

SMART ODR TOOL

BOOKLET OF THE PROJECT (D2.1)

Platform (<https://smartodr.eu>) based on information and communication technology (ICT) facilitates disputes settlement: designed by Works in Progress s.r.l. and co-financed by the SMP-CONS-2022-ADR Program of EISMEA, European Commission, project #101101995 started April 2023.

In Brief

Italian D.Lgs. 130/2015 regulates Alternative Dispute Resolutions or **ADR for consumers** (energy, telecommunications, travel, etc.) conducted even as On-line Dispute Resolutions (ODR).

Smart ODR Tool (<https://smartodr.eu>) helps in managing ODR procedures, facilitating conflicting parties in their interactions and supporting mediators in negotiating settlements. Therefore, *Smart ODR Tool* implements a series of functions that support conciliation by:

- **Standard WebRTC** (Web Real-Time Communication), in order to remote communicate in real time and complying with UE Reg. 2016/679 (GDPR), safeguarding personal data.
- **Predictive algorithms**, in order to rationally evaluate opportunity cost of the settlement options and to take prudent decisions.
- **User interface** discriminating confidentiality levels, in order to help parties in their direct communication, and to help mediators in briefly acquiring conflict information, and to help ODR providers managers in managing conciliation dossiers.
- **Statistic routines** evaluating big data and historic trends and pragmatic decisions, in order to record and to signal the recurring factors in successful bargaining processes.

Supporting the parties:

- Strategic evaluation of the opportunity to activate or not an ODR procedure.
- Rapid ODR procedure activation.
- Information handling and communication complying with GDPR.
- Settlement solutions evaluation by artificial intelligence (AI) routines.
- Settlement solutions evaluation by human mediators interactions.
- Settling agreements juridically valid and effective.

Supporting the mediators:

- Visualization of the “conflict map” in a fluid and concise way.
- Suggestions from the AI about advantages and weaknesses of the parties.
- Visualization of the economic Zone of Possible Agreement (ZOPA).
- Visualization of the topics to discuss with the parties.
- Track negotiation interventions, in order to remain goal-oriented.
- Supervising and guiding the information exchange synchronously or asynchronously.

ODR 4 operative steps:

1. **Data input.**

- a. Filter questions guide the interested party through the procedure of selection of the appropriate ADR tool for the matter being discussed, guiding the data entry and the uploading of documents relating to the dispute.
- b. AI routines estimate and communicate the average costs of managing the dispute through adjudication (the natural alternative to conciliation), which the proposing party can correct; then AI estimates the economic Walk Away Value (WAV) of the proposing party.
- c. Platform fills in an informative summary of the conflict, which it notifies to the invited party via certified email (CEM).
- d. Platform acquires whether or not the party invited wants to participate in the ODR procedure.
- e. Each party accesses her own reserved area to consult or to modify her position (WAV, costs, options, etc.) and to interact in the ODR procedure.
- f. Platform allows the manager of the ODR provider to notify any legally relevant event to the interested parties.

2. Direct negotiation.

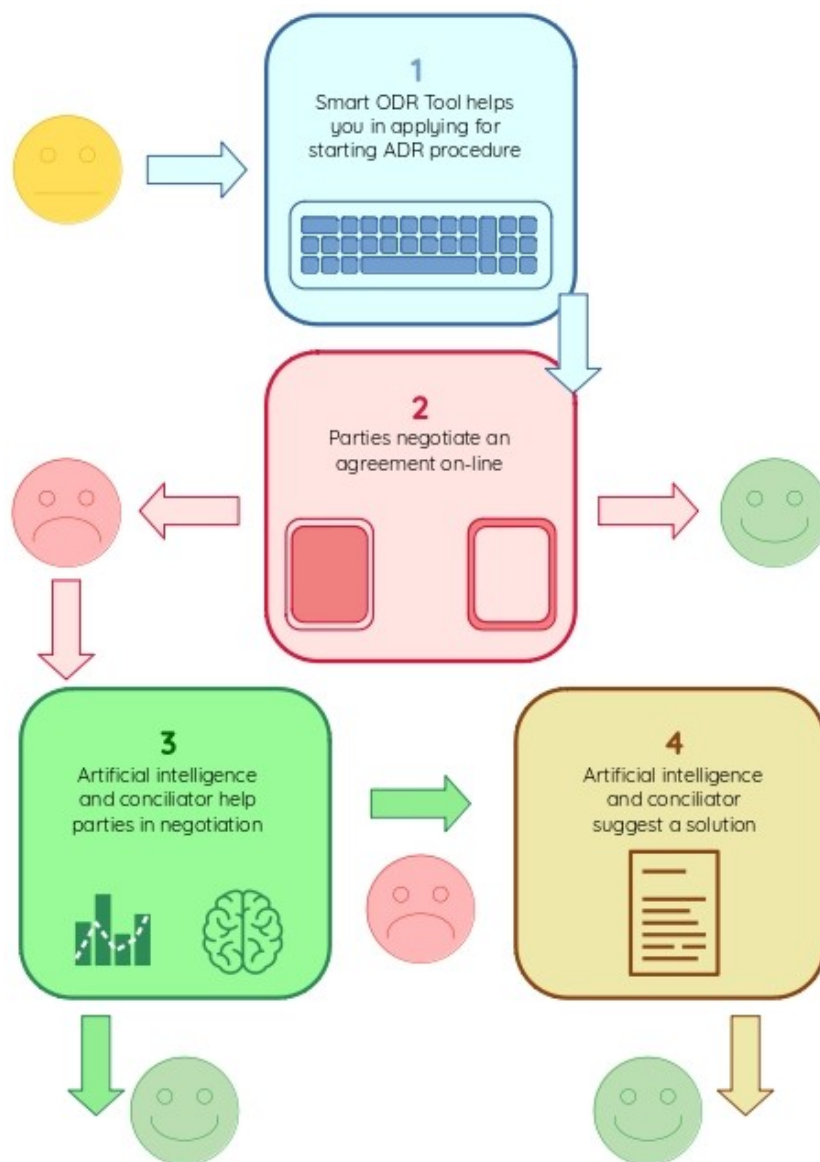
- a. AI calculates the solution optimizing the economic agreement and harmonizes the deviations compared to big data, informing the parties of the existence of that mathematical solution, but without revealing it to them, in order to push the parties to decide “their” solution, negotiating directly asynchronously, notifying them of the deadlines (with respect to the completion times of the ODR procedure) and providing suggestions for professional negotiation.
- b. Asynchronous interface implements a space where the parties exchange offers or economic requests or other useful information, even of an emotional nature. Direct negotiation lasts 18 days (including holidays and weekends). AI interprets the content of messages of an emotional nature, in order to correct the calculated optimal solution and to learn the most efficient conciliatory strategies.
- c. Approaching the deadlines, the platform urges the parties to act and informs them about the Zone of Possible Agreement (ZOPA), identified by the solutions already calculated by the AI.
- d. If the parties settle an agreement within 18 days, the platform helps them formalize the agreement through an electronic signature system and archives the data, which the AI compares with the predictive solution, to learn better strategies.

3. Mediation.

- a. If direct negotiation fails over 18th day, the platform activates a human mediator, who analyzes the entire dossier (including the messages exchanged between the parties and the solutions calculated by the AI) and negotiates for the parties within 60 days (in synchronous and asynchronous mode, at the discretion of the mediator).
- b. The mediator can facilitate the agreement or can propose a solution to the parties (possibly based on the solution already calculated by the AI), which the parties can freely accept or reject.
- c. If the parties reach an agreement, the platform helps them formalize the agreement through an electronic signature system and archives the data, which the AI compares with the predictive solution, in order to learn better strategies.
- d. The platform allows the manager of the ODR provider to notify any legally relevant event to the interested parties.

4. Agreement proposal.

- a. If the negotiation fails, the platform reminds the mediator to communicate to the parties the solution calculated by the AI, which the parties can freely accept or reject.
- b. If the parties reach an agreement, the platform helps them formalize the agreement through an electronic signature system and archives the data, which the AI compares with the predictive solution, in order to learn better strategies.



The ICT Platform

Smart ODR Tool implements two Information and Communication Technologies (ICT) areas:

1. Data management infrastructure.
2. Data processing artificial intelligence.

Data management

The platform records and stores data in 2 electronic archives divisions:

- **Local databases of the dossiers:** ODR provider using *Smart ODR Tool* shall file and process data of the parties in its own servers, personally complying with GDPR and with local regulations, acquiring consent of each party before storing and processing data.

- **A centralized database for AI processing:** Message-Digest algorithm 5 (MD5) encrypting data stored in Italy-based server (code IT3 Aruba SpA's Cloud service in the data center of Bergamo) ISO certified (additional technical details available from <https://www.datacenter.it/documents/specs/it/it-dc-schede-tecniche-it3-dc-a.aspx>), running AI, storing and processing anonymous data only (viz. standalone numeric information) received from local servers after each local dossier has been archived from the manager of the ODR provider (therefore, AI server acquires only economic data from local units, ignoring personal data).

Each user of the platform has a personal identification code and access key or can authenticate herself/himself via the Public Digital Identity System (*SPID*) or via the National Service Card (*CNS*). The platform discriminates access based on 4 privilege levels:

1. **Party users**, who can access their own dossiers, can create new dossiers and can carry on an ODR procedure.
2. **Mediators**, who can access the assigned dossier and can manage the ODR procedures.
3. **Managers of ODR providers**, who can create, archive and can visualize dossiers, notifying documents to parties and authorities.
4. **System engineers**, who can consult anonymized data and can modify both the relational infrastructure and the AI.

Each dossier or conciliation procedure is activated upon request from a user authenticated by the platform (party or provider): the platform allows the user to view her/his files (if the user has already carried out some procedure) or to start a new ODR procedure. In that case the platform guides the user in qualifying the matter and the type of conflict (e.g. fees for unconsumed electricity supply), specifying the economic amount that the user claims to receive in payment from his counterpart. Thus, the database is enriched with a vector with a unique identifier that will list:

- Users linked to the dossier.
- Matter and type of conflict.
- Economic data.
- ODR result.

The platform reminds the user of the need to communicate a **formal complaint** to the service provider before proceeding with the conciliation and asks the user for confirmation of the transmission of the previous complaint (providing her/him a draft of the text), which the user must transmit to the provider.

Then the platform guides the user in estimating her/his **opportunity cost** (WAV), based on the AI's routines. Thus, on the one hand, the user acquires rational information to negotiate a solution and, on the other hand, the database enriches the file vector with the costs and economic results expected by the party who activated the ODR.

After the user has verified and defined his/her WAV, the platform compiles a **summary document** of the file (identifying the activating part, the subject and reasons for the dispute, the economic claim) which the user can modify or confirm and which the platform, on request of the user, transmits to the other party, to invite her/him to participate in the ODR.

Then the party invited to conciliate can authenticate on the platform, where she/he can access the dossier (created by the party who activated the ODR), viewing the common information and consulting her/his own WAV (already estimated by AI), in order to modify and define it. Thus, the database enriches the file vector with the costs and economic results expected from the other party in

the dispute.

The the party invited to the ODR can opt to participate in the ODR or to quit it.

The data collected by the platform allows the AI to estimate an economic conciliatory solution, which enriches the file vector in the database.

Then the platform manages the asynchronous dialogue flow between the parties only, for direct negotiation: for **18 days** the platform allows the parties to communicate via a chat line through which parties can express themselves, negotiating and even reporting their emotional states (data necessary for AI to calculate a complex solution). The platform urges the parties to respond through the chat line after 4 days of inactivity and it urges them to conclude the negotiation on the 15th day from the start. If the parties find an agreement, they confirm it to the platform, specifying the economic contribution that one party will eventually pay to the other (a datum necessary for training the AI), and they upload the text of the agreement, which the platform makes the parties sign via the digital signature system implemented in the platform itself.

If direct negotiation fails, the platform urges the manager of the ODR provider to appoint a mediator who will manage the ODR through synchronous and asynchronous dialogic flow: for **60 days** the platform allows the mediator to access all the information collected in the dossier (including the previous chat line and the estimates made by the AI) and to interact with the parties via chat line or video conference. The platform reminds the mediator to solicit the parties after 4 days of inactivity and on the 40th day urges her/him to conclude the negotiation. If the parties reach an agreement, the mediator confirms it to the platform, specifying the economic contribution that one party will pay to the other (a datum necessary to train the AI) and she/he uploads the text of the agreement, which the platform make the parties sign via the digital signature system implemented in the platform itself.

At any time the mediator can share the solution calculated by AI with the parties or can use it as she/he sees fit: however, on the 50th day form the beginning of mediation the platform urges the mediator to propose the algebraic solution to the parties.

Finally, on the 61st day from the beginning of mediation the platform urges the manager of the ODR provider to archive the dossier and to notify the competent authority, if the parties have allowed 10 days to pass without interactions since the mediator's last communication.

Artificial intelligence

Smart ODR Tool's AI calculates the economic solutions that optimize the settlement of each dispute managed by the platform. Optimization algorithms derive from the literature on negotiation (principally J.F. Nash 1950 *The Bargaining Problem*; E. Kalai & M. Smorodinsky 1975 *Other Solutions to Nash's Bargaining Problem*; H. Raiffa 1953 *Arbitration Schemes for Generalized Two-person Games*; H. Raiffa 1982 *The Art and Science of Negotiation*; J.K. Sebenius 1992 *Negotiation Analysis*) and calculate a rational economic solution, based on 3 essential variables:

1. Initial economic request from the party claiming a compensation (p).
2. Walk Away Value (WAV) of the party claiming a compensation (q).
3. WAV of the party invited to negotiate a settlement (r) and her/his ultimatum ($s = p-r$).

WAVs (variables q and r) represent the economic opportunity cost of the conflict: for each party, AI aggregates the costs of judicial management of the conflict (adding the forensic parameters of L.D. 147/2022 to the unified contribution, the registration tax on the judicial sentence and the possible technical consultancy, all referred to p variable) and interpolates them with the 4 essential judicial

possibilities (winning the case and the reimbursement of litigation costs; winning the case with compensated litigation costs; losing the case with compensated litigation costs; losing the case refunding the costs payed by the other party); AI considers each possibility equally probable, but each party or her/his lawyer can introduce additional possibilities (e.g. a partial victory or defeat), allocating probabilities (based on case law knowledge). Furthermore, consumers' ADR regulation imposes separate compensation by subject, which AI integrates into the calculation of the WAVs.

Economic optimization algorithms calculate **7 possible solutions** (x_1-x_7 amount to be payed to or from the compliant) based both on linear and complex criteria (O.D. Rossi 2022 *Negoziare con l'Algebra*) then AI statistically merges the solutions via vectors inner product:

Classical solution:
$$x_1 = \frac{ps}{p-q+s}$$

Symmetric solution:
$$x_2 = \frac{pq}{p+q-s}$$

Symmetric average solution:
$$x_3 = q + \frac{s-q}{2}$$

Neoclassical solution:
$$z = \sqrt{|s-q|^2 + |p-q-r|^2}$$

if $\{q+r < p\}$ then $\{x_4 = q + \frac{zq}{2p}\}$ and $\{x_5 = \left|s - \frac{zr}{2p}\right|\}$

if $\{q+r > p\}$ then $\{x_4 = \left|q - \frac{zq}{2p}\right|\}$ and $\{x_5 = s + \frac{zr}{2p}\}$

Relativistic solution:
$$d = |q-r|$$

$$y = \frac{d}{q} \frac{d}{r} + \frac{r}{q} \frac{q}{r}$$

$$x_6 = \sqrt{\frac{y^2 d^2}{y^2 - 1}}$$

Complex solution ($i^2 = -1$): $\{-1 < \varepsilon < 1\}$ and $\{-1 < \eta < 1\}$

$$\{a = \frac{q}{p} + \varepsilon i\} \text{ and } \{b = \frac{s}{p} + \eta i\}$$

$$ab = \frac{q}{p} \frac{s}{p} + \frac{q}{p} \eta i + \frac{s}{p} \varepsilon i - \varepsilon \eta = \zeta + \tau i$$

$$|ab|^2 = \zeta^2 + \tau^2$$

$$x_7 = p \sqrt{\zeta^2 + \tau^2}$$

Merging solutions:
$$y_n = p - x_n$$

$$\dot{X} = \left\{ \frac{x_1}{\sum x_n}, \frac{x_2}{\sum x_n}, \frac{x_3}{\sum x_n}, \frac{x_4}{\sum x_n}, \frac{x_5}{\sum x_n}, \frac{x_6}{\sum x_n}, \frac{x_7}{\sum x_n} \right\}$$

$$\dot{Y} = \left\{ \frac{y_1}{\sum y_n}, \frac{y_2}{\sum y_n}, \frac{y_3}{\sum y_n}, \frac{y_4}{\sum y_n}, \frac{y_5}{\sum y_n}, \frac{y_6}{\sum y_n}, \frac{y_7}{\sum y_n} \right\}$$

$$\omega = \langle \dot{X} | \dot{Y} \rangle$$

$$\{x^* = \omega \sum_{n=1}^7 x_n\} \text{ and } \{y^* = \omega \sum_{n=1}^7 y_n\}$$

AI learns how to predict pragmatic solutions that people should evaluate as more efficient than algebraic solutions (viz. solutions coherent with human experience), comparing algebraic solutions (x^*) with pragmatic solutions selected by the parties (v). AI derives the statistical divergence coefficient (ξ from S. Kullback & R.A. Leibler 1951 *On Information and Sufficiency*), on which basis AI modifies ω coefficient when divergence exceeds standard deviation ($\xi > \sigma$):

$$v = \frac{v}{\sum x_n}$$

$$\xi = v \log_z \left(\frac{v}{\omega} \right)$$

if $\{v < \omega\}$ then $\{\omega^* = \omega - |v - \omega|\}$

if $\{v > \omega\}$ then $\{\omega^* = \omega + |v - \omega|\}$

Complete ODR procedure

Smart ODR Tool follows 4 operational stages, subsequent to users authentication in the platform.

1. Start of the procedure.

A) *Smart ODR Tool* administers filter questions in order to guide the consumer through the selection procedure of the appropriate ADR instrument (e.g. in the field of banking it is necessary to carry out a mediation pursuant to D.Lgs. 28/2010, while in the field of electricity supply it is necessary to carry out a conciliation according to the Integrated Conciliation Text of ARERA), entering the identification data and contact details of the parties involved in the dispute (the platform processes all data in compliance with the GDPR):

- i. Subject of dispute:
 1. Bank – D.Lgs. 28/2010 mediation.
 2. Insurance – D.Lgs. 28/2010 mediation.
 3. Electricity, gas and water supply – D.Lgs. 130/2015 conciliation.
 4. Telecommunications – D.Lgs. 130/2015 conciliation.
 5. Mailing services – D.Lgs. 130/2015 conciliation.

6. On-line sales – D.Lgs. 130/2015 conciliation.
 7. Transportation services – D.Lgs. 130/2015 conciliation.
 8. Pay TV – D.Lgs. 130/2015 conciliation.
 9. Holidays and travels – D.Lgs. 130/2015 conciliation
- ii. Type of dispute (payments, administration, etc.).
 - iii. Type of contract (written, verbal).
 - iv. Date of conclusion of the contract.
 - v. Value or scale of value of the dispute (economic claim for compensation).
 - vi. Identification data of parties.
 - vii. Free description of the facts.
 - viii. Documents uploaded to the platform, specifying which are open to all and which are reserved for the mediator.
 - ix. Power of attorney (PoA) in favour of a representative and/or a lawyer (always open, never confidential). The PoA may also have been granted in favour of the person lodging the request for conciliation on behalf of the person concerned.
 - x. Clarification of the legal grounds for the dispute (selection of reference standards).
 - xi. Date and proof of receipt of the formal complaint sent to counterpart.
- B) The platform suggests to the proposing party – on a confidential basis – an estimate of the costs of judicial handling of the conflict, calculated according to the value of the dispute and according to the legal parameters of cost evaluation (unified contribution, legal assistance, etc.) which the proposing party may correct.
 - C) AI calculates the WAV of each party on the basis of economic data given at previous letter C; anytime each party can consult her/his own WAV only.
 - D) The ODR tool shall elaborate a summary text – excluding (reserved) WAVs and economic costs – and asks the claiming party for her/his approval of the summary.
 - E) On approval of the summary text the claiming party signs the official request for the ODR services via the digital signature system implemented in the platform.
 - F) The platform requests the proposing party to pay any fee for initiating the conciliation procedure, then it notifies an invitation based on summary text (previous letter D)) to the other party via certified email (CEM).
 - G) The invited party receives the invitation to mediation and the information about the procedure.
 - H) Within 15 days from receipt, the invited party may join the conciliation procedure, paying any fee due to the ODR provider.

- I) After payment, the participating party have access to her/his reserved area of the platform and may consult the mediation dossier in order to:
 - i. Upload documents to the platform, specifying which are open to all and which are reserved for the mediator.
 - ii. Load PoA for her/his representative and/or lawyer (always open to the other party, never reserved).
 - iii. Correct – on a confidential basis – her/his own economic costs of the judicial handling of the conflict, so that AI updates the party’s WAV.
 - iv. Decide to join the mediation or to quit it.
- J) After 10 vain days from the notification of the invitation, the platform communicates an alarm (via email) to the invited party, requesting a response.
- K) The platform suggests to the manager of the ODR provider to archive the dossier, notifying the outcome to the Competent Authority, if the invited party fails to respond within 15 days of notification of the invitation (viz. 5 days after the alert at previous letter J)).

2. Direct negotiation.

- A) The platform informs the parties of the existence of an economic solution, but it avoids to reveal that solution, in order to push the parties to a personal decision.
- B) The platform allows the parties to communicate with each other asynchronously, through a chat line that implements special spaces to enter economic offers or economic requests (accessible to the other party) and personal emotional position (emoticons and linear gradients that either party may decide to make accessible to the other Party or not). Direct negotiation lasts 18 days (including public holidays and weekends), during which the parties can report to the platform if they reached an agreement. The platform reads the messages exchanged between the parties and the mutual offers, analyzing data with AI routines, through which the ODR tool learns the fastest and most efficient strategies that the parties adopt to reconcile. Moreover, the platform invites the parties to propose precise economic solutions (M. Mason & A.J. Lee & E.A. Wiley & D.R. Ames 2013 *Precise Offers Are Potent Anchors*) when it detects “round” offers, which the parties can still choose to communicate.
- C) If a party fails to communicate within 4 days from the last communication, the platform shall report an alert (via email) to both parties, soliciting the communication and the agreement. In addition, on the 15th day of direct negotiation the platform signals an alarm to the parties to urge the settlement.
- D) If the parties reach an autonomous solution within 18 days from the start of direct negotiation, the platform lets the parties sign the agreement through an electronic signature system implemented in the ODR tool: parties exchange the PDF text of the agreement until both of them approve the draft, then they signal if the agreement imply an economic transaction and, if yes, both of them must specify the same amount, in order to subscribe the agreement.
- E) If the parties settled the dispute, AI calculates its optimal economic solution (calculus is procrastinated to this stage, in order to save computational resources) and compares it with the solution agreed by the parties, in order to record the real deviations from the mathematical model and, thus, to learn the patterns of real decision making models, to be implemented in

future calculations of mathematical solutions.

3. Mediation.

- A) If direct negotiation results unsuccessful, the platform alerts the manager of the ODR provider to appoint a mediator/conciliator (randomly in the first months of project start-up, then interpolating data and assigning each mediator/conciliator to the type of conflict that she/he has historically proven to resolve more effectively): the manager appoints the mediator/conciliator and the platform communicates it via email to the parties and to the mediator/conciliator himself.
- B) AI calculates the optimal economic solution to the dispute (calculus is procrastinated to this stage, in order to save computational resources).
- C) The mediator/conciliator accesses the platform and analyses the assigned dossiers, including the messages exchanged directly between the parties, in addition to the solutions calculated by AI; so mediator/conciliator decides when to intervene with whom within 60 days from the assignment:
 - i. In asynchronous mode, via the chat line implemented in the platform. The mediator/conciliator may decide to:
 - 1. Solicit and intervene in a debate at a time preferred by the mediator.
 - 2. Read the messages prepared by each party and transmit them to the other party or suggest a change before sending.
 - ii. In synchronous mode, via videoconferencing or chat line, announcing to the parties the date of the meeting.
- D) If a party fails to communicate within 4 days form the last communication, the platform shall report an alert (via email) to the parties and to the mediator, requesting communication and settlement.
- E) On the 40th day of mediation, the platform alerts the parties and the mediator/conciliator about the upcoming closure of the procedure (on 60th day), with or without agreement.
- F) At any time the mediator/conciliator may propose to the parties her/his own conciliatory idea, which the parties may accept or reject.
- G) The agreement is signed via an electronic signature system implemented in the platform itself: parties and mediator/conciliator exchange PDF text of the agreement until both parties approve the draft, then they signal if the agreement imply an economic transaction and, if yes, both of them specify the same amount, in order to subscribe the agreement.
- H) On 50th day the platform alerts the parties and the mediator via email, pushing for a settlement; and it suggests the manager of ODR provider to archive the procedure on 61st day, reminding her/him to notify the outcome to the competent Authority, if the parties neglect to reply to the mediator/conciliator within 10 days of his last communication.

4. Agreement proposal.

- A) If the negotiation fails, the platform reminds the mediator to communicate to the parties the solution calculated by the AI, which the parties can freely accept or reject.
- B) If the parties reach an agreement, the platform helps them formalize the agreement through an electronic signature system and archives the datum, for AI training. Anyhow, the platform reminds the manager of the procedure to archive the dossier.

LOCAL SERVER		AI CENTRALIZED ITALIAN SERVER									
ID	Users	Class	Claim (p)	Costs _A	WAV _A (q)	Costs _B	WAV _B (r)	Proposal (x)	Coefficient (ω)	Solution (v)	Divergence (ξ)
...

Databases

