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IS project evaluation methodology - Science or art?

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THE EMERGENCE OF LANGUAGE CONSENSUS – INTENSIFYING LANGUAGE INTERACTION IN INFORMATION SYSTEMS DEVELOPMENT

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Abstract

As language is the venue for the concretisation of concepts and entities in information systems development (ISD), language unambiguousness is understood as an ideal basis for the success of the consolidation process in information systems development. In contrast, a fundamental postulation of language theories is the inherent ambiguity of natural language. Therefore, the analysis of how language consensus can be reached in an effective manner is of particular interest for collaborative ISD. We claim that the effectiveness of ISD depends on the ability to manage the question of how people deal with language in practice and reach consensus in the concrete ISD process. This requirement leads us to the point of emergence of language: the language interaction setting. Hence, we analysed the language interaction in an ISD project and identified different language interaction levels which serve as orientation for specific interventions in an interaction setting, enabling an intensification of consensus negotiation.

Keywords: ISD, Language Interaction, Emergence of Consensus, Communication.

1 INTRODUCTION

A central challenge in information systems development (ISD) is certainly the question how a coherent and meaningful model can be created out of the consolidation of different requirements and perspectives in the enterprise. As we understand ISD as a language development and formalisation process (Lyytinen 1985), the analysis of the consolidation process on a language level can provide an important contribution to this challenge. We argue that by characterising and analysing the use of language as an instrument for communication and for consolidation of an information system (IS) in the ISD setting, we can obtain helpful advice that enable us to enhance effectiveness in the emergence process of language consensus. Our main questions are: how language consensus in ISD processes is reached and how can we influence this process effectively? These questions lead us to the micro-level of ISD, the point where language consensus emerge, that is, the language interaction setting.

The relevance of the improvement of communication issues in ISD is obvious due to its impact on the ISD profitability. Alarming results of different requirements engineering surveys give an account of the failure arising in a significant percentage of software projects (Keil, Mann and Rai 2000, Standish Group International 2001). Some major reasons for this failures are e. g. the insufficient understanding of the integration in practice (Suchman 1995), information asymmetries, and goal incongruence (Keil et al. 2000). We propose: by improving the communication basis for the different stakeholders involved in the ISD process, we can achieve a better alignment of the IS with the business model of the organisation.

Along with the categorisation by Gregor (2006), the contribution of this article is the development of a theory that helps to explain and predict language interaction in ISD. Therefore, we emphasise on the role of language interaction by matching social interaction and communication theories with language theories. Our results emerge from the triangulation of positivist and interpretive research approaches on a research case (Lee 1991) and brought to light different strategies to deal with communication bottlenecks. At the end, we obtained different language interaction levels, which serve as orientation for specific interventions in an interaction setting, enabling an intensification of consensus negotiation.

We proceed as follows: In the next section, we locate the position of this article within the theoretical background of its field and introduce theoretical assumptions relevant to the contribution of this article. Then, we outline our fundamental theoretical propositions based on social interaction, communication and language theories for the particular ISD setting. After drafting our research approach in section 4, we present the results of the interpretive observation and the observed language interaction levels in section 5. Section 6 gives an overview on the application and embeddedness of language interaction levels in different observation cases and finally, section 7 presents an outlook and limitations of this article.

2 STATE OF THE ART AND PROPOSITIONS

Coming from a functional tradition, the IS research has been challenged by new alternative approaches since the 1980s (Lucas 1975). By the consideration of the contribution of those involved in and affected by the system, the understanding of IS as human activity systems gained significant attention (Robey and Markus 1984, Clarke and Lehane 2000). A further focus addresses communication-related questions about the processes of social interaction in IS and ISD (Hirschheim, Klein and Lyytinen 1995a) and the existence of a practice fraught with volatility, exceptions, unstructured data and unpredictable requirements (Truex, Baskerville and Travis 2000).

As far as language is concerned, although its relevance seems not fully established, the IS research has introduced different approaches and methods focusing on language processes (Lyytinen 1985, Winograd 1988, Hellmuth 1997, Holten 1999). The main focus on natural language has been set by

the Language Action Perspective (LAP) (Goldkuhl and Lyytinen 1982, Winograd 1988) which focuses on linguistic communication as the basis for understanding IS as well as on the impact of language action on a system (Winograd 2006). However, the focus on action through language was adopted for the analysis of ISs and less for the improvement of language use in ISD.

Yet, the importance of language for ISD can be discerned as dually constituted:

- Language is an instrument for communication in ISD (Pohl 2007)
- Language is deeply involved in the development and formalisation process representing coherent elements and functions of the future IS (Lyytinen 1985, Hirschheim et al. 1995a)

This is the point where the ISD setting defers from many other interaction and communication settings: language is an instrument and a result at the same time. Therefore, a main assumption of this article is that the ISD setting is a language based setting (Lyytinen 1985, Hirschheim, Klein and Lyytinen 1995b, Holten 2007) and that we need a special focus on this topic.

Regarding ISD as a language development and formalisation process (Lyytinen 1985), a main goal in ISD is the development of a coherent and sound IS model (Thomas and Carroll 1981, McDavid 1996, Holten 2007). The resulting models have to be successfully 1) legitimised on a language and knowledge level (Boland 1979) and 2) consolidated by social action and communication (Hirschheim, Klein and Newman 1991) in a collaborative setting, where multiple stakeholders representing the different fields of the organisation and of the system development are involved (Alvarez and Urla 2002, Kavakli and Loucopoulos 2003). Translating this assumption to the language perspective implies a somehow performed negotiation about and concretisation of language as a *sine qua non* during the ISD process. Several contributions have been made discussing the role of fixing the requirements elicitation in natural language (Ryan 1993, Rupp and Sophisten 2002). And even if the requirements are fixed in a formal language, we have to acknowledge the use of natural language because it is the most probable common communication media between the different stakeholders, and the most used communication instrument in practice (Pohl 2007).

The advantages of natural language are its universal use in different knowledge areas, its flexibility regarding abstraction grades and its simple use (Kamsties 2001, Pohl 2007). Nevertheless, there are significant disadvantages of natural language. Its inherent ambiguity (Pohl 2007) – e.g. lexical, syntactical, semantical, referential ambiguity and vagueness – provide space for different interpretations of the same requirements (Berry and Kamsties 2003), leading to an increase in negotiation costs and of the risk of misunderstanding in requirements engineering (Holten 2007).

Holten (2007) applied the language critique of the “Erlangen School” (Kamlah and Lorenzen 1984) in ISs and assumes that the reduction of the immanent ambiguity of language and the construction of language consensus between the ISD stakeholders is reached by the creation of a language community as a group of stakeholders with a consensual understanding of relevant language representations. Consequently, the stakeholders of an ISD project ought to reach a shared understanding of and an agreement on the same concepts about the system’s elements and functions.

Consensus as a language matter is also addressed by different researchers and practitioners (Rupp et al. 2002, Holten 2007). Different instruments to support the management of terminology were developed; e.g. the construction of dictionaries or lexica for consolidation of the company’s language (Sommerville and Sawyer 2003, Pohl 2007), the language standardisation instances (e.g. ISO TC37) or the development of terminology management systems or support tools (Holten 2001, Kamsties 2001). Nevertheless, none of them gives advices how consensus emerge at the micro level of the communication process in ISD. To analyse this setting we juxtapose in the following communication, social action and language theories with our understanding of ISD outlined in the next section.

3 THE COMMUNICATION, SOCIAL ACTION, AND LANGUAGE VIEW ON THE ISD SETTING

The analysis of communication is usually discussed in the sense of the classical code model (Shannon and Weaver 1949) and refers to the act of transmitting codified knowledge from sender to receiver. Yet, as already outlined, the successful development of an IS model means more than a transmission of requirements, but its social, action-driven consolidation. Consequently, a more adequate focus on communication is taken by circular communication concepts, assuming that communication success is related to the right interpretation of the utterance by the receiver and including his or her reaction (Sperber and Wilson 1995). Furthermore, Watzlawick (1990) sees communication as a reciprocal sequence of utterances between individuals in an action/reaction act. As communication is “carried out by an ensemble of people acting in coordination with each other” (Clark 1996), we use the term interaction, that refers to reciprocal social action. Thereby every stakeholder in the interaction encompasses his or her own actions with the actions of others. The perspective underlying this analysis is based on the social action theory of Max Weber (Weber 1921/1967): people perform instrumental-rational interaction which defines a social interaction form aiming for the achievement of goals through the use of an artefact. In this setting the goal is the development of an IS, and the artefact is language. As a result, we introduce the concept of language interaction.

The linguistic perspective is endorsed by basic semiotic concepts. Saussure (1974), as the precursor of modern linguistics, introduced the term sign as a two-sided psychological entity. It consists of the relationship between the signified as a mental fact related to objects in the real world (concept) and the signifier as its psychological imprint (sound pattern or term). That means, in language interaction we deal with subjective concepts by using terms as their representations. As the communication takes place over the use of terms, we also need a similar understanding behind, that is, the used terms should relate to the same concepts. Yet, the existence of same concept-term relationships is not self-evident, but as Kamlah and Lorenzen (Kamlah et al. 1984) argue, it can make the communication process more effective. The collaborative challenge in this field is thus the design of the process of language interaction in an effective way (Thomas et al. 1981).

Moreover, we postulate that the relationship between concepts and terms is developed in the particular socialisation process of each individual and actualised in the concrete interaction process. There, meaning is developed and modified through schemes of interpretation (Blumer 1973), e.g. subjective language schemes or assumptions. In Figure 1 we draft the role of language interaction in the ISD setting as used in this research.

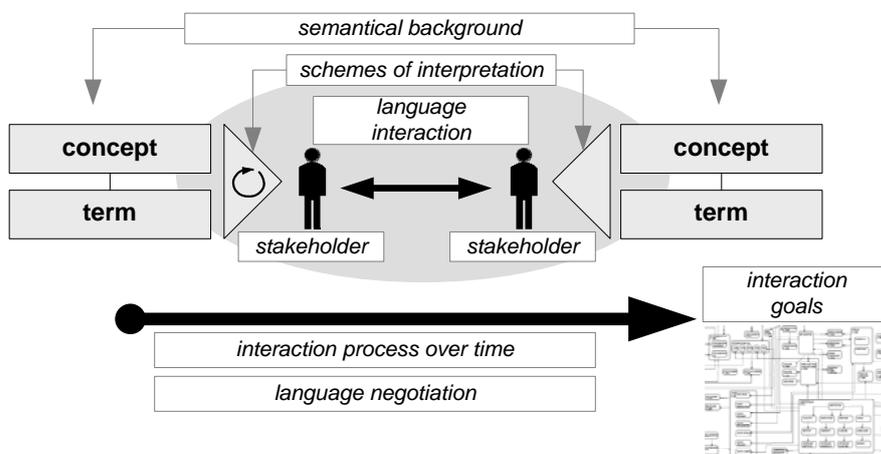


Figure 1. Language interaction in the ISD setting.

4 RESEARCH METHOD AND RESEARCH FIELD

Our research is developed against the background of the ontological assumption of the existence of a real world but the epistemological assumption that social action always arise out of a subjective cognition of it (Burrell and Morgan 1979). Moreover, we apply the combination of interpretive and positivist research according to Lee (1991).

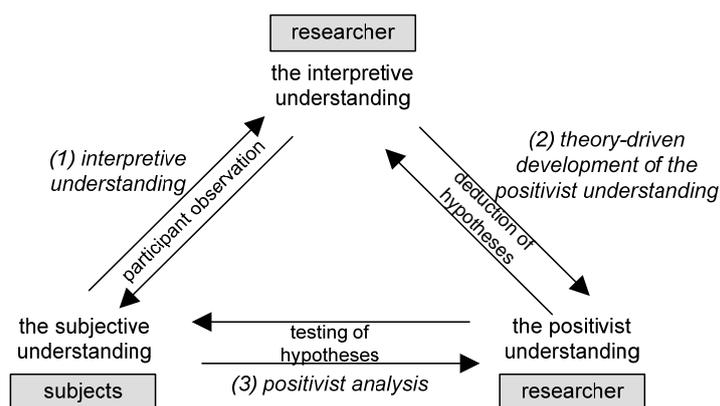


Figure 2. Integration of positivist and interpretive research approaches.

According to Figure 2, the first step, the **interpretive understanding (1)** consists of an interpretive observation of the language interaction in the ISD project. The procedure used by the researcher to develop the interpretive understanding from the subjective understanding (Lee 1991) includes the use of the hermeneutical circle to test the validity of the resulting interpretive understanding according to the research principles proposed by Klein and Myers (1999). The qualitative participant observation consists on the observation of the language interaction in the different face-to-face project meetings. As part-involved researchers, the observation was at all times performed in a two-person team, so that one researcher could concentrate on the observation and the other performed the required tasks. A qualitative participant observation was not only the precondition for the realisation of the research but it is moreover a necessary aspect for the understanding of the language community created by the stakeholders. In the second step, the **theory-driven development of the positivist understanding (2)**, we develop hypotheses about the language interaction levels and its impact on the consensus building by analysing the interpretive results and testing them against relevant literature in the areas of communication, social action and language theories. Based on Schutz (1962), in the second step a testing of the developed assumptions in terms of rationality was performed as our assumptions were compared rationally with other theoretical propositions (Lee 1991), in this case, of language interaction. The third step, the **positivist analysis (3)**, consists of a positivist re-observation of the different communication strategies on the ISD setting to confirm the relevance and the impact of these strategies in a qualitative way.

The observed ISD project aimed at the development of an IS for analysis, storage and retrieval of market-specific and user customised information with an expected user group of >500. The work was divided in two main tasks to be fulfilled: 1) the knowledge reproduction task, where the content of the system should be identified and collected and 2) the development of the IS, including the election of required system elements and functions. Our observation focus was set on 2).

The research began on December 2006 until September 2008. The development of the structure of the IS model was based on the acceptance and adoption of used concepts and terms used by the involved

stakeholders. The meetings took place in different project member configurations. By the drafting of this article, the requirements were being successfully realised.

The researchers had a project-inside role, as they were responsible for requirements engineering. This research position was convenient because although the other project stakeholders were informed about the documentation of interaction for research purposes, the reaction towards the researcher's role was overlapped with the role as stakeholders in the project. Table 1 shows an overview of the stakeholders involved in the research, the research team is underlined. Additionally, the information of the domain knowledge serves as indicator for the existence of different technical languages between the teams.

ISD related Knowledge		Business Knowledge	
	<u>Project Management Team (PMT)</u>	Business and organisational knowledge (2 Stakeholders)	
	<u>Requirements Engineering Team (RET)</u>	Academic and practical knowledge in IS (2 S.)	
<u>Developer Team (DT)</u>		Academic and practical knowledge in IS (2 S.)	

Table 1. Involved teams in the analysed ISD project.

5 INTERPRETIVE AND THEORY DRIVEN POSITIVIST UNDERSTANDING: LANGUAGE INTERACTION LEVELS

After the first interpretive observations it could be asserted that the stakeholders – using language as an artefact – changed the manner how to deal with language many times and were able to build a common meaning through their interaction. These changes seemed to occur motivated by the necessity to reach an interaction goal and we could observe which impact such changes had on language interaction success.

To classify the areas where changes occurred, we first use the concept of language interaction areas (LIA) as a superordinate concept. Table 2 offers an overview of the observed areas.

LIA	Interpretation
LIA-1	Existence of phases where the language interaction between the stakeholders strove for a common understanding of terms and concepts and, on the other side, phases where the interaction was built on mutual complementation referring to concept use.
LIA-2	The language negotiation was in most of the cases not performed on the language interaction surface, but implicitly present in the background of the discussions. Then again, in few cases the negotiation about language occurred explicitly, in the sense of: “what do you mean with the word XY?”.
LIA-3	Existence of a different use of natural language referring to the elaboration of utterances. There were on the one hand phases where technical language was on the foreground; on the other hand we could observe a high use of colloquial language and narrative elements.
LIA-4	Besides the oral language, written language was used during the face-to-face language interaction. It seemed to have different purposes, on the one hand, it was used for documentation and in other cases it allowed the visualisation of meaning.

Table 2. Language interaction areas.

Within each LIA, the discerned changes of the manner how to deal with language are now referred to as changes of language interaction levels. In the following paragraphs we present the language interaction levels for each LIA as a result of the theory-driven positivist analysis on the interpretive observations. Afterwards Table 3 provides an overview on these language interaction levels.

LIA-1: Symmetrical vs. complementary interaction level

In prior literature the phenomenon observed in LIA-1 was already analysed (Watzlawick 1990, Dennis and Valacich 1999, Holten 2007). We apply Watzlawick's (1990) concept of symmetry and complementarity. Symmetry means an interaction which aims for the building of the same knowledge, complementarity means that one stakeholder's knowledge complements the knowledge of the other. In the case of language, we assert that as long as both stakeholders have the same language basis, the interaction leads to a complementation of knowledge. Otherwise, the interaction leads to the building of a same language basis.

LIA-2: Explicit vs. implicit language interaction level

Based on the results of LIA-2, there are different approaches referring to the manner how language is negotiated constantly in everyday life. As everyday language is learned empirically in the socialisation process (Bourdieu 1990) it has a self-evident role on its use (Kamlah et al. 1984, Rupp et al. 2002, Pohl 2007). We use language more than we talk about it. The process of connecting signs with specific concepts is involved in its use in an existing environment of social interaction, and is therefore coined empirically, that is, by its practical use (Kamlah et al. 1984, Bühler 1990). Although an explicit language negotiation may be not usual, it sometimes seems inevitable, as for example in academic fields (Kamlah et al. 1984).

LIA-3: Colloquial vs. technical language interaction level

The questions raised by LIA-3 refer to the level of abstraction of language use. The use of technical language is usually associated with a differentiated and less context-dependent vocabulary (Cummins 1979) whereas the use of colloquial language is fraught with narrative contents, less concrete use of terms and context-rich utterances (Cummins 1979). Although the interaction in the level of colloquial language may be an indicator for a weak sign concretisation in the sense of sign unambiguity, it may provide a clearer notion for people with different language backgrounds. These observations are similar with the results of an ISD research performed by Alvarez et al. (2002), which assert that narratives and messy data may provide a deeper insight into the user's perspective.

LIA-4: Level of language interaction volatileness vs. codification vs. visualisation

The differentiation between oral and written language use, as observed in LIA-4, is of particular interest in communication theory. One important aspect is the question whether the results of language interaction remain fleeting or are perseverant as in the case of written language (codification). The construction of enduring utterances, e.g. in the form of reports and documentations are understood as language actions on time distance (Clark 1996). This implies a further reflection about the expression chosen, which ensures stability and uniformity of what has been written (Hellmuth 1997). Therefore, the change between oral and written language can be classified as more than a change between communication media but as a language interaction modus. A further observation is the use of written specifications, e.g. in form of conceptual models. The ISD has a long tradition of the use of conceptual models as instruments of the visualisation of concepts (Kottemann and Konsynski 1984, Karimi 1988). Therefore, this issue is considered as important as well.

LIA	Language Interaction Levels	Description
LIA-1	Symmetrical vs. Complementary Language Interaction	Symmetrical: Communication leads to the formation of a common language basis. Complementary: Communication built on a common language basis. The result is the complementation of knowledge.
LIA-2	Explicit vs. Implicit Language Interaction	Explicit: Stakeholders negotiate about language in an explicit way. Implicit: Stakeholders negotiate about language in an implicit way.
LIA-3	Colloquial vs. Technical Language Interaction	Colloquial: The language used is an easy structured, common everyday language. Technical: The language used is clearly defined, more standardised and not usual in everyday communication.
LIA-4	Language Interaction Volatileness vs. Codification vs. Visualisation	Volatileness: The language used is fugacious and concatenated. Codification: The language used is written and used for documentation. Visualisation: The language used has the purpose of provide a visible reference or an overview.

Table 3. Language interaction levels.

6 APPLYING LANGUAGE INTERACTION LEVELS IN THE CONCRETE ISD SETTING

As a conclusion we present three exemplary cases (EC) where the existence of the developed language interaction levels and its impact on language consensus is analysed, showing the appropriateness of the results already presented. The criteria for the choice of the ECs are on the one side their appropriateness to show some important insights in consensus building and language interaction, which can be the basis for further research. On the other side the ECs show a spectrum of different interaction lengths. EC-1 refers to an observation performed over different meetings, whereas EC-2 was observed over one meeting in a time segment of about 2 hours. EC-3 shows a passage of about 10 minutes and gives an outlook on further research. Afterwards we analyse EC-1 to EC-3 altogether and present further results which can be gained over the analysis of language interaction levels.

Analysis of EC-1:

In prior meetings the stakeholders had elaborated some notions about the structure and functions of the IS. Nevertheless the language interaction in one of the concluding meetings between PMT and RET was still fraught with ambiguity about how these foregoing notions should be articulated and referred to. In the specification process about the structure of the IS, there were many confusing situations in language use. Although the stakeholders had developed notions about the concepts behind entity types, they were not able to refer to them. They used different terms or described them by using colloquial language (LIA-3).

During the subsequent language interaction, the search for a language anchor was so obvious that the point arrived where one of the participants explicitly asked for a time-out to order the different concepts behind the terms (LIA-1). By doing so, he changed the current language interaction from the implicit into explicit language interaction (LIA-2). In the course of the conversation following, a negotiation about which terms should be connected with which concept emerged. In this negotiation, the relevant concepts were solidified and linked to terms; furthermore they visualised the relationship between the different terms (LIA-4). To better concretise the negotiation results, the stakeholders were also engaged in writing the produced terms and the relationships between them down, building thereby a structure (LIA-4).

In the next meeting, where the consolidation of the systems structure had to be accomplished, the PMT presented the negotiated terms and its relationships (LIA-1, LIA-2), indicating the importance of the specified terms for a better understanding within the project.

Analysis of EC-2:

The first meeting between the PMT, the RET and the DT was held in order to bring the different perspectives of the stakeholders together and develop a first concept of the IS structure. During the meeting, the discussion on the term *content* seemed to be held in an atmosphere of confusion. Although the stakeholders referred to the same term, they seemed to have different technical perspectives on the question of “how to deal with *content*”. By using the term *content*, the PMT referred to the data display whereas the RET and the DT meant the data structure on an abstract level

In this first phase of the meeting, the language interaction level of all stakeholders can be classified as complementary interaction. All three stakeholders were trying to build new knowledge without realising that the symmetric interaction could more appropriate (LIA-1). Later on, the negotiation seemed to stay in the level of implicit language interaction, as the concept was embedded into further explanations, but not defined as such (LIA-2). In this phase, the stakeholder interchanged between interaction volatileness and interaction codification (LIA-4), and colloquial and technical language interaction (LIA-3), without visible impact on the consensus building process. After a while, the possibility of everyone talking about different concepts was explicitly mentioned by one of the stakeholders (LIA-2). Then, the other stakeholders agreed on receiving an exemplary content document from the PMT to have a look at the meant *content*, thereby the stakeholders achieved a common understanding.

The change into explicit language negotiation (LIA-2) resulted to better suit the requirements of the language interaction. Even if the change between implicit and explicit language interaction as well as symmetric and complementary interaction seemed to be decisive (LIA-1, LIA-2), we suppose that the changes between interaction volatileness and visualisation (LIA-4) and casual and elaborated language interaction (LIA-3) were not unimportant as they brought the situation to escalate and enabled the change into an explicit language negotiation as a last chance of understanding.

Analysis of EC-3:

Language Interaction	Language Interaction Areas								
	Complementary	Symmetrical	Implicit	Explicit	Colloquial	Technical	Volatileness	Codification	Visualisation
A: Member of RET T: Member of DT									
A: This is then saved as “Users Profile” (...).	X				X		X		
T: I would call it “Personalisation area”		X		X		X	X		
A: Uh... “Personalisation area” is the whole thing. T: Ohh, ok. (...)		X	X		X	X	X		
T: I interpreted it as an “Information Object”, and then I assumed that it is associated with the user. A: No...		X	X			X	X		
T: Look, for us, an “Information Object” is not an “Information Object” anymore; it is e.g. a “Report”. (...) In addition, that what we call “Report” is now in this field the “Personalisation area”, so, the “User”.		X		X		X	X		
A: No, the “Personalisation area” is not the user; it refers to all possible users.		X		X		X	X		
A: This is everything that we can have as users, all this here (ed.: he draws a sketch of the relationship)		X	X		X		X		X

Table 4. Exemplary case using language interaction levels.

The dialog in EC-3 (Table 4) makes clear that as T has another concept of *Users Profile*, both stakeholders have to negotiate about their understanding of terms (LIA-1, LIA-2). Thereby they were able to find out that they have a different understanding of *Information Object*. It shows furthermore, how a same term related to different concepts can be the source of misunderstandings and how the stakeholders use language visualisation to find a common understanding (LIA-4).

EC-3 also shows how to classify language interaction situations along the drafted language interaction levels and it indicates possible further research fields, e.g. by coding the language interaction we could search for patterns or analyse the data using quantitative research as well.

Analysis of EC-1 to EC-3

EC-1 and EC-2 show that the estimation about the adequate point when the negotiation about language should occur is not self-evident. Both cases showed that the adequate point to negotiate explicitly about language seemed to be missed and, as a consequence, the language interaction remained ineffective in a first place.

In addition, EC-1 and EC-3 suggest that the explicit language negotiation can involve important solutions for ISD problems as:

- the concretisation of the concept-term relationship,
- the development of a conceptual model consisting of sign structure and its relationships and
- the development of common and accessible definitions of the concepts and terms used, which can serve as anchor for referring to already reached consensus.

Insofar, the change from language volatileness to language codification and visualisation can also be assumed as being important for consensus building (EC-1 to EC-3), as the conceptual model served as a basis for future communication.

Below the line, we could observe that the categorisation of language interaction in language interaction levels can provide a helpful perspective to understand the consensus building process. The awareness of language interaction levels could give stakeholders simple strategies to react in the different language interaction situations and to influence the interaction course significantly.

7 LIMITATIONS AND OUTLOOK

The detected language interaction levels show how language is used over the whole ISD process. This may contribute to a better language consensus building in ISD by providing orientation for specific interventions in the interaction and enabling an intensification of language interaction. Thereby we can gain a deeper understanding about the emergence of language consensus.

Although the interpretive approach and the process of finding the different language interaction levels seems to be the more sensitive link in the chain, we need to go over this step as language emerges in the interaction. There is a necessity of observation and participation as the only way to find out which language negotiation strategies are used in the micro level of communication is to be present there. There we have the chance to develop useful hypotheses to be able to intercede in language interaction by changing the schemes of interpretation of the stakeholders. By analysing the language interaction in ISD settings, we provide qualitative evidence and analytical generalisation of how language consensus is reached in practice. Using the developed interaction levels proved to be helpful tools for the analysis of single observations cases in the field of language interaction in the ISD setting.

Further research, besides the aforementioned research fields, could focus on stakeholder interviews, in order to get more detailed information about the user interpretation of the strategies to reach consensus. Another alternative could be action research, trying to change the current interaction levels intentional and observing its impact on the development of coherent entities in ISD.

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