**Robocop, roboethics, and the future of warfare: Myths and Reality, Part I**

It is 2028. Tehran, the capital of Iran, is full of sunlight, literally – but metaphorically, too: Huge biped robot guards are detecting and neutralizing any potential terrorist acts. They are quick, precise, and effective. Are they infallible? Not necessarily. And anyway, you can only be infallible, once you have decided exactly what is correct and what false, and if you have in your pocket the perfect compass for making the Right decisions (whatever this might mean!), as well as the Golden Scale of Justice.

And as the biped guards that are featured in the introduction of the new Robocop movie do not seem to have pockets, within the first three minutes of the movie comes the first “False Positive” judgment, as it is known in the terminology of security: a small child that happened to run in front of the RoboGuards is executed. The only difference with other instances of “False Positives”, for example the ones found in medical tests, is that in the case of armed and licensed-to-kill RoboGuards, the cost of a false positive is a Human Life – and in this case the life of a child. But whose fault is it? Is this due to the electromechanical nature of the RoboGuards? If they were made up of living cells, or even if they contained a human brain inside, would anything change? If they were simply people and not robots, would anything change? Is the total utility of the RoboGuards positive, despite the occasional “false positives”?

These and many more are the questions that the new RoboCop movie intends to create within the minds of its viewers. And the film that came out of Hollywood is not an unbiased “Tabula Rasa” (blank slate): it is colored, in an apparent and also in less apparent ways, with its own answers as well as subliminal shades of opinion, which it might well be able to imprint in the neurons of its viewers. But which are, though, the fundamental questions that the new RoboCop movie is touching upon, and which are the opinions it expresses about them? And most importantly, how are these questions related to our modern-day scientific knowledge and research, and how can they be placed in a wider context of Philosophy and Ethics? This is my main object of inquiry, even if in a very concise manner, within the text that follows.

The list of fundamental topics that the new RoboCop movie is touching upon, is certainly not short: Human and Machine Intelligence, Logic and Emotion, Free Will, Ethics and Reasoning, the relation of Governments to strong Multinationals, the responsibility of Public Intellectuals, all the way to – even if in tangentially touched upon – the question of the families and relatives of the Guardians. But let us view these topics one by one:

Coming back to 2028, after a half revolution of the globe, let us fly from Tehran to Detroit. While Iran is full of armed RoboGuards, which have been designed and manufactured by an American company, the USA still has only traditional old-fashioned armed policemen. But why? The “public intellectual” Dreyfus has convinced public opinion as well as the government of the United States that only humans should be allowed to have the “license to kill”. But on what grounds does this argument hold? Couldn’t it be possible that machines are more precise than people? Of course, the name of Dreyfus is an indirect reference to the philosopher Hubert Dreyfus, who is well known for his critique against the omnipotence of Artificial Intelligence. And, in a similar fashion, Dennett is a reference to the philosopher Daniel Dennett, who could be thought of as being in many respects a supporter of AI. But what might be the prerequisites in order to grant a “license to kill” to a man or a machine?

1. What might some basic prerequisites be for granting a license-to-kill?

Three of basic ingredients of potential answers to this question are usually the following: First, the capacity for **deciding correctly** if and when the trigger should be pressed. Second, the capacity for **fast and accurate targeting**. And third, possession of adequate **responsibility, legal** or otherwise. But do robots or humans, fulfill these prerequisites? And between these two endpoints of the biological-artificial spectrum, would a **mixed biological-artificial hybrid**, such as a “brain-in-a-vat” (using the philosophical slang), which is what RoboCop Alex could be approximately construed as, fulfill such prerequisites? RoboCop Alex, in the latest version of the movie, is made up of a human mind, which after having lived inside its natural body for many years, was taken out and placed within a mechanical body: and was furthermore augmented with silicon integrated circuits (chips) which were implanted within the biological brain. In order to attempt a first exploration of this question, let us look at the **prerequisites** one by one:

1.1 Decision Making, Information, and Ethical Reasoning

First, the capacity for correct decision-making regarding execution. A simplistic-traditional school of thought supports the opinion that only pure logic, totally decontaminated from any potential emotional distortion, can lead to correct decisions. Is this view, though, in accord with neuroscientific results? And is just the proper decision making **mechanism**-algorithm sufficient for making correct decisions, or do we need further elements in conjunction with the mechanism. For example, don’t we also need appropriate **information** in order to feed the mechanism with, and don’t we also need a clearly stated and practically computable system of values – **ethics**?

1.1.1 A slight diversion: Logic and Emotion

Are emotions, though, always an opponent of logic? Let us make a slight diversion discussing some sides of this question. In 1848, a big explosion pushed a long metal bar with such force, so that it passed through the skull of a young railway worker: Phineas Gage, the name of whom remains historical in the neurosciences. Many other people with brain lesions have acted as important sources for studying the human brain and the connection between its function, localized or holistic, and behavior, as the field of cognitive neuropsychology can demonstrate. An important though result for our present discussion that arises from such studies, is that people with lesions in brain areas which are heavily implicated in emotional functions, seem to have very big problems in tasks which at least at first view seem to purely “logical”, such as the solution of mathematical problems (Antonio Damasio, Descartes’s Error)

Furthermore, when analyzing the human thought process and its steps that unfold during the solution of a mathematical problem, it seems that beyond the simple steps of a proof, during which there usually is conscious reflection of all the possible next steps and conscious choice of the right operation-transformation to take, there also exists another species of steps: those that require a certain “mental leap”, during which we lose conscious tractability of a discrete sequence of thoughts that leads us to decide what the next step should be, and it seems to us that the solution-next step that we are looking for just semi-magically “arrives” to our mind. During such “mental leaps”, which are a very important part of the mental steps required for solving problems that seem to be purely mathematical-logical, there exists evidence that brain areas associated with emotions are heavily implicated:

An evaluation of the “taste” of groups of thousands of potential next steps seems to take place almost instantly, and some of them win over and arise as the output of this process, which is consciously not tractable. Thus, mathematical problem solving, and other such tasks which we naively think require “a purely logical mental process”, require the complementation of consciously tractable logical reasoning steps with what seem to be emotionally colored processes of very fast holistic evaluation. Thus, it is not the case that emotion is always an opponent of logic; and it seems that for some tasks, emotional processes are actually an indispensible ally of logical ones in order to be able to reach decisions!

Of course, this does not mean that there are no emotional and other systematic biases (cognitive biases) that cause humans to deviate from rational decision-making. And many such types of biases have been studied in depth – for example, the biases in economic decision making that have led to the Nobel of Kahneman and Tversky. But even some of these apparent deviations, could be justified if one views rational decision making within a wider picture, for example through the lenses of cognitive economy and bounded rationality. Summing up, the situation regarding the role of emotional processes in decision making, is certainly not that simple as the traditional view holds! And any inquiry regarding this interplay between the logical and the emotional, depends very much on how one defines boundaries for the artificial dichotomies between logic and emotion, the cognitive and the affective, and so on. And after all, when viewed under a broader framework, such systems which at their simplest version consist of two discrete and mutually exclusive poles, could also be viewed as describing fuzzily defined regions in a more holistic multidimensional and continuous map of mental varieties.

1.1.2 Can machines have emotions?

Thus, and contrary to the popular folk myth, it does not necessarily follow that machines are by necessity superior to humans when it comes to correct decision making, and certainly not so just because of the supposed simplistic “lack of emotional distortions” of machines. But, even if this is the case, and indeed machines should sometimes exhibit capacities of “emotional intelligence”, is it true that machines could ever “have emotions”? Again, popular opinion holds that only humans can have emotions, and certainly not machines. However, and again only after one clarifies what are the empirically testable indications which verify the proposition “Entity X has emotions” (where X could be me, or George, or my cat, or my Robot) so that we know what we are talking about, it seems that today’s machines (and certainly the machines of the future) possess some demonstrable forms of emotional intelligence! For example, there exist computer programs that can automatically analyze human facial expressions or the tone of a human voice and classify it as “happy” or “angry” or “excited”. Furthermore, there certainly do exist virtual characters or robots that smile or get sad depending on their interactions with humans – such as the famous Japanese electronic game Tamagochi – a virtual character in your pocket, which needs to be taken care of in order to remain happy and to grow! And in some cases, such programs can be more precise than humans when it comes to recognizing subtle indicators of emotions. And thus, the future of “affective computing” as a field seems to be bright!

If we thus postulate our fellow human, to whose emotions we don’t have primary access (i.e. we don’t directly feel what he feels, as we do for our own emotions), but only secondary access (i.e. we can hypothesize what he might be feeling on the basis of what we perceive through his face and voice, or other sources of information), indeed “has” emotions, then, what is the real differentiating factor that makes us be inclined towards saying that an android robot with situationally appropriate observable reactions (such as facial expressions) does not “have” emotions? Again, both in the case of a human beyond ourselves, as well as in the case of the android robot, we only have “secondary access” to observable indicators of emotions; we never have “primary access” by directly feeling what they feel, as we do for ourselves.

Thus, if a machine is capable of recognizing human emotions, or of giving the impression to its observers that it is “sad” or “happy”, does this mean that it really “has” emotions? When taking a more ontological approach, this does not necessarily follow; neither does the contrary. However, when taking a more phenomenological approach, what really counts are the observable indicators; as long as we don’t have direct primary access, we could be well justified to equate “appearing to have” with “having”, as long at least as we are stating this assumption. Think, for example, what makes you believe that any other human, beyond yourself, indeed “has” emotions: you just observe his or her expressions and behavior, you partially know the contextual circumstances, and thus you infer that: “For him/her to appear like this, he should be feeling X”. But did you ever have direct, primary access, to the internal state of any other human beyond your own self? What we always have is a second-order statement, of the form “I believe that Y believes Z” or “I believe that Y feels X” etc. And as it is the case that from our previous knowledge and current observations we for example believe that George feels happy, but it is also the case that we believe that our dog feels happy when it moves its tail – thus, why should things be so fundamentally different for a robot? In both cases, we never entered the mind of George or of our dog to feel what he feels – as is the case for the robot.

And I am not mentioning all of the above in order to lead you into a skepticist solipsistic stance (to use the philosophical term), but simply in order to remind you that it is only to your own emotions that you ever have primary access to (and arguably, only partial access), and that the emotions of any other entity (human, animal, or robotic) you can only postulate secondarily, given what you observe. Thus: yes, if we accept that our fellow human, “has” emotions, then we could also as well accept that machines can not only exhibit emotional intelligence, but also “have” emotion, according to the argument presented above. An exception to this, of course, would occur if we a priori postulate an essential difference between biological and machine entities which by definition prohibits machines to “have” emotions. But then, this would not be a conclusion that we can infer through a chain of reasoning, such as the one we presented above: it would just be assumed (by definition) dogmatically.

1.1.3 Human vs. Machine Decision Making

Thus, at least when it comes to the first prerequisite for granting a “license to kill” to an entity, i.e. being able to decide correctly, there does not seem to be a clear victory of neither machines nor humans, at least not a total victory or an apriori victory. And certainly the “emotional distortion” argument against humans does not alone necessitate a current or future victory of machines alone. A similar situation with no clear total victory of neither humans nor machines yet exists when it comes to other domains of comparison: for example, IBM’s Deep Blue computer has won over the world chess champion Kasparov, but in many pattern recognition problems humans are still much better than machines – at least given the current state of progress of machine intelligence.

However, it is worth noting that special training for humans so that undesirable emotional biases are decreased, while being partially possible nowadays, seems to be quite slow and painful, and with often unpredictable results and with sometimes undesirable side effects. And also, the fact that today there does not seem to be a clear victory of neither humans nor machines overall, this does not necessitate the continuation of this state of affairs in the future: it might be the case that the rates of change, as well as the existence of inherent limitations and upper bounds, lead to changes of this state of affairs in the future. However, one way or another, as we shall discuss later, what really interests us is not systems of isolated humans or machines: but the already demonstrable potentiality for loose or closer coupling of potentially thousands of humans and machines in order to create systems that exhibit collective intelligence.

1.1.4 Adequacy of information

Let us now return to the topic of taking correct decisions, and more specifically to two sides of it that we have not yet examined: First, the possession of adequate information, and also relevant to the decision to be taken: the mental mechanism for decision making is not sufficient alone; it has to be fed with the right data in order to take the right decision! And exactly there, a very interesting side of our topic is implicated: a big part of this information, might well not be coming from the senses or the memory of the human or robot – but it might be external derived information, for example gathered through the internet, or through a special database that a security agency has created, or from images arising from a camera network that covers a whole city.

Thus, as is also the case in the new RoboCop movie, robots and the hybrid human-robot Alex have direct access to cameras as well as to stored videorecordings and databases, which are situated externally to their body, and are accessed through the network. And exactly there, it seems that machines might have an advantage over humans: they have direct access to this information, while humans need a special intermediary (a human-machine interface) in order for the information to be accessible to and browsable by their mind, flowing through their senses. On the other hand though, a large percentage of such information, at least today, that exists in the web or through video storage, is not stored in a form that is directly comprehensible by machines (machine understandable form, for example through the semantic web); thus again, at least today, there is no clear inclination of the scale towards neither humans nor machines, when it comes to this second important aspect of decision making, i.e. access to adequate and relevant information.

1.1.5 Choice and practical computability of ethical and/or value system

And thus, after having started our discussion regarding the decision making mechanism, and the information required to feed it, let us move to the third side under examination: the existence of a clear – and practically computable – ethical system. When we are talking about a “correct” decision, under which theorizing of “good” and “bad”, “correct” and “wrong” are we judging? Or when talking about an “optimal” or at least “satisfactory” decision, which metric or utility function are we implying or explicating? Is there an “absolute bad” or “absolute good”, or at least a total or partial ordering of “better” or “worse”? And also, where do we put the limits of the examination of the consequences of an action, in terms of people, space and time? When we are judging benefits, benefits to whom should we be examining? The person that has taken the action dictated by the decision? Our selves? Our children? Our city? Humanity? Mother Earth, together with her biosphere?

And also, there exists significant variation regarding the subjective perceptions of the good among individuals, groups and cultures. At least, when it comes to what we would not like to happen to humans, there is considerable universal agreement, and thus foundational documents such as the Declaration of Human Rights have arisen. However, when we move from the negatives (what we would not like to happen to anyone) to the positives (what we would prefer), there exists a wide spectrum of options, which are also expressed in the multitude of philosophical and religious ethical systems that exist: Knowledge? Power? Money? Self-actualization? Love? Was Epicurus right, Jesus, Plato, or the Ecclesiastes of the Old Testament? Anyway, one could argue that the guardian-robot is not trying to maximize different aspects of the “Common Good”: Robocop does not aspire to be the electronic equivalent of the guardians of Plato – it is just a policeman, who would probably have belonged to the warrior class of Plato’s Republic, given his desirable attributes. RoboCop is usually just trying to avert events which would almost universally be condemned as negative, such as the murder of a citizen by a criminal. But again, can he calculate the results of his action, and weigh their components appropriately? And for that purpose, which computational system of ethical reasoning, will RoboCop utilize?

The three law of Robotics of Isaac Asimov, are just a well-intended but over-simplified system, which though still has practical computational difficulties, when trying to practically implement in algorithmic form. And beyond popular science theorizations, such as Asimov’s, the fundamental questions of ethical reasoning are heavy, and have always acted as dichotomizers of public opinion. “The end justifies the means”, “The cost of human life” and other such well known expressions are at the center of such discussions. Imagine for example, a flight full of passengers, with both pilots having lost their senses, and with a third non-certified amateur pilot half awake, asking for permission to land at a very busy international airport, such as Athens airport in August. Should the amateur pilot be granted the license? Should RoboCop shoot the plane down with missiles, in order to minimize the probability of an accident with potentially many more casualties than the passengers of the airplane? The very classic “trolley problem” of Philippa Foot, which is central to the field of ethical reasoning, is in many respects similar to the above highly realistic situation.

And in addition to such considerations, there is another important dimension regarding the computational implementation of ethics which is required in order for a machine to be able to autonomously act ethically: the dimension of practical implementability. Imagine, for example, a system which is based on the maximization of the statistical mean value of a utility function for the various potential outcomes of every possible action, and for which the outcomes are judged not only in terms of the primary but also the secondary and higher order consequences of each action, and especially those consequences that are mediated by other people. What do I mean with this? In simple terms, such theories could be summarized as: “Select that action that statistically results to the most good, and not only due to its direct consequences, but also its indirect: that is, through the consequences of the future actions of other people which will result as a consequence of how your action will have affected these other people”. Thus might seem like a nice and clear sentence, but it is often computationally impossible to accurately enough predict such indirect consequences of an action, either because of the lack of adequate information, or because of inherent computational complexity. Thus, for example in such cases, simplistic and inflexible ethical systems, such as those construed as a small number of “do” and “don’t” rules specifying what somebody should or shouldn’t do under simply testable circumstances, might sometimes end up being much more efficient in practice than elegant utility maximization theories regarding practically incomputable future states with secondary consequences.

1.2 Two more prerequisites

In the two previous parts we covered three aspects of the first prerequisite towards granting a “license to kill” to a human or a machine, or even to a hybrid human-machine entity that might be for example playing the role of an autonomous security guard. The first prerequisite was the ability to make correct decisions, and the three aspects were concerned with the decision making mechanism, the adequacy of information feeding the mechanism, and the ethical reasoning or value system providing the judgment scale. Now let us move to the other two postulated prerequisites: the capability for accurate and fast targeting, and the legal responsibility

1.2.1 Accurate and fast targeting

The first of the two is a matter of mechanical design and sensory-motor mechanisms – and in this domain it seems that machines are already ahead of humans, and thus even the hybrid human-machine Alex of the RoboCop movie, that has been equipped with electronic systems of targeting and trigger-pulling-in-action, is superior to the previous human-only Alex.

1.2.2 Legal responsibility

The second though is a substantially more difficult matter, as is demonstrated also by the difficulty that the official granting of legal responsibility to engineers for information technology projects has faced. But why might it be so difficult? Simply, because for a computer that is interacting through sensors and actuators with its environment, it is practically impossible to exhaustively check its correctness of operation, as there exist millions of potential states of the environment and system that might arise, and all of these cannot be a priori tested. Thus, even if the few (and very cumbersome) methods that exist for formal design and verification of software, usually these can never scale to the complexity of such real-world systems, and there still exist many cases in which for the results of an error of the system (which might have caused unnecessary deaths, as in the case of the roboguards in the opening of RoboCop), we cannot simply hold responsible a single programmer that has written code.

Even more so, for a highly complex system such as a future RoboCop, there might be many which might hold total or partial responsibility: the buyer-user, the company the manufactured the system, designers, or even wrong information that entered the system through the network or that has arisen from a camera. Thus, not only there is no legal framework at the moment in order to grant responsibilities for the case of an autonomous system which has the license to kill, but also tracing responsibilities for a potentially lethal error might require special long-term research efforts similar to those that take place after airplane accidents.

However, there is a very high probability, that in the next big war, robots will play a primary role. And it will not just be robots fighting against robots, but also robots against humans. But what is the difference between a robot and a tank which is aiming against an exposed soldier? It does, and it also doesn’t, one might say. We will soon explore such questions in more depth.

It is worth noting that in the US Armed Forces, where armed robots have already started to be experimentally deployed, and where remote-controlled pilot-less drones are operating and killing daily in Afghanistan, still the license to kill is given only to humans: autonomous machines are not allowed deciding they can pull the trigger on their own, but there is always a human having issued the command, so that liability can always be traced. Nevertheless, in cases of conflict where the response time is very important, this creates a comparative disadvantage as compared to granting authority to machines.

Of course, there is a lot of space for interpretations of what it means for a human to be “issuing a command” to the machine: it might simply mean “allowing the system to decide on its own from now on when and if to pull the trigger”, and thus even if the authorization came from a human, the final decision belongs to the machine in this case. It is worth noting that land mines, one of the most inhumane weapons, are aiming towards immobilization of personnel and are based on capitalizing on human empathy for fellow humans, in order to create even more casualties: it is very difficult for fellow soldiers to leave their companion immobilized after he has been hit by the mine, and thus they often try to pull him away, exposing themselves more. The millions of either dead or amputated victims of this inhumane weapon, most of which were citizens and not soldiers, testify for the brutality of this unfortunately still widely used weapon.

2. Beyond the individual unaugmented human or machine

Now let us move to another question: between the two extremes of purely artificial autonomous robots, and simple unaugmented humans, where should the hybrid man-machine Alex of RoboCop stand, being composed of a human mind and a machine body? While it seems at first sight that Alex belongs to an absolutely novel category of entities, this might not totally be the case after all. First of all, one important question for such hybrids is: where does the human end, and where does the machine start? For example, nowadays there exist laboratory cases of exoskeleton technologies (mechanical robotic prosthetics to humans), which allow increased bodily performance for soldiers, without them losing any biological part of their body. Apart from that, there also start to exist not only mechanical but also cognitive prosthetic devices for humans: such as portable intelligent cameras that record all of your experiences and can instantly recognize people that you have seen before, and bring back memories of previous interactions with them, displayed on a see-through head-mounted display – such as the Google glasses. This is thus a cognitive prosthetic, that acts as a memory augmentation device. Also, something much simpler which again can be viewed as a prosthesis, is a loosely-coupled hybrid of an armored tank with a human operator inside it: the tank is effectively the mechanical enclosing “body” of the human. And another case of a hybrid, with partial loss of body parts (unintentional though), is the case of prosthetic robot hands or limbs for amputated people.

But let us continue along this line of thought, and let us ask: how about the case of an armored tank with two human operators inside, one of which is also supported through wireless radio be external observers that give reports of the surroundings? In this case, we are slowly exiting the borders of individual intelligence, biological or artificial, and of the human-machine hybrids, loosely- or closely-coupled, and we are entering the domain of embodied situated human-machine collective intelligence, composed by a mixture of coupled humans and machines which participate in organized interaction. Such mixtures start to act as a unitary intelligent unit with a distributed body, the limits of intelligence of which might well surpass the limits of individual human or machine intelligence, or even the collective effective intelligence of groups of humans-only or machines-only. And along such directions one could foresee an important part of the future of security, of the military, and of intelligence in general: along the direction of the potentiality of creation of highly effective harmonious teams of mixed humans and machines, with their coupling accomplished through highly efficient and innovative human-machine interfaces and their intelligence interconnected and provided through networks. And this is pretty much the direction hinted by the recent RoboCop movie too: the real increase in capabilities of the new Cop comes not only through its novel mechanical body, but also from the camera network it is connected to, as well as the directly and intuitively real-time accessible archives of the police with distilled information, audiovisual materials, applications providing instant assessments of risk, and all of these other elements of distributed intelligence that the new RoboCop is interconnected with.

3. Epimetron of First Part

We have thus commented upon a large number of fundamental questions that arise out of the new RoboCop movie, such as: What is the relation of human and machine intelligence? Do robots have an advantage over humans, and what about hybrid human-machines such as Alex in RoboCop? Is emotion always an opponent of logic? When should we grant the license to kill to a human or machine? How is practical robo-ethics related to mainstream ethical and decision making theories, as well as to computational ethical reasoning? And thus, through this discussion, we arrived at mechanical and cognitive prosthetics, distributed and collective intelligence, and examined whether today robots or other devices have in some cases been granted the license to kill.

Many of the other fundamental questions of RoboCop, such as free will, the role and responsibilities of Public Intellectuals and the relation of governments to strong private interest groups, but also the question of families of guardians, have not yet been discussed, but we will return to them in a later article.

Nevertheless, it is worth closing with another relevant comment. In 1981, the first “personal computer” appeared; the famous IBM PC. But beyond its name, what really made it enter every home and spread so widely, were two applications that could run on it: word processing and the spreadsheet Lotus 123. These were the “killer apps” that allowed the wide spread of computers and turned them literally “personal”. However, similar applications that will allow the much wider spreading of robots, have not arisen yet. Such applications might be home assistance; or some other supporting application, for example for the elderly. And there is indeed a wide range of beneficial domains that robots have started to be able to assist with: from elderly care to people with special needs, to search and rescue robots, to demining robots, medical robots and more.

The question though remains: What will be the “killer app” that will make the wider application of robots outside industry become a reality? I hope that what follows will not be indeed the case, but I am afraid that, there is a very high probability the “killer app” will not just be metaphorically a “killer”, but might well unfortunately literally be so. The next big war, will most probably have robots playing a key role. And it will not just be robot-against-robot, but it will also be robots-against-human. But again, what is the difference between this and a tank pointing at an uncovered soldier, some might say? There is a difference, and there isn’t too. And a large fraction of the questions that we have started examining in this text, have exactly to do with this difference. Let us at least hope a non-biased awareness of these questions, the public discussion that should follow, a new generation of public intellectuals that can reach the masses and the decision makers, the mass media and public opinion, will help humanity to not discover again the wide spectrum of its binary hypostasis, which can range from the most beneficial creation to the most destructive rampage, after yet one more major humanitarian drama, such as those that had arisen following the introduction of chemical and nuclear weapons. It might well be the case that both we and our children might have to experience such a drama. Thus, think deeply, and let us start moving from thought to appropriate action!

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