Involving of Artificial Intelligence in committing a crime as a challenge to the Criminal Law of the Republic of Serbia

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Abstract

The present study emphasizes the question of the involvement of artificial intelligence in the commission of the criminal offense and the establishment of criminal responsibility as a challenge for the criminal parasite of the Republic of Serbia in these situations. Namely, first an explanation of the notion of artificial intelligence is given followed by an overview of the basic models of these systems. After that, possible abuses of the Artificial Intelligence systems are presented, as well as the involvement of the artificial intelligence system in the commission of a criminal offense. In the second part of the article, the attention is drown to the basic principles of criminal responsibility under the current provisions of the criminal law of the Republic of Serbia, in order to point out, at the end of his work, the possible links between the human actions and the actions of artificial intelligence in the commission of the criminal offense, as well as the possible ways of establishing criminal responsibility in situations in which the acting of artificial intelligence systems resulted with causing of criminal consequence.

Keywords: *artificial intelligence, criminal law, criminal responsibility, criminal liability, criminal law of Republic of Serbia*

1. Introduction

Artificial intelligence can help in making our life simpler not only for taking decisions, but also for the other aspects. Thus, artificial intelligence is slowly becoming a part of our day-to-day life and an essential part of all modern equipment as well. Whether it is automated climate control in the car or an automated manufacturing unit in industry. Whether it is a washing machine or microwave oven, artificial intelligence is everywhere (Kulkarni & Joshi, 2015:2). The same artificial intelligence can appear as a

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mean of committing a criminal offense in the case of an artificial intelligence system being under the control of people. It can also be a direct cause of criminal consequences in situations in which the behavior of artificial intelligence system is out of the control of people. In this regard, the question of criminal responsibility and the application of the provisions of the Criminal Code of the Republic of Serbia[3] on the issue of artificial intelligence involvement in the commission of a crime is raised.

2. Definition and understanding of artificial intelligence

Artificial intelligence is the science of making intelligent machines that perform task as well as, or better and faster than, humans can. Artificial intelligence is not really about intelligence, though. It is about solving problems. But the solutions in artificial intelligence are always math- and computer-based (Harris, 2011:6). We should first underline that it is difficult to give unique and precise definition of artificial intelligence, because of exist of so many different approaches to this issue. But, on the base of analyzing available literature which has been dealing with the issue of artificial intelligence we can conclude that all those various definitions of artificial intelligence can be classified into four categories (Nath, 2009:22):

1) Systems that act like humans;
2) Systems that think like humans;
3) Systems that think rationally;
4) System that act rationally;

2.1. Systems that act like humans

Under this first approach, artificial intelligence systems that think like humans are facing the so called "Total Turing test". This model is named by Alan Turing, British mathematician and logician, who has defined intelligent behavior as the ability to achieve human-level performance in all cognitive task to fool an interrogator. Namely, Turing maintains that attempting to distinguish people form machines on the basis of thought would be a mistake. According to him, the question "Can machines think?" is an unanswerable one, because the meaning of the word "think" is excessively ambiguous. Instead of struggling with such an unanswerable question, Turing suggests that computes be involved in an imitation game (Moor, 2003:xx). In this game, a human interrogator asks questions of two respondents: (A) a computer imitating a person, and (B) a genuine person. The interrogator then uses the respondent's typewritten answers to figure out which is the computer and which is the genuine person. Sensible questions about the computer's performance in the imitation game then replace the original, unanswerable query, "Can machine think?" (Turing, 1950:433). The Turing test shows that machines can interact with human beings the way human beings interact amongst themselves. Which, in a nutshell, means that machines can behave the way the human beings do (Nath, 2009:24). In this concept, artificial intelligence systems are acting humanly and it includes physical interactions with environment such as: speech recognition, computer vision or robotics and similar.

[3] Criminal Code of Republic of Serbia, (Official Gazette of the Republic of Serbia, No. 85/2005, 88/2005 - eg., 107/2005 - correct., 72/2009, 111/2009, 121/2012, 104/2013, 108/2014 and 94 / 2016).

2.2. Systems that think like humans

In this concept of artificial (machine) intelligence, the scientists from the field of cognitive psychology are bringing in the connection human and machine intelligence. According to them, the aim of artificial intelligence is to develop and test computer programs that exhibit characteristic human intelligence. We may argue that the class of systems acting humanly is a super set of the class of the systems thinking humanly. This is because the action is normally the final result of a thinking process (Yao, Zhong, Liu & Ohsuga, 2001:5). In the concept of cognitive modeling approach, scientists start from hypothesis that some machines have the capacity of intelligence and the essence of human cognitions. Namely, if the program's input/output and timing behavior matches human behavior, that is evidence that some of the program's mechanisms may also be operating in humans. So, this means that some machines have cognitive capacity like the human beings. In the cognitive modelling approach, thus, human beings and machines show the property of being intelligent. So, from this concept we have definitions of intelligence such as the definition of John McCharty, who say that: "Intelligence is the computational part of the ability to achieve goals in the world. Varying kinds and degrees of intelligence occur in people, many animals and some machines (artificial intelligence)" (Legg & Hutter, 2007:22). Also, representative for this group of definitions of artificial intelligence is Peter Voss, who says that: "the essential, domain-independent skills necessary for acquiring a wide range of domain – specific knowledge – the ability to learn anything. Achieving this with "artificial general intelligence" (AGI) requires a highly adaptive, general-purpose system that can autonomously acquire an extremely wide range of specific knowledge and skills and can improve its own cognitive ability though self-directed learning" (Voss, 2005:136). Those systems of artificial intelligence are especially development in the areas of vision, natural language, and learning.

2.3. Systems that think rationally

This group of definitions represents prescriptive and normative view of artificial intelligence. Definitions, or approaches from this group deals with theoretical principles and normative that artificial intelligence system must follow, instead of intimating humans. Namely, the rationalist approach deals with an ideal concept of intelligence, which may be independent of human problem solving. For artificial intelligence system we can say that it is rational if it does the right thing and makes the right decision. In the sense of normative approach, it is based on the well-established disciplines such as mathematic, logic and engineering (Yao, Zhong, Liu & Ohsuga, 2001:6). In this concept, behaviors of artificial intelligence system are based on the rules of inference. In this approach, emphasis is on the logical inference of a conclusion from the premises. In the artificial intelligence programme, this type of logical inference is of much use, since this programme provides a variety of logical reasoning. In an inference, a set of variables, a set of constant terms, a set of functions, the set of connectives if, and or, and, not, the quantifiers "exists" and "for all" are the most important symbols to build an artificial intelligence program. All these constants and variables are the arbitrary representations of the word. With the help of these symbols, the so-called logistic tradition within artificial intelligence helps to build on such programs to create intelligent systems (Nath, 2009:26). In connection to everything above mentioned, an example of an artificial intelligence definition, from this approach, is the one of Douglas Lenant and Edward Feigenbaum, according to which: "Intelligence is the power to rapidly find an adequate

solution in what appears *a priori* (to observers) to be an immense search space (Lenant & Feigenbaum, 1991:186).

2.4. Systems that act rationally

Acting rationally consists in acting so as to achieve one's goals, given one's beliefs. So, in this group of approach in defining artificial intelligence, artificial intelligence is viewed as the study and construction of rational agents. In this context, the "agent" notion is related to the mechanical agent or computer. So, under the "agent" notion is considered mechanical machine that perceives and acts.

Artificial intelligent systems can act rationally only after acquiring adequate knowledge from the real world. So, perception that stands for building up of knowledge from real world information is a prerequisite feature for rational actions. Also, a further step of thinking envisages that a machine without learning capability cannot possess perception. The rational action of an agent, thus, calls for possession of all the elementary characteristics of intelligence. Relating artificial intelligence with the computational models capable of thinking and acting rationally, therefore, has a pragmatic significance (Konar, 2000:3). In that sense, the agent is autonomous to the extent that its behavior is determined by its own experience. A truly autonomous intelligent agent should be able to operate successful in a wide variety of environments, given sufficient time and scope. In connection to this one of the representatives of definition of artificial intelligence from this approach is definition of Ray Kurzweil, who say that: "Intelligence is the ability to use optimally limited resources – including time – to achieve goals" (Kurzweil, 2000:24). Also, Ricardo Ribeiro Gudwin argues that: "Intelligent systems are expected to work, and work well, in many different environments. Their property of intelligence allows them to maximize the probability of success even if full knowledge of the situation is not available. Functioning of intelligent systems cannot be considered separately from the environment and the concrete situation including the goal" (Gudwin, 2000:2081).

2.5. Three consecutive generations of artificial intelligence

There is one additional distinction which is particular useful when thinking about the sequence and speed with which progress on artificial intelligence will unfold. In this sense, in literature there are generally three types of artificial intelligence (De Spiegelierie, Mass & Sweijs, 2017:30):

- *Artificial narrow intelligence* – which consists in machine intelligence that equals or exceeds human intelligence for specific tasks (for example Google Translate);
- *Artificial General Intelligence* – which consists in machine intelligence meeting the full range of human performance across any task;
- *Artificial Superintelligence* – which consists in machine intelligence that exceeds human intelligence across any task.

3. Artificial intelligence causing negative consequences ("committing criminal act")

Taking in consideration that artificial intelligence system which are developed to perform a certain task can cause problem in the sense of harming some values protected by law or of causing negative consequences, there is need for criminal law protection

from these systems. So, before we address issues regarding criminal liability of artificial intelligence according to the actual provision of criminal law or Republic of Serbia, we should first represent some of possible situations in which artificial intelligence system could commit the criminal act. In that purpose, in this paper we will use same methodology which is implemented by Matilda Claussén-Karlsson in her Final Thesis for the Law Program, entitled "Artificial Intelligence and the External Element of the Crime: An Analysis of Liability Problem". Namely, in her work she has pointed out on some already existing illustrative examples where artificial intelligence can endanger some values protected by law, such as: bots, autonomous cars and drones, high frequency trading artificial intelligences, autonomous weapon systems and military robotics, artificial intelligences in health and medical services. So, with the aim to represent how artificial intelligence could be challenge for criminal law of Republic of Serbia, we will first point out on the same artificial intelligence systems as possible "perpetrators" of crime.

The first system of artificial intelligence who can be a potential "perpetrator" of crime consists of bots. Bots, short from "robots", are neutral entities. At a very basic level, bots are a new user's interface. This new user interface lets users interact with services and brands using their favorite messaging apps. Bots are the contemporary way to expose software services through a conversational interface. Unlike most users, they are powered by a software rather than by a human, and they bring a product, a service, or a brand into a given messaging product via conversation (Shevat, 2017:2). Bot is a shortened name for a software robot, or an intelligent software agent. Bots often include elements of artificial intelligence. The Internet bot are integrated on websites, behaving as if it were a man itself. It is most commonly used for advertising or spam, but also for useful things such as technical support for the user, distance learning assistance etc. For instance, through its interactions with other people online, on the basis of its artificial intelligence, these systems can learn and adopt in his interaction some criminal behavior such as insulting, make a threat, or promoting a hate speech, despite a good intent from the producer and developer, because of its autonomous intelligence system it can act unforeseeable and not as intended. This was the case with the so-called Tay, the chatbot Microsoft unleashed on Twitter and other social platforms two years ago that quickly turned into a racist, sex-crazed neo-Nazi (Claussén-Karlsson, 2017:18).

A second system which is based on artificial intelligence that can be involved in committing criminal acts represents autonomous, or driverless vehicles and drones which' use in various aspects of society in previous years became very popular. For example, autonomous, or driverless, vehicles can be used by criminals to deliver drugs and weapons, or by hackers and terrorists for causing accidents. Drones can also be used in the same way. There are a lot of examples from practice where criminals are using drones to livestream and surveil law enforcement officials, and even to "flush them out" of hiding. Also, some smuggler groups allegedly use drone-based livestreams to monitor the movements of security forces, and can trigger a fire alarm to draw security away if they get too close to one of their members. Drug cartel smugglers, in a wide range, also use drones to avoid border control forces when smuggling drugs over the border.

The third system of artificial intelligence which can be used in a criminal purpose is high frequency trading artificial intelligences. High frequency trading (HFT) is an umbrella term comprising several groups of strategies. Given the breadth of High frequency trading, various market participants have somewhat divergent opinions of

what it actually stands for. So, for instance, the Technology Subcommittee of the U.S. Commodity Futures Trading Commission (CFTC), tasked with compiling a working definition of HFT, came back with the following draft definition in June 2010: "High frequency trading is a form of automated trading that employs:

• algorithms for decision making, order initiation, generation, routing, or execution, for each individual transaction without human direction;

• low-latency technology that is designed to minimize response times, including proximity and co-location services;

• high message rates (orders, quotes or cancellations) (Aldridge, 2013:13).

These systems can be used for market manipulation. For example, there is a case of market manipulation committed by an individual in Singapore who engaged in spoofing using algorithms as a tool. This case is called the "JGB Futures Case". In this case, the individual in Singapore used an algorithm to place small orders at the best bid (ask) (all on a scale around JPY 400 million), while placing large spoofing orders at the opposite best ask (bid) (from JPY several hundred million to several billion), which he never intended to execute, in order to induce others in the market to place orders that would match with the Singapore trader's small order to his benefit. The tool also allowed the trader to complete one trading cycle in an incredibly short period of time (the average time elapsed from the placement of the spoofing order and the cancellation was less than a mere 300 milliseconds) and accumulate profits by repeating such trading cycles multiple times (Niwa, 2016:39).

A fourth system of artificial intelligence which is also potential challenge for criminal law regulation is autonomous weapon systems and military robotics. Autonomous weapons or autonomous military robot is the autonomous weapon system that can independently search and engage targets based on programmed constraints and descriptions. This mean that it can acquire targets and initiate force without human intervention or supervision. Delegation of life-or-death decision making to nonhuman agents is a recurring concern of those who oppose autonomous weapon systems. The most obvious manifestation of this concern relates to systems that are capable of choosing their own targets. Regarding that, highly appreciated computer scientist Noel Sharkey has called for a ban on "lethal autonomous targeting", because it violates the Principle of Distinction, considered one of the most important rules of armed conflict – autonomous weapons systems will find it very hard to determine who is a civilian and who is a combatant, which is difficult even for humans (Sharkey, 2010:370). So, there is concern that allowing artificial intelligence system to make decisions about targeting can result in civilian casualties and unacceptable collateral damage, which means a crime against civilians.

The fifth system, or group of system of artificial intelligence which has been identified as potential criminal problem is artificial intelligences in health and medical services. Healthcare like many industries have been disrupted by the influx of new technologies in the Information Age. Particularly in the case of automation, machine learning, and artificial intelligence, doctors, hospitals, insurance companies, and industries with ties to healthcare have all been impacted – in many cases in more positive, substantial ways than other industries. Such in other fields, also in health and medical services it is possible that happened error in providing of medical services by artificial intelligence system. Everything foregoing mentioned concerns especially when the issue of legal liability is in the question. For example, in the last group of artificial intelligence system, field of health or medical care, if mistakes occur, who is to be held

liable, because a robot surgeon is not a legal entity, should the patient sue, or public prosecutor prosecute the owner, the programmer, the manufacturer or someone else? (Loh, 2018:61).

4. Criminal liability under provisions of criminal law of Republic of Serbia

Criminal liability, unlike some other types of legal liability, is purely personal, i.e. individual and subjective responsibility, responsibility based on the guilt of the perpetrators of the crime. Bearing in mind this nature of criminal responsibility, then it is completely clear that contemporary criminal law of Republic of Serbia has accepted the principle of individual and subjective responsibility. Otherwise, the principle of individual subjective liability in criminal matters means that everyone is responsible only for their actions (i.e. for his/her behavior), as well as to be responsible for the criminal offense under which he has a certain psychological relationship which may be subject to interruption by the social community – the state. Therefore, the essence of this criminal law principle is to exclude responsibility for the other (i.e. for other actions) and liability without guilt.

From the above it follows that this principle has its own two aspects. The first aspect, as we have seen, refers to the fact that everyone is responsible only for their actions, which means that the committed crime corresponds personally to its actor, not someone else (individual responsibility). The second aspect is that one can answer only if he/she is guilty, which means that the offender will be criminally responsible if the offense is hidden or if on his part there is a psychological attitude towards work as his own achievements (subjective responsibility) (Jović, 2011:202).

An active subject is, above all, a human being, that is, a physical person who, by his actions, achieves the consequence of a criminal offense, but it can also be a legal person. Namely that in our criminal theory and legislation the opinion was that the legal person could not be an active subject of the criminal offense and, therefore, cannot be criminally liable. In other words, a legal entity can only be an active entity of a commercial offense or offense, i.e. it was possible to respond to economic offenses and misdemeanors (criminal liability in the wider sense), but that person could not answer for criminal offenses (criminal liability). However, by passing the Law on Liability of Legal Persons for Criminal Offenses in 2008[4], the situation is, not only in our legislation, but also in the criminal-law theory of changes. Namely, from the wording of the provision of Article 6 Paragraph 1 and 2 of the Law on Liability of Legal Persons for Criminal Offenses, it follows that the criminal liability of legal persons includes liability: legal person, responsible person and natural person acting, i.e. performs certain activities under the supervision and control of the responsible person. The law, therefore, in principle, envisages two subjects of this specific criminal responsibility - a legal entity and a natural person.

It is justifiably considered that the act is the most important element of the criminal offense and therefore it attaches special significance to it in domestic and foreign criminal justice and literatures. The act causing harmful consequences is, in fact, the act

[4] Law on Liability of Legal Persons for Criminal Offenses ("Official Gazette of the Republic of Serbia", No. 97/2008).

by which the crime is committed. The criminal act is still defined and defined as taking actions in order to cause forbidden consequences. And the result is forbidden because it is harmful. It further states that this first element in the general notion of a criminal offense consists of the effects and consequences as well as the causal link between the actions of a particular person and the prohibited consequences that appear as a product of that crime. Therefore, if there was a criminal offense, it is necessary that there is a human action, a human action. In other words, something that becomes a criminal offense under certain conditions is a human act. Without human action, therefore, there is no criminal offense, since certain harmful effects can also be caused by animals or natural (higher) forces, but such consequences, since they are not the result of human activity, cannot be treated as a consequence of a criminal offense.

Therefore, for criminal justice evaluation only human action is relevant, because only such an action (due to some properties and under certain conditions) can constitute the act of a criminal offense.

5. Challenges of criminal law of Republic of Serbia in the sense of involving artificial intelligence in committing criminal offences

Based on all of the above mentioned, according to Criminal Law of Republic of Serbia, only human acts constitute the ground for imposing a criminal liability. An artificial intelligence act must be in connection with some human actions, that can fulfil the elements for criminal liability, *actus reus* and *mens rea*.

Considering that the *actus reus* can be expressed in acts and omissions, in the next section of the paper we will present the possible situations of artificial intelligence involvement in causing of the criminal consequence.

When it comes to acts, we have a situation where the artificial intelligence system is controlled by a person completely (example Drone via a remote control) in order to cause them a negative consequence. Thus, in this way, the user of the artificial intelligence system will actually use this system as a means of committing the crime. For this situation we can say that it is crystal clear, i.e. that the guilt for the resulting consequence is reflected in the fault of the user who misused the artificial intelligence system. For the existence of this situation, the necessary condition is that the system is completely under the control of the user, i.e. that it is governed by user. Here we should point out that by system user we understand a person who uses the artificial intelligence system at the time of committing the crime, that is, it manages with its acting. It may be the owner of the system, but also some other side person, for example, a hacker who breaks the code and takes control of the operation of such a system.

In terms of omissions, the situation is much more complicated. Namely, it is mainly about the situations in which there is a smaller or larger extent the autonomy of artificial intelligence. So, here we distinguish two situations. The first one reffers to a completely independent system, while the second refers to a system not *completely* under the control of the user. In both of these situations, in order for a person to be responsible for omission he must be obligated to act on his part. The question arising is who is the potential subject who can be responsible for omission or doing nothing in criminal situations where an artificial intelligence system, which is only partially or not at all under their control, is involved in causing criminal consequences. These subjects, or potential liable persons are the user, supervisor, owner and producer.

When it comes to the user and his responsibility for omission, one can work, for example, about the situation in which a user uses autopilot to drive his vehicle. At that moment, he has no control over the vehicle's handling, but he has the ability and also duty to intervene at any moment, if there is a serious risk of a negative consequence. In this regard, if the user behaved too irresponsible without taking into account the manner in which the autopilot manages his vehicle, and due to the errors in algorithm counting, the car pilot makes a mistake and traffic accident occurs, then that person may be summoned for criminal responsibility for failing to perform the necessary act or intervention with the aim of the prevention of danger.

With regard to the so-called supervisor, that is, the persons who foreshadow the work of some artificial intelligence system, his duty of attention and intervention is even greater, and therefore the responsibility. Such situations are, for example, in artificial intelligence systems that have a higher degree of autonomy, e.g. a drone that transports certain goods from one point to another, completely autonomous, but it is still under surveillance of the supervisor, whose duty is to oversee this process and possibly intervene in the path of moving the drone if something goes wrong or if for some reason it turn off with from the path. In this case, the supervisor would be criminally responsible, who failed to exercise control and prevent the occurrence of a negative consequence.

When it comes to the owner, it can appear in the role of the user and in the role of the supervisor, therefore, in the case of his criminal responsibility, in these cases, everything that has already been said for these two categories of persons applies. However, there is possibility that owner let some person, for example child to use system of artificial intelligence, even he realizes that although he is aware that there may be a possibility that due to ignorance and lack of necessary skills, the child may have causes negative consequences by use of that system. In such a situation, he will be held criminally accountable because he has failed to exercise control over the use of such a system by a person who is not competent to do so.

When it comes to the manufacturer and the issue of his criminal responsibility for the involvement of artificial intelligence in the commission of the criminal offense, we can say that the situation is the most complicated. First, we can have a situation in which due to the algorithmic error in the software, the system of artificial intelligence has been misplaced and caused a negative consequence. In such situations, criminal liability will exist only if there was an intent or negligence on the part of the manufacturer. So, the manufacturer was aware of this mistake and despite that he agreed to the possibility of having a negative effect, that is, that he acted out of negligence, i.e. that he was aware of these mistakes and the risk of occurrence of some danger or damage, but that he easily held that it will not have happened, that is, that he would be able to prevent it, and that such a product (artificial intelligence system) was put into the selling and using.

The second situation will exist when the manufacturer was obliged to upgrade certain information in the artificial intelligence system software, and he failed to do so, resulting in an error in his work and causing of the negative consequences. In such a situation, the manufacturer may be held criminally liable for the resulting negative effect due to his failure to act.

And the third situation is that in which a completely autonomous system, which has the ability to learn and acquire new knowledge, has caused a criminal consequence by its behavior. The issue of producer responsibility in this situation arises. On this issue, we think that there is no place for criminal liability of the manufacturer, because the

behavior of the artificial intelligence system is completely beyond its control. In such situations, it may be possible to speak out of civil liability for damage incurred.

6. Conclusion

On the basis of all of the above, we can conclude that it is quite justified to fear that in the future the number of crimes in which the systems of artificial intelligence are somehow involved will increase. Fear of the increasing involvement of artificial intelligence in the commission of criminal offenses, is primarily based on the fact of the increasing presence of such systems in the everyday life of human, almost in all spheres of his life. In addition, such systems are suitable for manipulation or abuse, since they are primarily intended to serve to humans. This refers primarily to artificial intelligence systems that are completely under the control of users of this system. Then, some types of these systems have a lower or higher degree of autonomy, which means that their functioning does not require human engagement. This refers primarily to systems that are, to a lesser extent or completely, out of control of the human, that is, in part, or completely autonomous. Also, these systems are unpredictable, because they have the possibility of self-learning and acquiring new knowledge, which can cause problems in the processing of a large amount of data and therefore unpredictable behavior. In addition to this, due to lack of awareness, such systems are unaccountable, like an animal. This is what makes them more suitable for misuse for criminal purposes. This is why the issue of criminal responsibility in situations in which these systems have caused the criminal consequences of great importance and the challenge for contemporary domestic criminal legislation.

Criminal liability for the commission of a criminal offense under the provisions of the current Criminal Code of the Republic of Serbia is prescribed only for people. This further means that in situations where artificial intelligence is somehow involved in the commission of a criminal offense, it can be said about criminal responsibility and punishments by sanctions of criminal law only if the functioning of the artificial intelligence system can be linked to a certain human behavior. In this sense, users of these systems, supervisors, owners or manufacturers appear primarily as entities that can be linked to the operation of these systems and whose guilt can be attributed to their criminal behavior.

And, at the end, we can say that biggest challenge for criminal substantive law, as well as for criminal procedural law regarding these cases, will be bringing in connection certain persons with acting of some systems of artificial intelligence and its causing of criminal consequences.

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