Chapter VII
Language–Action Perspective (LAP)

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ABSTRACT

The Language–action perspective (LAP) provides an alternative foundation for analyzing and designing effective information systems. The fundamental principle of the LAP approach is people perform actions through communication; therefore, the role of information systems is to support such communications among people to achieve business goals. Basing on linguistic and communicative theories, the LAP approach provides guidance for researchers to gain understanding on how people use communication to coordinate their activities to achieve common goal. Web services, a leading technology to develop information systems, aims to support communication among services to achieve business goals. The close match between fundamental principles of Web services and the LAP approach suggests that researchers can use the LAP approach as a theoretical guidance to analyze and resolve Web service problems. This chapter provides a comprehensive starting point for researchers, practitioners, and students to gain understanding of the LAP approach.

INTRODUCTION

Through their article, “Doing and speaking in the office,” Flores and Ludlow challenged the conventional notion that communication is merely the transmission of information or symbols and argued that people are linguistic beings who use language to perform actions (Flores & Ludlow, 1980). Through this article, they provided awareness and relevance of communication theories for the information systems field. Goldkuhl and Lyytinen (Goldkuhl & Lyytinen, 1982) coined...
the term “Language Action View” to describe an approach for designing information systems from the perspective of how people use communication to perform actions. Building on this perspective, Winograd and Flores (Winograd & Flores, 1986) presented a new foundation for designing information systems by conceptualizing actions performed through communications as recurrent communicative patterns. The revolutionary work of Winograd and Flores inspired a wave of diverse Language-action perspective (LAP) based applications in the last two decades (Weigand, 2006). They all have in common the fundamental agreement that language is not only used for exchanging information, as in reports or statements, but also to perform actions such as promises, orders, declarations, etc (Schoop, 2001; Weigand, 2003). LAP emphasizes that such actions should be the foundation for creating effective information systems.

In contrast, traditional approaches consider information systems as repositories for storing representations of facts about the real world (Yetim & Bieber, 2003). According to these approaches, the important goal of information systems is to process stored facts and provide required information for managerial and decision making purposes (Connors, 1992; Davis & Olson, 1984). Therefore, information systems development is considered a process of manipulating information to meet the requirements of a specific business task (De Michelis et al., 1997). Moreover, requirements for developing systems were based on simplified assumptions and heuristics that capture known properties of the real world while ignoring unknown properties (Oreskes, Shrader-Freechette, & Belitz, 1994). Thus, traditional information systems are seen as ‘mirrors of reality’, where users are provided with abstractions of the reality (Flores, Graves, Hartfield, & Winograd, 1988; Goldkuhl & Lyytinen, 1982). Therefore, each user has a ‘local view’ of the real world, that is the individual’s slice of the reality seen through an information system (Goldkuhl & Lyytinen, 1982). Several researchers within the information systems field have challenged this notion of information systems field as an image of reality (Goldkuhl & Ågerfalk, 2000; Hirschheim, Klein, & Lyytinen, 1995; Winograd & Flores, 1986).

On the other hand, the LAP approach presumes that the purpose of an information system is to support communication among people to help them perform actions together (Flores et al., 1988; Goldkuhl & Lyytinen, 1982). LAP considers communication to be a form of action performed by the participants (Winograd, 2006). Therefore, LAP recognizes the importance of communication in an organizational context and focuses on how communicative aspects are used for performing business actions (Muder & Reijswoud, 2003). Thus, according to the LAP approach, people are part of a community, who interpret the world and coordinate their actions together in that world (Goldkuhl & Lyytinen, 1982). The user is seen as a participant in the community of interpretation and information is contextualized for a community of interpreters (Goldkuhl & Lyytinen, 1982). Thus, appropriate level of analysis for the LAP approach is group and organization.

In spite of significant progress in the past two decades (Weigand, 2006), the LAP approach has not become a significant part of mainstream computing movement to address organizational computing problems (Lyytinen, 2004). Thus, the motivation for this chapter comes from the challenge put forth by Kalle Lyytinen (Lyytinen, 2004) to make LAP part of mainstream of organizational computing.

As organizational computing paradigm shifts away from object-orientation to service-orientation, I argue that the LAP approach provides appropriate theoretical foundations for designing and developing service-oriented information systems (Umapathy, 2007; Umapathy & Purao, 2007b). The LAP approach would be a good theoretical framework, because it was developed in the context of coordinating communications among organizational entities (which can be considered...
as services) to achieve organizational goals (Um- 
apathy & Purao, 2007a). Therefore, it is important 
for IS researchers to have good understanding on 
diverse theoretical frameworks such as LAP. The 
objective of this chapter is to provide a compre-
hensive starting point for information systems 
researchers, practitioners, and students to gain 
understanding of the LAP approach.

BACKGROUND

LAP emphasizes how people communicate with 
others; how language is used to create a common 
shared reality, and how people use communication 
to coordinate their activities (Schoop, 2001). 
Therefore, LAP is grounded in the linguistic and 
social rules that govern the use of the language. 
The main theoretical foundation for the LAP ap-
proach is the Speech act Theory (Austin, 1962; 
Searle, 1969). However, the LAP approach is 
also influenced by the Theory of Communicative 
Action (Habermas, 1984), Conversation Analy-
sis (Sacks, 1995), and Organizational Semiotics 
(Stamper, 1996). This section provides overview 
of the Speech act Theory.

Speech Act Theory

Speech act Theory was first introduced by Austin 
(Austin, 1962), and further developed and formal-
ized by Searle (Searle, 1969). The underlying 
theme of the theory is that the use of language is 
not only to describe a situation or fact, but also 
to perform certain kinds of actions (Goldkuhl & 
Ägerfalk, 2000). For instance, the utterance of the 
statement, “You passed the test,” is considered the 
performance of a declarative action as opposed 
to making a statement that may be judged true or 
false. Thus, according to speech act theory, speak-
ing is acting and by speaking, the speaker performs 
a ‘speech act’ (Bach & Harnish, 1979).

A speech act is the basic unit of communication 
that expresses the intention of the speaker, such as 

making a promise or asserting a claim (Auramaki, 
Lehtinen, & Lyytinen, 1988). The meaning of a 
speech act is understood based on the propositional 
content and context of its occurrence that includes 
the speaker, hearer, time, place, and other factors 
relevant to the performance of communication. 
The main characteristic of speech act theory is 
that every speech act consists of four levels of 
action. Suppose that a speaker succeeds in say-
ing something to a hearer in a given context, then 
the following acts can be distinguished (Austin, 
1962; Moore, 2001):

• **Utterance act** is the act of uttering some-
  thing. Utterance act refers to the action of 
  the speaker uttering something to the hearer 
  in the given context.

• **Locutionary act** is the act of saying some-
  thing meaningful. Locutionary act refers 
  to the actual action of the speaker saying 
  something to the hearer in the given con-

• **Illocutionary act** is the act of doing some-
  thing in saying it. Illocutionary act refers 
  to the action of doing something by the 
  speaker in the given context in virtue of 
  having performed an utterance act.

• **Perlocutionary act** is the act of affect-
  ing the hearer by saying it. Perlocutionary act 
  refers to the effect on the hearer’s feelings, 
  thoughts, or actions in virtue of the speaker 
  having performed the illocutionary act in 
  the given context.

Of the above four acts, the illocutionary act 
is critical for the successful performance of the 
speech act because it expresses the communica-
tive intent of the speaker (Traum, 1999). The 
illocutionary act can be further decomposed 
into (i) the illocutionary force, that specifies the 
type of action and (ii) the propositional content, 
that specifies the details of action (Austin, 1962). 
The illocutionary force represents the speaker’s 
intention in producing an illocutionary act. An
illocutionary force is the combination of the basic purpose of a speaker in making an utterance, including particular presuppositions, and the attitudes of the speaker (Searle & Vanderveken, 1985). For example, if the speaker says, “You have passed your defense,” then the speaker is declaring to the hearer that he or she passed defense. Thus, in this statement the speaker’s intention is to make a declaration. However, if the speaker says, “Have you passed your defense,” then it can be considered that the speaker is asking a question to the hearer. Therefore, in this statement the speaker’s intention is to ask a question. Thus speakers can perform different actions with the same proposition.

Bach and Harnish (Bach & Harnish, 1979) developed six major categories of speech acts based on the correlation between illocutionary acts and illocutionary forces. These categories of speech acts are constatives, directives, commissives, acknowledgments, effectives, and verdictives. Constatives represent the speaker’s beliefs, intentions, desires, or experiences. Directives represent the speaker’s attempt to get the hearer to perform the action indicated in the propositional content. Commissives represent the speaker’s intention to perform the action indicated in the propositional content. Acknowledgements represent the speaker’s feelings or psychological attitudes regarding the state of affairs represented by the propositional content. Effectives represent the speaker’s effects to change the state of affairs of an institution. Verdictives represent the speaker making an official judgment relevant to the institutional state of affairs that is social binding in the given context. Bach and Harnish have developed about fifty illocutionary forces based on the above speech act classifications.

Speech act frameworks and classifications can also be used to create larger wholes such as well-formed discourses and conversations (Hirschheim, Livari, & Klein, 1997). For instance, if the speaker asks a question to the hearer, the hearer may follow up with an answer or a request for clarification, a refusal to answer or a counter-question. Thus set of speech acts can be ordered in a sequence to form a logical whole (Auramaki et al., 1988).

LAP-BASED APPLICATIONS

The LAP approach is not merely a philosophical framework but has stirred the development of a number of methodologies and computer based tools for solving specific organizational problems (Lyytinen, 2004; Weigand, 2006). The LAP approach has been applied in diverse fields such as computer supported co-operative work (CSCW), workflows, business process modeling, business process re-design, e-commerce, electronic negotiations, software agents, and virtual communities (Lyytinen, 2004; Weigand, 2006). This section provides a review of several LAP-based applications.

Coordinator

The Coordinator is one of the earliest applications of the LAP approach (Schoop, 2003). This application was developed based on the observation by Winograd and Flores (Winograd & Flores, 1986) that in the most work environments the coordination of activities are of central importance and these coordinated activities are facilitated by conversations among participants (Beeson & Green, 2003). Winograd and Flores named these conversations as “Conversations for Action” (Winograd & Flores, 1986). Through the coordinator application, they provide a mechanism that utilizes a network of speech acts to model conversations that are directed towards explicit cooperative action (Winograd & Flores,
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1986). This mechanism uses circles to represent a possible state in the conversation, heavy circles for termination states, and lines connecting the states to represent speech acts that indicate actions taken, see Figure 1 for an example of a simple conversation for action.

Speech-Act-Based Office Modelling aPprOach (SAMPO)

The Speech-Act-based office Modelling aPprOach (SAMPO) provides a methodology for modeling organizational information systems (Auramaki et al., 1988). The SAMPO approach considers the purpose of information systems development is to support communication among people to perform their activities (Lyytinen, Lehtinen, & Auramäki, 1987). Therefore, the SAMPO approach considers the process of modeling organizational information systems as a process of modeling organizational discourses (Auramaki et al., 1988). A network of speech acts can be arranged in systematic order to model a discourse that establishes, controls, and coordinates organizational activities (Lyytinen et al., 1987). SAMPO provides a methodology and a graphical tool for modeling complete and coherent organizational discourses by logically structuring the sequence of speech acts (Auramaki et al., 1988).

Dynamic Essential Modelling of Organizations (DEMO)

Dynamic Essential Modelling of Organizations (DEMO) (Dietz, 1994, 2001) is an information systems development methodology that offers concepts and modeling techniques for re-engineering business processes. According to DEMO, an organization has three levels: documental, informational, and essential (Dietz, 1994). At the documental level, actions such as gathering, storing, transmitting, and reproducing information are performed. At the informational level, actions such as deducting or deriving information are performed, preferably using computers. At the essential level, business transactions are executed by human actors. Actions performed at the essential level are considered authentic busi-
ness actions, while actions performed at the documental and informational levels are categorized as supporting actions (Dietz, 1994). Therefore, business transactions performed at the essential level are the core of the DEMO methodology and are typically performed by two actors: the initiator and the executor (Dietz, Rijst, & Stollman, 1996). Business transactions are divided into three phases under DEMO: the Order (O) phase, the Execution (E) phase, and the Result (R) phase (Dietz, 2001; Dietz et al., 1996). In the O-phase both actors reach an agreement about the execution of some future action. Then, in the E-phase, the executor performs the negotiated future action. During the R-phase, both actors come to agreement on the facts that were accomplished as a result of the execution of the negotiated future action. Albani and Dietz apply DEMO methodology to model enterprise ontology for the strategic supply network development in the strategic purchasing domain (Albani & Dietz, 2006). Through this case example, they illustrate how to use DEMO methodology to identify business components and creating ontological models for developing information systems.

**Business Action Theory (BAT)**

Business Action Theory (BAT) (Goldkuhl, 1996, 1998) provides a generic framework for describing business interactions between the customer and the performer. The framework is divided into six phases (Goldkuhl, 1998): (1) Business prerequisites phase, (2) Exposure and contact search phase, (3) Contact establishment and proposal phase, (4) Contractual phase, (5) Fulfillment phase, and (6) Completion phase. The BAT-model emphasizes the idea that a business action involves both material and communicative actions; however, it presumes that material actions can be characterized as communication (Goldkuhl, 1996). The framework provides a graphical model to describe the inherent business logic and business processes as communicative exchanges, with exception to phase 1 (Goldkuhl, 1998). As shown in the Figure 2, phase 2 involves the exchange of interest, phase 3 involves the exchange of proposals, phase 4 involves the exchange of commitments, phase 5 involves the exchange of values, and phase 6 involves the exchange of claims or acceptance (Goldkuhl, 1998).

**Layered Pattern Approach**

Weigand et al. (Weigand, Heuvel, & Dignum, 1998) argues that in electronic commerce business transactions, participants would interact with each other electronically in multiple forms. However, traditional Electronic Document Interchange (EDI) protocols, that provide implementations for converting paper forms to electronic versions, cannot provide adequate support for e-commerce transactions (Weigand et al., 1998). Weigand and Heuvel, building on the notion of pattern analysis, proposed a layered pattern approach for conducting analysis on e-commerce business transactions (Weigand & Heuvel, 1998). This approach consists of five layers, that are the speech act, the transaction, the workflow loop, the contract, and the scenario (Weigand & Heuvel, 1998). The speech act is used to represent intentional action performed through message exchange in the transaction (Weigand & Heuvel, 1998; Weigand et al., 1998). Thus, speech acts are the basic unit of analysis in this approach. Transactions are considered the smallest sequence of possible actions constituting a business interaction (Weigand et al., 1998). A transaction is formed by compile a set of speech acts (Weigand & Heuvel, 1998). Workflow loops are sets of related transactions aimed towards a goal. Therefore, a set of transactions are grouped to form a workflow loop (Weigand & Heuvel, 1998). Contracts represent obligations and authorizations among business partners (Weigand et al., 1998). A contract is established by interrelating two or more workflow loops (Weigand & Heuvel, 1998). Scenarios are used to describe multiple interactions across contracts that run concurrently among
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Figure 2. Business Action Theory Framework (Modified based on Goldkuhl, 1998)


Generic Layered Pattern Approach

Lind and Goldkuhl (Lind & Goldkuhl, 2001) critically analyzed each layer of the layered pattern approach proposed by Weigand et al. (Weigand & Heuvel, 1998) to show their shortcomings. Lind and Goldkuhl proposed an alternative framework, called the Generic Layered Pattern Approach for any kind of inter-organizational electronic business transaction (Lind & Goldkuhl, 2001), unlike the layered pattern approach that focuses only on e-commerce transactions (Weigand & Heuvel, 1998). The Generic layered pattern approach consists of five layers: the business act, the action pair, the exchange, the business transaction, and the transaction group (Lind & Goldkuhl, 2001). Except for the business act, each layer is derived based on its preceding layer (Lind & Goldkuhl, 2001). A business act can be a communicative and/or a material action (Goldkuhl & Lind, 2002). An action pair represents the grouping of business acts as patterns of triggers and responses (Lind & Goldkuhl, 2001). An exchange constitutes one or more action pairs representing the contribution of one actor in return of the other actor’s contribution (Goldkuhl & Lind, 2002). A business transaction represents a pattern built from different types of exchanges related to each other (Lind & Goldkuhl, 2001). Business transactions can be thought of as having different phases involving exchanges that lead to states that satisfy the needs of both the customer and the performer (Goldkuhl & Lind, 2002). A transaction group represents recurrent business transactions framed for a long-term
agreement aimed at establishing relationships (Lind & Goldkuhl, 2001).

**Atoms, Molecules, and Matters**

Analogous to the three layers distinguished in Physics, Dietz suggests three conceptual layers to understand business processes (Dietz, 2003). Compared to the layered pattern model (Weigand & Heuvel, 1998) that focuses on electronic commerce, and the generic pattern model (Lind & Goldkuhl, 2001) that focuses on inter-organizational interactions; Dietz’s ‘atoms, molecules, and fibers’ model focuses on both inter and intra-organization interactions (Dietz, 2002, 2003). This model is comprised of three layers: atoms, molecules, and fibers, that capture the business of an organization (Dietz, 2003). Atoms consist of coordination acts and action rules (Dietz, 2003). Coordination acts are facilitated by communicative actions. By performing coordination acts, individuals enter into and comply with commitments directed towards achieving material actions. Constraints on ‘Atoms’ are provided by action rules, which contain possible acts and how the choice about actions should be made. Molecules consist of transactions and actor roles (Dietz, 2003). Transactions represent finite sequences of coordination acts between two actors directed towards achieving common objectives. Actor roles define the roles played by actors as sets of action rules. Fibers consist of business processes that are considered to be compositions of interconnected transactions (Dietz, 2003).

**Agent Communication Languages**

A software agent is a computer system that acts autonomously on behalf of a user or a program in a given environment in order to meet its design objectives (Nwana, 1996; Wooldridge, 2002). To be useful, an agent should be able to interact with its environment, user, and/or other agents (Wooldridge, 2002). Agent interactions are very complicated because agents need to maintain and share their knowledge, goals, and commitments (Labrou, Finin, & Peng, 1999). In order to maintain and use knowledge, beliefs, and intentions, agents typically exchange messages through certain agreed knowledge representation languages, collectively referred to as agent communication languages (Labrou et al., 1999). There are two well known and widely used languages, the Knowledge Query and Manipulation Language (KQML) (Finin, Labrou, & Mayfield, 1994) and the Foundation for Intelligent Physical Agents—Agent Communication Language (FIPA-ACL) (FIPA-ACL, 2002). Both languages were developed based on the speech act theory, following the fundamental philosophy of language as action (Labrou et al., 1999). These languages used speech act theory to develop appropriate semantics that allow agents to affect other agents’ knowledge, beliefs, and intentions (Pitt, Guerin, & Stergiou, 2000). These languages prescribe speech act based message exchanges to facilitate agents to perform actions upon receiving messages (Colombetti & Verdicchio, 2002).

**Formal Language for Business Communication (FLBC)**

A main problem in the field of business-to-business electronic commerce is the lack of formal schemes to encode messages for business communication (Weigand & Hasselbring, 2001). Standards, such as EDIFACT, are too costly, do not provide the required expressiveness, and are not flexible enough to cope with the dynamics of the new economy (Weigand et al., 1998). Moore developed the Formal Language for Business Communication (FLBC) based on speech act theory (Moore, 2001). FLBC defines broad range message types that express the speaker’s intentions while distinguishing those intentions from type of message content. FLBC utilizes the illocutionary force from speech act theory to provide
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separation between message types and message contents (Weigand & Hasselbring, 2001). This clear distinction makes it easier for e-commerce applications to interpret and respond to messages (Moore, 2001). FLBC message syntax was developed using XML (XML, 2006), a markup language for self-descriptive data.

Other Notable Applications

Other applications based on the LAP approach that were developed based on inspiration provided by the above applications are mentioned here. eXtensible Language for Business Communication (XLBC), drawing on FLBC (Moore, 2001), semantic network of the multilingual thesaurus and layered pattern approach (Weigand & Heuvel, 1998) provides an extensible communication infrastructure that permits message exchanges to be grouped into different aggregation levels of conversation (Weigand & Hasselbring, 2001). Milano provides a system for supporting multimedia conversations within a work process (De Michelis & Grasso, 1994). Action Technologies extended the Conversation for Action concept (Winograd & Flores, 1986) to develop a business modeling approach known as the Action Workflow Loop, that consists of four basic steps—proposal, agreement, performance, and satisfaction (Medina-Mora, Winograd, Flores, & Flores, 1992). Negoisst is a negotiation support system for conducting complex electronic negotiations over the Internet using both structured message exchanges and cooperative document exchanges (Schoop, Jertila, & List, 2003). Negoisst used the LAP approach to create its architecture and to structure message and document exchanges (Schoop, 2003). Johannesson provides a speech act theory based information systems development framework that reconciles the representation-based and communicative-based approaches to systems development (Johannesson, 1995). This framework shows how to model communications as discourses, and, at same time, view discourses as sequences of events. Cooperative Information Agents (CIA) is a communication system for the business-to-business application domain that allows software agents to query for required information and also to negotiate based on the information the agent can provide (Verharen, Dignum, & Weigand, 1996). CIA uses speech act theory to model message exchanges among agents.

Regardless of the continued development of diverse LAP-based applications, the LAP computing movement has not penetrated mainstream organizational computing (Lyytinen, 2004). For example, LAP concepts are not taught in most universities or in computing textbooks (Schoop & Kethers, 2000), and there is no example of extensive uptake of LAP-based applications in industry (Dumay, Dietz, & Mulder, 2005). Thus, the LAP movement has been confined to academic scholars, and is not widely known nor practiced outside the narrow borders of the LAP community (Lyytinen, 2004).

CRITICISMS ON LAP APPROACH

While the previous section showcases diverse applications to demonstrate the wide variety of interest in the LAP approach, LAP has also received some criticisms. Most of these criticisms are aimed specifically towards the use of speech act theory, but some focus on the general use of the LAP approach (Schoop, 2001). These criticisms are presented in this section along with solutions intended to counter them.

Bowers (Bowers, 1992) provides a critical attack on the LAP approach, specifically on the Coordinator, that heavily relies on formal speech act theory representation for expressing networks of communication structures. He attacks the notion of formal representations, that claims to make a task easier and clearer (Schoop, 2001). He argues that the notion of formalism includes the possibility of forcing people to behave according
to representations, thus, leading to situations of centralized power, where certain users can unduly influence others (Bowers, 1992). Therefore, Bowers claims that communication structures developed using the speech act theory oppress users because these structures enforce discipline and control (Schoop, 2001). Typically users are not aware of the vocabulary and intentions behind each speech act, hence, formalisms should be decentralized and kept open to critical assessment (Bowers, 1992). Schoop suggests that one strategy to achieve this goal is to use a participatory design to develop speech act based formalisms (Schoop, 2001).

Building on Bower arguments, Suchman provides the most challenging attack on the LAP approach (Suchman, 1994). She argues that LAP focuses on the speaker’s utterance and the hearer’s reaction rather than the interaction between the two, where the actual meaning and intentions emerge (Suchman, 1994). She further argues that predefined communication structures act as a plan with a set of actions to be executed, however, these actions are performed depending upon certain contexts and they are loosely connected to the plan (Suchman, 1994). She suggests that systems, instead of forcing predefined plans on to users, should keep track of actions and warn users of potential breakdowns (Suchman, 1994). Similar criticism of the LAP approach, in particular on speech act taxonomies, was provided by Ljungberg and Holm (Ljungberg & Holm, 1997) and suggested alternative criteria for classifying speech acts. Allwood (Allwood, 1977) suggests that the classification of speech acts should be based on communicative functionalities and context (Schoop, 2001).

As a result of these criticisms on the usage and shortcomings of speech act theory, many later applications based on the LAP approach used Habermas’ theory of communicative action (Habermas, 1984) in addition to speech act theory (Schoop, 2001). Habermas criticizes the shortcomings of the speech act theory, while agreeing on its fundamental philosophy that communication is used to perform actions (Yetim & Bieber, 2003). Habermas developed his own version of speech act theory to provide a framework for understanding social interactions as coordination of speech acts (Cecez-Kecmanovic & Webb, 2000). Habermas suggests that social interactions should be viewed from three dimensions (Goldkuhl, 2005; Habermas, 1984; Yetim & Bieber, 2003): (i) an ontology of three worlds (objective, subjective, and social); (ii) the pragmatics of language (representation, expressivity, and appellative); and (iii) the concept of validity claims (truth, normative rightness, sincerity, and comprehensibility). Habermas’ theory of communicative action provides a foundation for understanding and analyzing social interactions as the coordination of communicative actions towards achieving mutually agreed upon goals (Klein & Huynh, 2004). This theory also provides a framework for identifying and addressing breakdowns in social interactions (Yetim, 2002). Like any other theory, the use of theory of communicative action in information systems was agreed upon by some researchers (Goldkuhl, 2000; Hirschheim, Klein, & Lyytinen, 1996; Klein & Huynh, 2004; Reijswoud, Mulder, & Dietz, 1999; Yetim, 2002) and criticized by others (Brooke, 2002; Doolin & Lowe, 2002; Introna, 1996; Ljunberg & Holm, 1997).

**SERVICE COMPUTING: OPPORTUNITY AND CHALLENGE**

Over the past few years, the computing paradigm has been shifting from the current mainstream object-oriented perspective (Booch, 1993) to the service-oriented perspective (Papazoglou & Georgakopoulos, 2003). This type of change occurs when an existing paradigm reaches its limits to deal with increasing levels of software complexity. With the advent of Internet-based technologies, organizations are redesigning their information systems to support their business activities over
the Internet (Su, Lam, Lee, Bai, & Shen, 2001; Waldt & Drummond, 2005). Business applications that are implemented over heterogeneous Internet technologies need to be loosely coupled, dynamically bound, and interoperable within and across organizations (Jain & Zhao, 2003). The object-oriented paradigm provides inadequate support for implementing applications over the Internet because object-oriented applications are rigid and hard to evolve (Henders, 1998). The advent of the Service-oriented computing (SOC) paradigm, on the other hand, is intended to facilitate business collaboration and application integration through open Internet standards (Papazoglou & Georgakopoulos, 2003). The SOC paradigm, is therefore considered the appropriate infrastructure for conducting seamless and automated business over Internet (Alonso, Casati, Kuno, & Machiraju, 2004).

Web service is the most promising technology based on the SOC paradigm (Curbera, Nagy, & Weerawarana, 2001; Stal, 2002). A common goal of Web service architecture and its associated standards is to support and coordinate communication among services to achieve particular business goals (Gottschalk, Graham, Kreger, & Snell, 2002; Papazoglou, 2003; Umapathy & Purao, 2007a). However, fundamental shift in the computing paradigm has produced new challenges and problems that must be addressed by Web services to support business activities over the Internet (Khalaf, Mukhi, & Weerawarana, 2003; Tsai, 2005; Umapathy & Purao, 2007b). Some of the central concerns of Web services are precisely those addressed by the LAP approach—segregating of key functionalities, coordinating communication among services to support complex business interactions, and developing communication-oriented design methodologies and principles. The LAP approach, with its essential qualities of communication and coordination, is an appropriate candidate that Web services researchers can use to address its challenges (Umapathy & Purao, 2007a). However, the LAP approach is founded on human communication theories; on the other hand, Web services primarily support communication among machines. Therefore, Web service researchers must adopt LAP constructs with caution and tailor it towards Web services.

A good starting point to view Web services from the LAP perspective is to compare Web service standards stack against to LAP layered business process models-layered pattern approach (Weigand et al., 1998); generic layered pattern approach (Lind & Goldkuhl, 2001); and atoms, molecules, and matter approach (Dietz, 2003). Umapathy and Purao have mapped the layers of the LAP business process models to the layers of Web service stack (Umapathy & Purao, 2004). Their analysis indicated that none of the LAP business process models alone satisfies needs of Web service stack; however, if models are combined they would cover entire spectrum of the Web service stack. Umapathy and Purao in another study, develop a theoretical reference framework for Web services based on the LAP literatures (Umapathy & Purao, 2007a). The reference framework includes three major layers each containing sub levels within it. Bottom most layer is communication platform which provide preconditions to make message exchanges between services successful. Communication platform includes channel, messaging, and guarantee as its sub levels. Middle layer is communicative act layer which provides conditions for creating commitments between participating services. Communicative act layer includes capability exposure, capability search, proposal and negotiation, and contract establishment as its sub levels. Top most layer is rational discourse which provides conditions for creating commitments between participating services. Rational discourse layer includes exchange, transaction, relationship management, and managing multiple contracts as its sub levels. The reference framework is assessed against to stacks for WSDL-based, semantic Web-based, and ebXML Web services to provide recommen-
The Language-action perspective (LAP) approach provides a norm-based and interpretive alternative to analyze and design information systems—using language as it is constituted in social life (Umapathy & Purao, 2007a). The LAP approach has developed into a new foundation for constructing effective information systems with two key principles. First, linguistic communication should be the basis for understanding and designing information systems (Winograd, 2006). Second, people perform actions through communication; therefore, the main role of an information system is to support organizational communications (Schoop, 2001).

The LAP approach was first introduced by Flores and Ludlow (Flores & Ludlow, 1980) who challenged the conventional notion that communication is merely transmission of information or symbols and argued that people are linguistic beings and use language to perform actions (Schoop, 2001). The LAP approach argues that language is not only used for exchanging information, (as in reports or statements etc.) but also to perform actions (as in promises, orders, requests, and declarations etc) (Schoop, 2001; Weigand, 2003). Thus, LAP considers communication to be a form of action performed by the participants (Winograd, 2006).

The LAP approach considers that purpose of an information system is to support communication among people to perform their actions together (Flores et al., 1988; Goldkuhl & Lyytinen, 1982). Therefore, LAP recognizing the importance of communication in an organizational context, focuses on how communicative aspects are used for performing business actions (Mulder & Reijswoud, 2003). The LAP approach, thus, emphasizes how people communicate with others; how language is used to create a common shared reality and how people use communication to coordinate their activities (Schoop, 2001). Therefore, the LAP approach is grounded in linguistic and social rules that govern the use of the language (Goldkuhl & Lyytinen, 1984).

According to the LAP approach, organizations are social systems with actors that communicates to achieve mutually agreed goals (Dietz, 2003). The aim of Web services is to support communication among services to achieve business goals (Umapathy & Purao, 2007a). Therefore, there is close match between Web services and the LAP approach. This core mapping presents an opportunity for information systems researchers to use the LAP approach as their theoretical guidance to solve Web service problems, thus, help LAP reach mainstream computing paradigm.

REFERENCES


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KEY TERMS AND DEFINITIONS

Communicative Action: Actors engage in discussion to reach understanding and coordinate their activities to achieve their common goal.

Language-Action Perspective (LAP): Linguistic and communicative theories based alterna-
Language-Action Perspective (LAP)

tive approach to design and analyze information systems.

**LAP Approach:** An approach for designing and analyzing information systems with a presupposition that role of information systems is to support communication among people to help them perform actions together.

**Service Computing:** A computing paradigm to develop software applications as ‘services’, which are autonomous, platform-independent computational entities which can be combined in numerous ways to achieve business goals.

**Speech Act:** A basic unit of communication that expresses intention of the speaker.

**Speech Act Pattern:** Set of speech acts arranged in sequence to represent a communication or action performed.

**Web Services:** A software system that provides set of standards to support communication and coordination among services over a network, such as Internet, to achieve their goals.