Decision-Making and Artificial Intelligence: From Technical Mechanisms to Legal Concepts

Laurène Mazeau, Jordan Ninin

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Laurène Mazeau[1] and Jordan Ninin[2]

Introduction

Since the conference held on campus at Dartmouth College in the summer of 1956, artificial intelligence has greatly enriched the history of mathematics and informatics. In just a few years, we have seen an unprecedented rise in the use of technologies using artificial intelligence mechanisms. This expansion has been especially fueled by the resolution of notoriously complex problems that were deemed impossible to resolve only ten years previously (the comprehension of natural speech, the victory of the *Watson* software against the best players of *Jeopardy*, the victory of the *AlphaGO* software against the game GO grand master[3], *etc*.). These major advances have enabled the broadening of the possible applications of artificial intelligence. Numerous supposedly impossible problems have now become possible. This expansion could be compared with the creation of the personal computer[4].

Most artificial intelligence procedures have been created either to help the user make choices, or decisions. The fields of applications are vast. Even the term "artificial intelligence" has outgrown the framework of the *Deep Learning* algorithms within which it was originally confined. According to the authors of the "Donner un sens à l'intelligence artificielle" (or "Giving meaning to artificial intelligence") report of 2018: *"Artificial intelligence does not so much describe a well-defined field of research but rather a program, founded on an ambitious objective: understand and reproduce human*

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3 David Silver et al, "Mastering the game of go without human knowledge." (2017) *Nature* 550:7676 at 354.
4 Cover of Time magazine « *The Computer, Machine of the Year »,* 3 January 1983.

cognition; create cognitive processes similar to those of a human»[5]. As for the International Organization for Standardization (ISO), it defines artificial intelligence as: « *The capability of a functional unit to perform functions that are generally associated with human intelligence such as reasoning and learning* »[6]. Thus, in the light of these definitions, we shall be using the term "decision-making process" to represent all the new software or processes enabling learning or reasoning in order to support decision-making. The numerous ethical questions that can appear in relation to these decision-making processes stem mainly from the opacity of these technologies. 'Black box" mode implies processes where it is possible to observe the input and output data but where one does not completely understand the internal workings. The use of decision-making processes in certain sensitive areas questions about the security of above all, the products and calls for root and branch reflection on the question of human liability. Decision-making processes question our capacity to organize knowledge, give it meaning, increase our ability to control systems and, above all, justify our decision making.

Thus, in the context of the use of a decision-making process, the question arises of who takes the decision, if this person can actually be identified, or even if they exist, and above all, who is responsible for compensating the victim. How can you establish a hierarchy between the scientific, which reveals the collective nature of the decision, and the legal, which by way of a contract or not, seeks to establish the person who is responsible?

The developer of a decision-making process is not there to take the decision instead of the user[7], but does he realize that? He designs a decision-making process to search for what would appear to be the optimal decision, but through his choice of methodologies and implementations, he reduces the possible choices. As we shall see in the first part, this will be perfectly illustrated during the search for a solution satisfying several objectives. « *The more the user is free to choose, the more responsible he will be. And conversely, the more the user is influenced and limited in his choices, or intervenes*

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5 Cédric Villani et al, *Donner du sens à l'intelligence artificielle : pour une stratégie nationale et européenne*, (Conseil national du numérique, 2018) at 9.

6 ISO/ IEC 2382-28:1995

7 Bernard Roy, *Méthodologie multicritère d'aide à la décision* (Paris : ed Economica, 1985).

sporadically, the less responsible he will be.»[8]. Thus, even when using a decision-making process, the decision remains shared.

The comprehension of the decision-making process is a necessary step in the application of an appropriate legal regime. The complexity of the processes used raises the question of the comprehension and mastery of these tools by not only the users, but also the developers. Indeed, the question of liability comes second. In the case of complex decision-making processes, the liability which is a result of a prejudicial decision can only be “imputable” to the behavior of individuals. Thus, as we shall see in the second part, collective liability would seem to come to the fore, rather than at an individual level. In the light of such an event, several attitudes are possible, some of which we shall consider.

I. Understanding the collective nature of decision-making on a technical level

When decision-making, the decider looks for the best solution, that is to say, the best possible choice. Nevertheless, the idea of “best” is subjective and the decider can be tempted to use a decision-making process using artificial intelligence and mathematical optimization processes, to establish the legitimacy of his decision thanks to an objective *optimality* search.

A. The different forms of the decision-making process

The aim of a decision-making process is to search for the optimal solution to a problem. This optimality search is possible and certified thanks to mathematically proven theorems. This set of theorems enables the obtained result to be justified and certified objectively.

Indeed, each optimization method on which a decision-making process is based, works within a precise framework. If this framework is respected, the optimality of the decision can be guaranteed and does not require being called into question. This optimality proof

8 Jordan Ninin & Laurène Mazeau, « *La recherche opérationnelle: De quelques enjeux juridiques des mécanismes d'aide à la décision* » (2017) 22:1 Lex Electronica 57.

is highly sought after, as it enables decisions which normally cannot be called into question, because they are optimal and mathematically proven. Thus, there is no subjectivity.

Nevertheless, this apparent objectivity and mathematical optimality are often just an illusion. As although there is no doubt as to the mathematical optimality of the solution, the subjectivity of the modeling of the problem in itself could be questioned. Indeed, to obtain this mathematical optimality, the real problem has to be modeled. The variables have to be defined, the constraints respected, the objective minimized. Nevertheless, any modeling in itself is reductive, as it is impossible to capture the true extent of complexity and uncertainty when modeling. Even when, in certain cases, the complexity can be appreciated, there will always remain subjectivity in the methodology used. Effectively, whatever the mathematical method used, it can only answer a question it has been asked. The true subjectivity is in the formulation of the problem.

If we take the hypothesis of a "multi-objective" problem, where a decision must be taken which reconciles two distinct objectives function, for example, maximizing customer satisfaction and minimizing production costs; or minimizing the weight of a plane's structure to reduce consumption and maximize its reliability and strength, decision-making becomes more complex. How can you make an optimal decision when aiming for several objectives? How can you decide if one decision is better than another?

1. Multi-objectives and decision-making

.In the case of a single objective, it is possible to compare all the decisions. In mathematics, this is called a "total order". Thus, the best solution will be determined by comparing all the solutions against each other. When there are two objective functions, a « total order » is no longer valid, and only a « partial order » can be defined. For example, if there are two possible decisions A or B, solution A can be the best for the first objective function and worse for the second objective function, and conversely solution B can be the best for the second objective function and worse for the first objective function. These two solutions are not comparable as none is better than the other. They both correspond to compromises between the two objectives.

Mathematically, the set of best compromises is called « the Pareto front »[9]. This is the set of decisions for which there is no comparison or trade-off (for the two objectives at once). However, this set of compromises does not constitute "the" decision. Indeed, "the" decision remains to be taken. This "Pareto front" can represent dozens of decisions. When the choice is too broad, the user may find that the decision-making process does not give the support he expected. From there on in, what compromises should be retained? The developer will have to choose.

Let us illustrate the developer's choice by describing several methodologies planned in such a case.

The first method consists in finding the optimum for each objective function whilst ignoring the other. This solution enables the optimality to be obtained for one objective but often at the price of the deterioration of the second objective: effectively, a very light plane will obviously be less robust, or a product that satisfies all its clients completely would be too costly to produce. These solutions are rarely used as they represent poor compromises.

Another method consists in determining « acceptable » limits for each objective: for example, by placing the bar at 80% customer satisfaction or by selecting the maximum weight of the plane that should not be exceeded. The mathematical problem consists in optimizing one objective function subject to the constraint onthe second. In reality, if the objectives are contradictory, the constraint of the second objective will certainly be "saturated", and the solution will be optimal for the first objective function whilst respecting this constraint. This technique enables several compromises to be obtained but the limits must be given explicitly by the user and often these values are difficult to determine or cannot be determined at this point in the decision-making process due to lack of knowledge or possibility.

Finally, another method consists in merging the objectives into a single objective function. To do so, for example, the two objectives are added and weighted by a coefficient. There again, the user can be left the choice of weighting coefficient by giving more or less importance to one of the two objectives. Other approaches enable the

9 Kaisa Miettinen, *Nonlinear Multiobjective Optimization,* in *Operations Research & Management Science*, vol 12 (Kluwer Academic Publishers, 1999).

coefficient to be determined with more or less empirical subjectivity, or propose other methods of merging the objectives[10].

What should be retained at this stage is that the decision is in the form of a compromise, and the mathematical methods only enable the elimination of bad compromises. However, the search for mathematical optimality does not reduce, in any way, the ability to make choices and decide. Quite often, the mathematician, computer scientist or specialist is not aware that he is taking part in the decision-making, when he formulates the problem. The selection of the method and the different parameters represent choices to help the user to take decisions. They are also an integral part of the decision-making process.

In this context, is it still pertinent to try to proceed to impute the liability for damage or an injury to a single person or one link in the decision-making chain? At a low level of complexity, expert assessment seems to be a possible option. However, what happens when the comprehension of a decision mechanism becomes multi-criteria, multi-discipline (mechanics, aeronautics, automation etc)? Considering the complexity of the wide variety of points of view, methodologies, traditions and vocabulary, finding an expert capable of mastering the complete process could be a challenge.

2. Decision-making and explainability

To illustrate this diversity of fields and vocabulary, we are going to explore several decision-making processes that could be used by an artificial intelligence.

In computer science, the 1990s saw the growth of decision-making processes based on *expert systems*. The general principle consisted in building a demonstration to confirm or discredit a response. A simple version of an expert system could be the creation of a decision tree to find a suitable solution for the situation. Nevertheless, the number of branches on the decision tree remains limited thus reducing the number of possible decisions. Figure 1 represents a decision tree to help in a simple medical diagnosis. It reads from left to right. The questions are in red and you just follow the path corresponding to the response. The blue squares represent the proposed diagnoses.

10 Belur Dasarathy, *Decision fusion*, Los Alamitos (IEEE Computer Society Press, 1994).

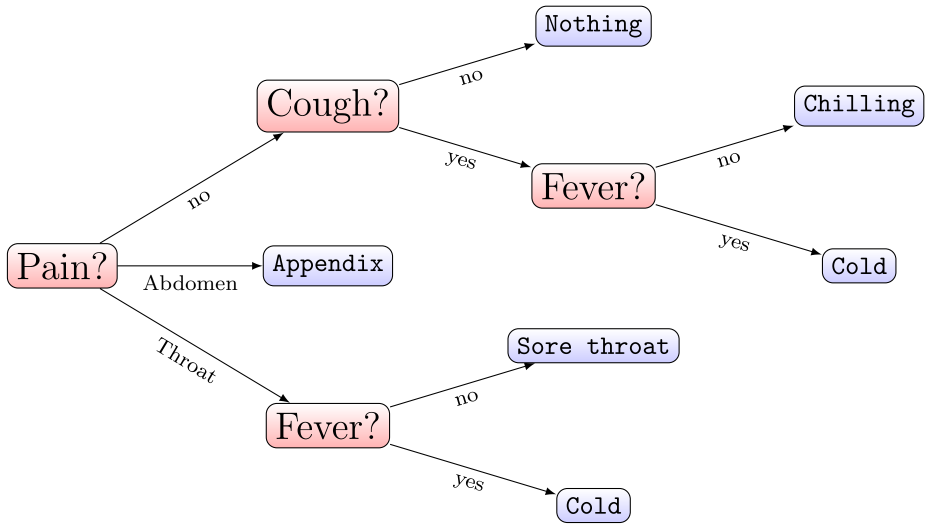

Figure 1 Example of decision tree.

Expert systems extend this principle by increasing the possibilities. They use a set of rules, called « grammar » and a set of truths called « axioms »[11]. The aim of the expert system is to use grammar and axioms to prove that a response is true or false. The number of responses that can be processed is greater. Thus, the user has an argued response on which he can base his decision. Nevertheless, these systems have reached their limit in the degree of complexity of the contexts in which they are used. Indeed, this type of approach is very effective for problems of little complexity. Technology requires a complete and coherent system, that is to say, that all questions can be asked, and that no response could be proved to be both true and false. However, Gödel's incompleteness theorems show us that when a system is complex, there cannot be a complete and coherent system[12]. For example, supposing everyone takes decisions in his own interest, when the number of people increases, most political systems choose representatives to take decisions in the name of the group. However, what happens if their personal interest is the opposite of the group's interest? The decision can be proved to be true if we consider the representative to be a person following his own interest, and false if we consider the representative as a personification of the group. The two responses can be proved and the field is not

11 Yves Bertot & Pierre Castéran, *Interactive Theorem Proving and Program Development, Coq'Art: The Calculus of Inductive Constructions*, (Springer Science & Business Media, 2013).

12 Kurt Gödel, "*Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme*" (« *Sur les propositions formellement indécidables des Principia Mathematica et des systèmes apparentés* ») (1931) 38:1 Monatshefte für Mathematik und Physik, 173 ; Alonzo Church, « *An Unsolvable Problem of Elementary Number Theory* » (1936) 58:2 American Journal of Mathematics 345 ; Jean-Paul Delahaye, "*Presque tout est indécidable!",* in *Pour la science, vol 375 (jan 2009)* at 88.

coherent. To solve this coherence problem, you could suppose that the first rule does not apply to representatives and the system is thus no longer complete. Thus, in practice the demonstration calculation is sometimes too time-consuming, limiting its use to well-defined, coherent systems for which we have complete knowledge.

With the rise of the so-called intelligent vehicle, automation has become a major subject in the science of decision-making. Indeed, the first objective of this field is to make automatic decisions. We presuppose that humans are not a part of this process. To enable this, a dynamic mathematical model of the system that we want to automate is required. This modeling is essential to be able to anticipate and thus simulate the future, so as to evaluate the impact of each decision and select the optimal outcome. Automation enables the creation of an automatic response for each situation, but, to do so, the creation of a model is essential. This must be as authentic as possible, incorporating as much information as possible concerning eventualities and uncertainties. The robustness of the automatic process lies mainly in the reliability of the model. Only that which has been modeled can be predicted. Any risks that have not been modeled will not be taken into account. For example, the automatic pilot of a plane foresees transferring the handling of the plane back to the pilot if some unforeseen behavior of the plane occurs. In conclusion, it is difficult to go without human supervision when the automated system is critical and an emergency can always occur.

In mathematics, or more precisely, in operations research, there are numerous methods to help decision-making. Clustering methods enable new situations to be attributed to a cluster[13]. For example, we wish to use a decision-making process to establish whether a patient is sick or not. These methods are always based on significant quantities of data that have been acquired from previous patients. These data can be structured, meaning that we know the correct decision for each of them. These methods are referred to as "supervised clustering methods". Data can also be non-structured, and the method tries to organize them into clusters, maximizing the common characteristics of the data within each cluster, whilst maximizing the differences between the different data clusters. This is referred to as "unsupervised clustering methods". However, in the two types of clustering techniques, it is rare that the clusters are markedly distinct.

13 Daniel Aloise & Pierre Hansen, *Clustering*, in D.R. Sheir, ed, *Handbook of Discrete and Combinatorial Mathematics* (CRC Press, 2009).

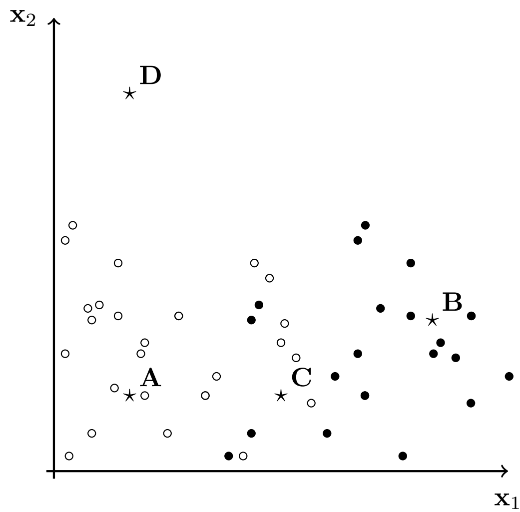

Figure 2 Example of supervised clustering.

For example, Figure 2 below illustrates a case of supervised clustering. The axes correspond to the parameters that were judged as pertinent to decision-making (i.e. the age and weight). The white dots represent the data of patients who have already been treated and diagnosed as being ill, and the black dots are the data of healthy patients. The aim of the decision-making process is to establish whether the patients A, B, C, and D are ill. When observing Figure 2, it would be logical to conclude that patient A is ill and patient B is healthy. Concerning patient C, the clustering technique would tend to class him in the ill patient cluster, as he is « closest » to this, but we can observe that certain healthy patients are in the same situation as C. The result of patient C is less clear. Finally, patient D can be classed as ill, as he is closest to this category, however, he is also completely isolated and these data do not correspond to any other previously processed patient. This patient could represent a new cluster. How can a decision-making process help the decider in this case? If the data do not represent the new considered case, or are biased, the decision will not be reliable.

Let us turn now to the algorithms which have led to the most significant advances in artificial intelligence over the past few years. These are methods based on neural networks, or *Deep-Learning*. These methods were first successful in the 1980s[14]. However, before staging a comeback in the last few years they were overtaken by other

14 Jürgen Schmidhuber, "*Deep learning in neural networks: An overview*" *(2015) 61:* Neural Networks 85.

methods based on separating hyperplanes or Support Vector Machines*[15]*. The latter gave the best results for decision-making by being based on moderate quantities of data, and had the advantage of retaining mathematical interpretation, i.e. the decisions could be justified mathematically. Thanks to increasing computer calculation capacity and above all, massive collection of extremely large quantities of data (*Big Data*), methods based on neural networks have, to a large extent, replaced the other methods. Watson and AlphaZero are mostly based on this type of method. These methods have enabled a probability of "likelihood" to be obtained for each of the possible choices. The choice with the highest probability becomes the "best" decision.

To create a neural network, you thus require an extremely large data set, as well as an optimization algorithm. The latter will enable the neural network to be configured so that it reaches good decisions based on a known data set[16].Thus, a good neural network will give a correct response in over 95% of cases. That means accepting that there will be some responses which are wrong in certain instances. It is also possible to create different neural networks based on the same data. Indeed, the optimization method used to create a neural network usually contains a random element which does not guarantee its reproducibility. Thus, it is possible to create several neural networks based on the same data, giving different likelihood probability results, whilst still obtaining the same success rate. Moreover, the explainability of the probabilities obtained by a neural network is very complicated to obtain and constitutes a whole field of research[17].

To conclude, each decision-making process requires preparatory calculations. Each method delivers a set of justifications which are more or less precise for the decisions proposed. The method chosen is, in itself, part of the final decision and depends on the context and the knowledge available. However, unfortunately, the developer is rarely aware of this, certainly due to the abstraction of the problem or his training (mathematical rules being absolute, conditions and limits to applications are rarely examined in detail when each decision is being made).

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15 Bernhard Schölkopf & Alexander Smola, *Learning With Kernels: Support Vector Machines, Regularization, Optimization and Beyond* (MIT Press, 2002) print.

16 Ian Goodfellow et al, *Deep learning,* vol 1 (Cambridge: MIT press, 2016) print.

17 Geoffrey Towell & Jude Shavlik, "Extracting refined rules from knowledge-based neural networks" (1993) 13:1 Machine learning 71.

Thus, it is difficult to know if a decision is due to the decision-making process, its use, or even the knowledge on which it has been designed. However, it becomes almost impossible to untangle the decision, when the method itself has been chosen by a decision-making process, or when the knowledge is generated by another process. Some decision-making processes have become so complicated that it is currently impossible to have an overview. They can mix decision trees and automation, everything governed by a neural network algorithm[18].

With this multi-disciplinary complexity, the analysis of a decision may require several experts in order to discover which part of the process influenced the decision the most. In the same vein, this puts the recommendation to improve the auditability of artificial intelligence systems of the 2018 report "For a meaningful artificial intelligence » into perspective. *"Auditability*" could "*involve the creation of a group of certified public experts who can conduct audits of algorithms and databases and carry out testing using any methods required. These experts could be called on in the event of legal proceedings, during an investigation undertaken by an independent administrative authority or on request by the Defender of Rights"*[19].

The concepts of artificial intelligence and decision-making processes cover an extremely broad spectrum. It is thus necessary to find a way to adopt a common vocabulary. Interaction between different experts, establishing good practice, and mutual comprehension will only work if there is a "harmonization of concepts". This could be guaranteed by using a soft law tool: technical standardization[20].

B. The harmonization of decision-making processes and technical standardization

At a European and international level, the phenomenon of the participation of technical standardization in the judicial system is particularly visible[21]. We see a true

18 Rodrigo Hernández-Alvarado et al,« Neural network-based self-tuning PID control for underwater vehicles" (2016) 16:9 Sensors 1429.

19 Cédric. Villani et al, *Donner du sens à l'intelligence artificielle : pour une stratégie nationale et européenne*, (Conseil national du numérique, 2018) at 21.

20 Laurène Mazeau, « *L'influence des sciences sur le droit de la responsabilité civile professionnelle : l'exemple de la normalisation* » (2010) *RRJ* at 711 ; Laurène Mazeau, *Les enjeux de la normalisation technique dans le domaine de l'intelligence artificielle* in *Cahiers Droit Sciences & Technologies* vol 8 (2018).

21 Communication from the Commission to the Council the European Parliament, and the European Economic and Social

generalization of methods leading towards a movement to rebuild a « world-class law » if we use Josserand's term[22]. Article 2 of Regulation n° 1025/2012 of the European Parliament and Council on European Standardization[23]. defines a standard as « *a technical specification, adopted by a recognized standardization body, for repeated or continuous application, with which compliance is not compulsory*" [24]. A standard is defined as a reference that has been jointly established by the general consensus of the stakeholders of a market, that is to say, the producers, users, laboratories, public bodies, consumers etc[25]. It is a general reference framework proposing technical and commercial solutions which are mainly used in view to the substantial simplification of contractual relations. One standard is thus the result of a consensus established by a process of so-called "standardization". The European Commission values the necessity to modernize European standards, considering their importance in the functioning of the internal market: "*Common standards guarantee the interoperability of digital technologies and are the keystone to an efficient digital single market*" [26]. As the European Commission points out: « *Standards play an important role for innovation. By codifying information on the state of the art of a particular technology, they enable dissemination of knowledge, interoperability between new products and services and provide a platform for further innovation* »[27]. In as such, standardization facilitates the transfer of knowledge and technologies in the product and services market. It enables the distribution and exploitation of the fruit of research and development, and encourages confidence in innovation. All in all, to fulfill these objectives, it is possible to employ four types of standard. The standards framework has different effects on innovation. First of all, the foundational standards which set the standards in terms of

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Committee, - "*Towards an Increased Contribution from Standardisation to Innovation in Europe"* - Brussels, 11 March 2008 - COM(2008) 133 final.

22 Louis Josserand, « *Sur la reconstitution d'un droit de classe* », *DH* 1947, chron at 3.

23 Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council.

24 Ruling distinguishing the « norm » from the « technical specification » primarily a document which prescribes the technical requirements to be respected by a product, process, service or system. See Art 2 (4) a) – d).

25 See in particular Eestelle Brosset, Eve Truilhe-Marrengo (dir.), *Les enjeux de la normalisation technique internationale*, CERIC, La Documentation française, 2006 ; Anne Penneau, *Règles de l'art et normes techniques*, (LGDJ, 1989) print ; Frank Violet, *Articulation entre la norme technique et la règle de droit (*PUAM, 2003) print ; Magali Lanord-Farinelli, *« La norme technique et le droit français: à la recherche de critères objectifs », RED consom.,* 2004, at 192 *seq.*

26 See Opinion of the European Economic and Social Committee on the « Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – *ICT Standardisation Priorities for the Digital Single Market"* », [COM(2016) 176 final].

27 Europe 2020 Flagship Initiative, Innovation Union, COM(2010) 546*,* at 16.

terminology, acronyms, symbols and metrology, ensure common comprehension of the technology and reduce the costs of transactions whilst facilitating commercial exchanges. Then, the specifications standards stipulate the characteristics and performance thresholds of a product or service. After that, the analytical and testing standards highlight the methods and means of running a test on a product. Finally, the organizational standards describe the functions and organizational relations within an entity. Taking into account the diversity of the stakeholders in artificial intelligence, it is essential to be able to employ foundational standards and a common framework and vocabulary. Standardization enables stakeholders from different horizons to speak the same language and establish a framework within which the technology providers and users can interact. The development of international standards for the concepts and terminology of artificial intelligence would seem to be a priority[28], as well as a framework for artificial intelligence systems using machine learning[29].

So as to establish a joint reference framework in the field of artificial intelligence on an international level, the International Organization for Standardization (ISO) has already begun a standardization program. The standardization process aims not only to answer artificial intelligence issues (in terms of robustness of solutions, regulation and even ethics), but also to maintain developments, without in so doing, hindering innovation linked to new technologies. Whereas the ISO defines artificial intelligence as: « *The capability of a functional unit to perform functions that are generally associated with human intelligence such as reasoning and learning* »[30], new standardization projects to define the boundaries of artificial intelligence are currently underway. Thus, in 2017, a Technical Committee (ISO/IEC JTC1/SC42 Artificial Intelligence) was set up to work on standardization in the field of artificial intelligence on an international level. The work of this committee is primarily concerned with foundational standards (e.g.: the definition of a common vocabulary), calculation methods (e.g.: specific algorithms) and confidence in systems using artificial intelligence. Two standardization projects have already been approved[31]. For the ISO/IEC 22989 (*Artificial Intelligence Concepts and Terminology)*

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28 ISO / CEI AWI 22989.

29 ISO / CEI AWI 23053.

30 ISO/ IEC 2382-28:1995

31 ISO/IEC 22989, *Artificial Intelligence Concepts and Terminology*,; ISO/IEC 23053, *Framework for Artificial Intelligence* (AI) *Systems Using Machine Learning* (ML), aims to define the concepts and terminology of this field so as to establish the bases for future norms of calculation methods.

standard, the work group has worked on fields such as « *Machine learning* », « *Deep learning* », « *Autonomy* », « *Automation* », « *Human-machine Teaming* », « *Narrow AI* » and « *General AI* ». Within this framework, numerous other semantic fields have been explored:« *Algorithmic bias* », « *Autonomous Systems*», « *Robotic and Industrial IoT systems: Do No Harm* », *etc*. One of the most pertinent aspects of the work of the IEC and ISO through the SC 42, lies in the fact that the analysis covers the entire artificial intelligence ecosystem, rather than just a specific technical aspect. Combined with the ranges of the fields of applications covered by the IEC and ISO technical committees, this will provide a complete approach to the standardization of artificial intelligence.

These contributions to work on technical standardization would seem to be essential facilitators to the comprehension of the different degrees of intervention of the experts in the formulation of the problem. That said, the existence of a complete expert assessment seems to be even so, too complicated to obtain, or even unattainable.

The mathematics reveals that in the presence of complex decision-making processes, civil liability which results from a prejudicial decision cannot always be attributed to the conduct of an individual. Thus, this liability rises to the surface on the collective rather than the individual level. In the light of such a finding, several attitudes are possible. The first consists in imputing the damage resulting from the decision-making processes to one or several defined subjects. The second aims to share the compensation either among a sufficient number of individuals, or among all the members of the national authority. We can perceive that these two classic methods for apportioning blame for a prejudice resulting from the exploitation of a decision-making process seem to be part of a dialectic relationship leading towards new paradigms. This classic approach to attributing liability seems to be increasingly challenged (especially with the development of presumptions of the imputability for the damage of the defendant). Rather than one liability which is clearly attributable, in this context we find new models of collective liability. Subsequently, if it is no longer possible to « be accountable for », then the law could seek to « impute to ». The algorithm developer/s, the software manufacturer, the user of the decision-making system – it has become “artificial” to determine who among them is the liable as such, burdened with contracting comprehensive insurance. If we agree on the principle that in complex systems, decision-making is not individual but collective, how can this intrinsically collective dimension be translated into civil law?

II. Legal interpretation of the collective nature of decision-making

As we have seen in the first part, it is very difficult to know if a decision is due to a decision-making process, its use or even the knowledge on which it was based. Moreover, it has become practically impossible to untangle the decision when the method itself has been chosen by a decision-making process or when the knowledge has been generated automatically by another process. Thus, by accepting to use such a procedure, the user is taking part in the decision-making process on the same level as the developer, even if the degree of implication of the user is variable from case to case. By accepting to resort to a decision-making process, the user also decides to assume even just some of the consequences. Holding the user uniquely responsible is out of the question. Here, we have set our sights on a chain of responsibility as it exists in real life. To do so, it seems extremely important to make sure of an essential precondition , the reality of the consent of the user through an obligation to inform. It is with full knowledge of the facts that the parties can come to an agreement as to the liability clauses. However, when the parties have not arranged their relationship via a contract, but the decision-making process is what causes the damage, we should start asking questions as to the adaptability of the rules of the French liability law. Can the existing tools take into account the "multi-disciplinary" nature of the decision-making systems?

A. The construction of the law when facing liability of a collective nature

The report of the French Council of State on digital technology and fundamental rights[32] points out that computer-based tools and the industrial secrets that concern them, contribute to the complex issue of the asymmetry of information between internet professionals and the layperson. In fact, the user tends to think that the rule established by default, conceived by a master in the art and followed by most other users, must also

[32] Conseil d'Etat, Annual Study 2014, *Fundamental Rights in the Digital Age*, *Doc fr, coll* The Reports of the French Conseil d'Etat, No 65, 2014, at 400.

be the best option for him[33]. So, considering the complexity of the systems, it is essential not to lose sight of the objective of freedom of choice of the individual. Thus, we should strive to optimize the conditions under which free choice is possible and also make sure that a person (the user) is capable of making that choice: the idea being that making a choice by default or necessity should not be encouraged. Thus, the developer should make sure that the user is capable of understanding the information, so that he is aware of and recognizes that he has some responsibility in the decision-making process, even if he is using automatic processes.

1. Decision-making and the obligation to inform

The ability of the user to understand the decision-making process will mostly be attained through a pre-contractual obligation to educate or inform. In theory, this is different from a duty to advise and, *a fortiori*, the obligation to inform during the fulfillment of the contract, be this an ancillary or main obligation of the contract. However, in practice, it is a delicate task to draw the line between a pre-contractual obligation and an accessory obligation of information, or between an obligation to inform and the duty to advise. These distinctions are more conceptual than practical, and thus particularly difficult to use in the complex processes of decision-making[34].

The obligation to inform incumbent upon the future contracting parties is explicitly stated in Article 1112-1 of the French Civil Code. This article lays down the existence of a public policy of *"duty to inform"* by stating that *"those of the parties who know of some information which is of decisive importance for the consent of the other party, must inform him of it, from the moment that, legitimately, the latter is unaware of this information or is trusting of his co-contracting party".* The article also states that *"…information is held to be of decisive importance if it has a direct and necessary relationship with the scope of the contract or the status of the parties".*

Two other texts define in general terms the obligation to inform which is incumbent upon the « professional ».[35] The first is Article L. 111-1, Paragraph 1of the French Consumer

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33 ibid.

34 Philippe le Tourneau, « *De l'allégement de l'obligation de renseignement ou de conseil* », *D* 1987 Chron 101.

35 According to the « preambular » article of the French Consumer Code, the term « professional » covers "*any public or*

Code, according to which « *All business suppliers of goods or services must, prior to conclusion of the contract, ensure that the consumer is made aware of the essential characteristics of the goods or services*.”. In addition to this, there is the obligation of the vendor of a product to provide the consumer with all the information which enables him to evaluate the inherent risks. Moreover, this is for a period of the product’s reasonable use, or expected use, and he should be forewarned of these risks if they are not immediately apparent without such due warning[36].

Under the terms of Article 1112-1 of the French Civil Code, the information communicated must enable the co-contracting party to make a fully-informed commitment and above all, to be able to measure the extent of his commitment. The obligation to inform appears to be the guarantee of the free and enlightened agreement of the user.

From the point of view of the creditor, the information is only due when he is legitimately unaware of the information.[37]Concretely, this is often the case when there is a contract involving a decision-making process. The obligation to inform for the creditor is only incumbent upon him if he is able to access himself to the information. This hypothesis, although conceivable, would only be at the margins of the average core competencies of most users. Moreover, the information is only due to the user if he trusts his co-contracting party. This concept seems to refer to the dependency the layperson finds himself in, in relation to the professional, with whom, we know, that case law has often been more severe, even if, most usually he is the debtor of a special obligation to inform[38].

As the contracting party is under obligation to inform the co-contracting party as to the collective nature of the decision-making process, he must inform him of the risks and advantages of the considered system or act. This also presupposes a training requirement on the part of the developer himself, which also includes ethics. To be able to deliver and supervise this training objective, the developer might be required to

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private, natural or legal person who is acting for the purposes relating to his trade, business, craft, profession or agricultural activity, including when he is acting in the name of or on behalf of another professional”.

36 C consom, Art L 423-1.

37 Patrice. Jourdain, « *Le devoir de “se” renseigner* », *D* 1983. Chron 139 ; Philippe le Tourneau, « *Les professionnels ont-ils du cœur ?* » *D* 1990. Chron 21.

38 Philippe le Tourneau, *Droit de la responsabilité et des contrats - Régimes d'indemnisation, Dalloz action, 11th ed, 2018-2019,* No 3112.14.

respect a certain norm, label, obtain certification or even commit to an ethics charter. According to Article 1112-1 of the French Civil Code, the debtor is "*the party who knows the information*". Such a statement should not intimate that the party to the contract who does not know some piece of information, even if it is decisive, would be exempt from providing it. This does not put an end to the duty of the information debtor to find out the information, especially if a professional. Over the last few years, case law has burdened him with a duty of investigation, which is a particularly heavy burden when using complex decision-making processes that are to be improved and updated regularly.

In the Montreal Declaration for a Responsible Development of Artificial Intelligence[39]., we find this intelligibility requirement for the functioning of "Artificial Intelligence Systems" (hereinafter AIS): "1*) AIS processes that make decisions affecting a person's life, quality of life, or reputation must be intelligible to their creators 2) The decisions made by AIS affecting a person's life, quality of life, or reputation should always be justifiable in a language that is understood by the people who use them or who are subjected to the consequences of their use. Justification consists in making transparent the most important factors and parameters shaping the decision, and should take the same form as the justification we would demand of a human making the same kind of decision*".

Thus, for complex decision-making processes, it would seem essential that the information debtor enlightens his partner on the product or service so that the latter can make a fully informed choice. Indeed, the debtor owes information *"the importance of which is decisive for the consent of the other".* Thus, we believe that the collective nature of the decision-making process should not be excluded from the scope of this duty of information. It is not a matter of a useless piece of information distracting the creditor from the essential. Indeed, a distinction should be made between this information and the advice of the debtor on the appropriateness of the act from the point of view of the client, which comes under a duty of advice and is not just a raw piece of information.

As proof, we can take the example of an artificial intelligence process which learns from its users and mimics their choices and behaviors. Thus, the solutions proposed by the decision-making process do not reflect the "best" decision for the user's problem, but the solution which is more usually adopted by all the users, in a collective way. The software

39 See the internet site : https://www.declarationmontreal-iaresponsable.com/la-declaration

can thus influence the user to make a bad decision on the basis of reiterated collective choices.

So, by being informed, enlightened as to the very nature of the decision-making process, which is inherently collective, the user can make an informed choice. However, that is where the duty of the debtor ends: he is not to take part, or prefer one solution to another. This obligation is, in theory, an obligation to achieve: to provide information. However, once this precision has been added, it is essential to clarify another aspect. Thus, classically, once the information has been given, its comprehension and taking into consideration by its beneficiary come under an obligation of means[40]. What happens when this is translated into a decision-making process?

Consequently, if the debtors of an obligation to inform have been too laconic, their partner should also be exempt of all liability, at least in part. This is the traditional rule for errors of substance and defects, when the purchaser uses an object for something for which it was not destined. A true dialogue between the parties, where the contracting party makes sure he is in receipt of all the information, should be inserted into contracts which involve decision-making systems, due to their complex nature. We can thus put these proposals into perspective with case laws covering a requirement to advise in the hypothetical case of providing devices or « complex systems ». All I.T. contracts do not merely consist of a duty of information, but a real duty to advise on the part of the professional. The French Supreme Court states this rule categorically: "*the professional vendor of I.T. equipment is obliged to inform or advise a client who is lacking in any competence in the subject*".[41]

To conclude, the violation of this duty of information as to the collective nature of the decision-making process will possibly result in two consequences. The first is a claim for tort of the debtor, the second concerns the possible cancelation of the contract if there is vitiated consent[42].Decision-making processes entail new requirements not only in terms

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[40] To this effect, the French Supreme Court upholds that a doctor is not obliged to succeed in convincing his patient of the risks entailed by the medical procedure he requests. See not, Civ. 1st, 18 January 2000, No 97-17.716, *Bull civ* I, No 13; *D* 2001. 3359, note M.-L. Mathieu-Izorche.

[41] Cass com, 11 July 2006, No 04-17.093. However, certain judgments uphold that the professional be obliged to establish that he advised his client with all the due diligence required, which would represent a heightened obligation of means. The distinction between obligations of means and results is ignored by Ruling No 2016-131 of 10 February 2016 bringing reform to the law of obligations, neither does it figure in the Civil Liability Draft Reform presented 13 March 2017.

[42] As those underlying Articles 1130 et seq of the French Civil Code.

of training[43] but also the information of professionals as well as the users. The comprehension of the tools, their functioning and their limits (especially in terms of autonomy) is a primordial objective for the sustainable development of these tools (the same remark could be made about the neutrality of the results)[44]. If the obligation to inform enables the co-contracting party to understand the decision-making system, he will be all the more able to negotiate the elements which are essential to the contract relative to liability.

2. Decision-making and liability clauses

When resorting to a decision-making process, the layperson might believe that he is making the decision alone, whereas in reality, it is made as a result of a chain of prior decisions. Thus, the absence of a contract could result in certain people being wrongly accused of being responsible for choices which were prejudicial to a victim, but which were run by the system. This could be mainly due to a problem linked to an expert assessment which has become almost impossible in certain complex decision-making processes. Thus, liable parties should be established *a posteriori* instead of sharing the risks out equally after the event. Such an arrangement before the event is essential and would greatly contribute to a better assumption of risks in the field of insurance. Subsequently, the different contracts which can and could exist in the future concerning decision making, should include specific clauses to encompass the obligations of the parties and apportion liability..The parties should be particularly attentive when establishing the limitation of a liability clause. By this, we mean any clause which aims to limit, or even eliminate, the effects of the liability of a contracting party. Article 1231-3 of the French Civil Code states that "*the debtor is bound only to damages which were either foreseen or which could have been foreseen at the time of conclusion of the contract, except where non-performance was due to a gross or dishonest fault*". So, the

[43] See to this effect : *Cédric Villani, rapp préc, at 198 :* « it is proposed […] to train health professionals in the uses of artificial intelligence, IOT and health big data, as well as coordination and empathy skills and patient relations ».

[44] Pierre L'Ecuyer et al. *"Non-neutrality of search engines and its impact on innovation."* (2018) 1:1 Internet Technology Letters. According to the authors of this study, although the mechanism is autonomous it may not be neutral for all that. There is a human behind the choice. Systems which seem to be autonomous to the uninformed user, in reality are not. Thus *Google*, for example, favors the contents and services of those which are hosted by *Google* (eg : *Google shopping*), which is also the case for *Bing*, *Microsoft's* search engine.

assessment date for foreseeing the damages is fixed « *at the time of conclusion of the contract* ». As a result, it would seem necessary to define the expected or foreseeable functional use of the decision-making process in the contract. Nevertheless, an unforeseeable performance on the day of the conclusion of the contract should not exonerate all liability. In any case, a disclaimer of liability due to the unforeseeable nature of the decision-making process would be faced with the prohibition of depriving the contract of its essential obligation. In this respect, Article 1170 of the French Civil Code resumes a constant case law: "*Any contract term which deprives a debtor's essential obligation of its substance is deemed not written*". This same reasoning is applied to all limitation of liability clauses (a contract term which limits compensation, or penalty clause, the aim of which should not be to affect the essential obligation of the contract). When the parties establish their obligations in their contract and thus, determine the liable party/parties for the decision, this does not represent a mathematic truth. It will be a contractually arranged verisimilitude to bring safety and confidence to the decision-making process.

Subsequently, according to this idea, liability is foreseen as an economic, ecological and technological regulation. We have gone from the acceptance of traditional liability consisting of "answer for", to seeking other instruments to "impute to". In this configuration, there is artifice, the creation of duties, where the whole chain of human stakeholders must be held liable; those who have created the decision-making processes as much as the users who feed them with data and complete the decision-making process.

B. The adaptability of the law in relation to the collective nature of liability

Henceforth, we should ask ourselves questions as to the consequences of a decision corresponding to a « normal » functioning of the decision-making process. Who is responsible for the poor choices made by the system (the developer, the owner, the user) ? What about the liability of the user whose choice differs from that delivered by the software and which proves to be prejudicial? Should the user be the only liable party if using the decision-making process leads to the harm of a victim ? The hypotheses of classic material system malfunction (loss of access to the database, computer system material breakdown, etc) is easily covered by the existing French liability. However, it is a different story for the consequences of a decision which corresponds to a "normal" functioning of the system. Several French liability mechanisms could be called into question: delictual liability for one's own acts, vicarious liability, or even the rather surprising hypothesis of "functionalist" liability of a robot. In particular cases of liability of the decision-making process in medical issues, we have shown that liability for one's own acts, as well as that due to objects and defective products were the mechanisms which were most likely to be invoked in the hypothesis that the decision-making process has caused damage[45]. For the most common case in decision-making processes (not seeking an exclusive medical diagnosis), and to be brief, only two solutions will be mentioned: liability for defective products(1) and liability for the actions of things (2).

1. Decision-making and liability for defective products

Here, we are in the hypothesis of the application of French liability for defective products as defined in Article 1246-1 of the French Civil Code. Although several questions could be raised about the adaptability of this regime to the issues surrounding complex processes, we have decided to concentrate on a selection.

On the basis of Article 1245-1 of the French Civil Code, the developer of a component piece of software, and the manufacturer, could jointly be held liable. Article 1245-5 releases the victim from the administration of the proof, by taking upon itself to determine if the fault should be attributed to the manufacturer of the machine or the developer of the decision-making process, by retaining joint liability. Indeed, the French liability targets the manufacturer of the finished product as it does that of the component part.

[45] For a more comprehensive analysis of the adaptability of French liability (for the specific case of medical decision-making software), see: Laurène Mazeau, « *Intelligence artificielle et responsabilité civile : le cas des logiciels d'aide à la décision en matière médicale* »**, in** *Revue pratique de la prospective et de l'innovation* (LexisNexis SA, 2018) at 38-43.

So that the liability for defective products works, the intrinsic fault must be able to be revealed, taking into account the state of scientific and technological knowledge at the time the product was issued. So, it is entirely possible that the decision-making process could evolve between its launch and an accident which occurs some months or years afterwards. That could bring to mind a modification to behavior by apprenticeship via machine learning, or even the addition of new functions by uploading suitable programs. In such a scenario, we see that the liability of the developer should be reconsidered as he will no longer be the sole developer of the evolved product. The comprehension of the collective nature of the functioning of a decision-making process enables a collective approach to shared liability between the developer and the user to be revealed.

Moreover, in French law, the idea of development risk should be clarified as this concerns the decision-making process. As a reminder, this idea enables the producer to be exonerated under French law as *« the state of scientific and technical knowledge at the moment when the product was launched, did not enable the detection of the existence of a fault"*. So, for example, the producer could allude to the development risk by asserting that he could not detect a fault at the time the system was launched due to an unforeseen evolution of his decision-making process. The temptation would be great for a developer to blame the user for having introduced a bias by transferring his behavior patterns to the decision-making process. Thus, it is interesting to note that on this subject, the draft reform of French liability presented by the French Chancellery on 13 March 2017 planned to reduce its field of application by preventing producers from alluding to it every time health products were implicated[46]. For the specific case of medical diagnosis support software, we can put into perspective the decision of the European Court of Justice of 7 December 2017 which states that recommendation support software is a "*medical device"*[47]. However, we can note that the existence and appearance of such biases in the data are problems which are inherent to these methods and of which the experts are perfectly well aware. It would be possible to

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[46] Art 1298-1, draft : « *The producer may only cite the grounds for exemption stipulated in 4° of Article 1298 when the damage has been caused by part of the human body or products originating from the latter, or by any other health product for human use mentioned in the first chapter of Title II of Book 1 of Part 5 of the French Public Health Code* ».

[47] See the European Union Court of Justice 7 December 2017 (*Snitem & Philips, aff. C-329/16*). V. also refer to the Médiator case : Cass 1st civ, 22 November 2017, No 16-23804, 16-24719, unpublished in the report.

reproach the developer for not having guarded against this, even if the consequences cannot be anticipated.

One last aspect should still be anticipated when implementing liability for defective products. This concerns the situation where the damage linked to the use of a decision-making process comes from an anonymous member of a group of defined people, meaning the developers and the users. This hypothesis calls into question the "constant" [48] condition of French liability, causality, and thus can perfectly be observed outside the framework of liability in the case of defective products[49].

To answer the major issues of compensating for damage resulting from an anonymous member of a group of defined people, the French Supreme Court has employed the concept of alternative causality over the last few years. A potential situation of alternative causality exists in decision-making processes. The process employs a multitude of similar activities (like the different methods mentioned in the first part), each being sufficient to produce considerable damage. One or several of them is effectively the cause of the damage, but not all of them. The victim is able to tell that the damage came from the operative event without, however, being able to determine which, thus prohibiting *a prior*, the imputation of liability. In the litigation linked to *Distilbène,* the magistrates recognized a relationship of cause and effect in law, where it did not exist as such[50]. Whereas the two companies had an 80% and 20% share of the market for Distilbène, the French Supreme Court decided to hold them jointly liable. This was because of the damage caused to the victim resulting from exposure to the risk of the litigious molecule *in utero*. The companies were held to be liable *in solidum* as liability could not be attributed to one or the other. We think that these "alternative" attributions of liability created by the judge in specific litigious cases, could also be applied to the field of decision-making processes. This is to the extent that the alternative causality applies to damage caused by a community without legal personality, and more specifically, to people linked to the community's interests or who share a common activity like decision-making software in medical matters.

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[48] Jean Carbonnier, *Droit civil :Les obligations*, PUF 22e éd., 2000, vol 205, at 377.

[49] The hypothesis concerns the cases of victims of an accident caused by several hunters, victims of damage caused by a collective game, or more recently, victims exposed *in utero* to Distilbène.

[50] Christophe Quézel-Ambrunaz, « *La fiction de la causalité alternative Fondement et perspectives de la jurisprudence "Distilbène"* », *D* 2010, at 1162 ; Laurent Neyret, « *La reconnaissance du préjudice d'exposition au Distilbène* », *RD sanit soc* 2002, at 503, spec, at 510.

Article 1240 of the Draft Reform Project on French liability states that « *when personal injury is caused by an indeterminate member of a group of identified people acting in concert or for similar motives, each one answers for all, except when proving that they cannot have been the cause*". The text thus expresses an identification requirement for the entire group of potential perpetrators, which is to be distinguished from the identification of their personal implication. On the other hand, the French Supreme Court, in a decision made on 17 June 2000, relative to litigation related to nosocomial infections departs from this logic[51]. The judges only refer to the participation of « several *establishments* » without distinguishing between them. Article 1240 also states that the authors, or in any case, the members of the group, must "*have acted in concert*". However, the potential perpetrators do not necessarily have to be acting in a group, despite the reference to the idea of the group present in the text. It is more a case of "*pure legal tradition*"[52]. The recourse to alternative causality enables the mitigation of the probationary impossibility of identifying the perpetrator of the damage by an expert, without claiming a unification of the generative act of damage.

Whereas the Draft Project confines its application to personal injury, case law sanctions the mechanism as much for compensation for personal injury as for material loss (litigation of *Distilbène*, nosocomial infections[53]). In summary, if the text were adopted as well as the restrictions to personal injury, the use of alternative causality could find a choice location in the litigations linked with the use of decision-making processes in medical matters. Finally, let us point out again that alternative causality requires the accused to answer for everything. Thus, the *in solidum* obligation implies that "*each shall answer for the debt of the whole*", contrary to proportional liability[54] which determines the liability of each party in relation to the causal link. The divisibility of the causes is carried out indirectly within the framework of the *in solidum* obligation on the contribution to the debt, by way of recourse, establishing the definitive part of the common debt.

51 Civ 1st, 17 June 2010, No 09-67.011,*RTD civ* 2010, at 567, obs Patrice Jourdain. Only two health establishments were impleaded although the victim stayed in six different establishments**.**

52 Emilie Quintane Villa, « *Contribution à une analyse rénovée de la causalité alternative* », (2017) 11: *Les Annales de droit*, 205.

53 Civ 1st, 17 June 2010, No 09-67.011.

54 « For an application of market share liability in American law » : *Sindell c/Abott Laboratories*, 26 Cal. 3d 588, 603-04, 607 P.2d 924, 930-31, 163 Cal. Rptr.132, 138-39, cert. denied, 449 U.S. 912 (1980) ; *California Law Review*, at 85. The Nanterre High Court also introduced dose proportionality: TGI Nanterre, 10 April 2014, No 12/12349, No 12/13064, *JCP* G 2014, at 575, obs C. Quézel-Ambrunaz.

To conclude, recourse to alternative causality demonstrates not only the will to establish a mechanism serving political necessities, morality, dissuasion and even distributive justice[55] but also and above all, it crystallizes the consideration of the reality of the process which is essentially collective and which does not enable exclusive imputation to be implemented.

2. Decision-making and liability for the actions of things

.In the cracks of the liability for defective products, it can be interesting to use the liability for the actions of things, in particular, when the damage results from an abnormal functioning of the decision-making system.

In French law, the liability for the actions of things impose an obligation on the custodian of the thing to compensate for the damage.. The custodian is the person who is invested with the power of its use, management and control[56]. So as to determine the limits of this liability in the context of decision-making processes, it is possible to refer to « split custody » which retains a distinction between the custody of the structure and the custody of the behavior[57]. The temptation can be strong to consider the decision-making process as being sufficiently developed to attain complete autonomy, which places it outside the control of the users and hence to conclude that it is incompatible with the liability for the actions of things. In reality, decision-making processes can accomplish a certain number of tasks in relative autonomy, but still remain mastered by the user or developer. The latter can always decide to shut it down, or not to follow recommendations. Hence, the risks of the structure linked to the design of the decision-making processes, could fall upon the manufacturer through the application of the law for defective products. On the other hand, for the behavioral risks, linked to the use of the thing, the obligation to compensate could be incumbent upon the owner or the user

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[55] Stathis Banakas, *Causalité juridique et imputation : réflexions sur quelques développements récents en droit anglais*, Seminar report of Genève, grerca.univ-rennes1.fr

[56] According to the definition given by the United Divisions of the High Court in the *Franck* judgment of 2 December 1941 (Cass ch réun, 2 December. 1941 : *D.C* 1942, at 25 note G. Ripert ; *S*. 1941, 1, at 217 note H. Mazeaud ; *JCP* G 1942, II, 1766 note J. Mihura), and then repeated in a constant manner by later case law.

[57] *B. Goldman, La détermination du gardien responsable du fait des choses inanimées : Thèse. Lyon 1946, No116 s., No 131 s. - A. Tunc, Garde du comportement et garde de la structure dans la responsabilité du fait des choses inanimées : JCP G 1957, I, 1384.* - Arrêt de principe *Cass. 2e civ, 10 June 1960, Oxygène Liquide : D. 1960, jurispr at 609 ; JCP G 1960, II, 11824, note P. Esmein.*

of the thing in regard to the victims. However, one should not think that this distinction is in a vacuum, in so far as a behavioral risk can be the origin of structural risk.

Conclusion

The method chosen by the developer of the decision-making process is, in itself, part of the final decision. As we have seen, it depends on the context and is contingent to the set of knowledge available at the moment of its creation. However, the developer is rarely aware of this, due to the abstraction of the problem or his training. Moreover, we have demonstrated that it is difficult to know if a decision is due to a decision-making process, its use, or even the knowledge on the basis of which it was conceived. However, when the method is itself chosen by a decision-making process or when the knowledge is generated automatically by another process, it is almost impossible to untangle the decision and to look for a traditional path of judicial imputation.

It is by taking stock of this complexity and the stumbling blocks that it can throw up, especially in the field of expertise that we have explored a few means so that the law adapts to become clearer. This is why we believe that it is essential to ensure adequate training for the developer to ensure that he himself understands the decision-making process and its stakes when it comes to liabilities and then to be able to explain to the user in particular when he is a layperson. To ensure this training and guidance, the developer could be called upon to respect a norm, a label, obtain certification or even sign up to an ethics charter. He cannot receive an obligation to inform the user of the complex nature of the decision-making system, if this one is not understood and appreciated by the developer himself. Moreover, this obligation to inform in addition to enabling technology to “make sense” for all the parties involved, enables the co-contracting party to understand the nature of the decision-making process. Hence, as we have seen, he will be all the more able to negotiate the essential elements of a contract relative to liability. We pass from the traditional acceptance of civil liability consisting in “answering for”, to seek other instruments so as to “impute to”. In this configuration, we are in a state of artifice, the creation of duties where the entire chain of human stakeholders must be made aware of their responsibilities: those who have created the decision-making process, as much as the users who feed off the data and complete the decision-making process. Apart from the hypothesis that the bounds of responsibility are outlined in a contract, we should question the sense of adaptability of the current French liability laws. It would seem to make sense to look for ways, in current regimes, to adapt the laws to the evolutions in decision-making processes. The creation of regimes of ad hoc liability would without doubt be more of a solution to the search for one problem. If we want to avoid creating a solution that would lead to more problems, it is possible for us to think how to develop existing tools and legal concepts. Thus, for the case of decision-making processes, liability for defective products, and for the actions of things would, without doubt, result in interesting tools. Certain concepts such as development risk, or alternative causality, the putting into perspective of the distinction between the custody of the structure and of the behavior, are all avenues for further reflection ensuring a coherent pathway between technical mechanisms and legal concepts.