Messages are Signs of Action
– From Langefors to Speech Acts and Beyond

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Abstract

Deciding on the elementary units used to understand and analyse the complex phenomena of information and communication is extremely important when communication is to be performed through computerized information systems. The traditional and still predominant view of information within the field of information systems has been characterized as a 'contents view', representing a 'descriptive perspective'. This view, in which information systems are regarded as repositories storing representations of facts about the real world, has been challenged from a language action perspective. One such effort includes the formulation of the concept of an action-elementary message (ae-message), which is thought of as the most elementary unit that carries both information and communicational intent. Practical experience from working with this concept indicates that even though it is sound on paper, finding ae-messages in real-life situations is not as straightforward as it might appear at first. The aim of this paper is to re-examine critically and to clarify the concept of the ae-message, in order to bring about a deeper understanding of information systems within organizations, and to provide a possible basis for formulating the 'rules of thumb' required for systems work.

1 Introduction

It is perhaps needless to say that information and communication are complex phenomena, especially if the social action context is taken sufficiently into account (Allwood, 1976; Auramäki *et al.*, 1988; Goldkuhl, 1995; Clark, 1996; Stamper *et al.*, 2000; Dietz, 2001). Nonetheless, deciding on the elementary units by which to understand and analyse these phenomena is extremely important when communication is to be performed through computerized information systems. This is so because important properties of the social context that make communication successful, which are readily available in a face-to-face situation, must be formalized and encoded in these systems. The traditional and still predominant view of the concept of information within the field of information systems has been characterized as a 'contents view' (Goldkuhl, 1995), representing a 'descriptive perspective' (Holm, 1996; Ågerfalk and Eriksson, 2002). In such a view, the common interpretation of 'information' seems to be 'linguistic sentences with the purpose of informing people' (Goldkuhl, 1995, p. 64). In this view, information systems are regarded as repositories storing representations of objective facts about the real world. One influential theory of information systems embodying such a descriptive perspective is that formulated by Langefors (1973; 1995). His theory bears much resemblance to other important theories within the information systems field, such as the relational model of data (Codd, 1970) and the entity/relationship approach (Chen, 1976), as well as more recent object-oriented approaches (Jacobson *et al.*, 1992; Booch *et al.*, 1999).

Several information systems scholars working within the so-called language action perspective have challenged the descriptive approach to information and information systems (e.g., Goldkuhl and Lyytinen, 1982; Winograd and Flores, 1987; Dietz, 1994). One such effort is that of Goldkuhl (1995), who analyses one of the central components of Langefors' theory, the elementary message (e-message). In Langefors' theory, the e-message is used to represent an elementary fact about the world, such as the price of a certain product. In his analysis, Goldkuhl (1995) concludes that the concept of the e-message, as the most basic information-carrying unit, should be extended to include not only references to things in the world (such as products and prices), but also the intentional aspects of language use (why and in what context the price is attributed to the product), in order to view information as action and communication. Goldkuhl's arguments are in line with theories of speech acts (Austin, 1962; Searle, 1969; 1979) and communicative action (Habermas, 1979; 1984), which suggest that language is used not only to describe things, but also to perform actions (see Sections 2 and 3).

Building further on Goldkuhl's (1995) analysis, Ågerfalk (1999) and Goldkuhl and Ågerfalk (2002) introduce the concept of an action-elementary message (ae-message) that reflects this proposed extension. An ae-message is said to consist of one or several e-messages augmented with an action mode (an illocutionary component representing communicational intents). The key point is that, while an e-message is the smallest unit that carries information (propositional content), an ae-message is the smallest unit that carries an action mode (Goldkuhl and Ågerfalk, 2002). An ae-message is described as the result of a performed elementary action (e-action), which can be thought of as a speech act (Searle, 1969; 1979) or communicative action (Habermas, 1984) performed by use of a computerized information system (IS).

On the basis of the concept of the ae-message, Ågerfalk (1999) and Ågerfalk and Goldkuhl (2001) present a business and information modelling approach aimed at requirements engineering and development of information systems. Practical experience from working with this approach indicates that, while it appears sound on paper, finding e-actions and ae-messages in real-life situations is not as straightforward as it might appear at first. I will argue that this is largely due to unclear handling of the illocutionary component of the ae-message, and that in fact the ae-message as it has been described to date can hardly be regarded as elementary at all. In order to formulate the 'rules of thumb' required for systems work, there is therefore a need to re-examine these concepts carefully and to pinpoint exactly what they stand for. Such clarification is the aim of this paper. Specifically, the aim of the paper is to present the concept of the ae-message in more detail than has been done to date, and this includes a clarification of how it can be interpreted. I argue that the ae-message can be viewed in two different ways that are both in some sense intuitive. The currently published descriptions follow the first interpretation, which I argue is inappropriate, and hence a further elaborated, 'reconsidered,' concept of the ae-message is suggested. Even though the rationale for this work stems from a need for comprehensive method support, the particular method mentioned above will be treated only indirectly. The reason for this is that the results should be understood at a theoretical level, as constituting the foundation for the method. Therefore, the results are not restricted to the context of an IS development method, but aim at a deeper understanding of information systems within organizations in general.

The paper is structured as follows. Firstly, the theoretical background is given in more detail. Secondly, the ae-message as it has been conceptualized to date is described. Thirdly, some practical problems related to the current notion of the ae-message are elaborated so as to ar-

gue for a reconsideration of the concept. Finally, a reconsidered interpretation of the ae-message is proposed.

2 From Description to Language Action

As the point of departure for my analysis, I will use the information systems theory of Langefors (1973; 1995) as representative of the descriptive perspective on information and information systems. In this theory, a central concept for the understanding of information is that of the elementary message (e-message). For Langefors, the e-message constitutes the smallest structure that carries information. He states that 'while an elementary message has a certain information content, or semantic content, nothing smaller than an elementary message has' (Langefors, 1973, p. 231). Langefors has described the concept of the e-message in several slightly different ways. For my analysis, I will use a version in which the e-message structure is said to consist of four basic terms needed to give information about a property of an object (Langefors, 1973, p. 320):

a) the identity of the object,
b) the kind of property (i.e., the attribute) we want to specify for the object,
c) the specification of that property for that object (i.e., the value of the attribute), and
d) the point in time at which the information is valid.

This structure is often described as a triple (o, p, t), where o refers to an object, p to a value of an associated property (i.e., b together with c, in the list above) and t to a point in time[1]. Evidently, the concept of the e-message[2] is closely related to that of the 'tuple' used to form the basis of the relational model of data (Codd, 1970), and to that of the 'regular entity' in the entity/relationship approach (Chen, 1976), as well as to that of the 'entity object' in object-oriented theory (Jacobson *et al.*, 1992). This resemblance is also noted by Langefors (1995) and Goldkuhl (1995).

When Langefors speaks of information, he refers to 'something we get to know … knowledge of some sort' (Langefors, 1995, p. 105). In this view, information is, somewhat vaguely, considered similar to knowledge and related to the process of increasing one's knowledge—that is, of becoming informed. Throughout his work, Langefors (1973; 1995) is explicit on the point that a certain set of data (in the form of e-messages) cannot, in itself, provide information. To clarify this point he introduces what has become known as the infological equation, I = i(D, S, t), which states that the information (I) that is communicated by a set of data (D) is a function (i) of the data, the 'receiving structure' (S) and the time interval (t) during which interpretation takes place (Langefors, 1973). Information is the result of someone with a certain pre-understanding (the receiving structure) interpreting data given a certain amount of time. After interpreting the message, the agent may or may not perform some action based on that interpretation.

In this view, the main topic of interest is the semantics of information: how some human agent interprets and understands a semiotic sign, as represented by an e-message, which is mediated by an IS. An important goal from an IS development point of view is to achieve a correspondence between the representations (the e-messages) in the IS and the facts in the

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[1] Note that the time t can also be understood as a time interval during which the information is valid (Langefors, 1995).
[2] Note also that there is another type of e-message structure used to represent relationships between objects. The distinction between the two is not important for my analysis; see Sundgren (1973) for further details.

world that they describe. Another goal is to gain inter-subjective understanding between the users of the IS, so that everyone interprets the representations uniformly.

Several information systems scholars working within the so-called language action perspective (e.g., Goldkuhl and Lyytinen, 1982; Winograd and Flores, 1987; Dietz, 1994) have challenged the descriptive perspective on information and information systems. One significant critique concerns the way pragmatic aspects of information are handled. According to Goldkuhl and Ågerfalk (2002), the common understanding of the pragmatic aspect of information systems seems to take the form of the kind of '*ex post* action' described above. That is, the pragmatic aspect of information systems seems to be restricted to actions performed by humans after receiving messages from information systems: messages are signs *for* action.

To correct this purported misconception, Goldkuhl (1995) argues that the e-message needs to be extended with an explicit action component in order to take account of the language action of which it is a part. This position is mainly derived from the theory of speech acts, originally formulated by Austin (1962) and later refined by Searle (1969). According to speech act theory, a social action in the form of a speech act consists of two basic components: a propositional content and an illocutionary force, depicted by Searle (1969) as F(p). The propositional content p represents what is talked about, the semantics of the utterance. The illocutionary force F (or rather the illocutionary point, which is only one part of the illocutionary force), represents what uttering the sentence does in relation to potential listeners. A classic example by Austin (1962) is that of the wedding ceremony. When the bridegroom utters 'I do', he does not do so to describe what he is doing or to state that he is doing it. Rather, he is actually performing the act of taking the bride as his lawfully wedded wife. The point is that speaking is not only about description, but also about performing action. People do things by speaking: promising, questioning, directing, and so on.

The concrete solution proposed by Goldkuhl (1995) was to extend the concept of the e-message with explicit references also to the actor communicating the information and the type of action used in the communication, the illocutionary point.[3] This idea was later refined by Ågerfalk (1999) and Goldkuhl and Ågerfalk (2002) into the concept of an action-elementary message (ae-message). An ae-message is understood to be a collection of e-messages[4] augmented with an action mode representing the illocution associated with the collection. From a descriptive perspective, the e-message constitutes the smallest unit that carries a meaning. From a language action perspective, the smallest unit that carries information is that which is associated with an action mode—that is, F(p). Langefors (1973, p. 231) argues that 'if we take an elementary message minus one of its terms it then has no semantic content'. Accordingly, one can argue that if we take an ae-message minus one of its terms (i.e., minus the set of e-messages or the action mode), it would not have any pragmatic meaning in the social context of its use.

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[3] Langefors refers to this as the *modality* of a sentence: 'being a fact statement or an instruction or order to be executed' (Langefors, 1995, p. 116). He further argues that 'it is a design decision whether to represent this in the message structure or in the environment' (Langefors, 1995, p. 116). That is, illocutionary forces could be described by other e-messages referencing the e-messages that constitute the propositional content of a speech act. I believe that such an approach is inappropriate in that it treats illocutionary forces as describable pieces of reality (belonging to the object system) rather than constituents of communicative action (as parts of the discourse).

[4] This collection of e-messages corresponds to what Sundgren (1973) refers to as a consolidated message (c-message): 'a c-message could be any combination of e-messages. A priori any message … will be considered to be a c-message, which, after analysis, may be broken down into e-messages'. (Sundgren, 1973, p. 97)

From a language action perspective, the social context in which a message is used is important in understanding the pragmatic meaning of a message. As indicated above, the infological equation stresses the importance of the interpreter. However, to take the social context fully into account we must go beyond that notion and see that any utterance is related to both speaker and listener as well as to the context (Vološinov, 1985). A message is communicated by someone with a certain intention and has certain effects on a listener. At the same time, it creates obligations on the part of the speaker (Bühler, 1934; Habermas, 1984). This condition is described vividly by Vološinov, who asserts: 'Orientation of the word toward the addressee has an extremely high significance. In point of fact, *word is a two-sided act*. It is determined equally by *whose* word it is and *for whom* it is meant. As word, it is precisely *the product of the reciprocal relationship between speaker and listener, addresser and addressee…* A word is a bridge thrown between myself and another' (Vološinov, 1985, pp. 52–53).

If these pragmatic aspects are not sufficiently taken into account during systems analysis and design, and, consequently, not properly represented in the systems, we run an obvious risk of ending up with systems that, for example, fail to provide relevant information, that users do not understand how to use, and in which users cannot trace responsibilities for information, actions and commitments made (Ågerfalk and Eriksson, 2002).

Unfortunately, however necessary it may be, taking the social context into account complicates the analysis of information and information systems. While it is straightforward to map semantically the propositional content of an utterance onto one or several e-messages, placing this content within a context of communicating actors, and thus relating the utterance formally to a speaker and one or several listeners, is far from straightforward. In the next section, I will discuss this in more detail in order to present the rationale for a proposal on how to view the relationship between propositional content, action mode, speaker, and listeners, in order to arrive at an elaborated understanding of the ae-message. In my analysis, I shall strive to be pragmatic and base the proposal on what is arguably most beneficial in the context of practical systems work.

3   Actions and Messages in Context

The view of messages as signs *for* action is too restricted a notion for understanding the pragmatics of information systems within organizations (Goldkuhl and Ågerfalk, 2002). Pragmatics should not be restricted to action *based on* transferred signs, but should be concerned with action *within* sign transfer as well: messages are signs *of* action. Attention should be directed towards the listener as interpreter of the sign, as well as towards the speaker as producer of the sign (Clark, 1996). This is in line with Vološinov's (1985) argument (see above) and can be depicted as in Figure 1. The important thing is that the listener's future actions ('new bridges thrown'), based on the interpreted sign, constitute a pragmatic aspect of the sign, as does the speaker's creation of the sign in the first place.

Speaker — Sign — *Listener*
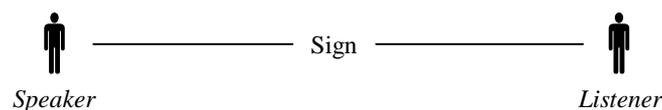
Figure 1: A sign is a bridge thrown between speaker and listener.

To say something is, according to Austin (1962), to perform three simultaneous acts: one locutionary act, one illocutionary act and one perlocutionary act. The locutionary act is the act of uttering certain words in a certain sequence with a certain sense and reference (i.e. mean-

ing). When performing a locutionary act an illocutionary act is also performed—that is, we do something by speaking, for example, making a promise or giving a warning. Doing something will probably also (usually) have some effect on the hearer of the uttered words, for example, changing her knowledge or causing her to act in response. Causing these effects is to perform a perlocutionary act. Searle (1969) adopted Austin's concepts of illocutionary and perlocutionary acts, but refined the concept of locutionary act, which led to the concept of a speech act as consisting of four different sub-acts:

a) uttering words = performing *utterance acts*,
b) referring and predicating = performing *propositional acts*,
c) stating, questioning, commanding, promising, *etc*. = performing *illocutionary acts*, and

d) causing effects in hearers = performing *perlocutionary acts*.

Note that the fourth sub-act (d) is a bit different from the other three. While the speaker in performing the speech act completes the first three, the actual perlocution does not lie within the control of the speaker. In fact, the distinction between illocution and perlocution can be questioned on the grounds that they both seem reducible to concepts of 'intention' and 'result' (Allwood, 2000). It seems more promising to think of the illocutionary act as a means to achieve eventually the desired (perlocutionary) effects, and I choose to use the terms 'communication function' and 'communication effect' to refer to these two aspects of the model (see Ågerfalk and Goldkuhl, 2001; Goldkuhl and Ågerfalk, 2002).

Several authors have criticized Searle's (1969; 1979) notion of the speech act on the grounds of a purported underlying assumption that one speech act is always potentially associated with one (and only one) illocutionary act (e.g., Allwood, 1976; 2000; Bowers and Churcher, 1988; De Mickelis and Grasso, 1994; Ljungberg and Holm, 1996). Instead, the multi-functionality of speech acts has been stressed. One aspect of multi-functionality is that a single utterance, referencing a specific propositional content, can be directed towards different listeners with different illocutionary (and perlocutionary) intent. Furthermore, a speech act can be directed towards a single listener with multiple intents. As an example, consider the case of a professor proclaiming 'let us have a five-minute coffee break'. To most students, this will probably be interpreted as a promise: now there will be a break for five minutes without lecturing, during which coffee may be consumed. To the teaching assistant sitting in the corner, it might instead be a directive to prepare the overhead-projector so that the professor can show the slides he prepared last night. This would be an example of the first case of multi-functionality: two illocutionary acts directed to separate listeners associated with one utterance act. Let us assume that the professor instead proclaimed a thirty-minute break. In this case, the teaching assistant might very well consider this as both a directive to prepare the overhead-projector and a promise allowing for some coffee sipping on his part as well. This would be an example of the second case: two different illocutionary acts (within the same speech act) directed towards one single listener.

As indicated above, the result of a speech act can be thought of as a sign—as the bridge thrown between speaker and listener, as depicted in Figure 1. Note that this result should not be confused with the perlocutionary act (i.e., with the communication effect that the speech act has on listeners). It is a result in the sense that it is a semiotic sign created by the speech act, to be interpreted by listeners. In the context of information systems, there is clearly a need for such a concept, since the interpretation may not occur instantly as in face-to-face communication. Rather, messages are mediated by, and typically stored in, the IS for later retrieval and interpretation—as signs of action. This sign notion of a speech act is illustrated in Figure 2.

The notion of a multi-functional speech act, as depicted in Figure 2, describes how a speaker, in performing an utterance act, references a propositional content and attaches it to a number of illocutionary acts, each directed towards different listeners (the ellipses in the figure indicate the potentially infinite numbers of illocutionary acts and listeners that are relatable to one speaker, one utterance act and one propositional act). Note that in Figure 2, the perlocutionary act has not been shown explicitly, but should be understood as an underlying intention of the speaker aligned with the illocutionary act (see discussion above).
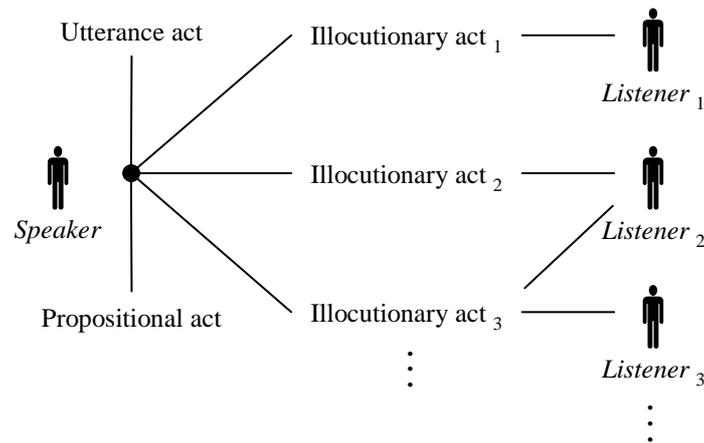
Figure 2: The notion of a multi-functional speech act.

According to Weber (1978) in his definition of *social action*, the term *action* refers to the human behaviour that attaches subjective meaning, and the term *social* refers to the conditions wherein one takes into consideration the behaviour of others. Consequently, social action is the action (including inaction) that is oriented to the behaviour of others. Based on these concepts, a speech act (or communication act) can be thought of as a social action that changes the deontic state of the world—that is, an action oriented to the behaviour of others that creates an obligation. Such an obligation may be directed towards the listener, for example, when the speaker intends to make the listener behave in a particular way. As suggested above, it may also be directed towards the speaker, in which case the speaker makes a commitment to behave in a particular way. In many cases, the obligation is mutual: it is directed towards both speaker and listener. In such cases, there is an additional kind of multi-functionality involved. Consider, for example, a business offer, which is both a request by the supplier directed towards the customer and a promise on the part of the supplier to sell the offered products should the customer accept the offer. Actually, following Bühler (1934), all communication acts are oriented to both speaker (through the expressive function of speech) and listener (through the appellative function). I will not distinguish this aspect in my analysis since the important thing is that, following Weber (1978), all social actions are oriented to the behaviour of others and are usually purposive. Therefore, I will assume that all speech acts have at least one, usually intended, function directed towards at least one intended listener.

I will distinguish neither (a) so-called indirect speech acts (Searle, 1969)—that is, when we do not say what we wish to say in the most direct manner, nor (b) speech acts performed with a 'hidden agenda'—that is, so-called 'strategic action' (Habermas, 1984; Ljungberg and Holm, 1996). The reason for this is that from an IS design perspective, it is arguably (a) imperative to design systems in which the meanings of possible actions are clear and visible (Ågerfalk *et al.*, 2002), and (b) desirable to design for good communication quality (Eriksson,

1998). The latter implies that communication through an IS should be comprehensible, should refer to the true state of affairs, should be performed in accordance with accepted social norms, and should reflect sincere intentions (see also Habermas, 1984; Goldkuhl and Ågerfalk, 2002). That is, from an IS design perspective, we are usually not interested in designing for hidden agendas; and even if we were, these agendas would be made known during design, and we could safely assume specific intended communication functions.

A further issue regarding multi-functionality, which is also beyond the scope of this paper, is the fact that communicative actions are performed not only to accomplish changes in the social world, but are also performed so as to enact conformity with, for example, values, emotions and norms (Weber, 1978; Goldkuhl and Ågerfalk, 2002).

4 The Action-Elementary Message

The concept of the ae-message is explicitly derived from the notion of a multi-functional speech act as depicted in Figure 2 (Ågerfalk, 1999; Goldkuhl and Ågerfalk, 2002). The ae-message is described as the result[5] of an e-action (which roughly corresponds to a speech act), and it is claimed that there is a one-to-one correspondence between these two: an e-action results in an ae-message and an ae-message is the result of one e-action. Ågerfalk (1999) states that, taking its multi-functionality into account, the action mode of an ae-message may have several communication functions (illocutionary forces) embedded in it. However, as stated above, the concepts of the e-action and the ae-message have proved difficult to use as modelling primitives in real-life situations. The particular difficulty experienced relates to the question of how to identify ae-messages in the first place (once identified, they are usually readily analysed and documented). The main source of these problems seems to be the relation between the illocutionary component (the action mode) and the ae-message *per se*. I will therefore base my analysis on how these concepts have been described to date, as depicted in Figure 3.
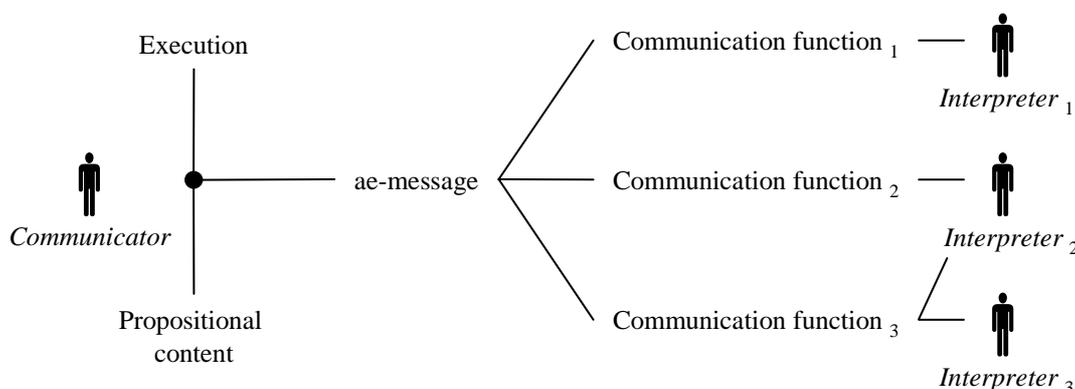
Figure 3: The notion of an e-action resulting in an ae-message.

Based on the notion of a multi-functional speech act as depicted in Figure 2, Figure 3 shows the execution of an e-action (elementary action) by a communicator (speaker), which results in an ae-message. The execution is the physical performance of the e-action and might, for example, correspond to the pressing of a specific button in the user interface of an IS. The ae-message carries an action mode, which contains multiple (in this case three) communication functions (illocutionary components). All three are associated with the same propositional content. The first communication function is directed towards a specific interpreter (listener).

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[5] Note that, as stated in Section 3, this 'result' should not be confused with the communication effects that the e-action has on interpreters.

The second communication function is directed towards another specific interpreter. This corresponds to the first case of multi-functionality described above—that is, one action that does two different things to two different interpreters. The third communication function is directed towards two different interpreters, of whom one is also the subject for the second function. This corresponds to the second case of multi-functionality—that is, one interpreter is the subject of two communication functions. Note that Figure 3 does not contain the ellipses of Figure 2. This is to indicate the design orientation inherent in the work on the ae-message concept. During the design of an IS, we, as designers, reckon with a specific number of intended communication functions and intended interpreters. Of course, an IS can be used in ways that were not intended from the outset, or can even be misunderstood, in which case the ellipses would apply. It is important, though, to distinguish such use of an IS from that intended in the original design.

Note that the concept of the ae-message should be understood as an abstract entity, representing the semantics and pragmatics of an e-action. Such a message must always have a corresponding physical representation (a medium). For example, ae-messages are typically received by interpreters in the form of graphical or textual representations on a screen document, which are more closely related to the syntax of the message. From a semiotic point of view, such visual representations can be thought of as signs (symbols or icons) of the message. The physical representation of ae-messages, and how it influences their formulation, execution and interpretation, is beyond the scope of this paper. Nonetheless, it is important to be aware that the structuring (layout) of documents has consequences for what we refer to as ae-messages in a given IS, since documents serve to hold together the various communication functions and propositional contents communicated: this structuring delimits, groups and explicates the message. Consequently, inappropriate mapping between ae-messages and documents may be a source of confusion. This would be the case, for example, if the propositional content expressed in a document did not match the intended communication functions (typically expressed by one or several illocutionary verbs), or if two ae-messages with different communicators and intended interpreters were mixed up in the same document.

Let us consider the trivial example of a person sending an e-mail message. The e-mail message could be seen as an ae-message, and sending it as an e-action. The recipients would probably agree that they all received the same message, even though they might each have interpreted it differently, and might very well act differently in response to it. This would accord with the view of the ae-message presented in Figure 3. From a computing perspective, this would also accord with the common view of e-mail messaging (the same message in terms of content, sender, time sent, and so on, would have been transmitted to multiple recipients). Obviously, this view of the ae-message seems rather intuitive.

Let us now turn to another, somewhat more intricate example. In most businesses, a typical communicative action is that of making a business offer. Table 1 shows the structure of a propositional content that may be used in such offers. A propositional content of the type described in Table 1 consists of four e-messages referencing a product description (m_1) and the price at which the product is offered, together with an expiry date (m_2), and the names of the responsible salesperson (m_3) and the customer (m_4). To be complete in terms of Langefors' theory, the example should also include a relational e-message referencing the other four, indicating that these combine to form an order. By way of simplification, we can think of pc_1 as describing that relation. Note that the structure described by Table 1 should be understood as a type (or class) of propositional content of which actual instances are created during the performance of communication acts utilizing that type.

Table 1: A propositional content structure consisting of four e-message structures together describing what is talked about in a business offer.

Propositional Content	e-messages			
	ID	Object	Property	Time
pc_1	m_1	Product	Description	As of now
	m_2	Product	Price	Valid until
	m_3	Salesperson	Name	As of now
	m_4	Customer	Name	As of now

The ae-message Business Offer should be understood as a combination of Salesperson (the business role that communicators of the offer play), Propositional Content, and a combination of communication functions and intended interpreters (the function used with respect to particular interpreters). We can denote this structure as ae-message = (Communicator, Propositional Content, Communication Function $\times$ Interpreter). If we assume that the e-action of making an offer also includes reporting to the sales manager that an offer has been made, we might end up with an ae-message structure as described in Table 2.

Table 2: The ae-message structure Business Offer[6].

ae-message	Communicator	Propositional Content	Communication Function	Interpreter
ae_1	Salesperson	pc_1	Offer	Customer
			Report	Sales manager

In Table 2, the value pc_1 in the Propositional Content column should be understood as a foreign key referencing the propositional content structure described in Table 1—that is, pc_1 describes the propositional content used in ae_1 messages. Note that the roles Salesperson and Customer appear both as (a) communicator and intended interpreter of ae-messages of the type described by the ae-message structure in Table 2, and as (b) objects referenced by the associated propositional content described in Table 1. This is an important distinction, and should be understood to indicate that the salesperson utters something concerning himself and a customer, directed to that customer. To return to Austin's example from Section 2, when uttering 'I do' the bridegroom both references himself and takes the bride as his lawfully wedded wife. Furthermore, he is also actually referencing the bride and the social institution of marriage, even though this is implied in the context (an implicit reference to the context that should usually be avoided in a formalized, computerized IS). Note that, as in the propositional content structure in Table 1, the ae-message structure in Table 2 should be understood as describing a type (or class) of ae-messages.

Obviously, the communication of the business offer corresponds roughly to the e-mail example above. The offer could even be sent by e-mail to the customer, with a so-called carbon copy (cc) to the sales manager. Even though this notion of the ae-message seems intuitive, it is not the only option available. In the next section, I will present an alternative interpretation and argue why it is necessary to reconsider slightly the ae-message concept.

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[6] Note that it would probably be a good idea to also include the time and place of the corresponding e-action in the ae-message structure, similar to Auramäki *et al.* (1988). This, however, is not significant for my analysis and has been left out to simplify the description.

5 The Action-Elementary Message Reconsidered

The ae-message (as it was described in the previous section) plays a central role in the business and information modelling method presented by Ågerfalk (1999) and Ågerfalk and Goldkuhl (2001). In deciding what information a system is required to maintain, and in designing the performance of e-actions at the user interface, ae-messages must be identified and described in detail. The resulting Message Definitions thus play a central role throughout systems development following the method. In order to identify ae-messages, one makes use of comprehensive descriptions of the business processes in which the IS under development is supposed to be used. The descriptions are depicted in so-called Action Diagrams. Among other things, Action Diagrams show activities (which consist of one or more e-actions) performed by human actors in interaction with information systems, together with information sets that are results of, and prerequisites for, activities. Figure 4 shows a minimal Action Diagram describing the business offer example introduced in the previous section. (In Action Diagrams, activities are shown within horizontal lines, and information sets are shown as inputs to, and outputs from, activities, which are represented by rhombuses connected to activities.)

Make Offer [Salesperson ↔ IS → Customer]

Business Offer

Offer Report

[Sales Manager]
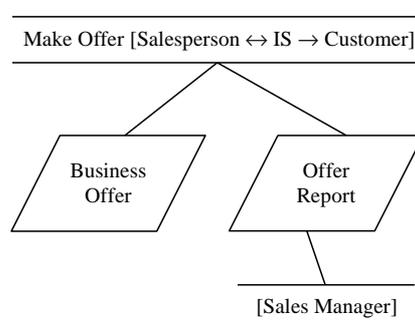
Figure 4: Action Diagram showing the making of a business offer, which includes reporting to management.

From the diagram in Figure 4, we can see that a Salesperson in interaction with an IS performs an activity, Make Offer, directed primarily towards a Customer, which results in a Business Offer. Additionally, an Offer Report is created for a Sales Manager for use in some further (unspecified) activity.

When working with Action Diagrams, it seems natural to distinguish the information set Business Offer from the information set Offer Report sent to management. Since this is not in line with the current descriptions of the ae-message (there is a distinction made between information sets and ae-massegs), confusion may arise when ae-messages are to be identified on the basis of Action Diagrams, and practical experience shows that in fact it does. When describing business processes with Action Diagrams, the focus is on what actions are performed and what these actions do—how they shape the flow of activities constituting business processes. The main interest is in the pragmatic aspects of action, and consequently actors and illocutions are in the foreground, while information content (propositions) is seen mainly as the result of (and prerequisite for) action, as a subordinate part of action objects.

When moving on to analysis of ae-messages, the focus shifts towards the semantics of information, the issue of how information is structured. The propositional content is now analysed in terms of entities and their relationships, and is eventually associated with an action mode that describes how the information is used within the business, as derived from the Action Diagrams (see Table 1 and Table 2). What then should constitute a proper unit of analysis—

that is, what is the ae-message? When identifying *action-elementary* messages, taking the action as a starting point seems rather natural. Following the notion of a multi-functional speech act (see Figure 2) and adopting the terminology of Figure 3, the ae-message as described in Section 4 obviously takes the propositional content and the communicator as its elementary parts: it is a combination of a communicator, a propositional content and a combination of communication functions and interpreters. In this view, the ae-message is elementary with respect to what a communicator communicates about, not with respect to what the communicator does when communicating. The reason for this may lie in the e-message heritage, but it can hardly be considered action-elementary. This may also be a source of the problems experienced when identifying ae-messages. The basis for identifying ae-messages is the Action Diagram, which embodies a pragmatic perspective on information, and ae-messages are identified primarily on the basis of their semantics. This requires a shift in perspective that is not only conceptually inelegant, but also potentially deceiving.

Based on this contention, I propose to view the ae-message as a 'true' combination of communicator, propositional content, communication function and intended interpreter, which can be denoted as ae-message = (Communicator, Propositional Content, Communication Function, Interpreter). In this view, the e-action of making an offer as depicted in Figure 4 should be understood as producing two separate ae-messages, one for each intended interpreter. Table 3 shows this reconsidered understanding of the ae-message.

Table 3: The ae-messages Business Offer and Offer Report.

ae-message	Communicator	Propositional content	Communication Function	Interpreter
ae_1	Salesperson	pc_1	Offer	Customer
ae_2	Salesperson	pc_1	Report	Sales Manager

In this view, the ae-message is elementary with respect to a communicator who does something to an interpreter, by saying something about something. This view, depicted in Figure 5, clearly accords with the original notion of the multi-functional speech act as presented above. In this view, a communicator executes an e-action, which results in several intended ae-messages, each directed towards one or several intended interpreters.
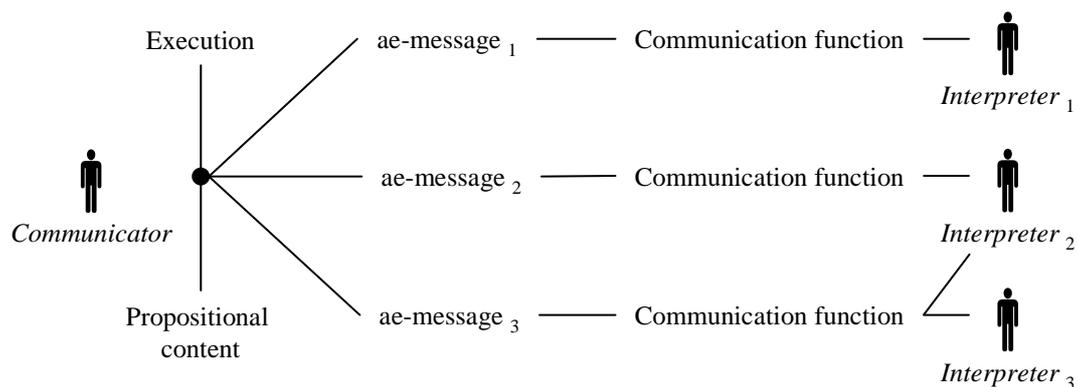

Figure 5: The notion of an e-action resulting in several (reconsidered) ae-messages.

In practical systems work, this means that identifying ae-messages can be based on the so-called illocutionary verb used to talk about actions in the business, for example, 'offer' and 'report', as is done when working with Action Diagrams; there is no need for a potentially deceiving shift in perspective. This also accords with the approach to action-oriented concep-

tual modelling proposed by Ågerfalk and Eriksson (2002). In their approach, Action Diagrams are used to identify important business actions based on illocutionary verbs. These business actions are then treated as *bona fide* entity types (or rather classes) during static conceptual modelling with UML class diagrams. The proposed notion of the reconsidered ae-message thus suggests a basis for utilizing speech act theory as a foundation for an integrated approach to conceptual modelling and business modelling.

A further, also practically grounded advantage of viewing the ae-message this way is that the unit of analysis in systems work becomes more modularized, which may potentially lead to reuse of specifications, or at least less reworking. This can be exemplified in a re-examination of the offering action discussed above. Let us assume that the action, Make Offer, eventually turned out to be actually an aggregate of two actions performed in sequence, or that systems developers decided to provide such a design as an alternative. This would be the case, for example, if the report action were performed by another user interface manipulation (execution), maybe through another system or simply at a later point in time. See Figure 6 for an illustration. (The dotted line in the diagram shows a temporal dependency between the two activities.)
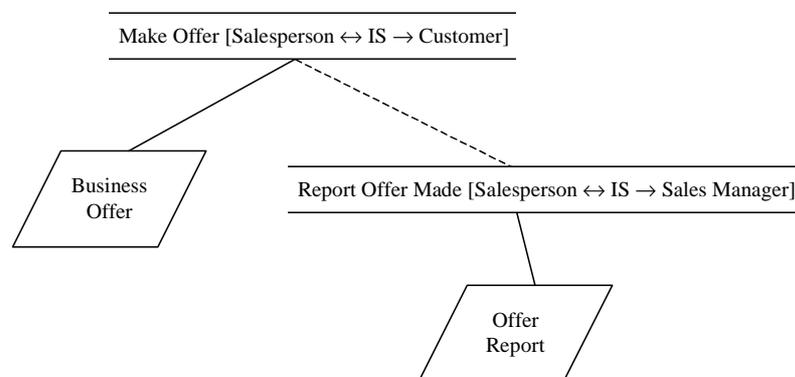
Figure 6: Action Diagram showing the making of a business offer, with reporting to management as a separate activity.

In this case, the two messages (Business Offer and Offer Report) could hardly be considered as the same ae-message. Therefore, given that initially they were, this re-design would require a reworking of the original documentation. Viewing the ae-message in the way proposed in this section, such a re-design would not require any reconsideration of the messages sent through the system, only of the way in which they are being used.

The proposed reconsidered view of the ae-message has further consequences for documenting and analysing ae-messages during systems development. Obviously, communicating messages that are identical in every respect, except for communicative function in relation to a range of different interpreters, potentially requires the description of a huge number of similar ae-messages. This can, however, be handled pragmatically by treating them as variants of the same message. Thus, *the description* of ae-messages would look similar to that of Table 2. One should not confuse this description with the concept of the ae-message *per se*.

Note that another alternative view of the ae-message would be to say that one execution (i.e., utterance act) results in several e-actions. This would introduce a distinction between the physical utterance (for example, pressing a particular button in the user interface of an IS) and the social action thus performed. This would imply, for example, that sending an order by clicking a button labelled 'Send Order', and sending the same order by clicking a menu item

with the same caption, would result in different ae-messages. Such a solution would be neither intuitive nor consistent with speech act theory in general, and has therefore been rejected.

6   Conclusion

In this paper, I have described and argued for a shift from a descriptive perspective on information and information systems to a view of information as action and communication. This was done mainly on the basis of the work of Goldkuhl (1995), Ågerfalk (1999), Ågerfalk and Goldkuhl (2001) and Goldkuhl and Ågerfalk (2002), and by way of clarifying their proposed concept of an action-elementary message (ae-message). On this basis, I have argued for the need to reconsider the concept of the ae-message in order to solve problems related to practical applications of the concept in the area of systems development. From my analysis, I conclude that an ae-message should be conceived as containing an action mode that consists of one, and only one, communication function in relation to its intended interpreter(s). This communication function should in itself be regarded as multi-functional (or at least multi-dimensional), since it may create obligations on the part of the speaker, and since it is both expressive and appellative. The reconsidered ae-message can be described as a combination of communicator, propositional content, communication function and interpreter, and is truly elementary with respect to all its components. It is thus an elementary unit of information as action and communication that suggests a foundation for an integrated approach to conceptual modelling and business modelling based on speech act theory.

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