Automatic Classification of Personal Conflict Styles in Conflict Resolution

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Abstract. The use of technology to support conflict resolution is nowadays well established. Moreover, technological solutions are not only used to solve traditional conflicts but also to solve conflicts that emerge in virtual environments. Therefore, a new field of research has been developing in which the use of Artificial Intelligence techniques can significantly improve the conflict resolution process. In this paper we focus on developing conflict resolution models that are able to classify the disputant parties according to their personal conflict style. Moreover, we present a dynamic conflict resolution model that is able to use that information to adapt strategies in real time according to significant changes in the context of interaction. To do it we follow a novel approach in which an intelligent environment supports the lifecycle of the conflict resolution model with the provision of important context knowledge.

Keywords. Online Dispute Resolution, Intelligent Environments, Conflict Styles, Profiling.

Introduction

Until now, several different approaches have been followed by researchers to implement Online Dispute Resolution (ODR) tools, some of them trying to take advantage of powerful mechanisms made available by the newest information and communication technologies [1]. Specifically, interest has grown in the use of Artificial Intelligence models and techniques that include but are not limited to Argumentation, Game Theory, Heuristics, Intelligent Agents and Group Decision Systems, as described by [2,3,4] mainly aiming at supporting the parties' decision making process.

In this work we are opening a new line of research based on a relatively recent sub-field of Artificial Intelligence: Ambient Intelligence [5]. Under this paradigm, computational power is seamlessly embedded into the environment, ultimately creating computational environments that implement their lifecycle in an ideally invisible way for the user. Our main aim is to develop conflict resolution environments that will support the already traditional conflict resolution tools by providing important context information derived from the environment. In that sense, from the point of view of the user, he still interacts with a regular conflict resolution platform. However, he does it from within an intelligent environment that is, transparently, supporting the conflict resolution tool with additional information that may be of importance for the evolution of the conflict resolution (Figure 1). This information, that is transparently provided to

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the conflict resolution platform, potentially without the interference of the user, will allow developing more complete conflict resolution models that, by being richer in information, will more realistically shape the ones undertaken by human experts.

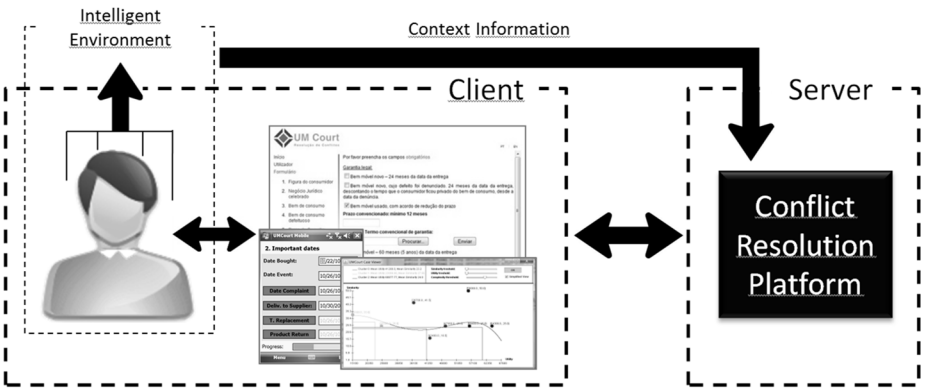

Figure 1. The model of a conflict resolution environment in which an Intelligent Environment supports a traditional conflict resolution platform with context information.

1. Important Knowledge and its relevance for dispute resolution

In a dispute resolution process it is important to: (1) provide the parties with useful and important knowledge about the dispute and (2) potentiate the role of the parties throughout all the process. In fact, parties that have poor access to important information generally make bad choices or, at least, they hardly make the best ones.

An important step is thus to identify the knowledge that is meaningful for the parties, according to the legal domain of the dispute [6]. In a first instance, it would be interesting for a party to determine to which extent is it reasonable to engage in a dispute resolution process, that is, are there any significant advantages against litigation and if the parties can reach the best outcome using an alternative dispute resolution. It has been abundantly pointed out in the literature the relevance of BATNA – Best Alternative to a Negotiated Agreement for ADR / ODR, or the possible best outcome "along a particular path if I try to get my interests satisfied in a way that does not require negotiation with the other party [7]". In ODR environments, through the use of data-mining techniques, semantic web technology or other techniques used to calculate BATNA, the parties should be able to foresee the possible outcome of the judicial dispute in case of not reaching an agreement through ODR [4].

However, the use of BATNA alone may not be enough as parties will often tend to underestimate the probabilities of an undesired result in judicial litigation [8]. In that sense, important knowledge also includes the WATNA – Worst Alternative to Negotiated Agreement, the ZOPA - Zone of Possible Agreement, as proposed by Raiffa [9], or the MLATNA - Most Likely Alternative to a Negotiated Agreement [10], here computed following a case-based approach [11].

It is also important for parties to have access to past cases, so that they can analyse them and gain a better understanding about the domain of the problem. However, it does not matter so much which is the most likely outcome (which might be hard to estimate, although being possible to introduce metrics in order to measure the

probabilities of each outcome), but rather to foresee the real risks that the parties are facing – the extreme value presented by WATNA may well force the parties to change their ideas about their BATNA and ZOPA. Following the same line of thought, we can additionally state that the existence of metrics that measure the probability of each possible outcome could also be extremely useful for a party in an attempt to understand how likely each scenario is [12]. However, all this knowledge can be used not only to correctly inform the parties but also to support some functionalities of the conflict resolution platform. Specifically, in this work this knowledge is used to allow the estimation of the personal conflict styles, as depicted in section 2.

2. From the Computation of the Utility to the Classification of the Personal Conflict Resolution Style

The style of dealing with a conflict that each one has must be seen as having a preponderant role in the outcome of a conflict resolution process, especially on those in which parties interact directly (e.g. negotiation, mediation). Ultimately, it is acceptable to state that the outcome will largely depend on the conflict resolution style of each party and on the interaction of the styles of the parties. Different approaches can be followed to formalize the way that we respond to conflicts. A well-known definition was presented by Kenneth Thomas and Ralph Kilmann, which encoded the way that we react under a conflict into five different modes [13]. To define these modes, they take into consideration the individual's assertiveness, which denotes how much a party tries to satisfy his own interests, and the cooperativeness, which denotes to which extent the party is willing to satisfy the other's interests. The five different conflict resolution styles defined are as follows:

- Competing – A party that shows this uncooperative style aims at maximizing his own gain, with a consequent minimization of the other's. Usually, a competing individual will use his ability to argue, his rank, his social status or whatever advantageous position that he can have to show dominance over the other party. This is thus a power-oriented style;
- Accommodating – An accommodating party will show a behaviour that can be classified as the opposite of a competing one in the sense that he will be cooperative. It may happen that an accommodating party will even neglect his own gain, thus maximizing the one of the others, in order to achieve a solution. Thus, it may be said that there is an element of self-sacrifice. Generally, such a party will tend to show generosity or charity, will be understanding and will easily obey other's orders or desires even if they represent a drawback;
- Avoiding – An individual that shows an avoiding behaviour is most likely not dealing with the conflict as he usually satisfies neither his own interests nor those of the other party. Common behaviours in this conflict style include diplomatically sidestepping or postponing some issue or even withdrawing from threatening or unpleasant situations;
- Collaborating – On the opposite side of avoiding is the collaborative behaviour. This is a cooperative style in which the party shows the willingness to work with the other party in order to find solutions that can be interesting for both. This implies that the party is interested in finding what the fears and desires of the other are and might even try to explore a disagreement in order

to learn from other's insights;

- Compromising – A compromising party will generally try to find a fast and satisfactory solution that can be interesting for both parties. This conflict style can be seen as an intermediary one between the competing and the accommodating. A compromising party is generally willing to split the differences between two positions, to exchange some concessions or to seek middle-ground solutions.

It is known that each one of us is able to use several or even all of the conflict styles, depending on factors such as past experiences, temperament or present situation. Therefore, it is not possible to characterize one individual as having a single conflict-handling style. Still, people tend to use some styles more than others, generally associated with the personality traits. The knowledge about the conflict-handling style may be of interest, either from the point of view of a human mediator or even from the point of view of a conflict resolution platform as it is possible to predict to some extent the evolution of the conflict resolution process according to the personal conflict styles.

In this paper we explore the potential relation between the personal conflict style and the utility of the proposals for the resolution of the conflict. In this context, the utility quantifies how good a given outcome is for a party. In that sense, it is acceptable to argue that a competing party will generally propose solutions that maximize its own utility in expense of that of the other party, while for example a compromising party will most likely search for solutions in an intermediary region. Essentially, what we aim is to classify the personal conflict style of a party by constantly analysing the utility of the proposals he creates. The relation between the utility of the proposals and the conflict style is depicted in Figure 1 and further detailed in section 4.

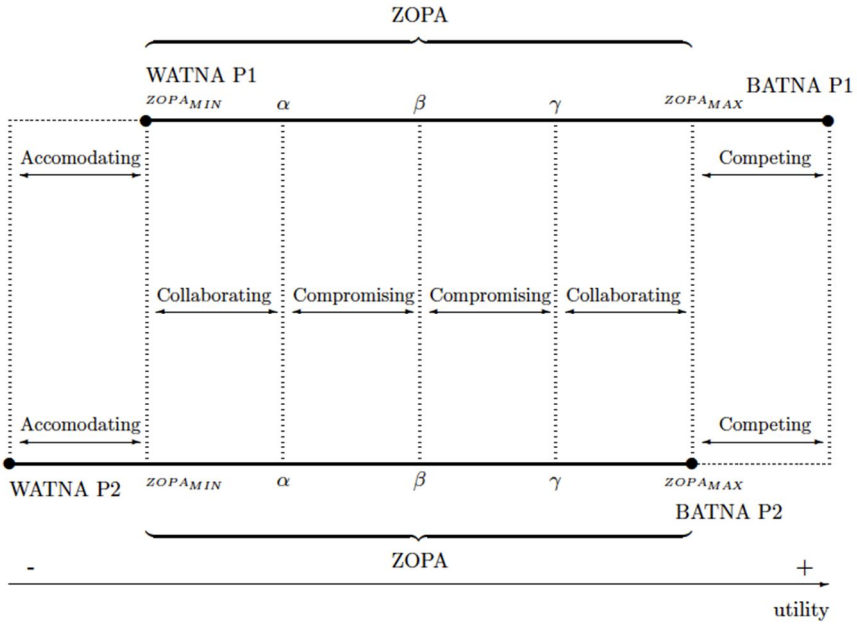

Figure 2. The space that defines the personal conflict styles in function of the utility of the proposals and the values of the BATNA, BATNA and ZOPA.

3. Classifying Personal Conflict Resolution Styles

In a conflict resolution process, one of the most important factors is the evolution of the behaviour of the parties. In that sense, if the conflict resolution tool has the ability to make a prediction about that evolution, it may design optimized strategies. In a general way, the behaviour of the parties can be determined following two different approaches: by questioning the parties and by analysing their behaviour. The first approach will provide information before the start of the process, being possible to plan ahead. However, the main disadvantage is that it is easy to lie and fake a behaviour in an attempt to undermine the process. Moreover, once the (potentially stressful) conflict resolution starts, parties are likely to change their behaviour. The second approach will gradually provide information as the process evolves. Although it may be a slower way of building knowledge about the personal conflict style, it will more reliably reflect the conflict resolution style and, more important than that, will reveal eventual changes in real time.

In this work, we explore the potential of the second approach. In that sense, we analyse the actions of the parties in each stage of the conflict resolution process. Namely, a party may ignore, accept or refuse a proposal, may reply with a new proposal or may leave the process. Moreover, the nature of the solutions proposed is also taken into consideration (e.g. is a party being too greedy?, is a party being realistic?). We make a combined analysis of this information together with the BATNA and the WATNA of each party as well as the ZOPA – the Zone of Potential Agreement, in order to classify the behaviour of each party.

To implement this approach, we are using a conflict resolution algorithm that was developed for the legal domain addressed, described in [14]. During the process, parties make successive proposals and counterproposals in order to achieve a mutually agreeable solution. It is thus possible to make an analysis of the proposals of each party and, together with additional context information (e.g. the space defined by the BATNA and WATNA of each party, classify the behaviour of the party in terms of its personal conflict style.

Each action that a party performs contributes to the overall characterization of his conflict personal style. In that sense, the conflict style that is computed for each party in each round is a result of all the previous interactions, although the weight of older interactions decreases exponentially. Two main scenarios are possible: the party ignores the proposal or the party answers to the proposal. If a party, upon receiving a proposal for a solution, simply ignores it, he is not satisfying his interests nor the ones of the other party. In such a scenario, the conflict style evidenced is the *Avoiding* one.

If the party makes a proposal or a counterproposal, he is cooperating on the process. However, the nature of the proposal must be analysed, namely in what concerns its utility for each party. When the utility of the proposal is higher than the BATNA of the other party, he is clearly showing a *Competing* style as he is trying to maximize his own gain, in a way that is potentially unrealistic and disregards the other party. On the other hand, if the utility of the proposal is lower than the WATNA of the other party, he is neglecting his own gain or even maximizing the gain of the other party. In such a limit scenario, it is reasonable to state that the party is evidencing an *Accommodating* behaviour.

The utility of the proposal falling within the range of the ZOPA indicates that the party is being reasonable and realistic and is trying to propose a settlement in which both parties will not win everything they could but will not lose everything either. In

such a scenario, the conflict style is determined according to the distance to the mean point of the ZOPA, as defined in equation 1.

$$\beta = \left(\frac{ZOPA_{MIN} + ZOPA_{MAX}}{2}\right) \quad (1)$$

Two additional points are defined that allow the classification of the remaining conflict styles, as depicted in equations 2 and 3, by defining additional intervals.

$$\alpha = \left(ZOPA_{MIN} + \frac{\beta - ZOPA_{MIN}}{2}\right) = \left(\frac{ZOPA_{MIN} + \beta}{2}\right) \quad (2)$$

$$\gamma = \left(ZOPA_{MAX} - \frac{ZOPA_{MAX} - \beta}{2}\right) = \left(\frac{ZOPA_{MAX} + \beta}{2}\right) \quad (3)$$

When the utility of a proposal falls within the range $[\alpha, \gamma]$, the party is trying to negotiate in intermediary points of the ZOPA, i.e., the party is trying to compromise, which implies a loss from both parts. In such a scenario, the behaviour of the party is classified as *Compromising*. On the other hand, if the value of the utility belongs to the range defined by $[ZOPA_{MIN}, \alpha[\cup]\gamma, ZOPA_{MAX}]$, the party is proposing a solution that is closer to the limits of the ZOPA. This is interpreted as the party is trying to work out a mutually agreeable solution, although he may be trying to explore the weaknesses of the opposing party by trying to force him to accept a given solution. Scenarios such as this one are classified by this approach as *Collaborating*.

Nevertheless, as depicted in the literature and as evidenced by our own daily interactions, we do not make use of a single conflict style throughout a conflict resolution process. More likely, we evidence a combination of conflict styles. In that sense, in order to more accurately define the boundaries, we propose an approach in which a main conflict style is inferred, potentially accompanied by a trend style. This means that a party shows a given style with a possible tendency towards another one. The notation used to denote a *main* conflict style with a trend to a *secondary* one is as follows: $Main_{\rightarrow secondary}$. Let φ be the value of the utility of a proposal. The following personal conflict styles are defined:

$$Collaborating_{\rightarrow Accomodating} \quad if\ \varphi \in [ZOPA_{MIN}, \frac{ZOPA_{MIN} + \alpha}{2}[$$

$$Collaborating_{\rightarrow Compromising} \quad if\ \varphi \in [\frac{ZOPA_{MIN} + \alpha}{2}, \alpha[$$

$$Compromising_{\rightarrow Collaborating-Accomodating} \quad if\ \varphi \in [\alpha, \beta[$$

$$Compromising_{\rightarrow Collaborating-Competing} \quad if\ \varphi \in [\beta, \gamma[$$

$$Collaborating_{\rightarrow Compromising} \quad if\ \varphi \in [\gamma, \frac{ZOPA_{MAX} + \gamma}{2}[$$

$$Collaborating_{\rightarrow Collaborating-Competing} \quad if\ \varphi \in [\frac{ZOPA_{MAX} + \gamma}{2}, ZOPA_{MAX}]$$

By determining the personal conflict style of each party in each round, it is possible to analyse its evolution throughout the conflict resolution process (Figure 3). When the conflict resolution system has a temporal representation of the evolution of the conflict styles, it may implement dynamic conflict resolution methods that adapt strategies in real time, as depicted in the following section.

4. A Dynamic Conflict Resolution Model

We are developing a conflict resolution model based on concepts from the recent trend of Intelligent Environments, in which computer systems seamlessly merge into the environment [5]. Our goal is to achieve a dynamic model, similarly to the ones run by human experts, which are able to perceive changes in the context of interaction (e.g. a party is getting stressed, a party does not like the current state of affairs) and change the strategy before it is too late (e.g. by making a pause in the process). The reason for following a line based on Intelligent Environments lays on the ability of these environments to provide context information. Thus, in this new approach to the ODR problem, parties are not simply interacting with web forms. Instead, parties use ODR tools in the context of an intelligent environment that can support the conflict resolution platform with important context information (e.g. the level of stress, the conflict style, the emotional state).

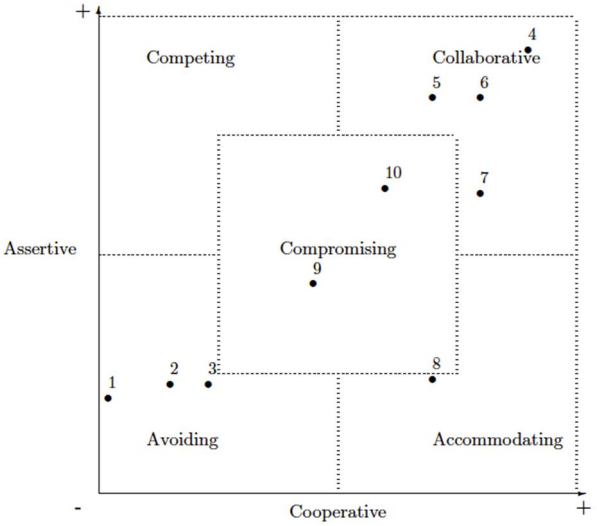

Figure 3. Representation of the evolution of the conflict style of a party in 10 rounds.

Considering this information, the conflict resolution model can dynamically adjust to significant changes in the context of interaction. Specifically interesting in this scope is the fact that parties frequently change the conflict style during the conflict resolution process, according to how it is developing. A typical trend extracted from our experiments is one in which parties exhibit an avoiding behaviour in the first stages of the resolution of the conflict, evolving then to a more cooperative style as the confidence on the process grows. Moreover, it is also frequent for parties to start by being competitive and having high expectations, which tend to be more realistic as the process evolves and parties become aware of the desires and rights of the others. In such scenarios, the conflict resolution style tends to evolve to a more compromising one. Nonetheless, the opposite may also happen.

These are the types of changes that the proposed model detects. This model is defined by four main steps, as depicted in figure 4. It starts by compiling the important knowledge mentioned before (e.g. BATNA, WATNA, ZOPA), which will be important

for parties to develop realistic views about their problem and for the model to use in the following steps. After this, the platform builds a strategy, which consists in selecting a group of possible outcomes that will sequentially be suggested to the parties. In order to build this first strategy, the platform takes into consideration a group of similar cases selected by a case-based approach, as described in [12]. Then, the process advances to the actual conflict resolution.

During this phase, the platform receives information in real time from the environment concerning the personal conflict styles, determined as described above. When the platform detects that a significant change is taking place, the strategy is adapted. Adapting a strategy consists in changing the list of outcomes to be proposed to the parties. This is implemented taking into consideration the utility of each outcome, for each party. As the utility of an outcome quantifies how good it is for a given party, the platform looks at the utility of the outcomes of the similar cases and changes the order by which outcomes will be proposed according to the state of the parties. Thus, in a setting with two parties in which party A is consistently exhibiting a collaborative behaviour while party B is moving towards an avoiding one, the system may suggest an outcome whose utility is better for party B than the utility of the previous one. This is done with the intention of maintaining the party interested in the conflict resolution process and, ultimately, to avoid his abandonment.

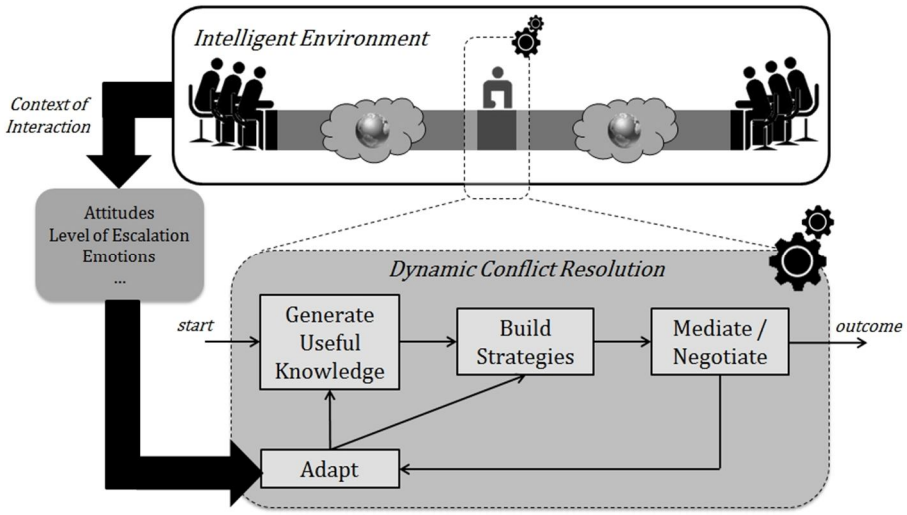

Figure 4. High level view of the dynamic conflict resolution model presented.

Nonetheless, we acknowledge that information about the personal conflict style alone may not be enough to correctly adapt the conflict resolution process. In that sense, we are now considering additional sources of context information that can be used by the system, namely about the level of stress. Specifically, we are developing interfaces for touchscreens that can provide information about the touch accuracy and intensity, which will allow the system to estimate the level of stress of the parties (Figure 5).

With the combination of all this important information we will be able to develop context-aware conflict resolution models that take advantage of technological tools without however losing the richness of face-to-face interaction. This way, we expect to

achieve more efficient conflict resolution mechanisms, able to achieve more mutually satisfactory outcomes.

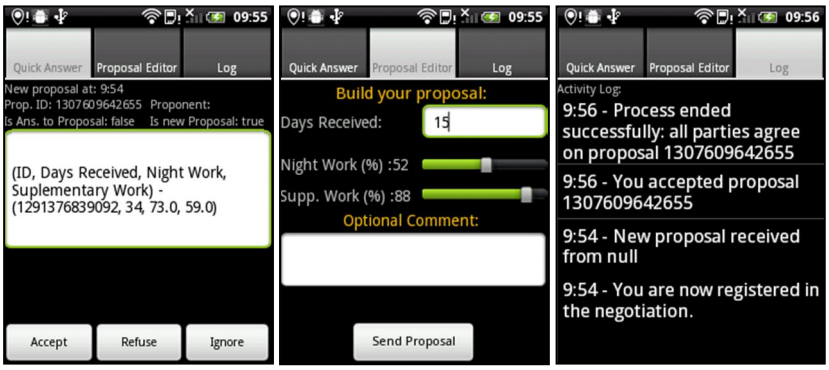

Figure 5. Android interfaces for interacting with the conflict resolution platform, providing additional context information about the user.

5. Conclusions

In Computer Science terms, the current approaches on Online Dispute Resolution are heavily based on technology, as it would be expected. However, this tends to leave aside some important advantages of traditional human-centred approaches. Specifically, the ability of human mediators to deal with context information such as the emotional state of the parties, their facework, or their personal conflict resolution styles is completely disregarded. This results in conflict resolution platforms that are insensible, unable to perceive the fears and desires of the parties in conflict.

We believe it is mandatory to consider not only all the important context information, but also methods that can make use of it in order to more accurately understand the parties and achieve outcomes that are more satisfactory. In that sense we presented in this paper a methodology for determining the personal conflict styles of the parties, by analysing their behaviour during a negotiated or mediated conflict resolution process. All this is done in a non-intrusive way. Merging this with additional context information such as the levels of stress or even the emotional state, will allow the development of conflict resolution methods that are able to adapt, in real time, to significant changes in the context of interaction.

This approach, in line with the vision of Ambient Intelligence, will bring significant advantages for the field of conflict resolution in the sense that it can empower cold and insensitive processes with context-aware abilities usually associated to human experts, combining ODR in its double meaning: resolving and preventing disputes ("online dispute resolution" and "online dispute avoidance").

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