Preface

There are, in every vocabulary of all our different cultures, words that, for many different reasons, are very challenging to define. Nonetheless, this does not prevent one from using them on a daily basis, without doubt or ambiguity, without the constant need for a precise definition. The term *Conflict* is, undoubtedly, part of this puzzling group of words.

In an etymological sense, its origin can be traced back to the early 15th century. It derives from the Latin term *conflictus*, past participle of *conflicere*, meaning something close to “to strike together”, formed by *com-*“together”+*fligere* “to strike”. This first definition is, without doubt, war-related.

There is no certainty about how this word came to be part of the English vocabulary. On the one hand, and although English is a Germanic language with a grammar and core vocabulary inherited from Proto-Germanic, there is a significant portion of this vocabulary that comes from Romance and Latinate sources. Thus, the term may have been directly borrowed from the Latin. On the other hand, it may also have come from other sources. Namely, there is the French term *conflit*, which was used in Old French and derives directly from the Latin original term, used to define a struggle or a quarrel. Interestingly, this term was also used early on in a psychological sense, to define “incompatible urges in one person”.

This points out one first and very important aspect of conflict, which also contributes to the challenges of defining it: there may be different forms of conflict. From these original uses of the term, one can conclude that at least two types of conflict were acknowledged centuries ago: conflicts between at least two parts (the parts that would clash together) and conflicts between parts of one person (inner conflicts). These are nowadays known, respectively, as intra-group conflicts and interpersonal conflicts. Chapters 1 and 3 of this book will shed more light on this issue and provide up-to-date definitions of conflict and its different forms.

There are, nonetheless, other aspects contributing to this mentioned difficulty in precisely defining conflict. Namely, conflict can exist in very different dimensions of our lives. One could even risk to state that conflicts exist in virtually every dimension of our lives. Indeed, there are conflicts in the workplace (as Chapter 3 points out), conflicts in learning environments (as detailed in Chapters 12 and 17), environmental conflicts (addressed Chapter 4) or conflicts between states (with the Arab-Israeli conflict being one of the most well-known examples nowadays), just to name a few. Each of these types of conflict, if we can address them as such, has its own domain, its own characteristics, often its own ontology. The use of a single word for addressing them all may thus result in ambiguity.

From the aforementioned aspects, which constitute by no means an exhaustive characterization or attempt to define the term conflict, it can be concluded that it is a complex term. Nonetheless, up to this point we have been focusing solely on conflicts involving Humans, while conflicts exist outside our species and existed certainly before our first steps as a civilization (Davies, 2012; Falger, 2012).
If we consider, for instance, conflict in the animal world, examples are endless and we grew watching them on Discovery channel. If we were to categorize these conflicts, we would create two main groups (Huntingford, 2013): conflicts over resources (e.g. food, shelter, mates) and conflicts over outcomes (e.g. killing or survival of prey, occurrence of mating, occurrence of parental care, distribution of care between parents). In fact, conflicts exist involving the largest animals or the smallest creatures (Duggal & Emerman, 2012) (e.g. evolutionary conflicts between viruses). In fact, conflicts exist even in plants (Grace, 2012) as each species’ strive for resources (e.g. area of land, water, nutrients) shapes the morphology and life history of plants, as well as the structure and dynamics of plant communities.

This book does not aim, as it could not realistically do so, to address all these forms of conflict. We do, however, enunciate them with a clear purpose. Leaving aside conflicts between plants (which take place at a different rhythm and are not easy to witness at a first glance or without an historic contextualization), all other types of conflicts (i.e. between animals) are generally easy to identify. This is so because they generally involve violence. And especially violent are the conflict resolution mechanisms in the animal kingdom. Indeed, animals will often injure or even kill other animals of the same species or of another species, in order to get food, shelter or a sense of security.

There were times in which this was the only approach humans (or our ancestor species) had to solve a conflict. Unfortunately, still today, violence is used often to solve conflicts. Violent approaches are, nonetheless, regarded as very negative and backward. Humans have, throughout the years, developed more refined ways of dealing with conflict that are more advantageous than fighting.

In fact, our refined ways of resolving conflicts are one fundamental part of our notable evolution as a species and of our notion of modern or advanced civilization. The second part of the book is precisely dedicated to this topic: methods for solving conflicts. As will be seen, many different methods exist, some more traditional and others more recent, including litigation in court, mediation, arbitration or negotiation.

There are also, as addressed before, many different domains of the Human existence where conflicts may happen. For this reason, the third section of the book is dedicated to the analysis of very different forms of conflict (e.g. in e-learning, in robotics, in smart cities), focusing especially on those that emerged recently due to technological evolution which are, precisely due to their novelty, the ones that call for work towards the definition of appropriate methods for their analysis and resolution.

This last section is also very important in doing justice to the book’s name. In fact, conflicts are now, more than ever, interdisciplinary. Their identification, their understanding and their resolution may involve people from backgrounds as diverse as psychology, computer science, law, mathematics, among others. The purpose of this book is to establish a bridge between these and other fields that are often regarded as not interrelated, in an attempt to foster interest and research in an area that, despite its long and rich history, is still thriving and in need of new tools, new approaches and new methods.

THE CHALLENGES

Given what has been put forward about conflict, not only concerning the traditional characteristics of conflicts but also about the changes induced by evolution at different levels in the past decades, carrying out research or work in the field of conflict, and especially in conflict resolution, is nowadays extremely challenging.
Preface

Indeed, even in well-established areas such as states’ legal systems, there are still numerous challenges to overcome. First of all, courtrooms – the place where conflicts are usually resolved – are a very competitive environment. Parties involved in a conflict are predisposed to be uncooperative, look at each other as the enemy. This constitutes a negative view on conflict, which could instead be seen as a potentially positive process for both parties instead of a necessarily negative for at least one of the parties. Chapters 1 and 5 look precisely at the positive potential of conflicts.

Another challenge that legal systems nowadays face derives from the increasing rights of citizens. In fact, with the evolution of societies, people gain rights (e.g. new laws to protect citizens, right to more appeals), which is undoubtedly positive. However, it also means an increase in the complexity of legal systems and in the time it takes to solve cases. There are also many new types of conflicts that are either made possible by these laws, or are a consequence of technological evolution. Take for instance complaints and conflicts related to telecommunication operators (Heikkilä, 2002) which, despite their relative small value, make up for a significant portion of nowadays conflicts. These conflicts, as many other new types of conflict, were inexistente two decades ago.

Due to all these factors, conflicts become increasingly complex, with new aspects to consider, new challenges to overcome, specialist terms and specialized language, the appearance of new concepts or the increasing amount of information contained in each case. Consequently, legal systems also increase in complexity in an attempt to provide an answer to all these new cases and their new characteristics, generally by continuously adding new rules or new procedures. Evidently, this has a cost in terms of legal practitioners and in terms of time, a cost that often constitutes a barrier for people seeking justice.

In order to address these current challenges of legal systems, the so-called Alternative Dispute Resolution (Sourdin, 2008) methods emerged, aiming to provide a more positive and cooperative milieu than the courtroom. As addressed by several chapters in Section 2, methods such as mediation, negotiation or arbitration can be used outside of the legal system, generally with smaller costs. Moreover, these methods can nowadays be supported by ICT, in an approach known as Online Dispute Resolution (Wahab & Katsh, 2012). Nonetheless, even these new approaches have disadvantages of their own.

First of all, when conflict resolution starts to take place through telematics, they become subject to telematics’ drawbacks. Namely, and especially, to the poor richness of communication (Novais, 2014) when compared to face-to-face approaches (Santos, 2013). It is a fact that we share much (or most) of our meaning in a conversation from aspects such as our body language, our tone of voice, our speech or our gestures, all of which are absent in the majority of online forms of communication. This significantly hampers communication as well as the parties’ decision making processes, which even in an unconscious way, are partly based on this contextual information (Carneiro et al., 2013).

There are, however, more drawbacks associated to these alternative methods. Info-exclusion is one of them: if one of the parties is not trained in using a computer or a similar tool, they will certainly be in a disadvantageous situation. There are also the very important issues of security, privacy, data protection and identity, which are one of the most significant challenges in today’s information society, in more aspects than those related to conflict resolution. Some of these rather interesting aspects are addressed in Chapter 2. Finally, some of these alternative methods may face a drawback on one of the aspects that they are precisely trying to avoid: the lack of a formal structure. In fact, a courtroom has well-known and established procedures. Such may not happen in an alternative approach, which may be too dependent on human factors and on the parties’ decisions and judgement.
Finally there is another aspect worth mentioning, which is more closely related to the guiding line of this book: interdisciplinarity. In fact, and as already mentioned, the field of conflict resolution involves people from increasingly different backgrounds. These people often have different knowledge, different vocabularies, different views on the problems, different paths to achieve solutions and potentially different objectives. This represents a significant challenge, ever more important as technology and all its players assume more important roles. This book aims to bring these different fields of knowledge and their practitioners closer together, in an attempt to address the mentioned challenges. For this purpose, the following section presents a group of potential solutions, some of which are addressed in the remaining chapters.

SEARCHING FOR A SOLUTION

There are certain paths that can be followed towards solutions for the challenges pointed out, some of which already explored in this book. One of the fundamental ones is the carrying out of foundational work, namely in the definition and formalization of conflict (in all its different forms and domains), in the formalization of valid conflict resolution methods and in the identification of new types of conflict, especially those caused by technological and social evolution. Section 1 of the book has significant contributions in these areas in all its different chapters.

Then, there is also the need for the development of autonomous solutions that can, at least to some extent, lighten the burden of legal practitioners, automatizing tasks in which human intervention is no longer fundamental. This can relieve human experts to perform more important tasks an increase the throughput of organizations working towards the resolution of conflicts. When considering conflict resolution processes undertaken online, the improvement of online communication environments should also be sought. Here the focus should lay on the acquisition of contextual information that may be significant for the efficiency of the communication process, such as our body language, our intonation or others. Such an idea is explored in Chapter 12. The implications of such approaches, that do exist, are analyzed previously in Chapter 2.

Conflict resolution processes could also benefit from tools that can compile and provide useful and valuable information for the parties, under the conviction that informed parties will take more realistic decisions, that take into consideration the rights and the obligations of both parties rather than focusing on self-interest. Such information may include, among others, the concepts addressed in Chapter 6. Additionally, tools to automatically generate possible solutions, especially solutions that maximize mutual gain, could also be interesting to increase the probability of achieving mutually satisfactory solutions.

When considering the challenges that affect legal systems, especially in what concerns their current low throughput, one of the potential solutions would be to foster pre-claim conciliation, especially for small-value claims which nowadays make up most of the pending cases. Moreover, other approaches such as the one described in Chapter 5 should also be considered.

Finally, the potential advantages of specific fields of Computer Science, especially those under the umbrella of Artificial Intelligence, should also not be disregarded. In fact, fields such as Decision Support Systems, Case-based Reasoning, Rule-based Systems, Neural Networks, Biologically-inspired methods and many others hold the potential to significantly improve decision-making processes, not necessarily automatizing them but, at least, making them faster, clearer or simpler. Chapters 9 – 11 address some of these issues.
ORGANIZATION OF THE BOOK

The book is organized into seventeen chapters, grouped in three different sections. A brief description of each of the chapters follows:

Chapter 1 analyzes, in a systematic way, conflicts and conflict resolution methods, comparing different approaches in terms of their main characteristics. It attempts to achieve a consensual and broad definition of the term conflict, one in which conflict is not necessarily negative, and looks at conflict handling styles and their importance in the conflict resolution process. Finally, it puts forward a framework to support conflict.

Chapter 2 addresses Biometrics, their current use, and the issues that this use raises, especially in what concerns privacy and data protection. The chapter acknowledges the advantages of the use of biometrics (e.g. low margin of error) for the purpose of identification, especially in given domains. However, it also thoroughly analyzes the requirements that should be met in order to do so in a way that does not threaten individual rights.

Chapter 3 starts by looking at different definitions for the term conflict and continues with the identification of triggers for conflicts. It also takes a positive view on conflict and addresses its potential value. It tackles the sometimes challenging task of differentiating between conflicts, disputes and disagreements and does all this while focusing on organizational conflict, undoubtedly one of the largest fields in this domain.

Chapter 4 looks at a very different form of conflict, yet by no means of lesser importance: Environmental Conflicts. Indeed, as pointed out in the chapter, environmental conflicts are very complex and involve social, economic, political and cultural factors. The chapter discusses the defining characteristics of these conflicts and the methods for their assessment and resolution.

In Chapter 5, the interesting concept of Restorative Justice is explored: an approach to criminal conflicts that focuses its efforts on restoring the harm done by criminal activities. Very simplistically, it can be stated that the main aim is to compensate the victim of a criminal activity so that there is no need to seek for revenge. The authors end their contribution by bridging restorative justice with Online Dispute Resolution, to propose Online Restorative Justice.

Chapter 6 opens Section 2 with a formal approach to knowledge representation and reasoning in the legal domain. One of its significant contributions is the definition of a method for quantifying the quality of judgments in scenarios of incomplete information. The chapter is supported by a realistic case-study that validates the proposed approach.

Chapter 7 starts with a brief overview of alternative means of dispute resolution (e.g. negotiation, conciliation, mediation, arbitration). The author then moves on to analyze the implementation of these alternative means in the member states of the European union to conclude, among other aspects, that European institutions have demonstrated a growing concern in ensuring the implementation and the development of the single European market of alternative means of dispute resolution.

Chapter 8 carries on this analysis at an European level, but focuses on Online Dispute Resolution for consumption. It starts by addressing the advent of the society of consume and of information, moving on to the appearance of extrajudicial conflict resolution, especially in the European Union.

Chapter 9, written entirely from a Computer Science perspective, looks at Artificial Intelligence, and in particular at Multi-Agent Systems, as a concrete and very innovative field of application of conflict resolution methodologies. Here, Agreement Technologies are analyzed as a means to achieve agreements between autonomous synthetic entities.
Chapter 10 starts with a very interesting analysis on the diversity of fields in which conflicts happen. It then addresses the use of search and optimization techniques, which can be classified as nature- or bio-inspired, within conflict resolution problem solving, focusing especially on three major techniques: genetic algorithms, differential evolution and particle swarm optimization. Equally interesting is the analysis of specific applications of these techniques in conflict resolution problem solving.

Chapter 11, which closes a section devoted to conflict resolution, presents an account of recent advances in the development of a novel e-participation framework which integrates social networks (particularly Twitter), intelligent information retrieval and argumentation techniques. One of its key contributions is the idea of applying argumentation systems for mining citizens’ opinions on a given topic, obtaining an “opinion analysis tree”, rooted in the first original topic that allows to analyze all the arguments and their relationships.

Chapter 12 opens section 3, dedicated to practical applications in the field of conflict resolution. This specific chapter looks at conflicts in e-learning environments and how technological tools and the acquisition of contextual information can help to mitigate them.

Chapter 13 addresses video-cameras and their use, specifically for real-time detection of pedestrians. Several segmentation algorithms and the implications of their use are compared throughout the chapter.

Chapter 14 introduces the concept of smart cities, linking their emergence to the rapid growth of the Internet of Things, that makes all resources in a city available at the distance of a service invocation. The authors address conflicts in the context of smart cities, focusing on those cases in which autonomous agents, with potentially conflicting objectives, need to make decisions about which service or technology to use to solve a given problem. The concept of Multi-agent Systems is thus addressed as well.

Chapter 15 presents us with yet another novel field of application of conflict resolution, unthinkable a few decades or years ago: robotics. While the chapter begins rather classically – by addressing conflict handling styles – it quickly advances to assess multi-robot cooperation and, specifically, the emergence of conflicts and how they can be solved in this domain. Several classical problems of robotics are addressed, including path finding and object manipulation. Finally, conflict resolution involving humans and robots are also addressed.

In Chapter 16 the apparent symbiotic relationship between conflict resolution and crowdsourcing is explored, along with an overview of both crowdsourcing and dispute resolution approaches, and use cases that are of particular interest. A systematization of the discussed approaches is also provided, that captures the main challenges and directions for mixed dispute resolution and crowdsourcing approaches.

Finally, Chapter 17 is also dedicated to conflicts in e-Learning but, more specifically, it addresses the main vulnerabilities of e-learning systems and their involvement in the emergence of conflicts for the participants from online training activities and for the educational institutions. The study develops from three types of conflicts: the availability and system integrity, the privacy of the information that is exchanged in virtual environment and the process of authentication of the participants.

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REFERENCES


