order for social order and welfare to be achieved and preserved (Berger and Luckmann, 1966). The process of institutionalization refers the sum of the processes by which social processes, obligations or actualities come to take on a rule-like status both in social thought and action (Meyer and Rowan, 1977). Alternatively, institutions are to social action what grammars are to speech. Patterns of behavior and modes of thinking and decision making may vary in their specifics, but to be interpretable and socially acceptable, their contours must conform to the taken-for-granted assumptions about the way things are. Different categories of actors are supposed to behave and react in a particular way according to the identity they have espoused or the role they enact (Barley and Tolbert, 1977).

In this sense, the institutions cannot be regarded as natural or 'given' facts of an objectively defined reality; they are socially constructed, as the result of an inter-subjective agreement and recurrent interaction among individual actors. Yet, as long as an institution is established and starts implying what is socially defined as real or meaningful (Zucker, 1987), it triggers the construction of a social reality which is not less real than the natural, objectively defined, reality.

What is striking about constructivism and what differentiates it from interpretivism is that although the meaning of reality and of the objects which constitute this reality may differ across different contexts and be compatible with different interpretations, this meaning is not completely irrelevant to "brute" reality. Brute reality and its objects have a key role to play in the creation of meaning.

The philosophical and methodological basis of constructivism lies in the principle of symmetry between the object and the subject: "subject and object emerge as partners in the generation of meaning" (Crotty, 1998, p. 9).

From the constructivist viewpoint, the meaning of reality cannot be described either as simply objective or simply subjective. "Objectivity and subjectivity need to be brought together and held together indissolubly" (Crotty, 1998, p. 44), such that a deep comprehension of reality may be reached. On the one hand, without a conscious agent who is able to conceive the object or world, there is no meaning in

the world. How could an object be described and ascribed a meaning independent of the conscious being who perceives it? On the other hand, without the particular object or the world, human consciousness is empty. "Consciousness is always consciousness of, and there is no object which is not an object for" (Crotty, 1998, p.45; Lyotard, 1991).

Therefore, since meaning is the result of an ongoing process through which individuals engage in the world and try to make sense of this world, it can be inferred that the same reality can be conceived in different ways by diverse people. There is no a single and uniform understanding of the very same phenomenon; the generation and interpretation of meaning are contingent upon the particular interaction between object and subject.

In this sense, at first glance, a unified, static and unambiguous object can be ascribed many different meanings according to the interests and understandings of the relevant social groups which appropriate it and interact with it in practice. In other words, the way an object ends up being developed or appropriated in practice is not something universally uniform and unvaried, fully anticipated and controlled. There is an heterogeneous ensemble of contextual dynamics (systems of values, institutions, societal trends and forces, interests of stakeholders, materialistic constraints, available techniques, etc.) which are involved considerably in the development and consolidation of a particular object within society.

Constructivist research "invites us to approach the object in a radical spirit of openness to its potential for new or richer meaning; -while at the same time it stresses that the- object has a vital part to play in the generation of meaning" (Crotty, 1998, p. 48-49). The meaningfulness of an object or an action goes beyond its physical attributes or objectively defined characteristics to include those derived from its relationship to the institutional structure and social values (Fusfeld, 1989). Yet, its meaningfulness is not completely independent of its material form; the possibilities of multiple interpretations and flexible inscriptions of the very same object are not infinite; the object appears to select, amplify and reduce aspects of human agents' experience and perception in specific ways (Ihde, 1979), which are

partially conditioned by its history of construction and materiality (Levis-Strauss, 1966).

Where before, there were purity and causality (objectivism) or agnosticism (subjectivism), now there is heterogeneity and correlation (Bijker, 1993), meaningful inscription and "grounded" interpretation. Neither the material specifications of the object nor the intentions of the individual can sufficiently predefine the exact nature and scope of the relationship between the two parties involved.

### 5. 3 Constructivism and the study of technology

In the 1970s and 1980s, the constructivist perspective informed many empirical studies on science and technology, promoting the theoretical view of the Social Construction of Technology (SCOT). SCOT emerged as a counter-view to the technological determinism which views technology as a semi-autonomous, value-free force dominating various aspects of social life in a predefined and predictable way (Winner, 2001).

According to the SCOT premises, technology cannot be considered as a single material entity which displays a unified, undifferentiated character and has a homogenous, unproblematic impact upon society; technological artifacts provide "a set of options open to choice and a variety of contests over will choices will be made" (Winner, 2001, p. 13). The way technology will be appropriated and its features will be enacted in practice remains highly contingent upon the particular contextual conditions that frame the technology-human agency interaction (MacKenzie and Judy Wajcman, 1985).

In this sense, a major contribution of the constructivist studies of technology is that they bring to the fore the importance of the local context and social diversity; they draw attention to the "processes by which technology is locally negotiated" (Kallinikos, 2004, p. 142) according to the meanings attributed to it by the various relevant social groups (Bijker, 1993); in other words, either the development of new technology (Bijker *et al.*, 1987), or the appropriation of an already available

technology (Orlikowski, 1992; Orlikowski, 2000) is locally negotiated and socially shaped according to the particular characteristics of the contextual settings it is embedded in. This openness and diversity in the shaping of technology is due to the fact that every technological artifact involves "an heterogeneous ensemble of social, technical or scientific elements that agents draw upon in order to frame, instrument and act upon the issues they confront" (Kallinikos, 2004, p. 142).

Central to the constructionist approach to technology is the concept of *interpretive flexibility* which draws upon the principle of symmetry (Bijker, 1993). Technology is conditioned by the social interactions among the actors of a social group and at the same time structures these interactions (Bijker, 2001). "Technology is not only malleable and changeable - it can be obdurate, hard and very fixed too" (Bijker, 2001, p. 27). The intrinsic properties of a technological artifact may not fully account for its technical success or failure, but still they have a particular role to play in the subsequent use of this particular artifact. The degrees of malleability of technology are not infinite and are always grounded in the material form of the technological artifact (Kallinikos, 2002b). To a certain degree, "tools insist on being used in particular ways" (Mowshowitz, 1976, p. 8).

In conclusion, the constructivist perspective on technology provides an account of its social shaping and interpretation, without denying nor underplaying the objective constraints that its materiality imposes. Technology brings with it a spectrum of potentialities which are envisioned by its designers and are built in its material form. Nevertheless, the way and the extent to which these potentialities will be enacted and used in practice is something questionable; it can only be revealed after the technology is embedded into a specific context.

### 5.4 Constructivism, the study of employment relations and methodological implications

Through constructivist lenses, the sustainability and spread of flexible employment forms are seen as the cumulative result of diverse interacting forces which happen to be activated under concrete contextual conditions. In particular, the constructivist analysis highlights the contingent and emergent character of ephemeral employment

relations, by portraying the various mechanisms which jointly produce the space of possibilities allowing this phenomenon to flourish. The final denouement of social and employment trends is something which can be speculated, but not fully anticipated or controlled.

The employment relationship is not seen as a bilateral relationship governed solely by rationalistic-utilitarian criteria; nor is it seen as a purely mechanical activity dictated by a technological imperative or a social obligation. The intrinsic features of particular technological artifacts may favor the detachment of the activity from the context of its implementation and use. The occupational identity may create some restraints in human action. The economic motives and self-interest appear to be implicated in the decision-making of agents. Yet, none of these factors could probably be identified as the driver or the cause of the spread of employment relationships in the highly-skilled IT sector. Particular technological tools, written contractual arrangements or implicit mechanisms of control can potentially delineate the sustainability of this relationship, but the underplay of one mechanism or a change in the contextual conditions could turn things otherwise. It is the interplay, interdependence and mutual shaping of all the above factors, as well as their embeddedness in the particular context of practice, which account for the spread of ephemeral employment relations.

In addition, as far as the methodological implications of constructivism are concerned, it can be argued that the constructivist perspective impinges upon the assumption that the meanings of objects or outcomes are the result of the involved agents' interaction and interpretive effort. Therefore it proposes that a detailed investigation into the "meaningfulness" of these objects and human actions (reflecting on how a particular culture -e.g. scientific culture- is created), refers to the micro-sociological study of the agents' routine practices and discussions (Berger and Luckmann, 1966; Knorr-Cetina, 1983).

In the same respect, the understanding of the *constructed* character of the ephemeral employment relations in the IT sector suggests an investigation and interpretation of the working practices, routines and perceptions highly-skilled IT contractors employ and embrace. A detailed description and interpretation of the way IT contractors

appropriate, enact and make sense of this relationship can provide significant insights in regard to the seemingly controversial employment relationship. "Empirical observation and experimentation can be seen as means for confronting our hypotheses with the reality of what is and thereby advance us toward a progressive better understanding of the nature" (Knorr-Cetina, 1979, p. 369). Even if the meaning of reality is socially constructed, the analysis of this meaning tends to be conditioned by the empirical manifestation of this reality.

### 5.5 Research strategy

Unlike research in the natural sciences which are purely governed by the use of statistical analysis and deductive reasoning, research in information systems is characterized by an heterogeneous mixture of methodological approaches (Mingers, 2003; Orlikowski and Baroudi, 1991; Walsham, 1995), having its "origins in a variety of reference disciplines with distinct theoretical research perspectives" (Avgerou, 2000; Kaplan and Duchon, 1988, p. 571).

A survey conducted in the early 1990s (Orlikowski and Baroudi, 1991) showed that a large part of information systems research reflects a positivistic orientation and is heavily based on the use of statistical tools. Such a research approach tends to promote a deterministic explanation of the object of inquiry: information technology is portrayed either as the determining factor which shapes human behavior or as a neutral tool which is submissive to human agents' objectives (Kaplan and Duchon, 1988). The historical and social context within which the phenomenon under study is embedded is largely disregarded (Lyytinen, 1987), while the character of events is completely ignored.

Rather than being accidental, a growing recognition of qualitative methods in information systems research stems from the belief that the information systems discipline is much broader than what it was once considered to be. It impinges upon technical, social, psychological and organizational parameters which delineate the context of use and scope of application (Barley, 1986; Galliers and Land, 1987; Orlikowski, 1992; Orlikowski, 2000; Zuboff, 1988).

There is no one single approach which can be claimed to be universally applicable and superior in comparison to the others. Each approach is characterized as appropriate according to the researcher's objectives and the nature of the research topic (Benbasat, 1984). "Our research methods must take account of the nature of the subject matter and the complexity of the real world... Each -one of the chosen research approaches- has its own strengths and weaknesses and will be more or less applicable in different circumstances" (Galliers and Land, 1987, p. 901). In the context of the current study, the research strategy used to guide the process of collecting, analyzing and interpreting observations (Nachmias and Nachmias, 1992) is the case study research design.

### 5.5.1. The case study research strategy

According to Yin (2003, p. 2), "the distinctive need for case studies arises out of the desire to understand complex social phenomena". In particular, the case-study strategy is particularly appropriate for research problems "in which research and theory are at their early formative stages, and sticky, practice-based problems where the experiences of the actors are important and the context of action is critical" (Benbasat *et al.*, 1987, p. 369; Yin, 1981). In the case study approach, the researcher studies a contemporary phenomenon in its real life context, without having any control or manipulation power over the research variables (Yin, 1981). In contrast to the laboratory experiments, field experiments and field studies, the researcher has "less a priori knowledge of what the variables of interest will be and how they will be measured " (Benbasat et al, 1987).

The case study approach allows the researcher to make direct observations, and interview and interact with the people involved in a contemporary event under investigation (Yin, 2003). "The social scientist is re-describing an act or experience by setting it into progressively larger contexts of purpose and intelligibility... -and- reveals what the agents are doing by seeing what they are up to and how and why they would be up to that" (Orlikowski and Baroudi, 1991, p.15). The 'thick description' of the field and the use of a wide variety of evidence, documents, artifacts, interviews and observations (Yin, 2003, p. 8), "enables the capture of

reality in considerably greater detail (and the analysis of considerably greater numbers of variables), than is possible with any of the above approaches" (Galliers, 1992, p. 154).

Yet, the detailed description and in-depth understanding of the phenomenon under investigation do not entitle the researcher to claim universal applicability of the research findings. Contrary to sample surveys and controlled experiments, case-study research is not concerned with the testability (verification or falsification) of articulated theories which produce statistically-grounded, generalizable knowledge (Orlikowski and Baroudi, 1991). Case study research aims at refining, illuminating or expanding our knowledge about the object of inquiry, celebrating the merits of analytical generalizability (Yin, 2003). The objective of such a research strategy "is to understand the deeper structure of a phenomenon, which is believed can then be used to inform other settings" (Orlikowski and Baroudi, 1991, p. 5).

### 5.5.2 Multiple Case Study research strategy and the study of highly-skilled IT contractors

Taking into account the basic features of the case study, it can be argued that the research strategy is appealing for the study of flexible employment arrangements: a contemporary, complex social phenomenon which cannot be adequately understood independent of its context.

As already shown in the literature review chapter, previous studies on IT freelancing usually examine the reasons which justify such a decision, addressing the question of when and why a firm should outsource part of its IT functions or why and when an IT employee decides to become a freelancer. However, little or no attention has been paid to the conditions which enable the provision of highly specialized IT services in a spot basis. Further, little or no attention has been paid to the conditions which make such an economic endeavor feasible and sustainable over the time. In this respect, the current study seeks to alleviate this lack of research by exploring the special conditions which account for the blossoming and diffusion of freelancing in the highly-skilled cohort of the IT sector.

Although the literature on flexible forms of employment reveals some general concepts and provides a useful vocabulary (theoretical constructs) with reference to the conditions of non-conventional employment, the precise constructs which might delineate the complexity and idiosyncrasy of the relationship between the highly-skilled IT contractor and his/her client-form remain largely unknown. At this point, it is worth noting that the conceptual framework, which is used to frame the research topic, stresses a standard problematic which is traditionally raised by economic theories of human behavior; in no case may it claim to exhaust or describe the subject matter in its totality.

Furthermore, it is difficult to draw a clear line between the subject matter and the context within which the former is embedded. The contextual setting within which the employment relationship (the IT industry) is enacted in practice might be pertinent to or constitutive of it. Therefore, it deserves to be explored along with the unit of analysis of the study (highly-skilled IT contractors).

To address the aforementioned needs, the current study draws upon a multiple-case study research design. The unit of analysis is the highly-skilled IT contractor who works either alone as an independent agent or in affiliation with staffing firms which undertake the matching between labor demand and supply. Each contractor is considered as a single case which reveals a part of IT freelancing reality, as it is practiced today.

Multiple cases should not be considered similar to the multiple respondents of a typical survey (Yin, 2003); they should be considered analogous to multiple experiments. The goal of multiple case studies or a comparative case study research strategy is to replicate the finding stemming from the first case, by examining a second and third (and so on) case. Each case is selected so as to predict similar results. "Each individual case study consists of a whole study... each case's conclusions are then considered to be the information needing replication by other individual cases" (Yin, 2003, p. 50). The multiple case study design aspires to achieve a balance between getting down to the specific details of each case and at the same time keeping a kind of analytical distance to allow for the cross-case-study comparisons (Bijker, 1993).

In the context of the current study, each contractor is asked to provide her/his own point of view and describe her/his experience regarding the essence and the practice of IT freelancing. Investigation into the inter-subjective meanings shared by the contractors reveals patterns and brings to the fore aspects and parameters of IT freelancing that would have otherwise been lost. Cross-checking and juxtaposing the views and interpretations that diverse participants assign to the very same phenomenon enables the researcher to come across emergent themes and observations s/he had not thought before; in other words, the multiple-case study approach allows a rich variety of constructs and related topics to emerge out of an in-depth and polyhedral examination of the subject matter.

Furthermore, the replication logic underlying the multiple case study approach makes the findings of the study look more compelling (Herriott and Firestone, 1983; Yin, 2003). Yet, the replication logic is not meant to pursue the objective of a statistically-grounded generalization which aims at drawing inferences from the sample (a particular setting) to a stated population. It does not seek to predict behaviors, and produce universal laws which can be applied uniformly across contexts. On the contrary, it serves an analytical generalization – a generalization which refers to theoretical propositions. The case study research approach is particularly useful in "developing and refining generalizable concepts and frames of reference" (Galliers, 1992, p. 155; Lawler *et al.*, 1985). The intent is not to prove the prevalence of a phenomenon to a stated population, but "to understand the deeper structure of a phenomenon, which is believed can then be used to inform other settings" (Orlikowski and Baroudi, 1991, p. 5).

Taking into account the above remarks, it can be argued that the multiple-case study approach is considered to be an appropriate research strategy to unpack the complexity of the study matter and reveal the spectrum of mechanisms that might potentially account for the spread and sustainability of contracting in the highly-skilled sector.

Even if the aforementioned research design brings with it the flaw of subjective interpretation - the same event can be assigned different interpretations by

individual researchers/stakeholders (Galliers, 1992, p. 151) - the complexity and controversy underlying the contracting of highly-skilled IT employees renders the use of case study both desirable and necessary.

Under such a research regime, the validity of the research findings stems from the consistency of the logical reasoning followed in the research approach and analysis (Walsham, 1993). A "coherent theoretical approach informing the approach taken, that it is conducted according to an actively managed plan or system and that this is implemented in as deliberate a fashion as possible" (Scott, 2000, p. 40) can be considered to be 'systematic' and potentially valid. Benbasat *et al.* (1987) argue that "a clear description of data sources and the way they contribute to the findings of the research is an important aspect of the reliability and validity of findings." (Benbasat *et al.*, 1987, p. 381). In other words, the thorough description of the analytical trajectory the researcher follows to arrive at his/her findings is itself a contribution to research (Scott, 2000).

### 5.5.3 Unit of analysis

#### 5.5.3.1 Definition

In this study, the unit of analysis is individuals who have obtained a degree in information science, mathematics or engineering and are mainly employed as contractors, and involved in projects related to software or web developing. All of the informants are contract-based or self-employed workers who have time-limited employment relationships with the employing organizations; the duration of their contract is bound to the completion time of the project undertaken. They are required to have high expertise in their domain and at least five or six years of work experience. These highly-skilled IT contractors may work alone or get together and form "loosely" partnership-based organizations. In such a case, each "partner" maintains his/her independency and freedom but for several reasons decides to form a kind of partnership-coalition.

The decision to select IT experts who have at least five or six years of work experience is deliberately made to maximize the possibility that the contractors have consciously joined the contingent workforce. Young graduates who have not yet found a permanent occupation and occasionally work as contingent workers are not part of the research interest. To put it in another way, the unit of analysis consists of IT experts who have deliberately chosen to work as contingent workers on a continuous basis, in order to earn their living.

Selection of participants

Given the fact that there is no established classification of IT individuals who work as free-lancers, nor is their membership in a professional body, a necessary condition for practicing their work, the selection of informants was not a straight-forward process (Evans *et al.*, 2004).

Informants were selected both from a list of the members of the Federation of Greek IS enterprises and personnel, as well as from lists of alumni of the two most highly regarded universities in Greece (The University of Crete and the Athens Polytechnic University; each one is famous for particular domains of specialization). It is worth noting that all of the alumni interviewed were also members of the Federation of Greek IS enterprises and personnel. The selection of the informants followed the logic of snowball sampling, i.e., respondents were asked to provide details of others they deemed interesting for the study (Evans *et al.*, 2004; Faugier and Sargeant, 1997). Even if the respondents of the research cannot be considered as representative of the relevant population in Greece, and therefore prohibiting me from arriving at statistical generalization, their explanations and testimonies contribute to what Yin (2003) characterizes as analytic generalization, i.e. they promote our overall understanding with respect to the spread and sustainability of flexible forms of employment in the highly-skilled IT sector.

## 5.5 4 Research Method: Interviews

The method employed to select the data of the research was the one of "ethnographic interviews" (Kunda *et al.*, 2002). The respondents were asked, through semi-structured, open-ended questions, to describe how they perform their everyday work; reflect upon the conceptual tools and methodologies they use;

reflect on how they are able to engage in work largely operationally disassociated from organizational boundaries and contexts; and share their personal views and opinions with regard to the challenges and practicalities related to their work.
In particular, the interview protocol, which was designed to structure my conversation with the respondents and aimed at avoiding predicated answers, revolved around two basic research topics:
1. How is the production process of the software development taking place? What tools and resources are they using? (Focus: the activity itself of the programming)
2. How is this working activity organized and maintained in the frame of ephemeral employment relationships?
-how do they acquire/update the necessary knowledge?
-how do they find their contacts?
-how do they form and establish the relationship with the client firm?

Apart from the main corpus of interviews, a short pilot study of 6 preliminary interviews took place in order to shed light on the basic concepts characterizing IT contracting of highly-skilled services.

### 5.5.5 Site Selection

Conducting the fieldwork in Athens and more generally in Greece is associated with several location-specific characteristics. In the early 1990s legislative reforms and the urgency to compete effectively in a globalized market made Greek companies turn towards more decentralized and flexible work arrangements (Kufidu and Michail, 1999). "Strict regulation has limited the employment of part-time workers in Greece and Italy" (Reilly, 1998, p. 15) and favored the trend towards self-employment, subcontracting and outsourcing. "Part-time contracts account for less than five per cent of the wage labor, a rate about three times lower than that of the European Union. Yet, Greece has the second highest rate in temporary employment (17.6 per cent) among the European Union countries (Papalexandris, 1997, p. 591; Siebert, 1997, p. 231-2), a fact that can be mainly explained by the extensive use of fixed-terms contracts, a practice which has existed since 1925" (Kufidu and Michail, 1999, p. 488). Therefore, the subcontracting and consulting of services seem to be the more widely applicable flexible arrangements in the Greek labor context.

Furthermore, the globalization of markets and the extended diffusion and use of new information and communication technologies created excessive demand for IT employees in Greece. For instance, Greek IT contractors were able to undertake and deliver projects for customers in the United States or Brazil, with whom they never had to meet.

In addition, the policies of the Greek ministry of development and several large European funded programs have resulted in fostering excess demand of IT services (all small and medium enterprises have been given the opportunity to be funded in order to renew their technological equipment in terms of software and hardware). As a natural corollary, the demand for IT services and applications has been dramatically increased and the conditions for freelancing in the IS field seem to be as favorable as ever before.

In conclusion, it can be argued that the specific characteristics of the Greek context, along with the ease of accessibility to the Greek Federation of IT personnel and Greek universities made selecting the interviewees both desirable and appropriate for the study of flexible forms of employment in the IT sector.

### 5.5.6 Constructing an account of the respondents' sayings

The way the narration of events evolves provides the platform upon which sense is made and in a way it conditions the truthfulness of a story. Human agents, before tackling the truthfulness of events, need to be able to make sense of them (Bruner, 1990; Czarniawska, 2004). And a structured narration of events seeks to provide a well-sustained explanation of why things are the way the are (Becker, 1998; Scott, 2000).

Yet, the analysis of qualitative data collected through interviews cannot be "merely" a matter of discovering and describing what is out there (Sue, 1985). The very process according to which the researcher ascribes meaning to the data and decides what is more or less relevant involves a significant degree of selection and interpretation which depends upon his/her taken-for-granted assumptions and

theoretical stance (Sue, 1985). Different researchers, with different experiences and theoretical pre-suppositions would generate a differentiated understanding of the very same subject matter.

Taking into account the above, the aim of the current sub-section is to present how the topics around which the narrative[1] is organized, have emerged. A thorough description of the way the narrative was constructed tends to clarify the underpinnings of the research and support the credibility and legitimacy of the research findings.

5.5.6.1 A Confessional account of the researcher

Confessional accounts or confessional writing (Van Maanen, 1988) is traditionally linked with ethnographic research and requires the researcher to provide a 'self-revealing' and 'self-account' of the research process s/he follows (Schultze, 2000). In particular, a confessional account of the research "presents the ethnographer's role as a research instrument and exposes the ethnographer rendering his/her actions, failings, motivations, and assumptions open to public scrutiny and critique" (Schultze, 2000, p. 8). Although the nature of the study cannot be classified under the paradigm of ethnographic research, the presentation of the assumptions and motivations which guided my research and allow me to make sense of the empirical data contribute to a more holistic grounding of the research process and an enhanced credibility of the subsequent findings. Let me elaborate.

Before I start investigating the particular conditions that allow for the spread and proliferation of the contingent employment relationship in the IT sector, I deliberately focused on the very way the functional base of IT work is currently organized. I opted to comprehend first hand the diverse kinds of resources that IT experts draw on to do their work and how they employ and organize these resources to do this work.

My choice to focus on the IT contractors' work practices was partly dictated by the theoretical framework I used to frame the research problem and party emerged by

[1] For the needs of the current research the notion of the narrative is considered to be equal to the notion of an account of the respondents' views

the interview data. "The narrative must be organized around specific propositions, questions or activities, with flexibility provided for modifying these topics as analysis progresses" (Yin, 1981, p. 60).

My reliance on RAT and TC theory has been particularly useful during my encounter with the field site. Every theory constitutes a lens for viewing the phenomenon under study in a relatively ordered and meaningful fashion. They indicate a particular way of looking at the empirical world, by stressing some data and ignore other data (Yin, 2003). In the context of the present study, the chosen theoretical framework provided the general orientation of my empirical investigation, and drew my attention to the prospective kinds of evidence I should be interested in and look for. "Empirical facts do not speak for themselves" (Kallinikos, 1999, p. 268) and may often need to be fitted in a loosely predefined pattern in order to become meaningfully perceived and analyzed.

In particular, being significantly sensitized by the theoretical presuppositions of my conceptual framework, I aimed to shed light on the dynamics of power that delineate this controversial employment relationship between highly skilled IT contractors and their client-firms. My commitment to discover the aforementioned dynamics brought me face to face with the notion of asymmetry of knowledge and control, which successively led me to the practicalities of the contemporary IS profession. To put it in other words, it was through my encounter with the theoretical propositions of Goldthorpe's analytical model that I started investigating the correlation between types of employment relationships (long-term or short-term employment relationships) and the work task characteristics (knowledge work or routine work) that the employment contract seeks to accommodate.

The sub themes around which the interview protocol was designed and developed aimed to reflect those peculiarities and contingencies of the IT work and uncover possible relational patterns between the IT work and the contingent forms of employment. As already stated in the methodology chapter, the scaffolding of the interview guide extracted the following information: how the activity of software development is taking place, how the specialized knowledge is obtained and updated, what are the techniques the contractors employ to find new contacts and

secure the flow of income, in which way do they build the relationship with their client-firms, etc. The interview protocol was constructed so as to investigate the importance of each factor regarding its contribution to the delineation of the aforementioned relationship.

Interestingly enough, as the amount of the gathered data increased, the importance of the "tools" the contractors used to perform the assigned work tasks became strikingly significant. Contractors put emphasis on the intrinsic characteristics of their tools, as enablers of their professional mobility. The tools and the techniques related to a craft have always been considered to be highly prescriptive for the professional identity and empowerment that the workers enjoy; yet I had never suspected their potential correlation to the particular form that the employment relation can take, at least not in the sense the respondents articulated and described it.

Before reading again and again the narratives that the interviewees recounted, I had never seriously thought about the possible linkages between the cognitive organization of a tool/technique and the possibility of transferability of knowledge across organizational borders. I had never thought about how a slight twist in the standard working procedures could have such an immediate impact on the perception of the professional identity and the formulation of the relationship between the employer and the employee.

Similarly, before my encounter with the empirical data, I had never thought about invisible and implicit mechanisms of control which are inherent in the individual and are indirectly imposed on it, through its recurrent interaction with the institutional, technological and organizational surroundings.

Although the theoretical propositions provided me with a vocabulary of concepts with reference to the phenomenon under study, they were deficient in addressing the complexity of the reality as a whole. In other words, the theory provided me with the conceptual munitions to confront the empirical world's untidiness; yet, it could not fully register and encompass the richness of the subject matter. It was only through the continuous and iterative juxtaposition of theory with the empirical

material of the study that a substantial comprehension of the employment relationship was able to be reached. In an attempt to draw analogies and find commonalities between the theoretical constructs initially identified, and the stories a posteriori narrated, I came across relationships and patterns of behavior that I was not aware of.

And it is exactly through the juxtaposition of the general with the specific, the tidy with the messy that the researcher is led to insights (Bateson, 2000; Kallinikos, 1996). Lofland (1976) notes that an empirical science is constructed out of the interplay of data and perplexed perception; perception gives rise to concepts which are enriched and constrained by the context of concrete empirical materials (Lofland, 1976).

In conclusion, it can be argued that the trigger for this set of inquiries was initiated by the theoretical propositions of my conceptual framework. Nevertheless, as the bulk of data started increasing, the explanatory power of the empirical findings paved new paths of perceiving the contingent employment and to some extent challenged some traditional premises characterizing it.

The next two chapters present a narration of the respondents' views and perspectives. The editing of the interview scripts has been largely based on the empirical data and facts, as they have been articulated by the respondents. The frequent presentation of multiple quotations uttered by the respondents aims to prioritize the role of empirical evidence, conveying as faithfully as possible the lived experiences and perceptions of the individuals. Yet, the structure of the narrative has been clearly underpinned by the theoretical preoccupations governing the conceptual framework of the study. These theoretical concepts (i.e. the notion of knowledge specificity, the notion of difficulty or ease of work monitoring, alternative conceptualizations of control, the concepts of flexibility and transferability, etc.) penetrated and partly guided the construction of the narrative, without though fully predicating its final formulation and content.

# CHAPTER 6 : FIELDWORK

## 6.1 Introduction

This chapter presents a narrative of IT contractors' working practices and experiences. It aims at reconciling the scattered and seemingly unrelated descriptions of the essence and practice of IT work under non-standard employment arrangements.

The narration does not follow the chronological order of the events - i.e. it does not narrate the events in the order that they were articulated by respondents - it rather seeks to present them in a consistent and meaningful way. The chosen ordering of the recounted events intends to systematically organize the core concepts which emerged in the course of the interviews and gradually reveal the perceived intentions, actions and goals of the respondents (Wagner, 2002).

The structure of this chapter is organized accordingly: Section 6.2 summarizes briefly the basic traits of the interviews conducted in the course of the fieldwork. Section 6.3 presents the respondents' generic characteristics. Section 6.4.1 demonstrates the main axis around which the narrative evolves and sections 6.4.2 and 6.4.3 present the corpus of the narrative.

## 6.2 Empirical research-ethnographic interviews

The interviews were conducted in Greece, between September 2005 and April 2007, and each of them lasted approximately one and a half hours.

IT contractors spoke at length about their career histories, the conditions that frame their working everyday life, their work and business practices, the strategies they follow to manage the difficulties of contracting, the lived experience of contracting, the way they perceive their identity in the world of contracting, etc.

Most of the interviews were tape-recorded at the participants' workplaces in Athens. Their workplaces were single-room (or double room) offices equipped with PCs, laptops, fax machines, landline phones and internet connections. In some cases, whenever the respondent's workplace happened to be his/her own home, the interview was held in public space areas. Furthermore, some informants were interviewed twice because the initial transcription rendered necessary a second round of interview. This is because there were issues that remained largely unclear and needed to be further clarified. In very few cases, I also had the opportunity to make some ad hoc observations in the respondents' working sites in order to see firsthand how they conduct their work on a daily basis.

### 6.3 Research participants characteristics

All the respondents were members of the Greek Federation of Information Systems "professionals" and could be classified under three general groups: IT consultants and managers, IT engineers specialized in a particular technology or off-the-shelf software package and highly-skilled IT engineers specialized in a variety of technologies. Eight of the thirty interviewees were general IT consultants and managers. Five of the interviewees had highly specialized skills in a very particular technology or commercial, off-the-shelf (COTS) software package such as the one manufactured by SAP. And the remaining seventeen interviewees were specialized in a wide range of technologies. All of the interviewees had university degrees in computer science or related scientific disciplines and all had at least five years of work experience. No matter how much they differed in the particular skills and dexterities, they were all considered to be proficient and respectful in their occupation.

The IT consultants were the ones who had the lengthiest experience in the business field. They all had worked for 15-20 years in IT organizations (their core business was the production of hardware and software) and/or multinational companies with IT departments. Working as freelancers, they used to undertake a whole project by themselves and subcontract parts of the project to other freelancers or even small IT companies. Generally speaking, their job consists of two basic activities: a) the

study of the organizational structure and business objectives of the client-firm, and b) the suggestion of specific solutions about how the firm could benefit from the introduction of new information and communication technologies. The IT consultants are considered to be the most appropriate people to speak about how the different functions of an organization could be supported or restructured through the use of technological systems. This kind of freelancer rarely writes code, but is mostly concerned with the identification of problems, the specification of requirements met by the information system, the restructuring of organizational functions, the division of labor which should be applied among the subcontracted freelancers, and the monitoring of the whole software production and implementation process.

The freelancers who specialize in a specific technology or an off-the-shelf software package have usually been responsible for cutting and tailoring the respective technology or package to the particular needs of the client-firm. Effective customization or parameterization of an already existing technology or software package usually means a good grasp of knowledge both in terms of business (domain) knowledge and software technicalities and functionalities.

Finally the third group of respondents, the freelancers who specialize in a wide range of technologies, have been software developers, web developers and web designers. This category of contractors writes code for a multiplicity of business applications, moving freely from the one object of work activity to another according to fluctuations in and the orientation of market demand. Interestingly enough, some of them seemed to deliberately focus on diverse kinds of applications which were specific to a particular business sector. For instance, some contractors were solely specialized or they solely chose to work on software applications related to the business activities of commercial or investment banks.

Generally speaking, being members of a large work team or working alone (e.g. undertaking the design of a web site or the development of an accounting software program as a whole), building something from scratch or relying upon already available software components, the respondents were seen as highly performing IT

people who could employ technology in such ways that few people have been able to do.

The informants ranged from 25 to 55 years of age, all had university degrees and lived in the greater area of Athens. Nevertheless, for the sake of their work they had to travel a lot within the borders of Greece or even across the globe. The duration of their contracts varied from four months to two years and many of the initial contracts were followed by maintenance or support contracts. The majority of the respondents (27) were independent contractors or self-employed individuals or "nascent entrepreneurs" as they liked to call themselves. They directly negotiated the terms of the contract with the client and thus avoided the mark-up charged by the market mediators – i.e. recruitment agencies. Only a few of them (3) were regularly employed through staffing firms, such as those strictly specialized in a very specific technology or software package, or the ones who were at the beginning of their career. Furthermore, some independent contractors admitted that sometimes they also used the services of staffing agencies; when they hadn't any contract on the way and they wanted to reduce the risk of uncertainty and potential unemployment.

Finally, as already stated, all the respondents had at least five years of work experience. Some of them started working after the completion of their studies, while others were working at the same time they were studying. Most of them had chosen to enter the contingent employment force after a more or less lengthy stay in the realm of permanent employment. Very few had become contractors just after completing their degrees.

### 6.4 Stories from the field

The description of the empirical findings relies upon respondents' working experiences and viewpoints regarding *the IT programming practice* in contingent employment settings.

The first part of the narrative presents how the production of software is socially organized under conditions of short-term employment relations, while the second part of the narrative presents how the actual production of software is taking place in practice. The presentation of the two streams of findings aims at revealing important facets of IT contracting. It aims at unpacking the mechanisms and conditions which render the controversial relationship between the contractor and the client-firm not only viable, but also widely diffused.

### 6.4.1 The embeddedness of the software production process in contingent work arrangements (Regulators of individual behavior)

A set of topics that emerged in the course of the interviews refers to the way IT freelancers perceive their working practices and appreciate the embeddedness of these practices in short-term contractual employment arrangements. The questions which were related to the above topics were largely triggered by and relied upon the theoretical assumptions of "difficulty of monitoring" and "opportunism exertion". They aimed at exploring the bonds which keep IT contractors' interests aligned with the client-firm's interests, irrespective of the properties of obscurity and intangibility that the knowledge work accommodates.

Investigation into the way IT contractors build and enact their business relationships within the circuits of IT contracting provides insights regarding the sustainability and spread of the contingent employment relationship.

*-Decision to become a freelancer and job/contract finding*

The respondents were asked to describe how they perceive and appropriate the contingent employment relationship they are engaged with, what are the stages of development of such an employment relationship (how they find their clients, how they come to an agreement with their clients, what reassurances exists that the two parties will respect and stick to the terms of the contract/agreement, etc.), how they manage the difficulties and contingencies of freelancing, etc.

Almost all of the respondents explicitly stated that their decision to become contractors was the result of serious consideration and deliberate choice, as well as a matter of coincidence.

"*I was the CIO at J&J Hellas for 8 years. In 1988 we were the first to introduce e-mail technologies and network technologies in the Greek Business sector. I was frequently sent abroad to participate in and lead IT projects held by the subsidiaries of J&J all over Europe. I obtained huge experience in the management of IT projects for multi-nationals in the fast moving consumer goods sector, but after all J&J was a shampoo company - not an IT company. I felt that there was no more challenge for me to stay there, nor move to another multi-national company. My rate of payment was also significantly high and the competition in the market fed by talented young people who would claim much less money than me was particularly high. It was at that particular point of my career that I decided to become a freelancer.*"

Apart from their personal reasons for entering the freelancing world (e.g. the desire for challenging types of work, the feeling of being competent, experienced and self-competent enough to become self-employed entrepreneurs, the desire to enjoy their time more flexibly and to have more control over their work), there were also other contingencies which seemed to influence the respondents' decisions to do so. Around 2000, the IS sector of the Greek economy underwent significant changes. Significant amounts of money were diffused in the Greek economy by the European Union in an attempt to promote and support IT innovation in small and medium-sized IS companies. Lots of IS projects had been undertaken and the demand for IS personnel increased radically. Software of good quality was produced and enthusiasm and excitement was spread throughout the IS sector. From time to time, bunches of engineers who had formed small IT companies were capable enough to compete successfully against large corporations, such as IBM and get bids for large IS projects.

"*It was believed that the introduction of new technologies would redefine the whole landscape of the Greek economy. Systematic and mathematically-based organization of the whole spectrum of production processes was supposed to correct*

*all the illnesses of the industry and services sector. Significant funds provided by the European Union alongside an augmented faith in the IT function rendered the IS profession the most sought-after profession. Coalitions of ambitious and highly educated engineers formed small enterprises equally competent to the "big names" of the field."*

This relative displacement of the equilibrium was not without frictions and tensions between the different players of the IS sector of the economy. The tension was aggravated by the massive introduction of companies in the Athens Stock Exchange and the radical increase in their stock values. Big IT companies started increasing their shares and their capital, the values of their stocks skyrocketed and the accumulation of wealth allowed them to buy and acquire or attract the most efficient IT executives of the small-medium sized IT companies which used to be their immediate rivals. Most of these mergers and acquisitions among IT companies took place without careful planning, and without thorough study of the successive changes which needed to be made. Small and medium sized companies lost the flexibility and autonomy they used to enjoy and found themselves entrapped in the politics and inefficiencies of a chaotic organizational life. The experienced executives' discontent and disappointment was more than apparent.

*"What is crucial for you to understand is that in order for somebody to be really good or gifted in his/her craft, he/she needs to really love what he/she is doing. If I am assigned a boring and routine task or if I am forced to follow orders which are completely irrational or inefficient regarding the overall functionality of the system, I freak out. When the company I was working for was bought by a big company of the sector, the quality and the challenging character of the project I was assigned to dropped drastically. Moreover, I was deprived of any kind of initiative or freedom. I could not keep on working in this kind of environment and under these kinds of conditions for a long time. It was just a matter of time when I would leave this place once and for all."*

The above condition was further aggravated by the sudden and radical fall of stock prices in the Athens Stock Exchange (fiscal year 2000) which resulted in a relative bankruptcy of many institutional and physical entities. Hard financial conditions and

surges of unemployment followed the crash. Encountering this menacing work and economic environment where security or optimism was no longer possible, many IT engineers were forced to think proactively and take their future in their hands. They made the decision to become independent freelancers, "entrepreneurs" or self-employed contractors.

"*There was no guarantee anymore that the company you were employed by would appreciate your lengthy experience and dedication towards it and, as a natural corollary, in exchange it would provide you with a secure career ladder. The more experienced you were, the more money the employing organization had to spend on you. Furthermore, there were so many young IT engineers who have been quite knowledgeable about state-of-the-art technologies and very keen on taking your work position for a much lower wage. Therefore, the most secure way was to take your work future into your hands and build around you a professional network through which you will be kept continuously employed. On the other hand, the economic instability of the Greek market favored the use of highly-skilled contractors as a means for firms to absorb market fluctuations and avoid potential lay-offs. Therefore, entering the contracting labor force seemed much more promising than continuing working under the unfavorable conditions of "permanent" employment.*"

All of the respondents had at least five years of work experience and the majority of them had previously been full-time employees in various organizations. Before they entered contingent employment, they had already built a professional network which would operate as a safety net against unemployment, especially at the beginning of their freelance career.

"*It was not all of a sudden that I decided to become a freelancer. Before leaving permanent employment, I had already started undertaking small projects that I managed by myself. Therefore, I developed a database of current and prospective customers and thus started building a professional network which would increase my visibility in the market and would provide me job opportunities. Before leaving the organization I was employed full-time in, I already had three short-term contracts on the way.*"

These professional networks consisted of ex-peers, people who had graduated from the same university department, people whom they had met at seminars, and other freelancers whom they had met through their joint participation in IT projects. The people who had already worked for large multinationals seemed to put particular emphasis on the importance of these networks.

*"A privilege you have when you are working in multi-national companies is that you come to know great numbers of executives who every two or three years move to another company. The turnover and mobility rates they display are incredibly high. In practical terms that means that after some years you have automatically created a large network of ex-peers spread across different companies and sectors. And these ex-peers can be used as a bridge to your prospective client-companies."*

Furthermore, in Greece, there is an association of IT people (EPE) which usually offers to its members professional development programs, awareness about job opportunities and a place for socializing. The aim of this association is to support the IT profession and contribute somehow to its formal professionalization. Apart from a financial annual subscription that members have to pay, there is also an implicit obligation of all members to help one another and contribute to the general "well-being" of the association. According to the respondents testimonies, their motive to join this professional peer group was to increase their visibility in the market, advertising themselves to a wide audience and thus reinforce their professional status. Yet, this association consists of a quite heterogeneous sum of IT graduates, in terms of their specialization and level of expertise (from support technicians who have not graduated from a university to highly-skilled IT consultants who have doctorate degrees); therefore, what was really important was who you know in the network and whom you had created bonds with.

The activation and use of such professional networks can prove particularly useful and constructive for the client-firm, too.

*"The managers always prefer to assign the outsourced projects – even if they have to pay higher rates than the ones set by the market - to people who are somehow introduced by a person they know and trust. This is a secure method to acquire*

*better information, to save money and time and escape risk. Quite often the managers are not able to control the quality of the work received and the quality of the work does not make itself apparent unless you try to upgrade a system or add new functionalities, which might mean a long time after the initial installation of the system. Therefore, being able to acquire detailed and rich information about the prospective contractor the client-firm is about to employ is considered to be a critical factor of success.*"

If the client-firm does not succeed in locating the candidate it is looking for through the known professional networks, then it addresses its request to the alumni associations of well-reputed universities located in Greece, and to the corresponding staffing firms.

"*The well-reputed universities in the IS discipline in Greece are not that many and the population of IS graduates is relatively limited and easily accessible. After having spent four-five years in the same institution and having participated in numerous projects, you have managed to build a name in there. The employers ask the alumni secretary to provide them a list of the IS graduates and then they try to cross-check the rumors about the potential candidate; in every case graduating from a high-standards university remains a strong indicator of the potential quality of the work one is potentially capable of doing. A couple of clients found me through the alumni association of the University of Crete I am member of.*"

Finally, there is always the option for the client-firm and the contractor to turn towards the agencies to find the appropriate candidate as a contractor or as an employer, respectively. Generally whenever they can avoid the mediation of staffing agencies, they do so in order to save the mark-up that they charge. But there are cases where the mediation of the agencies seems to be quite desirable.

"*After having worked for 8 years in SAP Hellas and having ascended to the upper levels of the hierarchy (I was given the title of business solution manager), I decided to become a contractor. I already felt pretty confident about my skills and expertise and the remarkably increased demand for IS consultants -consultants all over*

*Europe convinced me to send my CV to an agency – an internet recruitment agency,* www.jobserve.com[2]*. This is how I found my first contract for 8 months in the UK."*

The contractors who worked mainly through staffing agencies were highly specialized in a particular technology, had a very well built CV and were willing to travel all over the world to fill contractual work positions. They were based in Greece, where their families lived but they were traveling a lot (because the work should usually be conducted within the client's premises), almost every single week. Interestingly, this kind of contractor seemed to form repeated relationships with a particular agency which had proved to be trustworthy and reliable.

Another category of contractors who found their contracts through the internet staffing agencies (www.rentacoder.com) were IT engineers who were assigned small, well-specified components of particular software or web applications. The demand for web-related material has been significantly high. The contracts undertaken were quite short-term and the work involved was either specialized (the application of a highly specialized software tool) or standardized. It seemed to be more "neat and clean" in comparison to the work undertaken by IT contractors-consultants. These contractors never left their house and they didn't need to visit the client's premises. These kinds of contractors were quite young, at the beginning of their careers and had not yet established widespread professional networks. For them, the use of these staffing firms seemed to be a necessary starting point.

**-Knowledge application and updating- Informal professional networks and virtual communities**

Apart from being sources of prospective contracts, the professional networks populated by ex-peers, friends and co-contractors (contractors whom they had met in previous projects), seemed to play a significant role in the contractors' struggle to update their knowledge repository and perform their work well.

[2] This web site is an information hub which gathers advertisements of job positions all over the world and cooperates with hundreds of smaller agencies.

*"..sometimes you are part of a project team which is populated by the permanent employees of the client-firm; this is the case of a client-firm which has an organized IT department but needs to buy professional services for the completion of a highly specialized task. Whenever you have to work within the premises of the client-firm alongside the permanent employees, you might encounter a kind of hostility or isolation. Due to the fact that you have been hired as "the expert" and you are paid in a much higher rate than the regular employee, you are expected to have an optimum performance. Working in the client's premises is like having to take exams every single day. There is no room for mistakes nor for wrong estimations and the possibility to ask for advice from your co-members in the project is completely absent. Even a small bug is strictly forbidden for a highly-skilled contractor, since it could be used at the detriment of his/her reputation. Therefore, whenever I encounter any kind of technical problem or difficulty, immediately (just by clicking a button and without being perceived by anybody), I contact my friends - alumni from the same university and ex-peers or I visit specialized web-sites and users' groups. But even if I know what is the right thing to do among a multiplicity of alternatives, I always contact an ex-peer or friend. The confirmation I can get by him/her about the correctness and the robustness of my choice can save me a lot of time and energy."*

The respondents argued that the decision about how to go about producing a particular software application which would serve, in the best way possible, the needs of the employing organization, is not usually a straightforward process. In practice, there is no one best way to guarantee the achievement of the expected results. There is a multiplicity of equally acceptable and scientifically legitimized approaches, each one of which might equally contribute to the achievement of the very same result. Even when the IT engineer is capable of estimating the special business requirements and deciding which is the quickest and most efficient way to go about them, s/he has to spend long time to test and calculate in order to verify the actual results.

Interestingly, in order to respond adequately to the pressing time constraints of perplexed projects, some contractors chose to formulate loosely coupled

partnerships with other contractors (Kakihara and Sørensen, 2002b). Over time, some of these partnerships acquire a more stable character.

"*When the assigned project is very complicated and the completion timelines are particularly tight, I choose to subcontract other contractors, whom I know well. They may be friends of mine or other contractors whom I have cooperated with in the past and we have got along quite well with each other. Each one focuses upon a particular part of the project according to his/her particular expertise and the savings we have in time and effort are huge! Being able to discuss potential difficulties or problems with people of the same field can save you from much trouble.*"

But as far as the knowledge updating and work conduct is concerned, respondents also drew attention to the role of internet-based sources and virtual communities. All the informants have used the internet in order to extract information about a particularly new technology or some specialized features of an existing technology. They noted that the internet is a large encyclopedia in which quickly and effortlessly one can find anything he/she is interested in.

"*Internet is a fantastic source of easily accessible and timely information. When something has already been printed out in a book in our field, it is considered as obsolete. But even if the book is up-to-date, the time you will need to leaf through and browse the book to find a particular command is too much. No way! Instead you go to the Google webpage you type the command you look for and in less than one sec you come up with hundreds of results about the command and how and when the latter is used. We are paid by the hour and we are working under great time pressure. Every minute counts for us.*"

The respondents also talked about the extended use of internet sites which include bulletin boards, user groups, etc. and provide detailed information about software tools and how to tackle specific peculiarities and problems related to software. These sites constitute a virtual space where people with the same concerns can gather and exchange opinions. Their discussion concerns information about program

upgrading, tips for fixing program bugs, information about the launching of new tools, etc.

"*Sometimes you can even find ready-made solutions which can be integrated as a whole in your system, without any kind of amendment or alteration. This is terrific! Yet, the reliability of the solutions and information available in the internet is always a concern of ours. Generally we always follow the trial-and-error process of verifying the correctness of a suggested solution. The more theoretical and abstract the problem you have to sort out is, the more difficult it is to check the reliability of the suggested solution. Information overload is the other facet of the facilities brought about by the internet. Nevertheless, the information available in the internet is still a great resource. I could not imagine performing my work without the support provided by the internet.*"

Finally, it is worth pointing out that contractors also search the internet for business-related information. Working as contractors and moving constantly from the one organizational setting to the other, they have to deal with business concepts and specialized business vocabularies or organizational structures which they are not acquainted with. To acquire the knowledge they lack, they visit relevant internet sites.

"*When the manager who is about to hire you, describes to you a business concept you are not really aware of, you avoid posing to him naive questions which will make you seem ignorant. Being an itinerant IT consultant means you can translate quickly and efficiently any business problem into an IT solution. Concomitantly, what you do is you search the internet for theories and explanations associated with this conundrum-concept and thereafter during your second meeting with the hiring manager, you can ask for further clarifications, etc..!*"

Commenting on the nature and acquisition of business knowledge, some contractors remarked also that the longer they work in a particular business sector, the more aware they become of the business logic that governs the particular sector. Firms of the same business sector display great similarities in the way they manage their resources and set objectives.

**-Control, reputation and project management**

When contractors were asked to comment about the mechanisms which align the interests of the two parties and ties them "tightly" in such a transient relationship, they all mentioned that displaying a reliable and professional behavior is their only chance to stay continuously employed in this risky and volatile work environment.

"*The new digitalized world of work has made us all visible in new ways. Our membership to professional associations, virtual communities and virtual professional networks, our personal web sites, the easy communication and connectedness among the business organizations worldwide – let alone the Greek territory we are located in – have rendered our trajectories in the business field easily traceable. And we want to be visible and traceable, because this is how we are going to find our next contract: by being noticeable by prospective employing organizations. We deliberately pursue the exposure of our work, since this is how we get better chances to find interesting projects and build meaningful careers. Doing good work and building a good reputation is your passport to a lengthy and continuous employability, but also a means to nurture your self-esteem and gain recognition in this ambivalent workplace.*"

Furthermore, they noted that quite often they try to lengthen the transient character of the employment relationship with the client-firm by persuading them to sign contracts of support and maintenance.

"*If the client is satisfied with the quality of the service you have provided to him/her and the overall mode of cooperation –managing a transient employment relationship with a client-firm you merely know is an extremely difficult task. Apart from the complexities which emerge in everyday practice, it is also the expectations and the perceptions of the manager you have to cope with - then you have great chances that he will call you again and again... There is always something new which can be added to a new system... And having established a relationship of trust gives you the privilege of being listened to when you talk. From time to time I take the initiative to propose to my existing customers small amendments or upgrades for their systems which they usually agree upon. Furthermore, the initial contract is*

*also followed by contracts of maintenance and support, if the client remains satisfied with the received solution. Sometimes you are paid in order just to be on call 24 hours a day. The income stemming from the above resources is rather insignificant, in comparison to the sums of money you receive from your main contracts, yet strangely enough it provides you a feeling or illusion of security and continuity, which is sometimes very important in the menacing and hostile freelancing world."*

Moreover, the respondents expressed the view that the contract is perceived as a layer of protection against a client's possible extravagant claims. Once signed by the two parties, the contract is submitted to and certified by the financial authorities of the Greek government. It constitutes a formal legal document. If the behavior of any of the two parties deviates from the terms of the contract, they are accountable to the court of justice.

*"At the beginning of my career I made the mistake of not describing thoroughly and explicitly enough what I was supposed to do... I ended up doing 3 times more work than we had initially agreed upon. If you are a contractor, you have to know that the client is always right and you always have to keep him/her happy, no matter what it costs you in terms of effort allocation to the project. To some extent she holds part of your reputation and future employability in her hands. Therefore, explicit and detailed contract terms can save you from a lot of trouble."*

On the other hand, from the client-firm's perspective the terms of the signed contract are also perceived as a safety net against the possibility of opportunism by the potential contractor.

*"No matter how explicit or vague the terms of the contracts might be regarding the technical details of the activity undertaken, there is one term in the contract which should be indisputable: when the project will be fully delivered and what the final functionality of the software solution will be. This is a term both parties have to respect almost religiously, unless it is otherwise stated or commonly agreed. At the end of the day it is all about time and performance."*

Taking into account the increasingly competitive business environment within which current organizations operate, it would be plausible to assume that a possible delay in the launching of a new project might possibly signify great monetary or market-share losses. In other words, what the client-firm seems to be more interested in is ensuring that the contractor will provide the project fully completed and within the time frames initially agreed in the contract. To this end, an integral part of the contact is a detailed description of the successive dates ("milestones") the different components of system ("deliverables") have to be delivered to the client-firm. Interestingly, in cases where the project under completion is too extended and too complex, the client-firm tries to fragment the project into sub-projects, sub-deliverables and assign each to as many independent contractors as possible: "*Assigning us only small parts of the overall project seems to be a standard tactic of the client-firm in her attempt to acquire a relative control over the completion rate of the project and moderate her level of dependency upon us.*"

6.4.1.1 Conclusive remarks

The respondents' views presented so far would be summarized as such:
- there have been both personal motives and socio-economic conditions that made IT experts to join the contingent workforce
-most of them before they enter the contingent market, they had already informal professional networks (i.e. networks consisted of ex-peers) which operate as a safety net against unemployment.
-their membership in the Association of IT people in Greece offered them a place for socializing and raised awareness for job and training opportunities
-internet-recruitment agencies were also used by the contractors in order to be visible by prospective customers
-informal professional networks along with the internet virtual communities and specialized web sites on particular technologies consisted the main sources of knowledge updating and new knowledge acquisition for contractors
-the visibility brought about the internet and the struggle to retain a good reputation as an enabler of employability operate as mechanisms of control

-the rationale of project management appear to supplement and reinforce the efficiency of outcome-based short-term contracts.

### 6.4.2. The production process of software development

As already stated in the methodology chapter, the interview protocol included diverse questions which referred to the perceived work-related practicalities experienced by the IT contractors. It was believed that by exploring the practicalities of this work, it would probably be easier to identify some of the inherent features of the work which render it amenable to freelancing. In other words, my concern here was to discover whether the IT engineer's performance was somehow related to the acquaintance and familiarity s/he displayed towards the client-firm - a concern which incubates the theoretical assumption of "asset specificity". And in order for such an assumption to be tested, and the plausibility of such an argument validated, the research focus shifted towards the types and forms of knowledge associated with the particular profession or working activity. Therefore, investigating the knowledge IT experts employed to conduct their work seemed a necessary path to follow. It was at that point that the issue of the IT contractors' tools and especially the software programming tools and languages came to the fore.

Even from the first interviews, conducted in the frame of an exploratory pilot study, the issue of *programming techniques* seemed to revert over and over again in the contractors' discourse. Consequently, I chose to focus on the way contractors perceive and appropriate these techniques. My aim was to study the extent to which the choice and use of a particular programming technique could possibly be associated with distinct possibilities of action and thought.

In particular, the respondents were asked to describe how they conduct their work, reflecting upon the conceptual tools and the methodological techniques they use. The underlying logic behind these questions was influenced by my attempt to explore the following two propositions: a) whether there is something new or differentiated in the way programmers build software today, and b) if so, how this

shift could possibly be associated with the conditions that facilitate the spread of freelancing.

All of the respondents were expected to bring to the client-firm technical expertise which would support the organizational operations and promote the overall position (profitability, effectiveness or competitiveness) of the client-firm in the market. Irrespective of whether they were web developers, software developers or general IT consultants, they had to understand and translate - at least to a certain degree - the business objectives into specific IT applications. For instance, *software developers* and *IT consultants* were assigned the configuration and development of local networks, the customization of off-the-shelf software packages, the development of specialized software applications for supporting the decision making in organizations, the development of sophisticated software solutions for managing customer relations, financial flows, or supply chain flows etc., while the *Web developers* were assigned the development of web applications, or the designing and the construction of web sites. Interestingly, even those who were usually undertaking the development of web applications - an activity which at a first glance might seem simpler than the customization or development of integrated enterprise systems - had to figure out how they would fit in the overall strategy of the firm and what would stand for in everyday working practice. The virtual presence and the subsequent business activities of a firm on the Web could be as equally important and complex to the ones taking place in the traditional business context.

It was clearly agreed by all the respondents that a sufficient comprehension of the *organizational dynamics* and the *business objectives* which the software application was destined to serve and support, was a "must" in their work. The clear perception of the problem domain and a good grasp of the relevant domain knowledge have always been considered as crucial conditions in the software development process. Yet, all the above considerations seem to become significantly critical and dubious, if one takes into account the fact that the IT contractors had no acquaintance or prior experience with the organizational context within which the particular client firm operated.

*"Every time we are assigned a new project, we feel more or less like parachutists, having just landed on a new, strange and unexplored ground. Based upon our past experience, tools and intuition, we are expected to make sense of the business environment and suggest concrete technical solutions as a response to the organizational problems or dysfunctions. I would not exaggerate if I argued that sometimes figuring out the exact courses of action you need to be engaged in, in to order to produce the desired software solution, is equally time-consuming to the development of the solution itself."*

To raise their learning ability, some of them stated their deliberate decision to become specialized solely in a particular business sector (e.g. all their clients belonged to the banking sector or the insurance sector) or to provide IT solutions for a particular business activity or process across different industries and sectors (e.g. supply chain management). A deep understanding of a business sector or a particular business activity would promote their performance and speed up the completion time of the projects undertaken. Nevertheless, this kind of strategy was not always possible for all of the respondents, since many of them chose not to restrict the pool of their potential clients, in order to protect themselves from the pending risk of unemployment.

To restrain their unfamiliarity with the client's organizational structure and business climate, the contractors had to participate in several meetings and interact sufficiently with the project manager or other key-to-the-project managers. The bigger and better organized the organization was, the more chances the developer had to be given clear guidelines and to be told the system's or the user's requirements. The conceptual complexity involved in eliciting users' requirements depended upon the size and type of the project undertaken.

Sometimes, being assigned the completion of an application as a whole (in this case part of the contractor's job has been to explore and specify the requirements of a system, which is supposed to support the nebulous organizational functions and processes) could prove to be much more complex and risky than developing a highly specialized part of a well-defined application, where other analysts have already identified and described the requirements. But even in the case where the

requirements were easy to identify or had already (and correctly) been specified, the contractor had to deal with increased ambiguity, since the requirements were still subject to change as the project would evolve and the client would become more aware of what s/he was truly looking for.

"*No matter how much you try to specify as explicitly as possible all the features and the functionalities of the new application into a detailed and carefully written contract, there is always space for unanticipated contingencies to emerge. Lengthy work experience can protect you – at least at some extent - against this kind of unwanted effect; you can use your experience to avoid making the same mistakes or to foresee similarities and analogies in different kinds of projects. Furthermore, the more experienced you are, the steeper the learning curve you have in terms of how quickly and efficiently you make sense of a new business environment; yet what proves to be significantly crucial in your attempt to deliver efficient solutions – on a short time basis and within obscure organizational contexts - is your ability to alter or adjust already made parts of your work, thus saving great costs in terms of time and effort* ".

In other words, it could be argued that if a wrong estimation about the functionalities that the new application embodies is made or if the users' requirements start acquiring a slightly different orientation, then the contractor must re-evaluate and adjust part of the software s/he has initially developed. This would mean in turn more time extensions and delays. And if the part of the software already produced is interdependent with other modules undertaken by other engineers or if they are used as an input to other engineers' work, a small amendment or delay could signify great costs – both in terms of time, effort and money - for the project as a whole. And as far as the contractor's employability and reputation are concerned, such an incidence could seriously harm his/her career. All of the informants reassured me that they could not earn their own living as contractors if they were not able to deliver their project on time and under unfavorable contingencies or special circumstances.

"*When you are considered to be a highly-skilled contractor, the client is expecting you to provide him/her the solution he/she is looking for quickly and efficiently. You*

*are paid at a high rate in order to do what the permanent employees cannot do. Concomitantly, even if difficulties and contingencies arise, it is part of your to job to sort them out without complaining or asking for deadline extensions. A lack of capability to work under this kind of contingency sooner or later means your expulsion from the contracting world."*

A proactive response to the aforementioned problems and unpredicted contingencies (inherent in the software development) could possibly be the contractor's ability to localize the decisions made, leaving intact a big proportion of the work already done even if changes need to take place, and to easily adjust his/her work product according to the shifting demands of the client-firm. Concepts and words, such as "*multi-dimensional tools*", re-combinable "*first raw materials*" and "*flexible development approaches*" to software engineering seemed to govern the respondents' discourse.

According to their testimonies, the multi-dimensional character of the "tools" meant that the very same tool can be used differently according to the special circumstances and characteristics of the task undertaken. In other words, this "multi-dimensionality" allows the contractors to trigger and mobilize particular functionalities of the tool according to the specific needs of the application under construction. The logic of manipulating the tool remains the same, its functionalities are there waiting to be activated and the savings in time and energy are noteworthy. Therefore, in this case, the request for change or adjustment would mean in practice the choice of a new "combination", a particular set of functionalities and characteristics and the rejection of the initially chosen one. Under these lenses, a change in the users' requirements equals a relatively easy activation of a new set of already existing functionalities.

Furthermore, the respondents mentioned that no matter how unique and differentiated the project they are assigned to is, they never start from scratch. They always use pre-made components which they have developed at some point in the past in the context of previous projects. Thus they build their application in a piecemeal fashion, following the logic of assembling and disassembling new and old pieces together.

*"...Our only chance to respond adequately to such widely varying and shifting market demands relies upon our capability to decompose the various bits and pieces which commonly constitute a particular software application and then selectively recompose them to fit the requirements of a new one. How else could we ever have such great production of significantly differentiated and customized software solutions, spread over such a variety of organizational contexts and delivered in such short times? How could we ever suggest on the spot solutions to the constantly shifting demands of the client-firms, if we did not have in our tool kit the legacy of ready made "objects"- components waiting to be used as such?"*

Even if the notion of re-combinability and re-usability of already-made parts of code is not something new in the software industry, the emphasis that contractors placed on these properties regarding the description of their craft seems noteworthy. What is also interesting is the fact that at the beginning of the interview –when they were asked to describe the diverse tools and work practices of their profession - they did not explicitly mention the extended use of object-oriented techniques, because for them it was something which was taken-for-granted. Only when they were asked again and again about the particular nature of the tools they use, were they able to articulate a preference towards the object-oriented techniques and the increased modularity that they seem to accommodate.

The respondents expressed the conviction that the notion of "modularity" lies at the heart of the way the software programming activity is enacted and organized today. The modular techniques of software development (the *structured* and *object-oriented programming techniques)* enable the independent construction of various modules which jointly produce a particular system or software application (these modules are small sub-programs which can be developed independently and are then combined together to formulate a software application addressing the needs of a particular business task). To clarify their argument, the interviewed contractors chose to juxtapose the modular programming techniques with the non-modular or unstructured programming languages (in which all code is written as a single continuous block of instructions that is difficult even for the same programmer to separate, detach or even distinguish (Voutsina *et al.*, 2007).

*"Unstructured programming can be a real art. The way the programmer conceptualizes and fits all the pieces of the code together remains to a great extent something that escapes explicit verbal articulation and adequate justification. If the programmer who writes the code is really gifted in his/her craft, the result could be described as a masterpiece. Yet, maintenance of such a program is a major challenge for even the initiator of the program, let alone the allocation of parts of the work to geographically dispersed agents or the transferability of parts of the code across different implementations. The different parts of the code are so entangled that the resulting application can only be handled as an en bloc artifact. We could never work as contractors if we had remained faithful to the principles of unstructured programming."* (developer no.27, table 1, appendix)

According to the respondents' testimonies, the contracting work practices seemed to be intertwined with certain qualities and attributes that the programming languages displayed. Words and concepts, such as *"modularity", "decomposition", "re-usage", "re-combinability of different parts of the code", "transferability of ready-made parts of the code", "low interdependence", "high interoperability/compatibility between the various parts of the code"*, etc. seem to dominate IT freelancers' discourse.

At the beginning of the interview the respondents talked about both modular processes of building software (structured and object-oriented programming) as being more or less identical regarding their impending implications upon the work practices. *"Although each IT solution generated is highly specific and tailored-made to the needs of the particular client, existing lines of code have always been re-used in our craft, irrespective of whether this is a subroutine, a function or an object. You can make use of similar functionalities and achieve equivalent results no matter what technique you will employ."* (developer no. 30, table 1, appendix). However, as previously discussed, in their attempt to explain how they perform their jobs, they kept using terminology borrowed from the Object-Oriented programming realm (they were talking about classes and objects) and rarely terms stemming from the legacy of the structured programming vocabulary (e.g. they didn't really talk about processes or functions).

Before I present the respondents' views and stated experiences about a potential relationship between work practices and alternative programming tools, I seize the opportunity to provide a short definition of the two modular approaches to software programming. On the one hand, *Structured programming* aims at the detailed functional or logistical description and decomposition of tasks and operations, by focusing on the way information (data) flows and is processed step-by-step (DeMarco, 1978; Yourdon, 1989). On the other hand, *Object Oriented (OO) programming* rejects the decomposition of a system into processes and data flows, and instead draws attention to the decomposition of a system into independent interacting objects.

Both programming techniques were developed according the axiom of modularity: every application or large scale program had to be broken down into smaller components which could be constructed independently. Once developed independently, the components could then be combined to form the particular software application. As previously stated, when the IT contractors were initially asked, they didn't seem to explicitly articulate any particular difference between the two programming paradigms. Yet, when they were asked to provide some examples of particular projects they had undertaken and the technical way they had pursued them, they used object-oriented terminology. Consciously or not, they seemed to choose and deploy the Object-oriented programming tools.

The most straightforward way for them to explain how they perceived the practical difference between the two programming techniques was to draw charts which depicted the architecture of the system under construction. Each chart would represent graphically how the data and processes are manipulated by the rationale of each programming language in order for a particular application to take place. They drew a hierarchy and a network.

"*An easy way to understand the difference in the conceptual and organizing principles of each programming language would be to think of the difference between the organizational structure of hierarchy and that of the network enterprise. On the one hand there is a vertical chain of communication and command between the diverse elements of the system. These elements are linked*

*together by relationships of subordination or superordination. On the other hand, there is interconnectivity among independent and usually equivalent nodes of the system which are linked together through intersecting channels of communication."*

In the case of structured programming languages, the problem (overall task) is decomposed into sub problems (subtasks) and the sub problems into smaller problems, and so on, down to the level of very simple functions. The corresponding graphical charts which are called *"flow charts"* show how the information flows sequentially and step-by-step from one process to the other. A new process begins only when all the preceding processes have been fully completed. Sequential and thorough descriptions of how data flows from one process to the other constitute the very essence of structured programming.

*"Even when I had to write the code for very similar applications with slightly differentiated characteristics, I had to write the whole sequence of instructions from scratch. Even when most of the instructions remained the same, but some of them needed to be omitted or some of the steps needed to omitted, a great part of the code had to be re-written from scratch. In other words, in structured programming, a small differentiation or change implies the emergence of a completely new scenario of design which needs to be depicted anew. Each scenario corresponds to a unique flow chart. It could be argued that structured programming treats different scenarios as different systems; to simplify a little bit consider the following example: how many scenarios could you possibly consider for the very same application? Probably dozens. That means it would be necessary for you to draw dozens of flowcharts. Or if you tried to depict all the cases in just one flowchart, it would be so complicated that it would be impossible to be read. In other words, such an endeavor tends to be time-consuming and could possibly lead to a farrago of slightly differentiated cases which one cannot really make sense of. But in the world of contracting, clarity and accuracy, efficiency and strict time-management matter. And they matter a lot."*

The respondents emphasized the fact that the dimension of time was considered a critical factor in their work. The high fees they were charging were directly associated with the development of efficient software solutions in very short periods

of time. "Client-firms hire us because they want to do the job quickly and efficiently. The establishment of a good bridge of communication between us and the project-manager, a clear representation of the problem to be modeled and a relatively enhanced re-usability of already made parts of the code could imply for us great savings in terms of time and effort".

As already discussed before, the re-usability of already made parts of the code and the independent construction of some software modules have always been feasible in the realm of structured programming. This was the very essence of modular programming from the very first moment it was initiated. Yet, the strict sequentiality and the interdependency of the diverse steps of the software development process restricted the benefits related to the possibility of re-using parts of code. "*We could definitely use again and again the same function to diverse kinds of applications. Yet, our attempt to link every time this specific function with other functions and specify their temporal and data-sensitive relationship would mean for us to re-write the biggest part of the code almost anew.*"

Furthermore, due to this sequentiality and path-dependency inherent in structured programming, the assignment of different parts of code to geographically dispersed or independent agents could possibly conceal significant dangers. The most experienced of the respondents who had participated at various instances of their career in a variety of projects and work teams emphasized the fact that no matter how clear the specifications for each part of the system are, when the different parts come to be integrated into a consistent whole, great discontinuities arise and breakdowns occur. And this is not something which is due to the lack of good design principles and bad coincidence, but a regular, inherent property of software development.

"*Integrating independently constructed parts into a large scale program can often become a nightmare under the logic of procedural programming. Detecting where the problem lies can turn out to be an never ending process, since the output of some functions can be used as input into other functions. But even if the origin of the problem is detected, its rectification can be quite costly in many ways. For instance, once the problem has been identified, changes need to be done and the question that*

*arises is who is going to change this work product and invest more time and effort to produce a new one. The engineers involved insist on the correctness of their personal contribution and the new allocation of work is sometimes the result of politics and power relations among the different team members. I have quite a wide range of stories to recall regarding the integration of large scale systems.*"

Commenting on the conditions surrounding collaborative work and distributed work settings, the respondents mentioned explicitly that a safety net against the aforementioned problems could include the contractor's ability to "seal" his/her effort allocation, circumscribe his/her area of responsibility and thus protect his/her reputation.

"*Only when you are in a position to manipulate and control fully the behavior of the project you are assigned, you can effectively manage your relationship with the prospective and current client-firm. To be able to do that implies that the result of your work is rather independent of the work of other engineers. For instance when you are using resources and inputs commonly used or originated by other people's work, when a problem or a "bug" arises, it is really difficult to say who is accountable for what. And such a fuzziness could even deprive part of the payment you were eligible for. Therefore definition and control over your behavioral variables is also something which needs to be taken under serious consideration.*"

Aligned with the above argument, remarks by IT contractors seemed to support the view that the Object-Oriented programming generated as a post-evolution of the structured programming which could provide –at least to some extent- legible answers to the above puzzles surrounding the software development process.

"*I consider myself as an excellent programmer. I can develop for you really effective and reliable programs using either of the two approaches to programming. Before the extended diffusion and acceptance of object-oriented programming, I can ensure you that even in a structured environment I could find similar ways to organize my codes closely related to the very logic of object and class construction,. I had managed to create a kind of structure quite similar to the one found in the typical object-oriented structure. Yet, this was up to my personal intention and disposition.*

*Other developers didn't work like that. And when I had to participate in big collaborative projects, the problem of interdependency between the work of different programmers was still there. No matter how "tidily" I had learned to develop and manage my code, the dependency of my work upon other programmers' work was still high."*

But let's try to clarify a little bit what the respondents were talking about. As previously stated, object-oriented programming rejects the functional decomposition of tasks, prioritizing the organization of the system into interacting independent entities or "objects". These objects are semi-autonomous modules which comprise both information and behavior, thus being conceptualized to reflect physical objects in the real world.

"*What is interesting about objects in the real word is that the very same object, displaying a variety of attributes and behaviors, can selectively enact different roles according to the particular setting it is called to act upon. Similarly, a software object encompasses a variety of functions and data and can provide different responses to different requests. When I want to graphically map a system consisting of the interaction of three objects, instead of treating every single combination of possible actions as a different scenario (which needs to be depicted distinctively) I just have to define the three objects and the relationships among them. The same object can return a different value according to the kind of information the other object asks for (like in the real world, independent entities are linked to each other through the exchange of messages). As a natural corollary, the graphical representation of the system tends to become more clear and manipulable. The complexity of the system is not really diminishing but it is represented in a more understandable way.*"

Many respondents also noted that the Object-oriented design is more user-centric. The objects themselves reflect particular user-cases and the linkages between them reflect particular business scenarios. Relying upon the object-driven charts, the contractors expressed the belief that their communication with the clients seemed to have been somehow facilitated. The respondents felt more self-confident in perceiving and understanding the structure and the overall logic of the system under

construction. "*Given the fact that most of the time, we do not have any prior acquaintance with the client-firm, the creation of a common ground of understanding and the use of a relatively common vocabulary is critical for the timely and successful development of a software application.*"

Furthermore, the interviewees' responses seemed to revert again and again to the concept of encapsulation, a fundamental concept of Object-oriented programming. The contractors underlined that through the axiom of encapsulation (encapsulating both data (i.e. attributes) and functions (i.e. methods) into the very same object), the modularity of the systems under construction has been significantly enhanced. And enhanced modularity among the diverse components of the system meant easier transferability of the components across different kinds of applications and contexts.

"*For instance, the "log into" function to a system, or the "basket" application found in commercial websites supporting on-line transactions are typical independent entities which have a life of their own. We call them "buttons". They have all the information and the processing capabilities they need to execute particular tasks. You just press the button and you receive a particular answer without being interested in how this answer-output has been calculated. This button is treated by the rest of the system as a black box and is linked to the overall system through the exchange of messages which call the execution of the task the button or the object is designed for. This button can be attached or detached to a new system, leaving completely intact the overall functionality of the system.*"

Although contractors assured me that the reality of software programming is much more complex and obscure, they decided to illustrate the above example in order to emphasize the increased level of modularity brought about by the use of Object-Oriented programming. Additionally, this possibility of modularity is directly related to the development and preservation of "libraries" (the notion of the "library" refers to a collection of sub-programs or parts of code which can be used iteratively in the construction of software programs). The notion of the "library" is not new in the IS community, since the programmers have also created and used "libraries" alongside the structured programming techniques. In this case, the "libraries" consisted of functions which could be re-used in different kind of

systems, sharing each time a data set prescribed by the particular problem (in structured programming all the functions of the system have access to the same pool of data). In contrast, the "libraries" created for object-oriented languages consist of objects which can encapsulate both data and functions and can be introduced "intact", as "a whole" to the different kinds of systems or applications.

"*Combining ready made components, which have been tested again and again and have been proved to be reliable, provides us the opportunity to come up with reliable software solutions timely and efficiently. Taken as granted the fact that a)the prices we charge as contractors are at least half of the price that a software house would charge and b) that the completion period of the projects we undertake is quite short, it is easy to deduce the urgency of using ready made components. We could never earn our living out of subcontracting if we were not able to re-use extensively a range of ready made components, equally applicable to different software applications and contextual settings.*"

Additionally, my respondents insisted that although object-oriented programming could be conceptualized as a network of interacting autonomous nodes, each node had hiding behind it a carefully structured hierarchy of objects which also falls under the logic of subordination and superordination. But in this case of hierarchical structure, the logic of classification reflected the idea of grouping similar kind of things into classes which are subsets and supersets of other classes. And this conceptualization of hierarchy seemed to have tremendous impact on the process by which IT contractors produce slightly differentiated applications, addressing the needs of different client-firms.

"*Each object is a particular instantiation of a class, which defines the general attributes and behavior of the object. Diverse objects which belong to (i.e. are classified under) the same class all have some common attributes and behaviors (the ones which they have inherited from the mother-class), but they differ substantially on the way they enact their behaviors according to the different values of attributes. Once you have defined an abstract class which is quite general and encompasses a wide range of cases or scenarios, then you can move on to the easy construction of specific objects which address specialized organizational needs. Since the class*

*inherits automatically all the attributes and methods to its deriving object, the programmer constructs the object (whose particular instantiation will be specific for the particular software application), by writing code only for the extra attributes and behaviors which differentiate it from its class. Maintenance and alteration of the existing applications becomes easier and the production of new, diversified applications gets significantly simpler.*"

The contractors' libraries contained both abstract classes -which have been used as blueprints for the creation of objects-, and specific objects- "buttons", -which have been small sub-applications ready to be used and transferred across contexts-. Most of the contractors mentioned that they have created their own libraries of abstract classes/objects, or they have used libraries available on the internet or libraries provided by particular technology vendors. Their aim was to build upon these abstract and wide platforms (classes) with some more specialized sub-platforms (sub-classes or objects) which would deal with more concrete and more narrow organizational problems. These sub-platforms are also abstract (they can accommodate a wide range of problems), but are still much more focused to the framing of a particular category of problems. At the same time, IT contractors who have already built these sub-platforms (i.e. the more specialized kind of "tools" ready to be used) are much more competitive in comparison to other IT engineers or software houses.

"*The whole philosophy of modular programming (which finds its most representative version in the Object-oriented programming) and a steady pillar of IT sub-contracting is how you proceed from the general to the specific, how you proceed from the abstract to the less abstract and concrete and the extent to which you can standardize this process at your own benefit. But let me be more specific. The easiest way to talk about these issues would be the following: you can find in the market some off-the-shelf packages about managing your customers business partners, or ERP packages, etc. These packages are quite general; they are said to prescribe particular rules of modeling and conceptualization which are not always easy to follow and adequately adjusted to the rich tapestry of organizational contexts. If we assume that an IT contractor has extensive knowledge of a particular business sector (s/he is thus excellent in the modeling of the prospective business*

*problem) and an excellent knowledge of a particular off-the-shelf package (e.g. SAP), s/he can adjust this knowledge (exploit in the best possible way the technical possibilities and functionalities enabled by the use of the package ) so as to accommodate almost all the possible scenarios of action met in that particular sector. For example, a particular business process in a typical organization belonging to a specific industry can comprise 2 to 20 steps according to the complexity of the activity involved. Once the contractor has adjusted the particular off-the-shelf package to the specific needs of a particular industry and then s/he has standardized the development of alternative scenarios of use, s/he is capable of very quickly producing similar applications for a great variety of organizations. A large part of the code stays the same and only a small part is written from scratch - that part of the code which is responsible for the observed difference in the final result."*

The IT contractors informed me that once they have well defined abstract classes, and once they have successively narrowed them down to the corresponding sub-classes and specific objects, then they create a rich portfolio of n-dimensional and flexible software components or tools. These tools are ready to be used and can be transferred "intact" (i.e. "as a whole") in a multiplicity of applications and across different organizational settings. And given the clarity which governs the combinatorial rules among the different components of the system (through the exchange of messages), the resulting number of possible application projects undertaken by the very same individual (that is, the IT contractor) is raised considerably.

Finally, the respondents emphasized the new possibilities of collaboration and division of labor brought about by the use of object-oriented programming in the development of large-scale projects. Given the fact that a) each component of the system is an integral and semi-autonomous entity, which is programmed to perform functions specific to itself and using its own data, and b) the interaction among the diverse components of the system is reduced to the most elementary and straightforward level, simultaneous and collective development of different parts of the system is strongly facilitated.

Software programs built upon the logic of object-oriented programming are relatively easy to communicate and understand, since there is a specific degree of accountability to the diverse components of the system-objects and the interaction among them is kept to a minimal degree of complexity. On the one hand each object has a specific level of responsibility and if something goes wrong, one does not have to worry about tracking down every line of code that might have changed a specific attribute. Instead s/he has to look into the very structure of the object that controls the specific attribute. On the other hand, the design of simple interfaces, which allows the interaction of independent objects through the simple exchange of messages, paves the way for the clear allocation of different parts of the system to geographically dispersed agents. Both the aforementioned conditions have significantly facilitated the integration process of large-scale systems - a great concern in structured oriented programming languages.

It is worth noting that contrary to the contractors' relative difficulty in consciously distinguishing between the two modular programming languages in terms of the properties of modularity and transferability enabled by each language, the acknowledgement of the Object-oriented environment as the excellent collaborative platform was instantly and straightforwardly articulated by all of them.

"*As long as the project manager has allocated the work which needs to be done among us and the specifications of the interfaces have been carefully negotiated, each one of us can start working on his/her own sub-project alone, independently of the rest members of the team. After completing the various components, we bring all the separately developed parts together, avoiding all the typical problems traditionally related to the phase of integration. Each person's work is completely independent from the work of other people, a condition which makes detecting dysfunctions quicker and attaining changes easier*".

6.4.2.1 Conclusive remarks

The programming action becomes knowable, visible and shareable in new ways.

-OOP languages seem to support the IT engineers more substantively in their attempt to get familiarized with firm-specific knowledge.
It shrinks/diminishes the gap between "no prior acquaintance with the client-firm" and "struggle for the development of highly specialized applications".
-OOP languages displays better representational power than structured programming languages. The way the programmer is thinking is more closely related to the way the manager is thinking, because the basic units of the OOP are abstract entities with identical or similar characteristics common to the physical entities in the real world. Therefore, the base of communication becomes more solid and concrete. This enables the programmer - at least to some extent - to escape from possible misunderstandings and bridge in a more efficient way the conceptual gap which stems from the lack of familiarity with the particular organizational context of the client-firm.
-The possibility of adjustability and flexibility of the software is enhanced (even if a wrong estimation or comprehension is made, there is always the option for change and adjustment. This change or adjustment does not usually imply tremendous costs for the project.
-OOP techniques allow more extended re-usability of ready made components of software or parts of the code than structured programming techniques do. The final application for each is distinctively differentiated and unique, but the structural components may be the roughly the same or similar among a great variety of applications.
-Enhanced possibilities of extended emphasis and attention to the configuration of the business requirements. Occasionally time is equally spent between understanding what is needed to be done and developing the required solution
-More frictionless division of labor and coordination of work to locally dispersed agents with no prior acquaintance with the firm or among themselves. Less coordination is needed.

Yet, what is crucial to mention is the fact that when the respondents were asked to compare the two programming techniques, they avoided comparing them directly. They always talked about a different mindset, a different way of looking upon reality, a different way through which knowledge is fabricated and structured.

They commonly acknowledged that one can use both techniques to achieve similar kind of results. "*The perceptual segmentation of the features of the problem domain is a completely different operation for every single programming realm: it is a question of how the programmer tries to map the reality and sees the world*".

Interestingly enough, different age groups displayed a slightly differentiated stance towards the two programming techniques. For the young interviewees there were only the Object-Oriented programming techniques - the structured programming languages seemed to be out of question, since they never really needed to use them. The older respondents had experienced the transition from one language to the other; they did not explicitly reject the structured programming but they mostly preferred to use the OOP vocabulary when they were asked to talk about their work practices.

# CHAPTER 7: ANALYSIS

## 7.1 Introduction

The current chapter endeavors to articulate an analysis of the respondents' recounted stories and viewpoints. It seeks to illuminate the conditions which are potentially involved in the diffusion of non-standard employment arrangements in knowledge-intensive sectors of the economy. In addition, this chapter aspires to provide some answers to the concerns raised by the literature in regard to the inherently controversial character and great diffusion of non-conventional employment patterns of knowledge workers.

In particular, the analysis of the narrative aims at disentangling the bulk of empirical data and thus unpacking the complexity which characterizes the contracting practices of IT knowledge workers. The maintenance and diffusion of the aforementioned practices is not a straightforward process; dysfunctional ties and inefficiencies can potentially be traced because of the asymmetries which underlie such an employment arrangement. Therefore, an investigation into the emerging dilemmas and possible controversies is the starting point of the current analysis. In this sense, the applicability and plausibility of the assumptions that were initially introduced by Goldthorpe's (1998) theoretical framework (i.e. the assumptions of "difficulty of monitoring" and "asset specificity") are implicitly tested against the background of the stories provided by respondents.

The analysis of the empirical findings seeks to provide some answers to the following theoretical concerns:
a) If we take for granted that knowledge work is positively related to its lengthy embeddedness in a particular organizational setting, how can we then explain the provision of specialized IT services on a spot basis? What are the components of this knowledge that make it specific to the firm and at the same time transferable across organizational contexts? b) If we assume that knowledge-intensive work resists managerial rationalization and supervision, how can the interests of the

client-firm and the contractor be aligned? Are there any alternative mechanisms that prescribe certain behaviors and safeguard the balance of the asymmetrical employment relationship?

The analysis of the findings suggests that an attempt to comprehend contemporary IT freelancing practices brings us against two sets of considerations: a) the way the functional base of the work is currently organized, and b) the socio-economic edifice and organizational surroundings that frame the meaning of work and support the actual practice of this work.

It is worth noticing that in contrast to much of the sociological literature on technology which is interested in failure, the current thesis studies the "success story" of the contingent relationship between IT contractors and their client-firms. Much of the constructivist studies of the technology focus on "things that don' t work (p.300) problematizing –indeed overlooking- the idea that 'working' is socially constructed (footnote 21)" (Constant II, 1999; Law and Singleton, 2000, p. 770).

The structure of this chapter is organized accordingly: Section 7.2 presents the functional base of the IT work; the way programming tools and software methodologies are conceptually organized and practically involved in the production of IT goods and services. Section 7.3 describes the economic and social edifice, as well as the organizational dynamics which underlie the context within which the employment relationship between the IT contractor and his/her client-firm is embedded.

## 7.2 The functional base of the IT work: programming methods and programming tools

It has already been suggested that a potential explanation for the sustainability and diffusion of the relationship between the client-firm and the IT contractor might lie in the very way the latter performs his/her work; the recounted stories appear to

attest to a correlation between the functionalities embedded in the programming tools employed by the IT contractors and the practice of freelancing.

In describing the realities of their working practices, the IT freelancers identified the following conditions as inherent features of IT contracting. The freelancers' capability to adequately fulfill their role and effectively accomplish their work was strongly influenced by two conditions: a) how effectively the freelancer could operate as a member of a larger working team with which s/he had no prior acquaintance, and b) how effectively s/he could serve the shifting and not always easily discernible needs of a great variety of existing and prospective customers (client-firms).

On the one hand, the contractor's potential to participate effectively in large teams was considerably determined by his/her ability to maintain his/her work independence with regard to other people's work output. This would necessarily imply that the work project can be broken down into independent sub-parts which in turn can be easily allocated to different individuals (i.e. the axiom of *modularity*). Independence among the various constituting parts of the project, and subsequently among the individuals who perform them, signifies clearer allocation of responsibility, easier accountability and a more effortless correction of emergent problems. As long as the decisions made and the changes required can be localized to a particular module or sub-task - leaving intact the rest of the system - savings in time, effort and efficiency improve greatly.

On the other hand, the contractor's potential to sufficiently meet the shifting needs of a great pool of client-firms appears to be related with three capabilities: 1) the capability of *re-using* already made parts of the code as such, 2) the capability of easily *adjusting* or building upon already made parts of the code; for example, whenever the project's requirements change or whenever the requirements among diverse client-firms are different, the contractor can selectively employ and adjust parts of the code which had been developed in the past for other uses, and 3) the capability to clearly *communicate* the project's functional characteristics to the prospective client-firm – how the functional characteristics of the software application will serve the business needs.

A closer scrutiny of the respondents' discourse strongly suggests that the aforementioned conditions appear to be closely intertwined with the particular features and technical functionalities embedded in the programming techniques and tools used by the contractors. Rather that being accidental, the respondents referred to the extensive use of "n-dimensional tools", "flexible tools" – that is, tools which display a significant degree of malleability and thus can be accordingly adjusted to the specific needs of each customer and the particularities of each IT application.

The analysis presented in the current section aims at revealing the potential link between the programming tools employed by the contractors and the facilitation of freelancing practices. To do so, it will focus on the theoretical assumptions which underpin the cognitive organization of alternative programming techniques.

### 7.2.1 The axiom of modularity: independence and re-usability

The respondents repeatedly mentioned that modular programming and the functionality embedded in it constitutes a fundamental pillar of IT contracting. They alleged that their working practices are closely intertwined with the technical feasibilities triggered by the use of specific programming tools. As already presented in the previous chapter, the respondents deliberately juxtaposed modular programming techniques (structured and object-oriented programming) with non-modular, unstructured methodologies, in order to highlight the significance of modularity for the activity of software development.

The respondents emphasized that the "GOTO" programming languages, an unstructured method of software development, is directly associated with greater zones of ambiguity and vagueness in comparison to any other kind of structured or modular programming. Although any kind of software programming language is cognitively organized around explicit rule-based combinations of standardized digits (0 and 1), the possibilities of reproducibility and controllability of unstructured programming are significantly lower in comparison to the possibilities provided by modular programming. The different parts of the code are so tangled-up and interdependent that it is quite difficult for even the very same individual initiator

of the program to make sense and manipulate it accordingly. The above problem becomes more acute if one considers that complexity is an inherent property of the software output and the different components of the code always interact with each other in a non-linear fashion (Brooks Jr., 1987). The more tangled up the components of the program are, the more non-linear and unanticipated interactions among these components will become. It is thus plausible to assume that managing and maintaining a single and continuous block of code is a particularly perplexed activity, which renders the joint production of software practically impossible.

It is a common belief that freelancing and collective (group) work can be considered as two sides of the same coin. A highly-skilled IT contractor is expected to bring into the client-firm the knowledge that the firm lacks. S/he is usually asked to accomplish a highly complex technical task which the in-house employees are not in a position to undertake. To do so, the contractor is called to participate in working teams, undertaking a small part of the bigger project or being assigned the full completion of a smaller autonomous project (e.g. developing a small application or upgrading an exiting system). In both of the cases, the highly-skilled contractor often contributes partially and in a piecemeal fashion to the production process of the software and most importantly s/he is expected to coordinate and align her/his actions with the actions initiated by other individuals. But in order to achieve efficient coordination and alignment of individual activities, relative independence and a clear division of labor among the various phases of the production process need to be primarily applied.

In other words, it appears that it is the principle of modularity which paves the way for the development of highly sophisticated software solutions and large scale projects, assigned to a multiplicity of independent actors. *Modular programming* entails the breaking of programs and systems into smaller components which can be constructed independently from one another and can thereafter be recombined in order to make the overall system work. Alternatively, reliance upon the principles of modularity implies better *maneuverability of complexity,* which constitutes an inherent characteristic of software development, and increased *transparency* of the interactions among the various components of the code.

Both structured/procedural and object-oriented (OO) methods have been recurrently employed in the past by mixed working teams (i.e. teams constituted by both permanent employees of the firm and external contractors) in order to produce large scale software systems. Both approaches to software development draw upon the axiom of modularity. They are distinguished by their commitment to maintain a low degree of inter-module coupling and a high degree of intra-module cohesion. They thus ensure that each module, either as a function or as an object, is an internally coherent and solid unit which can be easily attached to or detached from the overall system (Sommerville, 1999).

More precisely, each one of the two aforementioned programming techniques organizes its structural components in a different way and follows its own logic of classification. Structured programming breaks down the system into discernible functions and sub-functions, while Object-Oriented programming breaks down the system into abstract classes and objects.

The straightforward advantage or perceived utility in applying this sort of classification can be described as such: firstly, the same part of the code (a function or an object) can be easily tracked and used repeatedly, just by calling its name and without it being necessary to write it from scratch (the very logic behind the notion of subroutine). Therefore significant amounts of effort and time are saved, while the possibility for mistakes is reduced. Secondly, diverse individuals participating in the project can simultaneously work on the assigned tasks, and therefore the overall completion time of the software task is reduced considerably.

It is worth noting that at the beginning of the interviews the respondents talked about structured and object-oriented programming techniques as being equivalently useful and equally usable. They affirmed that good programmers could achieve high quality results using either of the two techniques. Both techniques allow programmers to develop various parts of code independently from one another and

to re-use parts of code; the two fundamental conditions of freelancing could thus be sufficiently met.

The respondents emphasized the fact that no matter how specialized the IS application assigned to them may be, the re-use of existing lines of code, regardless of whether for a subroutine, a function or an object, is a necessary condition for delivering high-quality services under strict time frames and at competitive prices. All of the informants noted that the prices they charge are more or less half of what big software houses charge for the same type of work. While the time frames within which they are asked to perform tasks are considerably narrow; contractors are hired to do what the permanent employees cannot do in terms of expertise, time and efficiency. Increasing competitive pressures and market volatility have rendered the dimension of time (i.e. how quickly an organization can launch a new product or service so as to capture an emergent trend in consumers' needs; or how quickly an organization can adjust to the shifting market profiles) one of the basic 'enablers' of competitive advantage. Therefore, the IT freelancer's ability to re-use already made software components is crucial for the provision of cost-effective and timely IT services for a wide pool of client-firms.

Interestingly enough, whenever the respondents were explicitly asked to compare the two programming methods, they presented them as being identical in terms of functionality and possibilities of action. Nevertheless, as the discussion proceeded, they tended to display a kind of indirect and semi-articulated preference towards object-oriented programming techniques. Whenever they were asked to give specific examples to illustrate their programming practices, their discourse appeared to be largely dominated by the object-oriented programming vocabulary.

In an attempt to explore the respondents' semi-conscious preference towards the object-oriented programming method, I opted to look more closely into the cognitive organization of each programming technique. I endeavored to understand how the use of particular tools might be associated with freelancing work practices. Is there indeed a significant difference in the way each modular technique codifies

and cognitively organizes its constituting knowledge components? And if this is so, could the cognitive organization of the inner structure of the programming techniques account for the facilitation and diffusion of freelance practices?

### 7.2.2 The cognitive organization of programming tools and methods: towards a process of codification

Each programming technique arranges and organizes differently its structural elements and, subsequently, it produces different conceptual maps and levels of standardization. First of all, there is a clear distinction between the way the programmer conceptualizes and makes sense of the program, and the way in which the program operates to execute the predefined, codified instructions underlying the performance of a specific task.

As far as the execution of a software program is concerned, every single sequence of instructions is translated into a unique combination of binary coding (0 and 1) and consequently it is syntactically and semantically differentiated. Every software program operates under the assumption of "*frozen signification, fixed one-to-one correspondence and clear-cut and finitely differentiated semantic units*" (Kallinikos, 1996). Two different syntactic units can never refer to the same semantic unit. Two different combinations of 0 and 1 can never correspond to the same instruction. Whatever is presented as semantic content is indeed another syntactic notation that seeks to fix or agree upon the content it describes (Simon, 1977). The 'meaning' of each instruction - the particular operations which need to be performed - is always translated to a unique stream of machine code, identifiable by the computer. Therefore, the software program, irrespective of the particular characteristics of the process by which it is produced, remains largely the result of a highly codified process. Nevertheless, there is a great difference among alternative approaches to software development with reference to the way the developer makes sense of the various components of the system and manages the ambiguity related to the management of these components. In that respect, the two prevalent modular techniques of software development, the structured and object-oriented approach, are significantly different.

**Making sense of the code: Capturing and encapsulating ambiguity**

Any process of classification is itself a method of standardization since it ends up imposing a degree of homogenization that renders the particular individual differences irrelevant and rather insignificant (Bowker and Star, 1999; Townley, 1994). Deciding upon what is important and what is not, judging what is fundamental and what is inessential, thinking to what extent something is supplementary or contradictory to something else, is the first step of rendering oneself able to understand and manipulate a set of relations that otherwise would have remained closely interwoven and practically unexploitable. The explicit articulation and verbal manifestation of the knowledge which underlies and guides the aforementioned decisions, constitutes *a first order codification of knowledge*. As long it can be depicted in writing, commonly accepted and openly shared, the rationale which governs the classification process - i.e. the establishment of firm criteria and clear rules about how to distinguish the fundamental from the inessential - transcends the limits of the particular and acquires the form of standardized knowledge.

What is worth noting is that there is a great difference in the practical implications brought about by alternative methods of classification. The rationale underlying each method of ordering and categorization may draw upon a different mental logic and imply different courses of action. The process of negotiating "what aspects of information systems (systems development) should be formalized and embedded into information artifacts and what aspects human actors should carry out" (Sørensen and Snis, 2001, p. 96) is a particularly complex and disputable process.

As already stated in Chapter six, structured programming relies upon the functional decomposition of the project under completion (DeMarco, 1978; Yourdon, 1989). The overall project is broken down into a hierarchy of sequentially executable functions and the data is carefully separated from the functions which are supposed to manipulate it. Taking into account that several functions have access to the same pool of global data, it would be reasonable to assume that a function might

mistakenly modify data that is outside its scope or contribute to the corruption of data prospectively used by other functions. This phenomenon is characterized as a "side-effect" and makes the behavior of the final software application more difficult to predict.

The overall quality of the generated solution is contingent upon the depth of knowledge the programmer possesses regarding the programming techniques and the overall structural formula - the coupling possibilities and coherence of the system. It is up to the programmer to decide what kind of function has to be developed and what type of data and input values need to be used Yet, even if the programmer performs everything by the book, the final outcome still remains significantly vague. The inherent complexity and uncontrollable interactions and interdependencies of diverse components that share the same pool of data render the prediction of the final result rather ambiguous.

The aforementioned problem becomes more acute when multiple engineers are involved in the development of an IS system and jointly use the mistakenly modified or corrupted variable or data. In this case, it is almost practically impossible to track the source of the problem and put the blame on the responsible agents. Yet, in the IT contracting industry, being able to manipulate and control the behavior of code you are accountable for is of utmost importance. The quality of the employment relationship between the IT freelancer and the client-firm, as well as the freelancer's future employability, are highly dependent upon the ability of the employee to prove that s/he has done everything "by the book" and any potential problem or mistake should be attributed to another person. Contrary to the notion of accountability of the technical work, which refers to refers to the organization of the work in such ways so as to become visible in the course of its production[3] (Button

[3] "accountability is part of a business administrative terminology, implying, and referring to institutionalized audit, documentation and certification mechanisms and technologies of managerial control and intervention" (Eriksén, 2002, p. 177; Mathiassen et al 2000; Woolgar 2002).

and Sharrock, 1996; Button and Sharrock, 1998), the contractors' accountability referred to their ability to render visible the result of their working effort.

In this respect, the IT contractor's ability to account for the robustness of his/her developed solution tends to be better supported by the functionalities offered by the object-oriented programming tools. In object-oriented programming languages, the data (attributes) and procedures (methods) are encapsulated within a single independent entity, the "object", whose internal structure remains a black-box to the rest of the system. This is the *information hiding* principle (Parnas, 1972). Data can only be manipulated by the specific methods which are meant to manipulate them. The objects simply communicate the results of their operations, ensuring the largest possible independence and distinctiveness from the overall system (Mathews, 1996). As a result, the individual programmer's work output is rendered more controllable and increasingly distinguishable within the overall production process of the software.

The respondents drew attention to the fact that the increased modularity and independence of the constituting components of the system under completion favor the sustainability and well-being of the contingent employment relationship. Since the client-firm cannot really control the way the specialized IT contractor is doing his/her work, it is important for the firm to assign to the contractor a relatively concrete portion of the work, whose outcome is discernible.

Furthermore, not only are the interests of both parties in the contingent relationship better served, at least to some extent, but also the possibility of "side-effects" related to the overall quality of the software is diminishing. Thanks to the *information hiding* principle (Parnas, 1972), objects encapsulate discretionary and transient decisions and minimize the possibility of unanticipated interactions between different parts of the code, through the maintenance of carefully negotiated and stable interfaces. The behavior of the system is thus rendered relatively more predictable and the inherent complexity underlying its overall functioning is more efficiently managed.

Thereupon, even when the contractor is working alone, the controllability over her/his work product (which is further linked to her/his reputation and possibilities of further employability) appears to increase substantially. S/he does not really have to worry about wrongly linking data with functions or incorrectly modifying data. Once s/he has created the particular "object", s/he does not have to worry about how s/he will make the "object" function in a particular way. S/he just has to call or invoke the behaviors of an object by sending a corresponding message. In other words, the possibility of a "side-effect" decreases, since the IT engineer asks the object to perform an operation which is specific to itself, by using its own data.

It could be argued that experienced and gifted programmers could always develop and classify the different parts of the code in such a way as to enjoy the most controllability over them, irrespective of whether they were employing structured or object-oriented programming techniques (Luker, 1994). Nevertheless, in object-oriented programming, the process followed by the programmer to build a system tends to become, at least to a certain degree, more standardized and uniform. It acquires a universal character which expands beyond the individual agent's personal conceptualization and the idiosyncratic characteristics of the specific software application. In other words, the cognitive organization of object-oriented languages calls for *a second order codification of an already consolidated knowledge.* This knowledge is embedded within the rationale underlying the essence and functioning of the object and is represented by the following: a) the correspondence between methods (behaviors) and attributes (data), b) the uniqueness of the identity of every particular object, and c) the possibility of exchanging messages as the standard way of communicating and connectedness among objects.

The way by which objects are internally structured and externally connected to each other is substantially standardized and can be indiscriminately applied to every kind of software application. All the objects, irrespective of their aim or identity, display an identical structure (data and methods encapsulated together in a single object) and communicate with one another through the exchange of messages. But this

possibility of exchanging messages signifies the conversion of knowledge into distinctive and manipulable pieces of information which may be processed accordingly. It is a process of knowledge codification (Cowan and Foray, 1997).

More precisely, the very same message will be processed differently from diverse subclasses of the same class according to their unique identity (*polymorphism*), denoting a predefined and codified process of selection and appropriateness. in each case of message exchange, the appropriate method will be "automatically" selected according to the particular type of object. The process of selecting the appropriate method on the basis of an object's type is called *binding* (Bordoloi and Lee, 1994; Yourdon, 1994).

Alternatively, the methods of each subclass will be separately enacted in the specific "context" of the particular object. Therefore two objects that display exactly the same output to a predefined message can only be the same object. In terms of semantics, the "meaning" of each object response is unique and univocal. Contrariwise, the "meaning" and the response (or output) of a function may vary according to the data used and unanticipated factors.

These contingencies are related to subsequent interdependencies and possible unplanned interactions among different components of the code. For instance, even if the function is correctly written, the use of mistakenly modified or corrupted data could result in wrong calculations.

In other words, a part of what has previously been tacit knowledge: a) the functions that link to particular types of data, and b) the specific data the function should manipulate, is already codified and embedded into the very notion of the object itself. The classification patterns used to systematize the structuring and organization of code reveals the content and type of bonding between its constituents. Alternatively, the way object-oriented programming techniques are conceptually organized substantially contributes to increasing the degree of

standardization in the way both a) code is written (objects) and b) relationships between different strings of codes (classes inheritance) are established.

Thus, it can be argued that the object-oriented approach to software development (Parnas, 1972) appears to strengthen the principle of modularity by introducing the concept of *information hiding*. According to this design principle, the internals of a module should exercise information hiding and encapsulate discretionary modeling decisions, publishing clearly negotiated and stable interfaces for other modules to access. In other words, through the use of object-oriented languages, the interactions among the components of a system become less ambiguous and more stable and visible than those found in procedural programming. Ambiguity is encapsulated in the internal structure of the object, and in this way it is significantly diminished. The complexity underlying the internal structure of the object is more easily manageable –at least to some extent- in comparison to the complexity found in large, procedurally produced systems with many interacting components.

### 7.2.3.Possibilities of adaptability and transference

The increased standardization and visibility of the software development process brought about by object-oriented programming paves the way towards enhanced possibilities of IT knowledge transferability across different organizational environments. Hasselbladh and Kallinikos (2000), in an attempt to distinguish the characteristics which allow some ideas, managerial practices and artifacts to diffuse across different contexts and in a wider range than others, argue that the cognitive organization of such "rationalized packages" is key to their diffusion pattern. Further, they put forward three central qualities to describe the cognitive organization of such packages (Hasseldbladh and Kallinikos, p. 709).

- the ease/difficulty by which such packages can be locally reproduced;
- the degree of durability/perishability that they exhibit as they move across contexts; and
- the immediacy of communicability and the comprehensibility by which local actors encounter such artifacts/packages.

The possibility of reproducing an already made software application seems to be a central issue in the blossoming of subcontracting and freelancing in the IT industry. By separating the product (the software application) from the process by which it is constructed, through the establishment of verbally articulated rules regarding the way objects are constructed and related to each other, object oriented approaches considerably raise the reproducibility of IT artifacts and contribute to their transferability across contexts.

Software reproducibility or "software reuse includes employing the existing code or design directly and modifying the existing code or design to adapt to a new application requirements" (Bordoloi and Lee, 1994).

The analytic paths undertaken so far demonstrate that maintaining and reproducing a single and continuous block of code (the product of unstructured programming techniques) is so difficult, even for the person who initially created the program, that the prospect of transferring and applying parts of this code to a new application seems to be completely absent or very low. Yet, the distinction between procedural programming and object-oriented programming in terms of the possibilities of knowledge transferability that each methodology accommodates is more difficult to establish. The key concept that helps to unravel the difference between the two programming techniques resides in the notion of "inheritance" (i.e. the inheritance of methods and attributes from an abstract class to a particular type of object) and that of increased independence (i.e. independence among diverse components of code due to information hiding and black boxing).

Different independent, self-contained components (objects) of a system can be reshuffled, combined and separated, allowing the system to be decomposed and composed anew according to the imperatives dictated by the business objectives. And more importantly, the glue or bond among them is considerably formalized through the exchange of messages. The more standardized the combinatorial rules of a system are the easier its reproducibility and adjustability becomes. Or, in other words, standardizing the relationship between the independent and self-maintained components of the system is the first step to render it malleable and controllable; and this is exactly the case of object oriented programming. The respondents

emphasized the fact that they maintained several kinds of "libraries", repositories of already constructed objects ready to be used. These libraries have usually been provided by the technology providers or on-line communities, or they have been created by programmers through years of work and experience. Accessibility or maintenance of such libraries entails that the programmers are capable of coming up with a wide range of new software solutions (new combinations between existing objects) just by linking or separating the very same objects.

While procedural programming also provides code re-usability by allowing the programmer to create a function (a procedure) and then re-use it in multiple projects and for multiple purposes, object oriented programming goes one step further by allowing the programmer to define n-dimensional objects and abstract dynamic "relationships" between the independent classes of these objects.

In structured programming, a small differentiation or a minor change implies the emergence of a completely new scenario of design which needs to be depicted anew; even when most of the instructions remained the same, and only a few of them were omitted or expanded, a great part of the code had to be re-written from scratch. As the data can be passed from one function to the other, coupling between the distinct functions tightens and "changes to one part of the software system often cause a problem in a relatively unrelated program area" (Bordoloi and Lee, 1994). On the contrary, in object-oriented programming, thanks to the properties of *polymorphism* and *dynamic binding*, the relationship between the objects is not static and can be adapted and crystallized in different ways according to the imperatives of the system under construction. The very same object is a dynamic entity, a "living organism", which can display a multiplicity of behaviors and establish alternative bonds with the rest of the objects in the system, according to the particular business scenario which it is destined to serve.

The concept of inheritance allows the developer to create a great variability of brand new classes just by abstracting out common attributes and behaviors. Or, to put it differently, objects and their classes could be considered as "n-dimensional" entities

which possess general attributes and capabilities, which in their turn can be tailored accordingly to suit any particular occasion (Mathews, 1996). Metaphorically speaking, it could be argued that once the "prototype" of the object is created, the construction of differentiated versions of it becomes a relatively standardized and trivial activity. In practice what happens is that each abstract class inherits its methods and attributes to its sub-classes, enabling the programmer to write the code for them just once. In other words, whenever the developer creates a new sub-class or instantiates a class into a new object, s/he just has to write the new methods or attributes since all the other methods and attributes are automatically inherited by the parent class. Therefore, independent of the on-going application, a pre-existing part of the code is already ready-made, waiting to accommodate new uses without being subject to any kind of amendment or alteration.

In the same respect, when the implementation has to change to meet the needs of a particular client firm, the developer does not have to worry about changing the interface. Different client-firms receive different software applications with the same functionality and the same interface. What changes is the intrinsic structure of an object that addresses the concerns of the particular firm or context upon which the system is called to bear.

Furthermore, an object can be transferred from one application to another without significant *semantic alterations* or *distortions;* it signifies a self-sufficient whole of a public interface for sending and receiving messages, hiding its internal operations and decisions. Performing an operation upon itself, precise to itself, and by using its own data, the object delivers standardized and relatively predefined outputs. The object encapsulates all the information and the processing capabilities it needs to execute particular tasks. As already stated, it is a completely self-defined entity which can be attached or detached to a new system, leaving completely intact the overall functionality of the system. Contrary to that, the final output of a function, when transferred to a new context, may be non-uniform because of the emerging interactivity patterns it has with other functions, with which it shares a pool of common data.

Finally, as far as *communicability* is concerned, most of the interviewed professionals reassured me that it was easier to work with other contractors and achieve better overall integration of the system under construction. This can be explained by the fact that the standards of the common interfaces that objects interact with could be communicated better and more quickly than the details related to the intrinsic structure and objectives of various interdependent and sequentially executed functions. Once the specifications of the interfaces have been agreed upon, every programmer can work on his/her own part without struggling or worrying about the "compatibility" of his/her work with other people's work. More importantly, at the integration phase, if amendments or small adjustments are needed, the change is relatively easier communicated and pursued, since it is localized to the specific object – an easily discernible and autonomous part of the code - and does not spread to the whole system.

Furthermore, the respondents emphasized the fact that the cultivation of good communication and subsequent comprehension between them and the client-firms has been particularly crucial for the overall success of the project. Quite often the manager of the client-firm may not have a clear image about what the new information application would look like or how it would support the business functions of the firm. Due to the fact that the contractor is not initially aware of the idiosyncratic characteristics of each firm, s/he has to establish a common ground of understanding between her/him and the client, so as to facilitate her/his work and keep the client happy. Object-oriented design, being more user-centric, appears to contribute successfully towards this aim. "Requirements for an IS are specified through use cases that describe the interactions between the system and its users" (Sircar *et al.*, 2001, p. 460). Using objects to represent the problem to be modeled (the objects reflect particular user-cases and the linkages among them reflect specific business scenarios), the respondents felt much more self-confident and efficient in coming to a shared understanding and a common agreement with the client.

In conclusion, if it is assumed that the socio-economic conditions that govern the phenomenon of IT freelancing remain constant, it could be deduced that the intrinsic features of the technology potentially play a significant role in the transferability of IT knowledge across organizational contexts; the inner structure of programming languages provides different possibilities of knowledge codification and transferability:

-the "n-dimensionality" of object-oriented tools allows for great possibilities of adaptability and responsiveness to the customers' needs for differentiated applications

-the granularity and independence of objects allow for the easy expandability and integration of complex software systems

-focus on the goals to be achieved (neglecting the means by which these goals will be achieved) paves the way for better communicability between the contractor and his/her client-firm, as well as among different contractors.

### 7.2.4 An addendum to the re-producibility of artifacts

The objective of this sub-section is to further clarify the arguments presented so far by unpacking the different assumptions that govern the cognitive organization of software development techniques. It draws upon a theoretical taxonomy of archetypical cultural artifacts proposed by Goodman (1976), in order to emphasize how the different approaches to software programming impinge upon different rationalities and imply different possibilities of work practices and instances of action. Initially, I will present Goodman's theoretical approach and thereafter I will endeavor to draw some parallels between this approach and existing programming methods.

#### 7.2.4.1 Goodman's theoretical approach

In his theoretical analysis, Goodman (1976) investigates the production process of three archetypical artifacts (the pictorial representation, verbal writing and the musical notation). By analyzing the way each artifact organizes and composes its

constituting elements into a coherent totality, he points out that the internal structure of the artifact accounts for its inherent possibilities of shaping and adaptation across time and space (Goodman, 1976; Kallinikos, 2002b). In particular, Kallinikos (2002) referring to Goodman's work, argues that the degree of standardization found in the cognitive production of each artifact will largely determine two conditions: a) how easily the artifact can be reproduced and transferred across contexts without losing its identity, and b) the degree to which the artifact invites or excludes the human participation.

Pictorial representation lacks the very cognitive organization of explicitly defined and rule-based combinations of standardized marks that underlie the composition of texts or musical plays (Kallinikos, 2002). The possibility to codify the type of knowledge which is employed in the production of a painting is considerably reduced. There is no kind of particular recipe or well-defined sequence in the way the artist draws the lines and comes up with a specific outcome; his/her work process cannot be segmented or described into disjointed and distinct sub-projects or steps; on the contrary, the steps or sub-tasks that compose this specific work activity are highly undifferentiated, idiosyncratic and only roughly analogically approximated. The outcome of the painting process is considered to be "syntactically and semantically dense" (Goodman, 1976).

In this respect, it could be deduced that the reproduction of a painting remains highly contingent on the intrinsic skills and capabilities of the agent who has initially generated it. Concomitantly, its understanding and meaningfulness tend to be highly dependent upon its surrounding context, time, space and technical means that frame its production.

On the other hand, verbal text and musical performance obey the rule-based combination of alphabetic tokens and notes respectively, and are more prone to transcend the context-bound character of pictorial representation. The striking difference between the two artifacts resides in the degree of standardization each one displays at the syntactic and semantic levels.

As far as verbal text is concerned, it is well known that the construction of verbal language obeys precise and explicit rules of grammar and syntax that happen to be straightforwardly communicated and easily transmitted. The syntactic disjointedness and differentiation of alphabetical tokens constitutes the first condition of notational clarity and allows for a relatively easy duplicability and maneuverability.

Nevertheless, at the semantic level, the verbal word is subject to strong ambiguities and multiple interpretations. This is due to the fact that the language contains many terms which bear similar or even identical meaning and cannot be easily differentiated. The meaning of a word may properly overlap or be part of another word. Furthermore, the meaning of the same word itself may change in different moments or contexts of use (i.e. metaphorical meaning in contrast to the literal meaning), rendering the overall reproducibility of written language, although technically feasible, also problematic and doubtful. It is not rare or accidental for the reproduction of a written document to accompany conflicting views or decisions.

Finally, the musical score seems to meet all the necessary requirements for being considered a true notational system. It consists of characters or digits that are by definition syntactically and semantically differentiated and disjointed. Syntactically, the note-marks, lines and spaces between them constitute distinct characters of a system that thoroughly guides the musician about the types of action s/he has to engage in to perform a specific musical composition. Semantically, musical marks correspond to unique and distinct sounds (Kallinikos, 2002). Each mark on the score stands for a specific note which is clearly determinable and commonly accepted and understood.

In this respect, an instance of the score – even if it is the most miserable performance, but without actual mistakes - accounts as a genuine instance of the specific score and it is at least recognizable, independent of its source. In other words, all score inscriptions may not all be true copies of one another (differences), yet all will be semantically equivalent: all performances will be of the same work. Commenting upon the above, Goodman (1976) notes that "tempo" specifications cannot actually count as integral parts of the defining score; rather they are auxiliary directions whose observance or inobservance affects the quality of the performance

but not the identity of the work. The identity of the musical score is successfully preserved from performance to performance and this is achieved by the notational character of its cognitive organization. It is exactly this discontinuous (we may call it digital) character of the score that allows for the definiteness and repeatability of its readings across different contexts, and strongly delimits the possibilities of semantic alteration or distortion.

7.2.4.2 The cognitive organization of programming practices

The current sub-section will endeavor to draw some parallels between the theoretical taxonomy of cultural artifacts that Goodman suggests and a possible categorization of alternative programming techniques. It is argued that the way an artifact (e.g. a programming language) organizes its structural elements (i.e. how the system decomposes and how these components are tied to each other) accounts for its reproducibility across space and time.

At this point, it is worth pointing out that syntactically any software code consists of different combinations of disjointed and finitely differentiated alpha-numeric characters, universally acceptable and identifiable. Where the difference lies between the three alternative programming approaches is at the semantic level. Coding is seen to be characterized "by a proliferation of textuality which necessitates oral exegesis. The materiality of software thus invoke both oral communication and particular kinds of sociality" (Born, 1999, p. 46). Let me attempt to explain.

As we move from sketch to script and then to score, the production process of cultural artifacts tends to lose its tacitness and heterogeneity and starts acquiring the form of a well-structured uniform activity governed by explicit rules. These rules come as the crystallization of knowledge and experience and pave the way for the creation of a common explicit meaning. Similarly, as we move from unstructured to procedural and then to object-oriented programming, the way software is built tends to become more and more visible, more standardized, and relatively more comprehensible and manipulatable.

Taking into account the fact that the conceptual scaffolding of unstructured design is marked by great zones of ambiguity and vagueness, it can be argued that it bears some resemblance to sketching. Apart from some basic rules related to the style of writing in specific programming languages, the developer is free to build his/her code by starting from the middle, beginning or end of the program, and by following no clear pattern of action or activity. The derived outcome is a continuous block of code (a block of instructions) whose different parts are so tangled up with one another that once generated, it is difficult to maintain, alter, or reproduce even by the very same individual. It is about a unique and simultaneously frozen piece of work that, no matter how efficient it might be, is highly prescriptive for a specific context and susceptible to rapid obsoleteness.

On the contrary, procedural programming, just like the script, imposes upon a programmer a predefined way of action that prescribes some criteria and entails a very specific pattern of step-by-step code writing. The program is systematically broken down into components, each of which is in turn decomposed to sub-components and so on down to the level of very basic subroutines (a sequence of code that can be considered to be independent, can be separated from the main of the program and performs a specific task). A hierarchically structured model is produced which sequentially displays how the different actions are taking place in order for a whole task or operation to be performed. In engineering terms, this hierarchically structured model (data flow diagram) displays how the data flow through the system and are sequentially imported into diverse algorithms (processes).

As has already been suggested, the functional decomposition principle has significantly enhanced the literacy and comprehensibility of the overall program. Yet, despite the necessity of compliance with the functional decomposition principle, the degrees of freedom the programmer possesses in writing a specific program are immense. It is s/he who describes extensively the sequences of actions that will be performed and the way these actions will be performed. It is the programmer who decides upon and tells the computer how to handle a specific input

or variable (data). As a result, even the simplest software application may vary significantly in its format (in terms of code writing) among different IT developers.

Furthermore, no matter how much the functional decomposition principle has promoted the axiom of syntactic modularity and disjointedness among the different parts of the code, the sharing of the same pool of universal, common data (different algorithms or subroutines or processes use the same pool of data) leaves enough room for strong interdependencies and unanticipated interactions among them. Whenever a problem arises (some data which has been used recursively by a lot of different algorithms may have been corrupted), it is often difficult to isolate its source and estimate or track its possible impact on the system as a whole. To do so, one has to examine line by line all the code written, to search for correlations and interdependencies between different parts of code, etc. This is further encumbered by the fact that there is some kind of redundancy in the way code is written. Identical or slightly differentiated parts of code are often duplicated, since every possible scenario of action has to be started anew and in the greatest possible detail, no matter how many similarities it draws with the previously held cases. The lack of semantic disjointedness and differentiation among the different parts of the system, the welcoming of multiple idiosyncratic forms and styles of code writing and the difficulty in defining the relationship between cause and effect amongst the different parts of the system create great ambiguities about the overall performance of the system.

It is only through object-oriented programming that ambiguity is encapsulated within the object and complexity is restricted through sophisticated classification and representation schemes. As I will try to present hereupon, just like in the case of the musical score, the cognitive organization of object-oriented languages encompasses all the necessary characteristics that define a true notational system: not only syntactically, but also semantically, the constituent parts of the program are developed in such a way as to be disjointed and finitely differentiated.

Interdependencies between the different parts of the code are reduced to the minimum possible degree since each object constitutes an independent entity which encapsulates both data (attributes) and processes (methods) into an impenetrable

whole. As previously stated, the principle of "information hiding" allows for the internal structure of each object to remain meticulously hidden and steadily independent from the rest of the system. Objects are *finitely disjointed* among themselves. Decisions are localized within the boundaries of the object and any possible change or reconfiguration of the object's data or processes has no impact on the structure or the efficiency of the system as a whole. Alternatively, control over the overall performance of the system is also significantly facilitated, since it is much easier for the IT engineer to track possible inefficiencies or mistakes in a system of low interdependencies and enhanced visibility. Each object is responsible for what is to be done and how this "what" will be done.

But apart from being independent, self-contained and disjointed, the "objects", the most elementary building blocks of this programming approach, are also *finitely differentiated*. First of all, the objects are semantically segregated, since different objects that return exactly the same output - exactly the same piece of information - must be the same object. And secondly, the possibility of redundancy or duplication is reduced to a minimum. And this is due to the fact that the software is built incrementally, maximizing the re-usability of already made components. As stated earlier, similar objects can be grouped together to form a class (a class defines the abstract characteristics that are common to a category of objects). Or, rather, each object is a specific instantiation of a class, which means that different objects of a class inherit their methods and attributes from their "parent" class and differ from each other just by having different values in their variables. Alternatively, when the IT engineer wants to produce a new object, s/he only has to develop from scratch those "features" that differentiate the specific object from the other objects in the class.

Moreover, just like in the case of a score, object oriented languages are governed by *explicit and universally accepted combinatorial rules* that delineate straightforwardly how the various components of the system are linked together and interact with each other in order to produce the overall software application. The various objects communicate with each other by exchanging messages through simple and carefully designed interfaces. The only thing an object needs to know is

how to ask another object for a particular piece of information. The programmer just has to tell the computer what to do. And thereupon it is within the responsibility of the computer (i.e. object) to calculate or formulate this info.

The key points of the aforementioned analysis can be portrayed in a relatively simplified way as shown in Figure 1.

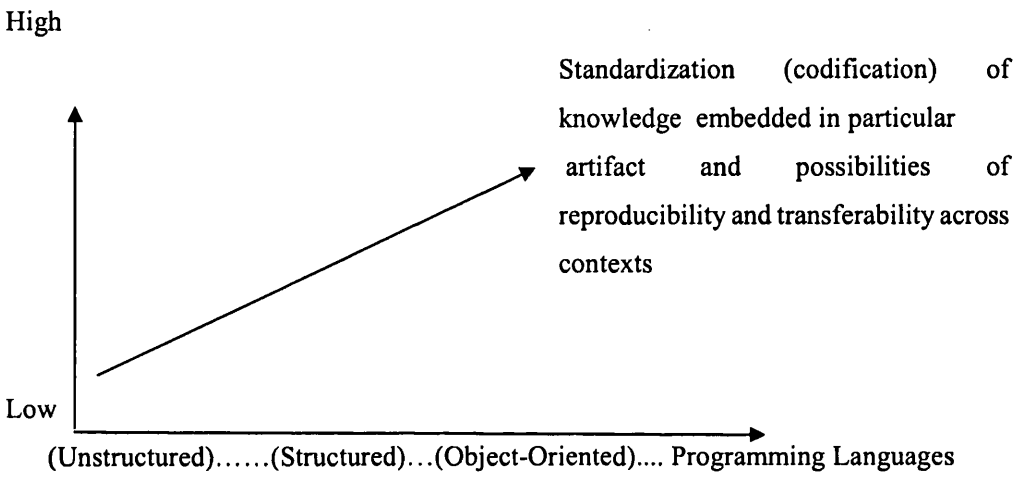


Figure 1: Programming languages and the possibility of reproducibility
Figure adapted from Kallinikos (2002, p. 292)

In conclusion, it can be suggested that object-oriented programming methods constitute a genuine notational system since they encompass "an articulated set of disjointed and unambiguous characters as well as a set of relative positions for them" (Goodman, 1976). Each object is unique and is assigned a distinctive role and functionality which remain preservable and identifiable across different contexts of use and among multiple programmers. A great deal of what was once left to the personal discretion of the programmer is now codified and translated into carefully designed taxonomies and, thus, is easily communicable and understandable. There has been a shift in the balance between the adoption of clear rules and the exercise of discretion with reference to the very way the programmer develops software systems. Standardized combinatorial rules dictate how the components of the systems will be tied to each other and structural and systemic properties (i.e. modularity and information hiding) safeguard against the possibility of obscurity and unanticipated correlations among the components of the system.

Nevertheless, the aforementioned remarks do not necessarily imply the elimination of tacit knowledge which is still crucial for the use and manipulation of this codified and relatively standardized knowledge. *"Codification is never complete and some forms of tacit knowledge will always play an important role"* (Cowan and Foray, 1997). In particular, the ability that developers display in deeply comprehending the business objectives and translating them into their computational vocabularies resides in the field of tacit knowledge and constitutes one of the most significant factors that determine the final success of the project (Curtis *et al.*, 1988).Yet, the aim of the current section has been to demonstrate that the different degrees of codification and standardization which underlie the cognitive organization of particular programming techniques are instrumental in packaging and transferring IT knowledge.

### 7.3 Community and Networks: The Social Roots of Contingent Employment

Alongside the specific technical features of the programming methods which facilitate the IT contractor's pursuit to supply timely and customized services to a wide array of customers, there is additionally a complex circuit of social processes which delineate and constrain the particulars of the contracting activity and the subsequent employment relationship. In other words, the IT freelancing practices might possibly be understood as the result of perplexed socio-economic processes and organizational dynamics which extend beyond the match between the technical characteristics of the artifact and the accommodated forms of working practices and employment relationships. Rather than having an ontologically independent status, the conditions of work "are the outcome of the social and institutional relations and the cultural predispositions underlying a social order" (Kallinikos and Hasselbaldh, 2003).

In this respect, the empirical findings presented in chapter 6 suggest the following about what might additionally account for the spread and sustainability of freelancing in Greece: a) the conditions which governed the IT sector of the Greek and global economy, b) the possibility of forming professional and virtual

communities as repositories of knowledge and sources of income and employability and c) the principles of project management governing the content and structure of contracts

### 7.3.1. Socio-economic conditions, formation of networks and the embedded role of ICTs

The globalization and opening of the markets in conjunction with enhanced connectivity and cost-effective mobility of economic agents across the globe (Beck, 2000; Castells, 2000; Larsen *et al.*, 2006; Stohl, 2001) have paved the way for the creation of a huge market of potential sellers and buyers of human labor. Sellers and buyers are electronically brought together and connected in fluid and transient networks for conducting efficient transactions to the benefit of all parties involved (Castells, 2000; Castells, 2001; Malone and Laubacher, 1998). By facilitating communication at a distance and by abolishing the time and space constraints traditionally identified with typical organizational boundaries, information and communication technologies have enabled the creation of a global market place capable of accommodating the exchange of a wide range of goods and services. Even highly skilled and professional services which used to be provided in-house are now subject to the laws of the free market and spot exchanges.

The respondents identified a close relationship between the feasibility of contracting practices and the possibilities of mobility and connectivity offered to individuals across the globe (Kakihara and Sørensen, 2002a; Kakihara and Sørensen, 2004). By posting their CVs on their personal web pages or by disseminating them via the networks of international, internet-based staffing agencies, IT contractors are rendered potentially visible and reachable by thousands of prospective employers all over the world. As already presented in Chapter 6, the respondents who were highly specialized in a very specific technology or software package were most likely to work for employers located far beyond the territory of their country.

Furthermore, the contractors who were at the beginning of their careers, and who were more prone to compromise with trivial programming tasks, competed via specialized websites – held by staffing agencies - against a large pool of coders or

web designers coming from all over the world. The entire negotiation process, the closing of the deal and the delivery of software applications were held and completed on-line. The contractor who would give the best bid for the advertised job task (in terms of completion time and price), would finally get the job. And due to the digitalized format of the final product, the possibility of "meetingness" and face-to-face interaction seemed rather unnecessary, costly and superfluous. Any need for further communication and coordination between the parties involved was fulfilled and supported through the use of e-mail, instant messaging or common remote desktops (this was only for the case of trivial programming tasks where firm-specific knowledge is rather absent).

But apart from the favorable legislative realm and the technical possibilities provided by the technological infrastructure, there were economic trends and contingencies, related to the global market in general and the Greek market in particular, which happened to reinforce the spread of freelancing practices in the Greek territory. The general trend of flexibilization of the workforce (Carnoy, 2000) matched with the turbulent economic environment which characterized the Greek IT sector in the late 90s (specifically, optimism and heavy investment in the IT sector, flourishing of IT entrepreneurial activities, unplanned and arbitrary initiatives of mergers and acquisitions among the IT companies, introduction of IT companies in the Athens Stock Exchange market, optimistic scenarios and sudden and radical fall of all the stock prices, layoffs) proved to play a crucial role in the governance of freelancing.

The overall deterioration of working conditions, the increasing possibility of layoffs and downsizing and intense insecurity about the future of employment relations in the IS sector made escaping into contracting "suddenly seem inevitable or desirable" (Kunda *et al.*, 2002, p. 245). Especially the IT engineers, who were quite competent and skillful in their craft and used to work for financially sound and technologically innovative companies, owned sometimes by the themselves or in general populated by small numbers of equivalent highly-skilled IT workers, were the first who decided to turn towards the contracting, short-term employment realm. The same category of IT personnel was the one who displayed a kind of awareness for

mentally stimulating and meaningful work, as well as an explicit will for autonomy and flexibility in the conduct of work itself (Kunda *et al.*, 2002).

Interestingly, all the respondents, before entering the contingent workforce, had already built a professional network which could probably operate as a layer of protection against the negative aspects of freelancing. If in their previous employment state, as permanent employees, the absence of continuity in employment was a possibility, now it was an inseparable part of their everyday working reality.

This kind of professional network consisted of ex-peers, people who had graduated from the same university, people whom they had met through training seminars, and other freelancers whom they had met through their joint participation in subcontracted projects. Through recurrent or past interaction among themselves, professionals came to know each other and develop ties with those they trusted or those they thought they could get along with. The generation of these informal professional networks has been the result of sequentially developed social relations; and these social relations seemed to play a key role in the potential search for new contracts and new deals. Paving the way for the production of trust (Granovetter, 1985), the formation of informal professional networks (Laubacher and Malone, 1997) appears to be a strong moderator of contracting life. They constituted the contractors' resources for maintaining long-term employability in a shifting and volatile occupational labor market (Osnowitz, 2006).

In particular, this kind of professional community seems to provide credentials about the professional knowledge, ethos and prospective reliable behavior that its members potentially display. In the absence of an institutionally established professional body or occupational community, membership in a particular network was indicative of the quality and dexterity of the people involved (Osnowitz, 2006). The information provided by a trustworthy person is always rich, extensively detailed and particularly accurate (Granovetter, 1985). A business person would avoid recommending a contractor whose efficacy and reliability remains doubtful, since such an initiative would jeopardize his/her own credibility in the business world. The importance of timely and accurate information about a potential

candidate becomes even more acute, if one considers the obscure and difficult-to-monitor conditions under which the highly-skilled contractor performs his/her work. Accordingly, it could be argued that the traditional notion of "control over the work outcome" is rendered supplementary or even subordinate to the notion of "control over/access to informational resources" regarding the prospective contractor's professional conduct and reputation.

Especially in Greece, due to a) the size of the IS market which is relatively small, b) the relatively high levels of executive mobility, c) easy ICTs – mediated connectivity among firms, d) limited numbers of well-reputed universities in the IS discipline and e) the culture of a close, "family-centered", "egocentric" society which has always been cautious towards "strangers" as potential enemies, the mobilization of professional networks and the cross-checking of information for the detection of the best possible candidate has been both desirable and feasible.

Whenever clients did not manage to find the prospective candidate through the mobilization of their professional contacts and networks, they addressed their call to the career office, alumni association or the available staffing agencies. The knowledge and expertise reflected upon the grade scale of the academic curricula of each particular university constituted an institutionally certified credential of the quality of services potentially provided. Interestingly enough, each university in Greece had a reputation of being particularly specialized in a specific domain of technology.

In the same respect, the selection of a good staffing agency with a well-established name in the business world operated as a guarantor of a good deal as well. The client-firms were looking for the best possible candidate at the lowest cost, the contractors were looking for the right job at the right wage and the staffing firms as mediators of the employment relationship attempted to do the corresponding placements as quickly as possible to maximize their own profits (Barley and Kunda, 2004). This was almost the only case, the identification and the traceability of the potential deal was largely subject to the laws of the market. Nevertheless, even in the case of internet staffing firms, the social bonding mattered a lot. The contractors chose to have repeated relationships with a network of agencies which displayed

reliable and trustworthy behavior (Barley and Kunda, 2004). Therefore, it was rather only at the beginning of the contractor's career that rules of the market purely operated in structuring the contingent labor market.

Finally, there was also a professional association of IT people in Greece which was supposed to promote the professional welfare of its members, by providing professional development programs, awareness of job opportunities and a place for socializing. Nevertheless, due to the diversified profiles of its members in terms of their levels of skills, dexterities and educational background, it lacked the prestige of a traditionally established professional body. Once more, what seemed to matter was the creation of sub-networks within the overall association of IT members.

### 7.3.2 Professional and virtual networks as generators and repositories of knowledge

Apart from concerns for finding the next deal and being continuously employed, IT contractors also have to take into account a number of serious problems related to their professional training. Having chosen to become contractors, they cut the bond with the employing organization which had been traditionally responsible for and "guarantor" of their professional training and development. From now on, it has been up to them to keep themselves marketable and technically up-to-date (Kunda *et al.*, 2002). They also have to update their already acquired technical knowledge, they have to build new knowledge and elaborate on the intricacies of knowledge to deliver highly customized IT services.

To cope with the above knowledge-related practicalities of free-lancing, IT experts form networks of relationships with ex-peers and friends who share the same professional interests, participated in diverse kinds of virtual IT communities, and visit specialized web-sites.

In particular, the specialized web sites concerning the use of a particular technology become a great source of easily accessible, timely and up-to-date information. Information concerning the use of a particular hardware or software is meaningfully

ranked, tidily classified and ready to be obtained and used just by the click of a button. Bearing in mind the rapid pace of technological change and obsoleteness, as well as the struggle of the IT contractor to possess cutting-edge skills – so as to be continuously employed (Barley and Kunda, 2004) - it would be reasonable to assume that the internet constitutes a substantial pillar of contacting practices. By being a content-rich source of knowledge and a medium of instant learning, the internet heavily impacts the way IT contractors build their repository of knowledge and conduct their work.

In the same respect, participation on Internet-based bulletin boards, user groups, etc. constitutes a standard technique to get accurate and detailed information not only about the launch and general use of state-of-the art technologies, but also about how to tackle specific problems and particularities related to that technology. Through these kinds of communal virtual places, the contractors gain access to the lived experience and consolidated knowledge of an expert community.

This observation is of crucial importance since professional knowledge, although partly formally acquired and certified, is also dependent upon the on-going interaction of individuals of the same profession. "Accruing competence in medical work has never been a matter of mastering a set of formal knowledge, provided by a long formal education. To become a competent clinician, practice and continuous dialogue with senior partners has been indispensable" (Kallinikos and Hasselbaldh, 2003). Towards the same theoretical direction, Barley and Kunda draw attention to the fact that "technical knowledge is encoded in and transferred through the narratives that technicians recount for themselves and each other" (2001). "Intermingling" with peers and sharing a repertoire of commonly accepted norms and resources, such as "language, routines, sensibilities, artifacts, tools, stories, styles, etc." (Wenger, 2000, p. 229) is the process through which competence is tested and built in practice. Learning, understanding and interpreting, and being able to distinguish what is the most appropriate decision to make according to emergent work contingencies, is something which is not easily articulated in words nor embedded in abstract theoretical axioms of knowledge (Brown and Duguid, 1991; Lave, 1988; Wenger, 1998). Rather it is something developed within a communal context and framed through active participation (Brown and Duguid, 1991).

Especially when work is technical, knowledge is best viewed as residing in a "community of practice" whose boundaries become sometimes blurry and extend beyond the boundaries of the organization (Barley and Kunda, 2001).

Yet, taking for granted that contractors are considered as "outsiders" - individuals who have a rather ambiguous relationship with the employing organization - their interactions with the permanent employees are often met with distrust and suspicion. And this atmosphere of distrust and suspicion might operate at the detriment of the efficient completion of complex IT work tasks. To avoid social isolation and to fulfill the need of constructive dialogue with peers, IT contractors have substituted traditional face-to-face communication among colleagues with virtual communication among internet-based IT experts.

The notion of the virtual community parallels nicely with the notion of *intentional network* - a social network of people who collaborate in order to get work done (Nardi *et al.*, 2002). An IT virtual community consists of IT experts who come from all over the world and display a significant interest in IS related topics. Although these people do not participate in the very same activities, they do share a general collective motive, namely the evolution of IS artifacts and the IS discipline. The notion of an IT virtual community could be considered to include both the idea of cooperation and collaboration, as defined by Lewis (1997, p. 213): "Cooperation depends upon a supportive community of actors who agree to help one another in activities aimed at attaining the goals of each person involved. Collaboration depends upon the establishment of a common meaning and language in the task which leads to the community setting a common goal". Although the members of the virtual community are not directly involved into the project undertaken by the individual IT contractor, they contribute substantially in the way tasks are performed by the supply of crucial information that the IT expert could not otherwise acquire.

Apart from participating in the aforementioned professional communities, IT contractors safeguard their knowledge related status and work performance by forming networks with ex-peers and friends who share the same professional interests. Nardi *et al.* (2002) note that networkers rely heavily on their own personal social networks as they seek to get the work done in today's world of organizational

boundary crossing. These networks could be considered as repositories of knowledge, where the knowledge generation process occurs whenever a node of the network (e.g. an IT contractor) mobilizes the network in order to find out specific information about a particular technical puzzle or problem. The contractor contacts other peers mainly through the exchange of e-mails, and shares with them concerns, opinions and views in reference to the problem under resolution. By cross-checking and validating the soundness of her/his tentative thoughts and technical decisions, s/he saves substantial amounts of time and effort.

The above remark becomes even more acute when one considers that contractors were paid at a much higher rate than permanent employees and as a result this inequality is often the source of hostility, jealousy and resentment (Barley and Kunda, 2004). Being able to complete the undertaken job "by themselves" without asking permanent employees for some kind of help or support has also been a necessary strategy to promote their overall image and reputation as "experts".

In some cases, small parts of these informal networks or coalitions among ex-peers and friends tend to acquire a relatively more stable character by giving birth to the formation of loosely coupled business partnerships (Kakihara and Sørensen, 2002b). The aim of these business arrangements has been to moderate the sense of isolation related to freelancing and reproduce the benefits stemming from collective work in the conventional office.

In conclusion, it can be argued that the new occupational edifice characterizing the production and organization of highly-skilled IT work appears to rely heavily on the formation and activation of virtual communities and technologically mediated networks.

The emergence and sustainability of these informal communities and networks tends to counterbalance the absence of the communal workplace and the activities enacted and shared in it, by creating a virtual locus of communal interaction. Via the use of mobile and internet technologies, IT contractors, although being constantly on the move, are able to re-establish the idea of co-presence, collegiality and knowledge sharing, simulating the environment of the conventional work place. The availability

or choice of communication channels is critical in the creation and maintenance of distributed communities, since the overall network sustainability is largely determined by two pivot activities: remembering and communicating (Lewis, 1997; Nardi *et al.*, 2002).

Another interesting finding regarding the knowledge acquisition is the fact that contractors use internet sources to get business specific knowledge. The globalization of the economy, the connectivity of the markets and the isomorphic tendencies of organizations (DiMaggio and Powell, 1983) contribute to the formation of common business objectives and identical business functions and organizational structures.

#### 7.3.2.1 Professional identity and reputation and normative control mechanisms

The IT contractors appear to fundamentally challenge the notion of occupational identity. They constantly move from one corporation to another, develop ephemeral types of relationships with heterogeneous groups of people consisting of other contractors or permanent employees, and subsequently they experience various and differentiated work settings. By disassociating the notion of the self from the immediate context of practice and the traditional view of employment, these "itinerant experts" must somehow find ways to define and perceive themselves anew in the contemporary workplace. To do so, they have had to develop "a coherent identity that could account for their experience and guide their actions" (Barley and Kunda, 2004, p.216).

The notion of identity refers to a common identification of a person with a collectivity, a social group or a social category (Tajfel, 1982); "a strong identity involves deep connections with others through shared histories and experiences, reciprocity, affection and mutual commitment" (Wenger, 2000, p.239). In practice, it is often synonymous with the internalization of diverse roles expectations; the notion of identity is composed of the distinctive meanings the person attaches or inscribes to the multiple roles s/he is expected to play under various kinds of circumstances and contingencies (Stryker and Burke, 2000). The way a person

behaves is no more than the enactment of a spectrum of roles which jointly constitute the amalgam of his/her identity. What is familiar and what is strange, what a person is expected to remember and what to forget, what a person needs to know and what s/he can legitimately forget are profoundly interwoven with the very essence of the identity s/he has consciously or subconsciously embraced (Wenger, 1998; Wenger, 2000).

For instance, the IT contractors had to meet different expectations and ascribe a purposeful meaning to each of the roles they were called to play (Barley and Kunda, 2004). In each case what was defined as the most appropriate behavior might be slightly different. In their eyes, they had to build meaningful careers by pursuing challenging tasks. In the eyes of the managers and permanent employees, they had to prove their dexterity, honesty and competency in performing the assigned task. In the eyes of the virtual and informal networks, they had to embrace the values of reciprocity and trust. All these roles commonly constitute the identity of highly-skilled IT contractors.

Embracing the premise that identity is created in relation to some "other people", it is reasonable to assume that the notions of culture and discourse are considered to be central in the process of identification. In particular, identity is related to the notion of the discourse (Ezzamel and Willmott, 1998) and is "constituted as a narrative of the self, which unfolds across the contingencies of time and space as interpreted by the agent" (Giddens, 1994; Patriotta and Lanzara, 2006, p.988). Observing that virtual communities and informal networks among peers constituted the virtual places where IT contractors with common interests and concerns gather regularly to "trade stories and share advice" (Laubacher and Malone, 1997, p.5), it would be reasonable to assume that the aforementioned social formations played the role of the main institutional body with which the contractors were most likely to identify.

Although this kind of interactive fellowships could not claim to have the formal power of traditional occupational communities such as, for example, the occupational community of lawyers or doctors which is entitled to provide formal certifications of expert knowledge and technical competence, to establish barriers of entry, to declare a clear mission and to define the legitimized practices of the

occupation, they were still powerful social formations which implicitly or explicitly invoke particular patterns of behavior and rules of conduct.

It is a common knowledge that the individual, as a social being, often behaves in ways which satisfy its reference group members. As a member of a community, the individual actor internalizes diverse kinds of roles, and adopts values attitudes and norms of behavior which are considered to be preferable, desirable or appropriate by the community. The needs of acceptance, belonging and socializing are considered to be high enough, so as to dictate specific courses of action and homogenous behavioral patterns to the group members (March and Simon, 1958).

In the case of IT contractors, the urgency to fulfill the aforementioned needs comes to the fore as striking as ever before. Due to the fact that the employing organization is no longer the primary source of occupational identity nor an object of emotional attachment (Barley and Kunda, 2004), IT contractors feel the need to redefine their relationship with the current workplace. The virtual communities and informal networks become for them the locus of social interaction and the object of professional identification (Laubacher and Malone, 1997).

Furthermore, apart from the fulfillment of personal needs, this kind of social group among peers and fellows, operates as a repository of knowledge and triggers job placement in the market. Consequently, participation and conformance to the values and norms of groups seems to be an implicit but necessary prerequisite for a successful contracting career and life.

Members of these groups tend to have the characteristics of the members of clans (Ouchi, 1980). The members are tied together through bonds of reciprocity and trust, share mutually defined goals and have internalized the same norms and values. "Through social interaction, contract professionals constitute a culture with informal expectations for participation and standards for occupational practice. Adherence to cultural codes and norms marks practitioners as occupational members in good standing" (Osnowitz, 2006). A highly-skilled contractor may choose to behave in a reliable way towards the client-firm, because such a behavior is consistent with his/her identity as a "good colleague", "real professional", and such a behavior is

applauded by the members of the community. Moreover, when an IT contractor is introduced by a member of his/her professional network to a prospective client-firm, s/he is expected to behave reliably, performing the assigned task in the most efficient possible way. This was originally the very logic underlying the formation of these networks: circulation of accurate and trustworthy information (Granovetter, 1985) among peers and prospective client-firms. And gaining legitimacy in the eyes of clients and peers involved the adoption of behavioral patterns and the employment of particular practices which were dictated by the occupational norms of the community and expanded beyond the technical standards of a high-quality task performance.

In the eyes of the community members and prospective clients, this kind of legitimacy has mostly relied upon the past record of business interactions and cooperation the contractor has had with other firms and individuals. It is closely related to the notion of reputation. In particular, it mostly has to do with the way people make sense and perceive the quality and reliability of work and the overall professional conduct of the freelancer. The reputation that the freelancer builds around his/her name is manifested in the everyday discourse of the business world and is widely spread across the market. The connectivity of organizations brought about by the extended use of ICTs, as well as the frequent mobility of individuals across organizational borders, has rendered the trajectory of the IT contractor as visible as ever before. And this transparency and visibility accounts significantly for the contractor's future employability and positioning in the market.

Information about IT contractors circulates so quickly and spreads so widely through the professional networks among former and current business partners and agents (including individuals, organizations and staffing agencies) that the exposition of a kind of unreliable or amateurish behavior on behalf of a freelancer - even if it were only once - could irreversibly destroy his/her career.

In conclusion, it can be argued that the IT contractors' behavior is largely influenced by the her/his struggle to build a coherent identity within a rather heterogeneous and scattered working environment. In their attempt to make sense of their identity, to build a meaningful career, and to fulfill their personal needs for self-esteem and

recognition, the contractors find themselves attached to social and virtual networks. These networks constitute a point of reference according to which individuals make sense of their occupational identity, as well as a counter-balancing factor of the social isolation and insecurity related to the freelancing work. It is the internalization of norms - which happens through past social interaction among members of these communities (Granovetter, 1985), and the extended transparency of members' professional trajectories, brought about by the use of mobile and internet technologies - that account for and guide the independent contractors' behaviors. In the current boundary-free and constantly reconfigurable working environment, professional agents' actions emerge in response to socio-technical and economic contingencies, and not so much as a result to an abstract, generalized morality or conformance to some kind of knowledge-related professional standards.

7.3.3. The labor contract and the rationale of project management

Apart from identity related issues and reputation-related concerns, the contract itself is regarded as a prescriptive mechanism of the contractor's behavior. According to the respondents' views the contract constitutes a substantial coordinator and regulator of the economic transaction between them and the client-firm. The specific terms and jurisdictions anticipated in it, no matter how abstract or concrete they might be, delineate the general landscape within which the two parties may legitimately assert their demands and fulfill their obligations, respectively.

Yet, the contingent breach of the terms of the contract is always a possibility which cannot be easily overlooked (Williamson, 1985). For instance, the client-firm, taking advantage of the competitive forces which govern the IT labor market, might ask for the provision of more or better services, other than the ones initially agreed upon during the negotiation phase of the contract terms. While the highly-skilled IT contractor might restrain his/her effort or contribution to the allocated work task, undermining the overall quality of the software application produced, is not at her/his long term favor.

Theoretically speaking, it could be argued that explicitness and clarity of the contract terms guard against malfeasant and unreliable behavior and ensure balance

and the smooth operation of the transaction and employment relationship. Yet, the spot exchange of knowledge work is supposed to be outcome-based (Goldthorpe, 1998) and the possibility to estimate the intensity effort or define the production process details is absent. Thereafter, the contract content is mostly focused on explicitly defining what will be delivered, when it will be delivered and at what price.

As far as the price estimation is concerned, it could be argued that generally the pricing schemes of professional services are highly influenced by the scarcity or abundance of relevant expertise or resources available in the current market. Nevertheless, quite often the client-firms tend to buy more expensive services from contractors whose reputation is well established, with the understanding that the quality of their work and overall professional behavior is guaranteed.

As far as the timely and efficient completion of the assigned project is concerned, most of the contracts apply the logic and vocabulary of project management. The project is broken down into smaller independent subprojects, which are meant to be completed sequentially and be delivered (indeed, they are called deliverables) over the contract duration on specific pre-set dates (milestones). The principles of project management aim at: 1) increasing the visibility of an obscure production process through the identification of sub-products which jointly constitute the overall software application and 2) enhancing control over the completion pace of the project assigned, so as to ensure that the time deadlines often settled by the competitive pressure of the market will be met. The provision of timely, functional and efficient IT services is considered to lie at the heart of freelancing and sub-contracting.

Interestingly, in the world of contracting the tight coupling between effort intensification, superior performance and long hours of work tends to fade. Although the pace of professional and highly-skilled work cannot be measured or estimated, long hours of work used to be a necessity for professionals and consultants as a signal of visibility and commitment towards the employing organization (Evans *et al.*, 2004; Perlow, 1997b). Nevertheless in the project-based boundary-less careers followed by IT experts, the expected time for the completion

of tasks is often related to factors other than the complexity of the task itself. For instance, client-firms, according to their organizational idiosyncrasies and sectoral competition, display particular preferences with reference to the time frames of project completion. What interests them is the timely acquisition of highly-functional, customized software solutions, given the relatively predefined budget. The actual effort - in terms of time - allocated by the contractor to the assigned project seems to escape managerial attention and interest. In the same respect, the pricing of contracting services is primarily influenced by the available budget of the firm and the prices charged for identical kinds of work by key players in the IT market (typically half the rate charged by big software houses and for off-the-shelf packages). In a free-market, an IT expert who has developed a unique skill in building a particular kind of software application and who can re-use a large proportion of ready made components across different contexts, can claim high rates for his/her services even if the actual effort s/he puts forth in every new application is quite limited.

Finally, drawing on the respondents recounted stories, it appears that numerous client-firms tend to have repeated relationships with contractors with whom they had a good record of previous cooperation. The possibility of a contract for support or maintenance makes it too costly for a contractor to engage in unreliable modes of behavior. "Individuals with whom one has a continuing relation have an economic motivation to be trustworthy, so as not to discourage future transactions" (Granovetter, 1985, p. 490).

In conclusion, it can be argued that institutional arrangements, like the type of contract and well-established techniques of control and surveillance, do not produce trust or commitment, but operate as a coordination mechanism that safeguards frictionless continuity of the contingent employment relationship. What is worth noting is that in some cases, the recurrent character of spot employment relationships calls for the emergence of intermediate organizational forms which appear to lie between the market and hierarchy. Economic transactions and employment relationships often take place within the complex webs of social contour, where coercive and normative methods of control co-exist with, substitute or complement one another.

## 7.4 Conclusion

How human activities end up being performed and organized depends "upon a context of knowledge and beliefs...which... provides material as well as intellectual resources which generate incentives and penalties for local players and pattern the conduct and outcome of local actors, by framing their discussions" (Pollock and Williams, 2007, p. 180). Both normative and coercive mechanisms of control (i.e. mechanisms of control stemming from the contractors' membership into relevant social groups, the material features of technology and management tools) appear to be invoked and operate as regulators of the contingent relationship between contractors and their client-firms. The same social formations and material resources also partly account for the easy running of the aforementioned relationship by counter-balancing some of the negative aspects of freelancing.

# CHAPTER 8: CONCLUSIONS-DISCUSSION

## 8.1 Introduction

The structure of this concluding chapter is as follows: Section 8.2 overviews the research process by providing an overall picture of the various stages of the research. And section 8.3 presents the discussion raised by the study and states the positioning and subsequent contribution of the study in the wider scope of Information Systems and Organizational Theory research.

## 8.2 Overview of the research

This research has been concerned with the study of the conditions that govern the proliferation and diffusion of non-standard employment relationships in knowledge intensive sectors of the economy (in particular, the subcontracting of highly-skilled contractors in the IS sector). It aimed at identifying and exploring the technological and socio-economic conditions that pave the way for IT freelancing to blossom and spread. In other words, the objective of this study has been to investigate the possibilities that technological infrastructure and social and institutional conditions create in regard to the proliferation of IT freelancing. To achieve this research objective, the study explored how the asymmetrical relationship between client-firms and highly-skilled IT contractors is enacted and sustained in practice.

This research belongs to a burgeoning literature which aims at describing, exploring and explaining the phenomenon of freelancing and outsourcing in the IT sector. Placed in the context of prior research on the subject of flexibility and contingent forms of working, the research is distinguished by the attention it pays to the task infrastructure of IT work and the social networks which frame and support the provision of this work. The expanding involvement of information and communication technologies in reconfiguring current work settings is highlighted and placed under scrutiny.

Previous studies on IT freelancing have usually examined the reasons that justify such a decision, addressing two general types of questions: a) researchers who have mostly focused on the employer's perspective, studying when and why a firm should outsource part of its IT functions (Lacity and Hirschheim, 1993; Mayer and Nickerson, 2005; Slaughter and Ang, 1996; Wang *et al.*, 1997; Whang, 1992), and b) scholars who have instead focused on the contractor's perspective, exploring the economic, social and institutional edifice that supports this employment arrangement and influences agents' behaviors (Barley and Kunda, 2004; Evans *et al.*, 2004; Kunda *et al.*, 2002; Osnowitz, 2006).

Little attention has thus been paid to the technological factors and the functional base of the work which potentially renders this kind of work amenable to freelancing practices. In this regard, the current research aimed at exploring the conditions which account for the proliferation and spread of freelancing in the IS sector, with a particular emphasis on the involvement of ICTs and the restructuring of the task infrastructure of IT work.

The research question which provided the orientation of the dissertation has been framed by the basic assumptions of the Rational Action Theory (RAT), transaction cost (TC) theory and agency theory. According to their assumptions, knowledge work resists managerial rationalization and control, and becomes increasingly effective over its lengthy embeddedness in the organizational culture of a particular firm (Goldthorpe, 1998; Williamson, 1985). In other words, the subcontracting of highly skilled work raises two main concerns: a) it raises issues of monitoring and control over the work performed, and b) it raises issues of the contractor's performance whilst lacking firm-specific knowledge.

As an answer to the above problematic, the RAT and TC literature suggests that knowledge work and services should be provided in-house: the provision of long-term benefits would curb the potential of the contractor's opportunistic inclinations and his/her lengthy familiarity with the organizational setting would increase his/her prospective performance. Nevertheless, current business practice appears to indicate opposite results: knowledge work tends to be become more and more the object of spot transactions in an open market.

Against this background, the research conducted was meant to provide some answers and develop insights into the aforementioned issues and concerns. To do so, it endeavored to investigate the mechanisms (alternative mechanisms of power distribution and control) and conditions (conditions of work "performativity") that guarantee the balance and efficiency of the contingent relationship between the client-firm and specialized IT contractors.

Towards this aim, thirty "*ethnographic*" interviews (Evans *et al.*, 2004; Kunda *et al.*, 2002) with highly-skilled IT contractors have been conducted in Greece. The selection of the informants has followed the logic of a snowball sampling, i.e., respondents were asked to provide details of others whose working profile matched the unit of analysis for the current study (Evans *et al.*, 2004; Faugier and Sargeant, 1997).

The respondents' explanations, testimonies and viewpoints have been believed to reveal important facets of the "lived conditions" that account for the proliferation and diffusion of contracting. The research approach chosen could be classified under the realm of an interpretive epistemological paradigm (Kaplan and Maxwell, 1994; Orlikowski and Baroudi, 1991; Walsham, 1993). It displays an exploratory and explanatory orientation and relies upon the analysis of multiple case-studies (Yin, 2003). In particular, the multiple cases should be considered like multiple experiments, following the logic of replication and intended to support an analytic generalization of the results (Yin, 2003). By juxtaposing multiple perspectives and viewpoints stemming from the investigated cases, I intended to reduce the possibility of significant divergence in the stories recounted and build a well-sustained interpretation of the phenomenon under study.

The editing of interview scripts has been based on the empirical data and facts as they have been articulated by the respondents. The frequent presentation of multiple quotations uttered by the respondents aimed to prioritize the role of empirical evidence, conveying as faithfully as possible the recounted experiences and perceptions of the individuals. Yet the structure and the consolidation of the empirical findings has been clearly underpinned by the theoretical preoccupations

governing the conceptual framework of the study. The concepts of knowledge specificity, difficulty or ease of work monitoring, alternative conceptualizations of control, and the concepts of flexibility and transferability, penetrated and guided the line of argument developed in the presentation and the analysis of the findings.

What is worth noting is that the trigger for this set of inquiries was initiated by the theoretical propositions of the study's conceptual framework. Nevertheless, as the bulk of the data started increasing, the explanatory power of the empirical findings paved new paths for perceiving the dimensions of power and to some extent challenged the traditional premises governing the employment relationship. It was through the continuous and iterative juxtaposition of theory with empirical facts that new meaning about the subject matter emerged and a deeper understanding has been achieved (Lofland, 1976).

The analysis of the empirical findings aspired to provide some answers to the following concerns pointed out in the literature review and framed by the theoretical assumptions and presuppositions of the study: a) If we take as granted that knowledge work is positively related to its lengthy embeddedness in a particular organizational setting, how can we then explain the provision of specialized IT services on spot basis? What is the nature of this knowledge that allows it to be specific to the firm and at the same time transferable across organizational contexts? b) If we assume that knowledge-intensive work resists managerial rationalization and supervision, how are the interests of the client-firm and the contractor aligned and ensured? Are there any alternative mechanisms that prescribe certain behaviors and safeguard the balance of the asymmetrical employment relationship?

The analysis of the findings suggested that an attempt to comprehend today's IT freelancing practices brings us against with two blocks of consideration: a) the way the functional base of the work is currently organized, and b) the socio-economic edifice and organizational surrounding that frame and support the meaning and actual practice of this work.

The free exchange of highly-skilled IT services between the IT contractor and the client-firm, instead of simply being subject to the rules of supply and demand

governing spot markets, tends to be highly contingent on the technological infrastructure and socio-economic conditions which govern the current workplace. "Rather than being given by a transcendent power, work conditions are the outcome of the social and institutional relations, and the cultural predispositions underlying a social order" (Kallinikos, 2002a).

The meaning of effective performance and the effective organization of work flows cannot be reduced to a single logic that remains constant and unchanged over time and across organizational contexts. What constitutes a successful form of organizing should rather be searched out into the particular spatio-temporal, social, economic and technological conditions which surround the work activity. In other words, to call for a particular employment form which is alleged to be socially and economically effective, is to call for a type of organizational structure that can be realized under specific, predominant conditions. These conditions refer to the technology of the product or service, the task structure of the work, and the dynamics and specific characteristics of the social and institutional context within which work is embedded (Perrow, 1986). A socially optimum form of organizational structure in context "a" may be mediocre or even ineffective in a context "b".

The analysis of the findings suggests that the contingent employment relationship between the highly-skilled contractor and the client-firm seems to be associated with the use of particular technological tools the contractors possessed, as well as the emergence of concrete social and institutional conditions that ruled the IT sector.

According to the research findings, technical functionalities brought about by the extended use of object-oriented programming amplified the IT contractor's capability to perform efficiently in a volatile market of transient economic relationships. Contracting implied that the independent IT contractor-consultant should be able to address the diversified needs of a wide range of prospective clients, deliver efficient, reliable and customized IT solutions, charge almost half the price charged by large software houses and be able to work as a good team member. The study reports that the object-oriented tools and techniques appear to better serve and promote all the aforementioned objectives and conditions.

The implementation of the "information hiding" and "encapsulation" principles (Parnas, 1972) promoted enhanced modularity and independence among diverse parts of the code. Unanticipated and unplanned interactions among the different parts of the code have been restrained and the complexity governing the integration of large scale programs has been better managed. In general, the *controllability* that the IT contractor exerts upon his/her work product has considerably increased irrespective of whether the contractor works alone or as a member of a work team.

The OOP techniques seemed to facilitate the effective coordination of collaborative work undertaken by mixed teams of permanent and contracted employees, by promoting clearer divisions of labor; thus less interdependence between the work of different individuals is achieved. Practically that means that different parts of the software or project can be allocated to different individuals and be processed simultaneously. Communication between the different participants in the project is simplified and the fixing of potential mistakes or bugs is also facilitated. Decisions and the execution of decisions are localized to the individual's area of responsibility (to the particular component of the project) and their impacts are not spread all over the system.

Furthermore, such a clear division of labor supports the capability of the contractor to safeguard and be held accountable for his individual contribution in the overall work and, simultaneously, it provides the client-firm (or the project-manager) a sense of control over the outsourced work. From the contractor's perspective, the prospect of being able to account for one's own work output is a necessary prerequisite for building a good reputation and ensuring future employability. From the client-firm's perspective, assigning distinguishable parts of work to independent contractors and estimating the respective outcomes is an implicit mechanism of supervision and control.

In addition, the principles of "information hiding" and "encapsulation" in conjunction with the concepts of "inheritance", "polymorphism" and "dynamic binding" allow for the incremental and piecemeal production of *flexible* software systems (Mathews, 1996; Sircar *et al.*, 2001; Yourdon, 1994). Software systems

consist of independent, loosely coupled, interchangeable and semi-autonomous parts which can display a variety of behaviors and interact with one another through the establishment of carefully negotiated and stable interfaces. An object can be changed or replaced, leaving the system still functioning. The system consists of "smaller, more manageable units that behave as mini-systems in their own right but can be coordinated as subsystems of a central intelligent super-system" (Mathews, 1996, p. 249)

In other words, the components (objects) of the system can be easily reshuffled and recombined allowing the contractor to decompose or compose a system anew according to the imperatives set by the objectives of the specific business project. The IT contractor can re-use a great deal of already made software components across different applications, as well as creating new components just by making minor changes to the overall bulk of the code. Objects and their classes –the building blocks of object-oriented programming - are n-dimensional entities with can be tailored to the specific needs of the prospective customers and can be transferred as a self-sufficient whole (without being subject to any significant semantic alteration or distortion) across diversified organizational contexts.

Moreover, commonalities in the structure and standardization of the way the components are produced create a good base of communication among the team members, while the user-centric character of the objects facilitates communication and cooperation between the client-firm and contractor. The aforementioned remarks become more acute when it is considered that the contractor is called to develop customized services for a client-firm that s/he is not familiarized with and when s/he is expected to cooperate with people s/he does not know.

The research shows that the increased level of standardization and visibility of the software development process brought about by the object-oriented programming paves the way towards IT knowledge transferability across different organizational environments. In particular, the research findings attest to a) the ease with which code can be reproduced, b) the possibility of transfer and use of already made parts of code intact across contexts and applications, as well as c) the immediacy of communicability and comprehensibility of OOP by which local actors (Hasselbladh

and Kallinikos, 2000) seem to constitute necessary conditions of freelancing practices.

What is worth noting is that apart from the technical functionalities of programming techniques, there is additionally a complex circuit of institutional and social processes that delineate the particulars of the contracting activity and support the sustainability and efficiency of the contingent employment relationship.

First of all, the globalization of the economy, the connectivity of markets (Castells, 2000) and the isomorphic tendencies of organizations (DiMaggio and Powell, 1983) seem to create similar and highly standardized working environments with relatively standardized kinds of needs. The logic of object-oriented programming, which relies heavily on the notion of generalization vs. specialization, (creating a general abstract category of objects – *the class* - and then extracting several objects out of this class; each object is a specific instantiation of an abstract class) fits perfectly in the contemporary business landscape filled with similar enterprises addressing the needs of a common audience.

Secondly, in the Greek economy there have been particular economic conditions that rendered the choice of freelancing as desirable or inevitable (Kunda *et al.*, 2002). The highly skilled employees wanted to escape the irrationalities and instability of organizational life (Barley and Kunda, 2004; Kunda *et al.*, 2002), while the managers of the firms preferred to avoid hiring high-maintenance personnel in light of economic turbulence.

Thirdly, before entering the contingent labor force, the majority of the contractors had already built a professional network (Barley and Kunda, 2004; Osnowitz, 2006) through which they could search for new contracts and close new deals. This kind of network, consisted of ex-peers, fellow university graduates, people who had worked jointly in projects or people who had attended specialized seminars, etc.

Especially in Greece, due to a) the size of the IS market which is relatively small, b) the relatively high levels of executives' mobility, c) easy ICTs – mediated connectivity among firms, d) limited number of well-reputed universities in the IS

discipline and e) the culture of a close, "family-centered", "egocentric" society which has always been cautious towards "strangers" as potential enemies, the mobilization of professional networks and the cross-checking of information for detecting the best possible candidate was both desirable and feasible.

In practice, this kind of professional network constitutes a layer of protection for both the client-firm and the IT contractor. On the one hand, the client-firm could receive timely and accurate information about the potential candidate and thus increase the likelihood of finding the proper candidate for the work to be undertaken. Although the work performed by the IT contractor is not subject to managerial monitoring and control, the final outcome can be relatively guaranteed not only through the terms of the contract, but also through the references (related to the IT contractor's past work achievements and reputation) given by trustworthy agents (Granovetter, 1985) of the professional network. In this respect, the notion of "*control over the work outcome*" seems to be supplemented by the notion of "*control on and access to informational resources*" regarding the prospective contractor's professional conduct and reputation.

On the other hand, the contractor's membership in these networks reduces the possibility of staying unemployed for lengthy periods of time. Through these networks, the contractors could spread their reputation and become more visible to a large pool of prospective client-firms. In particular, these informal professional networks provided the credentials about the professional knowledge, ethos and prospective reliable behavior that their members potentially display. Although they did not have the formal power that institutionalized professional associations have, they still have had the power to invoke particular kinds of behavior. Under this scope, the notion of "*commitment*" in exchange for a secure career ladder and long-term benefits was replaced by the notion of "*reliable professional behavior*" in exchange for being repeatedly employed by the same client or being continuously introduced to new client-firms.

Apart from being a layer of protection against unemployment (Barley and Kunda, 2004) and a guarantor of professional conduct, parts of these professional networks have proved to be significant repositories and beehives of professional knowledge.

The networks formed by ex-peers and friends who share the same professional interests, alongside the specialized sites and virtual IT communities (user groups and bulletin boards) replaced the traditional fellowship among co-workers operating under the very same roof. Through their participation in the informal professional and virtual communities, as well as through the use of specialized web sites, the contractors updated their already acquired technical knowledge, built new knowledge and elaborated on the intricacies of knowledge by ongoing social interaction. "Intermingling" with peers and sharing a repertoire of commonly accepted norms and resources (Wenger, 2000) is the process through which technical competence and expertise is tested and built in practice.

In sum, it could be argued that IT contractors had to redefine their relationship with the current workplace and reconsider issues related to their occupational identity. The case of an institutionally established professional body or a promising employing organization to constitute an object of attachment and identification did not exist anymore. Emergent social formations, such as informal professional networks and virtual communities have been the primary source of occupational identity and the main drivers of the IT contractors' behaviors. Gaining legitimacy in the eyes of the community members implied the adoption of particular behavioral patterns and work practices which expanded beyond the specificity of the technical task under way.

In particular, as far as power and control dynamics are concerned, the research findings indicate that there are two basic mechanisms that control the IT contractors' behavior: a) normative mechanisms of control which originate in contractors' struggle to build a coherent identity in a scattered work place and stay continuously employed, and b) more explicit or coercive mechanisms, found in the regulative content of the contract itself.

Even if the possibility of breaching the terms of the contract is ever-present (Williamson, 1985), the contract still represents a substantial coordinator and regulator of the economic transaction between the contractor and client-firm. Adopting the principles of project management, the terms and jurisdiction of the contract aim at specifying as explicitly as possible the successive phases of the

completion of various components which jointly constitute the overall project: what it will be delivered and when. Consequently, the content of the contract is structured so as to increase the visibility of the obscure production process and enhance control over the completion pace of the assigned project.

In conclusion, the study showed that the spread and sustainability of IT contracting can be better understood through the parallel juxtaposition of a multiplicity of conditions. Informal networks and communities appear to substitute part of the roles traditionally held by the employing organization, specific technologies provide enhanced possibilities for knowledge transfer and collaboration across settings and the overall trends of the global economy favor individual forms of employee involvement in the production process. The research findings suggest that IT freelancing is technically feasible, socially approved, organizationally performative and contextually justified.

## 8.3 Discussion-Contribution

### 8.3.1 Contingent employment patterns and the shifting nature of the functional base of IT work

The study of highly-skilled IT contractors epitomizes the emergence and spread of non-standard working arrangements in knowledge intensive sectors of the economy: highly-skilled agents sell their services to a wide range of firms in exchange for an hourly based or fixed enumeration; their knowledge capital becomes the object of a spot transaction sealed by the signing of an outcome-based and time-limited contract.

What makes this study different from other studies tackling the issue of IT contracting is the fact that it focuses solely on expert work and brings to the fore the significance of technological infrastructure for contracting practices. Recent contributions to the relevant literature have tended to focus more on the social, organizational and economic aspects of IT freelancing (Barley and Kunda, 2004; Evans *et al.*, 2004; Laubacher and Malone, 1997; Mayer and Nickerson, 2005; Newton *et al.*, 2007), downplaying or ignoring the potentiality of the technology to actively support or enable such work practices. Contrarily, the current study aimed

at dealing both with the technological and socio-institutional conditions which jointly underpin the spread and sustainability of freelancing practices in the IT sector.

In particular, the research promotes the view that an adequate understanding of employment forms necessitates a thorough investigation into both the technical infrastructure and organizational patterns that govern the production of the particular work. "..technology, organization and work co-evolve. Although cause and effect are difficult to untangle, sweeping innovations in organizing seem to accompany fundamental changes in technology as well as broad shifts in what people do for a living" (Barley, 1996, p. 404). In this sense, the research findings show that technical functionalities allow for the codification and transferability of IT knowledge, while social and institutional processes and trends (partially supported by new technologies) allow for the effective management of the inherent controversies of the contingent employment relationship. Each of the conditions related to the sustainability and spread of freelancing is proved to have its own dynamic and at the same time be part of a larger wave or movement marking the particular era, global space and time we live in.

As already presented in the previous chapters, object-oriented programming techniques in conjunction with internet technologies created new possibilities for organizing IT work. Object-oriented programming methods celebrated outright the axiom of modularity promoting better visibility and controllability of the production process of software. The software system produced is constituted by interchangeable, autonomous, homogenous and loosely coupled modules (objects) which interact in a standard way, through the exchange of messages on carefully designed interfaces. Each module has an identical structure (each object is constituted by its methods and its attributes) and is incrementally generated through the inheritance of specific characteristics (methods and attributes) donated by other more abstract, more "general-use" or progenitor modules (classes) (Mathews, 1996). The structure of the system resembles a flat and malleable network of interacting, interchangeable and independent nodes, while in their turn constituted by a web of hierarchical relations. The rationale which governs the internal structure of each node draws upon the notion of detailed categorization and piecemeal specialization.

The construction of individual nodes is viewed as a transition from more generalized cases to more specific ones (Bordoloi and Lee, 1994).

Although the complexity characterizing the system under development remains the same, the modularity, commonality and coherence in the structure of the system and its constituent parts drastically improved the possibility of legibility, control and understandability of the overall functioning of the system. A part of the individual's discretionary choices about how to link the different parts of the system together and how to develop the internal structure of sub-modules is encapsulated and objectified into the combinatorial rules and basic development instructions articulated by the object-oriented language providers. These rules are universally accepted, explicitly articulated and easily communicated among members of the IS community; the programming action becomes more systematized, and the division of labor and allocation of responsibilities are better achieved, while the integration of independently constructed parts of the code is eased. The contribution of the individual effort (the contractor's area of responsibility) is rendered more discernible and potentially more controllable.

Interestingly, once knowledge is disentangled – at least to a certain degree - from the agent who initially carries it and additionally from the context of its application, and is carried away in symbols which are disjointed and finitely differentiated, a new playfulness becomes possible (Zuboff, 1988). Once the IT engineering knowledge is codified and organized into scalable objects, logical categories and distinguishable taxonomies (objects and their classes), its constituent parts and the relationships among them are illuminated and combined into new ways. Plenty of the already constructed components (the notion of the "libraries") can be separated, reshuffled or recombined anew to produce various kinds of applications, while new components can be easily generated through the slight differentiation of existing ones. Taking into account that the diverse objects are freely and easily interchangeable among themselves (corollary of the great independence and the standardized mode of communication between them) and can be transferred intact among various contexts and applications, it is plausible to deduce that the number of possible combinations among them is almost limitless. The IT person can easily

conceptualize alternative scenarios and discover new potentials for software designing that would otherwise be impossible for to identify.

In other words, the process of software development tends to impinge upon the notion of mass customization. The possibility of recombinability of scalable, malleable, portable and interchangeable components enables the mass production of highly diversified and customized services. Once the prototype is produced (the class or the object), many versions of the same prototype (instantiations of the object) may be generated. Taking into account the increased number of diversified components and the possibility of the recombinability and reshuffling, it is possible to assume that the potential number of final applications can be inexhaustible. In the same token, the same individual can offer customized services to a great variety of client-firms across different organizational contexts, by using the same or slightly diversified materials. The software programs, relying upon the philosophy of object-oriented programming, can be written at a level of generality and a degree of scalability that transcends the particular conditions and context of practice or a particular application (Mathews, 1996).

Taking into consideration the above, it can be argued that technology evolves and organizes its cognitive elements in such a way as to overcome deficiencies and problems, stemming from the inherent complexity of code writing. But shifts in the way programming languages are cognitively organized, - shifts which are driven by the struggle of IT engineers to better manage complexity and meet the criteria of efficiency and controllability - impact upon the way work is actually performed. Object-oriented techniques, just like every technical artifact, represent a set of "standing possibilities" (Searle, 1995), in the sense that they prescribe, at least to a certain degree, what an IT engineer can do and how s/he can do it; in other words, technology, following a well specified rationale of efficiency, seems to provide new possibilities of action and support new ways of work organization. The design choices which are embedded within the particular artifact (programming language) have "a 'taken for granted' quality" (Pollock and Williams, 2007) which cannot be overshadowed by its contextualized use or appropriation.

### 8.3.2 The Social Roots of Contingent Employment revisited

Interestingly, the possibilities of action enabled by the use of particular technological tools appear to be strongly reinforced by the parallel emergence of new institutional formations, such as virtual professional communities (Barley and Kunda, 2004). These communities impact upon the regulative power of the market and appear to be increasingly involved in the sustainability of contingent employment arrangements. These emergent social assemblages of agents sharing the same professional interests appear to provide a) the resources for knowledge updating, b) the credentials for expertise possessed and practices followed and c) the referrals for future contracts. For contractors, they become the locus of social interaction, the primary object of professional identification (Laubacher and Malone, 1997), and a source of job opportunities.

In a sense, the aforementioned informal communities, largely empowered and enabled by the use of the Internet, appear to counterbalance the negative aspects of freelancing; the possibility of cost-effective connectivity and information sharing renders freelancing more "approachable", "technically feasible" and desirable for many highly-skilled engineers. The internet fora, bulletin boards and user group operate as an antidote to professional isolation and knowledge famine and support the freelancers in their struggle to stay "marketable" in a highly competitive and volatile working environment (Kunda *et al.*, 2002; Osnowitz, 2006).

Finally, the overall trend of globalization and homogenization of the contemporary workplace creates a common platform for business understanding and business applications. The emergence of virtual communities of practice resides exactly on the homogenization of concerns, interests and prospective solutions met or pursued in the IT industry worldwide. Although each organization is unique, organizations which belong to the same business sector and address the needs of a globalized audience tends to share many common features. The business logic remains the same while the particulars of the various application change. And rather than being accidental, object-oriented technologies and scalable and interchangeable components seem to fit and serve perfectly the aforementioned rationale of modularity and recombinability. "social and economic factors influence which

alternatives become institutionalized but almost by definition, innovation expands the space of technically feasible alternatives" (O'Reilly, 2005; Pentland and Feldman, 2007, p. 785)

### 8.3.3 The contingent employment relationship and the broader socio-economic and institutional setting

Apart from the possibilities of action enabled by the use of particular technological infrastructures and the formation of particular social groups, there are parallel trends in society and related discourses which impact upon the organization of work and the crystallization of employment forms. For instance, modularization of programming action seems to coincide with a growing individualized work ethic which glorifies the organizational flexibility and paves the way for the de-standardization of labor (Beck, 1992).

In particular, within the transient and constantly shifting work environment, the focus of the economic activity becomes, firstly, the individual itself, and, secondarily, the group or the hierarchy. Work loses its collective identity and becomes increasingly individualized in many of its manifestations; the discourse of individualism pervades working conditions, corporate culture, individual interests and the philosophy of business projects (Beck, 1992; Beck, 2000; Castells, 2000). Organizations, in their attempt to promote organizational flexibility and increase the possibilities of adaptability, encourage individual forms of employee involvement challenging the traditional terms by which individuals were tied in formal organizations (Jenkins, 1998; Kallinikos, 2003; Welsh and Leighton, 1996).

More precisely, the discourse of individualism alongside the discourse of organizational flexibility seeks to allocate responsibility and assign accountability to independent and discernible individual nodes which are loosely coupled in network-like forms of organization. These nodes-agents are expected to be able to enact a wide range of roles in an attempt to better support the organization's struggle for adaptability to the continuously shifting contextual conditions (Luhmann, 1996). "People are conceived and fashioned as though they are made of a relatively independent number of behaviors that can be invoked individually or in combination

to respond to the varying demands produced by the deeply differentiated and dynamic character of the contemporary world" (Kallinikos, 2003, p. 607). The image of the self-regulated and "self-programmable" agent (Castells, 2000) who can easily move between varying and shifting roles, or even between different organizational contexts, if required, seems to be the desired profile of tomorrow's employee.

It comes therefore as no surprise that the subcontracting of IT services tends to become a prevalent form of employment in a highly individualized workplace which struggles to meet the criteria of flexibility and efficiency. "It is a neo-liberal, marketplace logic that treats individuals as the locus of decision making and holds that efficiency, quality and productivity are best achieved through markets" (Kunda and Van Maanen, 1999, p. 76). In post-industrial societies, the governing logic is that of the free market and mass customization; the notion of the "monad" is prioritized: individual independent IT contractors are called to address the particular needs of every single client-firm. In other words, contractors sell their skills to the potential client-firms with whom they are related through contingent, transient relationships largely governed by the rules of the market. Contractors and clients jointly produce a cumulative level of supply and demand whose equilibrium is a particular price (Barley and Kunda, 2004). The work is dissociated from particular sites and labor becomes an object of spot exchange; the employment relationship between the two parties lasts as long as the contractor needs to complete the project assigned. All the responsibilities for the welfare and professional development of the employee shift away from the employer to the individual contractor (Beck, 1992; Kunda and Van Maanen, 1999). IT contractors need to carry the burden of their professional training and life-long learning, ensure their employability and cover all the expenses related to their pension schemes and health insurance (Kunda *et al.*, 2002).

A new spectrum of possibilities, masking sources of both opportunities and threats is now available to the diverse players of the market. Power is recollated, the dynamics of employment relationships are under constant change and what will

finally produced, how it will be produced and for whom is something which remains to be seen.

### 8.4 Conclusion

The significance of this study to organizational scholars and business practitioners lies in the fact that IT contracting constitutes an exemplary case for understanding new forms of organizing in knowledge intensive sectors of the contemporary workplace. The findings suggest that current employment forms, such as the subcontracting of highly-skilled services, are not neutral, objectively defined ways of organizing labor; nor can they be solely explained by strictly functionalistic or utilitarian criteria. They are complex mechanisms of coordinating work which appear to be closely intertwined, co-evolve, shape and be shaped by a perplexed web of technical tools, organizational practices and social discourses.

In particular, there seems to be a perplexed sum of conditions which jointly produce the prerequisites for the spread of freelancing employment patterns. Each of these factors constitutes a necessary but not sufficient condition for the understanding of the subject matter. Technologies under use are proved to strongly facilitate and support the flexible production and easy transferability of software components across software applications and organizational contexts, while the social, organizational and institutional contours pave the way for the mobility of individuals and the loosening of the employment relationships

On the one hand, the way programming languages and technological tools objectify and organize their tasks partially prescribes the possibilities for the emergence of particular modes of behaviors and courses of action. On the other hand, the social context cultivates, in turn, particular frames of mind and thought; it formulates the collective consciousness and makes some courses of behavior seem compulsory, inevitable or desirable. In other words, the possibilities of action embedded between the design of technology (the cognitive structure of programming methodologies) along with the exploitation of these possibilities through the use of technology under specific social settings allow for the particular patterns of organizing work and

employment to emerge. What appears to be a necessity is closely related to both the technological material potentials and the particular contextual idiosyncrasies and conditions which frame the human activity (Knorr-Cetina, 1979).

In this respect, it is important to stress that a substantial conceptualization of the impact and significance of subcontracting necessitates the parallel juxtaposition and historical analysis of the various social, technical, organizational and economic conditions surrounding the phenomenon under study. Understanding the changing nature of work and how this change co-evolves with the widespread social and technological frames is a first step for the substantial comprehension of current forms of organizing and employment patterns (Barley, 1996). "If we wish to understand the changes in the workplace...we must consider not only factly the impact of technology. We must also consider the roots and the enablers of the changes, those social, political legal, economic and cultural factors that help to explain why things have changed as they have changed in the past and are changing in the manner in which they are changing today" (Winter and Taylor, 1996).

## APPENDIX:

*Table 1: Interviewees' technical specialties, projects involved into and years of experience*

| *No.* | *Technical Specialty* | *Projects* | *Years of experience* |
|---|---|---|---|
| 1 | IT specialist | SAP customized applications | 6 |
| 2 | IT specialist | SAP customized applications | 8 |
| 3 | IT specialist | SAP customized applications | 7 |
| 4 | IT specialist | SAP customized applications | 5 |
| 5 | IT specialist | SAP customized applications | 7 |
| 6 | IT consultant | Management of IT projects | 10 |
| 7 | IT consultant | Management of IT projects | 20 |
| 8 | IT consultant | Management of IT projects | 9 |
| 9 | IT consultant | Management of IT projects | 12 |
| 10 | IT consultant | Management of IT projects | 15 |
| 11 | IT consultant | Management of IT projects | 12 |
| 12 | IT consultant | Management of IT projects | 15 |
| 13 | IT consultant | Management of IT projects | 17 |
| 14 | Web developer | Development and maintainance of websites | 5 |
| 15 | Web developer | Development and maintainance of websites | 5 |
| 16 | Web developer | Development and maintainance of websites | 5 |
| 17 | Web developer | Development and maintainance of websites | 7 |
| 18 | Web designer | Development and maintainance of websites | 8 |
| 19 | Web designer | Development and maintainance of websites | 10 |
| 20 | Database designer | Databases creation and management | 6 |
| 21 | Database designer | Databases creation and management | 8 |
| 22 | Architecture designer | Software designing | 12 |
| 23 | Software developer | CRM applications | 10 |
| 24 | Software developer | Network applications | 9 |
| 25 | Software developer | Network applications | 17 |
| 26 | Software developer | Supply chain Applications | 16 |
| 27 | Software developer | ERP applications | 12 |
| 28 | Software developer | ERP applications | 14 |
| 29 | Software developer | ERP applications | 14 |
| 30 | Software developer | ERP applications | 16 |

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