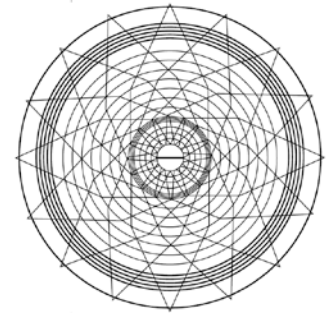


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# COMMUNICATIONS: MODEL REPRESENTATIONS ABOUT HISTORICAL RETROSPECTIVE AND POSSIBLE PERSPECTIVE

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### **Abstract:**

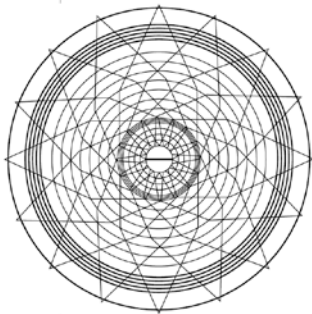
Communication is considered as communion between people through increasingly sophisticated information technologies (IT), from successively developing in the retrospect of the Humanity system harmonious development of signal posts/sounds/movements, mimic/gestures, speech/language, writing, text replication, computer IT and connect IT to promising nano-hardware-supported IT.

It is emphasized that these IT communications, along with production technologies, exist in parallel, interacting with each other.

It is noted that the current crisis in the Humanity system, which initiated their combined impact, is growing and deepening.

**Keywords:** communications, information technologies, model representations, historical retrospective, harmony, Archaeological Epoch, golden ratio, perspectives of Humanity development

Entering upon research on any scientific problem, we need to get clear definitions of the main terms and notions. Thus, "communication (from the Latin "communicatio", from communico - make something shared, do something in collaboration, interlink, have a connection) is the interaction of people and living creatures, that is supposed to be with an exchange of specific signals, mediums. In society communication is the interaction, exchange of opinions, knowledge and feelings, as well as the exchange of actions" (Kashkin 2016). On this definition of communication - as the *communion* among humans, we will base our ideas in the following paper.



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*Communication* is the word that has saved its way to be written (on Latin language) and the primary meaning. However, it became wider: communication nowadays is the word for roads, rivers and other circulation routes, as well as the radio, telephone-based and other media, and its form (i.e. design). The aspiration of people to live together and to be in touch with the others, their aspiration to the social (or political, as it was in the language of classical Greece), is the natural one. "The obvious interconnection between the ecology and the behavior guides us to the dominative theory of origins of social behavior of a human. It includes a range of interlinked reconstructions, that were developed on the basis of archaeological information, the extrapolation from the period of hunter-gatherer societies and the comparisons with the other types of primates" (Wilson 2015: 137).

Following the Aristotle, ancient Greeks supposed that one of the best ways of theoretical construction is the analysis of the origins of things: "... one cannot comprehend the last on the basis of the forerun that has no primary" (Aristotle 1952). This particular principle of Aristotle inspired us to consider the problems of communication from the deep historical retrospective, beginning from the moment of appearance of *Homo habilis*<sup>1</sup> (around 6,8 million years BC).

Moreover, the context and historical background change significantly, when we consider the problem as a part, that should be shaped into the full picture. In our case we will name the unit of measurement as the archaeological epoch – the period of time that is around 7 million years. In its turn, historical epoch is continuing for the last 7 thousands years and thus we can see the relation of these two periods as 1000 to 1<sup>2</sup>.

The research that was conducted by Yulia Schapova and studied the chronology and periodization of the *Archaeological Epoch* (AE) has shown a surprising result: that appeared that the development of Humankind at the AE, despite the regional and local variations, as a whole was *harmonious* (Schapova 2005, 2000). This conclusion is based on the well-known mathematical and humanity consistent pattern: the order of numbers, where the next one element relates to the previous one according to the "golden ratio" (that means 1,618... or 0,618...) consider harmonious. This may refer not only to the processes, when we speak their harmony, but also to the features of space when we speak about other entities – live nature, art and others (Zlatev, 2008; Petukhov, 1981; Prangishvili, Ivanus, 2004; Soroko, 2006; Tsvetkov, 1997; Shevelev et al, 1990).

Offered by Y. L. Schapova "Fibonacci model" of chronology and periodization of AE demonstrated this particular regularity, as it reflects the most essential dates of AE – the structure of the divisions of Stone, Bronze and Iron centuries – based on a discrete variation of the "golden scale" row – row of Fibonacci<sup>3</sup> (picture 1).

<sup>1</sup> Homo habilis means "a person capable", and never - skillful. "Skillful" is H. ergaster, H.sollers, ingenius (from the latter - the term "engineer").

<sup>2</sup> If the duration of the entire history is roughly equivalent to the height of the plinth 7 cm, the duration of the AE will give the height of the 23-storey building. And then the question arises: how seriously can you study the history of a phenomenon, the pre-history of which is so long, but is outside the field of view of the researcher?

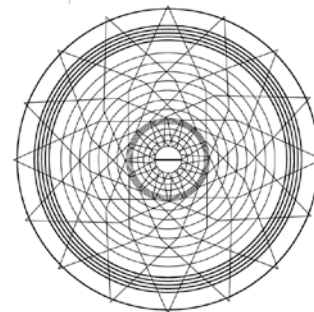
<sup>3</sup> Fibonacci (about 1170-about 1240) is a major mathematician of the European Middle Ages.

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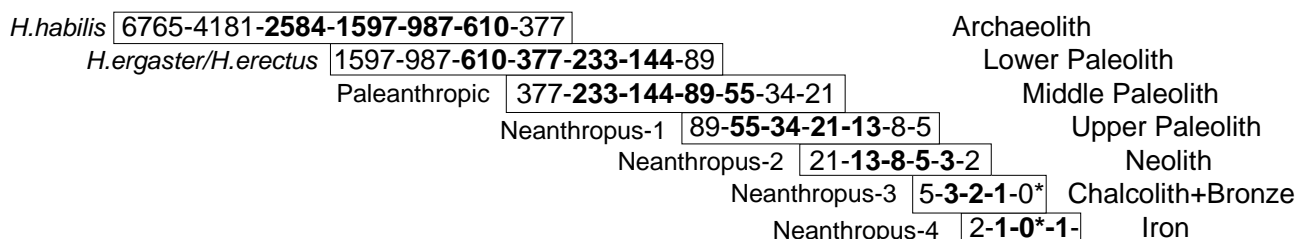
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The revealed by us harmonious "on average" nature of development of AE as a whole gives us some confidence that in our days and even in the some perspective of civilization development this regularity will be continuing.

Moreover, we managed to demonstrate (Shchapova, Grinchenko, 2017) the direct communication of the "Fibonacci" model of AE and analytical-model-based (informatics-cybernetical) approach to the historical development of *information technologies of communication* among people – in the process of development of a human in general and in the process of forming of personal-productional-social system of the Humanity. Here we examine this communication in details.



**Figure 1.** "Fibonacci model" of chronology and periodization of archaeological epoch.

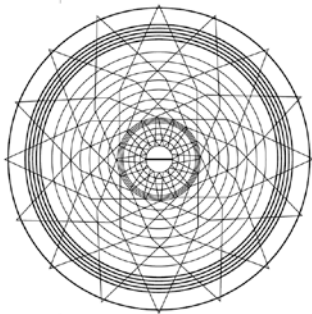
First of all, we should note that information technologies (IT) of communication implement not only computer IT and connect IT (that are so common today), but also retrospectively emerged earlier in history replication of texts (typography), writing, speech/language, mimic /gestures, signal poses/ sounds/ movements. That last ones are indicative not only for the distant human-beings but also for the higher animals – for the facial gesture and body language there should be a face and hands (as for the early humans), and the oral language is the tool of human himself.

The model of evolutionary development of Humanity system, that was offered by S.N.Grinchenko (Grinchenko 2017, 2011, 2007, 2006, 2001) allowed to get quantitative evaluation of moments of appearance for the new IT in history – or information overturn (IO) – as well as some information culminating moments of the development of IT (maximum of the speed of their complication). It is sure, that these evaluations are only approximate and reference marks (Picture 2):

1. For IT of signal poses/sounds/movements – this is the mark of 28,2 and 9,26 million years ago (as they correlate with the appearance of Hominoidea and Hominidae consistently);

2. For IT of mimic/gestures – this is the mark of 1,86 and 0,612 million years ago (as they correlate with the emergence of Homo ergaster/Homo erectus and the start of material production consistently);

3. For IT of speech/language – this is the mark of 123 and 40,3 thousands years ago (as they correlate with the appearance of Homo sapiens and the start of the development of material culture consistently);

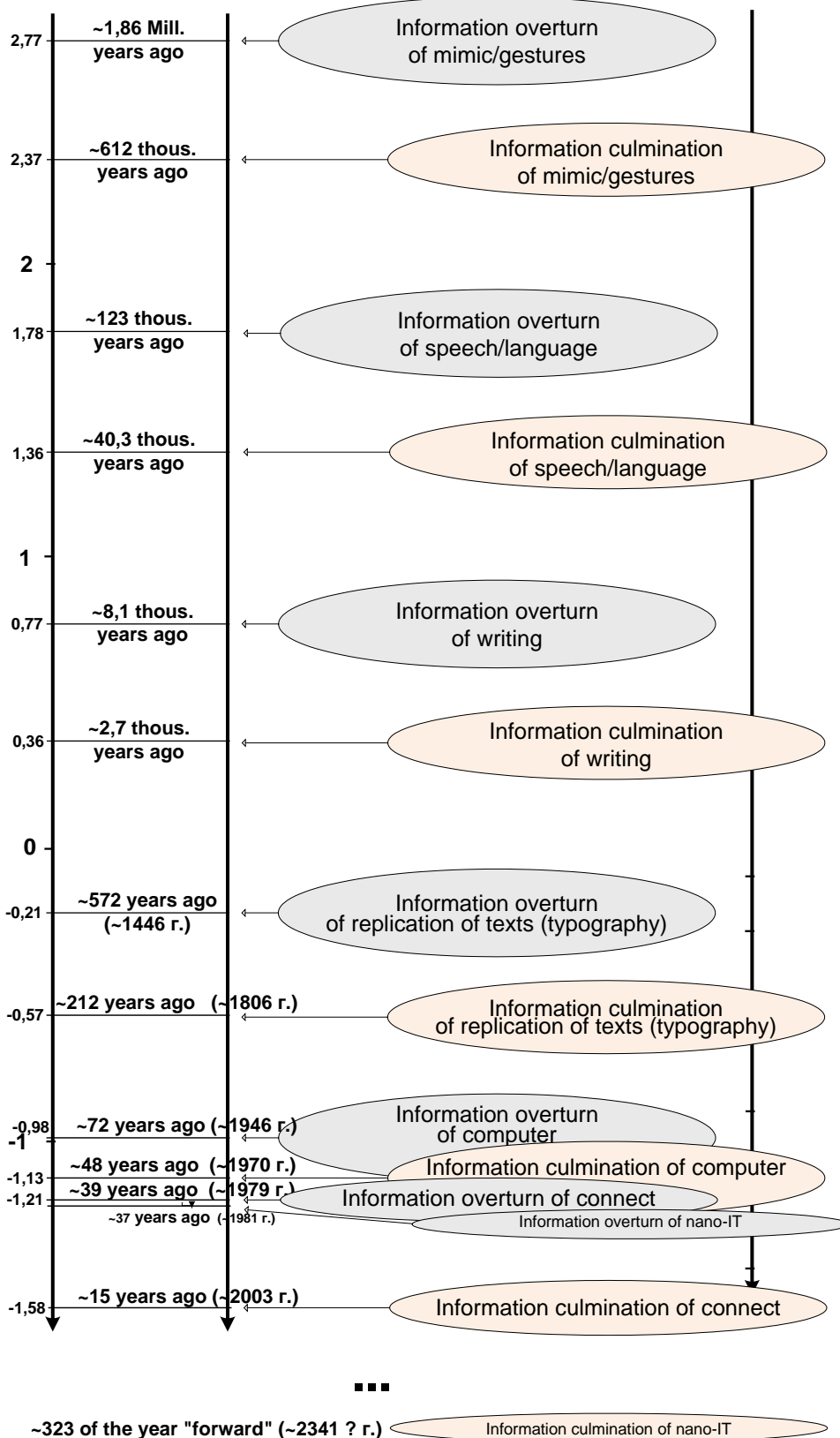


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$\text{Log}_{15,15}(T) \rightarrow T$  (years)



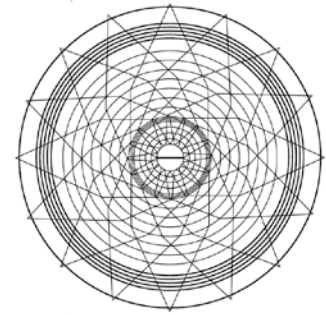
**Figure 2.** Model of the chronology of information overturns/culminations in the system of Humankind. Notes: 1) time, in millennia, measured on a logarithmic scale, from the current moment (2018) ago; 2) the time axis in the diagram is directed from the top to down.

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4. For IT of writing – this is the mark of 8,1 and 2,7 thousands years ago (approximately the beginning of the bronze and iron centuries);

5. For IT of text replication – this is 1446 (as Gutenberg started printing books) and 1806 (the highest point of industrial revolution);

6. For IT of computers – this is 1946 (first ENIAC – Electronic Numerical Integrator and Computer – started to work quite effectively) and 1970 (revolutionary event – the invention of the microprocessor);

7. For connect IT – this is 1979 (as the protocols of the Internet were invented soon after) and 2003 (the highest point of global dissemination of mobile network and Internet);

8. For the future nano-hardware supported IT – it is 1981 and 2341 (?). And so forth.

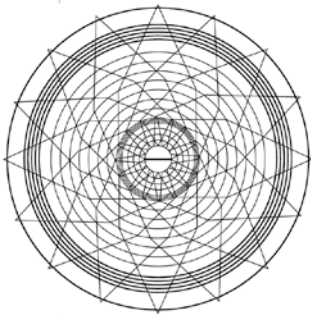
Here we should note the consistent pattern of communicative features of IT in this list: odd-numbered IT have wider audiences (i.e. use "remote-mass" communications), while even-numbered are focused on a local object-contactee (and use "approximately-dialogical" communications).

According to the "search-optimization" model, every one of the periods between the Information Overturns is shorter than the previous one in  $e^e=15,15...$  counts. Following this logic, dates of the latest Information Overturns in history make a line of ... - 1446 - 1946 - 1979 - 1981 - 1981 - 1981 - ... (in the end of the line the periods between the information overturns are months, days, minutes and so on). Here we see the point of so-called process convergence. This is 1981. What does this fact mean from the historical point of view?

Researchers, who understood the trend of "acceleration" of historical process, that is revealed during the last centuries and decades, and who are concerned with the questions of "when comes the end?" or "what happens at that moment?" - are giving to this temporal coordinate various names. Most of them are associated with the catastrophe: "sunset of civilization", "end of history", "point of singularity" etc.

Our point of view is different: those facts that we can observe empirically and that are proven with our models, give us the basis to change the account of general feature of historical process from unilinear to multilinear. The point is that the emergence of new IT technologies does not annihilate the existence of the older ones. For example, computers do not annihilate books, as well as the Internet does not annihilate nor books, nor local computers, and so forth – here we can observe the principle of development, that we can label as "cumulative" one: all the sub-systems that emerged are existing side-by-side in a strong interconnection between each other (picture 3).

Thus, modern transport, that in general features was offered in the age of industrial revolution (approximately 300 years ago), began to make active use of computer and connect IT.

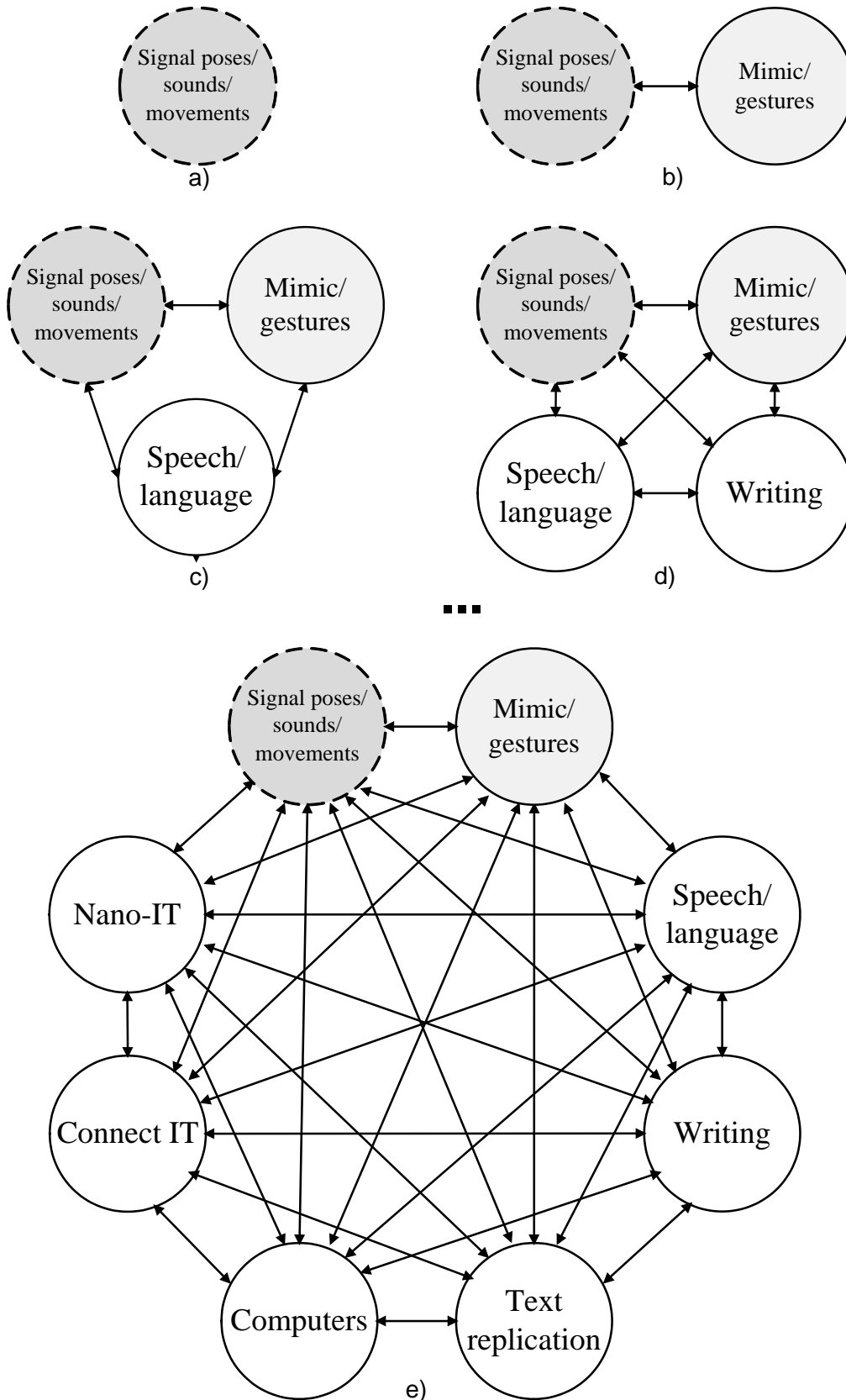


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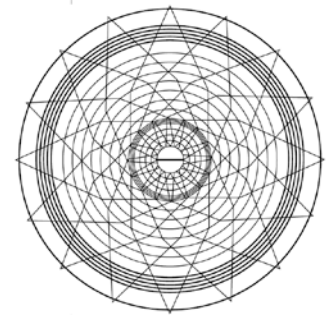
**Figure 3.** Scheme of interaction of subsystems of Humankind in the course of its development (IT is shown, used by a person at successive stages of the system complicating).

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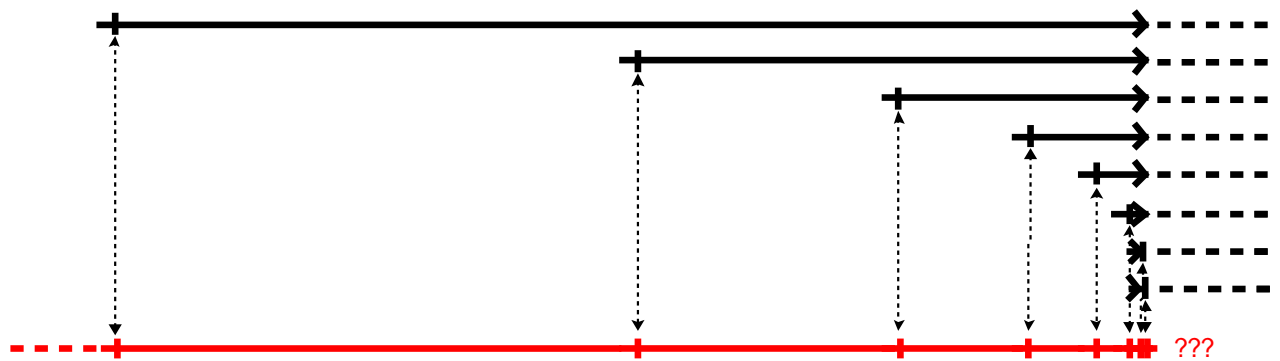
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Diagrammatically these processes are shown at the Picture 4. In the upper part of the picture there are eight provisional trajectories. Every line, that relay the axis of time of genesis and development of the relevant hierarchic sub-system of the Humankind, is shown in the following way: its "beginning", starting point of genesis is set on the left and marked with the cut, while the "ending" (at the current moment) has a symbol of arrow and is set on the right, the arrow points to the future (marked as a dotted line). If we compare these trajectories, we can see clearly the rising of structure complication of the Humankind system in general: while during the earlier stages of Humankind development interaction took place between 2-3 sub-systems (as the others did not exist at that moment), in the current situation we can count 8 sub-systems of that kind.

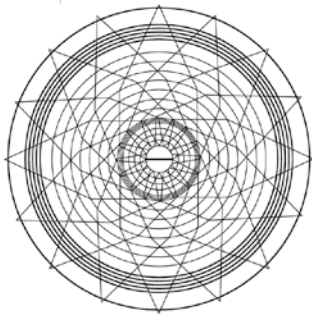


**Figure 4.** "Parallel" and "consistent" representations of the "acceleration" of historical time

During their development, they simultaneously interacted, but there was no consistent displacement from one sub-system to another!

Now we would like to point out the bottom red line on the Picture 4. This one demonstrates the unilinear model of "the end of an era", and at the picture it is shown as the notional projection of the eight lines above for the conjoint horizontal axis. Starting points of development of the sub-systems become the marks on the seemed as "one whole" axis of time. Their frequency in the historic progress (on the picture – direction from left to the right) seems as obvious, but hard to explain. Shift of the paradigm from unilinear to multilinear allows to solve this problem.

Now we would stop at the point that is conditionally labeled as 1981. This point is essential to new model representation, as it divides the tide of historical development of Humanity into two parts: pre-history and post-history. Pre-history is a period when: 1) there can be observed the origin of new sub-systems and their simultaneous complicacy. Those sub-systems that emerged long ago – decades and hundreds years ago – has already formed to one extent or another. What happened in 1981? This year were "launched" last of the possible in theory sub-systems. Now they are making their first steps in the development, having as the basis of "nano-technologies" (as well as "sub-nano" etc. IT). Post-history is the period after 1981 and can be described by the fact that new sub-systems do not emerge (as they have formed



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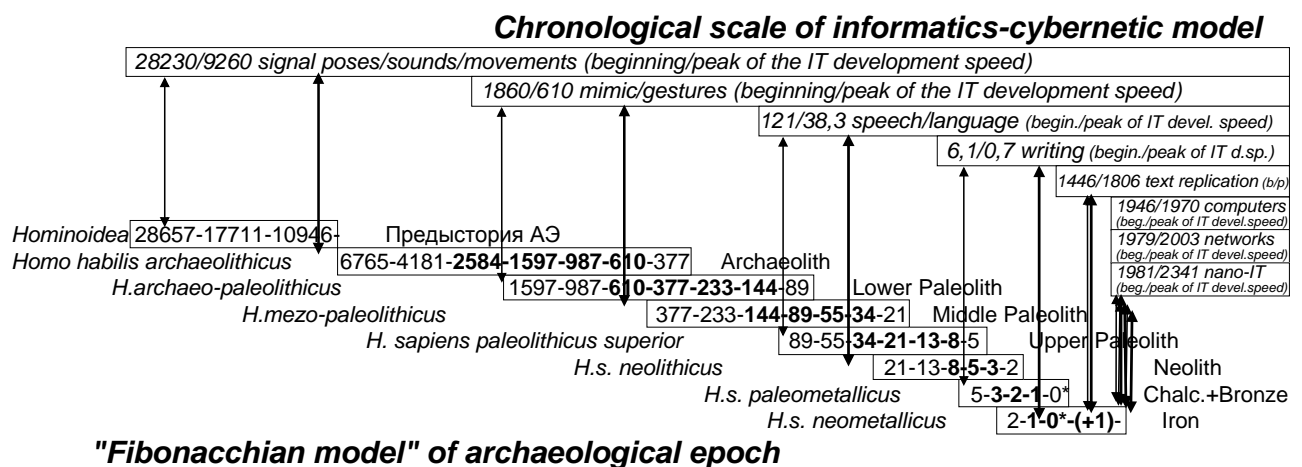
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earlier), but all the sub-systems continue their development – they increase in complicacy as autonomic sub-systems as well as the process of their interaction becomes more complicated.

Informatics-cybernetic model allows to estimate some general features of these processes. Thus, "speech-language" Information Overturn initiated the culmination in the development of the Upper Paleolithic age approximately 40,3 thousands years ago, Information Overturn of writing (approximately 2,7 thousands years ago) – culmination on the development of Neolithic. Then computer Information Overturn initiated (approximately in 1970) the computer revolution – the invention of microprocessors. After that connect Information Overturn initiated "connect-revolution" – the rapid dissemination of the Internet and mobile service (approx. 2003) globally. The next, "information nano-revolution" – the result of "nano-information overturn" – may be expected approximately in 323 years. What will be the core feature of this revolution, we cannot say now, but we can make a presupposition, that it will be "nano-hardware supported" selective telepathy. And it seems quite achievable for the Humanity to invent it with the relentless work in more than 300 years period. Of course, other variants of realization of "nano-IT" are possible too. Life will show us the right variant, when the time comes.

By the way, one more possible presupposition can be made, if we rely upon the pattern that was mentioned earlier. As the "nano-IT" is the point 8 in the list of IT, it can point out to its local-dialogical character. So we can assume, that new technology will allow to communicate tête-à-tête, but will not allow to command of big masses of people in a vast distance.

The consolidated model of civilization development of the Humanity (Picture 5) allows to go beyond the boundaries of Archaeological Epoch itself (Grinchenko Schapova 2016, 2014, 2012, 2010; Schapova Grinchenko 2017).



**Figure 5.** Integrated model of chronology and periodization of civilizational development of Humankind

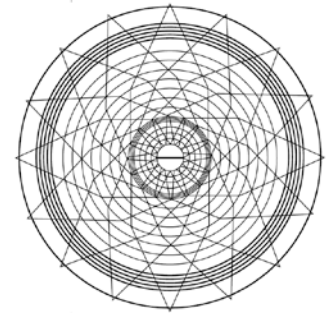


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The model demonstrates not only the concurrence of the main trends of civilization development of Humanity System in AE and in perspective, but also a correlation of the essential moments of that development (to the extent, that is enough for the practical usage of the model data). From the fact of this correlation we can conclude that the trend of historical increasing of complicity of the sum of IT of interaction among people – communications – may be conceived as *harmonious*.

Therefore, the offered multidisciplinary model approach allows to get new insights to main trends of civilization development of Humanity System in Archaeological Epoch and so forth as well as the insights to the specific features of evolution of communications – in particular, about its harmonious increasing complicity.

The last idea should also be added here. After the every information overturn there, alongside with simultaneously evolving production technologies, with the some time lag follows the crisis of the system: Humanity has to adjust new information-communication and production technologies to enter the new stable condition. On the previous stage of development, during the five centuries from industrial Information Overturn in the middle of XV century, it has happened to some extent. On the current stage, for the historically short 35 years (from 1946 to 1981), showed up two Information Overturns (computer-IO and connect-IO) and one more, still potential (nano-IO), but we are still far away from reaching their stable conditions. The crisis in the Humanity System, which we can observe nowadays, was initiated by the cumulative effect of those IO and production technologies. And now this crisis is growing and becoming deeper. Exactly in this quickly – and harmoniously! – complicating society we live and will have to live our future generations.

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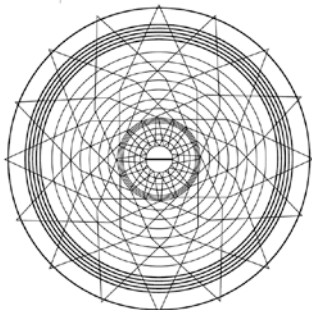
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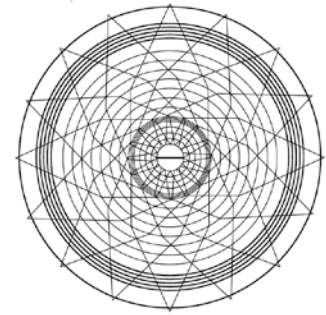
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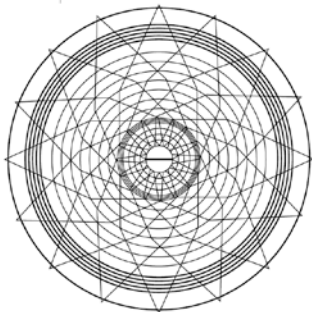
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### КОММУНИКАЦИИ: МОДЕЛЬНЫЕ ПРЕДСТАВЛЕНИЯ ОБ ИСТОРИЧЕСКОЙ РЕТРОСПЕКТИВЕ И ВОЗМОЖНОЙ ПЕРСПЕКТИВЕ

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#### **Аннотация:**

Коммуникации рассмотрены как общение между людьми посредством всё усложняющихся информационных технологий (ИТ), от последовательно возникающих в ретроспективе гармоничного развития системы Человечества сигнальных поз/звуков/движений, мимики/жестов, речи/языка, письменности, тиражирования текстов, компьютерных ИТ и коннект-ИТ до перспективных нано-аппаратно поддерживаемых ИТ. Подчёркнуто, что эти ИТ общения, наряду с производственными технологиями, существуют параллельно, взаимодействуя между собой. Отмечено, что наблюдаемый в настоящее время кризис в системе Человечества, который инициировало их совокупное воздействие, нарастает и углубляется.

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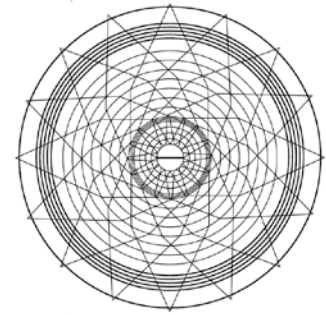
**Ключевые слова:** коммуникации, общение, информационные технологии, модельные представления, историческая ретроспектива, археологическая эпоха, «золотое сечение», гармония, перспектива развития человечества

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*Communications: Model Representations*

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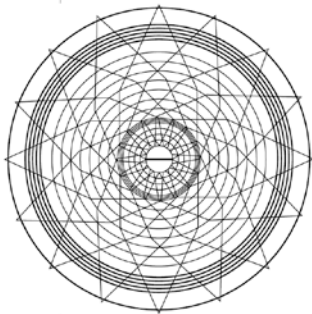
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