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Abstract. In my practitioner experiences in developing management systems, I have to understand the external and internal context of the organizations. I briefly summarize my methodological approach and I present the features of the workshops that drive my projects. In particular I describe my experiences of workshops in the form of interviews, applied to develop the analysis of the context and, recently to explore the topics of work systems and sustainability. The results of these workshops highlight the broad network of relationships among context issues, technologies and organization systems and the difficulties in transferring this high level of interdependence and complexity in the organizational structures. Learning from these experiences I pose some reflection on job organization, job classification and on the role of relationships and behaviors in managing the present digital transformations.

Keywords: Management System, Socio-technical Design, Context Analysis, Complexity and Systems Thinking, Organizational Changes.

1 Introduction

The paper describes my sociotechnical practice in exploring organizational contexts and presents the difficulties in transferring the sociotechnical approach in the organizational milieu. My practice deals with the development of Management Systems, in compliance with the requirements of ISO (International Standard Organization) Standards on Management systems that include as a key requirement the analysis of the organizational context. In developing these systems, I pay particular attention to understanding the relationship between the social side (for instance, the business model and the organizational structure) and the technical side (for instance, the soft-ware applications and the hardware network) of the organizations. I try to reduce the gap between the two sides and to increase the effectiveness of the entire system.

Section 2 summarizes the key features of the methodological toolkit I exploit in my activity that includes Conceptual Modeling and Process Analysis, Social Behavior and Socio-technical Design, Ethnographic Approach and Mapping. The section traces the changes in my practitioner approach and perspective due to the analysis of the
organizational context that I developed from 2015 and explores new theoretical references, including the contemporary approaches on Socio-technical perspective.

Section 3 focuses on my experiences on exploration of the context of the organizations as workshops in the form of interviews and on recent analysis of sustainability smart working and work systems. The history of the experiences is presented reflecting on the process of investigation and the exploration is detailed in terms of the framework of investigation, presenting a sample of results and examples.

Section 4 is concerned with the lesson learned. The difficulties experienced in organizational environments are discussed and summarized in reflections on organizational models and changes in attitudes.

Section 5 looks at possible future research themes crossing economic, education and research areas and reflecting on new jobs, new job profiles and new related competences.

2 My practice and my methodological background

2.1 Process Analysis and Socio-technical perspective

The conceptual framework that drives my practitioner activities is based on the organizational models proposed by ISO standard on quality management systems [1]. My projects have been developed in small and large sized companies for twenty-five years.

During this long-term experience with a broader field of organizations I moved my attention from the technicalities of the ISO standard requirements to the social and behavioral characteristics that could influence the organizations and to the topics of the Socio-technical approach. I briefly describe how these topics progressively influenced my practice.

In implementing management systems from 2000, I had to develop Process Analysis for “understanding and managing interrelated processes as a system” [1]. This practice allowed me to refine a method, in particular for defining the conceptual coordinates that drives the analysis and the phases that drive the design. In addition to the results in the implementation of management systems, the process analysis helped me to understand social behaviors of managers, employees and workers and in finalizing them to define a collective company identity.

My practice was a two-way interaction between processes and behaviors because the process analysis required a deep reflection on social behaviors [2]. For these reasons I was interested in studies that explain how organizations are influenced by psychological and social mechanisms. These studies encompassed the behavioral strategy [3], the role of emotions and social identities [4], the family centered management [5], and the costs of unethical behaviors [6].

Having this experiential background I found the approach of a Socio-technical design described in [7] very interesting. In the Socio-technical approach I identified several similarities with the concerns of my practitioner activities on Process Analysis [8]: the idea that “technical structure and work roles are both part of an inclusive system”, the attention on the environment and on the adaptive systems, the social
support designed to reinforce social behavior, the incompletion of the design, conceived as an iterative process.

Furthermore, the Socio-technical approach suggested a reflection on how to investigate the relationships between my behavior and my customer’s. I found interesting topics in the ethnographic approach proposed in [9]. I applied this approach to analyze the relationship between the practitioner and the organization [10].

In some experiences on Processes Analysis, I developed participative projects through a team of process owners (or their deputies) deepening the interaction between social and technological issues and considering criteria and tools to map the organization and its processes [11]. Assuming an Action Research approach [12], [13], I described the key features of this cluster of experiences in [14], presenting the lesson learned and proposing as a reflection the difficulties of transferring the participative approach deployed during the projects in the everyday work system. I posed as a research theme how to develop a common background of different areas to share organizational models and methodological tools.

2.2 Recent developments in my practice and new theoretical references

From 2015, ISO standards introduced the requirement of ‘Context of the Organization’. This topic has deeply influenced my practice in the recent years. To integrate it in my projects, it is necessary to explore the company’s environment and to take into account a broad set of stakeholders. Figure 1 summarizes the flow of my practice and its changes due to the new ISO standards.

![Fig. 1. My practice flows](image)

The practice of context analysis suggested me to enlarge and to revise my methodological framework, exploring new theoretical references.
In the earlier applications of socio-technical perspective I find interesting topics in:

- Trist [15] for the description of his experiences on interviews and action research, for the analysis of the organizations as a whole, for the reflections on the systems and the open systems, on new and old organizational paradigms;
- Checkland [16] for the reflections on changing the mental structures that lead the practice, on system thinking, on thinking in layers defined by an observer, on management and organization and the idea that functionalist and goal seeking management models could be enriched with relationships management.

In contemporary development of socio-technical perspective, the attention to sustainability and work systems is crucial. In particular, I find interesting suggestions in Bednar and Welch [17] for their reflections on contextual dependences and the role of manager as an architect of the context, on systems thinking in the era of digital transformations, on analysis of organizational boundaries and on impact of interaction among artifacts and human beings (inter-human and human-machine).

In earlier and contemporary socio-technical approaches, I highlighted that several authors [16], [17], [18], [19] explore relationships with philosophical topics such as phenomenology, hermeneutics, dialectics, praxis. I am involved in these topics with reference to a Multifocal approach proposed in [19] where academics from several fields, practitioners and managers reflect on the relationships ‘whole-parts’ and on ‘the multiple vision of the same truth’.

In the next sections I present a synthesis of my experiences from 2016 up to now. I follow, as a guideline, an action research approach [12], [13], [16] and hence I structure my experience in terms of process and methodology, clustering events and reflecting on them retrospectively.

3 Context Analysis. Workshops in form of interviews

3.1 History of the development.

The ISO requirement ‘Context of the organization’ (Clause 4) was introduced in 2015 in ISO 9001 and ISO 14001[20], in 2018 in ISO 45001 [21]. The new and key requirements of the clause are ‘Understanding the organization and its context’ and ‘Understanding the needs and expectations of the interested parties (or stakeholders)’.

ISO standards require describing the context of the organization in terms of external and internal issues and considering all the interested parties relevant for the management system.

For instance, ISO 45001, in Annex A.4.1, presents a detailed list of external issues, such as social, cultural, economic, political surroundings, new technologies, new knowledge and internal issues, such as governance, capability, policies, and information systems. In Annex A.4.2, the list of interested parties (or stakeholders) includes, in addition to workers, legal and regulatory authorities, workers’ representative and organizations, suppliers, customers, local community, medical community, and so on.
To support my customers in implementing these requirements I had to deeply change my practice and then I explored new ways of interaction and communication. Designing the way for gathering information I decided to develop the analysis on organizational contexts through workshops in the form of interviews.

My experience could be split into two phases.

From 2016 to 2019 I designed and tuned a method for context analysis refining my framework of investigation based on interviews, focusing on quality and on relationships between organizations and technologies. Focusing on the relationship supplier/customer I explored the concept of the workplace and of its constantly changing.

From 2019 my experience moved to Integrated Management Systems and then the interviews focused on environmental topics that I explored to develop Environmental Management Systems and on work system topics that I explored to develop Health and Safety Management Systems. I focused on changes of workplace due to digital technologies and on their influence on worker health and safety. For instance, the increasing exploitation of ‘smart working’ requires a new definition of workplace and of the related safety rules.

In 2020 the COVID pandemic event dramatically amplified the changes in working systems and hence these topics became one of the focal points of my interviews. The main questions are on digital technologies in particular on smart working (mainly as home working) and on its key support for business continuity.

I developed the interviews in several small and large size companies. In corporate companies I performed more than 60 interviews (two hours for every one).

Reflecting on my experiences I continuously enriched the structure of the framework of investigation in term of the posed questions and in term of interfaces. For instance, the questions on ICT technologies in the first phase focused on dedicated information systems (ERP, CRM, etc.) encompassed topics on social media and Industry 4.0. The interviewed set initially focalized to top management enlarged to middle management and communities, including worker’s representative.

In [15] and [16] I identify several topics that concern my practice. The interviews allowed me to explore the management of internal and external relationships in the organizations and to reflect on the process of investigation and on mental structure that leads my practice, as well.

‘Tentative ideas to inform the practice which then became the source of enriched ideas’ underpin my experiences, in a systemic process of continuous learning where I adapt to my practice the three interacting elements of user of methodology, situation addressed and methodology as ‘words on paper’, described in [16].

3.2 The Framework of Investigation.

The ‘Words on paper’ (on file) of my investigation are semi-structured questions posed during meetings with manager(s) of the functional areas/departments or with the communities. I pose the questions following structured tracks but adapting (in run time)
my interview to the answers of the interviewed. After each meeting questions and answers are revised. At the end of the meetings the results are shared with the board.

The questions are based on three main topics tailored to the different functional areas, clustered as sketched in Figure 2 and described in the follow.

![Fig. 2. The structure of questions](image)

The first cluster of questions in the interviews is related to the analysis of the context and interested parties. The focal points are the relationships of the company with its internal and external context and with the involved stakeholders: for instance, the relationships with market and customers, with sustainability issues and with workers and employees.

Considering the company’s boundaries and the stakeholder’s points of view, the second cluster of questions is focused on processes. As described in section 2, this point has been part of my projects for several years. Taking the stakeholders into account I enlarge the analysis of the processes to sustainability topics for instance reflecting on the production process with respect to environmental requirements and to safety rules.
The third cluster of questions is on risk management. Strategic, operational and business continuity risks are analyzed in relationship to context analysis and with reference to the interested parties. For instance, the risks for the customer are related to product and service defectiveness and the risks for the workers are related to their health and safety.

These clusters are tailored for every department/community (as listed in Table 1). For instance, with the supply chain department the questions could deal with the environmental impact in procurement of bulk materials and on relationships with suppliers and outsourcers in terms of sustainability values.

To perform the interviews in a company I adapt the toolkit to the characteristics of the company (product/service, market, localization, etc.) and to the company’s identity. For instance, the boundary of the working place in a production company and in a service has to be explored in different ways. The sustainability values and the business model presented by the general manager are discussed with every department for their specific implications.

This framework of investigation is deeply influenced by the theoretical references, highlighted in section 2.2. Some topics of the relationship with the literature review are described in the following.

- In general, the context analysis is strongly based on the key assumption of the Socio-technical perspective that a company has to be considered as a whole and as an open system in continuous relationships with its contextual environment.
- The structure of the interviews takes into account the experiences described in [15], considering the macrosocial level, the whole organization and the primary work systems.
- The interviews on smart working investigate the systems thinking in the era of digital transformations and the interaction among artifacts and human beings (inter-human and human-machine). They explore the contextual dependencies in the working lives as presented in contemporary development of Socio-technical perspective.
- The focus on the deployment of sustainability values of the organizational processes and practice reflects on system of values in management models and on role of manager as architect of the context.

### 3.3 Results and examples

The interviews allowed the gathering of information on the complexity of these relationships in the organizations. Table 1 is a partial summary of the main topics that came out in my projects and focuses on context and technologies. The results on processes and risks are not reported.

<table>
<thead>
<tr>
<th>Functional area</th>
<th>Context and interested parties</th>
<th>Technologies</th>
</tr>
</thead>
</table>

Table 1. Context and Technologies
<table>
<thead>
<tr>
<th>Top Management</th>
<th>Corporate economic scenarios, Shareholders, Lobbies, Market (customers, consumers, users), Sustainability (environment and people), Infrastructure (investment, budget), Business models and values, Diversity and welfare, Strategic risk and business continuity, including natural risks (earth quakes, floods)</th>
<th>New materials (Environment), New services and products, Line automation, including electronics, hardware and software, robotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Manager</td>
<td>Number of reports, meetings, decisions, and actions related to corporate economic scenarios.</td>
<td>Number of reports, meetings, decisions, and actions related to new materials and technologies.</td>
</tr>
<tr>
<td>CEO</td>
<td>Number of reports, meetings, decisions, and actions related to corporate economic scenarios.</td>
<td>Number of reports, meetings, decisions, and actions related to new materials and technologies.</td>
</tr>
<tr>
<td>Business Unit Manager</td>
<td>Number of reports, meetings, decisions, and actions related to corporate economic scenarios.</td>
<td>Number of reports, meetings, decisions, and actions related to new materials and technologies.</td>
</tr>
<tr>
<td>Manager</td>
<td>Number of reports, meetings, decisions, and actions related to corporate economic scenarios.</td>
<td>Number of reports, meetings, decisions, and actions related to new materials and technologies.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Finance Controlling</th>
<th>Financial and regulatory scenarios, Fiscal regulations, Economic, financial and fiscal external and internal context, including insurance companies, Ethics, values, code of conduct, Social and environmental accountability, Business continuity</th>
<th>Dedicated Information Systems for accounting and taxes, Social media (link with external and internal sites), Process mapping tools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to financial and regulatory scenarios.</td>
<td>Number of reports, meetings, decisions, and actions related to dedicated information systems.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to fiscal regulations.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to economic, financial and fiscal external and internal context, including insurance companies.</td>
<td>Number of reports, meetings, decisions, and actions related to process mapping tools.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to ethics, values, code of conduct.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to social and environmental accountability.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to business continuity.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human Resources</th>
<th>Evolution of professional profiles and educational structures, Social relationships, Regulatory issues, Ethics, values, code of conduct, People awareness and involvement, Societal security and resilience (intellectual property, business continuity, travel security)</th>
<th>Payroll management applications (country specific), Social links for recruitment, Communication and e-learning tools: Web, etc., Remote support for maintenance and for safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to evolution of professional profiles and educational structures.</td>
<td>Number of reports, meetings, decisions, and actions related to payroll management applications.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to social relationships.</td>
<td>Number of reports, meetings, decisions, and actions related to social links for recruitment.</td>
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<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to regulatory issues.</td>
<td>Number of reports, meetings, decisions, and actions related to communication and e-learning tools: Web, etc.</td>
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<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to ethics, values, code of conduct.</td>
<td>Number of reports, meetings, decisions, and actions related to remote support for maintenance and safety.</td>
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<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to people awareness and involvement.</td>
<td>Number of reports, meetings, decisions, and actions related to communication and e-learning tools: Web, etc.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to societal security and resilience.</td>
<td>Number of reports, meetings, decisions, and actions related to remote support for maintenance and safety.</td>
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<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to business continuity.</td>
<td>Number of reports, meetings, decisions, and actions related to communication and e-learning tools: Web, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication</th>
<th>Regulatory network, Territorial network (administration, welfare, labor, education, press), Media (traditional and digital)</th>
<th>Information Systems, Social media</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to regulatory network.</td>
<td>Number of reports, meetings, decisions, and actions related to information systems.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to territorial network.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to administration, welfare, labor, education, press.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to media.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Legal</th>
<th>Legal and regulatory network, Environmental, health and safety crimes, Intellectual property and patents</th>
<th>Information System, Social media</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to legal and regulatory network.</td>
<td>Number of reports, meetings, decisions, and actions related to information systems.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to environmental, health and safety crimes.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to intellectual property and patents.</td>
<td>Number of reports, meetings, decisions, and actions related to social media.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>ICT</th>
<th>Regulatory network</th>
<th>Hardware infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of reports, meetings, decisions, and actions related to regulatory network.</td>
<td>Number of reports, meetings, decisions, and actions related to hardware infrastructure.</td>
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<tr>
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</tr>
<tr>
<td>Marketing</td>
<td>Regulatory network, in particular for standards</td>
<td>Internal governance rules and policies</td>
</tr>
<tr>
<td>Project and Design Management</td>
<td>University and research network</td>
<td>Data and market analysis sites and platform</td>
</tr>
<tr>
<td>Value and Supply Chain (including Procurement, Operations, Delivery)</td>
<td>Regulatory network</td>
<td>Innovation network</td>
</tr>
<tr>
<td>Health and Safety Community</td>
<td>Regulatory network</td>
<td>Innovation network</td>
</tr>
</tbody>
</table>

To clarify the great amounts of topics two functional areas are detailed in the following: Human Resources and Supply-Chain.

The interview with Human Resource highlighted these topics, amongst others:
• Context issues: business models and evolutions of professional profiles, educational structures such as university, high school, professional school; social relationships such as territory, migration, diversity culture, language, religion, welfare; company values; ethics and shared values (for instance, occupational health and safety).
• Interested parties: shareholders, workers, educational structures, regulatory authorities, unions.
• Involved processes: recruitment, on-boarding, training, payroll management, internal and external communication, people surveys, smart working, engagement, team building.
• Supporting technologies: Information Systems for payroll, performance evaluation training, and social media tools for recruitment, e-learning, web communication.

The interview with Supply Chain highlighted these topics, among others:

• Context issues: political, economic, social scenario (for instance cost of manpower, black lists, conflict minerals); site specific constraints (environment, neighborhood, local political administration, social and economic attitudes); regulations (for instance on waste management), energy sources (new and based on recycling) environmental and sustainability strategies (circular economy, waste management, life cycle perspective); ethics and values for suppliers.
• Interested parties: shareholders, customers and users, suppliers, legal and regulatory authorities.
• Involved processes: sales, order handling, purchasing, production and/or service delivery, storage, shipment.
• Supporting technologies: CRM, ERP systems, business intelligence tools, warehouse management technologies, logistic applications.

The following examples present some answers from the interviews related to sustainability topics in project management and on workplace systems and smart working.

Table 2. Project management and sustainability

<table>
<thead>
<tr>
<th>Interviewed: R&amp;D Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q.</strong> How do you take into account the needs of the interested parties? In particular, how do environmental and/or health and safety (H&amp;S) performances influence the design of new products and new processes?</td>
</tr>
<tr>
<td><strong>A.</strong> In the projects of product, we perform design for safety. Recently a sustainability working group has been defined to develop life cycle assessment on product and its components. But the project objectives and the related procedures have not yet deeply changed. For instance, in feasibility studies, the ‘Risks and opportunities matrix’ continues to be strongly related to technical performances and financial index (market share, patents, ROI, etc.) while environmental risks are not systematically evaluated.</td>
</tr>
</tbody>
</table>
Q. What is the influence of digital technologies on R&D and process engineering?
A. The focus is on digital competences in recruitment, for the increasing role of
digital technologies in products and processes.
Covid pandemic has strongly accelerated the role of smart working (home working
in particular) and has posed several new issues such as the attention to wellbeing in
SOT (Safety Observation Tours) and the response to emergency with new
technologies (for instance AR for quick prototyping).

Table 3. Workplace systems and smart working

<table>
<thead>
<tr>
<th>Interviewed: Manufacturing manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. How does the context influence manufacturing performances? In particular, what effect has the Covid pandemic had on working environment?</td>
</tr>
<tr>
<td>A. The first lockdown (March 2020) amplified the difficulties related to job organization (less flexibility in working teams, difficulties in remote equipment setting). The effect was the increase of difficulty in production planning and then in respecting the customers’ requirements in term of delivery time. Workers on site did not easily accept the idea of employee’s home working. They perceived themselves as ‘Chernobyl liquidators’. To deal with these difficulties we increased the relationships with union representatives through regular meetings for crisis management. We had a positive collaboration with trade unions. At present, considering the changes induced by smart working, the company is projecting a redesign of spaces both for the offices and the production plants.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interviewed: H&amp;S Community (H&amp;S Manager, Union representatives, H&amp;S Leaders)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. How does the context influence manufacturing performances? In particular, what effect has the Covid pandemic had on working environment?</td>
</tr>
<tr>
<td>A. For pandemic management we collaborated well with the Covid committee: the safety procedures have been defined with the H&amp;S community. Presently the risk is to neglect other key safety points because our attention is focalizing only on problems caused by the pandemic. In general, due to the increasing role of smart working we have to manage several points. For instance, the redefinition of safety rules in homeworking (ergonomic requirements, safety compliance of home equipment, working time, etc.) and of ‘cohabitation management’ with new robots that will be installed in warehouses.</td>
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</table>

The interviews highlighted several interested points, summarized in the following:
- In large sized companies smart working (home working) became the key digital tool for business continuity during the pandemic.
- The digitalization is significantly changing the whole organization. For example, the competences and the roles of employees and suppliers.
- The sustainability values are part of organizational policies but not always systematically deployed in everyday processes.
• The use of digital tools such as augmented reality applications in maintenance processes and product prototyping has been accelerated.
• Manufacture managers described the divisive role during the lockdowns of home working: employees versus manufacturing workers.
• In the future the companies have to deal with several deep organizational changes: redesign of work spaces, changes in communication and relationships, changes in evaluation and management of health and safety risks.

Beside the ‘technical’ approach of ‘Questions and Answers’ I perceived the desire of managers and workers to share experiences and to communicate difficulties and challenges to participate in the changes in progress.

4 Lesson Learned and Reflections

As Checkland stated [16], ‘The process of learning by relating experience to ideas is always both rich and confusing’ and ‘Learning from books or lectures is relatively easy, at least for those with an academic bent, but learning from experience is difficult for everyone’. Then, with the awareness that my reflections are confusing and unstructured, I try to relate my experiences to some topics of earlier and present socio-technical perspectives.

I consider, as proposed by Checkland [16] the three dimensions of structural changes, process changes and changes of outlook and attitude and the suggestion of Bednar and Welch [17] that ‘the participative and multidisciplinary studies… have to consider the participation of real human beings whose contextual understandings, skills and desires are crucial’.

Hence, I cluster some points of reflection that arose during my projects into two main topics:

• contextual understanding and structural changes in organizations;
• role of behavioral and psychological topics (relationships, desires, attitudes) in work systems.

4.1 Reflections on external and internal organizational context

The amount of information I collected throughout my workshops in the form of interviews describe the organizations as an open system merged in a continually evolving environment confirming that ‘technical systems are perpetually in the making as well as management systems’. For these reasons engagement with complexity and management of changes are key challenges of the organizations.

I found several interesting topics and analogies in the paper of E. Trist [15]. I think that his conclusions, even if based on a different economic and social context could perfectly fit the present scenarios. Amongst the wide set of issues he posed, I would focus on the topic of ‘Rigid job classification’.

While, in my experiences the contents of the second and third columns of Table 1 have deeply changed in the last twenty years, the contents of the first column have not
changed: the job classification is still the same in the twenty-five years of my practitioner experience.

The companies are nearly always oriented to conventional organizational structures and job responsibilities that in turn are linked to conventional job profiles, competences and skills. The pillars of Finance, HR, Operations, etc. reflect the same model described in [15].

The context and the boundaries of the organizations are continuously changing. These changes could require new profiles in terms of competence and skills that, in turn, could involve the educational framework (melting of disciplines with a multifocal approach [19]) and a reflection on the role of management (as Bednar and Welch stated considering manager as architect of context [17]).

I pose the same question that E. Trist posed ‘How to transform a work group into a work system?’ I fully agree with his reflection: ‘Autonomous groups do not always succeed. A good deal has become known about the conditions affecting their success or failure. These will not be reviewed here, except to note that one of the most common reasons for failure is lack of support in the surrounding organizational milieu’.

Due to this ‘lack of support’ my projects on process analysis, where different skills shared reflection on organizational processes, did not have continuity in the everyday activities.

Then, despite the wide and continually evolving environment, my experience suggests that the companies are presently weakly oriented to structure ‘Socio-technical Areas’, considering the Checkland idea: ‘The great value of the model was that its boundary cut across the organizational boundaries of the actual departments’.

4.2 Reflections on relationships and attitudes

Furthermore, rigid job classifications and the need for new competences and skills is only a dimension of the organizational changes. The interviews on the coronavirus pandemic and smart working suggested many reflections on the future of the whole work system in terms of relationships with digital technologies, concept of workplace, relationships and communication inside and outside the company’s boundaries.

These changes will require a careful attention to social behaviors and hence to a socio-technical perspective. Focal points of this reflection could be on organizational structures in terms of communities and on jobs in terms of experience and practice.

A first reflection, from an ethnographic point of view, is on my ‘explorer mindset’ that was constrained by the same structural approach and rigid job classification of the organizations. In a first phase I based my interviews only on organizational charts. The requirement of H&S management system (where the stakeholders are inside the organization) and the interview at H&S community opened my mind to a dimension of the organization that is not described by charts but is based on communities, relationships and emotional experiences. The interview of a community was, in my experience, a relevant change of perspectives.

A second reflection is ‘upon use in relation to IT artifacts’ [19]. The interviews related to smart working posed a huge quantity of topics on inter-human communication and relationships within a work system: worker and employees,
employee and families, redesign of work space, safety at home, etc. and on human-machine communication: cohabitation with robot in plant spaces and safety on work problems. The interaction with Information Technology is driven by data (cognitive and operative interaction), by perception (AR), and by experiences and behaviors.

A third reflection is ‘about ethical values that are not borne out in practice’ [17]. The interviews on product and process design and the attention to environmental topics suggested a reflection on how sustainable strategies are actually embedded in organizations. Companies have assumed values, policies and accountability on sustainability even defining specific organizational functions. Now it is time to deploy sustainability as a mindset and as a framework that involves all the processes, technologies and monitoring approaches.

5 Conclusions

The Socio-technical perspective could require new organizational paradigms that retain part of the multiskilling and job interchange experienced in the organizations. Sharing methods amongst different communities and developing a multifocal approach could be a way to design these new paradigms.

In particular, I think that a reflection across economic, education and research areas on new jobs, new job profiles and new related competences could be fruitful.

For an effective socio-technical approach, I fully agree with Trist’s reflection: ‘He needs to unlearn the role of being an expert and to learn the role of being a contributor to a process of co-learning’.

References