Report on ISDO '00: The CAiSE*00 Workshop on "Infrastructures for Dynamic Business-to-Business Service Outsourcing"

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1. Introduction

The ISDO '00 workshop on "Infrastructures for Dynamic Business-to-Business Service Outsourcing" [1] was held as a preconference workshop of the 12th Conference on Advanced Information Systems Engineering (CAiSE *00) in Stockholm, Sweden, on June 5 and 6, 2000. C. Bussler (Netfish Technologies), M. Bichler (Vienna University of Economics and Business Administration), and Y. Hoffner and H. Ludwig (IBM Zurich Research Laboratory) organised the workshop and chaired the program committee.

The objective of the workshop was to provide a platform to discuss models and technologies for service outsourcing, with emphasis on the integration of the dynamic establishment, setup, and enactment of service relationships that connect the business processes of service provider and consumer businesses, thereby establishing virtual enterprises.

Nowadays, many production companies integrate their procurement processes using online marketplaces and network-based supply chain management systems. However, this is not the case for the service industry. Whereas many service organisations have already automated their internal business process management (e.g. using workflow management systems or enterprise resource planning (ERP) systems), service marketplaces still remain an uncommon phenomenon. The reason for this is that the integration of service sales, service enactment, and customer interaction with the service process still appears to be highly difficult. This is particularly the case where complex services, such as insurance and complex logistics, involve considerable customer interaction.

2. Issues of the Workshop

We can approach the dynamic service outsourcing by looking at two dimensions:

(1) Dynamic service outsourcing requires that the entire *lifecycle of an outsourcing* relationship be covered. Based on work on transaction costs economics, many authors, e.g. Schmidt [2], decompose a business relationship into the following four phases:

In the *information phase*, service providers describe their services and make them available. Also, service consumers describe their demand, e.g. inform providers of a request for bids. Among others, this raises the issues of service partner location, assessment of business partners, and service description. Typically, concepts such as marketplaces, electronic catalogues, or ontologies are applied to these issues.

In the *contracting phase*, business partners negotiate in detail the terms of their business relationship. The result of this phase is a contract that is a detailed specification of the mutual obligations of the parties. The issues in this phase include for example contract languages, negotiation protocols, and electronic signatures.

In the *fulfilment phase*, the business partners deliver what they have promised, e.g., perform the service or pay for it, respectively. Issues pertinent to this phase are the monitoring and control of a service by the service consumer, access control, mutual dependencies between service-implementing processes on provider and consumer sides, the provision of an external service consumer view of a complex service-implementing, billing, payment etc.

After completion of the service, both providers and consumers can enter the *analysis phase*. Both parties evaluate whether the service was delivered as defined in the contract. If not, the parties have to open a dispute-handling procedure and resolve the issue, potentially involving third parties such as notaries. In this phase, providers and consumers also analyse whether it was beneficial for them to pursue this business relationship at all, e.g., compared to an alternative service provider or to performing the service in-house.

It is important that concepts and systems used in different phases be adapted to each other to support seamless integration.
(2) Electronic interaction between two organisations has to be dealt with on *different layers*.
As in the case of any distributed system, we have to establish a *technical means of interaction* between (potential) business partners (networking, addressing, etc.).
On top of the technical communication platform, we need *protocols with general business semantics* that deal with interaction in all phases. This includes definitions of operations such as offer, acceptance, monitoring, control and payment operations.
In addition, we find a layer of *domain-specific interaction*. Beyond general business interaction, service outsourcing requires interaction that is specific to the domain of the outsourced service. When describing properties of services in a catalogue, defining services in a contract, and referring to service parameters at service performance time, we must ensure that domain-specific terms are understood in the same way.
Interoperability between companies with a business relationship must be established on all layers.
The aim of the workshop was to cover both the temporal and the infrastructural dimensions of business outsourcing as discussed above. In the temporal dimension, the focus was on the phases that have the most cross-organisational infrastructural requirements: the contracting and fulfilment phases. The issues were addressed by eight presentations and a concluding panel discussion.

3. Presentations

The presentations in the workshop were organised into an introduction to the subject and three sessions. The first session was devoted to current applications and problems in the field to provide a general end-to-end overview of the status quo of service outsourcing. The second and third sessions focused on the fulfilment and contracting phases, respectively, of the service- outsourcing process as outlined in the previous section. We present a digest of the sessions below.

3.1 B2B eBusiness Today

In the B2B eBusiness Today session, the first presentation focused on a solution framework, whereas the second presentation focused on requirements for dynamic service outsourcing.
Roland Klueber (University of St. Gallen, Switzerland, co-author Norbert Kaltenmorgen, HiServ, Germany) introduced the "business networking model" and the HiServ Business Port that supports the implementation of this model. The elements of this model are a "business bus", a set of standards for exchanging information such as offerings and processes, a "business port," which provides the gateway between an organisation's ERP system and the business bus, and "EServices," which are offered and provided by organisations through their business ports. The HiServ implementation of a business port supports the integration of various systems with the business bus. In the given case study, the SAP R3 systems of suppliers and customers of engineering products and services were connected to the "Newtron" electronic marketplace system.
Wijnand Derks (KPN Research, The Netherlands, co-authors Zef Damen, Matthijs Duitshof, and Henk Ensing) reported on issues of cross-organisational business processes in a logistics environment. Their experience was gained in the CrossFlow project (www.crossflow.org), which aims at supporting contractually defined cross-organisational business processes. In the logistics domain, processes of service providers and service consumers are highly interrelated. One of the reasons for these tightly coupled processes is that the handled physical goods contain workflow relevant data. This tight integration introduces problems in two particular areas. First, the service provider cannot guarantee QoS with respect to process run times if the service provider is dependent on the progress at the service consumer side. Second, in the case of process rollback, compensating service processes at the provider side may force the service consumer to rollback as well, violating its autonomy. Also, interrelated processes make it difficult to contract outsourcing partners dynamically on a case-by-case basis.

3.2 Cross-Organisational Process Management

The Cross-Organisational Process Management session focused on infrastructures for process support. Two presentations showed how workflow management technology can be extended to eBusiness applications.
Michael zur Mühlen (University of Münster, Germany) described the AFRICA prototype for interoperability of workflow management systems (WfMSes). This prototype represents an early implementation of Wf-XML interoperability standard as defined by the Workflow Management Coalition (WfMC). Wf-XML is a "binding" (i.e. concrete specification) of the WfMS's interface 4. This interface describes a number of operations to

start, stop, etc. processes in distributed WfMSes. Wf-XML defines an XML representation of operations and parameters and calls for HTTP as the transport mechanism.

Fabio Casati (Hewlett-Packard Laboratories, Palo Alto, USA) reported on the eFlow approach, which supports the composition of electronic services (potentially from different service providers) in the form of a process. In this model, service providers advertise their offerings in a directory along with a set of service usage restrictions. Service integrators describe an integration process that uses advertised services as components and offers composite services just as a regular one . Service integration on the basis of a process model promises to be faster and easier for service integrators. For this approach, traditional WfMSes are not sufficient because security and exception management in these systems is not tailored to the cross-organisational case. Also, support of XML and Java is required in this context. eFlow, which is based on Java and e-speak, offers this support.

3.3 Electronic Contracts

In the Electronic Contracts session, three aspects of contracting for service outsourcing were discussed: the role of transactional aspects in contractual services, legal aspects of electronic contracts, and a practical approach to and architecture for electronic contracting.

Paul Grefen (University of Twente, The Netherlands) presented the CrossFlow approach to specifying transactional workflows in electronic contracts for service outsourcing. The main ingredients of the approach are the explicit specification of (abstracted) processes for outsourced services in electronic contracts and the annotation of these processes with Level of Control (LoC) constructs. An XML-based contract specification language is used in which a process specification sublanguage is embedded, which is compliant with the WfMC process structure. LoC constructs accommodate the specification of high-level transactions and process control primitives to control these transactions. The transaction model used is a cross-organisational extension of the compensation-based Global Transaction model developed in the WIDE project.

Michael Gisler (University of Applied Sciences Bern, Switzerland, co-authors Katarina Stanoevska-Slabeva and Markus Greunz, University of St. Gallen, Switzerland) reported on legal aspects of electronic contracts. The work is carried out in the context of the Secure Electronic Contract (SEC) project. The talk was oriented towards Swiss contract law but is generally applicable to most western legal systems. The basic process of creating a contract consists of a sequence of stages – independent of its representation in electronic, written or any other form. The process starts when one party submits either an *invitation to treat* or an *offer*. An offer is different from an invitation to treat by its binding nature and its expiry time. A *counter-offer* and *acceptance* transform the offer into a legal contract. *Expiry* or *rejection* ends the contracting process. In general, contracts can be in any form, e.g. oral, unless specific legislation stipulates, for example, that they be in written form. Written form is also more practical in the event of dispute handling after the contract fulfilment phase. An important prerequisite for electronic, legally binding contracts is the legal acceptance of electronic signatures. Only then can parties handle legal disputes over electronic contracts. The SEC project has implemented an XML document format that contains documents of the contracting process as well as electronic signatures and thereby supports the full contracting process.

Zoran Milosevic (DSTC, Australia, co-authors Andrew Goodchild and Charles Herring) proposed an approach for B2B business contracts. The approach contains a format for XML-defined contracts and a conceptual architecture to deal with them. The approach proposes that an XML contract be divided into two sections: a body and a digital signature. The contract body is structured into a preamble, which identifies the parties, an approval section, and (nested) clauses that contain either a natural- language description of a rule or an expression of a policy language. A number of contract management tools have been introduced in this context for the efficient handling of contracts.

4. Panel Discussion and Results

The panel discussion dealt with the "role of electronic contracts in business-to-business service outsourcing". Fabio Casati, Michael Gisler, Paul Grefen, and Zoran Milosevic discussed this issue, chaired by Heiko Ludwig.

The panel concluded that electronic contracts are a useful concept throughout the lifecycle of a business relationship. However, the convenient use of electronic contracts, in particular in the negotiation phase of a business relationship, requires standardisation and reuse of contract templates. This conclusion is closely related to the observation in the third session that structuring of contracts is a major issue.

As a prerequisite, contracted services must be commoditised. Telecommunications is an industry where we can observe this phenomenon, because it trades call minutes and bandwidth as commodities. In general, we need an appropriate contract management infrastructure for electronic contracts, i.e., the technical as well as the organisational setup to deal with electronic contracts. In the workshop, approaches to develop such an infrastructure were presented.

Another issue concerned the format and type of contents of electronic contracts. The panel agreed that completely formalised, machine-interpretable contracts are unlikely to materialise in the near future. However, formalised parts such as specifications of interfaces of electronic services will be useful, in particular for the automated setup of contract fulfilment systems. The panel concluded that a hybrid form of electronic contracts, combining natural language and formal parts, is currently the most appropriate form for electronic services that are the subject of a contract.

The overall conclusion we can draw from the workshop have provided a clear indication that dynamic electronic service outsourcing is an important topic in the field of eBusiness. Many problems have yet to be solved, however, before we shall arrive at commodity solutions. Electronic contracts are an important ingredient in end-to-end solutions. The construction of appropriate infrastructures for contracting and service enactment requires the integration of business models, software architectures, and legal frameworks.

The proceedings of the workshop have been published online on the CEUR proceedings server at http://sunsite.informatik.rwth-aachen.de/Publications/CEUR-WS.

5. References

[1] H. Ludwig, Y. Hoffner, C. Bussler, and M. Bichler (eds.): *Proc. CAISE*00 Workshop on Business-to-Business Service Outsourcing*. Stockholm, Sweden, June 5-6, 2000.

[2] B. Schmidt: Requirements for Electronic Markets Architecture. In: *Electronic Commerce*. Vol. 7, No. 1, pp. 3 - 6, 1997.