A Web Tool to Analyse Negotiation Behavior

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Abstract — Decision-making processes in any context usually require great effort in solving regular conflicts. One approach to handle conflicts is through negotiation, which requires a wide range of strategies and personal skills. Moreover, during crisis periods, enterprises tend to downsize and the remaining professionals have to improve their negotiation aptitudes in order to maintain the organization alive. Experienced negotiators assert that the preparation stage is vital to achieve successful deals, but one of the major issues faced by negotiators, especially beginners, is to realize when they are technically and emotionally ready. Regarding the psychological side, sometimes it is difficult to measure how professionals behave when initiating negotiation modeling. Under this scenario, a Web Tool has been designed to support professionals to find out their levels of proficiency and behavior trends while negotiating. Therefore, this paper aims at presenting features of this environment, which combines psychological tests, behavioral simulations and negotiation games to set the negotiator skills profile. In addition, some studies and results are presented.

Keywords - Negotiation Support System, Decision-making Process, Negotiation Skills, Emotional Intelligence

I. INTRODUCTION

In general, people see negotiation as a common ordinary activity, like a process which deserves attention only during conflict resolution. Consequently, when they try to negotiate, it is common to oversee several potential risks since the preparation step was ignored. As important as to understand the negotiation context and goals, is to know how decisions are taken. Besides, it is crucial to realize how to lead decisions to a great deal. In this case, technical certifications probably will not help, at least not as far as negotiation skills could do.

Naturally, there are similarities in the strategy of negotiation but each person has their own way of negotiating. The strategies, in general, are motivated by the negotiator’s dominant skills. Therefore, before negotiating, it is imperative be knowledgeable about the counterpart’s profile, it means, how they may be thinking and how prepared they are to go to the negotiating table.

This approach works in any area, in which there are several people negotiating day after day without the enough preparation; then, it is critical that professionals know how to create value into their offering to differentiate their service from all the others. Accordingly, tools that provide a personal analysis from negotiator’s skills could make easier to choose the most suitable strategy and get benefits from all counterparts’ issues.

In this work, we¹ defend that professionals have different negotiation styles due to their area of interest. Moreover, there are meaningful variances when comparing technical and managerial staff. These conclusions are based on our experiments, shown in the results section.

The paper presents the Negotiation Support System which provides tools to prepare negotiations, to avoid risks, questionnaires to assess the professionals’ profile and their trends during conflict resolutions. Furthermore, the work depicts how simulation games can obtain the negotiator’s psychological profile.

Learn how professionals negotiate is an important step towards the creation of agreements for mutual gains and also to suggest specific strategies to achieve these agreements.

II. LITERATURE REVIEW

The proposed devices endeavor to support the negotiation decision making process aiming at facilitating the negotiator’s knowledge acquisition through a group of suggestive synthetic reports, which were developed through visualization methods.

In this section, background description of negotiation methods, types of intelligence, knowledge management and e-learning systems are introduced. This work uses these concepts during the computational environment development.

A. Negotiation

Negotiation is an activity that requires training, practice, coaching, strategy, and preparation and allows the execution of agreements that are mutually acceptable for counterparts, even though different conflicts may occur and external help may be needed [8].

There are some studies that emphasize that negotiations can be divided into phases [9]. According to these researches, in a negotiation process, four stages can be identified: preparation, value creation, value division and execution [7].

Preparation is the most important stage once it provides enough information to facilitate agreements, to define the issue to be resolved and to situate counterparts’ interests [1]. In the preparation step, negotiation should define the Zone of Possible Agreement which involves the counterparts’ satisfaction range [10][11]. This zone must also consider cultural and behavioral aspects to increase mutual gain suggestions [12].

¹ The word “we” is used to refer to the authors of this paper.
In the Value Creation step, it is important to continue exploring the counterpart’s interests and generating alternatives that extend mutual gains [13]. At this stage, it is important to avoid criticism and encourage the use of neutrality both to facilitate the relationships and to enable the creation without prior commitments [7].

The Value Division is a step to propose brainstorm on contingent options and to project future agreements [7]. At this stage, it is necessary to use neutrality to suggest possible ways of distribution and discuss standards and criteria for distributing the generated value [13].

Finally, the Execution must establish arrangements to keep track or check adopted decisions and facilitate the commitments maintenance. At this stage, incentives and organizational controls must be aligned and it is essential to work continuously to improve relationships as well as neutrality to resolve disagreements [7][9].

Great negotiators have already claimed that the Preparation step is the key to success in negotiations [14][15] because it prevents the consolidation of counterparts’ inflexible positions and focuses on the main interests of the involved parties. Besides, in negotiations, initiatives without adequate preparation can unexpectedly lead a promising business to failure. Even among experienced negotiators, sometimes failures happen due to lack of preparation and by negligence of risks. Amongst beginners, preparation is almost a challenge once these disregards frequently result in gaps of negotiation information and, in each round, the volume of information to be understood becomes a dilemma.

It has known that people’s cognitive abilities are limited in the simultaneous processing of a high amount of information [16]. As a result, it is the negotiator’s responsibility to determine what the most important information to be used on negotiation table is once it is impossible to memorize all negotiation variables. The most difficult task for negotiators is to know which information is important; thus, emotional tendencies may aid or thwart these professionals to prioritize information and make decisions fast [28].

In the scope of this work, an e-negotiation approach is presented to structure the preparation stage considering the skill level of each negotiator. In this context, based on key negotiation abilities, the developed tool intends to facilitate the negotiators knowledge acquisition through a group of suggestive interfaces and synthetic reports. For example, if the environment suggests that negotiator seems like an inexperienced negotiator, the software will propose an e-learning approach through a simulator that allows beginners to learn negotiation methods by interactive games.

B. E-learning Systems

Learning is the process of acquiring new knowledge, values, skills, preferences and understandings. According to [24], learning is ubiquitous in human life, not just in the domain of a new skill, but also in the emotional, social and even personality development. Learning is therefore an integrated process that leads to a qualitative change, altering the set of attitudes, and therefore the individual's behavior, contributing to his development.

Knowledge-based economy has shown an increasing demand for innovative ways of delivering education [17] and e-learning systems has become one of the most important educating ways to break down limits of space and time, reduce learning costs and improve learning efficiency [18].

Many E-Learning systems have been developed with many differenced learning services. These systems aim to improve science education providing high quality educational resources for learners and helping them to build up their own understandings [19].

Individuals can also build knowledge, skills and values through direct experience, and this process is referred as Experiential learning [25], supported by reflections, critical analysis, being structured to require that the individual who undergoes the process of learning takes initiative, decisions and be held accountable for the results of those decisions.

Therefore, there are many advantages to mix experiential learning and e-learning, resulting in the process of building knowledge through direct experience obtained via electronic media [20][25].

In the context of this work, negotiation games become suitable tools for experiential learning once they assume that the player will take actions that interfere with the game’s course and the user may be necessarily proactive and a decision maker. Thus, tools based on experimental learning were designed to be also used in the process of identifying negotiator's skills. The e-learning system is composed of a set of interfaces, questionnaires and simulation games that are developed to extract users’ information in an intuitive way, especially for inexperienced negotiators.

C. Knowledge Management

Currently, people acquire huge volume of knowledge faster than in the industrial revolution [21]. As a result, organizations have been attempting to adopt manners to stimulate collective and collaborative learning methods, assuming a role that should only be the government’s role; however, due to globalization challenges, organizations have been offering education opportunities to employees and outsourcers.

Organization’s modifications are related to the processes adopted, the internal structure, the new environment formed as well as the technological advances and systems implemented [3]. The emergence of such volatile situations within organizations has resulted in the rapid increase of the associated management risks and uncertainties regarding the progress, productivity rates, resource allocation, schedules and costs of organizations projects. These settings highly influence the processes and social relations between people and organizations causing significant changes in the corporate strategies.

Therefore, knowledge management is applied as an engine to guide organizations in a dynamic and efficient manner during changes imposed by globalization issues. Furthermore, knowledge dissemination through whole organization is
important to improve employees’ know-how once the number of individual skills composes the organization intelligence. Knowledge management can be viewed of as the deliberate design of processes [22], tools and structures in order to increase, renew, share and improve the use of knowledge represented in any of structural, human and social elements of intellectual capital.

Thus, leaders should stimulate the building of human capital in organizations by identifying and recruiting talents for work [23]. Additionally, the authors emphasize the importance of sustainable training programs within multiple organizational settings once training programs may facilitate the needs of the knowledge worker in meeting job requirements [2].

Once knowledge management has become a crucial strategic resource to improve deals, the volume of documents has been increased in order to detail negotiations’ aspects. On the other hand, it is imperative to create mechanisms which support a knowledge mining approach so as to manage this explicated knowledge during negotiations [5]. Therefore, next section shows how to combine extraction and retrieval of information through text mining tasks. This tactic enables the knowledge worker to uncover relationships in a text collection and to explore them to discover new knowledge.

III. THE WEB TOOL

The environment is distributed in three modules: Behavioral questionnaires, Negotiation Simulations and Negotiation Knowledge Management. From these modules, data are extracted and the Negotiator’s Skills profile is gauged, as shown in Figure 1.

A. Using simulations to discover negotiation abilities

By using simulation games, it is not possible to negotiate with real people neither to deal with real emotions, but it is feasible to infer the types of strategies in progress. Besides, if negotiations fail, there will not be hurt feelings, destroyed relationships, opportunities or careers. Then, simulations allow beginners to learn in a constructive way and also provide important behavior information to their supervisors.

This tool is a module integrated into a multilingual interface Negotiation Support System ENEG [26], which includes, among other features, negotiation planning, risk management, meetings control, negotiation tips and other modules.

The goal of the simulation is to explore different aspects of negotiation in several scenarios. By exploring different negotiation approaches, the user drives the negotiation towards different directions, changing his options, the other party’s and, eventually, the whole interaction. An example of decision scene is shown on Figure 2, which depicts the decision tree (dialogs background) and how this decision tree is displayed to users. In this tool, each answer anchored means a specific type of strategy or a conflict resolution negotiation tendency.

One does not expect to reach the goal by playing the game only one time. Observed behavior is likely to change as players acquire experience, suggesting that learning is important. Aspects of Principled Negotiation [1] will be explored as the player learns to focus on interests and proposes options of mutual gain, for example. Before taking a new action, the player may be alerted of how positive or negative his last action was to the whole negotiation, improving learning for the next play and for other future games and real world negotiations.
understand the knowledge management approach used in the environment do discover peculiarities in the way they negotiate.

**B. Managing the Negotiation Knowledge**

During the Knowledge Management, the negotiator is invited to fulfill some forms to keep the negotiation’s preparation data up-to-date. Figure 3 shows an example of interface in which negotiators can manage the negotiation knowledge through free text.

![Figure 3 - An example of imputing negotiation’s data](image)

Based on these stored records, the tool can cross the negotiation data through text mining techniques (Figure 4) and exhibit different types of graphics using visualization methods. Afterwards, major concerns of those who filled out the forms are highlighted, as an example depicted in Figure 5.

![Figure 4 – Text Mining Techniques](image)

The main procedures were adapted from [26]. As shown in Figure 4, the software extracts relevant data from mined texts (filled forms) and, for each text (negotiation element), the algorithm removes stop words and applies the stemming method, which considers the stems to evaluate the number of common words (e.g., texts, textual, text). Afterwards, the process manages the output with a thesaurus to balance the weights (proposed by experienced negotiators and/or extracted from old negotiations) and relevant word frequency. The quantification criterion depends on the type of negotiation. As a default, a merger between words’ frequency and weight to find each element value was used. At the end, these quantified values will be used to create the radar graph.

Once free texts are stored by negotiators, the tool uses them as inputs to applied text mining techniques. In the Knowledge Module, data are collected guided by ten key negotiation elements: context, interests, options, relationship, power, cognition, criterion, legitimacy, concessions and aspects of time, as proposed in [7]. These elements are used in some graphics, such as depicted in Figure 5.

![Figure 5 - Radar Graph](image)

The Radar graph is an example of how to use text mining to subsidize visual reports. This interface is gradually mounted from the inference of stored negotiation variables data. The radar takes into account the number of items extracted from the mining of each negotiation element as well as the possible presence of defined contents. The frequency of collected information is compared to each negotiation element and the software calculates the average value to shape the graph, considering the thesaurus weight.

This approach provides opportunities to manipulate old negotiations and attempts to discover similarities among them. Thus, the software may define usual strategies used by the same negotiator as well as compare with old successful preparations.

Observing this concerns and behaviors, experienced negotiators may suggest possible ways to increase the chances of agreement.

**IV. EXPERIMENTS AND RESULTS**

This approach has been developed since 2007 and, during this period, some interesting results have been achieved. Under the umbrella of professionals’ behavior, about 300 people were assessed. Among the participants, about 100 people were from IT domain and others were from distinct areas. 60% of the IT participants correspond to technical staff and 40% to IT managers. This distinguish is important for aspects of comparison.

All of these experiments were supported by the environment proposed in this work and three main conclusions
could be observed during 4 years of tests: i) IT professionals are more rational than others; ii) IT professionals have difficulties to create alternatives to mutual gains; and iii) IT managers seem more collaborative then technical staff.

The experiments were carried out mainly in Brazilian organizations, among enterprises, universities and Government institutions. However, around 50 people from 6 countries also used the tool and were considered in these experiments.

Figure 6 shows results that support the first and second conclusions. The inference was possible through the application of questionnaires to identify psychologist personal profile. In addition, simulations of IT contract negotiations were made.

In these simulations and analyzing the tools results, the path traced by each user was observed; so, as each answer indicated a type of behavior, it was possible to measure the user predominant strategy. The analyzed tendencies were: rationality, creativity, organization and communication and several interesting observations could be achieved.

Though the Logic behavior of a negotiator may seem easy to be deal with there is a problem which can deter the resolution of negotiations and mislead the opponents. Logical reasoning implies that it is peculiar for the person who is using it, i.e. for one negotiator it may seem obvious to react in a particular way while for his counterpart his behavior is odd or incomprehensible. In order to avoid misleading the negotiation to an unsuccessful result, a logical reasoning negotiator should single out only a couple of reasons that give sense and approve his position.

Creative people percept the given information in a unique way and look at the problems from various angles. These people are distinguished from other negotiators by their ability to arrange conventional solutions into more beneficial negotiation’s outcomes. They have the “lateral thinking” [27], those who keep to this principle when managing negotiations tend to open new facets of the situations hidden to others.

Communicative people are prone to starting conversations first, responding with eagerness and interest. When it comes to negotiations it is not always easy to say which behavior is more beneficial. According to [29] every person must react in coherence with his personal peculiarities. For instance, if a person is reserved by nature he can turn it to an instrument of his negotiating strategy. As he listens more than speaks he gets more information, therefore he can make more solid decisions.

One may assume that the most efficient (and probably easy) negotiations are held with organized (or disciplined) people. This estimation holds true for a variety of reasons, especially because organized people usually are more efficient and methodical. It was observed that people with this profile more often are capable of completing the tasks they have started, possess unique skill sets, are able to bear ordeals and face “brutal facts” and are also willing to adhere to the organization’s systems for getting work done.

Specifically from the IT point of view, other experiments were carried out to consolidate the analytical character of the IT professional. By using the negotiation support system, it was possible to analyze words and sentences and, mainly, rational stamp were widely used.

Though the lenses of IT people, when performing activities involving competition and asymmetric information, the groups of IT participants (technical and managerial) had results slightly different. The activity used game theory concepts [4] and was created based on the dynamics of a negotiation game called “Win as Much as You Can”, from Harvard Law School [6]. Furthermore, the game was completely adapted to the IT context. The idea was to verify, in asymmetry continued situations, the tendency to compete or collaborate in group.

It is important to emphasize that even the experiments which were carried out through questionnaires and psychological tests, the proposal was that respondents could not realize they were being analyzed. This approach was important to guarantee impartiality during the answers.

Thus, exploring the IT context, results of previous results were compared with competitive simulations to evaluate differences between IT Technical and IT Managerial behaviors.

As shown in Figure 7, simulations of IT negotiations were held among twelve rounds. The graph shows the options between collaborate or compete, as well as their degree of intensity. It may be noted that IT professionals start simulations in a zero-sum strategy, and in the following rounds, begin a contest. Realizing that competition brings harm to all, they attempt reconciliation. The same movement (compete and, afterwards, collaborate) is repeated in the following rounds. Figure 7 shows that the managerial profile is less competitive than the technical staff (third main conclusion).

Figure 8 shows the chart that accumulates attitudes and degrees of collaboration and competition among the underlying profiles (IT and Non-IT). The professionals at the managerial level (dotted line) are more attentive to long-term negotiations, which motivates collaboration for mutual gains. The IT management group was the best when the subject is
collaboration, by the other hand, the IT technical group was the most competitive in this cumulative analysis.

Figure 8 - Dominant Skills (negotiations among IT and Non IT professionals)

V. CONCLUSIONS

The proposal composed of a negotiation simulator, a preparation negotiation approach and a group of psychological questionnaires uses innovative technologies, (such as text mining and visualization methods) to improve the understanding of professionals profile.

We addressed that a great difficulty during negotiations is to distinguish if the negotiator is well prepared or not. The environment provides an analysis of the negotiator's psychological profile, their tendencies during conflict resolution and attempts to show their experience in the involved negotiation context, even in competitive approaches.

During four years of experiments, it is possible to observe that IT professionals behave different from other domain professionals during negotiations. IT professionals have great rational style and attempts to balance costs against benefits before taking any action during negotiations. On the other hand, they have difficulties to define creative alternatives, which lead to other trouble that is to create options of mutual gains. The research also shows that IT managers endeavor to collaborate more than technical staff, probably due to their profile a little more communicative and organized.

These results depict the relevance of the computational tools and studies, especially considering how difficult it is to analyze behaviors during negotiations. For future work, the environment may be further examined to involve other supplementary elements to the environment, which may also includes a Fuzzy Cognitive Maps to model negotiators thinking, inferences in different negotiation areas to examine the methods generalization to other backgrounds and video analysis of real negotiations, in order to compare with the simulations proposed.

REFERENCES