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**IDENTITY-BUILDING FOR DESIGN PROFESSIONALS: some issues from two
ethnographic fieldworks**

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Abstract

We examine why and how software engineers identify themselves so deeply with their activities, their trades and their companies. At its most, the accelerated process of innovation tests individuals' abilities to face new uncertainties regarding products, services, methods of working as well as professional sociability and the modes of self-construction at work. The milieus of intensive innovation form a tormented landscape in which the unfolding of the technological imaginary and the updating of high competences represent a challenge the face of the spreading of the sources of prescription and the destabilization of the space-time frameworks of the productive activities. How can professionals manage to save what makes them as subjects in the face of the relentlessness and the restructuring that affect them? The authors' analysis is directed toward the anchorage that makes it possible to resist the identity giddiness, the risk of dilution of sociability and the emergence of tactical and contingent behaviors. Indeed, the motives and processes of recognition in a context in which the identity benefits depend on work situation and are uncertain in terms of careers. That perspective is the guideline in two R & D locations in order to highlight how much the identity aspect of design work is an especially valuable factor of regulation of the perpetual movement in advanced technology organizations. When it is associated with a strong work sociability, it promotes a flowing cooperation, the critical point of matrix structures and the source of a lasting integration.

Key - words: matrix, identity-building, socialization, craftsmanship, skill.

INTRODUCTION

Identity for design professionals: a delicate question, a critical process.

Since the beginning of the 1980's, a « design revolution » has been disrupting the time frameworks for markets, organizations, and R&D activities. Profound changes have been taking place on several levels: the actual work involved in design has been confronted with various forms of activity on projects at different stages, with the self-regulation of the process within project groups and between different professions as well as with the acceleration in the

shortening of the design phase. Organization, at the institutional level, calls for redistribution in forms such as restructuring, change of stockholders, and the broadening of the research and development network. Matrix organization and multi-site configuration has considerably modified the modes of cooperation, the creation of collective belonging and the planning of one's professional future.

These companies are governed, in a domineering fashion, by the urgency of innovation and the rhetoric of adaptation to the point that these modernizing organizations falter when it comes to planning their continuity and envisaging their future. Pushed to its limits, this process puts to the test the capabilities of individuals to deal with new forms of incertitude concerning what they produce, their work procedures, along with their professional sociability and their means of identity-building.

Intensively innovative environments form a tormented landscape where multifaceted modernization does not unfold according to a known and reproducible scenario but one that is more complex and original. How can one be sure, in this shifting context of disseminating sources of prescription, of destabilized time and space frameworks in production, to simultaneously preserve the ability to learn, the transmission of the fundamentals in professions and the regeneration of technological imagination¹?. Comprehending technical work also requires documentation that links work activities, roles, and identities to industrial organization (both functional and projectized structures). The social organization of innovative design project work is an unique fruitful arena, ripe for sociological exploration.

More broadly, what permanent fixtures allow one to weather this identity crisis, this risk of dilution in sociability and tactical and incidental behavior? What today are the driving forces and the processes of identity-building in a context where work interactions can not be summed up by the simple relations of functional cooperation and authority, where the benefits for identity are rooted in the work situation and uncertain in terms of one's career?

This problem of the identity-building experience in one's work with professionals in advanced technological environments will serve as the unifying thread on two R&D sites. Design identity characterizes itself by a strong identification with one's profession and one's company as an area for the development of professional career paths. Associated with strong sociability at work, this design identity paves the way for harmonious co-operation, the critical point in matrix structures and source of durable integration. The identity-building aspect constitutes a particularly precious factor for regulation in the torment of perpetual movement in organizations.

¹ With this neologism opens an ever-renewable area for the production of innovative goods and services, with values as a going concern, for markets which cannot yet be represented using the technical possibilities which could be pushed aside. With their imagination, men fill the gap between our ordinary daily world, with its constraints and its routines, and our aspiration towards the abolition of obscurities and going beyond limits that progress unceasingly reactivates as conquests are made and satisfaction is obtained.

1. The dimensions of the identity-building experience in organizations wrapped in radical uncertainty ²:

The question of identity has forcefully come back today at the very moment when it has been pushed aside and become a problem. The wavering in the modes of defining oneself constitutes an indication of a crisis, inseparable from the rise of a society of individuals (Dubar, 2000, Martuccelli, 2002,). The crisis in the social link and the collective categories of identification creates tension in the process of identity-building. The individual emerges as an atom in modern societies, emancipated from traditional frameworks which forged him. Socialisation dreaded as a process of acculturation has given way today to an interpretation of socialization processes constituting the lion's share of experience (Dubet, 1994) as the driving force for subjective experience.

If life experience at work indeed constitutes the melting pot for socialization (Sainsaulieu, 1977) and for the production of collective belonging, the identity-building forms (Dubar, 1991) have profoundly changed and illustrate the possibilities of access to more restrictive recognition. Substantive and stabilized identities in work relations give way to identity-building scenarios which are less sign-posted and more uncertain.

1.1. A crisis in the transmission of work activities

Companies involved in intensive innovation encounter the following paradox : they combine their ability to produce innovation in the form of new uses or functionalities for highly technological products. A high level of professionalism is required to gain a firm grasp on the window of opportunity which compensates those who arrive first in a given market. However, project management relegates to the background the time needed for the social production of these high-tech skills and their adjustments, by only recognizing their immediate availability.

What the sociology of work activities and craft clearly reveals to us (Osty, 2003) is that the social dynamics in a work activity are part of a long process since the performance in a work activity is measured using its mechanisms of circulation and its regeneration of practical knowledge. Stated otherwise, it is important to consider professional socialisation as the result of the effectiveness of highly qualified knowledge. Actually, the skills required for design cannot be directly mobilized in the marketplace, as they are supposed to be socialized, that is to say to be developed at the heart of work interactions. The perfection of an art represents the aim of assembling people from a work activity as was the case in bygone corporations (Coornaert, 1968, Sewell, 1980). That shows how much know-how contributes to a feeling of community by putting the accent on the transmission of knowledge, standards, and values between generations. This constant reference when learning a work activity, its practice and its transmission is still essential to journeymen, who strictly go by the book and consider their initiation to its "secret" the foundation of their belonging to the community.

² The expression radical uncertainty refers to situations in which the actors have no certified knowledge of what the possibilities, categories, circumstances, or results of their action could be. This incertitude is the fruit of the interaction among several factors, including the need to incorporate the latest advances in applied science, to globalise the supply of products and services, to simultaneously make the most of economies of scale and the customizing of solutions for niche markets. Reducing incertitude is only possible after the fact, once the effects of one's actions are known.

In constant contact with these references, professionals form an identifiable group, through work which permanently re-interprets the foundation of their knowledge, given present day enigmas. Limited knowledge gives way to experiential knowledge which updates itself through the events (Zarifian, 1995) encountered. Even so, the dynamics of learning a craft remain fundamentally rooted in the practices of journeymen and the modes of cooperation among peers.

It is with this dimension of professional dynamics that bits of tension appear in connection with the modernising of management practices. Contemporary organisations are less and less companies with a memory or which draw upon any previously established model. The disturbances resulting from instability (Alter, 2002, 2003) produce situations which sometimes go as far as a state of political and organisational panic (with structural transformations which are successive and close together in time, with strategic about-faces, with pressure towards the acceleration of time and pace) jeopardizing the conditions of an identity-building experience in a work activity. The major time frameworks which set the pace in the life of contemporary companies seem to have been erased under the attacks of “short-term goals” which are more and more present. In this way, and the paradox is only apparent, as cognitive and technological abilities for innovation progress, their representations falter. They lose ground due to the illegibility of their structures, their permanent adaptation, and the correlative opaqueness of the future.

Work activities and craft here are presented in a defensive form ready to combat the whirlwind of organisational and managerial changes to production structures. Craft attempts to preserve areas for professional socialization in a secret way sometimes, when managerial indicators reduce work activities to simple exploitable resources. What remains to be understood is the way in which these seasoned and expert practitioners manage to inject their work situations full of the aspirations and ideal of the profession which underlie their commitment ?. What is the nature of this work experience which leads the individual to build his own standardized universe, to reinforce his relationship with the traditions of the work activity to which he identifies himself ?

It is in this way precisely that professional identities stabilized around work activities (whether they be communities of practitioners or functional identities in organisations) can no longer be designated as inherited or transmitted identities, even if one admits that they can be reworked. They take form through concrete work experience and are updated according to one’s interpersonal exchanges.

1.2. Identity-building scenarios

Through work experience, individuals build their own socio-professional identities using the diverse symbolic resources available. Belonging to a work activity or a category, events which nourish shared memory, codes, rituals and symbolic markers constitute as many influences on one’s identification to work. Professional identity can be analyzed as a scenario, which takes place in a given space and over a long period of time and which equally involves what makes up the substance of the professional world: standards, shared beliefs, representations of work/ the company.

Part of identity feeds on the experience of work relations (Sainsaulieu, 1977). The way one acts within the constraints of a situation reflects on the possibility of affirming oneself as an individual in work relations. Mechanisms of identification and differentiation play themselves out in the heart of the workplace as a basis for collective belonging, tracing the contours of real work sub-cultures through linguistic and behavioral norms. The permanence of collective

identities is a result of mechanisms of cultural transmission which anchor the identity-building process in the stability of the collective undertakings in the workplace. Actually, the spectre of identification models (Francfort, Osty, Sainsaulieu, Uhalde, 1995) broadens with the transformation of work situations, revealing new cultural models (concerning entrepreneurship, mobility, and public service) which are added to the models for growth years (concerning the bureaucracy, the profession, and the community).

In the end, professional identity is becoming a major phenomenon and is divided into several distinct modes referring to life at work as allowing one to take on a more meaningful role and gain more subjective experience.

However, greater affirmation of identity at work than in the past causes the collapse of traditional sectors of identification, making the quest for identity less certain and the modes of access for recognition more critical. The crisis of collective identities conveys a feeling of profound uneasiness and loss of meaning. The clash between the circumstances of the action and the cultural model of reference brings to light a faulty identity-building process and a fuzzy future on the horizon. The cultural dynamics of companies are thus based on the ability to bring to life a multiplicity of collective identities as well as offering sufficiently legitimate models for identification to allow for the recognition of commitment to work, which is asked of employees more and more (Sainsaulieu, 1997).

Recognizing in companies a socializing function goes back then to favoring the emergence of the dynamics of cultural apprenticeship. These dynamics are based on the development of strategic abilities generated by new relational experiences. According to R, Sainsaulieu, it is at the confluence of recognition modes (work, belonging, risk, career path, confrontation, resistance) and the successive ages of companies that the principles of identity affirmation appear (Sainsaulieu, 2001, p. 101).

Moreover, the diversity of identity-building forms according to the criteria for gaining recognition and biographical continuity (Dubar, 1991) emphasize the importance of taking into consideration one's relationship to the institution and the relationship to one's biographical career path as other guidelines to understanding the modes of identity-building. The identity-building scenario feeds on three major stages of commitment : one's relationship at work as a potential area for subjective experience, the relationship with one's peers as an area of belonging and the relationship with the company as an area for institutional recognition (Osty, 2003). One's identity is a product of the intersection of two main transactions : an intra-psycho transaction where the question of discontinuities in one's career path meet tension in terms of continuity or biographical rupture. Observed in the analysis of work/study programs in the 90's, this biographical process updates itself according to functional, geographic, professional, or company mobility. The programs being less linear than in the past, they put social situations to the test as a stabilized area of belonging.

The second transaction creates interplay between the individual and the management system in its ability to offer or not some sort of institutional recognition. Putting the emphasis on the symbolic dimension in the methods for mobilizing labor highlights the fact that access to recognition is not open to nor acquired by everyone. The company is therefore a stage for the production of statutory and symbolic attributes which act as recognition markers. The crisis in the collective categories of identification (Dubar, 2000) defers part of the identity-building process to narrative and reflexive forms thus disqualifying themselves from being seen as substantive and stabilized identities.

Being able to grasp the identity-building process using movement supposes creating order in the variety of identity-building scenarios or in the places where these scenarios take place³. When confronted with less attributed, more progressive and unique identities, it is advisable to have analysis charts to be able to identify the types of trajectories and the methods for identification as unforeseeable re-organisations, accelerated or distended time-frames, or the lessening of available spaces occur.

The question surrounding the construction of professional identities in the world of intensive innovation is without doubt in the nature of identity-building scenarios. This chapter aims to shed light on the process of construction of work identities emphasizing the point that identification with a conceptual activity results in a process of subjective experience at work. We will then show that professional socialization necessitates the edification of networking links, and a sociability of various intensities. Another area of identification and recognition has been added to the analysis of the work experience and concerns the institutional dimension of identity. Identification with one's company in this way represents the perimeter of professional projection for individuals.

1.3. Two worlds of conception hit by movement

The results presented are excerpts from a research program on the acceleration processes of industrial time and their social effects on conceptual activities and the work of professionals (Minguet & Osty, 2008). These two monographs (see figure 1) are involved in an intensive and repeated innovation strategy concerning either the supply of dedicated microcircuit functionalities (IXEL), or the supply of digital telephone exchange software for home and office phone lines and the transmission of broadband data in addition to internet access technologies (MARTEL), for the development of new strategy segments (products, customers, markets). The two fields have inherited a highly technological, professional and established organisation and have been subjected to an aggressive policy promoting exchanges within the organisation, the coupling of work activities and projects, the skills and commitment of professionals, and the increasing flexibility in the workplace.

The IXEL site is part of a worldwide leader in the design, manufacturing and marketing of advanced semiconductors (10 000 employees), whose headquarters is in the Silicon Valley in California. It is particularly active in markets for communication systems, automobile systems, data processing systems, secure transactions, and in the field of aerospace. This site, for the group, represents the state-of-the-art for its skills in dedicated micro-controllers, and its expertise and production in specific technologies. This Business Center is made up of 300 people, of whom 80% are engineers and technicians.

Local technological skills encompass four fundamental elements in the product range : analogic integrated circuits, nonvolatile memory, micro-controllers and microprocessors, standard and dedicated logical circuits. The understanding of what a product is at a certain stage of advanced design has proven difficult, particularly since the professionals themselves only describe one of its dimensions, in the form of their expert contribution in the development process. The virtual and hybrid character of a product, which reconciles the characteristics of the material (silicon here) or the assembled supports (circuits, memory) and the characteristics of software and therefore languages make it difficult to comprehend.

³ The example of contingent work in the Silicon Valley, sheds light on the experience of three professional figures with itinerant expertise: the guru, the hired gun, and the warm body (Barley & Kunda, 2004).

In this sector, innovation is characterized by the high velocity in the complexification and the miniaturisation of products as well as by the rapid arrival in the marketplace of new products. Moreover, more and more markets, especially the applied ones, are only equipped with one « system » chip which covers the totality of its functionalities. The lowering in the cost of functions through the increase in integration density (the possibility to concentrate more and more possibilities on a ever smaller surface) constitutes a factor of technological innovation

Figure 1 : Two monographs

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Features	IXEL Site: *Conception, development and manufacture of micro –processors, * Skill area : micro –controllers for the group	MARTEL Site: * Conception, development, software manufacture and maintenance for telecommunications
Sector	Microelectronics	Parts manufacturer for telecommunications
Head Office	World Group	World Group
Geographic location	Western France	Western France
Structure	* A site divided in two : business center and manufacturing center * A matrix configuration : work activity-oriented organization and project-oriented organization	* A site organized into a profits center and a predominantly R & D center * A matrix configuration : work activity-oriented organization and project-oriented organization
Work Activities and skill areas	*Micro-controller products * Integrated product solutions * Airspace products * Advanced Design Department * Product Engineering Department * Business Management Department	* Systems architecture and specifications * Development * Testing * Engineering * Tools and support
Populations interviewed	Technicians and engineers	Technicians and engineers
Number of interviews	38	40

The second site, MARTEL, is part of a world group for parts manufacturing in telecommunications in the fields of telephony and data communications. The site is devoted to the development of new digital telephone exchange software for telephony and the transmission of broadband data as well as Internet access technologies. The site accommodates 670 people (of whom 80% are engineers and technicians). This R & D function is organized around product lines (home and office telephony) and Common skills. Present on this site are the 5 Competence Centers supporting the following poles: [1] Architecture and systems specifications, [2] material and software development, [3] testing, [4] product engineering, [5] After-sales service or maintenance support, [6] support for marketing offers.

The supply of telephone equipment software is a productive activity whose aim is to play a part in one of the main server's functions. This function is included within a package, so as to respond reliably to applications and to customer uses. A project has been elaborated to respond to developments in the server itself. Function development is written into a succession of functional levels; one example is the "intelligent terminal" function. The conception of a function refers to multiple developments in which their final assembly constitute a release.

The development activity is structured by the dual logic of processes (projects) and the areas of expertise (work activities). The five basic work activities functionally find their places in the accommodation structures made up of the service centers. The established methodology organizes conception and development by sub-dividing them into several industrializable and reusable sub-systems. This has brought about a time reduction for development cycles and a rationalization in an unfriendly environment. Concurrent project phases aim at reducing costs and the time for each cycle.

2. Identification with the activity of design

In this incessant ballet of organisational transformations, about-faces in strategy, product metamorphoses, volatile markets, work activities take on both reference points and symbolic investments. The basis for this professional identity is made up of technique. Both a vector for innovation, structuring work as regards work protocols as well as a rallying language, technique is also a source for Promethean imagination. It is endowed with positive qualities since it is inseparable from the innovation that it produces.

2.1. An asserted identification with work activities

In speeches, pushing a project is seen as a source of movement and disruption. Work activities are considered "the temple guardians" and constitute anchors which are particularly important since individuals feel they are tossed about in projects. A project is the source of a career opportunity in terms of the perilous adventure that it infers for project managers. It does not entail any significance in terms of identification and takes on a purely instrumental character in the identity-building strategies developed. On the other hand, the work activity ideal is counterproductive to cooperation, nourishes career projections, builds up affinities, serves as a reference despite the incessant organisational changes.

☐ *The work activity ideal : the figure of the architect*

Whatever function one occupies, one finds an unequivocal conception of the work activity ideal which refers to the figure of the architect.

The work activity ideal serves as a shared scale of comparison with which one measures his work situation and symbolic hierarchy in his work activity. Work mobilization of architecture refers to mastered techniques to be ordered in an original configuration (Boudon, 2004). It is in this way that work takes on a life of its own through a process of creation, of translation into technical language, of testing the functionalities of one's work given the materials used (their resistance, their compatibility), and of materialisation. Here, the creative team has recourse to technological grammar for programming languages, as a material basis to translate specifications into software to be able to handle new functions. The arrangement of the different phases is crucial for this, the necessity to take into account the context of implementation indispensable⁴. Design takes on an aesthetic attribute when its experts possess it in its highest form, thanks to the fruit of a long apprenticeship, and the resulting object is all the better for it⁵. Other cases have been reported : in an important comparative study on manufacturers of automobiles, aircraft, computer, and aluminum, the result obtained was that the aesthetics of the process and of the metamorphosis of objects were part and parcel of the company's strategy (Roberts, 1994).

Moreover, the figure of the architect incorporates the totality of the stages which contribute to the building of an edifice, from its initial sketches to its detailed plans all the way up to the coordination of the various trades involved. One's responsibility extends up to delivery and the guarantee of an absence of vice for a specific amount of time. It represents an accomplished working man given his mastery of a complete process and an ability to proceed with restorations or additions with respect to what has already been done. It is in this re-interpretation of the architect from which the players in the field of conception draw to create the classifications which give a discriminatory order to work activities.

The architect, as a working ideal, refers to a desire for mastery, which are revealed in two complimentary facets : the representation of the putting together of the various components of a telephone exchange feeds a shared fantasy, particularly strong since the complexification and the developments in a product cancel out any inclination towards knowing a product in its entirety.

Surrounding the serveur, the various software fit together like a Lego game but their overlapping and systemic effects, notably through the specter of server regression, highlights the complexity of the interfaces between the whole and its components. The concern for mastery includes the memory of the development of the product, to create appropriate technical responses to ensure the compatibility of functions and software from different generations.

⁴The reference to the figure of the architect and the work of design which characterize architecture in an ideal way has an obvious limit: an engineer's work does not at all encompass all its aspects as he simply makes a partial contribution to a collective product. Nevertheless, it is reasonable to assume that architectural work could be an incentive for action for some engineers.

⁵. One only needs to consult successive working drawings of models on a screen and on paper for the purpose of the mask: lines, colors, geometry, and proportionality. The mask is defined as the array used to engrave the purpose of an integrated circuit onto a semiconductor chip.

Creating a technological legacy and ensuring its longevity represent the reverse side of this imaginary absolute power. Besides, some evoke a time when it was still possible to know in detail the history of its development and the product through methods used in programming.

A product today, taken as a complex technical system and as technological history, is disproportionately big for it is no longer on a human scale, a product which is nevertheless the result of human endeavor⁶. Having become « monstrous » in the mythological sense, a product fascinates and defies its creators to gain control over it and submit it to their will. By escaping partial control by its creators, it takes on a mind of its own through the uncertainties caused by its behavior in the event of additions of new functionalities and transforms each function into a separate entity which equally escapes being counted as part of the accumulated body of knowledge :

Technological complexity feeds an imaginary challenge where one tries to go beyond a partial understanding of a product and a work activity so as to extract the underlying ideas as well as a subtle understanding of the details. The frustration refers to powerlessness and values those who get close to this ideal of control.

▮ *Product identification*

The product represents the culmination of a collective project, giving meaning to the individual contribution of each player by offering him a context for identification. But even more so, it incorporates a technical dimension which constitutes the means by which innovative work is carried out step by step. The omnipresence of technical language in interactions translates a shared acculturation of the field's conventions, and gives structure to relational behavior as well as the work activity itself. At each stage of development, the product only exists in the form of specifications, computer programs, test results before taking on a perceptible existence, in the form of a mask as for a microcircuit.

The product, if it comprises a generic dimension referring to the end of a project, comes into being differently for each of the people interviewed. Some say it is a question of processor core, a shared legacy with the IXEL group. This core therefore has various forms depending on the type of market and the nature of the demand, but it is one's core which is the object of value insofar as it is associated with a technological asset, a source of competitiveness. In this sense, it protects and it must be protected as a strategic asset because it has a relatively long life expectancy compared to the products it equips. The "core" reference becomes a source of identification by its vital and central nature for the developments to come.

For others, the product refers explicitly to the name of the project on which they are working. The challenge consists therefore in getting the product recognized as an object endowed with an objective and with functionalities which correspond to what the customer asked for.

⁶ Hybris (or disproportion) for the ancient Greeks was the erroneous movement beyond the limit. We have taken this idea according to which technological hybris is embedded in the innovative utopia which feeds imaginary innovation. The Utopian dynamic of advanced technology is by nature linked to a permanent state of insatiability. The work of design activates purpose and passion and spawns the necessary analytical work in mourning any possibility of total control.

Finally, the rapport with the product can take on another form : that of its ultimate use. The product is referred to according to its function in a given technological context. The examples of a product which control all the connection cables in an automobile or in MP3 technology are in this respect representative of the imagination mobilized in the activity of design. Here, it is the functionality which gives life to the product and identification takes place through the end-user to whom the project is destined. The focus on its use erases the complexity of the project's progression and gives it visibility through the product's usefulness.

▣ *A passion for technique as incentive to action*

The diversity of work situations and their upgradeability are linked to various combinations of projects and interactions to which individuals are confronted. The richness of work experiences thus favors an identity-building dynamic in which work content fully contributes to one's fulfillment.

The technical challenge is emphasized by designers as an incentive to go beyond one's apparent abilities. Basically, even if only part of one's work provokes a confrontation with one's own limits concerning the design of a product, that suffices to give meaning to the work activity as a whole.

There is a part of adventure in research to push back the limits of what is possible through miniaturization or the complexity of integrated circuits. Astuteness, curiosity, and the diversity of experience are the expressions the most commonly used to designate this form of clever intelligence, pointed out by the ancient Greeks through the notion of Metis ⁷.

On the other hand, others emphasize the mastery of an art, possessing some sort of specific expertise which confers upon he who has it an attribute which is particularly positive since it is rare. Enrichment in a field of expertise is, in that way, preferable to ingenious tinkering. The challenge of this position is more a question of step by step exploration of a limited field where a discovery leads to ever greater refinement. The tech watch dimension is particularly in a growth period because it designates an advanced sector of knowledge.

This penchant for technique has its roots, for some, more deeply in a traditional vocation. As a matter of fact, the fascination with technique results from a rapport with oneself and the world which transforms itself into a passion.

2.2. The work activity as an area for identification re-activation

The identity-building process feeds on an identification with one's work which presupposes a personal commitment to work. But this commitment finds conditions in the concrete experience of work to put this work activity ideal into practice. Knowledge of the field is now added to the inherent qualities in the activity of design. The sub-division into various professional figures follows from a more refined appreciation of the different work

⁷ In Greek mythology, Metis ("wisdom" or "wise counsel") was a Titaness who was the first great spouse of Zeus, indeed his equal and the mother of Athena. Metis was the goddess of wisdom, cunning, craftiness and deep thought.

activities which make up the design process. This sub-division points out forms of the work activity ideal which are more or less degraded depending on the constraints of the activity.

☰ *The qualities required for design work*

Technical skills are pre-requisites to « master one's subject ». At MARTEL, these skills concern knowledge of the system, a technical speciality, and also incorporate accumulated experiential know-how to which is added the construction of a memory of the various developments in the product.

These qualities are supported by the two-fold skill of analysis and the breakdown of problems to choose an appropriate solution in addition to a skill for synthesis to incorporate the development sequence within the whole. This coming and going between detailed analysis and putting it into perspective with other parameters constitutes the daily routine in the field of design.

Discipline is the core of a methodical approach which is combined with intuition so as to anticipate the hazards, as well as track down and correct the defects; The combination of these two apparently contradictory qualities necessitates a certain situational flexibility, being grounded in reality, and a consistent appreciation for the relevance of either one of these skills.

Discipline in the mobilization of expertise is equally emphasized as an essential quality at IXEL. Mastering technical knowledge and its mobilization allow one to apply one's work, but only if the framework within which the skills are being applied to is an innovative process.

A second skill involved in the design activity concerns ingenuity. Indeed, curiosity is coupled with the qualities of discipline and scientific method, resourcefulness, adaptability and intuition all mobilized in the process of invention. Curiosity is held up as a quality which forms the basis of crafty intelligence, a sideways glance at the system, allowing one to outwit the powerlessness of thorough knowledge.

On a cognitive level, the people interviewed demonstrate a certain flexibility in the situations they encountered, leading them, depending on the phase of their work, to favor their disciplinary side or their inventive side. Obviously, the positions they occupy call upon these skills in different ways but they outline a certain technical professionalism within a context without boundaries formed by the knowledge of what action to take. The life of a project retraces, in this respect, this alternation between tinkering and the rigorous application of a work protocol.

Technical analysis, tracking defects, changing projects demand active learning, putting the acquired knowledge to the test in uncharted territory, pressure and interdependence. Within this framework of constraints, various styles prove themselves in the way of carrying out a given task so as to reveal an aesthetic dimension, an elaborate subdivision of quality work (Roberts, 1994) .

Work considered "proper" refers not only to respecting traditions in integrated design, but also to the responsibility linked to the portion of work carried out, within the context of a

complex process. The absence of vicious circles linking overspending and non-quality represent the result of collectively assumed responsibility..

Mastering a technical specialization for experts in the field or organizing the phases for those involved in the interface, act as a resource when faced with the disproportion of system-products. However, renunciation of this fantasy of subjecting oneself to technique finds a solution in a dual attitude of humility and willingness to affront the risks. Acting quickly, having an astute eye, being intuitive, having flair and a method, and diagnosing problems is the daily work of experienced professionals.

Actually, work implies a combination between accuracy and being able to see the big picture, attention and reactivity, diagnosis and action. The mobilization of technical knowledge is inseparable from other less standardized qualities but just as important.

Another quality required in design work is that of endurance to stress when faced with project pressure. It is at the end of a project that all the unsolved problems come together, when in the testing stage. These tests constitute the ultimate filter before industrialization, to instill qualities in the product (still in virtual form) before it is transformed into a perceptible product. On the one hand, the designers, pressed by other projects, are looking to push the project towards its final stages, at the risk of discovering developmental defects, leading once again to more design work. On the other hand, the customer is waiting to launch his product and is pushing the deadlines. It is not surprising that the most stressful period is found in the last stage before industrialization. The ability to resist, to keep one's critical distance, to negotiate, to react promptly and to add a little oil to the works are all part of know-how for the various players in this field. It is not surprising then that they provide a large number of managers in current projects, being exposed themselves to time pressures. Actually, this emergency functioning becomes for some a « drug that one gets used to ».

Finally, networking skills represent a reservoir of cooperation resources when faced with an emergency and pressure. This relational knowledge is built up throughout various experiences in interactions. This system of interpersonal links distinguishes stabilized zones of cooperation from zones of exploration.

These various qualities mobilized in the design activity co-exist at varying degrees for all professionals working in design and they can be combined without negating each other. The surprising alliance between discipline and astuteness, personal endurance and opening up to a network translates the fluidity between sequences mobilizing more or less one of these qualities, organizational positions and the nature of the project.

☞ *A variety of mobilized figures*

Work experience combines the controlled and orderly acquisition of technological fundamentals and qualities resulting from work experience : ingenuity, expertise, networking, stress endurance. In this way, we see an outlined panorama which combines these various components and refer to four professional ideal-typic figures.

The combination of expertise and network mobilization refers explicitly to the figure of the expert, registered in a community of peers. This figure is very present in skill areas since it is within the context of the work activity in which professional socialization operates.

Allied with stress endurance, the figure of the researcher emerges since the setting for his work is in a system of time constraints which are particularly demanding in the field of fundamental research. Expertise leans on perseverance so that the inclusion of advanced design takes place in the best of conditions. Here this position is lessened by a framework of applied research but it is actually expertise which is mobilized as a primary resource to develop a product within a given timeframe.

As far as astuteness, ingenuity, the tricks of the trade are concerned, two figures come into play. The first is the inventor, who combines resourcefulness with network mobilization to promote his finding. The second refers to the symbolic figure of the fireman who, when faced with a given situation (particularly in unexpected and fast-paced situations), must react as quickly as possible by combining different types of knowledge so as to find an appropriate response.

If some of these attitudes are more present than others in certain departments, it seems that they are all mobilized in the act of innovative design and that they presuppose reliable working relationships. The process of recognition starts in the very heart of the workplace where the efficiency of each professional act serves as a yardstick to assess the professional's skills and one's peers in terms of the required qualities mentioned above.

▣ *Customer-tested and Project-tested work identification*

Work identification comes into focus in the concrete work experience of design and is troubled by the sudden arrival of the customer in the process and the subordination of work activities to projects. The work of design blends customers' demands and confronts the unfolding of projects with resistance. As a matter of fact, work identity is forced into making certain concessions in accomplishing professional ideals.

A work ideal turned toward innovation and perfection does not blend well with other contingencies, especially those related to deadlines. At IXEL, the Business Center structure and projectized organization have set up a dynamic tension between customer demands and those of product development. The marketplace places its demands on certain projects as a key factor even if the guarantee of the product's technical reliability must be relegated to a secondary consideration.

Renouncing technical perfection is not simple and certain designers point out to what extent time factors intervene and limit their work by placing a ceiling on their contribution.

Incorporating the customer's demands is relayed by hybrid actors coordinating manufacturing, certain designers, and marketing. Let us take note that younger workers are more sensitive to this customer contingency, which can even become a source of added value and a challenge. Giving up on optimum quality for a product results in added value for the work done by the customer.

In actual fact, if the center of gravity for development remains part of the design process, the improvement in sales and marketing counteracts design's symbolic influence. Concerning Application Laboratory, although they share with design a technical identification, a synthesis of identity develops sparked by the interactive experience with the customer upstream (specifications) or downstream (After Sales services). In fact, the customer is very much "an actor" symbolically within the context of Business Center and the learning process in this contingency becomes standardized since seeking customer satisfaction forces its way into

projects given the ambivalence of this satisfaction and the variety of customer demands according to the products/market.

On the other hand, at the MARTEL site, the work ideal for design is blackened by a progressive degradation of the conditions in which it is experienced. Rooted in an expert and technical dimension of the activity, it is disturbed by the project steamroller, embodying another representation of what it is to be a professional. The logic of the demand causes an inversion of perspectives, since the intention is to provide specific responses springing from organized technological know-how and to multiply the number of business transactions undertaken so as to increase profitability. This strategy pushes one to make use of existing assets by reducing the dedicated solutions in places where technological innovations allowed one to improve products in a relationship with one mono-client.

With the setting up of a management system per project, the ideal for expertise is taken the wrong way round because the rationalization of products is carried out by mastering a technique instead of organizing it. Subordinated by the double logic of profitability and standardization, the degradation of this identifying figure manifests itself through frustration as one has to necessarily forego the ideal for quality work.

The conditions for focusing on the work ideal in concrete work situations are no longer all available at one time and give rise to statements which counter the qualities associated with design work. The work experience in the project mode no longer allow one to reach this ideal work figure. Moreover, it does not allow learning to take place with the aim to construct a hybrid figure between the technical expert and the project entrepreneur. If the norm of deadlines is generally accepted, it is due more to the inescapable constraint of the internalization of customer logic. Respecting deadlines not only activates games of cooperation but also games of diversion and recourse to letting off steam although this only remains acceptable to a small degree.

Shortening the development cycle subjects professionals to considerable time constraints which leads to easing up on professional demands for quality. Furthermore, it is this abandonment of perfection in one's work which qualifies work as "dirty" and irrespective of tradition.

2.3. Identity classification on a scale measuring improvement

The work situation presents itself as a test which necessitates an identity-building transaction between the work ideal and the reality of the work experience. Not all design activities take the same form given that each person identifies differently with his work. There exists a limit of some sort which cannot be exceeded between the work ideal and the possibilities of putting the Promethean imagination at the heart of the work experience. The arrival of a market logic and management on a per project basis represent degradation factors in work identity. But the position in the cycle equally influences the conditions of a successful identity-building transaction. In fact, there exists within the same community of values a scale of prestige which inconsistently classifies work activities depending on the prestige ranking.

The lords of design

The various activities in the field of product design do not offer the same opportunities to develop a work ideal and are linked to a symbolic and hierarchical scale of work activities. At the top of this prestige scale, one finds the work activities which take place at the initial stages

in the process. These activities are closer to the figure of the architect. At MARTEL, the “lords” of development are found in the center of the “systems” department. They concentrate on the global vision of the product and create the guidelines for its transformation within a limited technological context. Their advantageous situation is reinforced by an upstream position in the V cycle in which there is less pressure and more room for maneuver.

Within the “development” entity, specification professionals are close to those working on systems in that they subdivide systems analyses into specifications.

The field of development nevertheless gets its renown and its added value from this work activity’s history. Detailed analysis marks the beginning of the production phase itself. The customized work of writing up the development principles is the handiwork of these professionals and places the author’s stamp on it. Development constitutes the core of design work since it is responsible for transforming the detailed analyses of the product into programming language and to divide the system into developmental building blocks. Development is categorized along with other construction activities and so gives birth to the figure of the builder. Development is the basis for enhanced collective identification in the very place where secondary identifications find their subdivisions according to the work activities involved.

At IXEL, the Advanced Design department equally incorporates the historical memory of design core and follows step by step the traces of technological ruptures such as those involved in the rise of volatile markets. It is the one really put to the test to spot developments and sources of added value in terms of business; it is also the most in demand concerning knowledge capitalization. It is in charge of the Dominant Design model (Hatchuel A, & Le Masson P, & Weil B.,2004), the guardian of the company’s technological assets.

Two skill areas predominate. The advanced design unit’s aim is to further future product designs, IP (Intellectual Property) developments i.e. available data blocks for a specification which are optimized, testable and transferable in the application’s environment (microprocessors and memory). Their objective aims to obtain a standard product while at the same time offering ad hoc functionalities. The application laboratory pursues a three-part task of description stemming from the specifications (linked to marketing and thereby controlling the technical-sales relationship with the customer), from validation (in terms of integration coherence), and from a tech watch standpoint (linked to design).

These two entities are the best placed on the work ideal identification scale because they come into play at the very early stages in the V development cycle in all projects.

☰ *Design piece-workers*

In complete contrast with the more nobler departments, we find Testing which takes charge of incorporating the parts developed and detecting anomalies. Unitary coding and testing represent the least prestigious departments. The extreme specialization of tasks, the assignment of teams to projects lead to a depreciation of the activity, referring to workers who “plod along”. This work activity concentrates the most constraints linked to the lower area in the V cycle as well as the threat that outsourcing presents (especially at MARTEL where a great deal of its testing activities have been outsourced to Rumania). Their position must also take into account the threat to workers (Francfort, Osty, Sainsaulieu, Uhalde, 1995). The terms “peon” and “assignable resources” indicate the gap between the ideal aimed at and the reality of a crumbling job over which they have no control. Without being able to develop a more global vision, testers are reduced to being in a frustrating position between the ideal of discovery and reality.

Between these two fields is found a continuum on which is positioned the various development activities.

The work activity of Industrialization represents an intermediary position at MARTEL. It is spared piece-work and a partial vision of the product by being the guardian of the server's memory. Its global and even more so his cumulative vision gives it some footing in recognition modes when compared to the company's other work activities. On the other hand, the dire need for it by customers and project managers propel it to the forefront of problems concerning following up on errors, support deficiencies and conflicting demands from those it deals with everyday. Tossed about among diverse constraints, it attempts to overcome this sensation of dissipation and the fear of being overwhelmed in an interminable race towards deadlines, standardization, and dependability.

Concerning the inter-disciplinary work of Tools and Supports, we enter into a different scenario. Offering support to a company's other work activities, it draws its powerful resources from its position as a crossroads, but it does not represent a unified work activity to which one can identify. It concentrates a lot of constraints demanding real reactivity and must cope with the outsourcing of certain activities. Its virtual lack of autonomy coupled with a rough definition of its scope of action makes it difficult for a process of enhancement. It is an identity in the shadows, where its technical side gives it its identity-building support.

At IXEL, Product Engineering is a recent department, squeezed between advanced design and manufacturing. This department positioned downstream from the design flow is in charge of validating the circuit and its industrialization so as to stabilize a given circuit and prepare its access to the manufacturing stage. It does not contribute to the design process in that it does not add anything to the micro-controller (it only tests and validates it) and yet its influence in the project is as the master control room. It suffers from being the last link in a chain of dependence in series. It gets the unresolved problems from the other entities and must cope with any errors resulting from the critical passage from being virtual to becoming concrete in addition to any errors in development left up in the air. The Product Engineering function, to some extent, like the R&D departments of old in the automobile industry. It handles a local function of integration which organizes the interfacing between design and manufacturing. This intermediary position places it in an eternal quest to enhance its contribution.

In the end, in this first part, a major finding can be elucidated: the work ideal, learned during one's training is updated through work experience, particularly when there is homology between the work situation and working values. But even in less similar cases, this work reference acts as an enhancement by default (in testing for example) or by compensation. The identity of design professionals is not a virtual identity or one to be read between the lines as it truly reveals a solid foundation which takes on meaning in the workplace.

Behind this shared identification appears the specter of a symbolic scale which classifies the various professional areas by comparing them to each other. The scale is not a source of division or independence for the various professional areas to find their own identity; they are linked to each other by the invisible thread of belonging to the design ideal. This specter functions like an efficient operator for a widespread representation of the process. It is not unreasonable to think that it acts as a source of renewal for workers' strategic and learning abilities. Management by project is an excessive consumer of resources and it is neither concerned with the recognition of its members – only work activity and peer hierarchies have a say in this – nor the ability to renew itself – this is the contribution of work activities.

In conclusion:

We can learn several lessons from the exploration of identity-building mechanisms in the world of design. First of all, the commitment in the endless innovation cycles for products, services, and organizational transformations necessitate stability in the mobilization modes of high-level skills. Paradoxically, the greater the intensity of movement, the more continuously social regulation modes are in demand. Sustainable integration represents a condition for the building of interpersonal relations and for the circulation of skills. It also supports the updating of high-tech knowledge by offering a stable horizon for projection. It is at this precise moment that career management policies come into play as a factor in the stabilization of in-house job availability. By betting on long-term development of resources for professionals by broadening development channels and improving functional mobility, interpersonal relations will ensure the longevity of a reservoir of expertise which represents the main driving force for competitiveness.

As a matter of fact, the dependability of cooperative relations through the use of networking links represents a particularly effective resource for reactivity in the critical development of projects. It outlines more economical means of adjustment than functional coordination modes because it has been proven over time.

The setting up of management modes for professional channels represents then a factor for harnessing structural and organizational changes. It acts as a counter measure within an industrial context by adjusting itself according to new and for the most part unpredictable ways and by functioning in a high velocity and unstable mode. In other words, professional socialization modes, by ensuring creativity, integration and mobilization, constitute an appropriate response in situations of radical incertitude. They supply the necessary continuity to support the whirlwind of projects and the illegibility of structures. By outlining an area for professional projection and career management, companies present themselves in the form of mini-corporations (Mallet, 1963), manifesting themselves in the form of a closed job market.

Moreover, the socialization process in the world of design reveals two conceptions for the social link to work.

In MARTEL's case, sustainable identification in the field of telecommunications and development support the building of individual trajectories. The dilution of sociabilities push the identity-building process right back to the narrow perimeter of work experience. Identity is rooted in the individual, connected to the company through an impersonal link and incorporating little need for group activities. The company nature of the social link illustrates the way in which a professional in design finds, in his two-fold identification to work and the company, the driving force for personal accomplishment. The passion for technique represents the incentive for work mobilization whereas the institution represents a cocoon guaranteeing one a job and career development.

The IXEL site reveals a community version for work where integration takes place on three levels: one's work, one's group, and the institution. One can defend the proposition of real social regulation in the workplace at the heart of project management and matrix organizational structures. Work groups are endowed, as a means of shaping them, with an education in work. Inter-subjectivity, backed up by the circulation of practical knowledge, support an edification process of shared reference points for action and shared values. The social link to work finds its roots in daily interactions and the conditions for its legitimacy in the management policies for professional career paths. The congruency between the two spheres of identification create harmony in hierarchical relations where authority derives the

bases for its legitimacy from the expertise and the exemplary nature of one's career path. The recent identification to groups simply symbolizes the three-fold integration in its ability to offer symbolic and institutional recognition for work.

To finish our study, it seems to us that these contributions give credence to the thesis of a design identity but in various forms of integration. The rise to power of a knowledge economy founded on innovative design makes recognizing the contribution of professionals a real stake. Along with the development of management tools for professional channels and individual projections, there exists a variety of professional models for success such as management, expertise, and appropriate ways for carrying out projects. However, depending on whether an identity-building opportunity is offered (IXEL) or not (MARTEL), the consequences are considerable concerning the congruence between management modes and the social dynamics of work. Dynamic management of careers act as a reinforcement vector for one's commitment to design work by offering a plurality of professional development prospects. Access to recognition for design work is based on the elaboration of new forms of social compromise where the stability of professionals combines with mobile career paths which are likely to reinforce the effectiveness of networking links. In the end, the modes of mobilization and integration for professionals in design act as a variable which is as fundamental as the organization in the contexts of intensive innovation.

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