A conceptual framework to support mediation of perspectives in information systems analysis: the case of an interpretative approach

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Abstract

A conceptual framework to support the requirements analysis and specification of information systems in enterprises is presented. The framework is constituted by an ontology and the outline of an organisational inquiry method and is intended to be specialised according to the analysis perspective adopted. After the characterisation of the notion of development perspective, the social and organisational conceptualisation is described together with the structural features conceptualisation of information systems. Finally, the utilisation of the framework is illustrated in the constitution of an interpretative approach to the requirements analysis and specification of information systems.

Keywords: system analysis and specification, requirements analysis, organisational issues in systems integration.

1. Introduction

In the IS development field, it is more and more accepted that there is not a single rationality supporting the development approaches. As the neutrality of analysts (with respect to social and organisational matters) is clearly a myth, it is legitimate that their values and assumptions influence the way how information systems (IS) are developed, as long as these issues are clearly expressed. One way to do this is to make use of the concept of paradigm, a notion that tries to capture the collection of key concepts, suppositions and implicit rules controlling the problems identification and problem solutions, and thus the discourse, theories and thinking of a community of developers. Other researchers in the IS development field used the paradigmatic analysis in the study of IS development methodologies [Hirschheim et al. 1995].

Whatever paradigmatic influence, requirements analysis and specification for information systems (IS) in enterprises, always call for modelling method(s) in order to provide a shared understanding of the domain(s) being analysed. If the IS application is complex enough, the social and organisational domains of the enterprise become major issues in requirements analysis. Most of the current modelling methods that can be used in a requirements analysis process assume the organisation as a coherent whole, completely determined by pre-defined goals, which is more and more considered as too simplistic in order to support a comprehensive social and organisational analysis. Moreover, mainstream modelling methods lie in the dominant (so-called) functionalist paradigm [Hirschheim et al. 1995][Soares 1998a].

This paper presents a research work on conceptual modelling to be used mainly in the support
of social and organisational analysis in IS requirements analysis and specification. The distinctive point is to rely deeply in social theory for the social and organisational conceptualisation instead of the common superficial engineering attempts to this subject. Particularly, this work makes use of Giddens' structuration theory (ST) and Friedberg's organisational action analysis methodology as the social theoretical background. The main aspect to be dealt with in analytical terms is the structure vs action duality. Most of the current modelling methods emphasise one of the sides: structure or action.

The result of this work is a conceptual framework intended to make possible to support both an institutional analysis and a strategic actors analysis. The former encompasses analysing how the organisation goals are created and co-ordinated as adaptation and change to the environment, how goals are decomposed for the several sub-systems, which resources are selected to satisfy goals and how, etc. The later involves the identification of the relevant social actors, what they do and how they do it, which rules follow and how they interpret them, which intentions they have, how they use resources in social relations, etc.

Besides an ontology, the conceptual framework also embodies method outline (synopsis) to help in the models construction. The organisational action analysis methodology of Friedberg [Friedberg 1993] is the main inspiring source for the organisational inquiry: the primacy given to organisational actors with their intentions and goals.

We do not detail here the issues concerned with the ontologies that formalise the conceptual framework (this can be found in [Soares 2000]). We focus this paper on the overall framework structure, particularly on the way how the organisational inquiry methods can be integrated within the framework. The rationale of the conceptual core as mediating between development perspectives (a relaxation of the concept of paradigm) is also explained.

Our ultimate goal, within a broader research work, is to conceptually link the whole IS analysis process, from the organisational requirements analysis (resulting in a first definition of the organisational and technical objectives) to the software engineering methodology (e.g., the Unified Modelling Language, UML).

The core of the paper is divided in three sections: section II introduces the notion of perspective in the technical and organisational development, its relation with the notion of paradigm. Section III synthesises the conceptual framework by describing briefly the social and organisational conceptualisation of the enterprise, and the social structure based IS conceptualisation. In this section it is also outlined two basic specialisation patterns of the conceptual framework: functionalist and interpretative. Section IV shows the setup and use of an interpretative approach using the well known Soft Systems Methodology (SSM) as the organisational inquiry method.

2. A simplified account of perspectives in requirements analysis

The actors involved in a requirements analysis process bring to it not only their educational and training background but also their prejudices, values and interests.

These elements contribute to form, in a complex way, the perspective under which the development actors approach a requirements analysis process.

In practice, the approaches to the development of information systems in enterprises embody assumptions of all the four paradigms in a variable degree, though mainly influenced by one of

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1 Of course this is a complex issue whose theoretical background call for the works in the philosophy of science of Thomas Kuhn and Karl Popper. Nevertheless, the simplified analysis framework here introduced (and is based on Khun's later characterisation of paradigm) can be useful for a first contact with this problematic and will help to support the arguments in this paper.
them. We introduce the notion of perspective in techno-organisational development to further characterise the paradigmatic influences when analysing and specifying information systems. It intends to give an account of the conceptualisations, assumptions and tools (theories, methods, models, etc.) that the development actors make use of to achieve the development goals.

We will then consider a perspective in requirements analysis as having two components: a disciplinary component and a world view component.

The disciplinary component aggregates three elements that together characterise how a group of practitioners (or researchers) of ISD (being internal or external actor in relation to the organisation) produce and reproduce the knowledge related with requirements analysis. The constitutive elements are symbolic generalisations, particular shared models and methods. Please refer to for the definition of each element.

The world view component characterise how a group of practitioners (or researchers) makes judgements about theories and methodologies and how they find that a problem and the space of solutions are acceptable and admissible. It includes shared values as the main element but also individual cognitive aspects such as the experience in a given subject matter or tacit knowledge.

This notion of perspective can be mapped in the two dimensional space of paradigms in social theory from Burrell and Morgan [Burrel and Morgan 1979] (see Figure 1). This space is generated by the objectivism-subjectivism and order-conflict axis. Positioning the notion of perspective in this space, we can say that perspectives are a relaxed form of paradigm. Each perspective embraces one main paradigm but it can suffer influences from the other three.

2.1 Two simplified perspectives as an example

Two examples of perspectives in IS development are presented below.

Perspective A: technical development with social and organisational concerns

In this perspective the role of the information system under development in the enterprise is instrumental i.e., it is designed and implemented to solve problems and improve situations that are relatively well defined and that have clear and explicit goals. The emphasis is on the technical development but the need to consider the human, social and organisational aspects of the IS is recognised. The perspective is characterised as following:

Symbolic generalisations - expressions concerning the system efficiency, reflecting its mathematical modelling, e.g.: "cost per piece decreases with increasing manufactured quantity", "productivity depends on the product mix"; expressions related with quality: "variation always exists", "the process is under control when only exist common variation causes"; rules related with the design of manufacturing systems: "the number of operations in a manufacturing process must be minimised"; assumptions related with the information system development: "critical success factors must be quantifiable and previously defined", "management should establish generic system requirements and system goals";

Particular shared models - mathematical models of, e.g., the manufacturing system: queuing networks models, feedback models; conceptual models: process models, data models, systemic models of the organisation; motivation models; ergonomic models;

Methods - conventional development life-cycle model (requirements elicitation, specification, design, implementation according to pre-defined goals); methods for improving the system specification: prototyping, interviews, observation);

Images of the subject-matter - the organisation as an object or system, analogies with machines or organisms, information systems as a means to improve organisational effectiveness, people as passive information sources;
**Shared values** - neutrality and objectivity; instrumental concern with working conditions (ergonomy, satisfaction) i.e., as a way to improve organisational performance; clear preference for the management knowledge.

The functionalist paradigm is the main reference in this perspective. However, it is parti-coloured with assumptions and techniques that can be considered as “almost” interpretative and also show signs of radical structuralism. In the first case, considering the end-users as privileged information sources and the use of task observation and interviewing techniques imply interpretative ideas such as the recognition that the understanding of the stakeholders about the task structure and the system role is fundamental for the implementation success. In the second case, the adoption of feedback control models (planning-execution-monitoring), together with the primacy given to management views and decisions, introduce an opposition between management and the workers, characteristic of radical structuralism.

**Perspective B: participatory development of work and technology**

In this perspective the role of the information system under development is one of providing structuring characteristics of the organisational interaction besides its role as technical instrument. The IS is not determinant of structure and interaction but involves a set of meanings, resources and norms that are appropriated by the social structure were it is used [De Sanctis and Poole 1994]. Besides a functional support to organisational tasks, its design also involves the desirable features for the organisational structure and working conditions. However, this does not mean that is through the IS that social and organisational structures are determined, but that the design of the systems is undertook in a more comprehensive context including methodologies for socio-organisational intervention. The perspective is characterised as following:

**Symbolic generalisations** - adopts the majority of the symbolic generalisations referred in perspective A (manufacturing system efficiency, quality assurance, manufacturing systems design) and adds, e.g.: "the work role of a person or group should always include planning and execution tasks"; refuses the ones related with the IS development, replacing them for example by: "technical and organisational requirements are not pre-defined but are discovered by the organisational actors in an iterative learning process", "the participation of the organisational actors in the development process is a critical success factor";

![Figure 1 – Perspectives in the space of paradigms and the role of the conceptual core](image-url)
**Particular shared models** - mathematical models of the manufacturing system as in perspective A but used for functional efficiency assessment considered as only one of the effectiveness factors in the organisation; conceptual models: process models, data models, systemic models of the organisation; motivation models; ergonomic models as instruments for a shared understanding of the technical and organisational reality;

**Methods** - technical and organisational requirements elicitation and analysis as the crucial phase of the IS development; the developers are considered as learning facilitators of the organisational actors involved in the IS development; intensive use of technical and organisational prototyping; use of tools that manage the development process information and support organisational actors in the discovery and understanding of the organisational reality;

**Images of the subject-matter** - the organisation as a composition of different local orders of organisational action (not as an object or system as in perspective A); people as organisational action determinants, at the same level that the organisational structure; information systems as producing and reproducing meaning, resources and norms; people as builders of the organisational and technical reality;

**Shared values** - concern with working conditions as crucial factor for an improved quality of working life and organisational effectiveness; a great deal of importance given to organisational actors tacit knowledge as well as their perception of the organisation.

The interpretative paradigm is the main reference in this perspective. There is a primacy of organisational actors’ perceptions and viewpoints in the discovery of problems and opportunities, being the role of external developers to facilitate, train, and suggest. Influences of other paradigms can be also present: for example, an "excessive" focusing on the end-users points of view dismissing management views can be regarded as relinquishing neutrality in favour of workers, introducing in this way radical structuralist assumptions.

3. **A conceptual core for perspectives mediation in IS development**

A comprehensive information system requirements specification, informed by social and organisational knowledge, inevitably makes use of some kind of representation (e.g., conceptual modelling) as an instrument for shared understanding of the enterprise's problems domains and state-of-affairs. The more consistent the technical and socio-organisational conceptualisations are, the more easier is the shared understanding of the representative actors of different disciplines perspectives.

Structuration theory [Giddens 1984][Soares 1998b] is a social theory that provides a conceptual core that can support both an institutional analysis (e.g., how goals are co-ordinated within the enterprise for mission achievement and adaptation to the environment, how subsystems interact, which resources are used for achieving goals, etc.) and a social action analysis (e.g., identification of social-actors intentions, social relations and interaction, individual and group goals, etc.). Other authors used ST explicitly or implicitly in several forms of analysis of the inter-relations between IT and social processes in enterprises. Nevertheless, these research works did not deal with the specific issues of information systems and organisational requirements analysis and specification, particularly in enterprises.

We used ST as the foundation for a conceptual core aimed at mediating between perspectives in IS requirements analysis and specification in organisations. As sketched in Figure 1, this mediation concerns essentially to models and methods.
3.1 A social and organisational conceptualisation of the enterprise

Organisational structure

The notion of organisational structure is a particularisation of the one of social structure as used in the structuration theory. Rules and resources are the main concepts and through them it is possible to describe more specific concepts such as role structures, skill structures, technical structures.

Rules can be specialised in two generic types: constitutive rules and regulative rules. Constitutive rules are related with the definition of the activities e.g., "the first step in the creation of a weekly production plan for the group z is to analyse the quality indicators of previous customer order". Regulative rules have to do with how the activities should be performed e.g., "before the weekly production plan can be released, it must be verified by the production manager". These two types of rules can be further specialised in bureaucratic, work division, business, quality, etc., rules. The generality of this concept enable the representation of rules that go from informal, "soft" rules e.g., "when not supervised, skip step 3", to formal, "hard" rules such as "productivity reports are due every monday at 10 a.m."

Resources can also be specialised in two generic types: allocative and authoritative resources. The former are related with the control of organisational activities and processes. The later are related with the maintenance of social relations, involving the generation and maintenance of power relations. If we say "the functionality of the software module x enables the calculation of y which is necessary to perform task z" or "the experience of x in performing task y is important for performing task z" we are considering "functionality of the software module" and "experience" as allocative resources, as they are used to enable the performance of other tasks. On the other hand, if we say "the functionality of the software module x provides information about the performance of the working team z" or "the technical skills of actor x enable him to decide which tasks are performed by w and z" we are considering "functionality of the software module" and "technical skills" as authoritative resources as they can be used to exercise power in social relations.

Organisational actors and their strategy

Organisational actors are basically characterised by goals and intentions. Goals are logically linked to organisational actors and do not exist in a void. Usually, goals in enterprises are conceptualised as an hierarchy of goals, with the top representing pre-established and definite goals of the enterprise, as implied by a single rationality that assume a transparent and predictable behaviour of organisational actors. Considering organisational actors as strategic actors i.e., guided by interests and motivations not completely constrained by the organisational structure, a more convenient conceptualisation would be a web of goals, resulting from an aggregation of the individual actors goals. Obviously that "management", being an organisational actor, contributes with an important and influential set of goals. Nevertheless, this importance must be recognised at the analytical level although in logical terms "management" is at the same level than the other actors. Goals are linked to the actors intentions, meaning that organisational actors have intentions to execute activities to achieve certain goals.

The concepts of intention and intentional or purposive activities are central in the organisational action and actors characterisation. An intention can be defined as the will of a social actor to execute an activity. Intentions originate intentional activities i.e., activities which a social actor knows or anticipates that its execution can produce a given outcome or state of affairs.

Intention conceptualisation is also related with social interaction, particularly with power relations: a social actor can see realised a given intention not through its own agency but using the others capacities. This involves the adequate use of resources in social relations, depending on the domination characteristics of the organisational structure. Intentions can also have
different a temporal scope i.e., referring not only to short term activities but also to long term projects. Different intentions or purposes can be inter-related in a intention hierarchy where a long-term intention can entail shorter term ones.

**Social interaction**

Organisational actors follow rules and and use resources in the activities that they execute but also in the social relations that they establish with other actors, resulting in social interaction. The explicit representation of social relations is fundamental for a social and organisational conceptualisation as not all kinds of social relations can be inferred from the activities that the organisational actors execute jointly or from the resources that they share. Power relations are an important type of such social relations. Therefore, we can say that organisational actors establish social relations (interact) in which they use interpretative-schemes, rules and resources (modalities). This can result in changes or maintenance of the organisational structure as referred above.

### 3.2 A social structure based conceptualisation of IS

The structural features (of IS) concept was first introduced by [DeSanctis and Poole 1994] in the analysis of social and organisational influence analysis of groupware in office applications aiming to describe the social structures in IS (specific types of rules and resources provided by or embodied in the system). We follow the same path when describing the generic requirements of an IS.

Legitimation characteristics of an IS may result from imitation of existing rules within the organisational structure or from rules embodied in the system, following some design option. The first case is typical of systems developed according to particular enterprise requirements, whilst the second case results from systems with a certain degree of generality, designed for being used in a range of companies (e.g., similar industrial sector) and/or in a range of applications (e.g., manufacturing planning and control). Legitimation characteristics of an IS become part of the organisational structure, constraining or facilitating the execution of activities and the social interaction. Furthermore, according to ST the IS introduced or reinforced rules are interpreted by social actors, reconstituting the organisational structure legitimation properties (appropriation according to [DeSanctis and Poole 1994]) and leading to an acceptable discretion or to some problematic rigidity. A common example of this aspect can be found in IS supporting manufacturing planning and control, where its effectiveness depends on the adaptation between the system embodied rules concerning the decision making (work planning) centralisation or decentralisation, and the existing (bureaucratic) rules concerning work organisation.

The resources provided by an IS include e.g., information used by social actors in the execution of activities (process and production status, control charts, production and inspection plans, order lists, etc.) or control and co-ordination mechanisms (technical drawings version control, automated checking of plans against execution, automated document routing, etc.). These resources form the IS domination characteristics which are in turn integrated in the organisational structure: when a set of resources provided by an IS is used by social actors it assumes the role of modality producing and reproducing power relations within social interaction (and, at the same time, producing and reproducing the organisational structure domination characteristics). For example, an IS that provides a working team with accurate and timed performance indicators in terms of productivity and quality (allocative resources) can influence the organisational structure domination characteristics in two ways: it enables a dependency decrease of the working group in relation to the planning department, and it enables the increase of the group skills (the creation of new resources) which can serve for reinforce the image of the group and provide it more means in power relations.
Finally, IS structural features also involve production and reproduction of meaning i.e., signification characteristics. An IS embodies a conceptualisation of a domain (or domains) such as quality, planning, marketing and sales, etc., that influences in a variable degree the communication aspects of interaction. Social actors appropriate the system provided domain conceptualisation in multiple ways that reconstitute the signification characteristics of the organisational structure.

3.3 Formalisation of the conceptualisation

The above enunciated conceptualisation was formalised in a Social and Organisational Ontology (SOO) and a Systems Requirements and Specification Ontology (SRSO), constituting the so-called TODO (Technical and Organisational Development Ontologies) representational framework for technical and organisational analysis and design [Soares 1998c].

SOO includes social structure, organisational actor, and organisational action and interaction as its main parts. The concepts defined in SOO enable the modelling of the enterprise socio-organisational aspects going from the formal (bureaucratic) issues - organisational units structure, task allocation and responsibilities, etc. - to more "soft" (yet tangible) issues such as power relations and motivational characteristics of jobs. Also, the concept of modality and its sub-concepts (such as norms, facilities and interpretative-schemes), mediating between interaction and structure, are useful for modelling important socio-organisational issues.

SRSO defines the basic concepts related with the IS requirements analysis and specification. It includes terms related with architectural aspects of IS (e.g., system) and with functional and data specification aspects (e.g., requirement, functionality, output). SRSO includes the SOO which means that most of the concepts in SRSO are subconcepts of SOO. This also means that the technical and socio-organisational concepts are logically consistent.

The purpose of TODO is to act as a core representation i.e., a basic shared understanding for all the actors in an IS development process. It intends to include a comprehensive set of concepts, relationships and axioms that are fundamental for representing, communicating and reasoning about the technical and socio-organisational aspects of an innovation process in a company.

A powerful feature of ontological engineering is reuse. This means that every ontology doesn't need to start from scratch, but it can include terms already worked in other ontologies. For this work, we included in TODO the Enterprise Ontology [Uschold et al. 1996], whose defined terms on activities, resources and processes were found particularly useful.

3.4 Specialisation patterns in the conceptual models building: functionalist specialisation

In a functionalist specialisation it is assumed that the analysis methods (both inquiry and modelling) are supported essentially by a vision that assumes the analysts as detached from the organisation and where the relevant actors are identified on the basis of their role in the socio-organisational established order. This order is reflected in pre-established analytical categories (performance, quality, motivation, etc.) that are instantiated when, e.g., data is collected from the IS stakeholders in the enterprise. The models constructed in this way seek objectively "one best way" for an IS to satisfy a hierarchy of goals known and accepted by all the social actors involved.

The method to construct the conceptual models according to the functionalist specialisation is summarised in Table 1. This specialisation would typically support perspective A as described in section 2.
A. Identification of the rules that define the organisational structure
   1. Identification of the activities and their structure
   2. Identification of social actors and role structure
   3. Identification of goals and their hierarchy
   4. Identification of intentions
   5. Identification of rules (procedural, bureaucratic, work, etc.)

B. Identification of social relations

C. Identification of the resources used in activities

D. Identification of the resources used in social relations

E. Identification of interpretative schemes used in the execution of activities and in social relations

Table 1 - Synopsis of the method to build a conceptual model from a functionalist perspective

3.5 Specialisation patterns in the conceptual models building: interpretative specialisation

An interpretative specialisation of the conceptual core builds on the notion of particular realities [Friedberg 1993]. In fact, the analysis position defended by this perspective promotes the description of the particular action context perceptions of the stakeholders in the IS requirements analysis process. This leads to an exploratory construction and modelling of a "web" of goals: the description of "local orders" as seen by the social actors involved. The local models are always partial and are the starting point for an open and informed discussion aimed at obtaining accommodations in what concerns to the objectives and role of the IS as well as the related work (re)organisation and/or processes (re)definition.

The method to construct the conceptual models according to the interpretative specialisation is summarised in Table 2. This specialisation would typically support perspective B as described in section 2.

A. Identification of "local orders"
   1. Identification of the social actors
   2. For each social-actor identified, identify
      Goals, activities, intentions, rules, resources
   3. Identification of relations between goals
   4. Identification of the activities structure
   5. Identification of social relations
   6. Identification of interpretative schemes used in the execution of activities and in social relations

B. Aggregation of "local orders"
   1. Identification of conflicts
   2. Establishment of accommodations (agreements)

Table 2 - Synopsis of the method to build a conceptual model from an interpretative perspective

4. Using the conceptual framework from an interpretative perspective

An IS development approach always involve two categories of methods (even if included in the same methodology): organisational inquiry and organisational description. The conceptual framework described so far only provides an object oriented conceptual core used to generate social and organisational models, as well as the system specification models. Thus, the framework can be seen as a conceptual "infra-structure", providing in addition a basic modelling method (as described in the synopsis of Table 2).

To "build" an IS analysis approach using this "infra-structure" it is then needed an organisational inquiry method. In this section we will describe how the techno-organisational conceptual framework can be used to form an interpretative IS analysis approach i.e., an approach to the IS requirements analysis and specification according to an interpretative perspective.
4.1 Choosing an interpretative organisational inquiry methodology

One of the goals of this work was to test an alternative analytical framework for empirical research in IS development. In particular, our interests focused on the IS requirements analysis in organisations, emphasising the analysis of social and organisational aspects.

Although the conceptual framework here described was intended to support both functionalist and interpretative approaches, we follow basically a research stream summarised by [Walsham 1993] adopting broadly interpretative methods of research, aimed at producing an understanding of the context of an information system as well as the processes whereby the information system influences and is influenced by its context.

The Soft Systems Methodology [Checkland and Scholes, 1990][Checkland and Holwell 1998] clearly fits in the interpretative perspective. It helps a group of people in an organisation to express, conceptualise, evaluate and propose improvements for a problematic situation. We choose this methodology for two reasons: first, its long existence provided us with a handful of experience in practical terms, which is crucial when methodological research is concerned; second, although interpretative, it embodies a systems engineering bias, that seems to be an advantage when the goal is to support a process that ends with a IS specification and where analysts with an engineering background participate.

4.2 The integration of SSM within the conceptual framework

Figure 2 gives an overview of the interpretative approach to the IS requirements analysis and specification. The figure shows how the TODO conceptual framework integrates the organisational inquiry results (SSM outcomes). It should be noted also how the socio-organisational conceptual models are added to the logical stream analysis of SSM.

Figure 2 – An approach to the IS analysis and specification using SSM and TODO
The way how SSM helps to "populate" the social and organisational model as well as the system requirements and specification model is summarised in Table 3.

Regarding SSM logical flow of analysis, the identification and naming of relevant systems (rich pictures+root definitions+catwoe elements) cover steps A1 to A3 from Table 3.

The conceptual models of human activities constitute the first iteration in modelling the activities structure, therefore covering step A4.

In the cultural analysis flow, the social system analysis result in the identification of roles, values and norms. This contributes particularly to step A5, but also to steps A1 and A2.

The analysis of the political system provides a further identification and characterisation of social relations, rules and resources, contributing to A2 and A5.

Examples of using the cultural stream of analysis have been reported by [Checkland and Scholes, 1990]. One minor motivation in this work replace the cultural analysis stream of SSM in order to deepen the social and organisational analysis of the enterprise in a way that was more closely coupled with the derivation of IS requirements.

<table>
<thead>
<tr>
<th>SSM logical analysis</th>
<th>SSM cultural analysis</th>
<th>Social and organisational ontology</th>
<th>System requirements and specification ontology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rich pictures</td>
<td>(can contribute to characterise all the entities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root definitions, CATWOE elements</td>
<td>Social actors, goals, state-of-affairs,</td>
<td></td>
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<tr>
<td>Conceptual models</td>
<td>Social system analysis</td>
<td>Activities, rules, intentions, Potential resources,</td>
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<td></td>
<td>Political system analysis</td>
<td>Social relations, rules, resources, rules,</td>
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<tr>
<td>Differences with the reality</td>
<td>Intentions</td>
<td>Requirements, functionalities, constraints</td>
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</table>

Table 3 - Mapping of the SSM results to the technical and organisational conceptual core

4.3 Empirical evaluation

This interpretative approach was used in a non-profit innovation centre in Portugal for the analysis of the potential improvement (through a new information system) of selected organisational processes.

The experience gained in this practical application was of course very important to refine the analysis approach itself and the conceptual framework in particular. In this paper, we opted for the detailed explanation of part of the framework, which left no room for the presentation of the empirical results. Some illustrative examples can be found in [Leonardo and Soares 1999] and a complete case study paper is being prepared.

From the methodological research side, we tried to observe the set of principles for conducting and evaluating interpretative field studies in information systems suggested in [Klein and Myers 1999]. From these we utilised in an high degree the "hermeneutic cycle", "abstraction and generalisation", "dialogic reasoning" and "multiple interactions".

5. Discussion and further work

In this paper we described one strand of our research work concerned with the use of interpretative methods for organisational inquiry and the representation of the analysis outcomes
and requirements specification using the TODO conceptual framework. The goal was to go
through a technical and organisational analysis guided by the soft systems methodology ending
in a system specification materialised through the Unified Modelling Language (UML) having
the TODO as conceptual framework. Another strand is related with the use of the TODO to
enrich the concept of analysis patterns [Fowler 1997] with social and organisational
information. The goal is to support the organisational configuration of information systems
[Cruz and Soares 2000].

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