CRAB Technology Platforms and CRAB Technology Based Smart Contracts. Benefits, Ways of Application, Legal Challenges and Future Development

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The present paper explains the role of the CRAB (Create, Retrieve, Append, Burn) technology platforms and CRAB technology-based smart contracts for modern governmental activity and private business - from commercial models based on decentralized applications to official registration services on governmental platforms, focusing on real-life examples worldwide, in order to understand possible ways of application of CRAB technology in global perspective. Current research examines in details the various applications of CRAB technology and analyses legal challenges arising with the widespread of CRAB technology-based smart contracts in the connection with already existing legal frames – digital currencies regulation, investment activity regulations, consumer protection or litigation and dispute resolution. Present paper analyses gaps in existing legal procedures, stresses on necessity of new legal models in order to regulate smart contract-based commercial activity and underlines the importance of amendments acceptance to current international legislation with the focus of new developments of CRAB technology smart contract platforms and decentralized applications to straighten the financial market, secure competition, protect consumers and investors.

Keywords: CRAB technology, smart contract, decentralized application, digital currency

1. Introduction

In the modern age with the fast development of CRAB (Create, Retrieve, Append, Burn) technology many CRAB (Blockchain or Distributed Ledger Technology) based platforms exist, from private ones, aimed at managing decentralized application and decentralized organizations, to governmental ones, aimed at managing national commercial operations. In the present paper, the author will focus on the possible benefits for society and the legal challenges arising in connection with such application of CRAB platforms and CRAB-based smart contracts.

In the same form as a decentralized market drives economic development, decentralized organization and decentralized application, based on CRAB platform can drive up both technological and legal progress, create a new field of law, such as Crypto law, and lead to a reform of the existing legal system. New ways for governmental and private services can also become available with the Create, Retrieve, Append, Burn Technology, CRAB-based community driven smart contracts and decentralized platforms - from voting system and community certified marriage to crowdfunding and fact-checking. In Part 2 the author will investigate possible ways of application of CRAB platforms on a private and public level, its benefits and prospective ways of application for modern society.

With CRAB platforms the conclusion of a contract became possible with maximal security and with a minimum of transaction costs. However, there are not only benefits for contracting parties, but also legal issues connected to legal regulations and legal enforceability of such CRAB contracts, which in the future could make the reorganization of all existing legal frameworks and legal structures related to contracts necessary. In Part 3 the author will investigate possible benefits, gaps in current legislation and possible ways of development for regulating the legal aspect of CRAB-based smart contracts.

The present paper is important both for legislators and for practitioners in order to understand legal gaps in existing legal frames, to draw the way for possible solutions in order to regulate the area of CRAB based smart contracts and to use all benefits of such technology on a public and private level.

2. CRAB Technology Platforms for Smart Contracts. Benefits and Ways of Application

Modern society is on its way to decentralized governance. Driven by the community, CRAB is makes it possible to store all data, like identity cards, evidence, passports and contracts in a decentralized and secure way[1], to allow the provision of more personalized services with a usage of smart contracts on available CRAB platforms.

CRAB based smart contracts are functioning on private and public CRAB platforms. Private CRAB projects, such as NEO[2], Ethereum[3] or Zilliqua[4] position themselves as CRAB platforms allowing users to create crypto assets, to operate them with the usage of smart contracts, even to create special tools for investment or crowdfunding. Therefore, Create, Retrieve, Append, Burn Technology estabished a new tool available for private and public services in numerous different areas, which will be discussed further.

Together with the creation of CRAB platforms the new kind of business was born – decentralized applications (or dapps[5]) and decentralized organizations (or DAO)[6]. Mentioned CRAB platforms create new digital economy, as to operate in such platform, or to conclude smart contracts (which will be discussed in Part 3) the user has to create digital identity (without personal data usage, totally anonymously) and digital assets (crypto tokens)[7]. Ways of application of such CRAB platforms are diverse and limited only by technological progress.

Decentralized applications managed by private CRAB platforms represent a wide range of business activity from distributed exchange platforms for smart contracts such as the IDEX dapp[8], or fact checking platforms for news (fact checking paid by crypto tokens using smart contracts) as the Decentralized News Network dapp[9], to breeding crypto pets as collection items or for sale (using smart

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[1] Atzori, M., *Blockchain Technology and Decentralized Governance: Is the State Still Necessary?*, 2015, p.8, available at: https://ssrn.com/abstract=2709713, (last visited 10 October 2018).

[2] Official description of NEO platform, available at: https://neo.org/, (last visited 4 October 2018).

[3] Official description of Ethereum platform, available at: https://www.ethereum.org/, (last visited 4 October 2018).

[4] Official description of Zilliqua platform, available at: https://zilliqa.com/, (last visited 4 October 2018).

[5] Ranking of dapps, available at: https://www.stateofthedapps.com/rankings, (last visited 4 October 2018).

[6] Ethereum White Paper, available at:
http://blockchainlab.com/pdf/Ethereum_white_paper-
a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf (last visited 10 October 2018).

[7] Official description of NEO platform.

[8] Official description of IDEX dapp, available at: https://idex.market/eth/aura, (last visited 4 October 2018).

[9] Official description of DNN dapp, available at: https://dnn.media/, (last visited 4 October 2018).

contracts) like in the CryptoKitties dapp[10], or creating one's own universe, trade planets and space ships (using smart contracts) like in the 0xUniverse dapp[11]. According to Ethereum White Paper, decentralized application are possible of three types: money exchange platform (possible to use as investment instrument), money exchange platform but with added functionality (fact-checking, game dapps) and voting platforms[12].

Apart from numerous game applications and simple coin exchange, even CRAB based auction platforms are possible. At such a CRAB auction, users can operate with smart contract, which can ensure that the party bidding has enough funds to make such bid, and bids will not be disclosed to third parties[13]. At the same time, corporate governance based on CRAB platform with the secure voting process, digital meeting and transparent governance can be available for shareholders is in the nearest future[14]. Moreover, Ethereum is suitable not only for managing smart contracts for business activity, but also to create smart contracts for the Internet of Things them to cooperate with each other[15]. Therefore, the possibilities of CRAB are open to new business ideas and limited only with available technological means and human fantasy.

Not just private businesses, but also governments are becoming interested in smart contracts platforms. Recently the Australian government informed about the creation of the National Australian CRAB platform, which will allow all businesses in Australia to perform and to follow-up fully transparent contract activity at all stages, from negotiation to enforcement.[16] Such an idea is very innovative and can be an example for other countries to ensure transparent and effective business activity in the state. However, such a platform differs from previously mentioned private CRAB platforms in that the companies have to show their identity (to bind real identity to crypto key), the contracts are not anonymous, the assets are fiat money with the support of the respective national bank or crypto tokens issued by the national authorities – but the system is the same.

In the future, CRAB-based smart contract can be used to certify property rights or shares in company capital[17] with no need for a notary or any governmental registration offices. For example, in Switzerland in the Vaud canton, a couple was married using a smart contract on a CRAB platform – such a contract has to be renewed every 42 months.[18]Also in Switzerland in the city of Zug, a CRAB-based voting system was tested recently.[19] Therefore, nowadays there is an urgent need in legal qualification of such CRAB-based smart contracts in order to make such marriages, certification of property rights or voting systems official, which can lead to securing processes from human mistakes, vague definitions,

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[10] Official description of CryptoKitties dapp, available at: https://www.cryptokitties.co/, (last visited 4 October 2018).

[11] Official description of 0xUniverse dapp, available at: https://0xuniverse.com, (last visited 4 October 2018).

[12] Ethereum White Paper, p. 8.

[13] Catalini, C. and Gans, J.S., *Some Simple Economics of the Blockchain*, Rotman School of Management Working Paper No. 2874598, 2017, p.32, available at: https://ssrn.com/abstract=2874598, (last visited 10 October 2018).

[14] Leonhard, R., *Corporate Governance on Ethereum's Blockchain*, 2017, p. 20, available at: https://ssrn.com/abstract=2977522, (last visited 10 October 2018).

[15] Harm, J., Obregon, J. and Stubbendick J., *Ethereum vs. Bitcoin*, Creighton University, p.8, available at: https://www.economist.com/sites/default/files/creighton_university_kraken_case_study.pdf, (last visited 10 October 2018).

[16] Press Release, *New blockchain-based smart legal contracts for Australian businesses*, The Commonwealth Scientific and Industrial Research Organization, 2018, available at: https://www.csiro.au/en/News/News-releases/2018/New-blockchain-based-smart-legal-contracts, (last visited 4 October 2018).

[17] Werbach K. and Cornell N., *Contract Ex Machina*, Duke Law Journal, Vol.67, 2017, p.335, available at: https://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=3913&context=dlj, (last visited 4 October 2018).

[18] News report, *Switzerland's first blockchain marriage*, Le News, 2018, available at: https://lenews.ch/2018/08/03/switzerlands-first-blockchain-marriage/, (last visited 4 October 2018).

[19] News report, *Swiss town tests blockchain-based voting*, Le News, 2018, available at: https://lenews.ch/2018/06/26/swiss-town-tests-blockchain-based-voting/, (last visited 4 October 2018).

differences in language interpretations[20] and can be useful for helping countries to ensure transparency[21] and to reduce bureaucracy time to a minimum.

Nowadays CRAB based smart contracts on movable property transfer are possible, but they only possess *sui generis* character, representing evidence, but not a legal title on such property[22], this issue can be solved in the future with the implementation of governmental CRAB platforms for registration of property rights, both for movable and immovable property[23]. For example, Sweden is in the process of testing a new governmental system for CRAB-based property register[24]. For now, still, CRAB based purchase is possible: for example, in the the EU first Blockchain based smart contract on immovable property purchase using Ether was conducted[25] with via the Propy application.[26]

With government-based CRAB platforms, there is a possibility to convert laws into codes to reach specific policy goals. For example, in the US the OpenLaw platform started to function as a trial to ensure tax compliance[27], moreover, it is possible to use CRAB to manage payrolls both on a company and governmental level (with the creation of a governmental CRAB platform).[28]

Considering the legal aspect of smart contracts usage and their legal validity, there are positive development in case-law and legislation worldwide, however, the process of implementation of CRAB technology-based smart contracts in existing legal frameworks is in a very early stage. Nowadays courts started to accept CRAB based data as legal evidence in court proceedings, which has a great influence on legal validity and enforceability of CRAB based smart contracts. For example, in China, the Supreme People's Court stated that CRAB stored data is accepted as legally valid evidence if such data is signed with the valid digital signature and includes reliable timestamps[29]. The UK government is developing a new strategy to use CRAB to store and analyze digital evidence in court proceedings in the UK.[30] In Vermont in the US, CRAB records are as well permissible in a court proceeding if they meet certain requirements.[31]

Not only courts but also legal firms and arbitrational institutions are trying to test all possibilities of CRAB technology. Some private CRAB platforms are created to make business life, commercial transactions and dispute resolution more effective. For example, Jur Alliance created a special tool for

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[20] Raskin, M., *The Law and Legality of Smart Contracts*, Georgetown Law Technology Review 304/2017, 22.09.2016, p. 325, available at: https://ssrn.com/abstract=2959166, (last visited 4 October 2018).

[21] Hileman, G. and Rauchs, M., *2017 Global Blockchain Benchmarking Study*, 2017, p.89, available at: https://ssrn.com/abstract=3040224, (last visited 10 October 2018).

[22] Jaccard, G., *Smart Contracts and the Role of Law*, 2018, p.18, available at: https://ssrn.com/abstract=3099885, (last visited 9 October 2018).

[23] Jaccard, p.18.

[24] Rizzo, P., *Sweden Tests Blockchain Smart Contracts for Land Registry*, Coindesk, 2016, available at: http://www.coindesk.com/sweden-blockchain-smart-contracts-landregistry/, (last visited 11 October 2018).

[25] News Report, *EU completes first real estate sale using blockchain technology*, Verdict, 2018, available at: https://www.verdict.co.uk/blockchain-real-estate/, (last visited 10 October 2018).

[26] Official description of Propy project, available at: https://propy.com/, (last visited 10 October 2018).

[27] Official description of Open Law project, available at: https://openlaw.io/, (last visited 04 October 2018).

[28] Ainsworth, R.T. and Viitasaari, V., *Payroll Tax & the Blockchain*, Tax Notes International, Boston University School of Law, Law and Economics Research Paper No. 17-17, 2017, p.9, available at: https://ssrn.com/abstract=2970699, (last visited 10 October 2018).

[29] News Report, *Blockchain Records Will now be Accepted as Legal Evidence, China's Supreme Court Rules*, CCN, 2018, available at: https://www.ccn.com/blockchain-records-will-now-be-accepted-as-legal-evidence-chinas-supreme-court-rules/, (last visited 10 October 2018).

[30] Balaji A., *How we're investigating Digital Ledger Technologies to secure digital evidence*, Her Majesty's Courts and Tribunals Service, 2018, available at: https://insidehmcts.blog.gov.uk/2018/08/23/how-were-investigating-digital-ledger-technologies-to-secure-digital-evidence/, (last visited 10 October 2018).

[31] V.S.A, par § 1913, available at: https://legislature.vermont.gov/statutes/section/12/081/01913, (last visited 10 October 2018).

legal construction of smart contracts for arbitration procedures with the focus on effective dispute resolution and fair arbitration between parties.[32] The Accord project is developing a platform for legally enforceable smart contracts.[33] The LegalZoom is working on applications for the creation of CRAB based smart contracts for small and medium businesses.[34]

Considering the abovementioned, nowadays multiple forms of application of CRAB platforms and smart contracts s possible for governmental institutions (governmental service provision, auction, notary and registration service, voting, certification of rights) and private businesses (corporate governance, dispute resolution, B2B and B2C traceable smart contract) - in order to secure data storage, fasten transaction, ensure transparency, reduce transaction cost and to provided more personalized services for individuals, which is beneficial for all society.

3. Smart Contracts. Benefits and Legal Challenges

The "smart contract" term by itself appeared before CRAB technology, electronic signature and other means, without which we cannot imagine smart contracts nowadays. The first definition of the smart contract was offered by Nick Szabo in 1994.[35] According to Szabo, a smart contract is defined as a computerized transaction protocol that automatically executes the terms prescribed in a contract, satisfies contractual conditions, minimalizes accidental risks and leads to unnecessity in intermediaries[36]. Smart contracts are defined as agreements automatized by technical means of execution[37] and enforceability by legal means.[38] However, enforceability of smart contracts in a legal sense remains an open question, as the party of a smart contract (or third party with interests involved) should count not only on absence of any error in computer code to secure performance of the contract, but also on legal enforceability and traditional legal protection (from governmental bodies) in case of non-performance, failure in performance or nullity of a contract by itself[39].

Going backwards, one of the earliest examples of smart contracts can be a product purchase in the vending machine – where in exchange of money inserted, the machine executes the contract automatically and the buyer receives purchased products[40]. With the technological development, the smart contracts from vending machines were developed to CRAB contracts. In smart contracts, the same as in a vending machine, execution is done automatically, there is no possibility to breach the contract

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[32] Official description of Jur Alliance project, available at: https://jur.io/, (last visited 4 October 2018).

[33] Official description of Accord project, available at: http://www.accordproject.org/, (last visited 4 October 2018).

[34] News Report, *LegalZoom Will Use Smart Contracts In Legal Documents*, PRNewsWire, 2018, available at: https://www.prnewswire.com/news-releases/legalzoom-to-offer-smart-legal-contracts-with-clause-300713717.html, (last visited 10 October 2018).

[35] Szabo, N., *The Idea of Smart Contracts*, 1994, p.306, available at: http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net /smart.contracts.html, (last visited 4 October 2018).

[36] Szabo, p. 306.

[37] Raskin, p. 306.

[38] Clack, C.D. et al., *Smart Contract Templates: Foundations, Design Landscape and Research Directions*, 04 August 2016, (unpublished manuscript), available at: http://arxiv.org/pdf/1608.00771v2.pdf, (last visited 4 October 2018); Raskin, M., *The Law and Legality of Smart Contracts*, p. 309.

[39] Mik, E., *Smart Contracts: Terminology, Technical Limitations and Real World Complexity*, 2017, p.13, available at: https://ssrn.com/abstract=3038406, (last visited 9 October 2018).

[40] Raskin, p. 306.

for a party[41]. At the same time, there is no possibility to undo an executed smart contract[42] and no dispute (possible only *post factum*[43]) can restore the rights to the same condition, as it was before such execution. According to a recent British Columbian Supreme Court decision, the court obliged (*post factum* after an error) a Singapore based CRAB platform to return 530 Ethers (worth around 391 000 US dollars) mistakenly sent to Initial Coin Offering investor[44]. Therefore, from one point, execution of a smart contract does not rely on parties willing or unwilling to execute it, any breach, if there is no error, is impossible. In case, the breach occurs, legal enforcement is complicated due to the absence of legal regulations, however, possible.

The contracts automatization makes a contract performance as a secure one, as performance does not rely on the non-performance of the party or intermediary, on unpredictable circumstances, it depends only on the special condition, with the appearance of which the performance is automatically executed with the computer code. For example, in crowdfunding contracts made on the basis of the Ethereum project, which is a CRAB platform for decentralized applications and smart contracts, the contributors make donation to specific project and if the certain goal or the certain date is reached, then the money or CRAB tokens automatically transferred to the recipient, if not, they are automatically returned to the contributors.[45]

At the same time, smart contracts can depend not only on certain input from a contractual party but also on input from an external trusted source[46], for example, on a certain market level of company shares, financial data, certain law acceptance by the government. Whereas in CRAB based smart contracts, the payment is depending only on special fact, therefore, non-performance of the party and, subsequently, court cases connected with payment delays or contract enforcement are reduced to a minimum[47]. Such conditional characteristic of a smart contract can lead to efficient application in insurance (where the payment will be made automatically in a case of event occurrence), banking services (with CRAB technology it is possible to abolish SWIFT[48], moreover, currently many centralized banks are working on the development of CRAB technology-based services[49]) or licensed content distribution[50] (music, books to secure intellectual property rights protection), for example.

One of the benefits of CRAB based smart contracts usage is the absence of intermediaries between parties, but currently there is no legislation providing specific legal protective instruments for disputes arising between parties of smart contracts. Actually, CRAB based smart contracts are designed to eliminate any contract breach or any dispute, but if the dispute does arise in the end, there are still no legal regulations to solve them. At the same time, all possible ways of dispute resolution (court proceeding, arbitration or mediation)are rendered unavailable due to the anonymous nature of smart

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[41] Werbach and Cornell, p.332.

[42] Werbach K. and Cornell N., *Contract Ex Machina*, p.333; Grundmann, S. and Hacker, P., *Digital Technology as a Challenge to European Contract Law – From the Existing to the Future Architecture*, European Review of Contract Law, 2017, p.22, available at: https://ssrn.com/abstract=3003885, (last visited 9 October 2018).

[43] Raskin, p. 322.

[44] News Report, *Canada's Supreme Court of British Columbia Allows Copytrack Crypto Firm to "Reclaim" 530 ETH*, BitcoinExchangeGuide, 2018, available at: https://bitcoinexchangeguide.com/canadas-supreme-court-of-british-columbia-allows-copytrack-crypto-firm-to-reclaim-530-eth/, (last visited 10 October 2018).

[45] Official description of Ethereum platform.

[46] Peters, G. and Panayi, E., *Understanding Modern Banking Ledgers Through Blockchain Technologies: Future of Transaction Processing and Smart Contracts on the Internet of Money*, 2015, p. 7, available at: https://ssrn.com/abstract=2692487, (last visited 4 October 2018).

[47] Raskin, p. 324.

[48] Harm, Obregon and Stubbendick, p.9.

[49] Hileman Rauchs, p.78.

[50] Catalini and Gans, p.28.

contract based transactions[51] (on private CRAB platforms). However, on public CRAB (for example, the Australian CRAB which was discussed above) arbitration is the most suitable way to solve *post factum* any possible disputes arising from smart contracts. There are some CRAB arbitration platforms in development (as explained above), but if the contract was made anonymously, it will be hard to prove the identities of the parties in such CRAB arbitration, however, as was shown above, some countries already have adopted legislation to permit CRAB data as evidence.

Moreover, the conditional character of smart contracts and automatization of contract performance eliminate the possibility of court injunctions in such performance, as intermediate measures cannot change existing code. Therefore, one of the biggest problems of smart contracts usage is the absence of specific legal regulation for dispute resolution, notwithstanding of that, the CRAB-based smart contracts' transactions have a high level of automatization, which allows to eliminate conflicts between parties and to reduce such disputes to the minimum.

Considering current developments of CRAB technology, the usage of smart contracts is also limited to certain transactions (as not every contract can be expressed as a CRAB-based smart contract, for example, obligations, fulfilment of which relies on overall evaluation of performance under the contract)[52], but this is due only to present technical means, which can be changed in the future.

CRAB based smart contracts allow for lower transaction costs and faster transaction[53], eliminate ambiguity in contract terms as the value can be only true or false[54], provide high efficiency and security of transaction, eliminate risks connected with non-performance, eliminate disputes, remove intermediaries, eliminate human mistakes influencing contract efficiency and reduce long lasting bureaucracy need – but at the same time, the absence of proper legal regulation and technical means limits the applicability of CRAB-based smart contracts in practice.

Notwithstanding all mentioned benefits of smart contracts, some most important cons of CRAB contract usage are *inter alia* the possibility to hack the code (for example, DAO, Bitfinex, Parity hacks[55]), the interruption of data integrity, the absence of specific data protection[56] (IP address protection, or protection of company-specific data[57], for example) and legal unenforceability in certain jurisdictions.

Some countries have already started to amend legislation to ensure legal validity and legal enforcement of smart contracts. For example, in California a new amendment to the Government Code is being developed to create a working group to enable effective usage of CRAB technology to the benefit of California's businesses.[58] In Arizona law, the definition of smart contract, which describes smart

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[51] Kaal, W.A. and Calcaterra, C., *Crypto Transaction Dispute Resolution*, Business Lawyer, 2018, p.38, available: https://ssrn.com/abstract=2992962, (last visited 9 October 2018).

[52] Mik, p.25.

[53] Davidson, S., De Filippi, P. and Potts, J., *Economics of Blockchain*, 2016, p.11, available at: https://ssrn.com/abstract=2744751, (last visited 10 October 2018); Hileman and Rauchs, p.88.

[54] Catchlove, P., *Smart Contracts: A New Era of Contract Use*, LLH473 - Independent Research Project, 2017, p.8, available at: https://ssrn.com/abstract=3090226, (last visited 11 October 2018).

[55] News report, *Cryptocurrency: How To Avoid Getting Hacked*, Forbes, 2018, available at: https://www.forbes.com/sites/forbesagencycouncil/2018/09/27/cryptocurrency-how-to-avoid-getting-hacked/#29a21bc44692, (last visited 4 October 2018).

[56] Ardit, D., *Ethereum Smart Contracts: Security Vulnerabilities and Security Tools*, Norwegian University of Science and Technology, 2017, p.17, available at: https://brage.bibsys.no/xmlui/bitstream/handle/11250/2479191/18400_FULLTEXT.pdf?sequence=1, (last visited 10 October 2018).

[57] Hileman and Rauchs, p.71.

[58] California Assembly Bill 2658 text, 29.08.2018, available at: https://legiscan.com/CA/text/AB2658/2017, (last visited 4 October 2018).

contract as an event-driving program, was adopted[59], moreover, this law prescribed that a smart contract cannot be denied legal effect only because it is not realized in traditional contract form.[60] The UK Law Commission also provides legal research on possible amendments in legislation to regulate CRAB smart contracts[61]. According to the legislation of France, CRAB technology (or Blockchain) is defined as shared electronic registration technology.[62] In Malta, there is a specific legal framework provided by the Virtual Financial Assets Act of 2018, which regulates the activity of Initial Coin Offerings, placement of virtual assets, virtual assets' exchange and CRAB-based smart contracts[63]. The creation of such a legal framework as in Malta is a highly innovative legal step along the way of ensuring legal validity and legal enforceability of CRAB-based smart contracts.

Not just a legal enforceability of valid smart contracts can be an open question, but also a performance of a not legally valid contract. For example, the question of legal capacity can arise during the transaction based on CRAB smart contracts, as smart contracts have no means to test the legal capacity of the parties, most of the transactions are anonymous (on private CRAB platforms) and operated with a usage of a personal crypto key[64]. Therefore, the weak point of legal validity, possible nullity and legal enforceability of CRAB-based smart contract can be legal incapacity of a party[65], however, invalidity of a contract with legally incapable person is possible to prove only post factum after the contract performance, as was written above, which again leaves the room to develop legal mechanism to restitution and dispute resolution regulations.

At the same time, a smart contract is not a contract signed with a certified digital signature, but a personal crypto key, thus, in most jurisdictions it is not considered as a contract in written form[66]. Therefore, such contracts represent th free will of the parties and can be binding only for these parties, but the legal validity of such CRAB-based smart contracts for third parties needs to be regulated by law.

Moreover, the subject of a smart contract can be based on a value or an act, which infringes a fundamental principle of legal order, therefore, such a contract will be invalid from the perspective of law[67], but it will be executed anyway, because the code is bound to a certain event, not legal norms.[68] In such a case, , , it is only possible after contract execution to claim *post factum* invalidity of the contract and restitution of right, which opens the door to illegal trading using CRAB-based smart contracts, and therefore there is an urgent need to regulate smart contracts worldwide.

Considering the absence of regulations on smart contracts, not only the enforceability of CRAB-based smart contracts, but also certain specific legal issues should raise the awareness of the international

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[59] Blemus, S, *Law and Blockchain: A Legal Perspective on Current Regulatory Trends Worldwide*, Revue Trimestrielle de Droit Financier, 2017, p.13, available at: https://ssrn.com/abstract=3080639, (last visited 9 October 2018).

[60] Jaccard, p.20.

[61] UK Law Commission, Annual report 2017-18, no. 379, 2018, p.10, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/727386/6.4475_LC_Annual_Report_Accounts_201718_WEB.PDF, (last visited 4 October 2018).

[62] Blemus, p.12.

[63] Virtual Financial Assets Bill, March 2018, Part I, available at:http://justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29079&l=1, (last visited 4 December 2018).

[64] Werbach and Cornell, p.371.

[65] Jaccard, p.23.

[66] Jaccard, p.23.

[67] Principles, Definitions and Model Rules of European Private Law, Draft Common Frame of Reference (DCFR), 08.02.2007, II. – 7:301, available at: https://www.law.kuleuven.be/personal/mstorme/2009_02_DCFR_OutlineEdition.pdf, (last visited 09 October 2018).

[68] Savelyev, A., *Contract Law 2.0: «Smart» Contracts As the Beginning of the End of Classic Contract Law*, Higher School of Economics Research Paper No. WP BRP 71/LAW/2016, 2016, p.17, available at: https://ssrn.com/abstract=2885241, (last visited 9 October 2018).

community, for example, consumer protection issues in smart contracts from the perspective of a standard form contract. According to EU law, a 'standard term' is described as a term which was not individually negotiated by the parties, drafted in advance by a trader for several transactions involving different parties and the weaker party did not, therefore, had a chance to influence such term and its consequences, particularly in the context of a pre-formulated standard contract.[69] CRAB-based smart contracts are basically unilateral acts – one party places an offer on a CRAB platform and another party accepts this offer – or not[70] (for example, like in the fact-checking decentralized application DNN – one party is paid if such party provides services on fact checking – an offer is placed and any other party can accept it[71]). Such unilateral acts can raise a question of the unfairness of the terms, however, the mechanism to protect consumer rights and enforce such rights in smart contracts is still to be developed.

Therefore, there is an urgent need for the legal regulation of CRAB-based smart contracts, which in the future can lead to the appearance of new fields of law, such as Crypto Law, and lead to changes in existing legal structures and frameworks.[72]

4. Conclusions

Fast technological progress made a widespread CRAB based smart contract usage as a perspective for the nearest future. Create, Retrieve, Append, Burn technology opens the new possible way of application in various areas: from gaming application to corporate governance, tax management, Internet of Things, auctions, contractual relationships and certification of rights. Many governmental institutions, private businesses and Central Banks nowadays involve their employees in CRAB based projects, because they see all benefits of CRAB and possible development for technological and legal progress.

CRAB based smart contracts have a high level of transactions security, low transaction costs and low ambiguity. Such smart contracts are able to reduce the time spent on bureaucracy, fasten the process of performance, ensure transparency, eliminate breach of contract, human mistakes, non-performance, and the need for dispute resolution and an intermediary. CRAB based smart contract can be used to certify high performance and transparency of conditional contracts, such as insurance contract, crowdfunding, to certify property rights (movable, immovable and intellectual property).

Notwithstanding all benefits of CRAB based smart contracts, in most of the countries, there is no legal mechanism to secure legal enforceability and to ensure legal validity of CRAB smart contracts. However, all problems connected with the realization of CRAB-based smart contracts are connected either to technical developments (possibility of hacking, data protection, data integrity, errors in the code) or to the absence of legal regulations specific to CRAB-based smart contracts and the impossibility to fit it into existing legal frameworks.

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[69]Council Directive 93/13/EEC on unfair terms in consumer contracts, Official Journal of the European Communities, L 95/29, 05 April 1993, Art. 3, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31993L0013, (last visited 26 September 2018); Proposal for a Regulation of the European Parliament and of the Council on a Common European Sales Law, COM/2011/0635, 11 October 2011, Art. 2, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52011PC0635, (last visited 26 September 2018); DCFR, Art. I:109; 2016 UNIDROIT Principles on International Commercial Contracts, Art. 2.1.19, available at: https://www.unidroit.org/instruments/commercial-contracts/unidroit-principles-2016, (last visited 27 September 2018).

[70] Werbach and Cornell, p.343.

[71] Official description of DNN dapp.

[72] Reyes, C., *Conceptualizing Cryptolaw*, Nebraska Law Review, Vol. 96, 2017, p.62, available at: https://ssrn.com/abstract=2914103, (last visited 11 October 2018).

Therefore, all existing cons of CRAB based smart contracts can be eliminated with legislation amendments and technical development, which can lead to total restructuration of all existing legal frameworks, legal structures and the creation of a new field of law – Crypto law.