

# CHANGES ALL AROUND US AND WITHIN SCIENCE EDUCATION

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Author's short paper presents his conference keynote speech extended structure. It is formed as a set of thematic mind maps for presentation during authors' speech and further discussion during symposium BalticSTE2019. Selected mind maps are large-scale philosophy and psychology based maps for general orientation within the complex situations when we are searching definite solutions of concrete particular problems. All mind maps present visualization of definite thoughts' arrangement within corresponding structures, what are well-known products of systemic organization of humans' thinking.

Key words: general science education, philosophy of Science, systems theory.

## HUMAN and UNIVERSE:

**UNIVERSE MEANS TOTALITY OF EVERYTHING, and everything as a part of the Universe is reflected within Human's World of Thoughts as corresponding SYSTEM - the whole, what contains interconnected parts and what at the same time is a part of some other system. All systems are characterized by their properties, what are also characteristics of corresponding things or bodies of the Universe.**

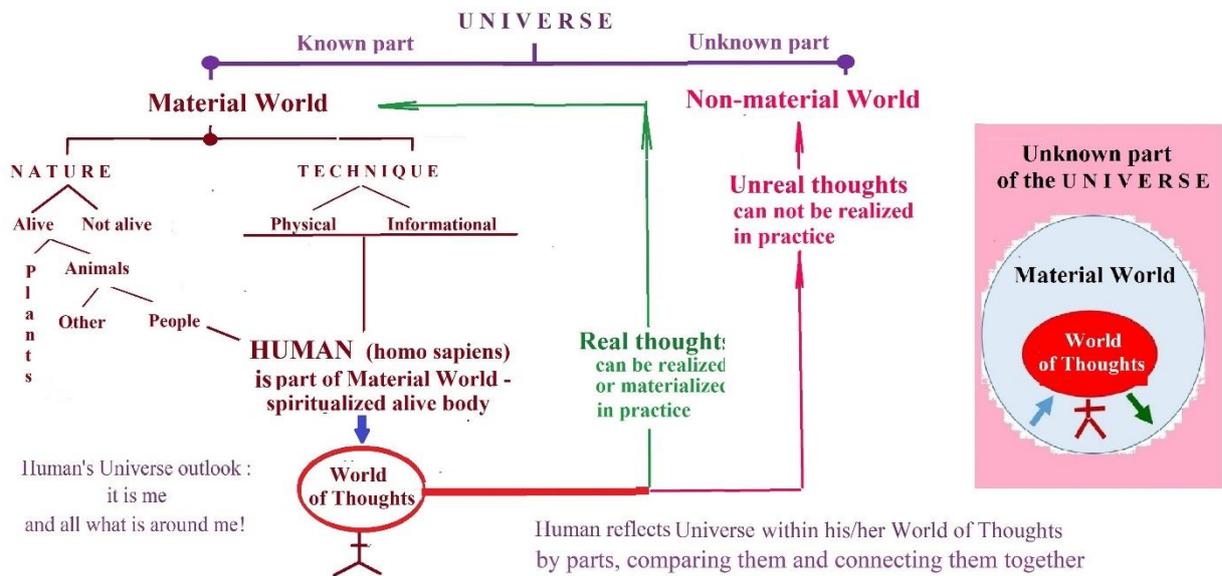


Figure 1: Human as part of the Universe and Universe within Humans' World of Thoughts

Wide diversity of **CHANGES** is fundamental property of everything – **everything** (all parts of the Universe and all systems as corresponding reflections of these parts within human's World of Thoughts) **is changing**.

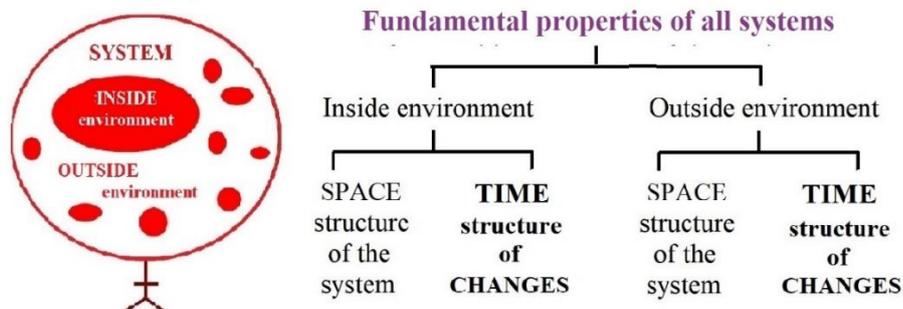


Figure 2: Human's life is a lifelong change – let us stop for a moment and think about this fact!

## SHORT INTRODUCTION TO SYSTEMOLOGY OF CHANGES

Following basic principles of systems approach, all changes are properties of corresponding systems as reflections of the Universe within our World of Thoughts. We are vitally interested in changes because **our life means realization of appropriate changes**. There are quantitative and qualitative changes. Understanding (factology) and comprehension (causality) of different changes are significant needs for humans' successful living.

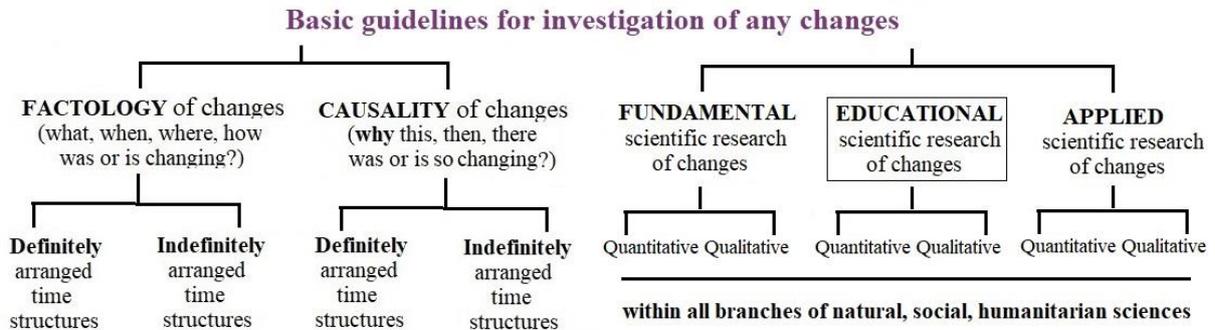


Figure 3: Above all - Factology and Causality of 'Definite and Indefinite changes

Investigation of any change at the level of factology is described by changing state of corresponding property "a" according to states "t" of selected clock as timer. Using mathematics, it means making graph of appropriate function a(t). All changes as appropriate time structures are built systematically step by step, what means integration of differential parts of change within total change as the whole. Fundamental characteristic of all changes is speed.

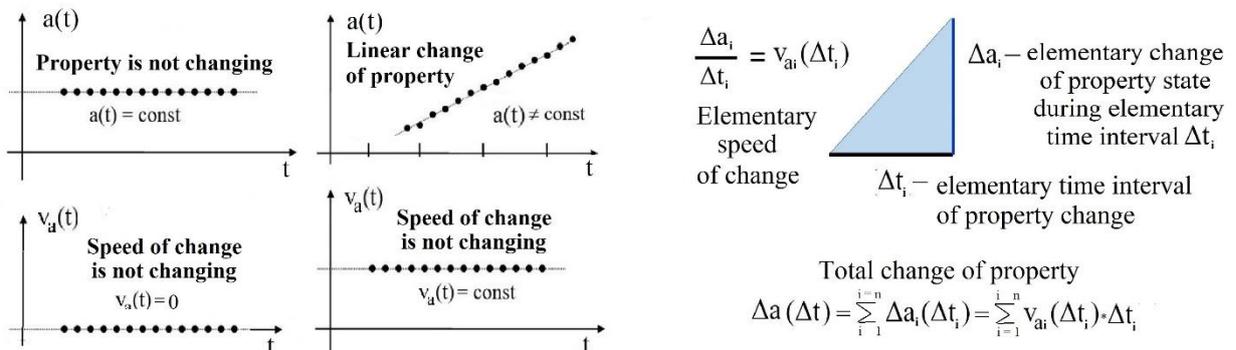


Figure 4: Graphs of simplest changes and elementary differential parts of changes.

### HUMAN'S LIFE ACTIVITIES ARE CORRESPONDING CHANGES

Significant part of human's life activities are purposeful changes what are organized and managed by human's thoughts and follow corresponding universal structure.

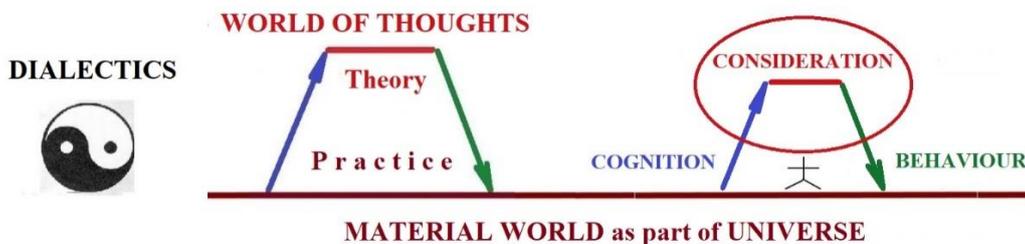


Figure 5: **Cognition – consideration – behaviour** are basic parts of purposeful human's life activities.

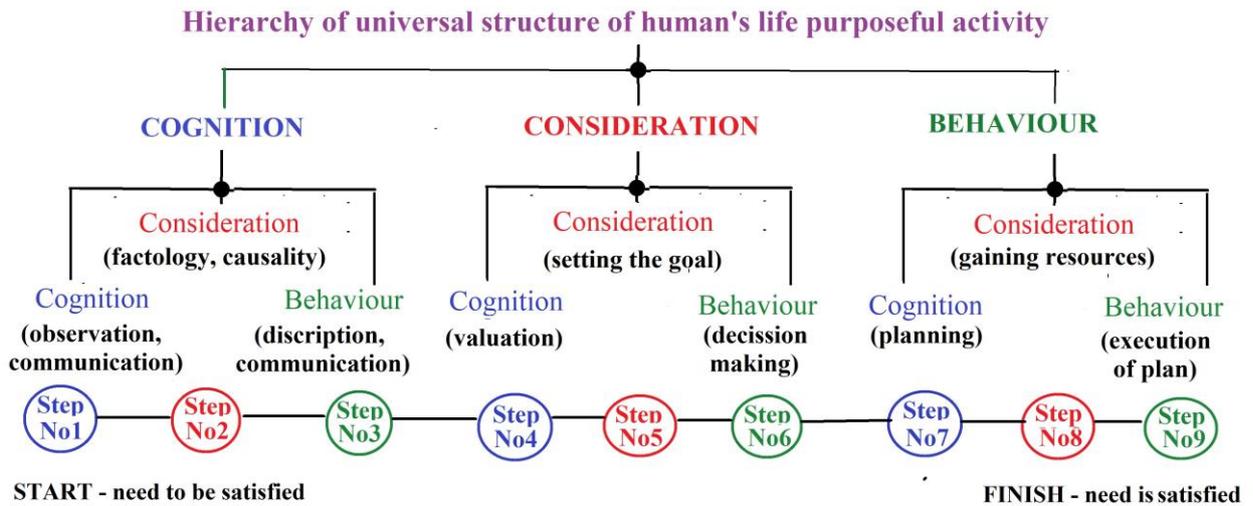


Figure 6: Nine steps within three level hierarchical structure of human's purposeful life activity.

Along with given above content oriented structure of changes it is important to consider also general funkcional (Management and Execution) structure of changes.

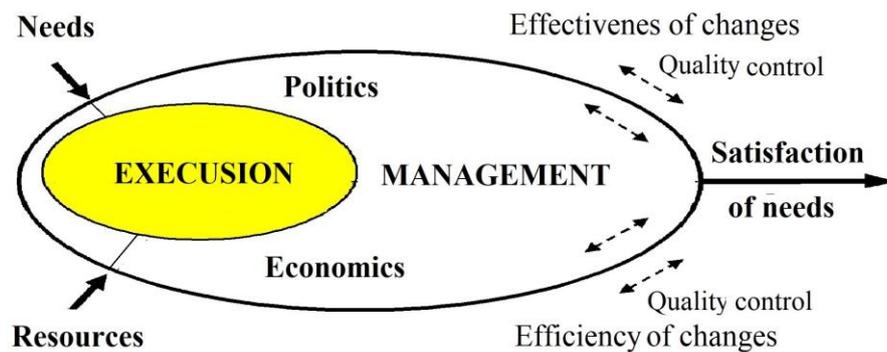


Figure 7: Functional structure of human's purposeful life activities

**EDUCATION as purposeful gaining of LIFE EXPERIENCE FOR LIFE**

Concepts of Life and Education as Life experience for life and corresponding changes within Life and Education always are closely interconnected. It seems to be obvious, but educational activities very often are far from real needs of different persons and societies. Be the way, effective educational activities follow mentioned above fundamental structures of purposeful human's life activities.

	COGNITON	CONSIDERATION	BEHAVIOUR
SKILLS		Valuation	From theory to paractice
ATTITUDES		Selection of VALUES	
KNOWLEDGE	From practice to theory	Values	

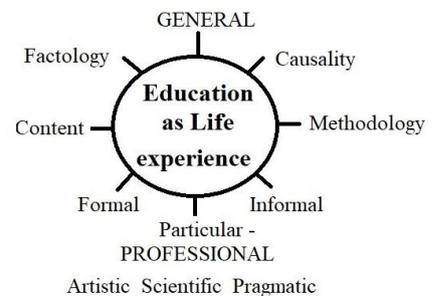


Figure 8: Systemic interconnection of LIFE activities (cognition, consideration, behaviour) and EDUCATION as life experience for life (cognition, consideration, behaviour).

## SOLVING PROBLEMS OF interconnected CHANGES within our Life and Education

Life and Education today are seriously changing. Because of the great progress of modern sciences and technologies, **global explosion of information** is one of the basic causes of recent overall changes.

Modern changes are **high-speed qualitative and probabilistic social changes** and because of that, many unexpected situations appeared. It is very difficult to predict detailed development of everyday life today, therefore it is especially important now to understand and comprehend general guidelines of possible development of Life and Education for tomorrow (Scharmer, 2016; Sorder, 2019).

**Modern problems are complex** – they are characterized by high-level internal as well as external diversity and high speed of corresponding changes. Today we need to start with change of traditional arrangement of our World of Thoughts and getting general orientation within our modern Life activities. Concentration on basic key words (diverse, fast, stochastic/probabilistic, particular and general, quantitative and qualitative, private life and social life etc. changes) can help us to arrange our modern world outlook. We are especially interested in creation of things with new properties to satisfy our life new practical needs. **Developing smart technologies, above all we need to develop also smart people by means of their smart education.**

One of the top concepts is formulated as “**sustainable development of humans’ life**”. It means study and development of predictable long-time changes. Other general guideline is fundamental causality concept – “**cause of everything is interconnection of everything**”. Finally, all changes should be studied, projected and realized using **systems approach**. (Broks, 2014; 2016). When developing solutions of new particular problems, it is worth to follow fundamental reliable general concepts.

Education as life experience for life is coming on the top of Life activities today.

### What EDUCATION for what LIFE - such is the question!

		DEVELOPMENT	CONSUMPTION
<b>SCIENTIFIC education</b>	Mind (concepts)	Fundamental and applied research	Technical maintenance
<b>ARTISTIC education</b>	Feelings (images)	Inspiration	Social life
<b>PRAGMATIC education</b>	Will (needs)	Practical creation	Use of science and art achievements

Figure 9: What EDUCATION for what LIFE – such is the question.

## REFERENCES

Broks, A. (2014). Systems Thinking – the backbone of modern Science and Technology Education. *Journal of Baltic Science Education*, 13(6), 764-766.

Broks, A. (2016). Systems theory of Systems Thinking – general and particular within modern science and technology education. *Journal of Baltic Science Education*, 15(4), 408-410.

Scharmer, C.A. (2016) Theory U – Leading from the Future as it Emerges. *Berrett-Koehler Publishers, Inc., San Francisco, CA., USA*.

Sorder, B. (2019). Homo-Natura alteritas. Philosophie et art 2015-2019. *Mansards, Riga, Latvia*.