Leveraging the language action perspective for system accountability and end user configurability

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Abstract. Computer supported collaborative work practices could afford substantial improvements in terms of user appropriation. System accountability and user-configurability in particular could be enhanced leveraging the Language Action Perspective on Communication Modelling (LAP). This position paper provides a brief outline of our research agenda.

1 Introduction

We are hopefully at a turning point in the evolution of the Information Systems (IS) field, and of computer supported collaborative work practices [1]. User appropriation of IT appears to be methodologically within reach. In particular, design for accountability and design for emergent use appear to be within reach,

because of recent work leveraging on the Language Action Perspective, presented at the series of conferences called ALOIS (Action in Language, Organisations and Information Systems) and LAP (Language Action Perspective) [2].

Object of the present communication is a research agenda, encompassing information systems and organisations, based on the social study of information and communication technologies, and specifically on LAP, featuring a methodology based on:

i) e-Negotiation [16] to provide end-users, or their representatives, with expert support for:

a) the identification of system viable end-user tailoring moves, and

b) requirements validation to allow the end-user tailorability to be checked against eventual governing rules and laws in the domain. In that way, the users, or their representatives, could make changes but only within the allowed variations.

ii) ISAT (IS Actability Theory) [3] and Thematic Roles [4] for implementing the use of Use Cases in design for accountability, and in design for end user design in use (DEUDU, [5]), attempting to exploit thematic-role derived work-graph representations.

Let's start with a word of caution on scope, and of explanation on terminology. In this attempt, we would like to address issues related to design and co-evolution of human work practices and information infrastructure support, resulting in the complex dance of human and machine agencies in organisations [6].

Furthermore, in this paper, the concept of Use Case coincides with the original, traditional definition of a natural language description of the succession of actions and actors in activities involving computer support of human work.

In the following, the key issue is human *interpretation*, analysed with the thematic role theory [4] linking *representations* (used by humans and machines) to *actions* (of both humans and machines). A key concept will be that of the *thematic role derived work graph representation* [4], a representation of work activities which is intended to be understandable at the same time both by users and by machines, for the purpose of enabling their collaboration in many ways, in the tailoring and evolution of the work graph itself, and of the Use Case it represents.

In 2002 Jacucci et al [5] proposed the use of Use Cases in Design for End User Design in Use (DEUDU). No methodology however was given at the time for carrying out that proposal. In this paper, we advocate the development of a methodology, based on the Language Action Perspective, on e-Negotiation, and on the Thematic Roles Theory, for analysing interpretations linking representations to actions in the natural language Use Case description. The methodology should enable the use of use cases both in design for accountability, and in design for end user design in use. PD is an essential approach to IT design. LAP has been explicitly espoused with PD over a decade ago [9]. We take explicit

account of this merging in our Use Case development and we profit from it in our approach.

2 A research agenda to put the new perspective to work

In order to be successfully deployed and implemented, the technological power of ICTs needs support and respect to humans and organisations, and care taking of their needs. The social study of information and communication technology (see the book recently promoted by Claudio Ciborra at the London School of Economics [7], and his own previous book [8]) has motivated the tenets of this proposed research agenda. Participation – of users and stakeholders – to the design of IT use, is one of the most prominent needs of humans and organisations [9]

The outcome of a Participatory Design (PD) approach are a number of design imperatives towards design for change, design for configurability, and design for emergent use (ref. my DEUDU); in particular:

- design for accountability [10, 11]
- design for end user design in use (DEUDU, [5])

Improved human machine cooperation can be further promoted by three main paths enhancing possibility of establishing a web of shared understanding and co-operation between humans and computers:

- action in language and organisation for information systems [2]
- interaction design and tangible computing [10]
- double dance of human and machine agencies [6]

Let us zoom on accountability (the system capacity of giving account of itself, provide sense making to users). System users do not know what systems are for, nor how they should be operated [11]. We should care for developing accountability of IT instruments to humans in knowledge communities. Systems should display "business" logics: system displays should emphasize system action aspects, in terms of knowing how a system works, its "business" logics, rather than just its operations [4].

Let us zoom on DEUDU, and the adaptability to situation. We should beware of limitations of planned/allowed use-scenarios. We should allow change in situation: introduce DEUDU (Design for End User Design in Use) as system adaptability by user intervention. Not easy: it requires brokering the needs of humans for 'gestalt' and the need of machines for hierarchy. Analysis on the problem situation recalls a foundational book indicating/advocating the new perspective to replace the rationalistic tradition. It is entitled *"UNDERSTANDING COMPUTERS AND COGNITION"(A new Foundation for Design),* authored by Terry Winograd & Fernando Flores, Addison – Wesley 1986 [12].

This book questions the assumptions of the rationalistic tradition about the objectivity of our representations of the world. This tradition provides us with a rationalistic perspective that serves as a basis for our culture's commonsense understanding of language, thought, and rationality

3 Looking for tools from the *Language Action Perspective*

User satisfactory IT use requires IT accountability and IT configurability in use.
A seminal paper of Goldkuhl and Lyytinen of 1982 [17] opens the way of LAP (the Language Action Perspective) . In the LAP on IT use, developed for supporting social interaction and work, IT infrastructures *is* language. For linguists, language has two main dimensions: semantics (propositional) and pragmatics (illocutory) [12]. As a consequence, also IT use must have two dimensions, semantics and pragmatics. This is in fact a user's tacit assumption. If only one dimension is carefully designed for use and satisfactorily implemented, while the other dimension is not taken into account and elaborated, then user frustration in use ensues immediately.

How do we proceed to address IS accountability and DEUDU remembering that ISs are language?

Zooming on language and speech act theory permits to identify two communicative functions:

- propository (semantics: content, meaning)
- illocutory (pragmatics: intentions, commitments)

This allows a new methodology for IS design. If ISs are language, then we should address need for both kinds of communicative acts. Par Ågerfalk [3] has provided us with a very nice example, from the analysis of a system assisting the handling of college syllabus.

This section lists telegraphically highlights of recent advances in the LAP area that can help solve the problems of our research agenda.

Closes this section the reference to a proposal of a representation language for actions based on interpreting language actions with thematic roles theory [4].

Communicative Aspects of IT-Usage [12]

In the field of IT-design the prevailing language perspective is a referential one. The most fundamental activities of system design are seen as the mapping of a universe of discourse into abstract symbolic models and databases.

But the "descriptive fallacy" of methods and techniques for IT-design has been attacked, and a new set of methods, techniques and software artefacts has now evolved that may be seen as a kind of "communication paradigm", in the way Winograd and Flores argued for a "new foundation of design".

This new orientation in iT-design is directed towards the development of computer software for organisational communication and action. Organisations are viewed as networks of commitments and undertakings.

A communicative or language oriented view of IT-design may be rewarding: a large part of work is performed through language, and IT is used to support communicative activities to a considerable extent.

Conversation for Action [Flores and Winograd, 1988 13]

Speech act theory as a foundation for design has produced a generic schema of conversation for action, that has widely influenced the area of Workflow Management, CSCW, and BPR.

A conversation is a coordinated, coherent sequence of language acts.

At each point in the conversation, there is only a small set of possible action types.

A discourse may be defined in a state transition diagram, where each state-transition corresponds to a speech act.

State-transition diagram from a workflow

For each task there is a workflow, which includes communication with the customer, according to the state transition diagram for the workflow of that task.

The basic workflow loop has four phases, through the fulfilment of commitments by a performer to the satisfaction of a customer.

According to this view, any work activity can be sequenced in four basic steps:

- *preparation*: the customer makes a request, or the supplier makes an offer;
- *negotiation*: the parties establish a mutual agreement of conditions of satisfaction;
- *performance*: the supplier declares that the undertaking is complete;
- *acceptance*: the customer declares satisfaction.

Several circles of can be interconnected with links, such that a speech act in one workflow may trigger one in another workflow. In this way, one workflow can be viewed as a sub flow to another workflow.

The basic workflow loop is used as a means to articulate customer-supplier relations, with customer satisfaction in focus. There is always an identified customer and a performer, with the loop representing a particular action the performer agrees to complete to the satisfaction of the customer.

Using the ALOIS related work of Ågerfalk, Goldkuhl, Andersen.

We propose to use the conversation-for-action schema, as enriched by Kensing and Winograd, and by Andersen, to design the communicative aspects of IT-usage in the end-user-tailoring of IT, accepting to be affected by all limitations elicited in *Speech Acts on Trial (Ljungberg and Holm, 1996 [14])*, except for the additional flexibility provided by tailoring. For IT-design, we propose – within

the same limitations - to marry the language action approach to PD, as already done by Kensing and Winograd. Note that Kensing and Winograd had already coped with unanticipated breakdowns by combining specialised and more general conversation patterns in a uniform framework.

As a methodology implement, for DEUDU (Jacucci et al., 2002 [5]) and end-user tailoring for flexibility in emergent use, we intend to use the ALOIS related work of Ågerfalk, Goldkuhl, Andersen. For providing end-users, or their representatives, with expert support for:

(1) the identification of system viable end-user tailoring moves, and
(2) requirements validation to allow the end-user tailorability to be checked against eventual governing rules and laws in the domain. In that way, the users, or their representatives, could make changes but only within the allowed variations,

e-Negotiation: A Language-Action Approach to Electronic Contracts

We intend to use the work of Schoop and Jertila on e-Negotiation [16]: The Language-Action Perspective and the Semantic Web – A Language-Action Approach to Electronic Contracts, recently presented LAP 05, June 19-20 2005, Kiruna, Sweden.

e-Negotiation is communication-intensive. In order to enable electronic negotiations, the complex communicative exchanges need to be supported by means of information technology. The Language-Action Perspective can provide a suitable theoretical and conceptual basis. In addition to the communicative exchanges, document management also plays a vital role for e-negotiations. Semantic web ideas can be most useful for this part of a negotiation. Ref [16] presents an integrated approach implemented in the negotiation support system Negoisst that combines LAP and Semantic Web and enables the support of highly dynamic complex electronic negotiations in a business-to-business environment.

We propose to apply e-Negotiation as developed in [16] to provide end-users, or their representatives, with expert support for:

a) the identification of system viable end-user tailoring moves, and
b) requirements validation to allow the end-user tailorability to be checked against eventual governing rules and laws in the domain. In that way, the users, or their representatives, could make changes but only within allowed variations.

We would now be ready to come down to cases, and try to solve specific domain problems (Distributed Collaborative Engineering, IT for Tourism, eGov, Health Care, HRM, etc.). Objective: Solve IT accountability and end user configurability in use, with the help of the methodology. In particular we need to:

- Indicate how humans and machines would be able to interpret each other.
- Indicate how design expert can come in picture to support users in tailoring.

- Indicate how upper software layers would be built in the OOAD framework.
- Indicate how humans would work with the IT infrastructure.
- Indicate how the IT infrastructure would function.

In an application example, one should:

- Discuss aspects of accountability and end user configurability.
- Make example of applications of e-Negotiation.
- Make examples of application of Actability Theory of IS.
- Make examples of application of Thematic Role Theory.

4 Conclusions

In general, communication and the establishment of a web of shared understanding between humans and machines, can be better achieved following the LAP perspective and its recent developments described above. e-Negotiation with design experts can support users in understanding IT infrastructures in use and identifying their allowed and useful configuration tailoring options.

Besides, design for accountability could be further pursued by analysing and identifying human interpretations of Use Case sentences with thematic role theory, and exposing them explicitly in the user-machine interaction by drafting and displaying the thematic role derived work graph diagrams.

Design for end user design in use could be pursued by analysing and identifying human interpretations of Use Case sentences with thematic role theory, and exposing them explicitly in the user-machine interaction by drafting and displaying the thematic role derived work graph diagrams, where are also displayed both a) alternative routes to work performance, and b) tailoring opportunities of the work graph exhibited in the work graph diagrams by appropriate graph modification controls.

5 Acknowledgments

Numerous useful discussions with Par Ågerfalk, Peter Bögh Andersen, Goran Goldkuhl, Finn Kensing are gratefully acknowledged.

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