Music Rights Clearance Business Analysis and Delivery

Carlos Pedrinaci[1], Ziv Baida[2], Hans Akkermans[2], Amaia Bernaras[3], Jaap Gordijn[2], and Tim Smithers[1]

[1] Parque Tecnológico de San Sebastián, Mikeletegi 53, 20009 San Sebastián, Spain.
`cpedrinaci@miramon.net, tsmithers@miramon.net`
[2] Free University, FEW/Business Informatics, De Boelelaan 1081a, 1081 HV Amsterdam, The Netherlands. `(ziv, elly, gordijn)@cs.vu.nl`
[3] Idom, Paseo de los Olmos, 14 Bidebieta I, 20009 San Sebastián, Spain.
`abernaras@idom.es`

Abstract. Semantic Web Services can be seen as remote Problem Solving Methods offered via the Web through platform and language independent interfaces. They can be seamlessly integrated to achieve more complex functionality by composing pre-existing software components. Despite technical advantages surrounding Semantic Web Services technologies, their perspective overlooks the commercial aspects of services in the real – non-IT – world, and is therefore incomplete and limiting. Real-world services – business activities such as insurances, medical services, ADSL etc – have nowadays an increasing social and economic importance. Important trends are the bundling of services and a growing customer-need orientation. Thus, there is a need for a computational background for describing real-world services and applying knowledge-based technologies for reasoning about them: configuring composite services and analysing them from a business perspective. We have developed ontologies and software tools to fill this gap, and applied them to industrial case studies. We present here a case study from the music industry, going from the analysis of a new business scenario to the development of an application called Xena that coordinates IT infrastructures in order to provide a profitable service that reflects major business principles. As opposed to currently proposed solutions in the Semantic Web Services community, our system is an automated implementation of a real-world service where important business decisions can be traced back.

1 Introduction

Reasoning about business value, economic feasibility of businesses and other business logics has traditionally been performed within business science [8–11]. The rise of Internet and Web service technology presents businesses with the opportunity to integrate business activities into a value constellation [10, 9]. Businesses bundle forces and use automated processes to offer the best solution for customer needs: a bundle of goods and services that together offer a higher added value than single services/goods. In spite of this strong intertwining of

business and IT, the wealth of Web service research is dominated by a technical perspective, not taking into consideration the business logics that drive business transactions, eventually executed by Web services.

The use of Web services, like other technologies, should be justified by their support of strategic business goals. Hence, transactions they execute must adhere to business logic, as dictated by the business domain, including issues such as competition, legislation and an understanding of the market. Consequently, a first step in Web service implementation should be understanding the business environment. A (possibly inter-organisational) bundle of services – business activities – has to be defined that provides a solution for customer needs. The next step is to define a business process model to carry out this service bundle. And subsequently, based on the process model and driven by business logics, it is possible to implement and select Web services that distribute the computation of the earlier described business activities (e-services). Thus, decisions made on the business perspective propagate to the system implementation.

In this paper we cross the boarders of research disciplines, and present an exploratory case study, where we investigate and implement e-service offerings, starting with a business analysis, and ending with a Web service based implementation of a scenario sketched by the business analysis. Important business decisions, made during the business analysis, are reflected in the system implementation. Our prototype application adheres to these business decisions, and coordinates the execution of distributed Web Services for the actual offering of e-services over the Internet. Our Web service based system differs from other work by the Semantic Web Services community in its business grounding, originating from a business analysis that can be traced back in the system implementation.

This paper is organised as follows. In Section 2 we present the case study domain, followed by an analysis from a business perspective. This analysis is the business-grounding of the system implementation, presented in Section 3. Finally, in Section 4 we present our conclusions and discuss important issues for future research on what we refer to as *business-value driven Web services*.

2   A Business Perspective on Music Rights Clearance

2.1   Case Study: Music Rights Clearance and Repartitioning

Conventional and Internet radio stations broadcast music to attract audience, and sell this audience to their advertisers. Commercial music use is bound by several rights reserved by right holders (e.g. artists and producers). Specifically, a radio station has to pay right holders for the right to broadcast music.

The process of charging radio stations for music use and of distributing the money among artists, producers and other right holders is supported by organisations called *rights societies*. These may be government-appointed organisations (as is the case in the EU) or commercial companies (as is the case in the US and is intended to be in the EU in the future). They collect fees from radio stations (an activity referred to as *rights clearance*), and distribute the fees among right

holders (an activity referred to as *repartitioning*). With respect to the right to communicate music to the public, rights societies provide Internet radio stations with the service of *clearing* this right, and right holders with the service of benefiting from this clearance: *repartitioning*.

Due to the liberalisation of the market for rights societies in the EU, the way of doing business in this industry may change dramatically. New rights societies may appear, and will start competing on customers: radio stations (customers for the clearance service) and right holders (customers for the repartitioning service). Currently the Dutch law determines which rights societies clear certain rights and repartition fees. A radio station has no flexibility in choosing a rights society to work with. Market liberalisation will bring an end to this situation, causing a collapse of the power structures within the industry. Our case study aims at analysing new ways of doing business in a liberalised market, concentrating on clearing rights for Internet radio stations, where the whole process can be supported by e-services. We present our case analysis, gradually going from a business analysis (Section 2) to Web service implementation (Section 3). The analysis process (Figure 1) includes the following steps: (1) analysis of network value constellations of enterprises; (2) specification of elementary commercial services and opportunities to bundle them; (3) description of inter- and intra-organisational processes for service delivery; and (4) implementation of an inter-organisational information system, based on ontologies and web-services, and supporting the business process/service description and business model.

**Fig. 1.** Analysis process: from a business perspective to an IT implementation

2.2 Business Analysis

Business analyses are studies that result in an understanding of how actors can profitably do business. The way of doing business can be conceptualised in so-called *business models* that show (1) the actors involved, (2) the activities performed by these actors, and (3) the objects of economic value that these actors exchange in their business activities. Business models for networked enterprises typically show multi-party dependencies, rather than a bi-lateral alignment of activities. The reader is referred to [3] for an ontology-based method to perform a business analysis, and to [7] for a detailed business analysis of our case study domain. Here we only discuss the most relevant issues for the current case study.

Market liberalisation means that new rights societies may emerge, that radio stations are no longer obliged to clear rights with a specific rights society, and that rights societies will compete on representing artists. This could be a nightmare for radio stations. A typical Dutch Internet radio station plays a large number of music tracks every month. Nowadays all the rights are cleared with the same two rights societies, as determined by Dutch law. But in the liberalised

market an Internet radio station would have to find out which (not necessarily Dutch) rights societies represent the artists of every track, and clear rights with all these rights societies. Radio stations may have to do business with a large number of rights societies, rather than just two. Two scenarios may solve this problem, by introducing new actors:

1. A *clearing organisation* is introduced; it takes over rights societies' role to interact with Internet radio stations. It offers a rights clearance service to Internet radio stations, and in fact acts as a proxy, and forwards individual clearing requests to the appropriate rights society. Consequently, rights societies no longer need IT to perform the inter-organisational clearing process themselves. Although a single organization interacts with radio stations, liberalisation implies that *any* rights society may represent *any* right holder, as opposed to the current situation.
2. Instead of a clearing organisation we introduce a *clearing coordinator*. Internet radio stations continue interacting with a rights society of their choice. This rights society cannot clear all the rights itself. Instead, it uses the services of a clearing coordinator to find out through which other rights societies it can clear rights for a customer (this information is not publicly available). Yet, the clearing coordinator does not interact with radio stations.
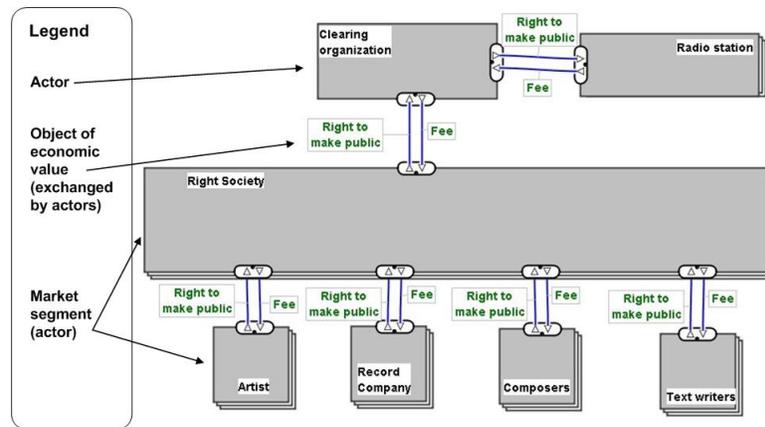
Fig. 2. Clearing organisation business model

The two scenarios, for which business models are depicted in Figure 2 and Figure 3, encapsulate important strategic business decisions:

1. Which actors are involved? Both scenarios involve rights societies and right holders, as in the current situation. However, both scenarios introduce a new actor: a clearing organisation and a clearing coordinator.
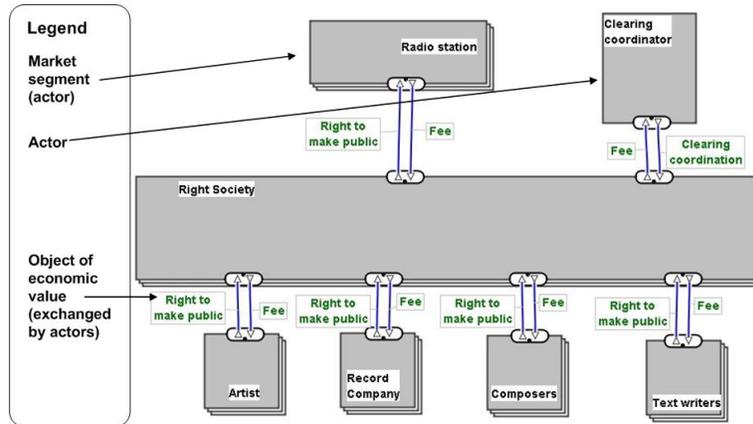
Fig. 3. Clearing coordinator business model

2. Which actor interacts with customers? In the first scenario, rights societies give up some power: they no longer interact with radio stations, making it hard to build a strong relationship with radio stations and to create customer loyalty. In the second scenario rights societies maintain their traditional position, maintaining direct interaction with radio stations.

3. Who determines fees? The party that interacts with radio stations can eventually determine the fees that radio stations have to pay. As long as another entity stands between rights societies and radio stations (clearing organisation scenario), rights societies do not determine the final clearance fee, making it hard for them to compete on radio stations as customers. In the clearing coordinator scenario rights societies continue determining the fees.

In the current paper we report about implementing the clearing organisation scenario. This implies important business decisions: (1) introducing a clearing organisation actor, (2) a clearing organisation, rather than rights societies, interact directly with radio stations, and (3) rights societies no longer determine the final fee. We created a business model [7] with which financial feasibility can be analysed for all actors involved. The clearing coordinator scenario was implemented as well, as reported in [7].

2.3 Service Description

The clearing organisation scenario includes two services: clearance and repartitioning. These services can be offered by multiple rights societies; each may require somewhat different fees. Consequently, rights societies need to describe their services in a way that attracts customers, from a business perspective: describe what the e-service provides to the customer, and what the customer gives in return. Hence, business activities identified in the business model (see Figure 2) are now described as *services*, using a service ontology [2]. Based on such

a description, a customer can choose the e-services – being business activities – that he or she wishes to consume. A discussion on using the service ontology to describe and bundle services based on business logics is presented in [2].

2.4 Business Process

The clearing organisation's business process for rights clearance consists of the activities of identifying the tracks being reported and the rights societies that can clear rights for these tracks, calculating fees (by rights societies), collecting fees (by the clearing organisation), and distributing the fees among rights societies. Repartitioning (distributing collected fees among right holders) involves identifying right holders, calculating their commission and distributing fees (either to right holders or to other rights societies that represent these right holders). Each activity operationalises a value-exchange, expressed by higher-level ontologies; it does not include pure technical activities, such as upload a play report to a database. In the next section we go another step further and we describe how, based on the business analysis performed, we have developed a clearing organisation prototype that provides the music rights clearance e-service to Internet radio stations by coordinating the interaction with distributed rights societies.

3   Xena: Web-Service Based Music Rights Clearance

The clearing organisation business model relies on establishing a new actor (i.e. the clearing organisation) that merely acts as a proxy between Internet radio stations and rights societies. Driven by this business model, we have developed Xena, a clearing organisation prototype. It is supported by our *E-Services Delivery Architecture* and relies on Semantic Web and Web Services technologies in order to actually deliver the music rights clearance e-service over the Internet. In this section we describe how we have reconciled business and technical aspects to implement our prototype. We first present the underlying software architecture that provides the structural framework for its development. We then present how business studies were applied to determine the activities to perform as well as their coordination. Finally, we review our prototype in the light of the main business decisions that were initially adopted.

3.1 E-Services Delivery Architecture

For a system to satisfy the business model proposed, it has to be the realisation of the business offering. This involves, applying the business logics captured in the business model during the system design and development and, most importantly, maintaining them at runtime. As a consequence, the system needs to support the service delivery process informed by the business knowledge. Moreover, because we are delivering an e-service that involves several actors, the system needs to be able to coordinate and seamlessly integrate distributed and

heterogeneous systems. Finally, the system needs to be scalable; after all, there are thousands of radio stations in the Web.

These highly demanding requirements pose the need for supporting runtime reasoning over an inter-organisational process where highly heterogeneous systems need to be coordinated. For this, Xena is developed on top of our E-Services Delivery Architecture. The core of the architecture which has previously been applied for supporting designing events, such as conferences or meetings [1], is an adaptation for the Internet of a what is usually referred to as a *Blackboard Framework* [5], a task independent architecture for implementing the blackboard problem-solving model. The blackboard problem-solving model [5] is a highly structured opportunistic-reasoning model where pieces of knowledge are applied at the most *opportune* time: either reasoning from data towards a solution; or from a possible solution towards needed data. The fundamental philosophy of this problem-solving model establishes that experts, also known as *knowledge sources*(KSs) in the blackboard literature, do not communicate with each other directly; instead, all the interactions strictly happen through modifications over a shared data structure called *blackboard*.

In order to adapt the Blackboard Framework to the Internet, our framework "externalises" knowledge sources thus enabling the use of their expertise to improve the interaction with the different business actors. In fact, given that KSs encapsulate expertise, we apply this knowledge to improve and direct the interaction with remote systems (such as web services from other companies). In order to streamline the collaboration among the business actors, we identify as part of our software architecture, ontologies as a means for representing the domain knowledge of the application (e.g. the music rights management ontology), and Semantic Web Services as the vehicle for a seamless but effective communication.

3.2   A Real-World Service Oriented Approach

Web Services have been proposed as a standard means for supporting interoperation between different systems independently from their platform or language. The power of Web Services lays in the fact that they can be seamlessly composed to achieve more complex operations, thanks to the use of so-called orchestration languages. The Semantic Web Services initiative couples Web Services with semantic annotations in order to establish the computational ground for a higher automation of the discovery, composition and execution processes. In spite of the technical advantages of (Semantic) Web Services technologies, their perspective overlooks commercial aspects and is therefore unnecessarily limiting.

In Section 2 we have presented the real-world services involved in the clearing organisation scenario and how they are composed in the final e-service offering. These services, are understood from a business perspective and are therefore different from (Semantic) Web Services some IT systems could provide. Still, we need to fill the gap between the e-services definitions and their Web Services based execution, in order to automate the provisioning of the music rights clearance service over the Web. Informed by the real-world services identified and the business process model obtained, we have followed what we call a *Real-World*

Services Oriented Approach as opposed to (IT) service-oriented approaches. In our prototype, each of the real-world services identified are provided by a particular knowledge source. The KSs encapsulate the expertise for delivering these real-world services and hence allow us to bring IT services to their e-services executable form.

Based on the activities the business process model identifies, we have developed three KSs. The first one, the *Main KS*, is derived from the first business activity and it is in charge of interacting with Internet radio stations and determining the rights societies to deal with, based on the different tracks being reported. The second KS, namely the *Clearing KS*, encapsulates the expertise for contacting rights societies, and executing the fee calculation service. Finally, the third activity, which is related to money transfers (collecting and distributing fees), is handled by the *Accounting KS*. See Figure 4 for a general overview of the system implementation.
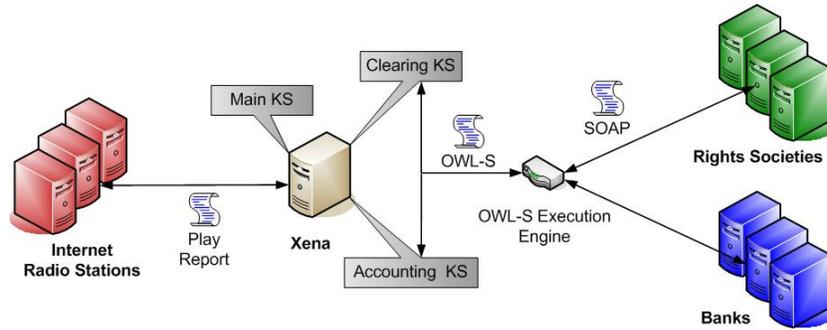

Fig. 4. Xena Architecture

3.3 E-Services Delivery Process

In addition to determining the e-services involved in the service delivery, the business process model establishes how the different business activities need to be coordinated. Therefore, the process model roughly specifies how the different KSs need to be coordinated and even establishes the activities they have to perform by identifying the actors they need to interact with and the expected results. In Xena we can distinguish two different levels where the delivery process is defined. On the first level, we determine how the different e-services must be composed for the final delivery as specified by the business process model. On the second level, we define workflows for mapping e-services into Web Services executions.

The e-services composition is supported by the opportunistic-reasoning platform. The KSs are informed by a music rights management ontology we have modelled in OWL and a set of inference rules. These rules determine the activities to be performed under certain conditions. In some cases, the action will result in rather simple tasks such as calculating the commission, but in other

cases they will trigger the execution of remote services, such as the clearing or the bank transfer services. The need to match real-world services into IT services, leads to the need for specifying and executing workflows that map business services into a composition of IT services. In order to be able to execute these (real-world) services we describe them using OWL-S[4], their groundings being linked to Web Services offered by the different actors identified in the business analysis. For example, the clearing service has been modelled in OWL-S as a sequence of Web Service methods offered by Rights Societies IT systems. In runtime, knowledge sources trigger the execution of the OWL-S services making use of an OWL-S execution engine[1] and the results of the executions are placed into the blackboard for further processing (see Figure 4).

3.4   Reviewing Our Approach

Having a business understanding of the scenario allows us to examine the system developed from a business perspective, to check whether the IT implementation faithfully composes the e-services that were identified. Comming back to the main business decisions that were adopted, it is then possible to check whether the implemented system adheres to the business logics dictated by the business model. In Section 2.2 we identified three strategic business decisions:

1. Introduce a new actor, the clearing organisation: this new actor is represented by our prototype, Xena. The rest of the actors, that is, Internet radio stations, rights societies and right holders, still remain involved in the business process.
2. The actor in charge of dealing with Internet radio stations is the clearing organisation: in our IT implementation Xena is charged of dealing with Internet radio stations and is therefore directly offering them the music rights clearance e-service (see Figure 4).
3. Final fees are determined by the clearing organisation: Xena contacts rights societies for calculating the fees and eventually adds its own commission to the final fee. Thus, the final fee is indeed determined by the clearing organisation.

Therefore, Xena implements the main strategic business decisions adopted during the business and services modelling phases. For this, the system is built on top of three important blocks: (1) the E-Services Delivery Architecture; (2) ontologies to model the domain and business knowledge; and (3) Semantic Web Services for a seamless integration of distributed and heterogeneous systems. This has shown to be a good solution for an automated implementation of a real-world service offering where important business decisions can be traced back.

4   Conclusions

The European music industry will have to face a new business environment with the forthcoming liberalisation of the market for the music rights clearance

---

[1] http://www.mindswap.org/2004/owl-s/api/

and repartitioning. Using knowledge-based technologies for *business modelling* [6] and *service modelling* [2], we have analysed this business scenario and obtained a profitable solution. A resulting business model relies on establishing a clearing organisation that merely acts as a proxy between Internet radio stations and rights societies. Driven by this business model, we have developed a prototype of a clearing organisation. The prototype, named Xena, is supported by our E-Services Delivery Architecture and relies on Semantic Web and Web Services technologies in order to actually deliver e-services over the Internet. Our business-value driven approach is an interdisciplinary approach where business and technical aspects are combined in order to actually deliver profitable e-services over the Web. There still remain, however, important issues we expect to tackle in the future. For instance, further case studies will be required in order to better establish the rules and guidelines that lead from the business analysis to the business process to the actual implementation. Finally, we intend to profit from the business knowledge and the flexibility of the E-Services Delivery Architecture in order to support business practitioners in the task of declaratively defining the delivery process.

References

1. J. Aguado, C. Pedrinaci, A. Bernaras, T. Smithers, H. Calderón, and J. Tellería. Online design of events application trial, version 2, September 2004. OBELIX IST-2001-33144 DELIVERABLE 7.8.
2. Hans Akkermans, Ziv Baida, Jaap Gordijn, Nieves Peña, Ander Altuna, and Iñaki Laresgoiti. Value webs: Using ontologies to bundle real-world services. *IEEE Intelligent Systems - Semantic Web Services*, 19(4):57–66, 2004.
3. Ziv Baida, Jaap Gordijn, Andrei Z. Morch, Hanne Sæle, and Hans Akkermans. Ontology-based analysis of e-service bundles for networked enterprises. In *Proceedings of The 17th Bled eCommerce Conference (Bled 2004)*, Bled, Slovenia, 2004.
4. The OWL Services Coalition. Owl-s: Semantic markup for web services, 2003. http://www.daml.org/services/owl-s/1.0/.
5. R. Engelmore and T. Morgan. *Blackboard Systems*. The Insight Series in Aritificial Intelligence. Addison-Wesley, 1988. ISBN: 0-201-17431-6.
6. Jaap Gordijn and Hans Akkermans. Value based requirements engineering: Exploring innovative e-commerce ideas. *Requirements Engineering Journal*, 8(2):114–134, 2003.
7. Jaap Gordijn, Patrick Sweet, Borys Omelayenko, and Bert Hazelaar. *D7.4 Digital Music Value Chain Application*. Obelix consortium, Amsterdam, NL, 2004. Available from http://obelix.e3value.com.
8. Morris B. Holbrook. *Consumer Value: A Framework for Analysis and Research*. Routledge, New York, NY, 1999.
9. Richard Normann and Rafael Ramirez. *Designing Interactive Strategy: From Value Chain to Value Constellation*. John Wiley & Sons, Chichester, UK, 1994.
10. Michael E. Porter. *Competitive Advantage: Creating and Sustaining Superior Performance*. The Free Press, New York, NY, 1985.
11. Don Tapscott, David Ticoll, and Alex Lowy. *Digital Capital: Harnessing the Power of Business Webs*. Harvard Business School Press, Boston, 2000.