Work Informatics – An Operationalisation of Social Informatics

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Abstract. A new approach to informatics and Social Informatics is introduced called Work Informatics. It is compared with Social Informatics, and it turns out that there is a high resemblance between their scopes and objectives. Work Informatics is more operational and therefore, we can use it more easily for practical purposes. Social, technical, and socio-technical aspects of both are analysed. The focus, unit of analysis and contents of Work Informatics are briefly outlined.

Keywords: Social Informatics, Work Informatics, Socio-Technical Design, Participative Design, Unit of Analysis

1 Introduction

Social Informatics has been characterised [1] in the following way:

> "Social Informatics refers to the interdisciplinary study of the design, uses and consequences of ICTs that takes into account their interaction with institutional and cultural contexts."

It is clear that the purpose is to emphasise the social aspects of information and communication technology (ICT). In this definition, we do not view that intention only in the name of Social Informatics, but also in the expressions of *interdisciplinary contexts* and *institutional and cultural contexts*. The definition is probably intentionally open, as it does not tell in full detail what should be the object of study or what characteristics one should study. The expectation of type of results from such studies is also open and how and for whom these results might be useful.

One conclusion of the general nature of Social Informatics is that each application of it has to begin by articulating many things to make the study specific enough. In this paper, I shall analyse one possible application area that I have called *work informatics*. Work Informatics is the name of a new master's programme at the

University of Turku, but it is also a research area within information systems research and probably also within Social Informatics.

Intuitively it seems reasonable to look for similarities rather than dissimilarities between Work Informatics and Social Informatics. Both of them have an important mission that aims at broadening and enriching the technically biased understanding and self-understanding of IT and IT artefacts. In this paper, we identify more approaches that share this objective and outline a concretisation towards its fulfilment based on informatics work.

2 Social or/and Technical

The emphasis on social aspects in Social Informatics raises two questions to the surface. (1) Does Social Informatics expand the area of Informatics by bringing some new research questions to the agenda? (2) What parts of informatics do not belong to Social Informatics? It is clear that the second question is more central for our interest in Work Informatics.

If we consider Social Informatics people sitting on one side of a border, who are sitting on the other side of it? Are they unsocial, non-social, or asocial? I am afraid that these labels are tautological and they do not add very much to the understanding of the substance of the difference. It is probably more fruitful and truthful to realise that *we* are sitting on the other side, as deviants from the mainstream. Moreover, it is not so difficult to find the name of the mainstream to be information technology. The identity of information technology people arose from the concept of technology and the technical. Information technology simply cannot escape its technical connotation. The message from Social Informatics is that this interpretation may not be the complete truth and perhaps not even its most important dimension.

The reference to the technical aspects of informatics brings a new challenge to the discourse reflected in the recent debate about the IS Core that divides the discipline in two main camps [2,3,4]. They have identified the two camps as the 'IT Artefacts' and 'IS in Organisations'. Without a deeper analysis, it seems natural that the latter one is a better candidate for an ally to Social Informatics, if it turns out that this kind of choice is necessary. Perhaps we can even use the label 'IS in Organisations' as a synonym to Social Informatics. Of course, Work Informatics would even be on the same side of this borderline.

It is possible to view this confrontation between the two fractions of IS Research (IT Artefact and IS in Organisations) one possible expression of another confrontation: ICT is fundamentally social or technical. This issue has been with us quite a long time. *Information systems are technical systems that have also social consequences* is a slogan expressed by the advocates of the technical orientation whereas the socially oriented people would favour a slogan *Information systems are social systems, part of which are technically implemented.* In addition, many groups obviously want to avoid making this choice as if they would like both to eat the cake and to have it.

It is beyond the scope of this paper to find an ultimate solution to the question whether information technology is technically or socially determined. It is, however,

still interesting to examine the role taken by IT on issues relevant to Social Informatics and Work Informatics.

The power of the computer to support human work and enhance organisational activities is based on the computer's ability to execute stored programs without frequent intervention of a human operator. This property seems to give support to the technical orientation. It also has the risk that the IT artefact is conceived as an actor that nobody needs to control and therefore can function more or less on its own. The other, more socially oriented option comes from the tool metaphor. Even if the execution of programs seems to happen independently of the human operator, a user makes use of the artefact as a tool that is ultimately responsible for the outcome, whether performed partly or entirely by means of computers. This is an interpretation that Work Informatics (and in my opinion Social Informatics) must do.

The actor issue is of crucial importance. This importance is underscored by the fact that the issue is not too often addressed. Most textbooks on information systems research and design silently accept the state of affairs that the computers perform certain tasks because they are better, faster, and more accurate or have other benefits when compared to human performance. There is an implicit division of labour between human and computerised tasks. It remains implicit, because we discuss the collaboration between people and computers quite seldom from the actor perspective. This is natural because it is extremely difficult. One must present a theory about the particular characteristics of the machine actor and, if the information system is supposed to perform some functions, what kind of actor it is? If something goes wrong, who takes the responsibility?

The problem does not boil down to the dichotomy between objective and subjective. A bullet does have an objective effect upon human flesh [5]. However, shooting people is socially and subjectively unacceptable rather than technically determined.

3 Socio-Technical Approaches

Our discussion above can be summarised in two issues. One issue is, how we conceive the relationship between technical and social phenomena? Many questions arise. Are they different or distinct? Do their domains consist of or contain same elements or are their units entirely different? Are they overlapping to some extent or is one of them perhaps a subset of the other? These questions are valid for any area that deals with technical and social phenomena, for example traffic, energy production, or home electronics.

In addition, another set of questions exists that are specific for IT. The actor problem discussed above is a good example of this. One may find another question, for example, in the complicated and integrated structures characteristic for many information systems. Are these structures social or technical? Do they coordinate social or technical activities?

The socio-technical school offers one consistent suggestion to both question groups. Emery and Trist [6] distinguish between two more or less separate systems: the technical system and social system. The innovation made by the Tavistock

School at that time was that these two systems are fundamentally different and therefore, one should design them according to their different principles. We should remember that we still in the 40's the ideal for the design of work organisation and other social systems was based on an analogy with technical systems. In this context, the socio-technical initiative was revolutionary.

The socio-technical principles soon received applications in information technology as well. Enid Mumford developed and introduced the successful development method ETHICS [7]. She supplemented the Tavistock approaches with her own theory of factors of job satisfaction. The design should aim at a good fit between the employer requirements and employee needs. The social and technical systems are designed separately and finally, they chose an optimal joint design of the alternatives given by both tracks.

We could interpret Social Informatics in terms of socio-technical approaches. This is a suggestion, for example, presented by the frequent use of the term socio-technical in the communities close to Social Informatics [8]. For some reason, the two socio-technical groups do not seem to belong fully to the same tradition. It is not, for example, easy to say whether Social Informatics people regard the technical and social systems as separate in the same way as the older socio-technical tradition. The phrases used in the definition of Social Informatics unfortunately indicate such separation. *The consequence of ICT* already gives a hint to that direction. The *interaction* of ICTs with institutional and cultural contexts is a stronger indication, because interaction does have identifiable parties.

I would personally hope that this Social Informatics does not subscribe to the separate and consequently non-social character of ICTs. The doubts I expressed above are probably a sign of widespread (but not therefore harmless) inaccurate words and idioms that give unintended connotations when read accurately. This is my hope, because the separate technical systems are likely to grow to autonomous systems. If this happens, reified technical arguments (that we need not or can not discuss) will confront us because they are not socially determined. In other words, no people exist behind these arguments and they do not necessarily serve human interest.

In Work Informatics, we can resist such reification; we should just remember the aphorism by Irmeli Sinkkonen [9]: *The work of the users is not to use the system*. Les Gasser [10] has also given a similar statement by:

> "Use of computers is any employment of computer-based information or analyses in the performance of other tasks. Thus, computer use presumes existence of other work..."

Work is a primarily social phenomenon. We cannot do work so that you first do some work, then interrupt it and do some technical tricks with the system, and then return to work. The system must be an embedded one that performs as an inherent part of work; we must not conceive it as a separate effort. Therefore, Work Informatics should reject the conceptual separation of the social and technical systems.

4 Discovery of Context and Participation

One possible way to give more emphasis to the social aspects of informatics is to pay greater attention to the contexts. This is exactly what Rob Kling has done in his definition by his reference to institutional and cultural contexts. His interest in context can be seen in the context of the widely spread interest in context during the last fifteen years. *Computers in Context* was the name of at least one conference [11] and monograph [12] in 1990s. Context has, in my interpretation, been an expression of the desire to escape from the narrow definition of IS area with dominantly technical label. There are so many aspects to consider such as work and its organisation, communities of practice, and motivation and skill.

Unfortunately, context is a poor concept since its analytical power is so minimal. Context somehow stands for anything that is not in the focus; yet it relates to the focused object. In informatics, for example, the discourse surrounding a context reveals the fact that the focus still was in the design and implementation of information systems, conceived as dominantly technical constructs. Now many scholars required that the focus should shift from ICT to the context. This is, however, impossible because when a new focus is taken into focus, the earlier focus becomes part of the new context. However, the new focus in the earlier context does not mean that everything is lost. Rather, it may open new ways of thinking about the relationship between ICT and work activities that follow the wisdom of the aphorism by Irmeli Sinkkonen, namely, that the work of the users is not to use the system.

This statement is insightful because it calls for a formulation of the work in terms that do not rely on information systems. The essential things reside outside the ICT artefacts. This reallocation of focus has an interesting parallel with the changes in the organisation of information systems development (ISD). Increasingly, outsourced companies have replaced in-house development. If we move ICT from the focus to the periphery, the same will largely happen to ISD. This has far-reaching consequences to participative design that has been one of the flagships of Social Informatics.

Participation has been justified by at least three groups of argument, namely 1) human right, 2) acceptance, and 3) quality of the future system. Happily, both Social Informatics and Work Informatics share the first argument, even if both have to articulate what is the object and process of participation. The acceptance of the users is likely to be higher if they have the opportunity for participation. However, this argument may have a flavour of manipulation, unless the genuine improvement of the future use or work situation forms its foundation. Hence, the third argument is the core of all participation.

The discourse on the quality of information systems is, again, dependent upon the choice; that is, that which we decide to place in the concept of information system. Shall we regard it as an IT artefact? On the other hand, shall we want to include the organisational context as well? This question is not only an academic or intellectual exercise, but it has an important practical significance. This is because the production and delivery of information systems more and more seldom takes place as an in-house development. Therefore, the design and production of the ICT artefacts is often finished when a customer organisation considers a purchase. Thus

the decisions on the structure and functioning of the software have already been made and beyond the potential participation of these particular users. One decision remains: the choice between alternative software products.

However, if we decide to consider the organisational context as a domain of participation, there is much to do in terms of designing work roles and responsibility areas and assigning them among employees. We need to decide user education and training, coordination practices, and many other aspects. One can even argue that organisational implementation is impossible without participation. This is because during an implementation, users must produce an interpretation of their own – no one else can do it for them. This kind of appropriation is an active form of participation performed both individually and collectively.

To sum up, participation in the design does not guarantee a successful implementation or appropriation. Work Informatics emphasises naturally the organisational implementation and appropriation; it is possible to accomplish good work and use situations even for a system designed without direct user participation, whereas it is not possible without participation in organisational implementation. I am convinced that Social Informatics shares these concerns of Work Informatics.

5 Unit of Analysis

After a shift of focus (ICT) to the earlier (organisational) context, the new focus is on the side of working (or organisational activity) instead of information systems. One fruitful trick of assessing the benefit of such redefinition is to identify the 'Unit(s) of Analysis' (UoA) within the new research focus. We often view units of analysis as an answer to the question: Facts about what? In other words, what are we talking about? It is difficult to overestimate the importance of the UoA discussion because very many misunderstandings are because people are not talking about the same thing. Furthermore, people use the term 'Unit of Investigation' for the same thing [13].

I have earlier [14] suggested that one feasible candidate to the primary UoA could be a work role. Here, we use the concept of work role to signify a meaningful collection of work tasks and processes connected to the rights, responsibilities, and resources needed for successful performance of work tasks. In organisation of work, the work role is a flexible building block that has a many-to-many relationship with the employees. What is important in the discussion of Work Informatics is the place of the ICT artefacts. The work role as the UoA embeds these artefacts in the work roles and the processes included in them.

This choice is of crucial importance. The work role as a central structural unit transcends the distinction between technical and social, because it embraces both of them. There is no separate social or technical system as both aspects integrate with each other within each work role. Integration takes place between work roles, not between their technical or social components. Of course, the work roles are not isolated islands; they have many connections to other work roles by means of communication and shared databases. In addition, the work role aims at being scalable to fit if small and large units of work. If we decide to regard the work role as

a more social than technical construct, we have given the social sphere the superior role subordinated to the technical one.

Here we cannot be completely sure about Social Informatics. To what extent do different scholars agree with Work Informatics about the dominance of social over technical? The name Social Informatics creates, however, expectations to this direction. The work role framework for the use of information technology is not alone in the manifestly social approaches to IS use and research. Steve Alter introduces one significant framework; he uses the term 'work system' as the name and basic construct. Just like with work roles, it is not meaningful to talk about Information System Development as an isolated enterprise, because the real issue is in the development of the work system and information systems as a part of it.

While it was quite straightforward to construct a natural Unit of Analysis for Work Informatics, it is not quite easy to do the same for Social Informatics. What could be the most obvious Unit of Analysis for Social Informatics? This question and the difficulty in finding an answer to it indicate that Social Informatics, indeed, is more a perspective to research than a well-defined set of problems. In this respect, Work Informatics offers a sub-discipline that is more operational. We now give some examples of its possible application.

6 Work Informatics in Action

We outlined above the meaning of Work Informatics as a discipline or sub-discipline within informatics primarily anchored to the work concept and only secondarily in informatics, as far as it is understood as IT artefacts. The technical perspective does not have an autonomous existence; rather, we always regard it in the context of the social perspective of work. This became clear in the discussion about the 'unit of analysis' above. We determined that the primary UoA was to be a work role that undoubtedly belongs to the social rather than to the technical side of this dichotomy. IT artefacts were not regarded as independent units of analysis; rather, they were seen as characteristics of the work roles.

This shift of perspective from the IT artefact to the organisational context reduces the autonomy of the technical system that cannot have any objectives of its own. It is, indeed, fine if we can do tasks effectively and reliably. However, people also determine these objectives, not by a nameless and faceless technology.

The new emphasis around work and its organisations does not imply that Work Informatics allocates itself in a small corner of 'information systems research', or even partly outside of it. Work Informatics actually more or less coincides with the ISR domain. This coincidence is not, however, a coincidence. What is different is the perspective: not from the IT artefact to the context, but from the work context to the artefacts. The difference in perspectives leads to different problem formulations. Most of the IS research really aims at creating some benefit. Furthermore, the greatest benefits are waiting in work organisations that hope to collect the fruits of the ICT artefacts.

Once this kind of theoretical conceptualisation occurred, it opened a question of demonstrating the legitimate status as a discipline. In information technology, one

important characteristic for a new theoretical approach is its fruitfulness. During the last fifteen years, our research group has performed a series of case studies that have taken the form of evaluation of the success of deployment of information systems in the collaborating work organisations. The experiences of these projects will now be replicated to parts of the master's programme in Work Informatics. The common part in all successful approaches has been that the current state is analysed in terms of non-technical abstraction: the work activities and their objectives are described in terms that are independent of the current ICT solution. This is because otherwise it is not possible to give an evaluation of the current solution, how well one achieved the work-related objectives. The abstraction often also gives good hints for discovering alternative solutions for the work and its organisation as well as for the development of skills and knowledge, not to forget improvements in the ICT artefacts.

The experiences are promising. We have given suggestions for moderate to significant changes that are most often to the satisfaction of the customers. Often the suggestions have been conflicting. This is not strange; it rather confirms many findings of Social Informatics. Here the reasons and mechanisms of impact have been expressed more analytically. There is a good reason to believe, that Work Informatics as a sub-discipline of ISR can contribute to a paradigm shift that has a positive effect in both work and business.

7 Structuring Work Informatics

Work Informatics is also the name of a recently established Master's Programme in the University of Turku in Finland. The Department of Information Technology hosts the programme that is the major educational effort of its information systems group. The contents of the programme are structured through the concept of work rather than one or other attribute of the IT artefact. The work is conceptualised according to three modalities: individual work, collective work, and services. One of the modalities is usually dominant in a particular work situation, even if the other two often are also present at least implicitly.

This kind of general study of work becomes Work Informatics when we find out that ICT takes different roles in different modalities. The modalities also provide a map over the field of information systems research. Various approaches, such as for example BPR, CSCW, or CRM get their natural favourite modalities. Similar connections emerge also to other theoretical frameworks often borrowed from reference disciplines. For example, communities of practice, activity theory, actor-network theory, articulation work, and situated action find their place on the map.

Two more aspects further strengthen the informatics connection of Work Informatics: knowledge and change. Knowledge has already turned out to be a crucial aspect for the use of ICT. Knowledge is embedded in the artefacts themselves and their skilful use is possible only by employees with sufficient knowledge. Nevertheless, probably the most important knowledge is related in the activities and processes of the work organisation. Moreover, of course, not all these dimensions of knowledge are independent on each other. We must absolutely address this theme (as addressed in ISR before).

Change is change of work and its organisation, with their tools and infrastructures. This is the emphasis that traditional IS Research had already in 1960s and 1970s. The problem is how to make analysis and design of systems to get them implemented in organisations – all activities were strongly change-driven. It is important to remember this change aspect so deeply rooted in all technology, but the new emphasis in Work Informatics makes the object of change broader and the process of change to be more dominated by technology-pull than –push.

8 Discussion

In this paper, I have introduced the concept Work Informatics and given it a characterisation by comparing it with Social Informatics. It comes as no great surprise that these two approaches have much in common: work is essentially social. Both approaches are concerned with the often-technical emphasis in the development and application of information technology. This concern gives them a perspective from which we can reformulate old research problems and invent new ones.

The discussion above has come to a suggestion that Work Informatics is more specific and thus, also more operational than Social Informatics. For people working in Work Informatics it is straightforward to find different work organisations, identify units of analysis, collect qualitative and sometimes quantitative data, interpret them, and advance towards new concepts and theories. Social Informatics, on the other hand, has its power in its abstract and general nature. Hence, we can find fruitful research problems in various different areas.

Work Informatics has an important contribution to give informatics in general and to Social Informatics in particular. This is because the vast majority of the benefits that ICT is expected to create to our societies is likely to emerge from work organisations. For example, these organisations make most decisions on purchasing and implementing ICT. This means that the industry should be interested in hiring people who have a special competence in Work Informatics. This justifies the introduction of the new master's programmes in Work Informatics.

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