SMART CONTRACTS AND SWISS OBLIGATION LAW

THE CONCLUSION "ON THE CHAIN" OF THE CONTRACT

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Table of abbreviations

art.	article(s)
ATF	*Recueil officiel des arrêts du Tribunal fédéral suisse*
BK	*Berner Kommentar*
BSK	*Basler Kommentar*
CC	Civil Code of 10 December 1907 (RS 210)
Cf.	*confer* (refer to)
CO	Code of obligations of 30 March 1911 (RS 220)
CR	*Commentaire romand*
ed.	edition
edit.	editor(s)
e.g.	*exempli gratia* (for example)
et al.	*et alii* (and others)
etc.	*et caetera* (and other things)
f.	and the next one
ff	and following
fig.	figure(s)
i.e.	*id est* (that is to say)
ibid.	*ibidem* (at the same place)
LES	Law on Electronic Signatures of 18 March 2016 (RS 943.03)
LCD	*Loi sur la concurrence déloyale* (=LUC)
lit.	*littera(s)* (letter(s))
LUC	Law on Unfair Competition of 19 December 1986 (RS 241)
n°	number(s)
OR	*Obligationenrecht* (=CO)
p.	page(s)
par.	paragraph(s)
PoW	Proof of Work
refs.	references
RS	*Recueil systématique*
s.a.	*Sine anno*
SC	Smart Contract(s)
sog.	so genannt (so called)
UWG	*Bundesgesetz gegen den unlauteren Wettbewerb* (=LUC)
Vol.	volume(s)

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1 Introduction

The object of this study concerns the formation of a legal contract following the use of a Smart Contract (**SC**). The SC represent a bridge between the digital world and the legal world, the use and control of which promise much. Indeed, the combination resulting from the use of computer programs as contracts makes it possible to ensure their execution in accordance with the terms defined when they were created, regardless of the evolution of the parties' will. Such a possibility prevents many of the difficulties associated with the performance of a traditional contract vis-à-vis a resigning party. However, this absolutism entails incompatibilities and risks that are sometimes difficult to conciliate with Swiss law. More generally, in our opinion, law and new technologies sometimes have difficulty to reconcile. This may be related to a slow evolution of the law and legal institutions regarding technology. However, we will see that these two worlds are not totally irreconcilable either.

SC are intimately linked to cryptocurrencies and blockchain technology. With the announcement of the launch of Facebook's cryptocurrency, Libra, the current banking and monetary system may be called into question. In view of the potential influence of such a currency, various doubts have already been raised, starting with the fact that a private company claims the right to create a currency, which was once the exclusive privilege of the state. For reasons that will be explained below, however, this study focuses on the blockchain Ethereum and its cryptocurrency, the Ether.

The approach followed below is based on the structure proposed by the Swiss Code of Obligations of 30 March 1911 (**CO**, RS 220), intertwined with some aspects of consumer law. Thus, after a brief description of the blockchain technology and of the technical aspects of SC, the fundamental juridical concepts of legal act and contract will be defined and confronted with their integration into the *a priori* autonomous system that forms the blockchain. These definitions will be followed by a presentation of the exceptions attached to these concepts, which will also be confronted with their integration into the blockchain. The presentation will conclude with the invocation of rights resulting from exceptions provided for by Swiss law in the blockchain.

As the object defined above is broad and the scope of this study limited, this one covers various selected aspects. In particular, it does not cover the establishment of a SC after the conclusion of a traditional contract. In addition, private international law aspects have been deliberately excluded, despite the intrinsic international nature of the elements discussed below.

2 Technical aspects

In order to understand the following study, it is necessary to briefly recall the technical concepts underlying the questions that arise. The blockchain is a combination of different technologies that allows the creation of a secured and distributed ledger. Such ledger can be used to share different types of data, but it was initially created as a support for electronic money. Indeed, even if the idea of electronic money is older than blockchain, the latter is the only one that has offered a viable alternative to what banks could offer[1]. Initially, blockchain was designed to be a support ensuring the integrity of cryptocurrencies and it received only later the ability to support SC. We will therefore present it first and introduce later briefly technical aspects of a SC.

2.1 Blockchain

The blockchain represents the environment in which the SC will be deployed in order to interact with cryptocurrencies. It is the technology that allows the creation and maintenance of cryptocurrencies and serves as a support for SC. After having defined the notion, we will present three consensus methods that permit the modification of the ledger around all the system, explain its setting in motion and delimit the concept.

2.1.1 Notion

"*Blockchain is a peer-to-peer, distributed ledger that is cryptographically-secure, append-only, immutable (extremely hard to change) and updateable only via consensus or agreement among peers.*"[2]

A peer-to-peer system (P2P) is a system in which all participants talk to each other, without a central authority[3], as opposed to a centralised network (server-client relation) in which the server offices as controller of the network. The participants to the system (or network) are usually called nodes.

The blockchain is a distributed ledger because it is spread across the network of nodes, where each node conserves a copy of the whole ledger[4].

It is cryptographically-secure as the whole blockchain is crypted through the use of hash functions and transactions use asymmetric cryptography to ensure the integrity and the reliability of the ledger. A hash function is a method used to convert an input text of any length in a fixed-length compressed form[5]. It is built to be easily computable in one way but impossible to compute the other way around[6]. There are different hash functions, but the most used in blockchains is SHA-3, also known as Keccak[7]. Asymmetric cryptography uses a set of two different keys to encrypt and decrypt transactions, a private key and a public key. The private key is used to sign the transaction and shall be detained by the only owner of the coins, while public keys are used by the nodes to decrypt the transaction, assuring this way that it was the actual owner of the coins that encrypted the transaction[8].

Being append-only means that data can, in principle, only be added to the blockchain in respect of certain rules[9], which implies that modifying or deleting the data stored in the blockchain is almost impossible[10], which itself implies that it is immutable.

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[1] BASHIR, p. 15.
[2] BASHIR, p. 17.
[3] BASHIR, p. 18.
[4] *Ibid.*
[5] BASHIR, p. 104.
[6] BASHIR, p. 104; BUTERIN, p. 7.
[7] BASHIR, p. 106 ff.
[8] BASHIR, p. 146 f.; NAKAMOTO, p. 2.
[9] BUTERIN, p. 7.
[10] *Ibid.*

Among these rules, we find the rule of consensus, which requires that all the nodes of the network have to agree with the proposal made by one of them in order to add data to the blockchain. Indeed, as the blockchain is distributed between all nodes, the exact same data must be registered on all nodes, because otherwise, there would not be one ledger but different ones. There are different ways to reach a consensus between the nodes[11] and these depend on the kind of blockchain used. It is usually distinguished between the permissioned blockchain and the permissionless blockchain[12]. A permissionless blockchain is open to the public, everyone may join it and take part to the system, whereas the permissioned is restricted.

2.1.2 Consensus methods

The modification of a distributed ledger has to observe a rule in order to be functional: the consensus. Indeed, if each node is able to modify the whole ledger at will without having to respect any rule, we may face a problematic situation in which different versions of the ledger exist in parallel (the so-called "forks")[13]. This is precisely what the consensus methods like the "Proof of Work" (**PoW**), the "Proof of Stake" or these based on the Byzantine Fault Tolerance aim to avoid[14]. The consensus method responds as well to security concerns such as the avoidance of Sybil attack[15] or falsifications of the blockchain.

The PoW consensus is based on the brute force of the nodes (also called "miners"), which are in competition in resolving a computationally hard problem, assuring the distribution of block creation in a way that statistically gives everyone a chance and prevents a single element from taking power[16]. The difficulty of the problem is dynamically adapted to maintain a specific time between each new consensus (which leads to the creation of a new block)[17], for example 10 minutes in the Bitcoin blockchain[18] or between 10 and 19 seconds in the Ethereum blockchain[19]. This consensus is very effective in public blockchain, where the nodes cannot be individually trusted. However, its energy consumption is worrisome[20].

The Proof of Stake consensus relies on the fact that users that own large amounts of the cryptocurrency (or, in more general terms, of the tokens of the blockchain) have a specific interest in the coin and will therefore avoid damaging in any way the blockchain[21]. It is an alternative to the PoW system in public blockchains that is less energy consuming.

In a blockchain where the number of nodes is restricted (*e.g.* a permissioned blockchain), each node can usually be trusted, and you therefore do not need to resort to heavy methods such as the PoW to assure the integrity of the ledger. There are thus specific consensus methods adapted to small blockchain based on the Practical Byzantine Fault Tolerance algorithm[22]. This algorithm basically works on the replication of the message through the different nodes of a network, in order to assure the veracity of the information transmitted.

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[11] *Cf. infra* section 2.1.2.
[12] BASHIR, p. 33.
[13] BASHIR, p. 330.
[14] BASHIR, p. 36 ff.
[15] A Sybil attack consists in creating and using multiple identities in order to overrule a peer-to-peer network.
[16] BASHIR, p. 36 ff; BUTERIN, p. 7; NAKAMOTO, p. 3.
[17] *Ibid.*
[18] BASHIR, p. 168.
[19] BASHIR, p. 327.
[20] The current consumption of energy of the Bitcoin blockchain is close to the one of Austria (https://digiconomist.net/bitcoin-energy-consumption; last consultation on 02.08.2019).
[21] BASHIR, p. 38.
[22] CASTRO/LISKOV, p. 1 ff.

2.1.3 Functioning

This section is intended to describe how a blockchain is set in motion through the description of a simple transaction. For the purpose of delimiting the range of this paper, we will focus on the Ethereum blockchain, but the system is fundamentally similar to the one that is used in the Bitcoin blockchain. This choice is simply related to the fact that the Ethereum blockchain was designed and built to support SC contrary to the Bitcoin blockchain.

Most popular blockchains can be described as a transaction-based state machine[23], that is, a system in which an initial state evolves through a transaction into another (final) state. The state can be described as the ownership status of the tokens in the blockchain, which is modified through transactions[24]. The transaction is, in a simplified way, a data package containing in particular: the address of the recipient, the signature identifying the sender, the amount of cryptocurrencies (e.g. Ether, the coins of Ethereum) and the data to send[25].

The steps leading to the registration of a transaction in the blockchain are the following[26]:

1. A person decides to transfer a sum of cryptocurrency to another. The easiest way is to use a wallet software as interface to interact with the blockchain.
2. This person will fill in the necessary fields in the application (address of the receiver, amount of cryptocurrency, etc.) in order to enable the wallet software to create the transaction and to sign it with the private key.
3. This transaction is broadcasted to the nodes and verified by them. It will then be included in the next block.
4. Once a block is constituted, the nodes try to solve the PoW in order to add it to the blockchain.
5. When the PoW is solved, the solution is broadcasted to the nodes and the block is added to the blockchain.

It is however important to note that even if the block containing the transaction is added to the blockchain, that transaction is not entirely confirmed. It is possible that the sender is trying to deceive the blockchain in paying simultaneously different transactions with the same coins, this issue is called the double-spending[27]. Even if, when verifying a transaction, the nodes verify, among others, that the signature of the sender is valid and that the balance of the account of the sender contains enough coins for the transaction[28], the receiver should wait for a few blocks being added after the block containing the transaction so as to ensure the validity of the transaction. Indeed, even if the block is accepted by the blockchain, it may be rejected in a second time becoming thus an orphan block[29]. This situation can occur where two nodes produce a new block at the same time and the next block(s) found decides which block will be kept in the blockchain, as the rule is that the latest version of the ledger is the longest[30].

Transactions on Ethereum are not free, they cost "gas", which is basically a low amount of Ether. The gas has two function in the blockchain, it avoids infinite loops and it compensates the miners' effort. Indeed, as Ethereum makes it possible to use computer programs (SC) interacting with the blockchain, it is important to ensure that the blockchain cannot be blocked by problems in such programs[31].

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[23] BASHIR, p. 282; BUTERIN, p. 5 f.; WOOD, p. 2.
[24] BUTERIN, p. 5.
[25] BUTERIN, p. 14; WOOD, p. 4.
[26] BASHIR, p. 283 ff.
[27] NAKAMOTO, p. 5.
[28] BUTERIN, p. 5; WOOD, p. 7.
[29] BASHIR, p. 167.
[30] *Ibid.*
[31] BASHIR, p. 328; BUTERIN, p. 14.

2.1.4 Delimitation

The blockchain is originally a compilation of blocks, which are themselves a compilation of transactions combined with additional information (such as a timestamp, a nonce, etc.[32]). As it is wholly conserved on each node, it is distributed, but it must be dissociated from other kind of distributed database. Indeed, there are distributed ledger that are not blockchains, as for example R3's Corda[33].

[32] BUTERIN, p. 6 f.; NAKAMOTO, p. 2 f.
[33] BASHIR, p. 32; HEARN, p. 4 f.

2.2 Smart Contracts

With the environment in which they work described, it is now time to clarify what is meant by SC. This chapter focuses on the technical aspects of the SC, that is to say, what they are, how are they composed and precise what they are not.

2.2.1 Notion

"*A smart contract is a computerized transaction protocol that executes the terms of a contract. The general objectives of smart contract design are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries. Related economic goals include lowering fraud loss, arbitration and enforcement costs, and other transaction costs.*"[34]

As SZABO highlights it, a SC is a computer program, in other words, a set of instructions given to a computer in a specific language, which is, in theory, conceptualising an agreement. SC aim at gaining efficiency through the speed of the digital world and reducing the need for intervention and, therefore, contract specific performance costs[35]. However, the concept of SC does not necessarily overlap with a contract in the legal sense. Indeed, the SC represents the computer program running the terms of an agreement, but most of the time not the agreement itself[36]. We will thus distinguish between the specific language constituting the program (**code**) from the legal prose. There are several types of codes, and their use depends on the environment in which they are intended to work. In Ethereum, the language constituting the code will be either Vyper or Solidity, the latter being the most used for the moment[37]. It is worth noting that SC were designated before the blockchain[38] and, as simple computer programs, it is thus possible to create and run them out of a blockchain. They might however reach their full potential in a blockchain, especially in a tokenized one, where they directly interact with cryptographic assets, that is to say, money.

The code is mainly composed of functions that will be activated using either internal information, that is, information that is defined in the source code (for example: "uint receiver = receiverAddress;", where "uint" categorizes the type of data recorded (unsigned integer, which are positive integer), "receiver" is a variable to which the value "receiverAddress" is given), or external information, in others words information from outside the source code (through oracles, which are links to external sources of information that can be used by the SC implemented in the blockchain[39], references to other contracts, etc.). As it is a program, the SC will execute itself once it is called to by a user (and where there are other conditions, if these conditions are fulfilled). This is the self-enforcing characteristic of the SC, that is, the fact that once the agreement is translated into code, the agreement will be executed according to the code without, in theory, any way to avoid it (hence the famous expression "Code is law")[40]. More concretely, if I send a sum of Ether to a contract to execute a sales contract, the contract will be executed, and it will no longer be possible to reverse the transaction. If the author of the transaction would like, for one reason or another, to recover the amount of cryptocurrencies sent, the only possible way would be for the recipient to return the said cryptocurrencies himself by a new transaction.

In Ethereum, SC form a special category of address. We distinguish two types of addresses, those of users and those of SC, as contracts are hosted on the blockchain in the same way that addresses of users

[34] SZABO, p. 1.
[35] *Ibid*.
[36] CARRON/BOTTERON, n° 21; MEYER/SCHUPPLI, p. 208; MÜLLER, n° 7.
[37] BASHIR, p. 314.
[38] *Cf.* SZABO, p. 1 and the refs. to see that they had already a pretty good idea of what the blockchain will later embody.
[39] BASHIR, p. 272 ff.
[40] BASHIR, p. 264.

are (and their "balances", i.e. the balance in Ether of each address)[41]. It implies that once deployed in the blockchain, SC can in theory be used by any address (whether it is a contract or a user). The theoretical nature of this statement is due to the fact that in order to be able to use a contract, users at least need its address in the blockchain, an address that can only initially be provided by the creator.

SC can take very different forms and all the possibilities may probably not have been fully explored yet. They can range from the creation of specific Tokens (e.g. for an initial coin offering, the so-called "ICO") to the conclusion of escrow agreements (by directly storing the cryptographic value in the contract and unlocking it at specific conditions).

2.2.2 Delimitation

As mentioned above, the SC should in a general way be distinguished from the legal contracts, but this distinction will be further examined below[42]. Another important demarcation is to be made between SC and Ricardian contracts[43]. The concept of Ricardian contracts has been introduced by GRIGG[44] and aimed at issuing bonds through contract readable both by the user and by the machine[45]. It can be placed between SC and legal contracts, as it is supposed to represent both of them simultaneously. This idea has been further developed by CLACK *et al.*, who have been working on a way to implement legal contracts in way that could easily be transcribed into code[46].

[41] BASHIR, p. 291.
[42] *Cf. infra* section 3.2.
[43] BASHIR, p. 267 ff.
[44] GRIGG, p. 1.
[45] GRIGG, *Ricardian Contract*, n° 1.2.-1.3.
[46] CLACK *et al.*, p. 6 ff.

3 Juridical aspects

As we have seen it above[47], the SC is not, *a priori*, a contract as such under Swiss law. However, the question now arises as to whether the SC can be used for the conclusion of traditional contracts and how it should be treated under Swiss law[48]. With sufficient publicity, a SC could for example be used to distribute specific tokens (as it is the case when financing a project through the issuance of tokens, better known as "ICO"), and therefore conclude various sales contracts (or other, depending on the utility of the tokens)[49]. This situation corresponds to an "on the chain" contract conclusion and will be our hypothesis along this study, as opposed to "off the chain" contracts, which aim to develop a SC based on an existing agreement[50]. This seemingly simple example raises many legal questions, we will therefore focus on the formation of the legal contract following the use of a SC and the limits of its validity. In order to clarify the legal situation, it is necessary to recall, from the outset, the different concepts necessary for the understanding and conclusion of the contract as a legal entity. Therefore, the concepts of legal act and of contracts will be presented in the following sections.

3.1 The legal act

The legal act (*acte juridique, Rechtsgeschäft*) consists of one or more expressions of will which produce the legal effect corresponding to the expressed will[51]. It allows a modification of the legal situation by the expressed will[52]. As TERCIER and PICHONNAZ[53] observe, *the consecration of the legal act is the expression of the principle of private autonomy and the culmination of an "all-powerful will"*[54]. This underlines the importance of this concept in the context of Swiss private law. However, the legal effect necessarily arises from the law, thus any expression of will does not necessarily lead to the desired legal consequence[55].

Different sorts of legal acts are distinguished according to different criteria[56], but for the purposes of this contribution, we will only present distinctions made according to the number of expressions of will and the scope of the legal effect on the patrimony.

Therefore, depending on the amount of expressions of will, a distinction is made between uni-, bi- and multilateral legal acts[57]. The unilateral act (*acte unilatéral, einseitiges Rechtsgeschäft*) consists of an expression of will, which is both necessary and sufficient to produce the desired legal effect, whereas bi- and multilateral acts (*acte bi- et multilatéraux, mehrseitiges Rechtsgeschäft*) consist, in essence, of several expressions of will[58]. The formative act (*acte formateur, Gestaltungsgeschäft*) is the typical example of a unilateral act, while the contract is the typical example of bi- or multilateral acts[59]. The formative act derives from the ability of a person to unilaterally modify a pre-existing legal situation: the

[47] *Cf. supra* section 2.2.1.
[48] MÜLLER, n° 39 ff.
[49] For a very concrete example, we invite the reader to consult LakeDiamond's white paper explaining the sale of tokens representing reactor operating time for the creation of artificial diamonds (available at https://www.swissquote.ch/website-static/pdf/cryptocurrency_offerings/20181015_LakeDiamond_WhitePaper.pdf; last consultation on 22.08.19).
[50] MÜLLER, *Die Smart Contracts*, p. 335.
[51] GAUCH *et al.*, n° 118 ff; HUGUENIN, n° 45 ff; CR CO I-MORIN, art. 1 n° 5; TERCIER/PICHONNAZ, n° 170 ff.
[52] BK-MÜLLER, Einleitung in das OR n° 85 ff.
[53] TERCIER/PICHONNAZ, n° 172.
[54] Free translation of the author.
[55] TERCIER/PICHONNAZ, n° 176 f.
[56] *Cf. e.g.* GAUCH *et al.*, n° 127 ff; HUGUENIN, n° 50 ff.
[57] GAUCH *et al.*, n° 128 ff; HUGUENIN, n° 50 ff; BK-MÜLLER, Einleitung in das OR n° 92 ff; TERCIER/PICHONNAZ, n° 201 ff.
[58] HUGUENIN, n° 50 ff.
[59] CR CO I-MORIN, art. 1 n° 22.

formative right[60]. Formative rights are based on the law or on an agreement between the parties[61]. The contract results from the exchange of at least two concordant expressions of will and creates a binding effect for the parties[62].

Depending on their legal effect on the patrimony, a distinction is generally made between the legal act giving rise to an obligation (*acte juridique générateur d'obligation, Verpflichtungsgeschäft*) and the legal act of disposition (*acte juridique de disposition, Verfügungsgeschäft*)[63]. The act giving rise to an obligation, as its name suggests, creates an obligation for one of the parties[64], namely, a juridical link between the parties by virtue of which one of them is bound towards the other to perform a service[65]. Unlike the act of disposition, the act giving rise to an obligation has no direct effect in property law (*droits réels, Sachenrecht)*[66]. The act of disposition is the legal act by which a party transfers or modifies the status or content of a right that belongs to it[67]. As the act of disposition has a direct effect on the patrimony of its author, the latter must have, in addition to the civil capacity to act[68], the power of disposition (*pouvoir de disposer, Verfügungsmacht*) of the right in question[69]. The power of disposition derives from the principle of Roman law that no one can transfer more rights to another than he himself has (*nemo plus iuris transferre potest quam ipse habet*[70])[71].

[60] CR CO I-MORIN, art. 1 n° 25; TERCIER/PICHONNAZ, n° 269 f.
[61] *Ibid.*
[62] *Cf. infra* section 3.2.
[63] GAUCH *et al.*, n° 134 ff; HUGUENIN, n° 62 ff; BK-MÜLLER, Einleitung in das OR n° 154 ff; TERCIER/PICHONNAZ, n° 206 ff.
[64] *Ibid.*
[65] GAUCH *et al.*, n° 24 ff; BK-MÜLLER, Einleitung in das OR n° 177 ff; TERCIER/PICHONNAZ, n° 99 ff.
[66] BK-MÜLLER, Einleitung in das OR n° 156.
[67] GAUCH *et al.*, n° 137 ff; HUGUENIN, n° 64 ff; BK-MÜLLER, Einleitung in das OR n° 158 ff; TERCIER/PICHONNAZ, n° 208.
[68] *Cf. infra* section 3.2.1.
[69] BK-MÜLLER, Einleitung in das OR n° 161; TERCIER/PICHONNAZ, n° 370 ff.
[70] Digeste of the *Corpus Iuris Civilis*, Book L, Title 17, n° 54.
[71] HUGUENIN, n° 65; BK-MÜLLER, Einleitung in das OR n° 161.

3.2 The contract

According to art. 1 CO, the conclusion of a contract requires a mutual expression of concordant intents by the parties. This provision refers to three main elements: the parties, their expressions of will and their agreement[72].

3.2.1 The parties

The parties must be subjects of law, this implies having passive civil capacity in accordance with art. 11 and 52 of the Swiss Civil Code of 10 December 1907 (**CC**, RS 210), that is, being a person. The notion of person used in art. 11 and 52 CC includes any living human being (natural person) as well as any entity to which the legislator recognizes this status (in particular legal persons)[73]. The legislator recognizes, by way of example, the status of person to different forms of companies such as companies limited by shares (art. 620 ff CO) and limited liability companies (art. 772 ff CO). In addition, specific characteristics are necessary to recognise a person's ability to create rights and obligations through its actions (art. 12 ff CC). Those characteristics are, for natural persons, the active civil capacity provided for in art. 12 ff CC, that is, being of age and capable of discernment and, for legal persons, those provided for in art. 54 and 55 CC, that is, the governing bodies required by law have been appointed and their articles of association adopted, all this being subject to the exceptions provided by the law.

In principle, the parties to the contract are directly involved in its conclusion through expressions of their own will. However, Swiss law provides an alternative to this system by allowing representation (*représentation, Vertretung*; art. 32 ff CO)[74]. Direct representation allows a person to delegate to another person the capacity to conclude contracts on his or her behalf (art. 32 par. 1 CO). For the effect of representation to occur, in other words, for the contract concluded to bind the principal and not the representative, a number of conditions must be met[75]. One of those conditions is that the power of representation must be delegated to a person, that is, a subject of law (within the meaning of art. 11 and 52 CC)[76] with the capacity for discernment[77].

As various authors have already pointed out[78], the SC has no personality within the meaning of art. 11 and 52 CC, thus the SC cannot act as a legal subject in a legal relationship. It is therefore still too early to consider that the SC assumes a representative function within the meaning of Swiss law[79]. We believe that a qualification similar to that of the messenger (*messager*, *Bote*; art. 27 CO) is much more appropriate for them, at least for the use that is currently made of it[80]. Indeed, the messenger, unlike the representative who gives his own expressions of will, is only a support of the will of a party[81]. These aspects are further explored in relation to the expressions of will[82].

Another aspect already noted by some authors[83] is that the parties may potentially remain completely anonymous when using SC, which may make certain controls, particularly with regard to the other

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[72] HUGUENIN, n° 140 ff; CR CO I-MORIN, art. 1 n° 2 ff; TERCIER/PICHONNAZ, n° 213 ff.
[73] CR CC I- MANAÏ, art. 11 n° 3.
[74] GAUCH *et al.*, n° 1305 ff; TERCIER/PICHONNAZ, n° 376 ff.
[75] *Ibid.*
[76] CR CO I- CHAPPUIS, art. 32 n° 2; BK-ZÄCH/KÜNZLER, art. 32 n° 128.
[77] GAUCH *et al.*, n° 1340; TERCIER/PICHONNAZ, n° 393.
[78] CARRON/BOTTERON, n° 20; FURRER, p. 109; GLARNER/MEYER, n° 30 f.; MÜLLER, n° 60.
[79] CARRON/BOTTERON, n° 20; thinking, however, of a form of representation: FURRER, p. 108; WEBER, p. 293.
[80] Of another opinion: FURRER, p. 108; MÜLLER, n° 62; KIANIČKA, p. 97 ff.
[81] HUGUENIN, n° 1034 ff; BK-ZÄCH/KÜNZLER, Vorbemerkungen n° 17.
[82] *Cf. infra* section 3.2.2.
[83] JACCARD, n° 83; MÜLLER, n° 42; MÜLLER, *Die Smart Contracts*, p. 344.; SWISS LEGALTECH ASSOCIATION, p. 44.

party's civil capacity or certain actions, particularly legal actions, difficult or even impossible[84]. It is however necessary here to nuance the point; first of all, art. 3 par. 1 lit. s of the Law on Unfair Competition of 19 December 1986 (**LUC**, RS 241) imposes certain obligations on anyone offering goods, works or services by means of the electronic commerce, including the obligation to indicate clearly and completely his identity and contact address, including for electronic mail[85]. If this information is not provided, the other party can be released from the contract by invoking a defect of consent[86]. However, it should be noted that it is yet difficult to imagine, but not impossible, for a person to make serious use of a SC without having a minimum amount of information about it.

3.2.2 The expressions of will

Expressions of will (*manifestations de volonté, Willenserklärungen*) are intentional communications of the author's willingness to create, modify or terminate a right or a legal relationship[87]. They themselves include two elements: an expression and a will[88].

3.2.2.1 The expression

The expression may be express or tacit (art. 1 par. 2 CO) and is not subject to compliance with any specific form, unless otherwise provided by law or by the will of the parties relating to the form thereof (art. 11 and 16 CO)[89]. Therefore, the following behaviours can constitute an expression: a head shake, an oral statement or any other conclusive act[90]. The law provides that certain contracts must comply with a specific form in order to be valid, as is the case, for example, in art. 216 CO requiring the authentic form for all sales of real estate.

The expression of will may also be transmitted by means of a messenger or other intermediary (art. 27 CO). The messenger serves as a support for the author's expression of will[91]. However, some rules of representation apply by analogy, as in the case of art. 32 par. 2 CO, which provides that the principal only becomes a direct creditor or debtor of the other party if the representative (or messenger) has made himself known as such or if the other party should infer it from the circumstances[92]. The messenger must also have the power to transmit the expression (*pouvoir de représentation*, *Botenmacht*), similar to the procuration in the context of the representation[93]. In addition, if a specific form is required, the author of the expression of will must comply with it[94].

According to the theory of reception (*théorie de la réception*, *Empfangstheorie*), the expression of will must be received by the other party in order to be perfect, that is, to have a legal effect[95]. This assertion underlies the existence of a communication process between the parties[96]. This communication process is either direct (*processus de communication direct*, *unmittelbare Willenserklärungen*) or indirect

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[84] It should be noted, however, that art. 3 ff of the Federal Act on Combating Money Laundering and Terrorist Financing of 10 October 1997 (AMLA, RS 955.0) subjects financial intermediaries to know your customer (the so-called "KYC") procedures aimed at identifying the origin of funds and the identity of their owners, making it conceivable, in Switzerland, to check the identity of cryptocurrencies holders.
[85] CARRON, n° 73 ff.
[86] *Ibid.*
[87] BK-MÜLLER, art. 1 OR n° 12 ff.
[88] *Ibid.*
[89] HUGUENIN, n° 167 ff; CR CO I-MORIN, art. 1 n° 5 ff; BK-MÜLLER, art. 1 OR n° 32 ff.
[90] *Ibid.*
[91] HUGUENIN, n° 1034 ff; BK-ZÄCH/KÜNZLER, Vorbemerkungen n° 17 ff.
[92] *Ibid.*
[93] BK-ZÄCH/KÜNZLER, Vorbemerkungen n° 22.
[94] BK-ZÄCH/KÜNZLER, Vorbemerkungen n° 21.
[95] HUGUENIN, n° 167 ff; CR CO I-MORIN, art. 1 n° 5 ff; BK-MÜLLER, art. 1 OR n° 32 ff.
[96] TERCIER/PICHONNAZ, n° 181 ff.

(*processus de communication indirect, mittelbare Willenserklärungen*)[97]. Communication is direct if the parties are in immediate contact, namely the time of emission and reception of the will correspond in time. It is indirect if the parties are not in immediate contact, in other words, the time of transmission does not correspond in time with that of reception. This distinction is historically based on the major use of letters through the Post Office but is likely to become increasingly questionable with the advent of digital technologies such as E-mail or Short Message Service (better known as SMS).

The expression of will expressed by means of an indirect communication process is considered to have been received, and therefore to have produced its effects, when it entered the sphere of power of the recipient[98]. Thus, regardless of when the addressee actually becomes aware of it, the decisive moment is the moment when it is up to him alone to become aware of the expression of will. To illustrate the point, in the context of an exchange of will by electronic messaging (e.g. SMS, E-mail, etc.), the legal situation is as follows: A writes a message thus transcribing its will (emission phase) and sends it to B (sending phase), the message is considered received and known by B when it is received in the receiving entity of the means of communication used (receiving phase; e.g. the inbox of E-mails) regardless of when B will actually read the message (perception phase)[99].

In the absence of a legal or conventional exception, expressions of will formulated in the form of a transaction in a blockchain, as well as those formulated by other means of electronic communication, are valid under Swiss law[100]. The blockchain can be considered a means of indirect communication, so the theory of reception is applicable there[101]. The emission and dispatch of an expression of will corresponds to the moment when its author writes and respectively validates the transaction (it will then be signed through the software used)[102]. Reception occurs when the block in which it is written is added to the blockchain[103]. However, this statement must be nuanced because, as mentioned above[104], all miners seek to solve the PoW at the same time, which can lead to forks in the blockchain and the creation of orphan blocks. If the expression of will is contained in one of these blocks, it will not appear in the blockchain and will therefore be lost[105]. Thus, as it is already the practice for the vast majority of cryptocurrencies users[106], the recipient of the expression would be well advised to wait until several blocks are added to the blockchain after the one containing the other party's act in order to ensure that it is not deleted. This conclusion is unsatisfactory in theory, but would have little practical impact, as the wait is a few minutes in the case of Ethereum.

3.2.2.2 The will

As seen above[107], the will of the author of the expression is a central element in the conclusion of the contract (art. 1 CO). The will, in order to have legal effect, includes at least the willingness to make a legal commitment to do what is expressed[108]. This means that the party who expresses his will must

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[97] HUGUENIN, n° 177 f.; CR CO I-MORIN, art. 1 n° 8 ff; BK-MÜLLER, art. 1 OR n° 60 ff; TERCIER/PICHONNAZ, n° 182-183.
[98] ATF 143 III 15, recital 4; HUGUENIN, n° 184 ff; CR CO I-MORIN, art. 1 n° 13; BK-MÜLLER, art. 1 OR n° 93 ff; TERCIER/PICHONNAZ, n° 184.
[99] TERCIER/PICHONNAZ, n° 183.
[100] CARRON/BOTTERON, n° 68 ff; KIANIČKA, p. 24.
[101] MÜLLER, n° 50 ff.
[102] HECKELMANN, p. 505 f.; MÜLLER, n° 51 ff.
[103] *Ibid.*
[104] *Cf. supra* section 2.1.2.
[105] MÜLLER, n° 53.
[106] *Cf. supra* section 2.1.3.
[107] *Cf. supra* section 3.1.
[108] ATF 116 II 695, recital 2; the components of will vary according to the authors, however the literature generally distinguishes between the will to act (*volonté d'agir, Handlungswille*), the will to explain (*volonté de déclarer, Erklärungswille*) and the will to be bound by rights (*volonté d'être lié juridiquement, Rechtsbindungswille*); compare GAUCH *et al.*, n° 170 ff; HUGUENIN, n° 170; BK- KRAMER/SCHMIDLIN, art. 1 OR n° 31 ff; BK-MÜLLER, art. 1 OR n° 15 ff; TERCIER/PICHONNAZ, n° 179.

have the serious and effective will to commit himself, which is not the case when he acts under constraint (*vis absoluta*)[109] or by joke[110].

For a contract to be concluded, two or more reciprocal and concordant expressions of will are usually required (art. 1 CO). The first is generally referred to as an offer (*offre, Antrag*) if it contains all the elements necessary for the conclusion of the contract and if it has only to be accepted by the other party[111]. The offer is binding on the offeror (art. 3 par. 1 CO), in the sense that the offeror may be bound by a contract if the other party accepts the offer, and *a fortiori* be the subject of a possible action for performance (art. 97 ff CO)[112]. The expression of will that follows the offer can be qualified in different ways depending on the reaction of the party concerned[113]. It will be an acceptance (*acceptation, Annahme*) if the party concerned by the offer agrees, a counteroffer (*contre-offre, Gegenofferte*) if the acceptance does not correspond to the initial offer or a refusal (*refus, Ablehnung*), in which case the contract will not be concluded. The offer must be distinguished from the invitation to make an offer that does not bind its author[114]. It is generally considered that proposals made on the Internet constitute invitations to make offers (art. 7 par. 1 CO, by exclusion of art. 7 par. 3 CO), otherwise, online merchants could be overwhelmed by contracts in relation to the number of products available[115].

The offer may have a fixed period of validity, thus obliging its author to respect it in the event of acceptance during this period (art. 3 par. 1 CO), or not, in which case two situations must be distinguished, namely when the offer is made between absentees (art. 5 CO) and when the offer is made in the parties' presence (art. 4 CO)[116]. In the first situation, the period of validity of the offer is limited to the time when the offeror can expect a timely and regular reply (art. 5 par. 1 CO), this time being assessed in the specific case according to the nature of the case[117]. In the second case, the offeror is released if acceptance does not take place immediately (art. 4 par. 1 CO).

In the context of a blockchain, the SC, once deployed, can take very different forms and uses (the limits being the imagination of the programmers who create them), it can therefore be a mistake to generalize. With regard to the nature of the offer or invitation to make an offer, we agree with the opinion of CARRON and BOTTERON[118], which suggests that this character should be assessed on a case-by-case basis, depending on the design and purpose of the SC. The same applies to the period of validity of the offer, if it is concluded that it is an offer within the meaning of art. 3 CO. If, as the case may be, the use of a SC corresponds to an offer, it would then be made between absent persons (art. 3, 5 and 9 CO)[119].

As mentioned above[120], the SC cannot (yet) assume the status of representative under Swiss law in accordance with art. 32 CO. However, it is capable, to a certain extent, of transmitting an expression of will (for example, by confirming the conclusion of a contract). The action taken by the latter must then corresponds, or at least be linked to the actual will of the party making use of it (the user), if legal effects are to be attributed to it[121]. Indeed, as the legal act is essentially composed of the will of its author[122],

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[109] HUGUENIN, n° 170.
[110] CR CO I-MORIN, art. 1 n° 20; TERCIER/PICHONNAZ, n° 179.
[111] HUGUENIN, n° 204 ff; TERCIER/PICHONNAZ, n° 605 ff.
[112] CR CO I-MORIN, art. 1 n° 84; TERCIER/PICHONNAZ, n° 615 ff.
[113] HUGUENIN, n° 221 ff; TERCIER/PICHONNAZ, n° 621 ff.
[114] HUGUENIN, n° 211 ff; CR CO I-MORIN, art. 1 n° 81; TERCIER/PICHONNAZ, n° 610.
[115] GAUCH *et al.*, n° 1340; HUGUENIN, n° 213; TERCIER/PICHONNAZ, n° 610; more specifically about SC, *cf.* KÕLVART *et al.*, p. 143.
[116] HUGUENIN, n° 234 ff; CR CO I-MORIN, art. 3 n° 7; TERCIER/PICHONNAZ, n° 605 ff.
[117] ATF 134 II 297, recital 4; CR CO I-MORIN, art. 5 n° 1.
[118] CARRON/BOTTERON, n° 71; *cf.* however CARRON/BOTTERON, *Blockchains*, p. 126 f. which present good arguments in favour of the qualification as an offer.
[119] BK-SCHMIDLIN, art. 27 OR n° 22-23.
[120] *Cf. supra* section 3.2.1.
[121] CARRON/BOTTERON, n° 20; KIANIČKA, p. 24; MÜLLER, n° 60.
[122] *Cf. supra* section 3.1.

the SC should only reproduce the will of the user. However, as MÜLLER[123] notes: *the particularity is that when the contract is concluded, the party does not (yet) have the will to perform a specific legal act at a specific time. On the contrary, this act will be automatically generated by the "Smart Contract" on the basis of the pre-programmed parameters.*[124]. The debate then focuses on when the party is actually willing to perform the legal act in question and whether, and how, this will can be attributed to the SC user.

The moment when the party actually wishes to perform the legal act in question depends on the nature of the SC and the party concerned. If the SC is qualified as an offer (art. 3 CO), the legal act of the offeror then corresponds to the online publication of the SC. If the latter is merely qualified as an invitation to make an offer, then the legal act of the SC user intervenes when the offer made by the other party is accepted. The acceptance (or offer, depending on the qualification of the SC) of the other party occurs when the latter executes the SC (most often through the payment of a certain quantity of cryptocurrency).

The question of how the willingness to perform the legal act in question can be attributed to the user of the SC depends, in our opinion, on the degree of automation of the latter and, *a fortiori*, on the predictability of the expression and its content[125]. It is therefore necessary, as KIANIČKA[126] does, to distinguish between automated declarations (*déclaration automatisée, automatisierte Erklärung*) and declarations of autonomous (electronic) agent (*déclaration d'agent autonome, Agentenerklärung*)[127].

3.2.2.2.1 The automated declaration

Automated declaration is the one that results from pre-programmed options[128]. Thus, once the conditions formulated in the agent's parameters are met, the agent executes what it was programmed for. In this way, the expression of will is transferred through a computer program that will deliver it as such. The program should not theoretically have the ability to modify its content, unless there is an execution error resulting in an erroneous expression. The predictability of the expression and its content is therefore, in principle, total. The use of programs issuing automated declarations should therefore correspond, in our opinion, to the use of messengers or other intermediaries under Swiss law (art. 27 CO)[129].

Indeed, such use implies that the program is only a support for the expression of will and that intellectual performance is essentially provided by the user, even if the emission of the expression takes place under specific conditions. The expression of will expressed in this way is therefore binding on the user, subject to the intermediary's error (art. 27 CO) or the principle of trust[130]. This is also the position of the Commercial Court of Zurich[131], which, inspired by PERRIG[132], stated that *in addition to the expressions of will transmitted individually, also oblige those given by a pre-programmed computer (so-called "electronic software agent")*[133]. As a result, the SC that executes the *x* instruction under *y* conditions,

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[123] MÜLLER, n° 61.
[124] Free translation of the author.
[125] KIANIČKA, p. 42.
[126] KIANIČKA, p. 41 ff; see WIEBE, n° 4 as well.
[127] In this study, we will use the following terminology: automated declaration for "*automatisierte Erklärung*" and autonomous declaration for "*Agentenerklärung*" with minor adjustments. In our terminology, a SC can constitute an agent.
[128] *Ibid.*
[129] BK-SCHMIDLIN, art. 27 OR n° 19 ff.
[130] *Cf. infra* section 3.2.3.
[131] *Handelsgericht* of the Canton of Zurich, HG150136 of the 16.02.2016, recital 2.3: "*Nebst individuell übermittelten Willenserklärungen sind auch solche verbindlich, welche von einem vorprogrammierten Computer automatisch abgegeben werden (sog. "elektronischer Softwareagent"* […]" (original quotation, emphasis added); see as well the decision of the 16.10.2012 of the *Bundesgerichtshof* of Germany X ZR 37/12 n° 17.
[132] PERRIG, p. 326.
[133] Free translation of the author.

which represent the main use of SC at the moment, assumes a similar role to that of the messenger in our view.

3.2.2.2.2 The autonomous declaration

The autonomous electronic agent declaration differs from this in that, despite the possible existence of pre-programmable parameters, the agent has the technical ability to issue an expression of will that is no longer directly that of its user[134]. This is a higher degree of automation in the sense that the agent will be able, by having his own analytical capacity, to make decisions himself, instead of simply reproducing those already formulated by the user. To our knowledge, such a degree of automation does not yet fully exist. However, since the program has the power to modify the expression in different ways according to different factors, we could already, in our opinion, admit to the presence of such a declaration[135]. Indeed, as soon as the user of such a tool does not know with certainty the final result, it is necessary to verify if the expressions of will issued actually correspond to the will of the user.

So, if the intellectual performance is essentially provided by the program, the question of linking the expression to the will of its user is all the more important. Indeed, the criteria of the predictability of the expression and its content are no longer fully met[136] and it is therefore possible that the agent may issue an unexpected, or even unwanted, expression of will by its user, thereby raising the question of the existence of the legal act in question[137].

In such a case, the doctrine is divided on the treatment to be given to these expressions of will[138]. The following positions are proposed: FURRER[139], supported by MÜLLER[140], makes an indirect analogy with the procuration in the representation, which would be defined by the circumstances surrounding the consent to the conclusion of a contract through the SC and would define to what extent the expressions of will can be attributed to its user. This solution focuses on the interpretation of the various contracts surrounding the implementation of the SC to determine whether an expression of will issued by the SC can be linked to the user's will. KIANIČKA[141], not limited to the SC framework, argues that such expressions of will are generally not covered by the user's will but that this defect could, in certain circumstances, be remedied, in particular by the principle of trust[142]. Finally, an analogous application of the position of the Commercial Court of Zurich would also be possible, which would amount to assimilating these expressions of will to those of the user without further examination[143].

The analogous application of the Commercial Court's position seems, in our view, to best serve the legal certainty necessary for legal transactions. Indeed, although attractive, the position defended by FURRER and MÜLLER underlies the existence, in particular, of a pre-existing agreement (*"Grundvertrag", "contrat fondamental"*) executed using a SC set up for the occasion (which corresponds to a bilateral elaboration of the SC). This situation, although realistic, does not represent all possible contractual relationships when using SC and more precisely does not represent the assumption pursued here. Thus, which agreement(s) should be interpreted when the parties conclude a contract exclusively through the SC? In such a situation, the only expression of will is that which flows from the SC, and the only agreement to be interpreted is the SC itself, yet the interpretation of the SC will hardly lead to any other result than that which has been produced. Indeed, it is difficult to see how the interpretation of the application contract (*"Applikationsvertrag", "contrat d'application"*) or the interpretation of the

[134] KIANIČKA, p. 44 ff.
[135] See as well KIANIČKA, p. 47.
[136] KIANIČKA, p. 45.
[137] KIANIČKA, p. 47 ff.
[138] FURRER, p. 108 ff; KIANIČKA, p. 47 ff; MÜLLER, n° 57 ff.
[139] FURRER, p. 109 ff.
[140] MÜLLER, n° 69 ff.
[141] KIANIČKA, p. 47 ff.
[142] *Cf. infra* section 3.2.3.
[143] *Cf. supra* foot note n° 129.

platform contract (*"Platformsvertrag", "contrat de plateforme"*) could be used when the development of the SC is unilateral[144]. However, a closer look could be taken at the documentation provided with the address of the SC, which could serve as a basis for interpretation[145]. Nevertheless, this solution remains adapted to the situation targeted by the authors who defend it, but then the question arises as to whether different rules of imputation of the will applicable to different situations would be an appropriate solution. Moreover, as KIANIČKA himself points out[146], the systematic use of the principle of trust to link the expression of will to the user and to admit the existence of a contract, as he suggests, would transform the exception into the rule, which is undesirable. This is why the position of the Commercial Court of Zurich seems the most appropriate solution: the systematic attribution of the expression of will issued by a SC (or any other computer program) to its master makes it possible to ensure legal certainty and better comply with the reality of exchanges on the Internet, while covering all possible situations.

3.2.3 The agreement

Once the parties have exchanged their expressions of will, it is necessary to check whether they agree on the essential elements (*éléments essentiels, wesentlichen Vertragspunkte*) to admit the existence of a contract (art. 1 and 2 CO)[147]. The essential elements of the contract are either objectively, namely those which constitute the necessary core of the contract, or subjectively, that is, those which are necessary and recognizable as such in the eyes of one (or more) party(ies)[148]. In principle, these elements cannot be filled by the judge in the event of a deficiency[149].

The assessment made by a judge, in the event of a dispute concerning the agreement follows the principle of the primacy of subjective will. Thus, the judge will seek to verify whether the true and common will of the parties actually matches, that is, whether the parties have understood each other. If this is the case, there is a factual agreement (*accord de fait, tatsächlicher Konsens*)[150]. If the wills do not effectively match, or if the judge fails to establish the true and common intention of the parties, the judge will have to seek the objective will of the parties by determining the meaning that, according to the rules of good faith, each of them could and should reasonably lend to the declarations of will of the other in accordance with the principle of trust (*principe de la confiance, Verstrauensprinzip)*[151]. According to the principle of trust, the internal willingness of the declarant to commit is not the only determining factor; an obligation on his part may arise from his conduct, from which the other party could, in good faith, deduce a willingness to commit. The principle of trust thus makes it possible to attribute to a party the objective meaning of his statement or his conduct, even if it does not correspond to his intimate will[152]. In such a case, there is a *de jure* agreement (*accord de droit, rechtlicher Konsens*).

If, unlike KIANIČKA[153], it is assumed that the expressions of will issued by the SC are covered by the will of its user, the parties could effectively reach agreement through concordant expressions of will and thus form a valid contract (art. 1 CO). However, if the conception of KIANIČKA[154] is followed and the

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[144] See FURRER, p. 109 ff; MÜLLER, n° 69 ff.
[145] SC intended for general use are usually accompanied by white papers explaining their functioning and purpose.
[146] KIANIČKA, p. 152.
[147] GAUCH *et al.*, n° 308 ff; HUGUENIN, n° 245 ff; TERCIER/PICHONNAZ, n° 224.
[148] ATF 97 II 53, recital 3; unpublished case of the Supreme Court 4A_262/2017, recital 4.2; GAUCH *et al.*, n° 330 ff; HUGUENIN, n° 256 ff; KIANIČKA, p. 157; TERCIER/PICHONNAZ, n° 569 ff.
[149] GAUCH *et al.*, n° 336 ff; HUGUENIN, n° 259; KIANIČKA, p. 157; TERCIER/PICHONNAZ, n° 574 f.
[150] ATF 143 III 348, recital 6.2.1 (not part of the published decision, cf. however the whole decision 4A_508/2016), 123 III 35, recital 2b; unpublished case of the Supreme Court 4A_51/2019, recital 4.2.2; GAUCH *et al.*, n° 310 ff; HUGUENIN, n° 245 ff; TERCIER/PICHONNAZ, n° 580 ff.
[151] ATF 143 III 348, recital 6.2.2 (not part of the published decision, cf. however the whole decision 4A_508/2016); unpublished case of the Supreme Court 4A_51/2019, recital 4.2.3; GAUCH *et al.*, n° 315 ff; HUGUENIN, n° 249 ff; TERCIER/PICHONNAZ, n° 590 ff.
[152] ATF 144 III 93, recital 5.2.3; unpublished case of the Supreme Court 4A_51/2019, recital 4.2.3.
[153] KIANIČKA, p. 147 f.
[154] *Ibid.*

willingness of the SC user to act is denied, the contract concluded through the SC could still be deemed valid by application of the principle of trust[155].

As mentioned above, we prefer the solution provided by the Commercial Court of Zurich, which simply links the expressions of intent issued by the SC to its user. This solution has the advantage of being clear, predictable and better aligned with reality. Indeed, it cannot be accepted that the party putting a SC into service does not have the will to conclude the contracts that could result from it. In addition, the party who benefits from the advantages of automation should logically bear the risks. However, it is true that the hypothesis underlying this study corresponds more to an automated declaration than to an autonomous declaration, as defined by KIANIČKA[156], and that the latter makes the linkage of will dependent on the degree of autonomy of the program. As a result, our opinions differ only with regard to programs with higher degrees of autonomy. However, in support of our position, if the program with a high degree of autonomy makes such a serious mistake that there may be doubts about the will of the other party, two solutions would be likely to resolve the situation. The first would be an *a contrario* application of the principle of trust; indeed, if a willingness to commit can be imputed on the basis of the objective meaning of its declaration, it can also, in our opinion, in the most serious cases, be excluded if the good faith of the contracting partner allowed him or should have allowed him to become aware of the absence of that willingness to commit. The second would be the invocation of a defect in consent, and more specifically that of error (art. 23 ff CO)[157].

[155] KIANIČKA, p. 158 ff.
[156] KIANIČKA, p. 41 ff.
[157] *Cf. infra* section 3.4.3

3.3 Requirements related to electronic commerce

The LUC imposes various obligations on anyone who offers goods, works or services in Switzerland by means of electronic commerce. These obligations are: (1) clearly and completely indicate his identity and contact address, including for electronic mail, (2) indicate the various technical steps leading to the conclusion of a contract, (3) provide appropriate technical tools to detect and correct input errors before sending an order, (4) confirm the customer's order without delay by electronic mail (art. 3 par. 1 lit. s LUC). European law (in particular Directives 2000/31/EC and 2011/83/EC) provides for more extensive information duties than the LUC, which must be respected in each case where the offer falls within their respective scope of application. In the event of non-compliance with these obligations, the majority of the doctrine[158] is in favour of applying the defects of consent[159] to the termination of the contract in civil matters. In criminal law, art. 23 LUC provides for a penalty of privation of liberty of up to three years or more or a pecuniary penalty.

It is necessary, however, to specify the scope of application of such a provision. First of all, the person concerned must offer goods, works or services, which implies the offer to conclude bilateral contracts, which may cover a wide range of services[160]. In addition, this proposal must be made by means of electronic commerce, in other words by means of electronic forms of communication, with the exception of the devices excluded in art. 3 par. 2 LUC[161]. This provision excludes voice telephony and contracts concluded solely by the exchange of electronic mail or similar means of communication. This exclusion is justified by the individualized nature of the relationship between the parties and by the difficulty of complying with the obligations in relation to the proposed relationship[162]. According to the majority doctrine[163], private offers on online auction sites are also not affected by the provision. By private offer is meant an offer put online by a natural person outside his commercial or professional activity.

The blockchain falls quite clearly within the scope of electronic commerce and is, in our opinion, not affected by the exception provided for in art. 3 par. 2 LUC. Indeed, it consists of an electronic means of communication, but does not correspond to a means of communication similar to voice telephony or electronic mail. However, a distinction must be made between the case, deliberately avoided in the context of this paper, of the SC set up in the context of the performance of a pre-existing contract. This situation is likely to occur in the case of exchanges of mails or other forms of electronic messages preceding the implementation of the SC, thus fulfilling the conditions of the exception. Finally, in accordance with the opinion of the majority doctrine, offers made by natural persons on the blockchain outside their professional activity must be rejected, although this hypothesis seems uncommon. The application of the provisions on defects of consent is not the most appropriate in the context of the blockchain, given the difficulties of their implementation in this context[164], however, allowing the invalidity of the contract under art. 20 CO would not facilitate such implementation.

[158] BSK UWG-BÜHLER, art. 3 lit. s n° 41 ff; CARRON, n° 76; CR LCD-WERRO/CARRON, art. 3 lit. s n° 38 ff and the refs.
[159] *Cf. infra* section 3.4.3.
[160] CR LCD-WERRO/CARRON, art. 3 lit. s n° 14.
[161] BSK UWG-BÜHLER, art. 3 lit. s n° 39 f.; CR LCD-WERRO/CARRON, art. 3 lit. s n° 16 f.
[162] *Ibid.*
[163] BSK UWG-BÜHLER, art. 3 lit. s n° 17 f.; CR LCD-WERRO/CARRON, art. 3 lit. s n° 22 and the refs.
[164] *Cf. infra* section 3.5.

3.4 Exceptions to the *pacta sunt servanda* principle

Although it seems possible to admit the conclusion of a contract by means of SC, users of SC should remain attentive to different mechanisms of Swiss law which allow, under certain conditions, the cancellation of the contract, or even provide for its nullity, and therefore its legal non-existence. These mechanisms derive mainly from the defect of the object, the defect of form or the defect of consent, but there are also other specific rules.

3.4.1 The defect of the object

According to art. 19 CO, the terms of a contract may be freely determined within the limits of the law. This article enshrines the freedom of the contractual object and the parties therefore have a great deal of freedom in determining the content and terms of their contract[165]. Accompanied by art. 20 CO, these articles also provide for the limits of this freedom: the contract is thus null and void if it has as its object something impossible, unlawful or immoral[166]. Unlawfulness corresponds to the violation of a mandatory rule as to the content of the contract, its conclusion or the purpose pursued[167]. Are contrary to morality the contracts condemned by the dominant morality, that is, by the general feeling of decency or by the ethical principles and value judgments implied by the legal order as a whole[168]. Finally, by impossibility art. 20 CO refers to the objective and initial impossibility of performing the contract, meaning that anybody would not be able to perform the contract at the time of its conclusion[169].

Legal contracts resulting from SC risk the invalidity of art. 20 in the same way as any other contract. Thus, legally, the contract for, for example, the sale of drugs without authorization (*cf.* art. 2 lit. a of the Drugs Law of 3 October 1951, RS 812.121) or the sale of prohibited weapons (*cf.* art. 5 of the Arms Law of 20 June 1997, RS 514.54) is void. However, as CARRON and BOTTERON point out[170], contractors of this type of contract are rarely interested in the legal validity of their acts. This is the danger of the SC, which carry out the instructions given to them without regard to any standard or morality and therefore make it possible to ensure the execution of contracts where the legislator has deemed it appropriate not to do so.

However, it also happens that certain contracts are null and void even though the legal value of the said contracts was important to the parties and *a fortiori* one of them may claim this invalidity to its advantage. Thus, for example, if a contract is qualified as an excessive commitment within the meaning of art. 27 CC in view of its duration or intensity, the excessively committed party will have an interest in having its legal invalidity recognised in a court of law. The difficulties related to the implementation of these rights in the blockchain will be analysed below[171].

3.4.2 The defect of form

In the same way as art. 19 CO for the object, art. 11 CO enshrines the freedom of form of the contract, subject to the exceptions provided for by law[172]. Thus, as noted in the context of expressions of will[173], the consensualism generally provided for by Swiss law allows the conclusion of contracts through a blockchain[174]. This freedom may be restricted by law (art. 11 CO) or by the will of the parties (art. 16

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165 GAUCH *et al.*, n° 624 ff; HUGUENIN, n° 392 ff; TERCIER/PICHONNAZ, n° 708 ff.
166 *Ibid.*
167 GAUCH *et al.*, n° 638 ff; HUGUENIN, n° 396 ff; TERCIER/PICHONNAZ, n° 725 ff.
168 ATF 132 III 455, recital 4.1; GAUCH *et al.*, n° 656 ff; HUGUENIN, n° 410 ff; TERCIER/PICHONNAZ, n° 739 ff.
169 GAUCH *et al.*, n° 631 ff; HUGUENIN, n° 426 ff; TERCIER/PICHONNAZ, n° 754 ff.
170 CARRON/BOTTERON, n° 85; CARRON/BOTTERON, *Blockchains*, p. 131.
171 *Cf. infra* section 3.5.
172 GAUCH *et al.*, n° 488 ff; HUGUENIN, n° 337 ff; TERCIER/PICHONNAZ, n° 663 ff.
173 *Cf. supra* section 3.2.2.
174 CARRON/BOTTERON, n° 87 ff; MÜLLER, n° 76 ff.

CO). There are various special forms provided for by the law, including: textual form (*cf. e.g.* art. 40d CO, 5 LDIP, 17 CPC etc.), written form (art. 12 ff CO, *cf. e.g.* art. 165, 493 CO), olographic form (art. 505 CC, *cf. e. g.* art. 498 CC) and authentic form (art. 55 final title CC, *cf. e. g.* art. 216 CO, 184 CC)[175]. The formal requirement extends in principle at least to the essential elements of the contract[176]. A contract that does not comply with the prescribed form is, in principle and unless otherwise provided, void[177]. However, the case law has recognised the existence of an abuse of right by the party claiming invalidity in a manner contrary to the purpose of the provision establishing the specific form[178]. It should be mentioned here that the written form generally requires the handwritten signature of the person who is bound (art. 14 CO), but that the qualified electronic signature with qualified electronic time stamp within the meaning of the Electronic Signatures Law of 18 March 2016 (**LES**) is also accepted. A qualified electronic signature is defined as an advanced electronic signature created by means of a secure signature creation device based on a qualified certificate relating to a natural person and valid at the time of its creation (art. 2 lit. a, b, c and e LES) and by qualified electronic time stamping as an electronic time stamp that is operated by a recognized certification service provider holding a regulated electronic stamp (art. 2 lit. d, i and j LES)[179]. The law refers to an asymmetric cryptographic system similar to the one used in the blockchain including a public key and a private key (art. 6, 7 and 8 LES)[180].

A contract resulting from the use of a SC that does not comply with a required legal form would *a priori* be null and void (art. 11 par. 2 and 20 CO). However, the majority of contracts that may be concluded on a blockchain are not affected by specific form requirements. Indeed, both sales contracts (art. 184 ff CO), exchange contracts (art. 237 and 238 CO) and lease contracts (art. 253 ff CO) relating to movable property are generally not subject to specific formal requirements, the specificities relating to real estate being reserved. As a proposal, the written form might be respected in a blockchain, provided that the code composing the SC and a corresponding white paper are accessible. The qualified electronic signature referred to in art. 14 CO does not seem to be incompatible with the keys required to sign a transaction in the blockchain (art. 7 and 8 LES), the main difficulty being, in our opinion, the supply of the qualified timestamp, which must involve a recognised supplier (art. 2 lit. j LES)[181]. Indeed, the Zurich University of Applied Science (ZHAW) has collaborated with Swisscom to make the use of recognized electronic signatures possible in the blockchain[182].

If we accept the need to accompany the use of a SC with a corresponding white paper, whether on the basis of an analogy with the principle of accessibility in the context of general business conditions[183] or on the basis of compliance with the written form as described here, the question of an inconsistency between the description contained in the white paper and the functioning of the SC arises. In our opinion, two visions are likely to be opposed in such a situation. The first would be to state that the contract is not legally concluded because the party gives its consent on something other than what the SC provides. This vision would be based on an analogy with the general conditions[184], which would not be validly integrated into the legal relationship in question. A possible *de jure* agreement in favour of the party

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[175] GAUCH *et al.*, n° 502 ff; HUGUENIN, n° 344 ff; MÜLLER, n° 76 ff; TERCIER/PICHONNAZ, n° 671 ff.
[176] GAUCH *et al.*, n° 537; CR CO I-XOUDIS, art. 11 n° 24 ff.
[177] GAUCH *et al.*, n° 547 ff; HUGUENIN, n° 368 ff; TERCIER/PICHONNAZ, n° 696 ff.
[178] ATF 138 III 401, recital 2, 116 II 700, recital 3, 112 II 330, recital 3; GAUCH *et al.*, n° 550 ff; HUGUENIN, n° 370 ff; TERCIER/PICHONNAZ, n° 698 ff.
[179] BK-MÜLLER, art. 14 OR n° 68 ff; CR CO I-XOUDIS, art. 14, 15 n° 14.
[180] Art. 3 of the Ordinance on Certification Services in the Domain of Electronic Signatures and Other Applications of Digital Certificates of 23 November 2016 (RS 943.032) delegates the power to determine the technical and administrative requirements to the Federal Office of Communications. The latter exercised this competence through the Annex to the OFCOM Ordinance of 23 November 2016 on certification services in the domain of electronic signatures and other digital certificate applications (RS 943.032.1), which refers essentially to European standards.
[181] DEPARTEMENT FEDERAL DES FINANCES, p. 9; EGGEN, *Contracts,* p. 8; *contra:* CARRON/BOTTERON, n° 89.
[182] https://www.zhaw.ch/storage/hochschule/medien/news/mm-blockchain.pdf (last consultation on 08.07.19).
[183] *Cf. infra* section 3.4.4.1.
[184] *Cf. infra* section 3.4.4.

having based itself in good faith on the white paper is also possible. The second would be to state that the contract is concluded but tainted with fraud[185]. This should then be invalidated by the deceived party (art. 31 CO) and the services rendered on the basis of illegitimate enrichment (art. 61 ff CO) or claim action (art. 641 CC)[186]. This second vision is, in our opinion, more in line with reality because the SC represents the main contractual relationship between the parties and does not have to be integrated into it. However, we are still in favour of the application by analogy of certain protective rules linked to the general conditions[187].

3.4.3 The defect of consent

The party issuing an expression of will does so in circumstances that are specific to him and on the basis of its own representation of those circumstances. Will must be freely formed, and consent must be given in full knowledge of the facts[188]. If this is not the case, the party should, depending on the circumstances and in accordance with the security of the transactions, have the opportunity to release itself from its commitment[189]. The law recognizes three situations where consent is not genuine and then allows release: error, fraud and duress (art. 23 ff CO). The contracting partner whose consent has been vitiated by a defect may declare to the other party that he does not intend to maintain the contract within one year after the discovery of the said defect; in the absence of such a declaration, the contract shall be considered ratified (art. 31 CO). If the defect of intent invoked in support of the invalidation is proven, the contract is null and void, in principle *ex tunc*. The parties are released from the obligations it provided for. Services already provided must be returned in accordance with the rules of reclaim or unlawful enrichment[190]. The difficulties related to the implementation of these rights in the blockchain will be analysed below[191]. A typical case of application of the defects of consent could be the non-compliance with the requirements of the LUC in terms of electronic commerce (art. 3 par. 1 lit. s LUC)[192].

3.4.3.1 The error

A party is in error when its representation of the facts or its expression of will does not correspond to that which the majority of human beings would have had in the same situation, the latter being chosen by the judge as the last resort[193]. In order not to harm the security of transactions, the law allows release only in the presence of an essential error (art. 23 CO, *erreur essentielle, wesentlicher Irrtum*), that is, a distorted representation of facts that commercial loyalty allows the person claiming his error to consider as necessary elements of the contract (art. 24 fig. 2 and 4 CO, so-called basic error; *erreur de base, Grundlagenirrtum*) or a difference between what the author wanted to manifest and what he actually manifested (art. 24 fig. 1 and 3 CO, so-called declaration error; *erreur de déclaration, Erklärungsirrtum*)[194]. The error can therefore occur at two times: during the formation of the will and during its expression. The error which only concerns the motives of the contract is not essential (art. 24 II CO). The declaration error may also be made by an intermediary (art. 27 CO)[195]. In addition to an essential error, the law makes release conditional on compliance with the rules of good faith (art. 25

[185] *Cf. infra* section 3.4.3.2.
[186] *Cf. infra* section 3.5.
[187] *Cf. infra* section 3.4.4.
[188] GAUCH *et al.*, n° 760 ff; HUGUENIN, n° 464 ff; TERCIER/PICHONNAZ, n° 769 ff.
[189] TERCIER/PICHONNAZ, n° 769.
[190] Unpublished case of the Supreme Court 4A_286/2018, recital 2.2; GAUCH *et al.*, n° 888 ff; TERCIER/PICHONNAZ, n° 776 ff.
[191] *Cf. infra* section 3.5.
[192] *Cf. supra* section 3.3.
[193] Unpublished case of the Supreme Court 4A_286/2018, recital 4; CARRON/BOTTERON, n° 91 ff; HUGUENIN, n° 464 ff; TERCIER/PICHONNAZ, n° 782 ff.
[194] *Ibid.*
[195] TERCIER/PICHONNAZ, n° 790.

CO) and, in the event of negligence, compensation for negative damage resulting from the invalidity of the contract (art. 26 CO)[196].

A basic error may occur, in particular, when the user's contracting partner is reading the white paper. If, on the other side, the white paper is wrongly written, a declaration error may occur for the user of the SC. When the white paper contains an error, the user risks being imputed a *de jure* agreement, which may be undone by invoking the error, if the conditions of the latter are met.

However, when interacting with a SC, the error is essentially likely to occur during the formation of the will and therefore to concern facts. Indeed, currently, the majority of SC operate with the payment of an amount of cryptocurrencies, thus making the hypothesis of a declaration error, in our opinion, limited. The latter is still possible if the party makes a mistake on the amount of cryptocurrencies to send, resulting in a larger contract than expected, but this scenario should be avoided if, in accordance with art. 3 par. 1 lit. s LCD, the SC user provides the appropriate technical tools to detect and correct input errors before sending an order. The error of declaration is also possible when the expression of will issued by the SC does not correspond to the will of its user, but when the latter is imposed a *de jure* agreement in accordance with the principle of trust[197].

3.4.3.2 The fraud

Fraud is an intentional deception that leads the victim, in error, to conclude a contract that she would not have concluded, or at least not concluded under the same conditions, if she had had accurate knowledge of the situation (art. 28 CO)[198]. Deception may result from inaccurate statements or from the dissimulation of facts that the author had a duty to disclose[199]. This duty to disclose may, depending on the circumstances, arise in particular from the rules of good faith or the law[200]. The extent of the duty to inform depends on the circumstances of the specific case, such as the nature of the contract, the manner in which the negotiations took place, the intentions and knowledge of the participants[201]. Deception may also be committed by a third party for the benefit of the other party, if however, this is not the case, the party remains bound (art. 28 par. 2 CO). Finally, deception must occur in a natural and adequate causal relationship with the conclusion of the contract, that is, without it the deceived party would not have committed itself to these conditions[202].

As mentioned above[203], a difference in the functioning or expected result between the white paper and the SC would be likely to constitute a fraud, if this difference is intentional; otherwise it would rather be an error. Admitting the existence of a particular duty to provide information always depends on the circumstances surrounding the establishment of a SC, but users should, in our opinion, attach particular importance to the drafting of their white paper, especially if it is aimed at a wide public. Indeed, when a professional is aiming a large public, as is the case through the Internet, he is subject to a particular duty to provide information, especially in the presence of complex services and a significant information unbalance[204]. It should also be recalled that the LUC provides for a duty to provide information on the identity of the offeror and the technical steps leading to the conclusion of the contract. In view of the causal relationship between deception and the conclusion of the contract and the intentional nature of

[196] TERCIER/PICHONNAZ, n° 815 ff.
[197] *Cf. supra* section 3.2.3.
[198] Unpublished case of the Supreme Court 4A_286/2018, recital 3.1; HUGUENIN, n° 532 ff; TERCIER/PICHONNAZ, n° 822 ff.
[199] *Ibid.*
[200] ATF 121 III 350, recital 6c, 105 II 75, recital 2a; Unpublished cases of the Supreme Court 4A_286/2018, recital 3.1, 4A_285/2017 recital 6.1; TERCIER/PICHONNAZ, n° 828.
[201] ATF 116 II 431, recital 3a.
[202] ATF 136 III 528, recital 3.4.2; Unpublished case of the Supreme Court 4A_286/2018, recital 3.1.
[203] *Cf. supra* section 3.4.3.
[204] CARRON, n° 43 ff.

the deception, fraud should not be allowed too easily, especially if it is based on deficiencies in the white paper, with the exception of cases of significant deficiencies.

3.4.3.3 The duress

Duress is a form of defect in consent resulting from the threat of future harm in order to obtain the consent of the person concerned (art. 29 and 30 CO)[205]. It underlies the existence of four conditions: a threat directed without right against a party or a relative, the resulting duress, the intention of the author of the threat to determine the addressee to make a declaration of will and the causal link between the fear and consent[206]. The threat may also be caused by a third party, but if this third party acts independently of the other contractor, without the latter being aware of the threat or having had to know it, the party who is the victim of the threat may have to compensate the other contractor if equity so requires (art. 29 par. 2 CO).

The Internet is a place that can be threatening, even dangerous. People who are not a least cautious on it may expose themselves to different forms of threats: cyberbullying, hacking, phishing, sextortion, etc.[207] These threats may, without being limited to the SC framework, be used to obtain undue consent or performances. Contracts resulting from such threats are obviously vitiated and likely to be resolved, but the difficulties linked to the implementation of rights sometimes make it difficult to recover executed performances[208].

3.4.4 Protection mechanisms linked to the general conditions

Some authors[209] rightly see a potential analogy with the general conditions of use, since the code forming the SC is inaccessible to the majority of people likely to use it. Thus, if some SC were to be used on a large scale, it is to be expected that the contracting parties would not have the possibility of effectively being aware of the functioning and subtleties of each SC, as is already the case for the general conditions, and would give their agreement without fully understanding their commitment.

The application of certain protection mechanisms related to the use of general conditions therefore seems appropriate when the use made of the SC is similar to that of general conditions[210]. General terms and conditions are clauses formulated in advance, intended to standardise legal relations and not subject to individual negotiation[211]. A SC could be assimilated to it when it is unilaterally developed and aims to be used by a significant number of people, without the latter having the possibility to negotiate or modify it. On the contrary, the special rules related to the general conditions should not apply when the SC is being developed bilaterally, or when it is aimed only at specific partners[212].

The protective rules are spread over different levels: they concern the validity of the integration of the general conditions into the contractual relationship concerned, their interpretation and determination of their content, and finally their validity[213].

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[205] ATF 111 II 349, recital 2; Unpublished case of the Supreme Court 4A_514/2010, recital 4.2.2; HUGUENIN, n° 550 ff; TERCIER/PICHONNAZ, n° 832 ff.
[206] *Ibid.*
[207] The Swiss crime prevention website presents various examples of this: https://www.skppsc.ch/fr/ (last consultation on 02.08.2019).
[208] *Cf. infra* section 3.5.
[209] CARRON/BOTTERON, n° 81 ff; EGGEN, p. 161 ff; HUG, n° 53; MÜLLER, n° 116 ff and the refs.
[210] MÜLLER, n° 116 ff.
[211] Unpublished case of the Supreme Court 4A_47/2015, recital 5.1; HUGUENIN, n° 606 ff; CR CO I-MORIN, art. 1 CO n° 165; MÜLLER, n° 116; TERCIER/PICHONNAZ, n° 858 ff.
[212] MÜLLER, n° 118.
[213] CARRON, n° 81; HUGUENIN, n° 612c.

3.4.4.1 The validity of the integration

In order to be effective, the general terms and conditions must be integrated into the contractual relationship they complement, that is, the addition of these terms and conditions to the contractual relationship must be agreed between the parties[214]. In addition, a few sub-conditions are added to the integration for it to be considered valid: the general conditions must be accessible and understandable[215], and they must not contain any unusual clauses[216].

In the context of a SC, and more precisely in the context of our hypothesis, integration does not seem to pose any particular difficulties because the SC is at the very origin of the relationship. However, an analogy with the accessibility rule could lead to the conclusion that it is necessary to make the provision of a white paper or any other explanatory document mandatory when using a SC[217]. Such a rule might also make it easier to comply with the rule of the unusual, insofar as the surprising or unexpected parts of a computer code would be explained and highlighted. However, the criticisms raised against this rule in the general conditions would also probably apply in the context of the SC[218].

3.4.4.2 The interpretation

The interpretation of the general conditions is done in the same way as any other contractual clause[219]. If, however, a clause remains ambiguous, the judge shall interpret it to the disadvantage of the party who drafted it (*in dubio contra stipulatorem*)[220].

As CARRON and BOTTERON[221] correctly point out, the computer code composing the SC can hardly be interpreted because of its precision. This rule therefore does not seem relevant in the context of a SC. However, it is likely to apply in the interpretation of documents accompanying the SC, such as the white paper.

3.4.4.3 The substantive validity

The general terms and conditions used in contractual relations with consumers are also subject to a substantive validity check in the light of art. 8 LUC. Indeed, if the general conditions provide for clauses which, contrary to the rules of good faith, result in a significant and unjustified disproportion between the rights and obligations arising from the contract, to the detriment of the consumer, the latter are void under art. 20 CO[222].

Provided that its conditions of application are met, this article seems to be fully compatible with the use of SC. The application of the latter would amount to removing the lines of code leading to the disproportion[223].

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[214] CARRON, n° 82; HUGUENIN, n° 614; TERCIER/PICHONNAZ, n° 869.
[215] ATF 77 II 154, recital 6, 100 II 200, recital 5; CARRON, n° 82 ff; HUGUENIN, n° 616; TERCIER/PICHONNAZ, n° 869.
[216] Unpublished case of the Supreme Court 4A_152/2017, recital 4.3; CARRON, n° 86 ff; HUGUENIN, n° 619 ff; TERCIER/PICHONNAZ, n° 880.
[217] In this sense, CARRON/BOTTERON, n° 81.
[218] *Cf. e.g.* BIERI, p. 203 ss, the main criticism being that despite their availability, the general conditions are only rarely read.
[219] Unpublished case of the Supreme Court 4A_152/2017, recital 4; CARRON, n° 91; HUGUENIN, n° 627.
[220] *Ibid.*
[221] CARRON/BOTTERON, n° 81.
[222] *Message du 2 septembre 2009 concernant la modification de la loi fédérale contre la concurrence déloyale* (FF 2009 p. 5539 ff), p. 5568; CR LCD-PICHONNAZ, art. 8 n° 170 ff.
[223] In this sense, CARRON/BOTTERON, n° 81.

3.5 Invocation of rights following the expiry of the contract

As we have seen[224], the legal contract may be non-existent or invalid for various reasons[225]. In this case, the legal situation is as follows: either the service(s) has (have) not been provided or the service(s) has (have) been provided. If the service has not yet been performed, the party concerned is no longer obliged to perform it[226]. If, on the other hand, the service has already been performed, the party concerned has the possibility of obtaining its return by two potential means: the reclaim of something (*action en revendication, Eingentumsklage*, art. 641 CC) or the return of unjust enrichment (*enrichissement illégitime, ungerechtfertigter Bereicherung,* art. 62 ff CO)[227]. It should be noted that, since SC are self-executing, there are very rarely any means of preventing their execution once they are implemented, which makes it necessary to return the services after the cancellation of the legal contract.

The reclaim action allows the owner of a thing to obtain restitution if he has been dispossessed of it without right[228]. It underlies three conditions: the claimant shall be the owner, of something, held without right by the defendant[229]. Ownership is a legal state of control over something that is acquired either originally, that is, based on the law, or in a derivative manner, in other words, based on an acquisition transaction[230]. The Civil Code defines the object of movable property as things that can be transported from one place to another, as well as natural forces that are susceptible to appropriation and are not included in immovable property (art. 713 CC). Finally, something is detained "without right" if the defendant cannot invoke a preferable right against that of the claimant[231].

The action for unjust enrichment makes it possible to recover a transfer of patrimony done without a cause[232]. It is subsidiary in nature; it complements the general system where no more specific action is provided[233]. It underlies the existence of two conditions: enrichment at the expense of others and the absence of a legitimate cause[234]. Enrichment may take the form of an increase in patrimony or a non-decrease of it, by a transfer of funds or in some other way[235]. It must be done at the expense of others, which means that a certain patrimonial value has unduly escaped the creditor[236]. The absence of a legitimate cause may result from different situations: there was no legitimate cause at the time of the act, the cause did not occur, or it ceased to exist, for example as a result of the nullity of the contract[237].

Whereas ownership of cryptocurrencies can generally be acquired both originally through mining and in a derivative manner through the purchase of these from stock exchanges and whereas thanks to the publicity of the register the ownership of those does not seem difficult to prove, the real debate concerns their legal qualification. Indeed, the doctrine is divided on the qualification to give to cryptocurrencies[238]. One of the issues at stake in the debate concerns the application of art. 641 CC, opening the way for action to reclaim, or of art. 62 CO, opening the way for action to return unjust enrichment. The main difference concerns the statute of limitation; the reclaim is not time-barred as long as the owner maintains his status (art. 641 CC)[239], while the claim related to unjust enrichment is subject

[224] *Cf. supra* section 3.4.
[225] TERCIER/PICHONNAZ, n° 481 ff.
[226] TERCIER/PICHONNAZ, n° 500.
[227] CARRON/BOTTERON, n° 100 ff; MEYER/SCHUPPLI, p. 219 ff.
[228] CR CC II- FOËX, art. 641 n° 28 ff.
[229] *Ibid.*
[230] STEINAUER, n° 129 ff.
[231] CR CC II- FOËX, art. 641 n° 32.
[232] CR CO I-CHAPPUIS, art. 62-67 n° 11; TERCIER/PICHONNAZ, n° 1812 ff.
[233] CR CO I-CHAPPUIS, art. 62 n° 30 ff; TERCIER/PICHONNAZ, n° 1815 ff.
[234] CR CO I-CHAPPUIS, art. 62 n° 3 ff; TERCIER/PICHONNAZ, n° 1828 ff.
[235] *Ibid.*
[236] *Ibid.*
[237] CR CO I-CHAPPUIS, art. 62 n° 17 ff; TERCIER/PICHONNAZ, n° 1833 ff.
[238] CARRON/BOTTERON, n° 103; GRAHAM-SIEGENTHALER/FURRER, section III.A.4; MEYER/SCHUPPLI, p. 219 ff; MÜLLER, n° 107 ff; MÜLLER/REUTLINGER/KAISER, p. 86 ff.
[239] Unpublished case of the Supreme Court 4A_41/2011, recital 2.2.2; CR CC II- FOËX, art. 641 n° 33.

to a relative period of one year (and, from 2020 onwards, 3 years) and an absolute period of ten years (art. 67 CO). Referring to the definition of the thing proposed by WIEGAND[240] transcribing the opinion of the majority doctrine[241], part of it raises doubts about the quality of the thing to cryptocurrencies by mainly advancing the lack of materiality[242]. Others exclude claims based on the loss of ownership related to a possible mixing of cryptocurrencies at the addressee's address (art. 727 CC)[243]. Finally, some also note that cryptocurrencies, and *a fortiori* their transfer, are exclusively linked to the blockchain and that control over them is therefore not absolute[244].

The debate on the materiality of cryptocurrencies leads to question the definition of the thing proposed by doctrine and jurisprudence. These propose different criteria assembled in WIEGAND's proposal[245]: *the thing is a delimited tangible object subject of control in fact and in law*[246]. The criterion of three-dimensionality is also sometimes used[247]. The blockchain, like anything that involves computers, is physically only an electrical current passing through different components. The definition of the object of ownership in art. 713 CC includes natural forces that can be appropriated. Electricity is therefore one thing within the meaning of the Civil Code, as recognized by the jurisprudence of the last century[248]. However, a cryptocurrency represents more than a simple electric current, it embodies an abstract value, thanks to the mechanisms of supply and demand and interest. But it remains an entity susceptible of control and, in our opinion, the value of something should not have an impact on its legal qualification. Thus, despite the *a priori* majority opinion of the authors who have commented on the subject[249], we are of the opinion that cryptocurrencies should, just like electronic data, be qualified as things[250]. It should also be noted that art. 727 CC is not applicable in the case of a mixture of money in cash, but the Supreme Court had recognised, in such a case, the acquisition of the property under common law ("*en vertu du droit commun*")[251]. The reason for such a decision was that in the presence of cash, there was no way to differentiate between the money claimed, so it was necessary to prove unjust enrichment, which opens the way to restitution under different conditions. However, in the case of cryptocurrencies, it is possible, in accordance with the reservation made by the Supreme Court in the same judgment, to identify exactly the amount of cryptocurrency mixed and to obtain its return. Finally, with regard to the lack of absolute control over cryptocurrencies, we reply that the system is close to that of scriptural money, all what matters is the trust placed in it. Finally, since the action for illegitimate enrichment is subsidiary to a more specific action, it must, in our opinion, be left aside for the benefit of the action for reclaim.

That being said, although debated and debatable, the theory does not consider the practical aspects that further complicate the application of the law in such an environment[252]. Indeed, depending on the circumstances[253], the only information available to the applicant may be a public address and therefore the applicant may not know the identity or domicile of the defendant. There are certain possibilities for attaching an address to an identity, in particular if the holder of the address has publicly given

[240] BSK ZGB II-WIEGANG, vor art. 641 n° 5 ff.
[241] See CR CC II- FOËX, Intro art. 641-645 n° 15 ff; STEINAUER, n° 59 ff and the refs.
[242] MEYER/SCHUPPLI, p. 219; MÜLLER, *Die Smart Contracts*, p. 349 ff; MÜLLER/REUTLINGER/KAISER, p. 87.
[243] CARRON/BOTTERON, n° 103; MEYER/SCHUPPLI, p. 220.
[244] *Ibid.*
[245] BSK ZGB II-WIEGANG, vor art. 641 n° 5 ff.
[246] Free translation of the author.
[247] ATF 132 III 353, recital 2.1; CR CC II- FOËX, Intro art. 641-645 n° 16.
[248] ATF 48 II 366, recital 2.
[249] CARRON/BOTTERON, n° 103; EGGEN, *Contracts,* p. 14; GLARNER/MEYER, n° 62; JACCARD, n° 39; MEYER/SCHUPPLI, p. 220; MÜLLER, *Die Smart Contracts*, p. 349; ZOGG, p. 101.
[250] See as well GRAHAM-SIEGENTHALER/FURRER, section III.A.4; HARI, p. 208 ff.
[251] ATF 47 II 267, recital 2.
[252] It should also be noted that we have deliberately left aside, as said above, the aspects of private international law that would have a good chance of intervening in a real situation.
[253] *E.g.* when a person makes a mistake when entering an address, however, the probability of finding a valid address when making a mistake is low.

information making it possible to attach him to the said address[254]. However, these options are only possibilities and finding a person's identity from a public address is rather an exception. As said above, the self-executing nature of the SC obliges the contracting parties to recover the services *a posteriori*. Such recovery seems very complicated to implement for the party concerned, so that the majority simply abandons the matter.

[254] BIRYUKOV/KHOVRATOVICH/PUSTOGAROV, p. 1.

4 Conclusion

As it has been demonstrated throughout this study, the majority of the legal institutions are not fundamentally incompatible with SC. In reality, SC bring only a few aspects that are fundamentally different from what is already being done, on the Internet or elsewhere. The main aspect, and the one that is most subject to discussion, is the self-executing nature, which calls into question the necessity of the court for the enforcement and the invocation of certain exceptions. This character allows them to intervene both in the conclusion of the contract (as in the hypothesis followed during this study), as well as in the execution of the contract. Thus, while intervention in the conclusion of the contract does not seem to pose any particular problem, the automatic execution of the contract may be incompatible with the legal exceptions to the *pacta sunt servanda* principle. It is in the attempt to invoke such exceptions that the claimant will be confronted to a system designed to prevent them and will understand that Justice is a very relative concept.

Indeed, the idea behind the SC was to work without the intervention of third parties, including the intervention of any Court; the system was designed with this aim in mind and it is therefore difficult, today, to involve a court in this process. However, some lawyers are considering the introduction of arbitration clauses in the SC, thus providing for the recourse to an arbitrator in the event of a dispute[255]. Such a clause, although resolving the problem of access to justice, would run counter to why SC were developed and would ultimately only create a system where the state only intervenes as a legislator, or even no longer intervenes at all. It is up to society to choose the path it wishes to take, but it is important to take all factors into account before reconsidering thousand-year-old institutions. At the crossroads of the digital and legal worlds, one should not, in our opinion, do without the other, unlike what the computer scientists at the origin of the system in question had in mind.

Such an innovation, in our opinion, calls into question the idea of justice, its necessity and its cost. But it should not be forgotten that the tools that represent SC are intended, in a way, to muzzle a relationship and to avoid the occurrence of disputes by force. Thus, the question is whether this innovation does not represent a regression in terms of Justice in favour of efficiency and whether this change in the balance is beneficial or harmful.

[255] FAVROD-COUNE/BELET, p. 1109 ff.