

Three Ways of Talking Business and IT Design

Similarities and differences between three approaches in the Language Action Perspective

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Abstract

The Language Action Perspective (LAP) on understanding the relation between business processes and Information technology has reached a mature stage. More and more researchers are considering this perspective along with the more traditional perspective on information systems development. On the basis of their place of origin, communication based approaches can be divided into three main groups; the Business Design Technology, the Scandinavian School and the DEMO approach. In this article these three approaches will be examined and some similarities and differences are determined in their way of thinking and their way of modeling. The paper is concluded with some notions on the usability.

Keywords: Language Action Perspective, process modeling, information system modeling.

1. Introduction

Communication is a form of action. Austin first made this statement when he introduced a new way of thinking in the Philosophy of Language. Searle further developed the initial ideas of Austin. This new, so-called Speech Act theory revolutionized the academic understanding of language and communication. Researchers started to realize that they can do things with words, and that communication can bring about a change of the state of affairs in the world. No longer is language and communication a mere instrument for information transfer.

In the early 1980's Flores and Ludlow started to explore the implications of the Speech Act theory in the field on information systems. When observing office environments they noted that the coordination of the different activities is performed by coupled communicative acts. People commit themselves to perform specified actions with request-promise communication pairs. After observing this phenomenon, the authors expressed the idea that communication could be a good way to understand, model and improve the coordination of work procedures in organizations that form the basis for new information systems. The work of Flores and Ludlow that was later extended in Winograd and Flores' Business Design Technology approach, forms the basis for various research efforts to investigate the possible impact of the language action perspective on the functioning of organizations.

In this paper we identify three approaches that build on the Flores and Ludlow's initial work in the Language Action Perspective (LAP). The Business Design Technology approach as been developed by Action Technology builds directly on the work of Winograd and Flores. The Business Design

Technology Business Design Technology is the oldest approach. In Scandinavia research was started soon after. In the Scandinavian school two approaches are dominant: SAMPO and BAT. The newest approach was developed in the Netherlands and become known under the name DEMO.

The paper examines the similarities and differences of the three approaches along two aspects; the way of thinking and the way of modeling. In the way of thinking, we examine the underlying theoretical foundation, and in the way of modeling we focus on the modeling technique that has been developed. Before we start our exploration we will first describe the foundations of the Speech Act theory. We then continue to compare the way of thinking and the way of modeling. We will conclude our comparison by determining the strengths and the weaknesses of the three approaches and their applicability in the business practice.

2. Foundations of the Speech Act Theory

The Language/Action perspective has its roots in the thinking of John Austin, an Oxford don whose William James Lecture at Harvard University in 1955 was published as a monograph on speech as action in 1962. But Austin's ideas are perhaps best known through influential interpretations by John Searle and Jürgen Habermas, both initially formulated in the second half of the 1960s. It is this tradition that inspired Winograd and Flores (1986) to adapt Speech Act Theory (SAT) to software design (Flores was a student of Searle at Berkeley). The Speech Act Theory (Austin 1962; Searle 1969; Searle 1979; Searle, Vanderveken 1985) has proven to be a strong frame of reference for understanding and modeling organisations and information systems (e.g., Flores, Ludlow 1981; Winograd, Flores 1986; Taylor, Cameron 1987; Winograd 1988; Taylor 1993). The main characteristic of Speech Act Theory is that it considers the use of language as a form of rule-governed behaviour. Uttering a sentence is the performance of an act, a so-called speech act.

The most important type of speech act in an organisational context is the illocutionary act. Falling through the prism of Speech Act Theory, instances of saying something spread out a spectrum of illocutionary acts, classified into illocutionary kinds. These kinds specify how the utterance in question is intended to be taken - that is, what natural effect (cognitive, motive, social or legal) it is intended to have, and, accordingly, in what dimensions (truth, feasibility, propriety, and so on) it is supposed to be assessed. For instance, an utterance can convey a statement, a warning, a promise, an order, and so forth (Vendler, 1967). Following the example of Searle, several researchers classified speech acts. Among them are Ballmer and Brennenstuhl (1981), and Janson and Woo (1992).

Important criticism on Searle's Speech Act Theory was provided by Habermas through his theory of Communicative Action. He argued that Searle's taxonomy failed to explain co-ordination of action and proposed a taxonomy based on validity claims (Habermas 1984, 1988). It is not our purpose to provide another classification, but to clarify which illocutionary kinds are relevant to DEMO. Therefore in Figure 1 we present a matrix in which the taxonomy of Searle and the taxonomy of Habermas are compared. This matrix is a slight adaptation of the one presented in (Dietz, Widdershoven, 1991). The categories of Searle are placed on the horizontal axis, those of Habermas on the vertical axis. Figure 1 also shows how the illocutionary categories of DEMO correspond with those of Searle and Habermas. All performative actions (request, promise, state and accept) fall in Habermas' category of regulativa, and all informative acts (question and answer) in the category of constativa.

| | Directives | Commissives | Assertives | Declaratives | Expressives | |
|------------|------------|-------------|------------|--------------|-------------|--------------------|
| Imperativa | | | | | | claim to power |
| Constativa | question | | answer | | | claim to truth |
| Regulativa | request | promise | state | accept | | claim to justice |
| Expressiva | | | | | | claim to sincerity |

Figure 1: Comparison of Searle's Speech Act Theory and Habermas' Theory of Communicative Action'

3. Three Schools in the Speech Act Theory

In the past decades the Speech Act theory has proven to be a powerful foundation for the understanding, modeling and changing of organisations and information systems. Flores and Ludlow, 1980; Winograd and Flores, 1986; Winograd, 1988; Taylor, 1993; Reijswoud, 1996; Dietz and Mallens, 2001). When analyzing the publications where the Speech Act theory has served as a foundation, we identify two phases. The first phase, from 1980 till 1992, can be characterized as a theory-building period. The second phase, starting from 1992, we observe a strong emphasis on the development of theories that can be used in practice. During these two periods we see the emergence of three schools. The oldest school is the Business Design Technology, which emerged directly from the initial work of Flores and Ludlow. The Scandinavian school started shortly after Business Design Technology school and extended the theoretical basis. The last school, initiated in the Netherlands, draws from both sources and concentrated mainly on the modeling language. In this paragraph the three schools are described along two lines, namely the theoretical foundations they have developed (way of thinking) and the techniques that have been introduced to model processes and organizations (way of modeling). In the way of thinking we will concentrate on the communication models that form the basis of the three approaches.

3.1 Business Design Technology

The Business Design Technology (BDT) was developed in the US and builds directly on the work of Flores and Ludlow in 1980 (Flores and Ludlow, 1980). The theoretical foundations of the school matured in the book by Winograd and Flores in 1986. The theory that was developed was commercialized by the American company Action Technologies. On the basis of the work of Winograd and Flores the company developed a new concept for email communication in a product called the Coordinator. They also introduced a modeling approach for designing and optimizing workflows, called Action Workflow.

3.1.1 Way of thinking

The core of the BDT is formed by the Speech Act theory as described by Searle. According to the BDT coordination of action is achieved by the exchange of speech acts by the human actors in an organization. Organizations are then understood as networks of interrelated speech acts.

As initiated by Flores and Ludlow and greatly extended by Winograd and Flores, speech acts appear in patterns. Initially, the patterns described by Flores and Ludlow were pairs of directives – commissives to initiate action, and assertives – declaratives to coordinate the completion of a specified action. At Stanford University Winograd and Flores proposed a more complex model in the Conversation for Action (CfA). The CfA describes communication as a dance between two actors

aiming at the successful completion of an action. The CfA starts with a request for action and proceeds through an act of promising, reporting completion to the speech act by which the action is declared to be completed and the transaction finishes. The CfA action describes the possibilities to divert from the ideal path as described above and proceed into discussion. The figure below displays the CfA pattern. Next to the Conversation for Action BDT identifies the Conversation for Clarification, Conversation for Possibilities and the Conversation for Orientation. The patterns of these conversations have not been developed in detail.

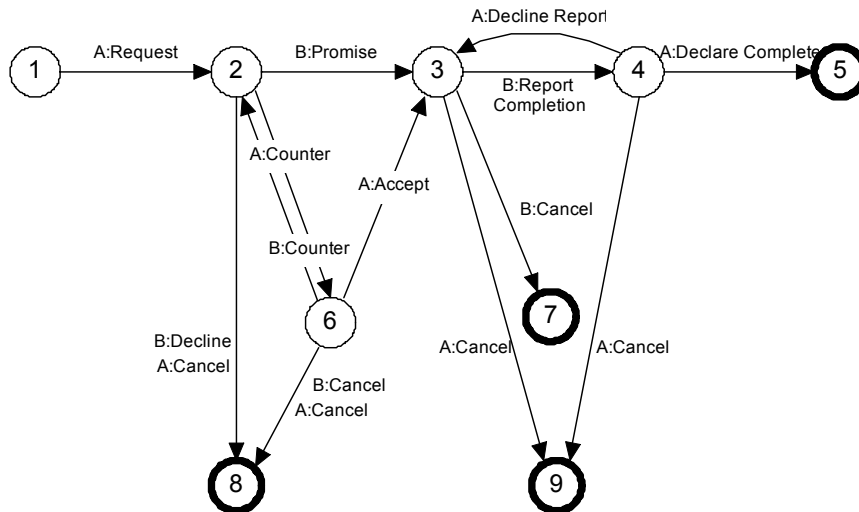


Figure 2: Winograd and Flores' Conversation for Action pattern

3.1.2 Way of modeling

In the beginning of 1990's the basic pattern of the CfA was developed into a modeling methodology by Action Technologies. The complex CfA pattern was reduced to its basic communication structure in the Action Workflow loop. By interlinking the Action Workflow loops the coordination network of the organization was depicted. From each of the four speech acts in the Workflow loop a new Workflow loop can be started.

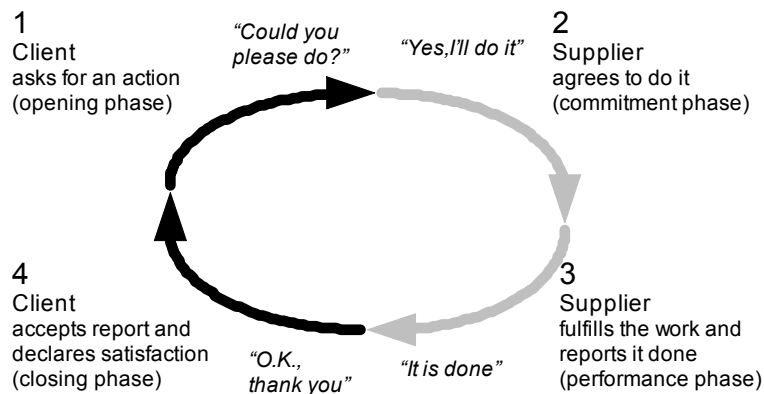


Figure 3: The basic Action Workflow loop (Schäl, 1995)

3.2 Scandinavian School

Shortly after the publication of the work of Winograd and Flores a research group from Finland presents a new approach for understanding the nature of office work. The SAMPO approach (Speech Act based office Modeling aPrOach) finds an important source of inspiration in the speech act theory, but integrates more theories (Auramäki et al, 1988; Auramäki et al, 1991). In the beginning of the 1990's the initial research in the SAMPO approach is extended by a Swedish

research group lead by Goldkuhl. The research group develops the Business Action Theory (BAT).

3.2.1 Way of thinking

The SAMPO research team tried to develop a deeper understanding of the structure of business communication by extending Searle's Speech Act theory by introducing concepts from Conversation Analysis and Williamson's Transaction Cost theory (Williamson, 1979). These theories are introduced to get a better understanding of the relation between the different conversations in a professional context and to extend the applicability of the theory from the office environment to the business environment.

Since SAMPO was also designed to be a tool for designing information systems the Universe of Discourse (UoD) is divided into two domains: the Entity Domain (ED) and the Action Domain (AD). The ED describes the static world in which entities appear and disappear, this domain relates to the field of data modeling. While the AD focuses in the process perspective and forms a basis for data flow and information process modeling. The application of the Speech Act theory is located in the AD. The AD identifies two types of acts: Instrumental Acts (IACTS) and Speech Acts (SACTS). The IACTS bring about changes in the ED, while the SACTS establish the processes.

Elements from Discourse Analysis are introduced to understand the relationship between the acts in the AD. Speech acts are grouped into topics and moves. The topics of the speech act determine the transaction process to which it belongs and the move denotes the position of the speech act in the transaction. The discourse segments that appear are grouped into transaction patterns and discourse types. The transaction patterns and discourse types are further developed in the Business Action Theory.

The Business Action Theory has developed a generic pattern describing the structure of the communication that takes place between business and customers. According to BAT business communication proceeds through 5 phases (Goldkuhl, 1998):

1. *Business prerequisites* – each business sets the conditions for a possible business transaction
2. *Exposure and contact search* – communication between the parties is opened
3. *Contact establishment and proposal* – business proposal is prepared and offered to the client
4. *Contract* – the order is made and obligations of client and supplier are expressed
5. *Fulfillment* – the service or goods are delivered by the supplier and paid for by the client
6. *Completion* – the transaction is completed when both parties are satisfied with the result.

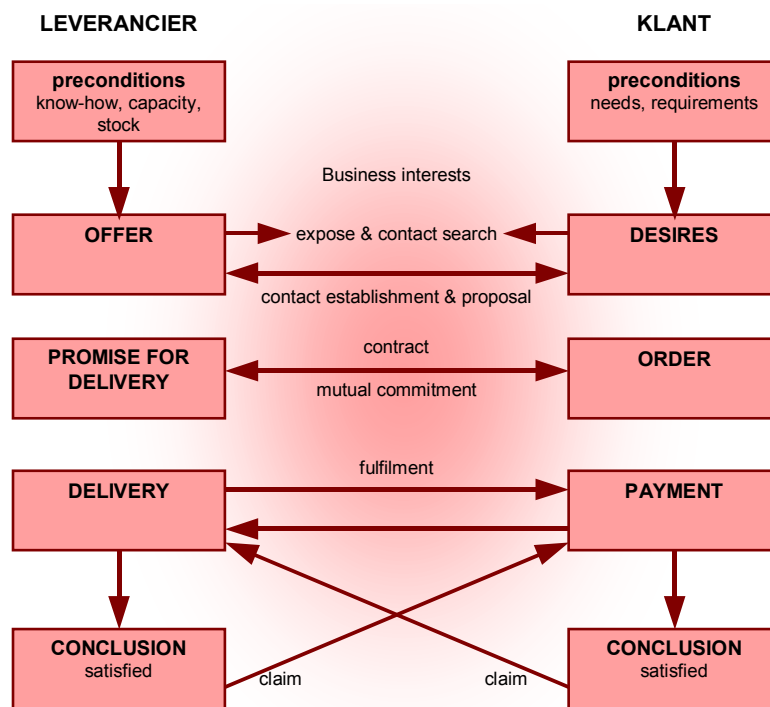


Figure 4: The six phases of the Business Action Theory (Goldkuhl, 1996).

BAT shows that business communication is not a free way of communication, but has to proceed through predetermined phases. The order of the phases cannot be changed without losing the characteristics of business communication.

3.2.2 Way of modeling

There is a clear difference maturity between the ways of modeling of the approaches in the Scandinavian School. This difference is caused by the fact that the two approaches are from a different time frame. SAMPO was developed mainly as a new way of thinking in the 1980's, while BAT has focused more on the development of a modeling approach for the understanding, modeling and optimization of business processes in business organizations. The published case studies clearly reflect this. (Lind, 1996a; 1996b; Lind and Reijswoud, 1998; Goldkuhl and Lind 2002; Reijswoud and Lind, 1998). Because this paper is about Business and IT design we will focus on BAT for the way of modeling.

To model business and IT design, BAT uses concepts from the SIMM techniques (Goldkuhl and Röstlinger, 1993), which is derived from the ISAC modeling approach. The main model used is the Action Diagram. This diagram provides a detailed description of the material and informational activities that take place in an organizational context. It also specifies the information that is stored in the processes. The model is derived from the communication processes that take place between the actors. The main symbols are displayed in the figure below.

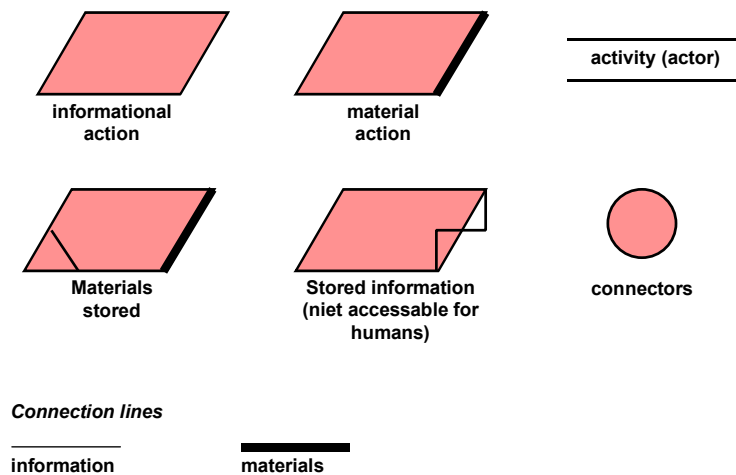


Figure 5: The basic modeling elements in the Activity Diagram (let op ‘niet’ moet zijn ‘not’ in accessible)

Next to the action diagram BAT employs a Process Diagram. The Process Diagram is a high level description of the activities, information, material flows and action objects. The activities, flows and actions are grouped into business process components. BAT identifies three types of business process components:

1. client processes
2. Side processes
3. Sub processes

Every process exists at least of one client process and a possibly some side processes. The client process takes place between the client and the supplier of the service and/or the product. Side processes support the client processes as conditions or consequences of the client process. The client processes and the side processes are mostly composed of sub processes. The sub process in its turn is composed of activities and their mutual relationships. It aggregates parts of the Action Diagram.(Lind, 1996b).

Below an example of a process diagram is displayed. The client starts the process at the top and is the beneficiary at the bottom. Several sub processes are identified. The client process is highlighted by a thick border and the side processes by dotted borders. The processes are connected by information flows and material flows. Material flows are shown by thick lines and information flows by thin lines (Lind, 1996b).

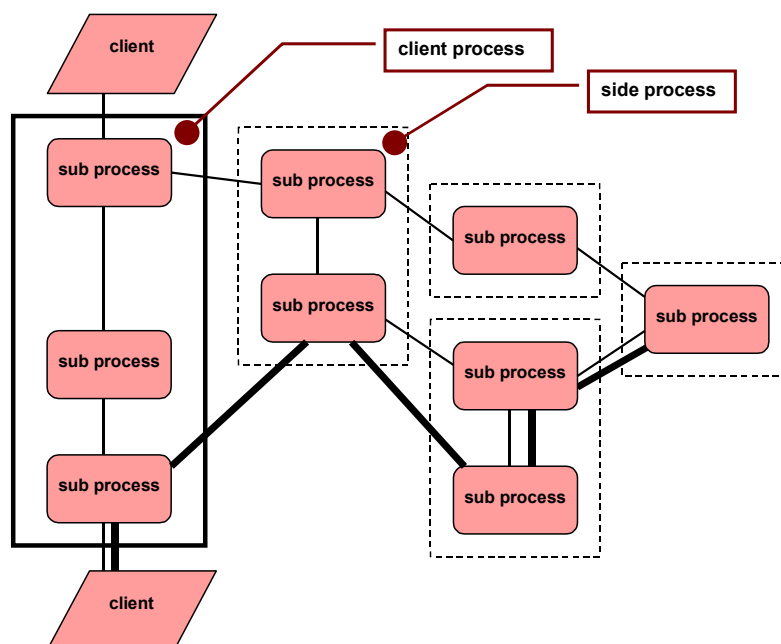


Figure 6: Example of the syntax of the Process Diagram in BAT

The way of modeling of BAT is still developing. New elements in the modeling technique are introduced regularly.

3. DEMO

Around the beginning of the 1990's a new research group is launched in the Netherlands. The DEMO (Dynamic Essential Modeling of Organizations) research group focuses on the further development of a modeling approach for business processes and information systems within the Language Action paradigm. Like SAMPO and BAT, DEMO relies heavily on the initial work of Winograd and Flores. However, it distinguishes itself from the other approaches by including Habermas' theory of Communicative Action on the theoretical side and the strong focus on formal system thinking on the modeling side.

3.3.1 Way of thinking

The core concept of the DEMO approach is the business transaction. The business transaction is a pattern of communication between two parties in the social world aiming at bringing about a change in the state of affairs in the object world. The business transaction consists of three phases: the opening phase starts in the social world (SW) by a request of the initiator of the transaction. When possible, the executor of the transaction will promise to perform the action. The transaction then moves to the world of objects (OW) where the actual performance of the objective action takes place. This phase is called the execution phase. In the last phase, the result phase, the transaction moves back to the social world (SW) where the completion of the objective action is reported by the executor and the result of the transaction is accepted by the initiator. The general pattern of the DEMO business transaction is displayed below.

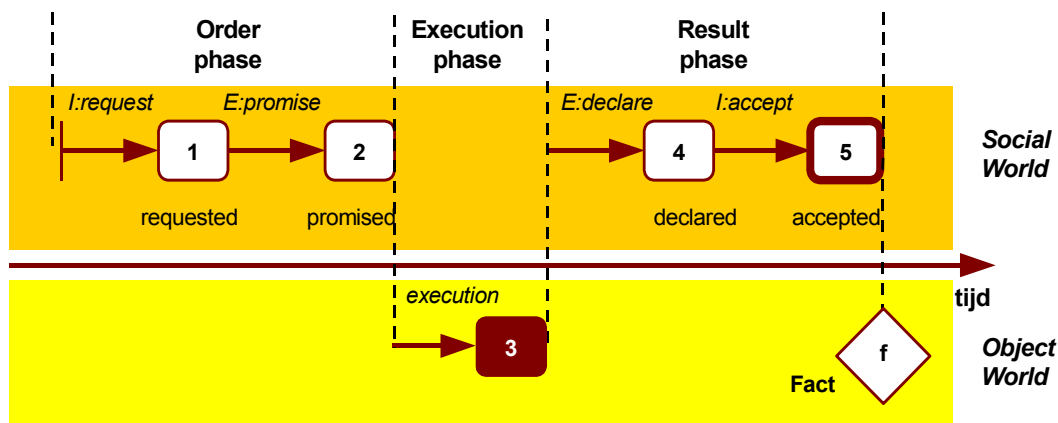


Figure 7: The general structure of the DEMO business transaction

The general concept of the business transaction builds mainly on the principles in the Speech Act theory. The business transaction is however extended in the Transaction Process Model (TPM) (Reijswoud, 1996), which integrates concepts of Habermas' theory of Communicative Action. In the TPM three levels of communication are introduced:

- *success level*: this describes the structure of the successful business transactions
- *discussion level*: this describes the communication alternatives when the actors in the transaction disagree on aspects in the transaction
- *discourse level*: this level describes the communication alternatives that generate the background conditions for business transactions.

The TPM provides a description of extended communication alternatives for the understanding of

breakdowns in transaction processes.

Next to transaction processes DEMO identifies informative communication. By informative communication the members in an organization exchange existing information.

DEMO identifies three aspects of communication: essential, informational and documental. The essential aspect of communication aims at coordinating actions between the actors in an organization. The informational aspect concerns the supporting information that is needed to perform the action. The documental aspect describes the form by which the action communicated (E.g. paper, email, or spoken message).

3.3.2 Way of modeling

DEMO deploys several interrelated aspect models to understand, model and optimize business processes and information systems (Dietz and Mallens, 2001). Together the models are labeled as the business model of an organization.

1. Coordination Model
2. Process Model
3. Fact Model
4. Action Model

The Coordination Model (CM) is the core model in DEMO and describes the business transactions, the initiating and executing actors and is supplemented by a list of the transactions and their resulting facts. The Process Model shows the causal (initiating) and conditional (waiting) relationships between business transaction types. For each transaction it is indicated what other transactions need to be initiated in which phase of the transaction. The Fact Model (FM) provides a formal specification of the facts that were identified in the CM. All the constitutive and attributive facts are described accurately. In other words, the FM specifies the state space of the object world. Finally the Action Model (AM) is a collection of behavior or action rules that apply to every step in the business transaction process.

In the figure below the relationship between the different DEMO models and the modeling concepts are displayed. On top the general notation for the business transaction is shown. The CM is the central model in the way of modeling of DEMO. On the left side the concepts for business process modeling and on the right the ORM-like notation (Halpin, 2001) for the modeling of the state space. The notation for the AM is a procedural pseudo code notation that is not presented.

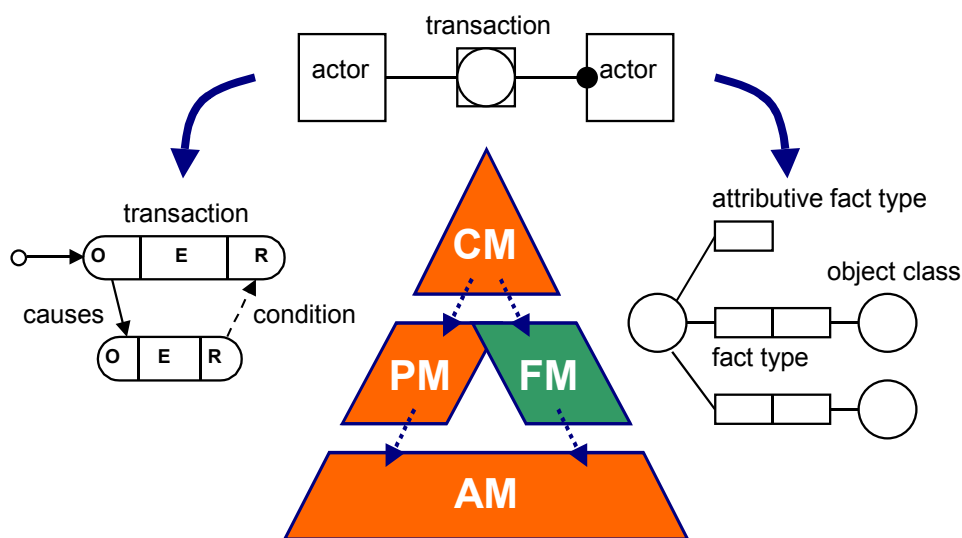


Figure 8: Relationship between the DEMO models and modeling concepts of the CM, PM and FM.

4. Comparing the three Schools

In the previous section we have discussed three approaches for understanding and modeling business processes and information systems. The three approaches are founded in the same underlying perspective, the Language Action perspective with the Speech Act theory in its central focus point. Communication in these approaches is not only used to facilitate information transfer, but is also a means to coordinate human action in organizations. The structure of the organization and its information systems can best be understood by understanding the communication processes.

The Language/Action perspective of communication as developed by Flores and Ludlow and by Winograd and Flores can be regarded as the first generation. The developed theory stays very close to the concepts as defined in the Speech Act theory. The approaches in the Scandinavian School and DEMO can be considered as the second generation. Their theoretical foundation builds on the Conversation for Action concept. Both approaches extend the initial CfA model with new theories.

In spite of the shared theoretical foundation, the three approaches show significant differences. The differences are in the way of thinking and the way of modeling. The major reason for the Scandinavian School and for DEMO to introduce new theories is to explain the relationship between the speech acts and to support the design of information systems. The Scandinavian School introduces concepts of Conversation Analysis and Transaction Cost theory, while DEMO refers to Habermas' theory and system thinking to explain these relationships. Because of the introduction of these additional theories the dependences between the communication and coordination processes are understood in more depth in order to allow the step towards optimization of processes and design of information systems.

Another difference in the way of thinking between the approaches in the second generation and the first generation relates to the focus of understanding. Business Design Technology is solely focused on the coordination mechanism that is achieved by communication. The other approaches however focus both on coordination and information. In their view communication is both used to establish coordination and to create of transfer information.

When we consider the way of modeling the differences become more significant. These differences can best be characterized with reference to the formal underpinnings of the modeling approaches and the views/perspectives that are used. The Business Design Technology deploys only one view to explain the construction of an organization. Interrelated 'action loops' provide the understanding. The consequence of this limited focus is that the approach can only be applied to modeling and optimizing business processes. SAMPO identifies a static and dynamic perspective in their way of modeling. The static perspective relates to the information characteristics and the dynamic to the process characteristics in an organization. This makes the approach suitable for both the business process design and information systems design. The same holds for the BAT and DEMO. Both approaches cover the business process domain and the information systems domain.

The major difference between BAT and DEMO is located in the modeling focus. BAT strongly focuses on an economic understanding of the structure of business communication. This is clear from the activities in the six phases of the generic model of business communication. DEMO on the other hand is founded in a formal-logic understanding of systems. As a consequence the models of DEMO exhibit a stronger interrelationship.

| | Business Design Technology | Scandinavian School | DEMO |
|-------------------------------|-------------------------------|--|---|
| Theoretical foundation | Mainly Speech Act theory | Speech Act theory and discourse analysis | Speech Act theory, Habermas' theory of Communicative Action and System Thinking |
| Communication pattern | Action pattern | Action pattern | Action pattern and information pattern |
| Theoretical focus | Coordination | Coordination and information | Coordination and information |
| Modeling concepts | Interrelated action cycles | Activity and process modeling | Communication and information modeling |
| Modeling focus | Commitment centered | Activity centered | Transaction centered |

Table 1: Summary of the major differences between the three approaches

5. Epilogue: A practitioner's view on business and IT design in the language action perspective

The BDT approach has been successfully applied in optimizing business processes and implementation of workflow systems. The Action Workflow software of Action Technologies in Alameda, California, translates the speech acts in a design and implementation of human-computer interaction. A 'computer screen' can support each speech act for the customer or supplier. This 'direct' translation of the model into software for the business processes delivers a predictable, consistent and rapid software implementation.

Flores and Winograd (1985, pp 151) point at the conversation for possibilities in which 'managers create, take care of, and initiate new commitments within an organization. At a higher level, management is also concerned with the generation of contexts in which effective action can consistently be realized'. In 'creando organizaciones para el futuro' (1995) Flores elaborates on the conversations for action in relation to the conversation for possibilities and emphasizes the importance of re-articulation of the context into a strategy and vision. Although aspects as strategy, organizational structure and culture are recognized as preconditions or consequences of a successful design and implementation of business processes and information systems, the interrelationship of these aspects are not formally described and not explicitly taken into account in practice.

BAT has been applied in the commercial process of businesses. A well-published application is the design of business processes in the Structo case study. The pre-defined phase model is very recognizable by commercial people, and allows for a design of organizational structure. But at the same time the application of BAT is limited to commercial business processes where one actor named 'the customer' fulfills the roles of decision making unit who (1) orders, (2) uses and (3) pays the product or service. For governmental institutions and in policy making processes these actions do not have to be performed by one actor. The police officer that asks a car driver to pay a fine for speeding and in turn writes a receipt cannot be compared to the customer who pays for a product. Very often the payment of governmental institution are indirectly organized through national or local taxes and budgets.

In contrast to BAT's predefined phase model, DEMO uses a 'universal' transaction process model. A commercial business process can be constructed by two transactions, one for the delivery of the product or service and another for the payment. Because DEMO lacks a direct translation into business software and does not use a pre-defined phase model, DEMO is often considered 'academic' and 'abstract' by IT and business people. However because of the rigor academic foundations in Habermas's and System Thinking theory, DEMO can be applied in many ways and for different aspects. DEMO provides a good foundation for Business Process Design (Reijswoud,

Rijst, 1995), workflow design (Reijswoud, Mulder, 1998) and Rapid Application Development (Beek et al, 1997). Next to the design of business processes and information systems DEMO is applied in developing business strategies (in which conversations for possibilities are linked to actions and actors), designing organizational structures and understanding the cultural aspects of communication. However just as BDT these applications in practice are not formally described.

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