AN AGENT-BASED APPROACH TO CONSUMER´S LAW DISPUTE RESOLUTION

Nuno COSTA, Davide CARNEIRO, Paulo NOVAIS
Department of Informatics, University of Minho, Braga, Portugal
nuno.costa.78@gmail.com, dcarneiro@di.uminho.pt, pjon@di.uminho.pt

Diovana BARBIERI
Faculty of Law, Salamanca University,Salamanca, Spain
diovanabarbieri@usal.es

Francisco ANDRADE
Law School, University of Minho, Braga, Portugal
fandrade@direito.uminho.pt

Keywords: Online Dispute Resolution, Multi-agent Systems, Consumer Law.

Abstract: Buying products online results in a new type of trade which the traditional legal systems are not ready to deal with. Besides that, the increase in B2C relations led to a growing number of consumer claims and many of these are not getting a satisfactory response. New approaches that do not include traditional litigation are needed, having in consideration not only the slowness of the judicial system, but also the cost/beneficial relation in legal procedures. This paper points out to an alternative way of solving these conflicts online, using Information Technologies and Artificial Intelligence methodologies. The work here presented results in a consumer advice system, which fastens and makes easier the conflict resolution process both for consumers and for legal experts.

1 INTRODUCTION

B2C relations, on-line or off-line, are increasing. Although these are, most of the times, simple processes, there are often conflicts. To solve them one may appeal to the courts. But, by the growing amount of complaints, courts start piling the processes, taking a long time to solve them, and resulting in a highly negative cost/beneficial relation in legal procedures. In order to have quicker and more efficient decisions, one must start thinking in alternative conflict resolution methods. Traditional alternative methods may include negotiation, mediation or arbitration and take place away from courts, and now these may take place also on-line, allowing faster and cheaper processes (Klaming, 2008).

2 ALTERNATIVES TO COURTS

2.1 Alternative Dispute Resolution

Several methods of ADR (Alternative Dispute Resolution) may be considered, “from negotiation and mediation to modified arbitration or modified jury proceedings” (Goodman, 2003). In a negotiation process the two parties meet each other and try to obtain an agreement by conversation and trade-offs, having in common the willing to peacefully solve the conflict. It is a non binding process, i.e. the parties are not obliged to accept the outcome. In a mediation process the parties are guided by a third neutral party, chosen by both, that acts as an intermediate in the dispute resolution process. As in negotiation, it is not a binding process. At last, the arbitration process, which is the

most similar to litigation. In arbitration, a third, independent party, hears the parties and, without their intervention decrees an outcome. Although ADR methods represent an important step to keep these processes away from courts, there is still the need for a physical location in which the parties meet, which may sometimes be impracticable, in the non rare situations in which parties are from different and geographically distant countries. A new approach is therefore needed, one that uses the advantages of already traditional ADR methods and, at the same time, relies in the information technologies for bringing the parties closer together, even in a virtual way.

2.2 Online Dispute Resolution

Online Dispute Resolution (ODR) uses new information technologies like instant messaging, email, video-conference, forums, and others to put parties into contact, allowing them to communicate from virtually anywhere in the world.

The most basic settings of ODR systems include legal knowledge based systems acting as simple tools to provide legal advice, systems that try to put the parties into contact and also "systems that (help) settle disputes in an online environment" (De Vries et al., 2005).

However, these rather basic systems can be extended, namely with insights from the fields of Artificial Intelligence, specifically agent-based technologies and all the well known advantages that they bring along. A platform incorporating such concepts will no longer be a passive platform that simply concerns about putting the parties into contact (Chiti and Peruginelli, 2002). Instead, it will start to be a dynamic platform that embodies the fears and desires of the parties, accordingly adapts to them, provides useful information on time, suggests strategies and plans of action and estimates the possible outcomes and their respective consequences. It is no longer a mere tool that assists the parties but one that has a proactive role on the outcome of the process. This approach is clearly close to the second generation ODR envisioned by Chiti and Peruginelli as it addresses the three characteristic enumerated in (Chiti and Peruginelli, 2002): (1) the aim of such platform does not end by putting the parties into contact but consists in proposing solutions for solving the disputes; (2) the human intervention is reduced and (3) these systems act as autonomous agents. The development of Second Generation ODR, in which an ODR platform might act "as an autonomous agent" (Chiti and Peruginelli, 2002) is indeed an appealing way for solving disputes.

ODR is therefore more than simply representing facts and events; a software agent that performs useful actions also needs to know the terms of the dispute and the rights or wrongs of the parties (Chiti and Peruginelli, 2002). Thus, software agents have to understand law and/or and processes of legal reasoning and their eventual legal responsibility (Brazier et al., 2002).

This kind of ODR environment thus goes much further than just transposing ADR ideas into virtual environments; it should actually be "guided by judicial reasoning", getting disputants "to arrive at outcomes in line with those a judge would reach" (Muecke et al., 2008). Although there are well known difficulties to overcome at this level, the use of software agents as decision support systems points out to the usefulness of following this path.

3 UMCOURT: THE CONSUMER LAW CASE STUDY

UMCourt is being developed at University of Minho in the context of the TIARAC project (*Telematics and Artificial Intelligence in Alternative Conflict Resolution*). The main objective of this project is to analyze the role that AI techniques, and more particularly agent-based techniques, can play in the domain of Online Dispute Resolution, with the aim of making it a faster, simpler and richer process for the parties. In that sense, UMCourt results in an architecture upon which ODR-oriented services may be implemented, using as support the tools being developed in the ambit of this project. These tools include a growing database of past legal cases that can be retrieved and analyzed, a well defined structure for the representation of these cases and the extraction of information, a well defined formal model of the dispute resolution process organized into phases, among others.

The tools mentioned are being applied in case studies in the most different legal domains, ranging from divorce cases to labor law. In this paper, we present the work done to develop an instance of UMCourt to the specific domain of consumer's law. As we will see ahead, the distributed and expansible nature of our agent-based architecture is the key factor for being able of developing these extensions, taking as a common starting point the core agents developed.

In a few words, consumer's law process goes as follows. The first party, usually the buyer of the

product or service, starts the complaint by filling an online form. The data gathered will then be object of analysis by a group of agents that configure an Intelligent System that has a representation of the legal domain being addressed and is able to issue an outcome. At the same time, other agents that make up the core of the platform analyze past similar cases and respective outcomes, that are presented to the user in the form of possible outcomes, so that the user can have a more intuitive picture of what may happen during the process and therefore fight for better outcomes.

At the end, a Human mediator will verify the proposed solution. He can agree with it or he can change it. In both cases, the agents learn with the human expert. If the expert agrees with the outcome proposed, the agents strengthen the validity of the cases used, otherwise the opposite takes place. This means that the system is able to learn with both correct and incorrect decisions: failure driven learning (Leake, 1996). The developed system is not to be assumed as a fully automatic system whose decisions are binding but as a decision support system which is aimed at decreasing the human intervention, allowing a better management of the time spent with each case and, nevertheless, still giving the Human the decision making role. The main objective is therefore to create an autonomous system that, based on previous cases and respective solutions, is able to suggest outcomes for new cases.

Among the different law domains that could be object of our work we choose consumer's law. This choice was made after noticing that consumer claims in Portugal, particularly those related to acquisition of goods or services, are not getting, most times, the solutions decreed in the Portuguese law, undoubtedly due to an unfair access to justice, high costs of judicial litigation versus value of the product/service and the slowness of the judicial procedure. All this generally leads the consumer to give up on the attempt to solve the conflict with the vendor/supplier.

Having all this into consideration, we believe that an agent-based ODR approach, with the characteristics briefly depicted above, is the path to achieve a better, faster and fairer access to justice.

3.1 Consumer Law

As mentioned above, the legal domain of this extension to UMCourt is the Portuguese consumer's law. Because this domain is a quite wide one, we restricted it to the problematic of buy and sell of consumer goods and respective warranties contracts. In this field there is a growing amount of conflicts arising between consumers and sellers / providers. In this context, the approach was directed to the modeling of concrete solutions for the conflicts arising from the supply of defective goods (embodied mobiles or real estate).

We also thought relevant to consider financial services as well as the cases in which there are damages arising out of defective products, although this is yet work in progress.

Regarding the boundaries that were established for this extension of UMCourt, we have tried to model the solutions for conflicts as they are depicted in Decree of Law (DL) 67/2003 as published by DL 84/2008 (Portuguese laws).

Based upon the legal concepts of consumer, supplier, consumer good and the concluded legal business, established on the above referred DL and on the Law 24/1996 (Portuguese law), we developed a logical conduct of the prototype, having in view the concrete resolution of the claims presented by the buyer. In this sense, we considered the literal analysis of the law, as well as the current and most followed opinions in both Doctrine and national Jurisprudence.

During the development and assessment of the platform, we realized that the prototype can be useful in cases when the consumer (PHISICAL PERSON) (Almeida T., 2001) is acquiring the good for domestic/private use (Almeida, C. F., 2005), or is a third acquirer of the good (Law 24/1996, article 2nd nr.1, and DL 67/2003, article 1st B, a) and 4th nr. 6). Besides these cases, it is also usefully applied in situations in which the consumer has celebrated a legal contract of acquisition, buy and sell within taskwork agreement, or renting of embodied mobile good or real estate (DL 67/2003, article 1st A and 1st B, b)).

Still, contracting must take place with a supplier acting within the range of his professional activities, being this one the producer of the good himself, an importer in the European Union, an apparent producer, a representative of the producer or even a seller (Law 24/1996, article 2nd nr. 1 and DL 67/2003, art. 1st B, c), d) and e)). At last, the defect must have been claimed within the delay of warranty (DL 67/2003, articles 5 and 9), and the delay in which the consumer is legally entitled to claim his rights towards the supplier has as well to be respected (DL 67/2003, article 5 A).

Once the legal requests are fulfilled, the solutions available to the consumer will be: repairing of the good (DL 67/2003, articles 4th and 6th); replacement of the good (DL 67/2003 articles 4th

and 6th); reduction of price (DL 67/2003 article 4th); resolution of the contract (DL 67/2003, article 4th) or statement that there are no rights to be claimed by the consumer (DL 67/2003, art. 2nd, nrs. 3 and 4, arts. 5, 5A and 6).

These decrees have been modeled in the form of logic predicates and are part of the knowledge of the software agents, which use these predicates in order to make and justify their decisions.

3.2 Architecture

As stated before, the architecture of UMCourt is an agent-based one. In Figure 1 a view of the core agents that build the backbone of the architecture is shown. This backbone has as the most notable services the ability to compute the Best and Worst Alternative to a Negotiated Agreement, BATNA and WATNA, respectively (Notini, 2009) and the capacity to present solutions based in the observation of previous cases and their respective outcomes (Andrade et al, 2009)

The interaction of the user starts by registering in the platform and consequent authentication. Through the intuitive dynamic interfaces, the user inputs the requested needed information. After submitting the form, the data is immediately available to the agents that store it in appropriate well defined XML files. This data can later be used by the agents for the most different tasks: showing it to the user in an intuitive way, automatic generation of legal documents by means of XSL Transformations, generation of possible outcomes, creation of new cases, among others. Alternatively, external agents may interact directly with the platform by using messages that respect the standard defined.

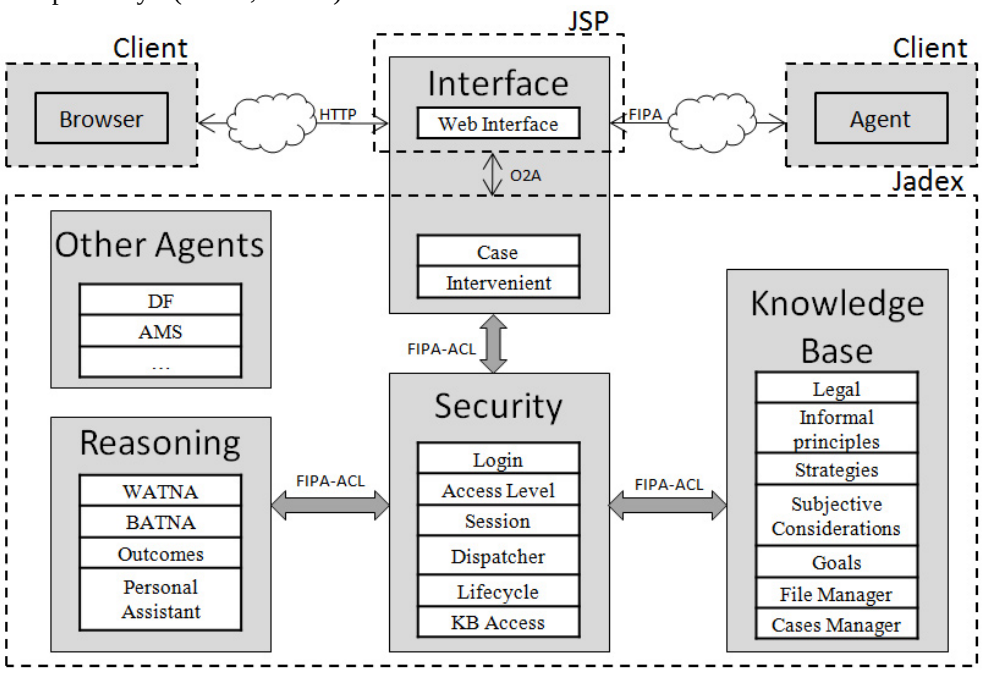


Figure 1 – A simplified version of the system architecture.

Table 1 shows the four high-level agents and some of their most important roles in the system. To develop the agents we are following the evolutionary development methodology proposed by (Jennings, 2001). We therefore define the high level agents and respective high level roles and interactively break down the agents into more simple ones with more specific roles. The platform, without the extensions, is at this moment constituted by 20 simpler agents. To the agents that make part of the extension we will call from now on *extension agents*. Among these phase tests can be conducted to access the behaviour of the overall system. This means that the advantages of choosing an agent-based architecture are present throughout all the development process, allowing us to easily remove, add or replace agents. It also makes it easy to later on add new functionalities to the platform, by simply adding new agents and their corresponding services, without interfering with the already stable services present. This modular nature of the architecture also increases code reuse, making it easier to develop higher level services through the compositionality of smaller ones. The expansibility of the architecture is

also increased with the possibility to interact with remote agent platforms as well as to develop extensions to the architecture, like the one presented in this paper. We also make use of the considerable amount of open standards and technologies that are nowadays available for the development of agent-based architectures that significantly ease the development, namely FIPA standards and platforms such as Jade or Jadex.

Table 1 - The four high-level agents and their main roles.

High-level Agent	Description	Main Roles
Security	This agent is responsible for dealing with all the security issues of the system	Establish secure sessions with users
		Access levels and control
		Control the interactions with the knowledge base
		Control the lifecycle of the remaining agents
Knowledge Base	This agent provides methods for interacting with the knowledge stored in the system	Read information from the KB
		Store new information in the KB
		Support the management of files within the system
Reasoning	This agent embodies the intelligent mechanisms of the system	Compute the BATNA and WATNA values
		Compute the most significant outcomes and their respective likeliness
		Proactively provide useful information based on the phase of the dispute resolution process
Interface	This agent is responsible for establishing the interface between the system and the user in a intuitive fashion	Define a intuitive representation of the information of each process
		Provide an intuitive interface for the interaction of the user with the system
		Provide simple and easy access to important information (e.g. laws) according to the process domain and phase

3.3 Data Flow in the System

All the modules that integrate the system meet the current legislation on consumer's law. When the user fills the form to start a complaint, he indicates the type of good acquired, the date of delivery and the date of defective good denunciation, stipulating also the date when the good was delivered to repair and/or substitution. He can also indicate the period of extrajudicial conflict resolution attempt, if necessary. To justify these dates the user has to present evidence, in general the issued invoices, by uploading them in digital format. Concerning the defective good, he must indicate its specification and the probable defect causes. At last, he has to identify the supplier type as being a producer or a seller. After filled, the form is submitted. Figure 3 shows a screenshot of the online form.

When the form is submitted, a group of actions is triggered with the objective of storing the information in appropriate well defined structures. As mentioned before, these structures are XML files that are validated against XML Schemas in order to maintain the integrity of the data. All these files are automatically created by the software agents when the data is filled. The extension agent responsible for performing these operations is the agent *Cases*.

Figure 2 - The graphical representation of the possible outcomes for each party.

After all the important information is filled in and when a solution is requested, these and other agents interact. Agents *BATNA* and *WATNA* are started after all the information is provided by the parties through the interface (Figure 3). These agents then interact with the extension agents *Cases* and *Laws* in order to retrieve the significant information of the case and the necessary laws to determine the best and worst scenarios that could occur if the negotiation failed and litigation was necessary. Agent *Outcomes* interacts with extension agent *Cases* in order to request all the necessary information to be able to retrieve the most similar cases.

All this information (WATNA, BATNA and possible outcomes) is then presented to the user in a graphical fashion so that it may be more intuitively perceived (Figure 2). In that sense, the likeliness is represented by the colored curves which denote the

area in which the cases are more likely to occur. A higher likeliness is denoted by a line that is more distant from the axis. To determine this likeliness, the amount of cases in the region is used, as well as the type of case (e.g., decisions of higher or lower court) and even if there are groups of cases instead of single cases, as sometimes highly similar cases are grouped to increase the efficiency. The graphical representation also shows the range of possible outcomes for each of the parties in the form of the two big colored rectangles and the result of its intersection, the ZOPA – Zone of Potential Agreement (Lewicki, 1999), another very important concept that allows the parties to see between which limits is an agreement possible. The picture also shows each case and its position in the ordered axis of increasing satisfaction, in the shape of the smaller rectangles.

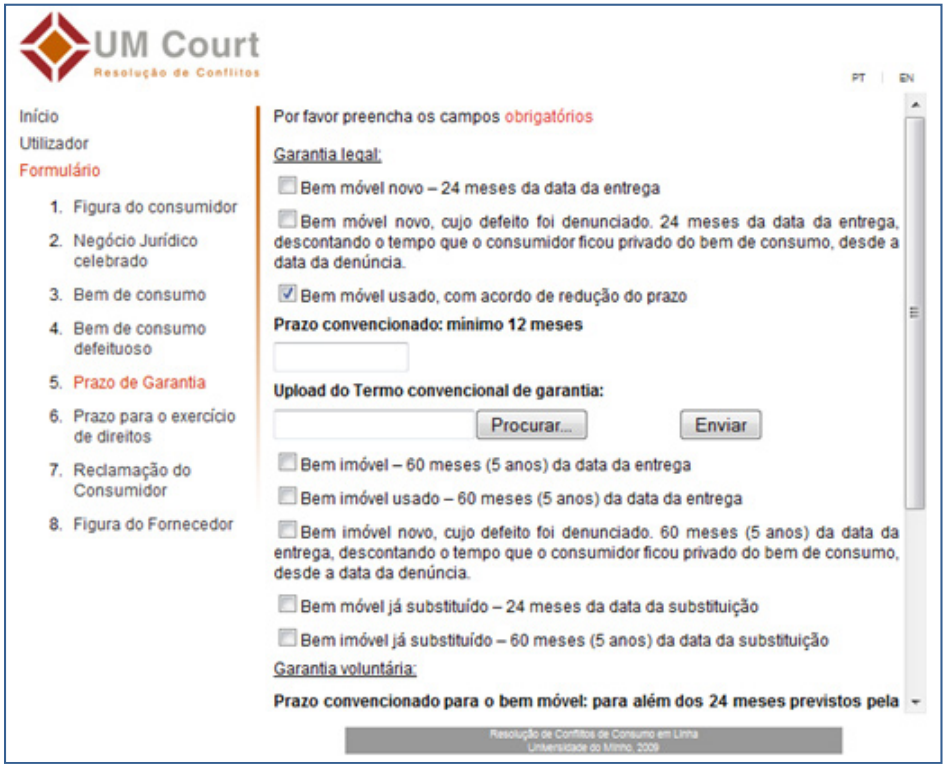


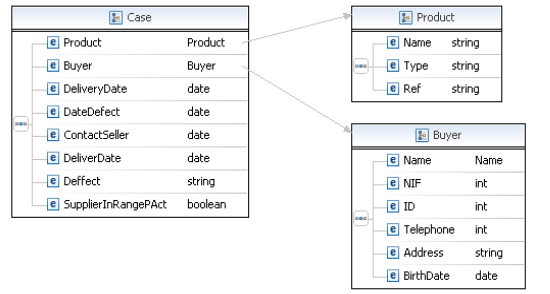
Figure 3 - Online form.

Looking at this kind of representation of information, the parties are able to see that the cases are more likely to occur for each party when they are in the area where the colored lines are further away from the axis of that party. Therefore, the probable outcome of the dispute will probably be near the area where the two lines are closer.

At this point, the user is in a better position to make a decision as he possesses more information, namely important past similar cases that have occurred in the past. In this position the user may engage in conversations with the other party in an attempt to negotiate an outcome, may request an outcome or may advance to litigation, if the WATNA is believed to be better than what could be reached through litigation.

If the user decides to ask the platform for a possible solution, the *Reasoning* extension agent will contact the extension agents *Cases* and *Laws* in order to get the information of the case and the laws that should be applied and will issue an outcome.

The neutral, when analyzing the outcome suggested, may also interact with these agents, for consulting a specific law or aspect of the case. He analyses all this information, and decides to accept or not to accept the decision of the system. After the solution is verified, it is validated and presented to the user.




```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" targetNamespace="h

    <complexType name="Case">
        <sequence>
            <element name="Product" type="tns:Product"></element>
            <element name="Buyer" type="tns:Buyer"></element>
            <element name="DeliveryDate" type="date"></element>
            <element name="DateDefect" type="date"></element>
            <element name="ContactSeller" type="date"></element>
            <element name="DeliverDate" type="date"></element>
            <element name="Deffect" type="string"></element>
            <element name="SupplierInRangePAct" type="boolean"></el
        </sequence>
    </complexType>

    <complexType name="Product">
        <sequence>
            <element name="Name" type="string"></element>
            <element name="Type" type="string"></element>
            <element name="Ref" type="string"></element>
        </sequence>
    </complexType>
```

Figure 4 – Excerpts and tables from XML Schemas for some case information.

3.4 Example and Results

To better expose these processes, let us use as an example a fictitious case (Figure 5): a physical person that acquires an embodied mobile good for domestic/private use. The celebrated legal contract is of the type buy and sell. The date of good delivery is October 22nd, 2009. The date at which the consumer found the defect in the good occurred at October 26th, 2009 but the good was delivered to repair and/or substitution on October 30th, 2009. There was no extrajudicial conflict resolution attempt. As evidence, the user uploaded all invoices relative to the dates mentioned. Concerning the defect that originated the complaint, the user mentioned that the good did not meet the description that was made to him when it was bought. In this case, the supplier acts within the range of his professional activities and he is the producer of the good.

When a solution is requested, the system proceeds to the case analysis and reaches a solution. The good is under the warranty delay: 11 days, calculated through the difference between the date of good delivery and the actual date

The limit of two months between the date of the defect detection has been respected: 7 days, calculated by the difference between the date of defect finding and the actual date. Two years have not passed since the date of denunciation: 2 days, calculated by the difference between the date of denunciation and the actual date, deducting the delay which user was deprived of the good because of repair/substitution (since no date of good delivery after repair and/or substitution is declared, the default is the actual date). The period of extrajudicial conflict resolution attempt is also deductable, but in this case it doesn't occur. As the good was delivered for repair and/or substitution, the supplier has two choices: either make the good repair in 30 days (at the maximum) without great inconvenience, and at no cost (travel expenses, man power and material) to the consumer; or make the good replacement by another equivalent.

This rather yet simplistic approach is very useful as a first step on the automation of these processes. The case shown here is one of the simplest ones but the operations performed significantly ease the work of the law expert, allowing him to worry about higher level tasks while simpler tasks, that can be automated, are performed by autonomous agents.

```
<?xml version="1.0" encoding="UTF-8"?>
<Case Type="BuySell" Date="2-11-2009">
    <Product>
        <Name>HTC Hero (Sprint)</Name>
        <Type>Mobile Phone/PDA</Type>
        <Ref>20055468DDW45S</Ref></Product>
    <Buyer>
        <Name>João Silva Antunes</Name>
        <NIF>165987456</NIF>
        <ID>49863254</ID>
        <Telephone>214569865</Telephone></Buyer>
    <DeliveryDate>22-10-2009</DeliveryDate>
    <DateDefect>26-10-2009</DateDefect>
    <ContactSeller>28-10-2009</ContactSeller>
    <DeliverDate>30-10-2009</DeliverDate>
    <Deffect>The product does not match the specific
    <SupplierInRangePAct>Yes</SupplierInRangePAct>
```

Figure 5 – Extract from an example case.

4 CONCLUSIONS

In the context of consumer's law, only some aspects have been modeled, still remaining for future work: a) the situations covered by the Civil Code, when DL 67/2003 is not to be applied; b) the cases considered in DL 383/89 of damages arising from defective products; and c) the issues of financial services, namely concerning consumer's credit. The work developed until now, however, is already enough to assist law experts, enhancing the efficiency of their work.

The next steps are in the sense of further improvements of the agents while at the same time

continuing the extension to other aspects of consumer's law that have not yet been addressed in this work. Specifically, we will adapt a Case-based Reasoning Model that has already been successfully applied in previous work in order to estimate the outcomes of each case based on past stored cases.

ACKNOWLEDGEMENTS

The work described in this paper is included in TIARAC - *Telematics and Artificial Intelligence in Alternative Conflict Resolution* Project (PTDC/JUR/71354/2006), which is a research project supported by FCT (Science & Technology Foundation), Portugal.

REFERENCES

Almeida, C. F., 2005. *Direito do Consumo*. Almedina. Coimbra (in portuguese).

Almeida T., 2001. *Lei de defesa do consumidor anotada*, Instituto do consumidor, Lisboa(in portuguese).

Andrade F., Novais P., Carneiro D., Zeleznikow J., Neves J., 2009. *Using BATNAs and WATNAs in Online Dispute Resolution*, proceedings of the JURISIN 2009 - Third International Workshop on Juris-informatics, Tokyo, Japan, ISBN 4-915905-38-1, pp 15-26.

Bellifemine, F., Caire, G., Greenwood, D., 2007. *Developing Multi-Agent Systems with JADE*, John Wiley & Sons, Ltd. West Sussex, England.

Chiti, G., Peruginelli, G.: Artificial intelligence in alternative dispute resolution. Proceedings of LEA, pp. 97–104. (2002)

De Vries BR., Leenes, R., Zeleznikow, J., Fundamentals of providing negotiation support online: the need for developping BATNAs. Proceedings of the Second International ODR Workshop, Tilburg, Wolf Legal Publishers (2005) 59-67.

Goodman, J.W., The pros and cons of online dispute resolution: an assessment of cyber-mediation websites, in Duke Law and Technology Review (2003).

Jennings, N., Faratin, P., Lomuscio, A., Parsons, S., Wooldridge, M., & Sierra, C.: Automated Negotiation: Prospects, Methods and Challenges. Group Decision and Negotiation, 10(2), 199-215. (2001)

Klamig, L., Van Veenen, J., Leenes, R., I want the opposite of what you want: summary of a study on the reduction of fixed-pie perceptions in online negotiations. "Expanding the horizons of ODR", Proceedings of the 5th International Workshop on Online Dispute Resolution (ODR Workshop'08), Firenze, Italy (2008) 84-94.

Leake, D. B. (1996). Case-Based Reasoning: Experiences, Lessons, and Future Directions. AAAI Press.

Lewicki, R., Saunders, D., Minton, J., Zone of Potential Agreement, In Negotiation, 3rd Edition. Burr Ridge, IL: Irwin-McGraw Hill (1999).

Muecke, N., Stranieri, A., Miller, C., The integration of online dispute resolution and decision support systems. Expanding the horizons of ODR, Proceedings of the 5th International Workshop on Online Dispute Resolution (ODR Workshop'08), Firenze, Italy (2008) 62-72.

Notini, J.: Effective Alternatives Analysis In Mediation: "BATNA/WATNA" Analysis Demystified, (http://www.mediate.com/articles/notini1.cfm), 2005. Last accessed on November, 2009.

Silva, J. C., 2006. *Venda de bens de consumo. DL n.º 67/2003, de 8 de Abril. Directiva n.º 1999/44/CE. Comentário.* Almedina. Coimbra (in portuguese).

Silva, J. C., 2006. *Compra e Venda de Coisas Defeituosas. Conformidade e Segurança*. Almedina. Coimbra (in portuguese).