

# **e-LEGAL SERVICES: TO SPEED UP JUSTICE FOR B2B SYSTEMS**

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## **Abstract**

International business is increasingly undertaken within flexible, multi-organisational e-Businesses to address the needs of the global market. Underpinning this are Business-to-Business (B2Bs) processes and Web Services. The purpose of this paper is to outline new ideas to speed-up business processes, to allow early intervention by mediators or arbitrators, thereby avoiding litigation. It addresses the need for systems to support the legal process when a negotiation has broken down by proposing SOA [Service Orientated Architecture] to combine negotiation and associative legal services.

The paper provides a summary of B2B process management for virtual organisations using Web Services and the Grid. It provides the relevant details on knowledge management, shared ontologies for legal systems and e-Negotiation systems, providing the background to the design of a B2B BPEL architecture to speed up legal 'back office' process. The paper describes an e-NegLegal network and a conceptual design of an e-Legal Services module.

## **1 Introduction**

### **1.1 Context**

Despite many recent advances in internet and artificial intelligence search technologies, take up of ICT in trials or in dispute resolution has been ad hoc and unspectacular [Barnett 2005a]. Lawyers use email and wi fi connections to their offices and spend vast sums of money to automate back office functions.

Present global legal systems were designed for the pre-internet world. As commerce moves on, the challenge is to harness emerging technology for the future generation of legal process, to enable lawyers, judges, mediators, bankers and clients conduct better hearings, meetings, mediations and if necessary trials.

Criminal and civil litigation trials are cumbersome, expensive and time consuming. Long hearings become document heavy, taking weeks or months investigating events that often took place many years ago. Because of the huge increase in cost, there is reluctance amongst clients to go to trial. Legal process has to be redesigned to catch up with the changing commercial landscape.

The increase in globalisation of trade has resulted in a proliferation of international disputes. These often involve potential litigants, based in remote locations, where the disputes exhibit dual problems of differences of language and legal systems. The growth in ICT and intelligent decision support system has enabled a rapid growth in the scale

and connectivity between users, around world. The historic perspective on ICT is described in [Susskind 2003]. This paper is concerned with speeding up the processes used in Business-to-Business dispute resolution.

ADR and ODR are growing to reduce the cost of justice [Katsh 2001, **Rule 2002**, Larson 2004]. Early examples of ODR are Squaretrade and Cybersettle. These support human-to-human discussions and collaboration. ADR is growing at the expense of traditional litigation. Private panels of mediators and arbitrators supported by ICT will provide an alternative to expensive trials conducted by Judges employed by national legal systems.

## **1.2 Introduction of ODR**

The use of ICT in litigation has grown in two distinct areas. The Virtual Courtroom movement led by Professor Frederick Lederer ([www.legaltechcenter.net](http://www.legaltechcenter.net)), uses electronic filing, electronic evidence and the development of virtual or electronic courts with the use of video conferencing and other technologies to enable litigants in remote locations to participate in the hearing. Some techniques pioneered in the McGlouglin Moot Courtroom at Courtroom 21 are now in everyday use throughout the world, but in the UK, the 1995 vision of the paper free courtroom of the future lies in ruins, as various initiatives have fallen by the wayside [Barnett 2003].

The Online Dispute Resolution movement, led by Professor Ethan Katsh, defines ODR as *any method of Dispute Resolution* which wholly or partially designates the Internet as the *virtual location to solve a dispute* [Katsh 2001]. Examples include:

- Litigation (court processing),
- Mediation where the two parties agree to resolve their differences with a non-binding agreement, and
- Arbitration where parties agree to abide by the results of the arbitration.
- Negotiation, which is the process of reaching a mutually beneficial agreement through compromises and the discovery of information

[Cameron 2004, Nolan 2006] consider the various techniques embraced by the phrase ODR and conclude that no single existing definition is wholly appropriate for it. Further, they suggest that ODR involves the use of ICTs to create a forum for dispute resolution. ICTs increase the efficiency of traditional methods but cannot automate the actual decision process.

There are a number of potential advantages to ODR [Rule 2002]. These include: potentially speeding up decision making; building in pauses that can be periods of reflection, supporting further research during the process, and reducing bias. Neutrals can use asynchronous communication as a cooling-off device, to re-frame (for example the argument) and to caucus simultaneously with each party. Other potential advantages include early intervention, cost reduction, retention of customers and better feedback loops. [Davis 2002] remarked:

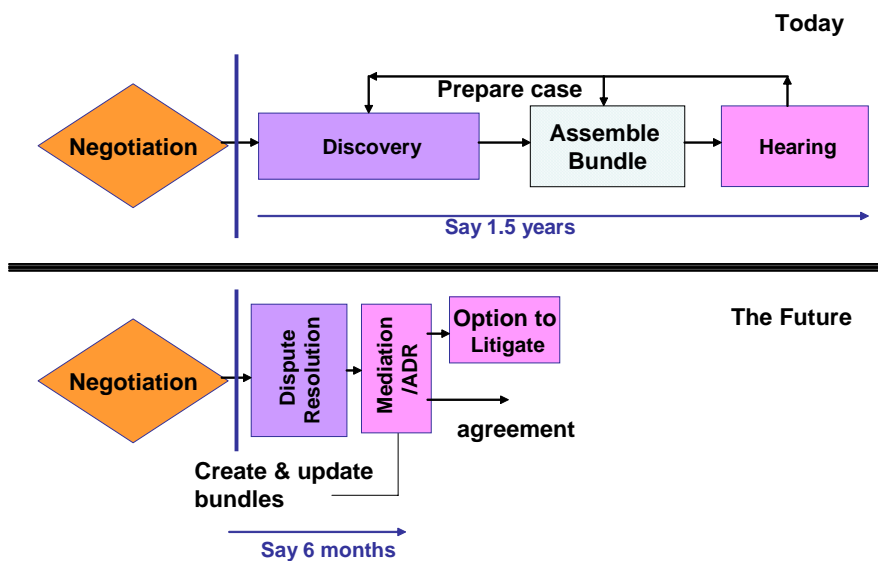
*'A merger of terrestrial ADR and online ODR activities appears inevitable. More broadly however with the advent of the use of online technologies in traditional dispute resolution in courts, I do wonder whether we will see a further integration of ODR, ADR and traditional court proceedings worldwide in a manner heretofore only glimpsed as we work towards our common goal to provide a fair, impartial and neutral dispute*

*resolution - in short, justice – for all. Thus in our lifetimes, our task will be to build the truly seamless dispute resolution web'*

In ODR, the technology is often referred to as the Fourth Party [Katsh 2001]. This analogy has been taken by others and extended. For example, [Bol 2005] in an attempt to clarify, defines the provider of services such as a web site, where e mediation takes place, chat or e-mail facilities as the Fifth Party. Although this extension is helpful in considering the legal liability of all parties to a mediation, the Fourth Party should be limited to those specific situations where the technology plays a role in the decision making process by the disputants or the mediator, for example in Smartsettle.com where the software is a tool capable of extracting hidden value from a negotiation by any party to the process.

### 1.3 ICT enabled Dispute Resolution

A particular class of ODR considered here is ICT-enabled Dispute Resolution, where the emphasis is on those ICT systems that unpin ADR processes. A recent conference held at Leeds University Business School (LUBS) on May 11<sup>th</sup> 2005 on IT-enabled Dispute Resolution and UK-China disputes, discussed the advances and the issues that need to be addressed [Barnett 2005b and Shenkar 2005].



**Figure 1 Speeding up Justice**

Practitioners have recognised the trend towards document heavy hearings in both civil and criminal jurisdictions, as disclosure and discovery generate huge stores of information, including email traffic and network information. The use of ICT to support the legal process concentrates on the ability of legal practitioners to master these large data sets. This is illustrated in Figure 1. [See below 3.1]

## 1.4 Purpose

The purpose in this paper is to outline new ideas to speed-up the Negotiation and Dispute Resolutions business processes in flexible, multi – organisational, e Businesses.

This paper concentrates on negotiations that have broken down, rather than the negotiation process. It describes a possible e-Legal Service and the feasibility of an e-Negotiation/Legal network (e-NegLegal) architecture, that integrates negotiation and legal services to enhance the capability of B2B systems support processes, to permit legal practitioners resolve conflicts that might arise with speed.

At present heavy international disputes are now resolved in global centres such as the WIPO Arbitration and Mediation Centre in Geneva. Parties often have to fly to hearings, unless point to point video conferencing, with its well documented limitations, has been arranged. Negotiations have often failed prior to the hearing.

Here we study Web-based services for international business mediation and arbitration using B2B inter-process systems that operate in a virtual organization, within a global market. **The virtual organization** is a network of organizations with compatible business processes. **Web Service/Grid environments** are designed to support virtual organisations using international standards. The inter- and intra-business processes are modeled in the Web Services standard **BPEL** (Business Process Execution Language). In this paper BPEL is used to model the inter-processes, which interface with the local workflow engines managing the intra-processes. An example of the use of BPEL for negotiation is given in [Kim 2004].

The paper is structured as follows. Section 2 provides a summary of process management for virtual organisations using Web Services and the Grid. This is followed by relevant details on knowledge management and shared ontologies for legal systems. Section 4 is concerned with the design of an integrated e- Negotiation/Legal network (e-NegLegal). This leads on to a conceptual design of an e-Legal Services module that is a key building block of the e-NegLegal network. Finally conclusions and future work are discussed.

## 2 Process Management for Virtual Organisation using the Grid

The purpose of this section is to discuss the key architectural elements that will be used, ie the Grid, which is a loosely-distributed system, based on the Web Services Resource Framework (WS-RF) and the BPEL [Alonso 2004a and b].

### 2.1 Grid and Virtual Organisation

The Grid provides a collaborative computational and data infrastructure for supporting global virtual organisations (e- businesses and organisations). It is a major paradigm shift in distributed computing, with a focus toward service oriented, open standard integration, collaboration and virtualisation of resources, [Joseph 2004 *etc*] using a **service-oriented architecture (SOA)** [Alonso 2004a]. A service is a stable, published interface that can be invoked by other processes. Services specify the functional and non- functional (e.g. Quality of Service – QoS - such as security, performance etc.) of a service. It is an

extension of component architectures used, for example, by Kim [Kim 2004] for e-Negotiation systems.

More generally it enables *the integration of services and resources within distributed, heterogeneous, dynamic, virtual organisations* [Foster 2001, Foster 2004]. It provides the required connectivity to integrate applications and better utilise unused compute processing power and data storage. Open standards are provided by the Open Grid Service Architecture (OGSA), implemented in a set of well defined Grid Middleware Services. Early implementations of Grid Middleware are Globus4 [<http://www.globus.org/toolkit/>] and Crown [<http://www.crown.org.cn/en/>].

## 2.2 Web Services and BPEL

Workflow is widely used in industry to coordinate business processes. The extension of workflow management systems to service-based Grid architecture has been considered by [Yang 2005]. Workflow automation enables quick deployment of process, monitoring and improvement of implemented processes and is achieved by the separation of **build time** and **run time** components.

The **build time** is concerned with assisting the creation of processes, business rules and user models. At **run time** the workflow management system provides the interpretation of process models, the creation of process instances, and the control of processes and activities. Following the classification of Stohr and Zhao [Stohr 2000], the requirement is for flexibility and specificity of the process. For support of Legal Services the key requirement is a Document centric architecture with workflow capacities. This is provided by companies like ECM with their EMC Documentum and E- Rooms systems [<http://www.documentum.com/>].

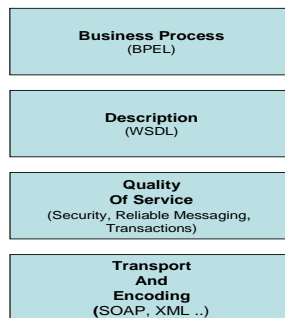
The basic **SOA** is used to describe and publish services and is an interact mechanism for service composition. However it needs to be extended to provide Quality of Services (QoS) as shown in Figure 2. For this purpose the WS- Resource Framework has been specified. This is inspired by the work of the Global Grid Forum's Open Grid Services Infrastructure (OGSI) Working Group.

Today, Web Services most often provide their users with the ability to access and manipulate state. There is a need to define conventions for managing state so that applications discover, inspect, and interact with stateful resources in standard and interoperable ways. The *WS- Resource Framework* does this within the context of established Web Services standards. A secure collaborative workflow system has been proposed by Russell [Russell 2005]. This system enables dynamic workflow-team policies to authorise user access to workflow instances and corresponding service instances.

The WS-Resource Framework standard has been divided into four layers as shown in Figure 2. These are

- **BPEL**: overcomes many of the weaknesses in workflow languages; it provides the composition of services within a virtual environment using WS- Coordination and is supported by industry.
- **WSDL**: WS description language which is enhanced by WS-Policy to allow the encoding of QoS information services in the form of reusable services.

- **Quality of Services (QoSs):** There are a number important WS services at this level: WS-Coordination and WS-Transaction to support robust service interactions; WS-Security for enforcement of information integrity, to maintain the accuracy of the information, and prevent access by unauthorised parties [OASIS Security 2004 and 2005]; and WS- ReliableMessages.
- **Transport and Encoding:** These services underpin Web Services such as SOAP (Logical Messaging) and XML for encoding.



*Figure 2 The Web Services Stack*

**BPEL** provides a means to formally specify business processes and interaction protocols [OASIS 2005, IBM 2005]. The language has been proposed to handle asynchronous and long time transactions (e.g. as arise in negotiation). It was introduced in July 2002 by BEA, Microsoft and IBM and is now following the OASIS standardisation process draft version 2.0 [WS-BPEL 2.0]. **BPEL** overcomes many of the limitations of the early workflow languages. Worked examples are given in [Alonso 2004]. Kim [2003 & 4] proposed a BPEL process-based solution approach to e-negotiation.

**BPEL** is a process-oriented form of service composition. Each BPEL process composition is a business process (or workflow) that interacts with a set of Web Services to achieve certain business goals. There are two key primitives: – **process-services** and process interactions called **partners**. A process, like any other Web Service, supports a set of WSDL statements that enable the exchange of messages between partners; see [Juric 2002].

## 3 Knowledge Management

### 3.1 Management of Legal Documents

One of the key elements in our goal to speed up justice is document management. This involves the capacity to search very large unstructured, multi-media documents together with the ability to annotate them. This section outlines the issues that must be addressed.

XML is often used for the efficient managing and processing of information for legal documents. This has been considered by a number authors – see [Boer 2002]. There are a number standards for the representation of legal documents mainly developed by legal publishers.

(see OASIS, Legal XML web site:  
[http://www.oasisopen.org/committees/tc\\_home.php?wg\\_abbrev=legalxml-intercept](http://www.oasisopen.org/committees/tc_home.php?wg_abbrev=legalxml-intercept)).

In addition there have been number of initiatives by government agencies to annotate legal documents. These include the British Legal and Advice Metadata Scheme (LAMS) (<http://www.uklegal.com/abi/>) and the Australian Justice Sector Metadata Scheme (JSMS) (<http://www.ag.gov.au/>). A more interesting way forward is the use of schemes

that enable more flexible ways to markup documents to enrich them with *metadata*. This allows applications such as intelligent retrieval and reasoning to be used. These are expressed using RDF which is the basis of semantic reasoning and is part of the semantic web initiative. [Winkels 2003].

**Bundle Management** is a fundamental process used by lawyers in disputes. They collect legal multi-media documents submitted by the various parties. Some documents are private to one of the parties whilst others are public and available to all parties. Most law firms use now use legal documentation management systems in daily practice.

An early implementation legal document managed system is Custodian from CourtCom Ltd. This was built in 2003 to demonstrate the main features of an online searchable 'jury bundle'. The key requirement is to be able to handle unstructured data in order to preformed content-dependent search and retrieval of documents. Custodian uses a document management system from Nextpage/FAST (<http://www.nextpage.com>) to provide collaborative document management services such as search, authorisation and account management, and adds indexation as a core function.

Other relevant document management systems are Documentum ECM and Solcara Information manager (<http://www.solcara.com>). These systems provide an integrated approach to the identification, capture, classification and sharing of an organisation's information. They enable management of knowledge resources (e.g. conceptual metadata) as discussed below.

The Bundle Management Service for the e-Legal system described below will provide a secure, Web Services document exchange which can store all case papers and allow pre-defined levels of access to multiple participants to a legal action and permit online preparation.

### 3.2 Two-level Methodology

There has been considerable progress in knowledge- based information systems, for example see [Beale 2002]. Beale proposes a two level methodology separating out knowledge, and system modeling and management:

- 1) **Information**: statements about specific entities and used at the system level, and
- 2) **Knowledge**: conceptual statements which apply to all entities of a class, to provide future-proof systems and data; domain empowerment; interoperability at the knowledge-level; and the possibility of more intelligent searches.

The term **archetype** has been introduced to denote a model defining some domain concepts. These are expressed using constraints on instances of the structure of an underlying reference model.

### 3.3. Semantic Web

Similarly in Web Services, there is a need for a knowledge service layer. This is provided by the Semantic Web/Grid technologies, which make the semantics explicit. See [Goble 2004].

The Semantic Grid has:

- An unique identity of resources by the URI and namespace,
- The ability to undertake the annotation of resources with metadata for subsequent querying or manipulation,
- A shared ontology to supply the terms used by the metadata for querying,
- An ability to make inferences over the metadata and ontologies such that unasserted facts or knowledge data can be inferred.
- Minimal components include: annotation mechanisms;
- repositories for annotations and ontologies with associated queries; and lifecycle management.

Inference engines are resilient, reliable and perform well. Semantic Web is described by the Berners-Lee Layer (see [Goble 2004]) and revisited in 2006 see [Shadbolt 2006]. Layered above the XML is RDF (Resource Description Language) and schema which describe metadata, building on Web Services [Broekstra, 2002]. The Ontology layer, using OWL Web Ontology Language, provides the layer for the building shared ontology that is discussed below. Finally an ontology can be specified and viewed using Protege.

### **3.4 Shared Ontologies for Legal Systems**

Law is concerned with constraining and controlling social activities using documented norms. Legal questions concern the justification by law and legal systems. It is the nature of *social* situations and activities that is the object of ontological modeling for law. A good discussion is given in the paper is “Ontologies for Legal Information Serving and Knowledge Management” [Breuker 2003]; this describes a legal ontology for the Dutch e- COURT project. Other papers concerned with Legal informatics include [Winkels 2000 & 2002, Bench-Capon 1998, Allen 1997].

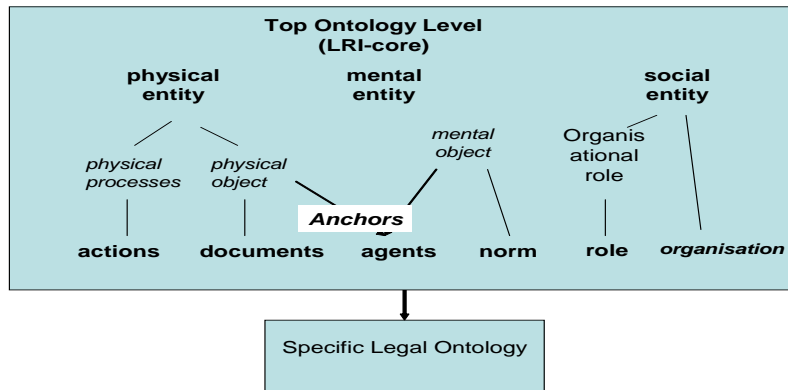
The design below is concerned with a B2B application, which shares information between the partners who are involved in a negotiation or the resolution of a dispute. The business partners are likely to have different business practices and terminology and hence there is always the possibility of confusion in the meaning of terms [Breuker 2003].

There is a need provide a glossary that provides a common definition and therefore a common identify that can be used for both for the negotiation and the legal services. This consistency is an important factor in reducing the time to resolve a dispute. It is very unlikely that one single ontology standard will be sufficient and so there is a need for an ontology registration service as well as an ontology repository service [Kim 2004].

The conflicts between the general definition and the company specific definitions are managed through using a **name space** which is widely used to discriminate one from others. Further business-process oriented delivery of knowledge is discussed in [Abecker 2000].

*LRI-Core Upper Ontology* shown in figure 3, provides consistency and has been proposed for legal ontologies. This is in contrast to the IEEE Standards Upper Ontology

(SUO) (<http://suo.ieee.org>) [Lehmann 2001] which is more appropriate for physical communities [Breuker 2003].



**Figure 3 LRI Upper Shared Ontology**

The underlying principles used by [Breuker 2003] are:

- *Objects and processes* are the primary entities of the physical world.
- *Mental entities* behave in ways largely analogous to the way physical objects behave. In fact, one may argue that the mental world consists largely of metaphors of the physical world. A typical mental object is a concept., Mental processes affect mental objects. Knowledge, facts, and beliefs are mental objects consisting of concepts.
- *Communication* proceeds via physical objects (documents, sounds) and actions (talk, reading) which represent mental objects (information)
- *The mental and physical and mental worlds* overlap in the concept of an “agent”. It is ambiguous and because “agent” is classified as both a physical and a mental object
- *Social organization and processes* (e.g. communication) are composed of roles that are performed by agents that are identified as individual people.
- *Time and Space* have an ambiguous state. They provide positions of events and situations both related to occurrences and as physical entities.
- *Anchors* connect the major categories used in law (person, role, process, procedure, time, space, document, information, intention).

The main purpose of the ontology is to provide a framework for particular domain ontology and allow inheritance of well-defined terms. The ontology is at a very high level of abstraction to enable all lower level domain ontologies to inherit the framework. It is implemented in DAML+OIL/RDF.

## 4. B2B e-NegLegal Networks

### 4.1 Introduction

B2B is a term used to describe inter-company business processes where buyers, suppliers and any third parties operate in an online marketplace to request or supply products or services. There are a number of business models such as *auction and sealed bidding*, which can lead to more competitive and dynamic businesses. Our main focus is on B2B organisations involved in the delivery of web-based services for international business mediation and arbitration. Examples of such B2B systems that are of interest here are discussed below.

This section and the next outline a high-level service-based network architecture for dealing with situations where a negotiation has broken down and the parties resolve to go to law. It is one example of a system for “Speeding up Justice”. Our intention here is to outline the conceptual model of the architecture, which could provide the structure for a detailed user requirement analysis.

This paper proposes a conceptual design for a network that combines negotiation and dispute resolution legal services (called *e-NegLegal network*). The integration of these services would make dispute resolution faster. The context dependency makes it difficult to build general systems, that are applicable to a wide variety of negotiation and dispute resolution problems. The *e- NegLegal* system is designed as a decision support system where humans (actors) are supported in making higher quality decisions at reduced cost.

A virtual organisation is used, where legal organisations operate independently and information is distributed around the network with appropriate security levels. A major trial, mediation or enquiry such as the Bloody Sunday Enquiry [Barnett 2003], could involve the creation of a virtual organization. This would enable participants involved in the dispute from around the world to come together in the virtual environment. Here they could consider evidence and argument, contained in documents and other media held on disparate networks

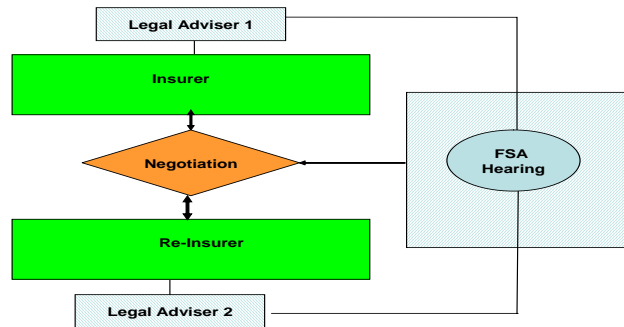
A process oriented approach is used, which enables the business and system processes to be modeled using BPEL. The processes for negotiation and legal services are both specified at build time so that it is much quicker to move from the negotiation phase to the dispute resolution phase. The information needed for dispute resolution can be captured during the negotiation.

The need for more rapid dispute resolution is discussed below, followed by the background on the Kim et al e-Negotiation system using the Market-Based business process model. This is used to illustrate the issues involved in the design of a BPEL *e-NegLegal* network.

### 4.2 The Need

The two examples given below illustrate the type of B2B networks that arise in business and for which the e-NegLegal network could provide a greater integration between businesses, negotiation and legal processes. This would achieve the goal of “speeding up justice”.

### Example 1 B2B - Reinsurance contracts -

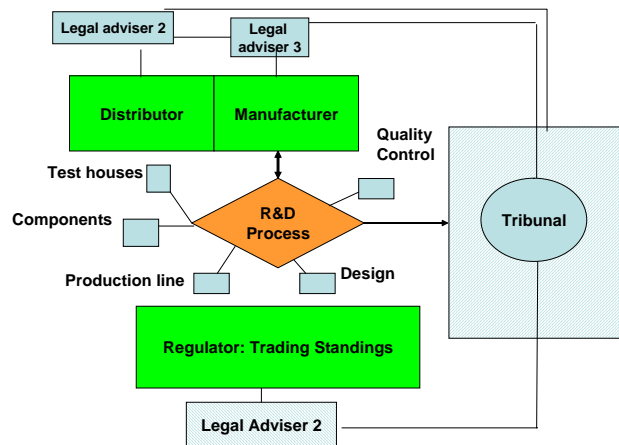


**Figure 4. B2B - Reinsurance**

In this example, the aim is to ensure quick and efficient compliance with the new regulatory regime that is anticipated. Disputes that may arise would include:

- Disputes between parties to the negotiation as to the terms of these contracts,
- Regulation by the Tribunal of FSA [Financial Services Authority] under s133(4), where the Tribunal must determine what (if any) is the appropriate action for the FSA to take in relation to the matter referred to it. Further an ADR process has been established for suitable cases.

## Example 2 C Arb Product Safety Tribunal



**Figure 5 C Arb Product Safety Tribunal**

The second example is in relation the new Tribunal established by the Chartered Institutue of Arbitrators [C Arb] . The present regime for contested product recalls is expensive, very lengthy and protracted.

The DTI has established a new 'Advisory' scheme under the 2005 General Product Safety Directive, to be administered by C Arb. This is cheap, very quick, and highly skilled. Procedures allow for the presentation of **any form of evidence and for participation by video link**. The parties are limited to 3 representatives per side, and the evaluator can call an independent expert if required. Strict procedures have been laid down to ensure that a hearing can take place within days of a proposed action, rather than the 6 - 12 months delay that occurs at present. (One case that is presently being undertaken is expected to take place 24 months after the enforcement action).

Much evidence in such cases is of a highly technical nature. Suppliers have an obligation to retain a 'technical file' including all design, specification, safety certification including individual components. Quality management techniques also require business process information in respect of production line information, rectification procedures and other material such as complaints and actions files. These technical files are usually held in various document stores (often in many countries as many products are manufactured in the Far East) and need not be retained in one paper file. It is envisaged that these virtual technical files will be built on new platforms to assist in the speed and accuracy of the design procedure.

### **4.3 Introduction to e-negotiation system (ENS) and the Market place.**

Negotiation is the process of reaching a mutually beneficial agreement through compromises and discovery of information [Katsh 2001; Fisher 1991]. While the negotiation has been a primary business transaction mechanism there is growing

research on "automated negotiation". A comprehensive reference covering this material is [Lodder 2005].

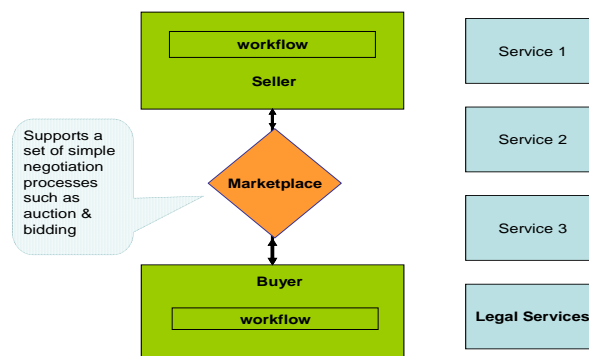
Every negotiation that involves the use of ICT distributes the work between people and the technology. The work has to be agreed by the parties and the rules for the negotiation have to be written down and agreed by all parties before the negotiation can take place. A protocol for negotiation is a set of rules governing the interpersonal and intrapersonal activities.

Modern ICT systems have also vastly increased the ability to store and access large volumes of information. Furthermore they make it possible to use models and procedures to process this information [Bichler 2003]. This has led to Negotiation Support Systems (NSS), which are a class of group decision support systems designed to support the negotiation activities of two or more parties. Electronic Negotiation Systems (ENS) (or e-Negotiation Systems) are NSSs which use internet technology for communication such as the web [Wu 2006, Webber 2005]. A component-based software protocol approach has recently been proposed by [Kim 2005] to improve the class of negotiation problems that can be addressed by ENS.

A number of studies have approached ENS from a business/workflow management perspective [Kim 2003, 2004 & 5]. Kim and Segev have discussed a process management approach using BPEL.

A Market-Place is used for structuring a negotiation, which is a transformation of supply chains into an open market place. It supports the composition of Web Services [Chen 2004]. Web Services and BPEL process management standards can enable a clear definition of negotiation processes that are both understandable and platform independent. In addition the Market-Place is more efficient than point- to-point links between every buyer and seller.

This is illustrated in Figure 6 for a WS Buyer-Seller- Negotiation network.



**Figure 6**

Kim and Segev have proposed a WS-enabled Market-Place architecture, which has been extended below to include legal services. This paper specifies two *generic BPEL services*:

- **P1 Business Services** to support intra-processes, such as existing workflow processes, and inter-processes for the interaction with external processes
- **P2 Negotiation Services** such as the Market- Place.

The WS-enabled Market-Place architecture provides:

- *Shared ontology and message formats:* With a number of potential partners it is necessary to have a consistent naming service. In the Market-Place this comprises a glossary of common definition of terms (e.g. price, delivery and other terms and conditions). Based on these shared terms the Market-Place can provide negotiation message formats and templates. The message templates contain common negotiation variables such as price, quality etc.
- *Negotiation process definition:* There needs to be a shared understanding of the rules of the negotiation. The processes to enforce these rules can be expressed in BPEL. This enables clearly defined and easy to interpret processes. The process definitions can be specified for a number of common processes in negotiation (e.g. two-stage sealed-bit auction). This is explained more fully in section 4 of Kim and Segev).
- *Negotiation process execution and control:* Instances of the negotiation process are to be instantiated, controlled and monitored using the Market-Place. It can enforce the commitment of the negotiation partners by providing a non-repudiation mechanism. In addition the Market-Place is well placed to execute and control the negotiation process.

To achieve interoperability between processes Kim and Segev's architecture includes an inter-organisation process management system that mediates between the negotiation partners through Web Services. The Market-Place has a BPEL repository of executable negotiation processes and runs a WS execution engine that enacts and controls the negotiation process. In addition the Market-Place stores the Shared Ontology and Message Templates (using NameSpace) and the Negotiation Process Definitions. This is more fully explained in Kim and Segev.

To illustrate the negotiation process Kim and Segev use a RFQ- service (Request For Quotation). BPEL interacts with the negotiation processed through WS-Negotiation. Ports In their example there are 7 *PortTypes* to communicate between the negotiation process and partners. For example to enable: (1) the Buyer to receive RFQ from the negotiation process; (2) from the negotiation process to the Seller to request/receive a quote. Because the negotiation information flows through the WS-Negotiation Ports it is possible to capture information and documents on the progress of the negotiation that can be used if a dispute arises.

#### **4.4 The Market place**

The goal is to provide decision support services and assist the human decision making process and not replace or automate it (in contrast to e-Neg systems what provide reasoning tools). It is necessary to record the negotiation at key points during it thus creating an audit trail, which can be used by the e-legal service.

The Market-Place can be used to illustrate the main services needed to support legal services. To illustrate this consider the enhanced B2B network shown in Figure 7 which now includes the legal services modules. The details of the legal services are given in the next section.

Consider the following scenario:

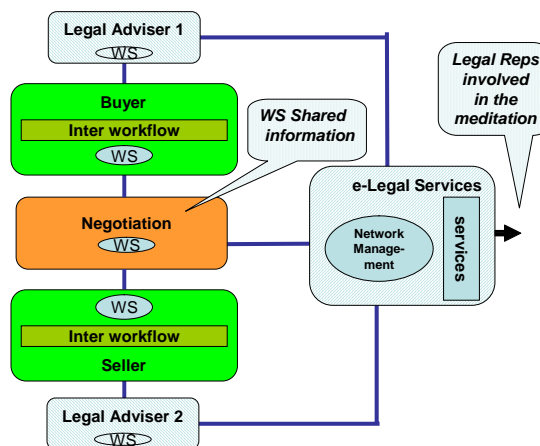
"A situation has arisen where the negotiation has broken down and it is necessary to go to law. The dispute is to be resolved by a Mediator that both partners have agreed on. They are using the e-NegLegal network, which has been established prior to any negotiation taking place. The relevant documents on the negotiation have been collected as the negotiation proceeds at the WS-Negotiation.Ports (discussed above). This information is collected from the Ports

Each party has their own external legal adviser. Relevant documents for both parties are collected into a "Bundle" and are marked private or public and are available to all parties. This is managed by a Bundle Service. Once it is complete, the bundle is made available on-line for the parties and the Mediator. The speedup is achieved in two ways

- 1) from a significant reduction in the time needed to form the Bundle. This is because during the negotiation phase the negotiation itself has been captured and together with other documents from each party can be made available on line and put into the Bundle
- 2) an immediate mediation process can be started before views become entrenched on either side.

An example of an e-NetLegal network is shown in Figure 7 for a two party Buyer- Seller model (see Figure 6). To build the network two additional generic BPEL services need to be specified:

- A P3 Legal Advisor service which is responsible for the documents on behalf of their client
- P4 Legal Services to support the parties and the mediator in reaching a decision faster.



**Figure 7 WS e-NegLegal Network using BPEL**

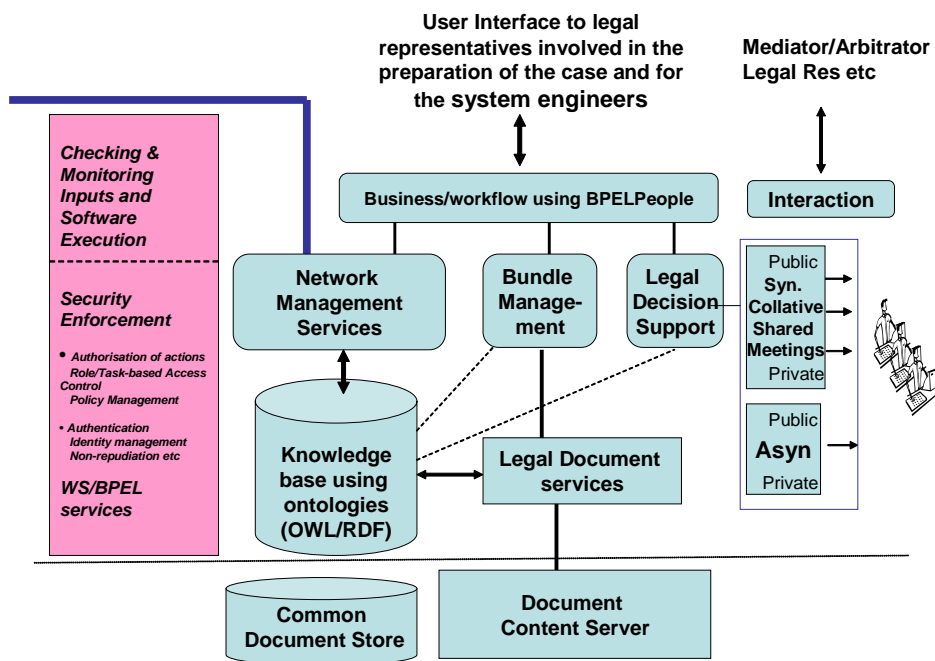
The Legal Advisor and the Negotiation services are composed into a BPEL Network Management Services using orchestration. An instant of the service collects the documents etc for a particular case. The negotiation "Shared Ontology and Message

format” data stored in the relevant database together with the “Negotiation Process Definition” data. This will ensure consistency within the network.

#### 4.5 Enhancing the Market-Place model

Enhancing the Market-Place model requires negotiating parties to agree on a structure or framework for negotiation, which can be very complex in business negotiations. To enhance the capability of the Market – Place, and provide an effective process for the participants, it is necessary to incorporate a tool to assist the parties, such as Smartsettle [Thiessen 2003] , which is a secure eNegotiation system using patented optimisation logarithms to achieve fair and efficient solutions.

#### 4.6 e-Legal Services



**Figure 8 WS e-Legal Service Structure**

This section outlines the e-Legal Services architecture to support Dispute Resolution. The purpose is to present an early conceptual design, to capture detailed user requirements.

The major innovations are:

- A set of process services that enable rapid transfer of information and documents around the e-NegLegal network

- A significant reduction in the time to form the "Bundles" and potential improvements in the accuracy/richness of the information
- The use of a well defined WS security/trust model that maintains confidentiality & privacy whilst making information highly available to the parties involved
- The use of a Legal Ontological Service that provides the knowledge concepts structure for a shared ontology for dispute resolution.

The high level system structure for the WS e-Legal Services structure, given in Figure 8. is an overview of the main services and interaction with each other and with the outside world through a network management services gateway.

- **BPEL Network Management Service** for the composition of the BPEL e-Neg/Legal network as described above. The main e-Legal services (e.g. Bundle Management) are composed by an internal business/workflow service to provide the user interface for the various legal representatives, system engineers etc
- **Legal Ontological Services** are an important part of the design. It provides a knowledge-base to support consistency (for example of terminology) for the e-Legal services. It builds on the LRI-Core Upper Ontology discussed in section 3 and its application to Dutch e-Court research. The LRI-Core Upper Ontology provides a way of ensuring consistency between the negotiation and legal phases for specific legal cases. The ontology separates the knowledge and systems layers (see section 3). It is used by the main business services: Network Management, Bundle Management and Legal Decision Support services.
- **Bundle Management Service** provides BPEL service interfaces to the Legal Document Management system. It enables each legal representative to have their own view of their relevant documents and the public documents. Legal Document Management, for example, can be an extended form of the services provided by the Custodian system. (This provides customised search and navigation of the Legal Documents store).
- **Legal Decision Support and Conferencing:** This collection of services supports the parties and Mediator in reaching a decision. The user interface provides interactive support between the legal representatives and the system using something like BPELPeople. Both synchronous and asynchronous conferencing is required. One of the best solutions for conferencing is the AccessGrid which can support large-scale distributed meetings, collaborative work sessions, seminars, lectures, tutorials and training with other sites across the world. It provides either room or desktop multiparty conferencing and multimedia document exchange across the Internet ([www.accessgrid.org](http://www.accessgrid.org)). The first commercial instance is provided by inSORS ([www.insors.com](http://www.insors.com)).
- **QoS support:** as discussed in section 2, the WS Resource Framework has a layer for the Quality of Service such as security enforcement. This includes authorisation of actions providing role/task access control and policy management, authentication identity management and non-repudiation etc.

## 5 Conclusion and Next Stage

The paper provides a proposal for an eNegLegal-Network. This will support future private legal systems, which will be quick, effective and flexible, aimed at people who do business in remote parts of the world. The next stage is to validate the architecture with potential users and stakeholders, and using their feedback, update it in preparation for an implementation study. The architecture shows that the range of technologies needed to support an eNegLegal service is substantial, but necessary.

The potential beneficiaries of this service include business communities, lawyers, mediators, negotiators, system integrators and professional advisers. These

stakeholders need to be consulted and involved in assessing the value of an on line negotiation and dispute resolution service, and considering how such a service should develop. For this to happen we need to build a demonstrator for example of the proposed eNegLegal service.

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