1. The features of an international cultural event [1]

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1. Overview of the Conference

Goals of the Venice Conference

The International Conference *Joint Design of Technology. Organization and People Growth* was organized by Irso (RSO Institute) and it took place on October 12-13-14 1988 in Venice. It moved from the idea that a turning point was taking place in the developments of advanced technologies (and mainly information technologies). From 1963, the first 25 years have been characterized by amazing developments of automation and information technology but the matching of such a tremendous technological innovation with organization and people was scarce: technology was running ahead. The International Conference in Venice was based on the forecast and hope that during the following 25 years the time should come for relevant developments of anthropocentric technologies, for integration of technology, human organizations and for people growth in order to render advanced services fully oriented to the user needs based on IT an improve the quality of working life.

The International Conference was intended first to review the few but important cases of developments of the last 25 years in designing, implementing, using new technologies jointly with *ex-ante* consideration about the effectiveness and sustainability of the organizations. The conference aimed also to explore new options for the future of organizations and work, for solutions and methodologies intended to jointly design advanced technology, for skilled and integral working roles, for flexible, adaptive, creative non-hierarchical organizations in industry, services and administrations.

[1] This chapter and the followings were written in 1992 when Federico Butera and Louis E. Davis prepared in Los Angeles the book of the proceedings of the Conference. The book did not come out, but the papers are available as working papers of Irso Institute.

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The Conference was ideally on line with a strong tradition of International Conferences on technology and work, starting with the first ICQWL Conference in Arden House 1972 (*The Quality of Working Life*) promoted by Louis E. Davis and followed by many others as the *Canadian QWL Conference* in Toronto (1982), the *Eurojob Conference* in Paris (1985), the Genova International Conference (*City: Crisis and Design*, 1985). the RKW Conference in Munich (*The Future of Work*, 1986), the European Foundation Conference in Dublin (*Options for the future of work* 1987) and others.

The Conference was dedicated to the memory of Albert Cherns and Fred Margulies, great leaders of the ideas underlying the Conference.

Who made the Conference possible

The Conference was organized by the *Irso-RSO lnstitute*, an international research and design center active in the sociotechnical field since 1975. It was based in Milano led by Federico Butera, at that time also Full Professor of Sociology of Organization at the University Sapienza of Rome and Chairman Social Effects of Automation Committee of IFAC. In designing the Conference he consulted his teacher Louis E. Davis, Professor Emeritus of Organization Design at the University of California Los Angeles and founder of the *Quality of Working Life Council.*

The Conference was sponsored by the *European Foundation for the Improvement of Living and Working Conditions* in Dublin, by the *Social Effects of Automation Committee of IFAC* (International Federation for Automatic Control) and also *by ILO (*International Labour Office), by *IEA* (International Ergonomic Association*),* by *Eurojobs*, by *CIRP* (College International Recherche sur la Production), by *AIS* (Italian Association of Sociology). A substantial financial support to the initiative was secured by ENEA (the Italian National Energy Agency,) SIP (the Italian national telephone and telecommunications Company). Also European Foundation and Bull Italia offered to cover the cost of some services needed for the success of the Conference. The Conference attracted more than 50 written contributions around three areas:

1. Papers about approaches and solutions;
2. case studies;
3. methodologies.

The three days Conference was organized on the basis of three plenary sessions and five parallel sessions with invited presentations.

Place and participants

The Conference took place in the Scuola di San Rocco, a 15th century building whose ceilings and walls are astonishingly painted by Tintoretto, the real first expressionist of the history of art. The choice of Venice and Tintoretto's art was suggesting that technology – the new as the old one – could produce not only wealth but beauty and good quality of life as well.

300 participants attended the Conference, whose more than 100 came from countries other than Italy. Out of those 300, 50 were speakers, 16 students, 10 professional journalists. The others 225 senior people were scholars, managers, government and international officers, union leaders.

Daily press and magazines gave pretty large space to the Conference. The sessions were very dense. Were produced more than 3.000 page of the proceedings, now working papers of the RSO Institute. Various networks came across in Venice and opened up to an increasing communication. Professional associations and friendships became stronger during those three days. A great deal of discussion took place during lunchtimes and dinners in Piazza San Marco and in those "calli", the Venetian tiny streets.

The work done at the Conference

The opening addresses

The Conference commenced with the welcoming and introductory remarks given by Federico Butera, President Irso-RSO Institute and by Clive Purkiss, Director of the European Foundation. Thomas Martin, at that time Chairman of the Committee "Social Effects of Automation" of IFAC, Harry Davis, Past President IEA took the stage. Substantive messages of warm participation from leaders of ILO and CIRP were read.

Antonio Ruberti, at that time Italian Minister for Scientific Research and University and former Rector of the largest European university (Rome Sapienza), stated that we were going through a real revolution, driven by a cluster of technologies including IT, biotechnologies, genetic engineering, new materials and others. Can this technological revolution be governed? His answer is yes, if actions are promoted in planning R&D at national level, in organization development in the firms, in education and cultural modernization in the society at large. Goals of such developments are preservation and improvement of human environment in work and life.

In the *first plenary session* chaired by Tom Martin, interactions among new technology and individuals were explored. Thomas Sheridan (MIT),

one of the major world experts in advanced robotic, described the development of 45 years of man-machine systems. He described three phases in the trial to fit man and machine. He suggested to recognize the necessity of mistake innate in human creativity: it is better "to tolerate" slight human errors than adopting very rigid technical unmanned systems, leading to catastrophes like the deterministic system of the Three Miles Island plant. He insisted for paying attention to professional satisfaction and to good degree of control allowed to the human supervisor.

The idea of less hierarchical organizations, of more professional work, of workers' autonomy and involvement in the goals of the organization has gained social acceptance, but in practice this ideas meet serious difficulties, Luciano Gallino said, one of the leading social scientists in Italy and at that time President of AIS, the Italian Association of Sociologists.

Bruno Pavesi, Managing Director Bull Italia, gave an account of how good process design and managerial skills comes prior of information technology: the latter must support and not dominate the first. Antonio Zappi, Managing Director SIP, the leading telecommunication Italian company, gave a large account of how advanced telecommunication technologies are going to radically change organization structures, roles and skills.

In the *second plenary session*, chaired by M. Scott Morton, Professor MIT Sloan School of Management, the relationship of new organizations and new technology was explored. For Louis E. Davis, worldwide known scholar and designer of sociotechnical systems, many major American enterprises in front of the Japanese competition tried to reduce their workforce through intensive automation have but soon realized that the technological instrument is not sufficient without redesigning or designing the organization. He focused his keynote address on the criteria for designing an effective organization. Joint design call in functions and technical competences that usually do not communicate among themselves: «This is why design of new systems represents an arena of controlled conflicts». Therefore, it becomes essential that power-holders in the organization support. The new professional expert of next years – the engineer, the organization analyst, the psychologist – must have an understanding of the professional fields interacting his work: he/she should at least to know the fundamental questions arising in other fields.

R. Lindholm, Vice president of the Swedish Employers Confederation, stressed the need for a "pedagogic revolution". There is a need for a lifetime education mainly at the workplace: it must ten times wider and

deeper than now. New skills should be developed and cooperative learning processes should to be fully encouraged.

Today some firms, working in the field of technological innovation tend to structure themselves around huge projects of cultural and organizational change initiated by the top management (e.g. like total quality projects, rather than on pharaonic functional projects technology based, as the MIS) and nothing happens: this was the actual case illustrated by Roberto Albanesi, CEO of Rank Xerox Italia.

M. Kupperman, President of the American Epstein & Sons', a large international engineering company that designed several advanced plants in a sociotechnical perspective. He frankly stated: «Based on our experience, the "appropriated use" of existing technology and organization in many cases can give better results than the introduction of totally new technologies».

Sergio Nanni, CEO of Apple Computer Italia, presented the results of a recent survey on the IT negative attitude among Italian managers. He said that the present information systems that are usually too rigid, too centralized and unfriendly for users at a managerial level. More services and a better technology could be developed together starting from user needs.

The *third plenary session*, chaired by C. Purkiss, Director European Foundation for LWC, was opened by an address of Michael Scott Morton reporting about the ambitious research projects about firms' strategy, information technology and management carried on within the Mit Sloan School of Management, Boston, named *Management in the '90s*. The introduction of a new technology in a firm gives a very limited competitive advantage in case the firm maintains a traditional corporate culture and organizational form. «We also wanted to verify the correlation between levels of investment in new technologies and firm performances, and we found out – with the great disappointment of our industrial sponsors – that there is no significant correlation between the two variables». Scott Morton concluded that in the '90s firms will have to concentrate their investments on the "soft" parts of the organization – personnel, organization, culture – because their real competitive advantage will stem from their ability to anticipate the changes in technology and economic environment.

Agostino Mathis, Director of Information Systems ENEA, described ENEA's projects about the so-called "industrial districts", those extremely vital and homogeneous set of small firms working in the same geographical areas characterizing part of the Italian economic systems (e.g. the textile industry in Carpi, the silk industry in Como).

Parallel sessions and the main achievements of the Conference

It is impossible to give account of the work done by the very dense parallel sessions. We may only remember focus, domain and main practical preoccupations.

The status of art of research seems very promising. The field is actively moving and converging toward a number of program of multidisciplinary research and practical developments.

Competitive strategies include always *an appropriate combination of technology, organization design and human resources policy*, as illustrated by M. Scott Morton from MIT and A. Zappi from SIP.

Advanced technology is married with new paradigms of organization, as L.E. Davis illustrated.

J. Taylor illustrated the idea of "*virtual groups*", ultra-advanced organizations developed in high tech environment that have never known bureaucracy.

Naffha – on the technological side – described *advanced multimedial management information technologie*s consistent with fastly evolving enterprises and ultra-organic organizations.

Cooley, Mathis and Butera, on the other hand, reported that *telecommunications technology and network organizations* may foster enterprise creation and modernization of the regional organization.

Manufacturing technologies and skill preservation and developments will be more associated in the future. IFAC names those developments as «skill based manufacturing». CHIM (Computer Human Integrated Manufacturing): as illustration, also the presentations of P. Brodner, H. Rosenbrock should be remembered.

Options for increasing *quality of working life* were illustrated in different ways by E. Koheler, W. Wobbe, M. Schumann, C. Besusso and others.

New generation of *man machine interfaces* are generated both by technical advancement and by new ideas of human responsibility in the processes: this is the idea of interdependence as illustrated by T. Sheridan.

The quality of *managerial skills and processes* are prerequisites for a competitive use of new technology: this was a point raised for instance by R. Lindholm. Practical instances were given by industrial CEOs: B. Pavesi of Bull, Albanesi of Rank Xerox, S. Nanni of Apple, C. Pellas of Italcable.

An image of a possible "*new alliance" between technology and social science* in system configuration depend by the intense mutual understanding and by the intense cross references. Noticeable is the

multiple background of many distinguished participants (belonging to three generations): engineering and social sciences.

Entrepreneurs, CEOs and functional managers, union leaders, government leaders presented what really they and their organizations are doing. Not too many prescriptions but *concrete projects* as in the case presentations of Zappi, Pavesi Kupperman, Albanesi), Longo, Pellas, Besusso Molla Formica, Ferretti, Marinazzo and Hoche-Mong, Dina, Aguren, Gioia and others.

The conference indicates that, differently from the '60s and '70s, there is not too much resistance from managers for joint design of technology and organization. They do not seem sharing with some previous generation of management a "technological determinism": they seem *seeking the success of the firm rather than the technical success only*.

From unions came willingness to find *new rules and procedures of industrial relations*.

Examples of "good job and organization design" do not display the popularity of some advanced cases of the '70s (Olivetti, Volvo or XeroxPARC).

A round table was held with the participation of Bruno Trentin (General Secretary of Cgil). Pietro Merli Brandini (leader of Cisl). Gancarlo Lunati (Managing Director of *Il Sole 24 Ore*, the employers confederation publishing house), Giancarlo Lombardi (entrepreneur and authoritative member of the board of Confindustria). The speakers agreed for a *new age of collaboration among the social partners*, in particular on education of workers in the new technologiesThey agreed that managers users of technology seem in most cases unprepared in front of the expertise of technology providers.

A wide agreement has been reached on the most controversial issues

Information technology is nowadays less distant from (and less threatening for) the final users: *support technology and user-friendly interfaces* are more diffused. Nevertheless all speakers agreed that user friendliness is not enough: the harmonization of user oriented technologies with flexible and "organic organization" and with skilled people is far from being a reality. *Participative processes of de*sign and implementation are still rare. Good ideas have been presented on this but not many actual examples of positive implementations.

Technology is not able to change by alone organizations nor human skills: on the contrary, there are many instances of technology designed for being "instead" of people and organization.

2. The introductory address by Federico Butera

Design options non-social effects of new technology

Good promises about positive social effects of technology nowadays are diffused. But worries about negative social impacts of technologies also increase. However, it is becoming always evident that technology in itself is not the problem. Often inadequate are the paradigms of the overall sociotechnical system and the process of designing and applying technologies and correlated organizational solutions in the concrete settings.

Every day we have contradictory facts in front of us. Information technology is upsetting the content of most jobs of blue and white collars, but it also creates new settings for professions and managerial positions. Advanced manufacturing technologies cut jobs but they may also foster new activities and give rise to job and enterprise creation.

Information technologies may support processes of centralization of the firm but they may also allow unprecedented processes of articulation of firms as in the case of network enterprises.

Potentially dangerous technologies as nuclear, biotechnologies, centralized information systems and the like, seriously threaten the ecological system and the safety of human beings: suggestions are conflictingly proposed swingling amongr to slow down technological development or to improve technological control devices, or to improve the ability of men to cope with dangerous technologies.

Most observers agree that modern technology has not deterministic social effects: it upsets the present situation but only human decisions and designs may reset – for good or bad – work, organization and society.

It is time for options and choices. Some of those options support positive expectations. Some procedures for choice, as well. However, a great work is needed to avoid risks.

Research is needed in order to conceptualize the main phenomena and to clarify the intricacies of mutual interdependencies among technology, organizational and individual goals, processes, organization, actual roles, personnel policies and rules, social system.

A great deal of social activity is also needed. Technological revolution needs to reformulate most of the categories, practices and policies about the policy on labor and research. This creates new problems for the main actors of the industrial policy. Politicians should be as fast as the technological development require; unions should better represent the emergent professions, women, young and unemployed people, because their traditional base is fading away: employers' confederation should consider that medium and small companies are the majority of firms (by number and total turnover; government should invest more in education and research.

Main trends in designing technology and organizations

Technology is now largely available and cheap and enables people to more and better understand and control the production processes. User orientation, software ergonomics, decision support systems and cooperation technologies are offered by the recent generation of technology. But user friendliness is not enough: the harmonization of user oriented technologies with flexible and "organic organization" and with skilled people seems the real target.

Advanced technology is often married with new paradigms of organization. Diffusion of digital technologies links together small firms, foster enterprise creation and modernization of the regional organization, and it represents a main infrastructure to develop network organizations and network enterprises. Flat and not hierarchical organizations are easier when computer supported control of processes is available. *Virtual groups* and *high commitment organizations* are developed in high tech environment that have never known bureaucracy. CHIM (Computer Human Integrated Manufacturing) adopts the best of factory automation and at the same time preserves the human skills and the flexibility of the organization. Multimedial management information technologies appear consistent with fastly evolving enterprises and ultra-organic organizations. Options for increasing qualification and quality of working life in the automated factories are often implemented through new roles and appropriate training. New generation of man- machine interfaces are generated both by technical advancement and by new ideas of human responsibility in the processes.

Full control tasks, training, qualified roles and flexible and organic organizations should be developed not only for improving the quality of working life, but also for giving competitive advantage to firms and public administrations. In the '70s, the generation of ideas was supported by cases

like Philips, Volvo, Olivetti, Dalmine and the like. Presently, we do not have enough many "exemplar cases" of the '90s.

What is really an organization? We prefer define it as a sociotechnical system. It includes the strategic formula of the firm (or administration): the macro- and micro-organizational structures; the work tasks: the occupational and professional roles; the human resources policies and of course the manufacturing and information technologies. All they should in principle be "consonant" among themselves and "appropriate" to the economic, technical social goals of the actors of the system).

Directions for future Research and Development

After the tremendous advancement in technology, now substantial advancement should be developed also in the organization field. The ideas of network enterprises, lean and flat organization, human control of routine and innovation processes, professionalism in the workplace, participation in improvement, quality and innovation programs and so on are becoming popular in USA, Japan and Europe.

Some directions are indicated by the literature and by the expert in the field. The main arrows of endeavors open to scientists and practitioners seem the following.

1. Setting and monitoring jointly economic, human and organizational goals and parameters at the same time when technical systems are designed or put into action.
2. Organizational effectiveness (flexibility, quality, innovativeness, degree of service and so on) must be taken into account as area of competitive advantage of the organizations.
3. Quality of work and life, environmental protection should be taken into consideration before than a serious damage has already happened.
   Integrity of individuals should be assured in various dimensions:
   - integrity of body (physical health);
   - integrity of mind (psychological health and well-being);
   - integrity of professional roles (quality of professional life as variety, complexity, meaning or work, career, social recognition);
   - integrity of life roles (social integration as indicated by public esteem, social integration, compatibility of work and family life);
   - integrity of self (identity).
4. Models, methodologies and approaches for technological and organizational innovation and for development of human resources

should develop a visible stock of knowledge, solutions and methodologies that could be used by common people.

5. It is needed to diffuse the existing and to develop additional substantial knowledge about organization and work in advanced technology. New fields are trying to do so as software ergonomics, communication, computer supported cooperative work, creativity, learning in computer environment and so on.
6. It is time to make human sciences and computer sciences communicating among themselves. Technological research must incorporate recent findings of organizational and social sciences. Organizational and social research should be more solution oriented and should achieve a better understanding of the nature of technology and technological processes.
7. A new multidisciplinary training for engineers and social scientists is needed in the universities of many countries.
8. Moreover, multifunctional and multidisciplinary projects are needed, where specialists with various backgrounds are involved.
9. Final users should be involved when possible.
10. Goal setting and negotiation must be refined because technological development is an arena of controlled conflicts.
11. It is time to foster the developments of methodologies for planning, designing, implementing, experimenting jointly technology, organization and people.
12. It is mandatory to give raise to new exemplar cases, which may give confidence to all concerned that "it is possible".
13. Technological design has a worldwide scope: projects should be in most cases international.

In synthesis, the challenge for scholars is to make their knowledge usable. The challenge for managers and union leaders is to use the best scientific knowledge in different fields for the competitive advantage of their firms. And both of them have to generate new methodologies that common people may use for working better and for changing.

The message of the international research program launched in Venice by the Irso Institute Conference

The design of technological devices and applications is very important. But it should be considered also as a preparatory and complementary area

to a wider approach that we have termed «joint design of technology, organization and people growth». *They are programs and projects of experimental approach in a single setting oriented to organizational, technological and human change, taking into consideration multiple design criteria that adopt a strategic, dynamic and systemic approach and benefit from participation of people concerned.*

Settings could be shops or offices, firms or public administrations, cities and regional districts. Strategies and action plans take into account the multiple criteria of economic effectiveness, technical excellence, Quality of Working Life, sustainability. Collaboration is required among managers, technologists, social scientists, representative of employees, public institutions and people.