

ARTIFICIAL INTELLIGENCE IN THE LIFE'S WORK OF STANISŁAW LEM

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Abstract

Since 1956, countless devices and their programs have been declared artificial intelligence. The word “robot” has changed meaning similarly since 1922. Lem devoted much of his entire life's work to publishing his ideas on robotization, cybernetics, and self-aware machine intelligence, which he described as homeostatic systems. The technological development of the 21st century is following precisely the same course, making the same mistakes that Lem, with his characteristic sarcasm, has illustrated in the stories of Trurl and Klapaucius. This paper presents the author's key findings for AI developers.

Keywords

Lem, AI, robots, cybernetics, design flaws, ethics, and legal regulation

1 Introduction

Those who have attended my lecture on Asimov's oeuvre [1] or read the published study [2] know exactly what the terms artificial intelligence and robot initially meant. In this paper, I will focus on Lem's oeuvre and only mention his relationship with Asimov.

In short, to sum up in points, we can conclude the following:

- a) Scientific and technological progress has given rise to artificial intelligence [3].
- b) The concepts of robot and AI have been intertwined from the beginning (1920 Čapek).[4][5]
- c) The idea of using machines that are not only automatic but also able to adapt to the environment was obvious in interstellar travel and the conquest and terraforming of planets.
- d) Science fiction is a semi-technological futurology, the genre itself being linked to technological progress and its expected results. Artificial intelligence cannot be left out of science fiction. But they have nothing to do with each other!

In this work, I cite only his works published in Hungarian because I read them in my mother tongue. The Hungarian titles and translations are different from the English ones, so I use the English titles for clarity.

In his work "Science Fiction and Futurology"[6] Lem devotes a special chapter to the problem of artificial intelligence, entitled "Robots and Humans". His book "Summa Technologiae"[7] deals exclusively with this subject, but does not use the term, but mentions it verbatim in his The Catastrophe Principle and The Weapons Systems of the Twenty-First Century or the Upside down evolution.[8] He is similar to Asimov, who used the term artificial intelligence only twice in his novels, as I wrote in my essay on him [2].

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Lem and Asimov were contemporaries, Lem was only a year younger than his colleague, so it is no wonder they dealt with similar problems, even with entirely different approaches. Asimov was not much concerned with cybernetics, the technology of creating artificial intelligence, but both were concerned with epistemological approaches, ethics, consciousness, and psychological aspects.

In both their writings, cognitive processes are presented in fiction, with a special emphasis on intuition as one of the least explored psychic phenomena of thinking, a subconscious process that supports conscious action.

Stanisław Lem, as a famous writer, is known to most people as a fiction or science fiction writer and not as a scientist, so the primary information to his name is this. Indeed, he did not earn a science degree at the cost of a university education. However, his scientific achievements were recognised during his lifetime!

He was awarded honorary doctorates by four Polish universities and was elected a member of the Polish Academy of Sciences in 1972.[10]

Typically, as László Ropolyi reports in his philosophical analysis of Lem's life's work,[11] "when the 11th International Congress of Logic, Methodology and Philosophy of Science of the IUHPS was held in Krakow, Poland, in August 1999, the highlight of the Congress was not the appearance of a well-known philosopher, but of Lem."

To commemorate the 100th anniversary of his birth, the Wrocław University of Technology established the Lem Prize [12]. The announcement of the prize is also a tribute to Lem: *"The Stanisław Lem European Research Prize (the "Lem Prize") was established by Wrocław Tech on the 100th anniversary of the birth of the Polish science fiction novelist Stanisław Lem. In 1981, the institution awarded the professor of literature and futurology an honorary doctorate. Lem's work focused on the relationship between technology and humanity."*

Universities have also analyzed his writings at the Masaryk University in Brno, where the course "Philosophy in Science Fiction" is the subject of a lecture led by the head of the department [13], and at the Eötvös Loránd University in Budapest, where László Ropolyi teaches, who in his excellent summary mentioned above gives an excellent philosophical-literary summary of Lem's oeuvre.

I could list numerous other reasons to justify the scholarly work of the author, known worldwide as 'only' a science fiction writer. However, the above are enough to be considered a serious scholar by anyone, even someone who has never read a line of his writings.

Anyone who starts to read Lem should be aware that he was born at an age when a scientist was not considered a scientist without a knowledge of Latin and Greek, and for the same reason, French and English phrases regularly appear in his writings. He is one of the last of a dying breed, one of the last representatives of a writer and scholar with a classical European education and an immense lexical knowledge, and hence a vast vocabulary, whom an uneducated person will never be able to understand unless he reads up on the things he writes about, mentions or quotes.

Coupled with this is his extraordinary ability to change his writing style with the greatest of ease. He can write a story, or he can turn into a chuckling story, or he can write poetry with almost no attention, or he can write a novel full of emotion, or he can turn into a university professor and give us a book that we have to put down chapter by chapter because it needs to

be digested. Moreover, no matter his writing style, he does it all with core ideas and academic rigour.

Her linguistic ingenuity is unmatched, few literary translators can do what Beatrix Murányi does, to present it as the author has done in her language, enchanting her readers. A literary translator is also an artist in her own right. Beatrix Murányi, who has produced most of Lem's translations to Hungarian, has undoubtedly identified with the author's intentions and has done a masterly job, to the great delight of Hungarian readers.

This study cannot undertake to present all his writings published in Hungarian, evaluate the works not published in Hungarian, or analyze any of his writings in detail and in depth, mainly for reasons of space. The main line is artificial intelligence, as indicated in the title, and only to a minor extent will I make other, literary, philosophical, related remarks.

A kaleidoscope is thus being created, where I only occasionally depart from the shapes drawn by the 'highlighted colour' - artificial intelligence. The key questions Lem has addressed are:

- a) Can we create a program that mimics human thinking if we don't know how the human brain works?
- b) What takes more time, to fill the program with information, or for the program to process the information and create complex knowledge within itself?
- c) Are we able to understand and interpret what an artificial intelligence or an alien intelligence, which we do not engineer, is doing and why?
- d) Can we handle the mistakes of faulty programming, or do the mistakes multiply in the self-improvement program, resulting in a crash, or does it work differently than we planned?
- e) What are the limits of energy supply, how long can technical civilization be sustained if its energy demand is constantly growing?

The (Qa-Qe) notation for each quote will identify these questions in the study.

2 The emergence of artificial intelligence in Lem's writings.

First, I'll explain how important the subject was in his novels and writings and give a summary of the work's content.

Pirx's Adventures of a Pilot [14] was written during the rise of science fiction and is a typical example of early space-age literature. Lem's genius is already apparent here, with intuition being the protagonist in all the adventures of the protagonist Pirx. This is why he does things that others do not understand why he does, but by the end of the stories, he has deduced precisely what drives the action. I could not be more succinct myself than the blurb in the first Hungarian edition:

"Fragments of the personalities of long-dead astronauts live on in the circuits of a broken robot, reliving their tragedy repeatedly in the mysterious Morse code that sounds out at night... Robotic astronauts with perfectly human appearances weave their cold, computer-accurate plans on a test flight where no one knows whether the other is human or robot... A robot on a nameless planet sets its mind to climbing a mountain. Is he broken or has his sporting spirit awakened?... In these stories, world-renowned science fiction writer Stanisław Lem, as usual, offers fascinating reflections on the relationship between man and machine, artificial senses

and personalities, the "psychology" of robots, and many other timely and forward-looking issues of the technological age." (Qc, Qd)

Yes, it's about artificial intelligence and possible faulty design, assembly, mechanical damage, or programming errors. To deal with this, sometimes you need to explore the machine's "psyche."

In the novel *Invincible* [15], he goes one step further and imagines a planet where a human visitor finds an ecosystem of robots. Various levels of artificial intelligence are explored as humans are assisted by infobots, energy robots, reconnaissance robots, repair robots, transport automata against a cybernetic ecosystem of self-sustaining robots developed by the "land-dwellers", then abandoned and left to fend for themselves, self-maintaining and self-improving on a planet called Regis III.(Qc)

The low-consciousness robots and their companions introduced in *Invincible* will return much later, in *The Weapons Systems of the Twenty-First Century* or *the Upside Down Evolution*, in *A Moment of the Mankind* [8]. In the latter, he hypothesizes a very tiny microchip the size of a grain of sand that transforms weapons and warfare.

What makes the subject interesting is that we have now reached the stage where we can produce nano-scale components [16].

Not only that, but as an article published on 24 September 2021 (From air to atmosphere: the world's first flying microchip smaller than an ant) says: "Some researchers have developed the world's first flying microchip the size of a grain of sand, which could be ejected from an airplane and released into the atmosphere." [17] Moreover, this is not the only report of devices of this size, from a completely open source, which means they could be much more advanced than this in secret military and other labs! All the technical parameters of the "chip soldiers" envisaged by Lem are available, exactly as he described. We only need to fear that there will be a development engineer who has read Lem's reasoning on this subject [8], and we can (finally) lock up all the existing arms factories.

This is not his first "prediction" that has come true, as László Ropolyi's article [11], cited above, says: "He proudly cites proven cases, such as the prediction of the possibility of virtual reality in the 1960's, or the invalidity of Leszek Kołakowski's contemporary critique of *Summa technologiae* and the vindication of his position thirty years later." The foresight of the possible consequences of technological development resulted from a level of knowledge appropriate to the times and knowledge of the foreseeable directions of development, i.e. it was a scientifically based presentation of a possible vision of the future, not a 'prediction'.

In the novel *Return* [18], there are countless varieties of androids and non-android robots, each with the level of intelligence prepared for it to do its job, just like the various levels of intelligent automatons described in *The Invincible*. The description is coherent, following a logical train of thought based on the scientific hypothesis. The catharsis comes in nearly the city's "urban scrape yard", where it is revealed that the robots are "alive", conscious, and begging not to be destroyed."(Qc)

In his novel *Eden* [19], on a planet, various self-evolving robots create an "intelligent" civilization, a caricature of human civilization, a world created by artificial intelligence.

In the novel *Solaris* [20], an encounter with a non-human life form reveals a planetary ocean to be a conscious being that the scientists wish to know and understand, while the alien "being" confronts the humans with themselves, who do not know themselves. It confronts us precisely with the fact that it is difficult to articulate what consciousness, intelligent being, thinking, human or non-human intelligence, or intelligence is. As a philosophical work, it spends a great deal of time contrasting the pretentious technocratic approach, the need to develop without a theoretical basis, the lack of real knowledge, and the lack of everything without which artificial intelligence cannot be created. (Qc)

In the novel *His Master's Voice* [21], he is writing about trying to contact non-human beings using methods already in use at the time of writing, giving and searching for signals, but also experimental homeostats, cybernetic modelling methods, in order to decode the "message" received. It is just like writing a program for a computer to decipher a cipher, of which there is now a considerable stock. (*Qa, Qc*)

The *Summa Technologiae* [7] (hereafter *Summa*) is, I believe, Lem's magnum opus, with a slight modesty of title, referring to St Thomas Aquinas' *Summa Theologiae*. While Thomas was an attempt to explore the divine creative intention, the principles, morality and functioning of the world that flow from it, Lem, based on the technological advances made up to the middle of the twentieth century, presents the possibilities and future of cybernetics, a possible direction of development, based on the machine, which is self-sufficient and allows for self-evolving reason, "created" by human reason. A scientific theoretical grounding in cybernetics, processing an encyclopedic body of knowledge. It dissects the relationship between the homeostats we can create and the consciousness we develop within them, artificial intelligence, while holding up a mirror to us. A must read for all engineers and computer scientists! (*from Qa to Qe, and more*)

Lem wrote his *Summa* in the 1960s, yet all his statements are still valid at the beginning of the 21st century. Chapter by chapter, paragraph by paragraph, it would be possible to identify from the *Summa* the individual novels and short stories written by Lem, which he has repeatedly examined or explained. As I have written, 'could be', but I shall not do the identification here for space reasons. Lem, fortunately, took care, at the same time as the *Summa*, to produce a version of his *Summa* that anyone can understand if they think about the short stories a little. I have not found such a statement in any of the analytical writings on the writer's works, although there is an apparent correspondence between *Summa Technologiae* [7] and *Cyberiad* [9]. (*from Qa to Qe, and more*)

The *Cyberiad* [9] is a collection of narratives in which the basic questions, the nerds, the moral, theoretical and practical problems are all there. Trurl and Klapaucius, the two engineer robots, and as holders of the "Perpetual Omnipotence Certificate" and "omnigenic designers", are capable of anything "nature" can do, every chapter of *Summa* [6] is recognisable, even several chapters in a story, or several problems in a single writing. Moreover, the literary palette is varied, ranging from the simple textbook tale (*The Three Electroknights*) [9, pp. 7-14] to the series of interlocking tales known from the tales of the One thousand and one nights (*The tale of three storytelling machines of King Genius*) [9, pp. 301-382]. from the short cabaret-style short story (*How Microx and Gigant Made the Universe Expand*) [9, pp. 50-56] to the perfect caricature of a social phenomenon (*The fifth sally or Trurl Prescription*) [9, pp. 262-271].

The *Cyberiad* and the Trurl and Klapaucius stories found elsewhere are for those who could not understand the *Suma*, which is full of dry jargon and scientific statements. They are parables, funny sketches with bloody profound observations.

As an example, here are some excerpts from the story of Trurl's electronic bard (Sorry but I like it better *Electroubadour* name from the Hungarian translation):

: *"Trurl had once had misfortune to build an enormous calculating machine capable of only one operation, namely the addition of two and two, and that it did incorrectly. As is related earlier in this volume, the machine also proved extremely stubborn, and the quarrel between it and its creator almost cost the ladder his life. From that time on Klapaucius teased Trurl unmercifully, making comments at every opportunity, until Trurl decided to silence him by building a machine that could write poetry. First Trurl collected eight hundred and twenty tons of books, cybernetics, and twelve thousand tons of fine poetry, then sat down to read it all. Whenever he felt he could not take another chart of an equation, he would switch over to verse, and vice versa. After a while, it became clear to him that the construction of the machine is child's play in comparison to the writing of the program"* [29. 43.p.] (*Qa, Qd*)

The enlightenment of the technocrat while making a text- and poetry-writing automaton. The machine is easy to build, but the program it runs needs much information, because you want an artificial intelligence that can produce any poem about anything, so the program must contain knowledge not only of literature, but also of grammar, mathematics, physics, history, sociology and countless other disciplines, and in chronological order, knowing the stages of development.

"The program found in the head of an average poet, after all, was written by the poet's civilization, and that civilization was in turn programmed by the civilization that preceded it, and so on the very Dawn of Time, when those bits of information that concerned the poet-to-be were still swirling about in the primordial chaos of the cosmic deep. Hence, to program a poetry machine, one would have to repeat the entire Universe from the beginning, or at least a good piece.

Anyone else in Trurl's place would have given up then and there, but our intrepid constructor was nothing daunted." [29. 43.p.] (Qa, Qb)

The technocrat knows that, in theory, this machine and the program inside it can be created, and wants to make it happen, but to do so, he has to model everything.

Interestingly, Vilmos Csányi's new book was published just as I wrote this article, and his remarks about it fit in perfectly. The report's title, "*Vilmos Csányi: No point in reproducing humans with artificial intelligence*", is telling in itself, but read on. "*This is the difference between thinking intelligence and linguistic intelligence. They could have stuffed tens of thousands of books in there, but they did not include my or your life. In principle, you can make artificial intelligence with a life story. It must be nurtured for twenty years, given different tasks, and interact with society. You can reproduce the human; it just does not make sense.*" [22]

These are tricky words, but look at what Lem wrote about this a little over half a century ago. How did he resolve the paradox of creating linguistic intelligence?

"He built a machine and fashioned a digital model of the Void an Electrostatic Spirit to move upon the face of the electrolytic waters, and he introduced of parameter of light, a protogalactic cloud or two, and degrees worked his way up to the first ice age-Trurl could move at this rate because his machine was able, in one five-billionth of a second, to simulate one hundred septillion events at forty octillion different locations simultaneously. Moreover, if anyone questions these figures, let him work it out for himself."[29. 34 p.] (Qa, Qb)

There is not much difference between Csányi's and Lem's opinions. However, there is a significant difference between the 20 years since the foundations of the great linguistic models were laid, the time since creation and the development of reason and its development in biology, sociology, linguistics, etc.! Today's technocrats are presumptuous in 'pouring knowledge' into their programs, while moaning that they have exhausted their supply of source materials. As reported in the New York Times article [24] "OpenAI, Google and Meta ignored corporate guidelines, changed their own rules and negotiated to circumvent copyright laws when they sought online information to teach their latest artificial intelligence systems." he writes under the subtitle:

"OpenAI faced a supply problem at the end of 2021. Its artificial intelligence lab exhausted every repository of reputable English-language texts online when developing its latest AI system. More data was needed to train the next version of the technology - much more. Mr. Zuckerberg demanded a solution, according to staff. The capability Mark is looking for in the product is something we cannot provide right now," said one engineer."

They are unable to recognize the fact that Lem explained and Csányi recognized! The creators of the various "leading" chat programs started out with the same arrogant presumption as the creators of all operating systems and their associated programs. Without principles, thorough preparation, and scientific methodology, they put together something that more or less fulfilled their expectations, concentrating on the task at hand.

However, let us stay with the electronic bard, where the machine writes poetry that most likely cannot be done by the programs currently available for word processing and text production, and those that will be created in the coming decades. Unless some programmer who has read the history of the electronic bard, not models the human civilization from creation to the present day, fills the program with all the knowledge that exists, and creates not a statistician but the intuitive, heuristic intelligence of an artist...

Here is the quote:

„All right, then ask it something else! Whatever you like! Go on! What are you waiting for? Afraid?

Just a minute,” said Klapaucius, annoyed. He was trying to think of a request as complex as possible, aware that any argument on the quality of the verse the machine might be able to produce would be hard if not impossible to settle either way. Suddenly he brightened and said:

“Have it compose a poem — a poem about a haircut! But lofty, noble, tragic, timeless, full of love, treachery, retribution, quiet heroism in the face of certain doom! Six lines, cleverly rhymed, and every word beginning with the letter S!!”

“And why not throw in a full exposition of the general theory of nonlinear automata while you are at it?” growled Trurl. “You cannot give it such idiotic — ”

However, he did not finish. A melodious voice filled the hall with the following:

“Seduced, shaggy Samson snored.

She scissored short. Sorely shorn,

Soon shackled slave, Samson sighed,

Silently scheming,

Sightlessly seeking

Some savage, spectacular suicide.” [29. 43-55. pp.]

Programs designed for conversation, text analysis and authoring will never be capable of such performance for obvious reasons, simply because their designers failed to model chaos, virtual creation, and the rest, which Trurl did. (*Qb*)

The notoriously atheistic Lem is not the first or the last time to recite or refer to biblical quotations. His favorite solution, with very few hidden allusions, is to juxtapose religion with scientific epistemology, for example in the short story *Non Serviam* from the book *Insomnia*. The machine intellect developed there comes to assume and seek its creator. However, its relationship with him is governed by a completely atheistic, pragmatic logic, so it feels no gratitude for being created and no reason to serve its creator...

However, since Mymosh the Selfbegotten (from *Cyberiad*)[9, pp. 363-370] goes through the same process of development. Unlike the electronic bard, he also creates a linguistic culture with his awakening. However, he created it because anyone can think only logically in concepts and categories if they have language and know it. *“That evening, something emerged at the edge of the dump, not far from the puddle which had by now dried up, and this something, a creature of pure accident, was Mymosh the Selfbegotten, who had neither mother nor father, but was son unto himself, for his father was Coincidence, and his Mother –Entropy” [29. 211 p.] (from Qa to Qd)*

However, it is developed to its full potential in the story of the Lébolo (Happy Being Contemplator shortly Contemplator) [23, pp. 214-261], where Trurl the robot engineer perfectly brings the human behavior that humanity has committed and is committing with every human invention, be it device, technology, material. Sadly, I cannot find the English translation of the novel Contemplator; maybe nobody has translated it. The original edition was published in the book named: *Bezszenność*. [Insomnia.] Kraków: Wydawnictwo Literackie, [1971].

He does something because he can. It operates while dealing with and repairing problems arising from theoretical and theoretical deficiencies. Then, when it realizes that the invention was theoretically unsound, that it did not consider some fundamental principles in its design, and that it therefore poses a danger to the operator or humanity, it restricts its use, abandons it, or destroys it. He behaves in the same way, abusing the technology at his disposal, without any theoretical basis, without any thought, as Dustin Hoffman, who brilliantly played the captain in the 1991 film *Hook*, demonstrates the childish selfishness and impatience of the child: "*I want, I want, I want,, I, I, I, Mine, Mine, Mine, Now, Now, Now!!!*"

Lem describes almost step-by-step in the Contemplator almost everything that he explains with scientific thoroughness in the Summa, condensed into a single short story, where at the end Professor Cerebron, with sarcastic thoroughness, impresses upon his pupil that, however excellent a machinist he is, however capable he is of building anything, his actions are theoretically unsound, his unpreparedness leads to damning consequences, his mistaken ideas lead to disastrous results. (*Qa, Qc, Qd*)

The Contemplator is a compendium of Lem's Suma - a huge scholarly achievement, worthy of a doctoral thesis or even an academic chair thesis for its scope, number of references and thoroughness - that few can match. The short story summarizes the copious content of the Summa's subheadings and headings in almost a single sentence. Moreover, it includes the naming and conceptualization typical of Lem, rephrasing the Summa's definitions to match the chuckling yet thought-provoking stylistic traits of the *Cyberiad*, which are rife with humor and puns.

2.1 Lem's guidance and the reality

Lem's whole oeuvre explored the relationship between the man-made artificial environment and man, the relationship between man's attempts to create artificial intelligence and its possible consequences.

Lem was already writing about virtual reality and its associated problems when CAD (Computer Aided Design) had only been around for a few years and only raster green lines could be drawn on cathode ray tube (CRT) monitors.

In his Summa, there are limits to technical civilisation, the discussion of energy requirements and available energy, and his conclusion is devastating. We will continue to destroy our energy reserves until we are eventually unable to maintain the usual level of technical civilisation.

The reality is that chatbots (no longer robots, just bots), image and movie-making programs, and connected servers and storage consume more electricity every day than Hungary's annual energy production. Users experience this as mere fun and games, developers as experiments, and the tycoons who finance it all as investments. At the same time, there is a terrible waste and destruction of the environment.

The 'let's do it because we can make it' attitude, which ignores all the theoretical, moral, epistemological, and many other approaches and is based solely on technical arrogance, will cause continuing failures and disasters. One only has to look at the various computing fiascos

to see what Lem has written down in advance since he was perhaps the only one who really thought it through, deduced it, and then put it on paper.

Is there a widespread operating system used by almost everyone in the world that has not had to release a security update, patched or patched after its creation, or that does not have a known zero-day bug?

Has a program for these systems ever been written that did not need to be changed because it was sloppily done and the shoddy work caused problems later?

Has any hardware device been made that did not have a firmware bug in it afterwards that caused problems?

I think those knowledgeable on the subject would have gotten to the end of any question immediately: No!

The situation is the same as described in the conclusion of *Summa Technologiae*: "The reliability of equipment cannot be assessed independently of statistical-technical methods. This is dictated by technological development, in which an increase in the complexity of the equipment produced accompanies mass production. Even if all the components of a system of 500 elements are 99% reliable, the system has a reliability of less than 1% (assuming that all its components are essential for its operation). The maximum reliability achievable is proportional to the square of the number of elements, which makes it impossible to obtain a reliable product, especially in the case of very complex systems. Systems "linked" to a human as a controller (the aeroplane, the car) are less susceptible to damage, as the plastic behaviour of the human often compensates for a malfunction. In contrast, there is no such plasticity in a "human-less" system such as an intercontinental ballistic missile or automatic equipment in general (e.g. a computer). Therefore, the lower reliability of such systems is due not only to the greater number of components and the novelty of the technology used, but also to the absence of a human to "compensate" for accidental failures..." [7 352.o.]

Furthermore, the reason is as simple as Lem described it in the *Lébolo*, in the words of Cerebron: "*You neglected theory as a lazy idiot of the lazy, as an idiot with talent in other respects, and I tolerated you because you were skilled in the lower arts, which go back to watchmaking.*" [p.23 253] That is, they made, produced the thing they were capable of, despite not understanding its theory, they learned to make it superficially, and they made mistakes. It is evident that until psychology, philosophy and other sciences dealing with the subject can agree on what consciousness is, what intelligence is, how it works, we will never be able to model and create something, which you can call it whatever you want, that will never be able to do what it was intended to do.

Just as the popular term "artificial intelligence" is a set of separate programs, "human intelligence" is as diverse as people on Earth, and the expected knowledge level varies just as widely.

I believe that the readers of this paper have already found the answers to the questions from Qa to Qe indicated in the introduction, but I will write my answers here:

- a) We do not have a "Perpetual Omnipotence Certificate," we are not "omnigeneric designers," and therefore, we are not (yet) able to.
- b) Of course, need much more time to understand the information, than to get it.
- c) Not yet.
- d) We can barely handle the complexities of even current computer programming, a complex artificial intelligence is impossible.
- e) We can already see the unsustainable energy needs of our current civilisation

2.2 Lack of regulation and lack of ethical design and use

Lem described exactly what aspects should be taken into account when designing artificial intelligence, exactly what mistakes can be made in design and operation, and exactly what problems we face when using it.

Obviously, for programs that differ in their interpretation, operation, and goals, where the "experts" on the subject - who are as much as futurologists - who infer the future from facts and trends of the present, can typically offer tendentious rather than factual suggestions for regulation.

Yes, where there are no principles or principles but the designers do not follow them, as in Trurl in the *Lébolo*, you cannot make reasonable regulations. Today's engineers create their programmes without moral inhibitions, and investors encourage them to do so. There are no design ethics or user-operator ethics. Everyone is only interested in the result that can be achieved. Even basic self-defence reflexes do not work in humans when we use these programs. I heard a speaker who said that Asimov's laws of robotics are utopian. The first is: „*A robot may not injure a human being, or, through inaction, allow a human being to come to harm.*” Why is there no such requirement for programmers and operators? I believe there should be a minimum ethical requirement for the designers and operators of artificial intelligence programs to not harm or injure a human being.

In the *Contemplator* Lem wrote same!

The normative regulations produced by the EU [25] and the US[26][27][28] and adopted by their member states lack the same epistemological, moral principles that Lem described in *Cyberiad* [9] and *Contemplator* [24], and are inadequate to the problems, their entry into force, which is sometimes several years, does not take into account the newer and newer developments and paradigm shifts that are available in the meantime. For cybernetic homeostats of high complexity, there is no more 100% security than for the most straightforward organisation in our world, once a programme is operating at an acceptable level, we can rub our hands with satisfaction.

As we can still not produce a usable "human-like" artificial intelligence, many developers are producing what they can. Politicians and legislators are trying to regulate it as best they can. It is the same gambler method: either you succeed or not.

It is not possible to regulate without laying down principles and ethical foundations.

It should be noted that military, law enforcement artificial intelligence programs and tools are exceptions, not covered by the intended scope of this regulation, neither in the EU nor in the US regulators, which raises further concerns.

3 Conclusions

In the 20th and 21st centuries, some programs are being experimented with and further developed. These programs can replace human activity using self-improving, self-learning program components. They can produce products through text or image representation that only humans could create until now. In the scientific and mainstream press, these are collectively called artificial intelligence, conflating them with purpose-built programs. Developments are moving towards autonomous activity in machine creation and thinking.

Lem's oeuvre is concerned with self-learning and self-improving homeostasis with similar capabilities. At the beginning of the second half of the last century, the author summarized the expected programs and the consequences of their application that we are confronted with today.

I think it is important to draw the attention of theoreticians and practitioners to the need to pay more attention to their work's theoretical and theoretical underpinnings before they start experimenting. This requires that, after scientific systematisation, moral rules are established to provide clear guidelines and strict limits for engineers and designers unfamiliar with the subject. Lem's *Summa Technologiae*, which summarises the essence of his life's work, provides the perfect basis for this.

4 Resources

- [1] Szabó Lajos: A mesterséges intelligencia Asimov szemével, avagy egy élet munkája.
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