Table of Contents

Go Back

World Integrated Warning Forecasting System Based on System Dynamics Principles as a Basic Factor in Sustainable Development

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World is in crisis. To reach sustainable development, it is necessary to change methods of shaping policy into that based on knowledge of its complex and future results. We ought to create a possibility of forecasting and measurable evaluating policy effects and other changes in life–conditions . This will allow us to change economics into based on account of complex profits and costs with its social and nature elements. With this end in view a large scale international science and technology operation on popular and common use system dynamics should be undertaken..

For proper governance I also propose a conceptual model System of Life (SoL). The SoL reflects common properties and structural features of systems: man – technology – environment (social and/or natural). The model reflects life-systems feedbacks. It also reflects the process of life. The SoL includes static as well as dynamic properties and structural features of these systems.

Contents

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1. Introduction

After September 11th, 2001 we have come to give a different meaning to the words *Inclusive Globalization*[1]. The idea of *Inclusive Globalization* is very important for sustainable development of the world society. Its realization requires very efficient multilevel governance. However, proper governance is impossible without the knowledge of future results of our own and/or other people's policy, as well as other changes in the socio-natural environment. Proper governance is also impossible without some understanding of socio-economic and eco-social systems that are being transformed by means of our policy.

In the era of the present-day highly developed science and technology aided life we should be able to predict changes in life conditions and adopt our forms of life by anticipating to new conditions. The global crisis is a result of short-sighted forms of life and a currently dominating outdated value system.

A common and popular use of system dynamics methods is therefore necessary to overcome the global crisis. With his aim in view we have to change our egoistic and short-sighted economics, which is a basis of *Pernicious Globalization*, into a new one, based on a principle of common good and the knowledge of complex and future results of socio-economy activity.

In order to introduce the idea of *Inclusive Globalization* into practice we should, among other things, build the following

1. A World Integrated (and distributed) Warning Forecasting System (based on system dynamics principles) and
2. A World Integrated Information System for Measurable Evaluation (results of socio-economy activity and/or other environmental changes).

Implementation of the *Inclusive Globalization* without building an information base of proper governance and sustainable development economy, will lead the world society – as well as the *Pernicious Globalization* – directly into a global catastrophe.

In order to justify the above conclusions in what follows I present the results of a system analysis, which was carried out with the aid of the System of Life[2]. The System of Life is a conceptual model of the system: man – technology – environment, which I have formulated in accordance with the proposition put forward by A. P. Sage (Sage, 1977, 8). This general homomorphic conceptual model (of the real world) is – in my opinion – especially important for: proper governance, *Inclusive Globalization*, and sustainable development.

2. Dangerous consequences of the policy without knowledge concerning its complex and future results

In December 2000, the CIA published a report: *Global Trends 2015*[3]. Two scenarios presented in this report are especially important: *Pernicious Globalization*, and *Inclusive Globalization*.

In the first scenario - *Pernicious Globalization* - : *Global elites thrive, but the majority of the world's population fails to benefit from globalization. (…) Population growth and resource scarcities place heavy burdens on many developing countries (…) growth continues in developed countries; many developing countries experience low or negative per capita growth, resulting in a growing gap with the developed world (…) Internal conflicts increase, fueled by frustrated expectations, inequities, and heightened communal tensions; WMD proliferate and are used in at least one internal conflict.*

In the second scenario - *Inclusive Globalization -: A virtuous circle develops among technology, economic growth, demographic factors, and effective governance, which enables a majority of the world's people to benefit from globalization. (…)Technological development and diffusion (…) are utilized to grapple effectively with some problems of the developing*

world. (..) Governance is effective at both the national and international levels. (…) Conflict is minimal within and among states benefiting from globalization.

Nearly ten years ago we had another - warning forecast[4]: – *Beyond the Limits*

*One model says that this finite world for all practical purposes has no limits (*to growth – LM*). Choosing that model will take us even further beyond the limits and, we believe, to collapse.*

Another model says that the limits are real and close, and that, there is not enough time, and that people cannot be moderate or responsible or compassionate. That model is self-fulfilling. If the world chooses to believe it, the world will get to be right, and the result will also be collapse.

A third model says that the limits are real and close, and that there is just exactly enough time, with no time to waste. There is just exactly enough energy, enough material, enough money, enough environmental resilience, and enough human virtue to bring about a revolution to a better world.

The Inclusive Globalization scenario is in agreement with Meadows' third model, as well as with the sustainable development concept, formally approved at the UN Earth Summit in 1992[5].

After September 11th 2000 the need to understand the problems of *Inclusive Globalization* has become increasingly popular.

In accordance with Mikchail Gorbachev's statement that *If the battle against terrorism is limited to military operations, the world could be the loser. But if it becomes an integral part of common efforts to build a more just world order, everyone will win (…)*[6].

Also Hubert Vedrine, the French Foreign Minister, stated that *We must redouble our efforts to create a globalization with a human face*[7].

On his part Gerhard Schröder, the Federal Chancellor of Germany, has called for *an action to tackle the issue of globalization of security and the globalization of justice.* (…) *Security and social justice are the answers to the new challenge. This can be achieved through* (inclusive – LM) *globalization*[8].

Also James Wolfensohn, World Bank President, claimed that *The world's leading nations must increase efforts to reduce global poverty if the fight against terrorism is to be won*[9],

But nowadays it is impossible to return to a "welfare state" without bringing about a general change in the economic system. Beyond "the limits to growth" (Meadows et al, 1993), elimination - in such a simple way - of unemployment and poverty would speed up regression.

To overcome the global crisis, to reach sustainable development and to eliminate social causes of terrorism we have to change in quite a new way the actual forms of globalization into "globalization with a human face". With this end in view we should build, with the aid of system dynamics methods, not only knowledge-based, but especially a wisdom-based society,

The Pernicious Globalization – which obviously leads us into a global catastrophe - is a result of the lack of knowledge of complex and future results of our socio-economy activity and the weakness of governance – especially that devoid of this knowledge. It is also the result of an improper value system used for shaping the developing policy. Conservative continuation of the current egoistic and short-sighted forms of globalization , i.e. the *Pernicious Globalization* – has led us to greater regression and explosion of defensive terrorism and/or to a global collapse. The *Inclusive Globalization* would lead us, if improperly introduced, in the same direction.

But what should be done if we really want to reach – with the help of the proper *Inclusive Globalization* – a sustainable development of the world society? What should be

done, if we want to avoid the negative consequences of the new – present-day global - "welfare state"?

3. General homomorphic conceptual model as a tool for sustainable development governance

Multilevel governance is treated - in the Report *Global Trends 2015* (CIA, 2000) - as the main tool of *Inclusive Globalization.*

Proper governance depends on two basic factors:
- comprehensive information system, and
- adequate value system.

To build such an information system and to find a proper – "here and now" - value system it would be useful to recall the A. P. Sage proposal of a method of computer aided policy shaping (fig. 1).

If we want to reach sustainable development, the above mentioned method should generally be used in governance. Most of the components, which are necessary for introducing this method into practice – including system dynamics methods – are already in existence.

Among these components the conceptual model of the real world holds a special position. Without this model, properly constructed, it is impossible to understand and change the systems that are to be transformed by means of our anti-crisis and sustainable development policy.

Therefore, I would like to discuss the problem of a conceptual model necessary for governance. For this purpose we need at least two conceptual models:

- a general homomorphic conceptual model (GHCM), and
- a detailed conceptual model (DCM).

The GHCM should include universal science concerning the real world changed as a result of governance, together with a general systems theory, general cybernetics (including general information theory and theory of life-process), and other adequate general and/or philosophical knowledge. The GHCM is especially essential to determine the currently existing constraints of changes and a proper value system.

The DCM, coherent with the GHCM, should reflect, in a conceptual way, the basic interrelationships that exist in specific objects of policy (for example, factories , corporations, states, communities of states, ecosystems, etc.) and between these objects and their environment. We usually already know how to create the DCMs. But this knowledge is - in my opinion - very limited. We have a lot of elements to create such a general model, but we have to synthesize these elements in one, appropriate, cognition tool.

I have undertaken the task of building such a General Homomorphic Conceptual Model and I called it: *A **System of Life*** (Michnowski, 1995).

4. The System of Life as a general homomorphic conceptual model of the system: man – technology – environment

The System of Life (SoL) reflects common properties and structural features of the systems: man – technology – - environment (social and/or natural - SMTE), their sub-systems (especially systems: man – technology) and over-systems. It reflects life-systems feedbacks. It also reflects the process of life of systems of this kind. The SoL includes static as well as dynamic properties and structural features of such systems. Below I will present some fragments of SoL, which allow me to justify the main conclusions of this paper.

The SoL treats the system: man – technology – environment, as a life-system. In the same way it treats the system: man – technology (SMT) and the environment of the SMT. The life of every life-system depends on the life of environment, its relevant form and quality.

The Life-system is open (Bertalanffy, 1952), autonomous (Mazur, 1999), self-organizing, information, anticipative and dynamic system, therefore has a possibility of homeostasis (fig. 2). It is capable of creating life – producing negentropy and minimizing entropy - for itself and the environment. The life-system also has a possibility of defending its life and, what is of general value, cooperating for the support of its own life and the life of the environment. The quality of the life-system is measured, in conceptual way, by its level of information.

Between the level of information and the level of entropy of the life system there exist the following interrelationships:

$i = A(n)1/s,$

where:

i is the level of information (Wiener, 1971),

s is the level of entropy, and

n is the number of elements of the life-system.

In the SoL, entropy is a conceptual measure not only of the level of disorganization but also of the development-reserves.

The life span of the life-system is finite, but not limited, and it depends on the level of information of the life-system.

Every act of life-system for system and environment is followed by two quite different results: positive (negentropy effect), and negative (entropy effect). When the production of negentropy exceeds the production of entropy the life system develops. The stream of energy (in a wider sense) which leaves the life-system (as an open system) is - from the point of view of the leaving-system - degraded, but the same energy can be the factor of life of another outer life-system. Therefore by proper differentiation of subsystems it is possible not only to decrease the range of growth of the entropy of the life-system, but even to get a synergetic effect of cooperation.

There are two different kinds of entropy and negentropy processes: parametric and structural. Parametric entropy process (physical destruction) is a kind of destruction of life-system which needs - for the elimination of its negative consequences - simply the rebuilding of the old, physically destroyed forms of the life-system. The structural entropy process (not physical, but moral destruction, ageing, obsolescence, outdatedness) is a destruction of the life-system, which needs - for the elimination its negative consequences - the construction of quite new forms of life-systems adequate to the new life conditions. More technology results in a greater moral destruction of even physically not destroyed forms of life.

The structure of the SMT life-system consists of:

- hardware, software and orgware (fig. 3),
- elite, non – elite and life-resources, and
- a control (governance, homeostat) subsystem and a technology subsystem.

The orgware is a set of feedbacks which join software and hardware elements of the life-system in acting wholness as well as join the life-system with the environment.

During the process of life, software and hardware are changing practically continuously, but the orgware is changing discreetly – from time to time.

The homeostat consists of successively added – together with development – elements such as

- an information field (the basis of natural homeostasis, and intuition),
- elite, and
- common (elite and non-elite) consciousness of the life-system.

The process of life of the SMT life-system consists of its two qualitatively different forms: normal, i.e. development, or pathological, i.e. crisis (fig. 4). This process goes through various phases and stages.

The first phase of development depends mainly on proper creation of a new orgware fitted to the new stage of development. The second phase – accelerated by proper orgware - is a rapid development of software and hardware of the life-system. The third phase – which slows down the pace of development as a result of moral ageing of the existing orgware – is now less fitted to the new hardware, software and environment of the life-system. In the third phase, new elements are created which help transform the old orgware form into a new one, fitted to the new inner and outer conditions of life and development of the life-system. When the old – morally aged - orgware form stops developing, the stage of development is finished. After that the life-system enters a new stage of development or crisis.

The development of the life-system depends on proper changing time-space configurations of the elements of the system: life-system - environment, in that getting maturity of existing systems elements and integrated them into its new subsystems relevant to life-needs of the system (and/or its environment).

When the life-system develops

- the amount of its elements grows,
- its structure differentiates, and
- the level of information rises.

When the life-system is in crisis, its quality generally deteriorates and it approaches a "death" limit. The crisis is mainly a result of decreasing, with the old orgware, the possibility of access to life resources.

The first phase of the crisis is quiet. The level of information of the life-system decreases in a not too visible form. This regressive stability is a result of the stabilizing activity of the stronger part of the system, which is materially interested in life determined by the old orgware. If not interrupted, this phase brings the life-system to a death limit.

The second phase of the crisis features instability of the life-system, which is a result of the defensive activity of a part of the system, being either mostly menaced by the influence of the old orgware or understands the deathly consequences of life without building a new, proper form of the orgware. During this phase the system increases its quality periodically and for only a short time. This is a result of partial destruction of the old orgware combined with access to resources which were, till then, inaccessible.

The longer the crisis persists, the more life-resources are depleted. Therefore, in the second phase of the crisis the system also approaches a death limit.

The second phase of the crisis can more easily be overcome. In this phase it is possible to combine wisdom and defensive activity of the elites with spontaneous defensive activity of non-elites of the life-system.

If in the second phase of the crisis the life-system does not find a proper way of transformation of the old form of orgware to a new one, it will enter the third phase .

The third phase of the crisis is again stable. It results from pathological governance. In this phase a new, but pathological orgware, is built. This new orgware allows conservation of life of the life-system by destroying life of the social or natural environment, or by limiting access to deficit resources for the weaker part of own life-system. For some time the life–system upgrades its quality, but this tendency is short-term. If the crisis is not overcome by the end of the third phase, the system will enter a new stage in the crisis.

This is the SoL basis on which we can more precisely define the notion of sustainable development (fig. 5). Sustainable development is a kind of development which is not interrupted by periodically occurring crises – heavily destroying life-resources. In the era of globalization a global crisis can easily evolve into a global catastrophe. Sustainable development depends on properly made transformations of the orgware of the life-system, long preceded by relevant development of software and hardware. It means that the present-

day concept of sustainable development is not only ideal for proper governance, but also lays down an essential condition for survival of humankind.

For sustainable development we ought to know a set of life-states of the life-system and a set of general transformations which are necessary to avoid crises.

The life-system can be, during the period of its existence, occur only in eight quite different life-states (fig. 6). Four of them are normal life-states, and other four are pathological. These states are described by a tendency which concerns such items as

- the quality of life of elite (of the life-system),
- the quality of life of pseudo-elite,
- the quality of life of non-elite,
- the level of inner life-resources, and
- the relation to the environment.

Here are– in consecutive order – normal life-states of the life system :

I - egalitarian stagnation

II - elitist growth

III - non-elitist growth, and

IV - eco-development.

In the **egalitarian stagnation** life-state – the first stage of life and development – the life-system does not have its elite. In this state the system is externally constructive. It means that its outer impacts support the life of the environment. The reason for its existence is the growth of the quality of life of its units. The system, however, is not able to gather reserves of life resources and increase its durability. The main homeostatic item is the life-system information field. When the growing life-system exhausts its potential for supporting life of the environment, it collapses or goes through **elitist transformation**.

As a result of this transformation, in the life-system there arise its elite and the system forms an **elitist growth** life-state. The life-system in this state is externally destructive. The elite stop developing the non-elite, which is treated by the elite mainly as a form of technology. Reserves of the life-system resources continue to increase. The durability of the system is also increased. The main reason for the homeostasis is the elite of the system. But when system that is growing up becomes excessively inert and the expanded elite become so strong that it can destroy the non-elite, the life system should start to transform itself into the next normal - non-elitist life-state. Therefore, the life-system goes through **non-elitist transformation**.

The life-system in a **non-elitist growth** life-state continues to be externally destructive. It still lives at the cost of the environment. In this state, durability and the quality of life of the elite as well as that of the non-elite of the system increase. Here the main homeostatic item are ethically matured elite supported by collective (elite and non-elite) consciousness of the life-system. But the increased potential of destruction of the environment leads to the threat of the destruction of the environment – the basis of life-resources for the life-system. When the increased intensity of moral degradation stems development it is necessary to make the next, **ecodevelopmental transformation**.

The system in an **eco-development** life-state is externally as well as internally constructive. It increases the quality of life of the elite and non-elite of the systems, and helps the environment to develop. The homeostasis of the system is based on its fully developed homeostat which acts harmonically with the homeostat of the environment. It allows the system to be long-sighted, anticipative and flexible. The system draws upon reserves of life-resources especially needed for the elimination of unpredictable threats .

All these three sustainable development transformations feature the above characteristics.

They are made properly when (as a result of the previous stage of development):

- the system is excessively inert, and
- there arises a threat of the destruction of the environment of the life-system and/or of the life-system elite.

The main feature of these transformation is a change in the life-system value system and the strengthening of its homeostat. Information efficiency rises. The transformation depends on the change in the structure of the life-system by the creation of an additional set of feedbacks which make it possible to enlarge the creative and defensive potential of the system. As a result of proper transformation the life-system becomes more efficient, long-sighted, flexible, reserve-creative, and gets access to new life-resources.

When proper transformation is not made the system enters a crisis and builds up a pathological life-state.

There are four pathological states of life:

- regressive stagnation,
- regressive growth,
- pseudo-elitist stagnation, and
- regression.

The system in a **regressive stagnation** life-state of is externally destructive. It decreases its durability. In a short run it increases the quality of life of its elite and non elite. It lives at the cost of its future generations.

The system in a **regressive growth** life-state is externally constructive. It increases its durability and the quality of life only of its pseudo-elite, whereas it decreases the quality of life of its elite and non-elite. The pseudo-elite grow at the cost of the weaker parts of the system, depriving them from their life resources, even bringing them to death.

The system in a **pseudo-elitist stagnation** life-state is also externally constructive. It increases the quality of life of the pseudo-elite, whereas it decreases its durability and the quality of life of the elite and non-elite. The weaker parts of the pseudo-elite are introduced into non-elite.

The system in a state of **regression** is externally as well as internally destructive. It decreases its durability and the quality of life of the elite, pseudo-elite and non-elite of the system, and runs on low life-resources. This means that the operation of the system homeostat is faulty.

The regression of the life-state exists as a separate stage of the pathological form of the process of life or as the last part of the first phase of other stages of the crisis. Other pathological life-states are formed in the third phase of the crisis.

As a result of the crisis – and pathological life-states - the life-system can

- be immediately destroyed, or
- enter a pathological life-state, or
- enter again a normal life-state and restore development.

The life-system which has entered a crisis after the state of elitist growth, and cannot return to its normal life-state, successively passing through crisis stages – gives shape to the following pathological life-states

1 - regressive stagnation,
2 - regressive growth,
3 - pseudo-elitist stagnation being slowly destroyed, or
4 - regression – when it is immediately destroyed (fig. 7).

The essence of the crisis of the life-system depends on the lack of ability to access outer life resources combined with the lack of skill to support the life of the (near and/or distant) environment. The more developed (and inert) the life-system is, the more anticipative

it should be for life in a changed environment. The main cause of the crisis is the underdevelopment of its homeostat.

In the policy practice it would be useful to know how to change - in sustainable developmental way - the structure of the socio-economic control (governance, homeostat) system.

In accordance with the SoL, the control system (including an information system as basis for proper control) of the SMT is changed in the following consecutive stages (fig. 8):

1 – dispersed,
2 – centralized,
3 – organic, and
4 – communal.

When the control system of the life-system is **dispersed**, cooperation between its subsystems depends on spontaneous self-organization . The knowledge needed to govern is in the possession of life-system subsystems.

Governance based on a **centralized** principle depends on one-directional access to information resources available by the life system. The elite (or pathological pseudo-elite) - the strongest subsystem which controls systems activity - use these resources for life-system governance. This control system needs big creative potential of a dominating control subsystem.

Organic governance is based on a subsidiary principle. At the upper level governance deals with control problems which are difficult to be resolved at subordinated levels. The higher the level of governance is, the more long-sighted it becomes. The information base is also centralized, but it is accessed according to the needs of subordinate levels.

Communal governance depends on commonly accessible information base and technology used for life-control (homeostasis). Every decision in common policy is done independently, but it is based on the knowledge of its future results and future results of activity of other subsystems of the life-system, as well as of the environment.

Also in this case the process of reshaping of the governance system is connected with the problem of flexibility of the life-system. When the inertia of the life-system reaches some maximum level, the control system must be changed. A new form of the control subsystem (homeostat) should enlarge the strategic horizons of the life system and divide the process of realization its life supporting policy, acting for the common good and that having full access to information, among a larger number of- decision-makers. This enlargement is therefore connected with sharing the access to the information base and other information technologies

The more developed is the control system (governance, homeostat), the more successfully innovators and decision-makers dealing for common good realize the support of life of the life-system and the environment.

Proper governance also depends on the development of technology, access to technology as well as on intellectual creative skillfulness of people attending controlling life-processes.

To increase the potential of homeostasis it is necessary to let people step up on the “ladder of human needs” (fig. 9).

Human needs are changed together with the level of access of individuals or societies to life-resources, technology, and information - in the following way:

1 – the need to **possess life** in a biological sense, as well as to have access to life-resources necessary for life,

II – the need to **possess technology** which allows reducing costs of life and making life-supporting activity more efficient,

III – the need to **increase the use of own intellectual potential** in the life-supporting activity,

VI – the need to support own intellectual creativity by **social cooperation** and **access to** outer sources of **information**,

V – the need to **cooperate in world governing** for the common good.

By stepping up on this "human needs ladder" the life-system multiplies its creative potential and activity that support own life and the life of the environment.

The life-system can be a creator of life (own and that of the environment), as well as of technology or simple life-resources for stronger life-systems in their surroundings. The function that life-system fulfils in its over-system and the way in which its acts depends on its creative and defensive potential and life-conditions in the surroundings.

When one life-system acts on another life-system by supporting its life, the reaction of this latter system is also positive. When one life-system acts on another life-system by damaging its life, the reaction is negative. The force of such a reaction depends on the creative- and defensive- life potential of the reacting system.

The behavior of life systems depends also on their access to life-resources and differences in the creative-life potential.

If two life-systems, one of them stronger and another weaker, exist in the situation of accessibility to life resources, the stronger one use the weaker as technology.

If two life-systems exist deprived of their life-resources, the stronger one causes the weaker one to die and takes over its resources.

If two life–systems of the same creative potential exist deprived of their life resources, they start to cooperate to get access to new resources.

The above described cooperation is also possible between strong and weak life-systems, if the destruction of the weaker one leads to the death of the stronger one - but only when the stronger has the knowledge of such a danger.

5. The global crisis and sustainable development as described by the System of Life

The System of Life (SoL) can help in the diagnosis of world society's life-state, and in the search for sustainable developmental forms of its life.

From the SoL's point of view (a fig. 7), at the beginning of the 20th century humankind has fallen - from the state of elitist growth (instead of reaching the non-elitist growth life-state) into a regressive stagnation life-state. It means that a global crisis then began. Therefore, to avoid entering this first stage of the global crisis - the humanistic transformation should then be made to introduce a feedforward and organic control possibilities into socio-economic relations. Instead of checking the discontent of the non-elites by means of a short-sighted social policy of the "welfare state", with egoistic economy preserved – egoaltruistic and long-sighted economy should be introduced into practice.

The humanistic transformation means not only the introduction of long-term strategic planning of human activity. It means radical enlargement of the flexibility of this activity. With this end in view non-elites should be introduced into innovative activity. For this reason the egoistic relations of dividing should then be changed into those based on a principle of social justice, i.e. those who "offer" more for the common good of all people, should be able to "receive" more.

But no ethical, scientific and technological conditions for the introduction of the non-elitist growth life-state of world's society existed at the beginning of the 20th century. At that time, as a result of the regressive stagnation life-state, the quality of life of most of world's population was improved in the short run. Also increased the world's population. But the increase in quality of life was made at the cost of future generations, because it lead to the destruction of the natural environment and deprivation of natural resources. Therefore, instead of transforming great scientific and technological achievements of the 20th century

into a sustainable factor humankind enters the next, second stage of pathology - regressive-growth life-state.

Nowadays the world system is probably still in the second phase of the second stage of the crisis. World's terrorist activity can be treated as a defensive activity of societies degraded by the pathological form of life. We are now probably facing the possibility of:

- forming institutions of a regressive growth life-state (the third phase of the second stage of the crisis, and the second scenario of "Beyond the Limits),
- forming eco-development (the third scenario of "Beyond the Limits'), or
- total collapse.

To overcome this crisis and to reach sustainable development we should precisely analyze the nature and causes of the crisis. Nowadays it is rather obvious that we are facing a crisis which depends on the exhaustion of natural resources, destruction of the natural environment, and we are approaching rapid destruction of the social environment. But there exist quite new - non commonly understood - symptom and factor of global crisis. It is rapidly pacing and not overcome, moral degradation of existing forms of life.

The pace of moral degradation is mainly proportional to the level of technological development. Elimination of negative consequences of moral degradation requires very efficient governance, long-term strategic planning, proper acceleration of the scientific and technological progress, eliminating - in anticipative way - known threats, building reserves of intellectual and material resources to combat the unpredicted danger.

Until the 20th century, i.e. till the first industrial revolution, socio-economic organization based on a feedback (a posteriori) control system was efficient enough for development. Low pace of changes in life-conditions (as a result of the low level of technology) made it possible to introduce new forms of life, after having confirmed in the practice not usefulness of the older forms. Then it was useful to introduce innovations by copying other patterns verified in practice or by using a method of "trial and error". When introducing false innovation it was usually possible to reject it without causing excessive damage. Additionally, at that time the human activity was supported by homeostatic, outer constructive nature.

As a result of the development of science and technology, specially outdated is social–Darwinism. It is a very entropy-expensive form of stimulation of development. Natural evolution – the pattern of social-Darwinism – roughly depends on blindly creating new forms of life and testing them in practice. The forms not fitted to the currently existing life-conditions are eliminated. Highly developed scientific technology, especially information technology, allows us to make a pre-selection of new forms of life by means of computer simulation methods - in a virtual space, not in a real space. Natural evolution methods in socio-economic life can and must (for our own survival) be maximally limited by introducing intellectual evolution methods, based on a popular intellectual creativity and computer simulation - system dynamics).

Nowadays - using highly developed science and technology – the delay between introducing innovation and revealing its negative effects can be very long. Catastrophic life-processes may cause in the future big damage as result of false innovations, introduced without the previous knowledge of their complex time-space impact.

The lack of ability to carry out anticipative elimination of negative consequences of moral degradation was, and still is, the main factor of the global crisis. The symptoms of the global crisis: exhausting of natural resources, damaging of natural environment, overpopulation, defensive terrorism, other social pathologies –result from egoistic, short-term and nonflexible socio-economic organization of the world society.

It is obvious that at the beginning of the 20th century there was no science and technology basis for such transformation - essential for a long-term action. At that time there was no well- developed information technology, either.

Nowadays the situation is quite different. We have extensive knowledge and high technology, but we have not enough wisdom which is necessary to properly use this knowledge and technology to overcome the crisis and introduce world society into sustainable development. In such a situation, if we want to survive and reach sustainable development, we should go through ecohumanistic transformation, which combines two transformations: humanistic and eco-developmental.

Ecohumanism is a partnership-based co-operation for the common good of all people (rich and poor, from countries highly developed and lagging in development), their descendants, and natural environment - commonly supported by science and high technology (Rio Declaration …, 1992)**.**

Ecohumanism needs Inclusive Globalization. It is a pre-condition of how to cure the natural environment and to get access to new resources by means of a proper use of such a large, often passive, intellectual potential of humankind and scientific methods of development.

I have demonstrated the present-day need for ecohumanism from the analyzes of pre-conditions of long-term forecasting and (on such forecasting based) measurable evaluation of policy projects and acts, as well as the results of other changes in life-conditions.

For long-term predictions we ought to use, theoretically, all knowledge humankind gained so far. Because the system of man – technology – nature is changing very rapidly, we ought to carry out also a very efficient process of gaining new knowledge of the changing world as well as eliminating lack of knowledge of its past. Without ecohumanistic partnership it is impossible to collect this reflecting the world information.

To eliminate negative consequences of such a rapid – with high science and technology progress – pacing moral degradation of the various forms of life (proper for the past, but unfitted to the new life-conditions) we must introduce intellectual innovative and creative activity to more and more people. The same should be done in order to create reserves of intellectual and material resources, which could be necessary to avoid some unpredicted catastrophes. This process also needs large cooperative partnership.

Another argument for ecohumanism is that in the global crisis humankind is approaching a global catastrophe. We do not know the range of the life/death limit we are approaching, as a result of this crisis. Then any damaging forms of resolving the existing social contradictions (such as the clash of civilization, harmful globalization, military methods of solving social problems, revolutions, etc) may lead us rapidly into a global catastrophe.

What we really have to build nowadays is the ecohumanistic civilization of life, instead of conservative civilization of death (based on social-Darwinism), transformed by shaping the regressive-growth life-state into a new totalitarianism (Jan Pawel II, 1994).

Together with ecohumanistuc transformation we might check **demographic explosion** in a natural way. It seems very probable that this demographic problem is a natural form of life defence of the global ecosystem. Maybe self-organizing nature intends to reinforce the homeostasis of the Earth by multiplication of its basic, intellectual factor - human minds. By building social and informational conditions for activating intellectual creativity of a large human population, its "demographic" procreation activity could be controlled and optimized. To optimize human biological creativity we should create socio-economic conditions for substitution of intellectual creativity for such biological creativity .

It means that we should transform the economic system into one based on complex calculations of profits and costs, including social- and natural- environment elements in these

calculations. This new system of ecohumanistic economy should allow us to introduce eco-social justice. In other words we should join access to wealth with eco-social usefulness of socio-economy activity. But this new social and economic order should proceed with special care of young, weak societies to help them to reach maturity.

From the SoL analyzes of structural and information conditions of sustainable development I have come to the following additional conclusions.

To reach sustainable development we need - among other information technologies - a commonly accessible computer simulation monitoring system, which allow us to monitor the pace of world's development - as well as that of the local - society. When the pace of development starts to diminish, we should prepare a new form of the orgware, which is essential for avoiding a crisis.

A proper educational system, which will shape intellectual independence, creativity and ecohumanistic consciousness, is also necessary. Introduced into school programmes of systems-knowledge, including general homomorfic conceptual modelling, it becomes particularly important.

The next task in building the bases for sustainable development is the development of flexible automation (and cyborgization), especially for rapid elimination of negative consequences of unpredicted catastrophes.

To reach sustainable development we also need:

- to reinforce the world elites, and provide them with eco-humanistic consciousness,
- to form the scientific, technological, informational and other social conditions for long-term thinking and acting, as well as to divide effects of common work according to the principle of eco-social justice,
- to form very information- efficient social relations,
- to build up other bases for ecohumanistic economy, and
- to master the ability to bring to a state of eco-development those parts of the world system that are young or delayed in their development.

6. A large-scale science–technology operation to build an information base for sustainable development

Overcoming global crisis is impossible without building an information base of sustainable development. To this end we ought to implement a large-scale international multi-stages science-technology operation.

The strategic, long-term aim of this operation is the creation of an information system for governance based on a communal principle (fig. 8).

By means of this information system the following information should be delivered:

1 - results of policy in accordance with the model (Sage, 1977, 8, fig. 1), including influence of policy on progress (existing) and development (quite new) technology.

2 - dates for complex and long-term accounting of profits and costs of socio-economy activity,

3 – dates about changes of the quality of life of the global and local societies,

4 - when can danger of global and/or local crisis arise.

I propose to measure the quality of life of the members of the society by their average inner and outer creative life-span. Progress in the existing technology could be measured by reducing the complex unit cost of using any particular form of technology, including costs of production, exploitation, and rebuilding of social and natural environment damaged during the production and exploitation of this technology. The results of introducing qualitatively a new technology could be measured by its influence on the growth of durability and quality of life of a society.

The final result of introducing such an information system would be the creation of a possibility of predicting and evaluating in measurable way of projects and effects of policy and other changes in life-conditions.

This large-scale operation should be divided into two parts:
Part I: A World Integrated (and distributed) Warning Forecasting System,
Part II: A World Integrated Information System for Measurable Evaluation (of socio-economy activity and/or other results of environmental change).

Below I shall focus only on the first part of this operation.

For example the creation of A World Integrated (and distributed) Warning Forecasting System (WIWFS) should be carried out in such stages:

1. Continual supervising (monitoring) and forecasting of the changed state of the world system with using system dynamics methods (Meadows et al., 1992). Results of this activity should be published every year .
2. Developing systems dynamics methods and introducing them into national states and their communities by continual supervising and forecasting activity.
3. Introducing these methods into states internal (local) continual supervising and forecasting activity.

Such a big task – part I and part II of this operation - needs a global governance institution. I propose to create - for example under the auspices of the United Nations – of A World Center for a Strategy of Sustainable Development[10]. This professional Center should stimulate - acting on the subsidiary principle – the construction of a proposed sustainable development information system, supervise and forecast world eco-social situation, warn and suggest some actions to avoid crises or catastrophes. A very important part of this activity should be the integrated, but territorially distributed, world knowledge base, indispensable for such supervising and forecasting action. Also a very important task of this Center should be to shape ecohumanistic consciousness, especially that of the world elites, including systems thinking, and using general homomorphic conceptual modelling and systems dynamics in every-day political practice.

7. Conclusions

We, humankind, are facing a global catastrophe. As viewed by the System of Life – general homomorphic conceptual model of the real world - the main cause of the global crisis is the rapid moral degradation of all the forms of life unfitted to new (rapidly changed with the development of technology) life-conditions. To eliminate negative consequences of this great moral degradation we need to introduce, among other things, popular system dynamics methods to properly shape the respective policy and its modification if the results of this policy do not agree with its general goals.

To overcome the global crisis and to reach – with the help of *Inclusive Globalization* – a sustainable development we need proper multilevel governance. This governance should be based on a new, ecohumanistic and measurable value system and supported by a world integrated information system. This information system should allow introducing into politics popular long-sighted forecasting methods. It allows also introducing new, ecohumanistic economics (based on complex accounting of profits and costs with its social- and natural-environment components). Ecohumanistic economics will stimulate innovative activity and allow combining particular interests with the common good of all people (wealthy and poor), their successors, and the natural environment.

Popular systems dynamics methods introduced to policy needs global governance support for such an initiative. Then the World Center for a Strategy of Sustainable Development under the auspices of the United Nations is proposed. The first big task of this

Center should be the construction of a World Integrated (and distributed) Warning Forecasting System (WIWFS).

The construction of the WIWFS – based on system dynamics - needs money for its implementation. But without proper information system politicians are blind. Intuition and detailed knowledge not transformed with the aid of computer simulation methods into proper politics projects can be false. It can cause damage instead of bringing profits. To reach the sustainable development a system dynamics is essential.

8. **Endnotes**

[1] Kofi A. Annan: *Thus the central challenge we face today is to ensure that globalization becomes a positive force for all the world's people, instead of leaving billions of them behind in squalor. Inclusive globalization must be built on the great enabling force of the market, but market forces alone will not achieve it. It requires a broader effort to create a shared future, based upon our common humanity in all its diversity.* See: Annan, Kofi, 2000, *We the People, The Role of the United Nations in the 21st Century*, Millennium Report of the Secretary-General of the United Nations,
http://www.un.org/millennium/sg/report/

[2] General homomorfic conceptual model (GHCM), called the *System of Life* as well as some suggestions for ecohumanistic globalization, see: Michnowski, Leslaw, 1995, *Jak ¿yæ ?, Ekorozwój albo … , " (How tolive?, Ecodevelopment or …,)*, Wyd. "Ekonomia i Œrodowisko", Bialystok, http://www.psl.org.pl/kte/books.htm , General conclusions from looking - with the help of GHCM-System of Life - for information conditions of sustainable development of the world society, see: Michnowski, Leslaw, 1999, *Czy regres cz³owieczeñstwa?, (Is it humanity regression?)*, Wyd. LTN-K, Warszawa, http://www.psl.org.pl/kte/books.htm .

[3] CIA Report: *Global Trends 2015: A Dialogue About the Future With Nongovernment Experts*, Central Intelligence Agency, December 2000,
http://www.odci.gov/cia/publications/globaltrends2015/index.html .

[4] D.H. Meadows, D.L. Meadows, J. Randers, *Beyond the Limits, Global Collapse or a Sustainable Future*, Earthscan, London 1993, p. 234.

[5] See: *Rio Declaration On Environment And Development, 1992,*
http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm .

[6] Gorbachev Mikhail S., *A Leading Role for the Security Council*, New York Times, October 21, 2001 (Internet),

[7] *Statement of H. E. Mr. Hubert Vedrinem French Foreign Minister,*
56th session of the United Nations General Assembly,
New York, NY Saturday, November 10, 2001,
http://www.un.org/webcast/ga/56/statements/011110franceE.htm

[8] World Economic Forum, *Globalization: Adopt an Agenda for Security and Justice*, 1 February 2002 - New York,
http://www.weforum.org/site/homepublic.nsf/Content/Globalization%3A+Adopt+an+Agenda+for+Security+and+Justice

[9] The World Bank Group, Press Review, Headlines for Friday, February 22, 2002: *Fight Against Poverty, Fight Against Terror Linked: Wolfensohn*, (Internet).

[10] In 1997, 165 prominent persons of Polish science, culture, politics, religion life, proposed to introduce such proposal into Rio+5 United Nations General Assembly. See: *Polska Inicjatywa na rzecz Trwa³ego Rozwoju Œwiata* http://www.psl.org.pl/kte/Polinicj.htm ,
http://www.psl.org.pl/kte/Lista.htm ,
also: Michnowski, Leslaw, *The Polish Initiative For a Sustainable Development of the World Society*, 1997,
http://www.psl.org.pl/kte/polinit.htm .

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Michnowski, Leslaw, 1995, Jak ¿yæ?, Ekorozwój albo … , " (How to live?, Ecodevelopment or …,), Wyd. "Ekonomia i Œrodowisko", Bialystok, http://www.psl.org.pl/kte/books.htm ,

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Jan Pawel II, 1994, *Przekroczyæ próg nadziei*, KUL, Lublin.

10. Figures

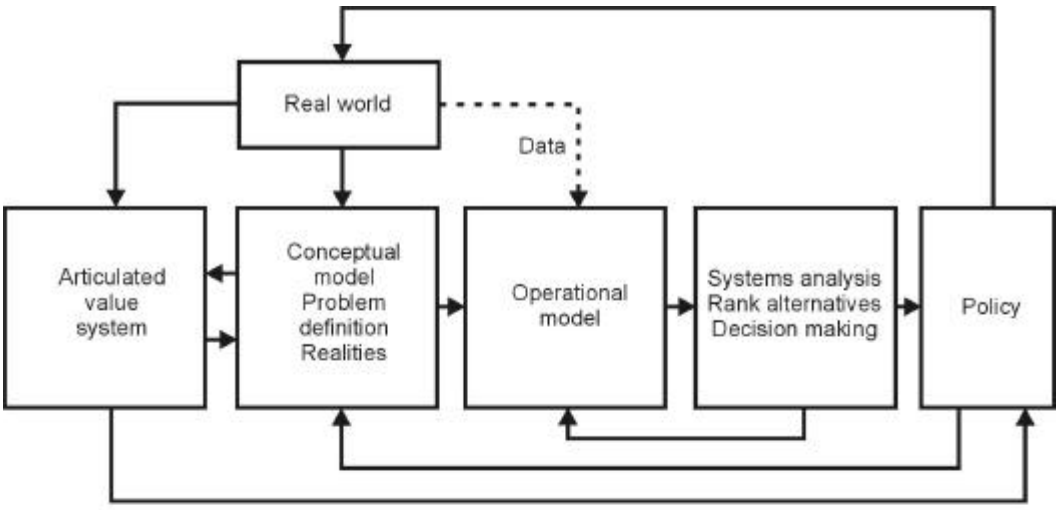
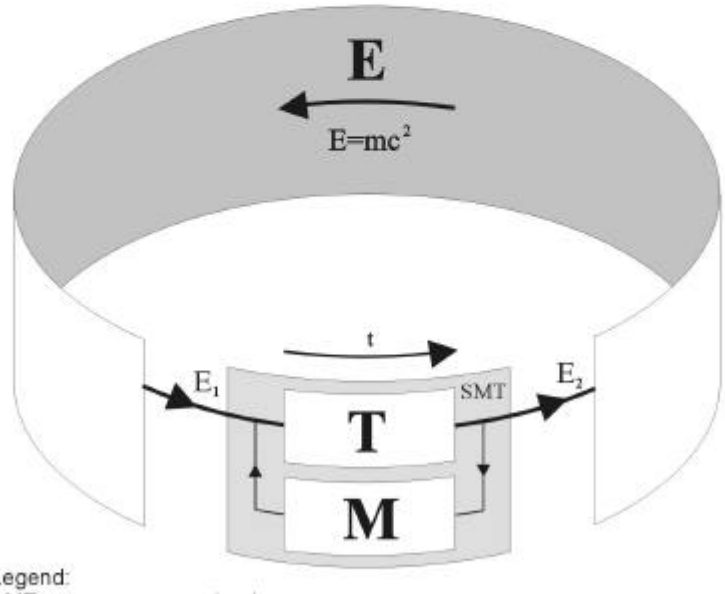
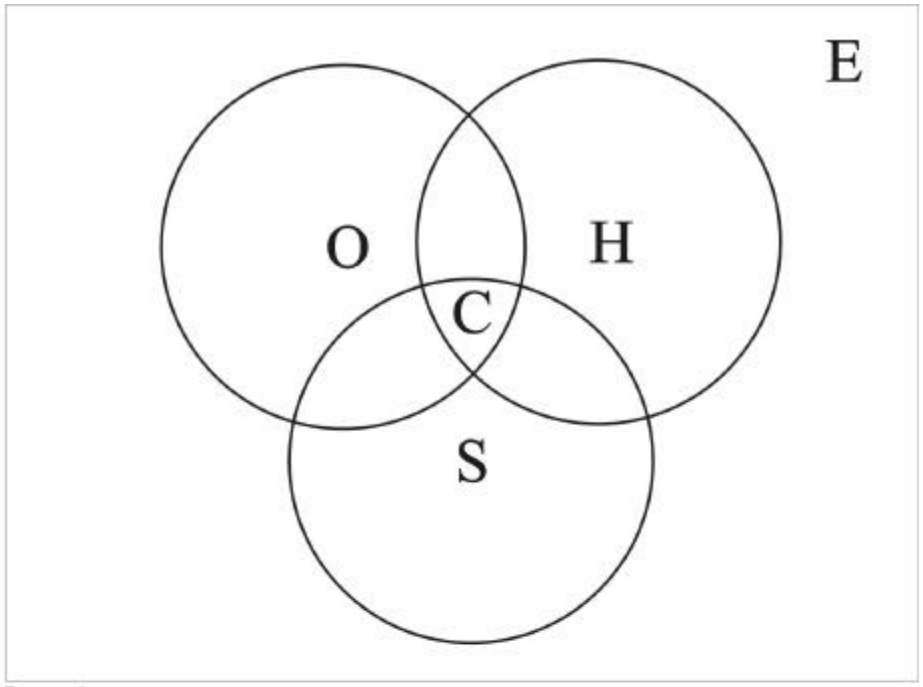


Fig.1 Systems engineering-based policy formulation process (Sage,1977,8)



Legend:
SMT system: man-technology
E social and/or natural environment
T technology
M man, control subsystem of SMT
t time
E1 input energy (in large sense), the form depends on our approach to enviroment
E2 output energy (constructive and destructive impacts), the form depends on our consciousnes

Fig.2 System: man-technology as an open system



Denotations:
C control system-homeostat
H hardware
S software
O orgware
E environment

Fig.3 Structure of the system: man-technology

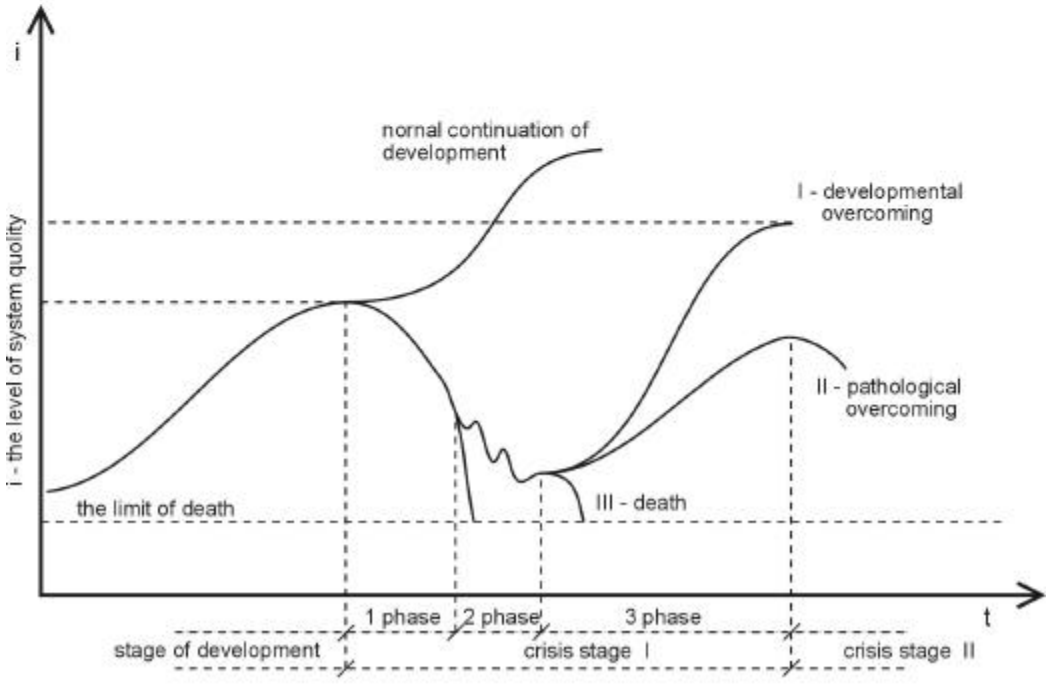


Fig.4 Phases of the crisis and forms of its overcoming

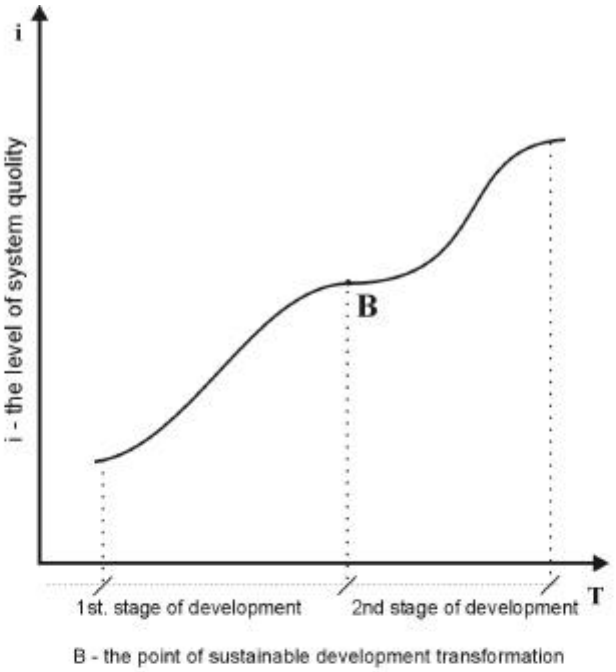


Fig.5 Sustainable development

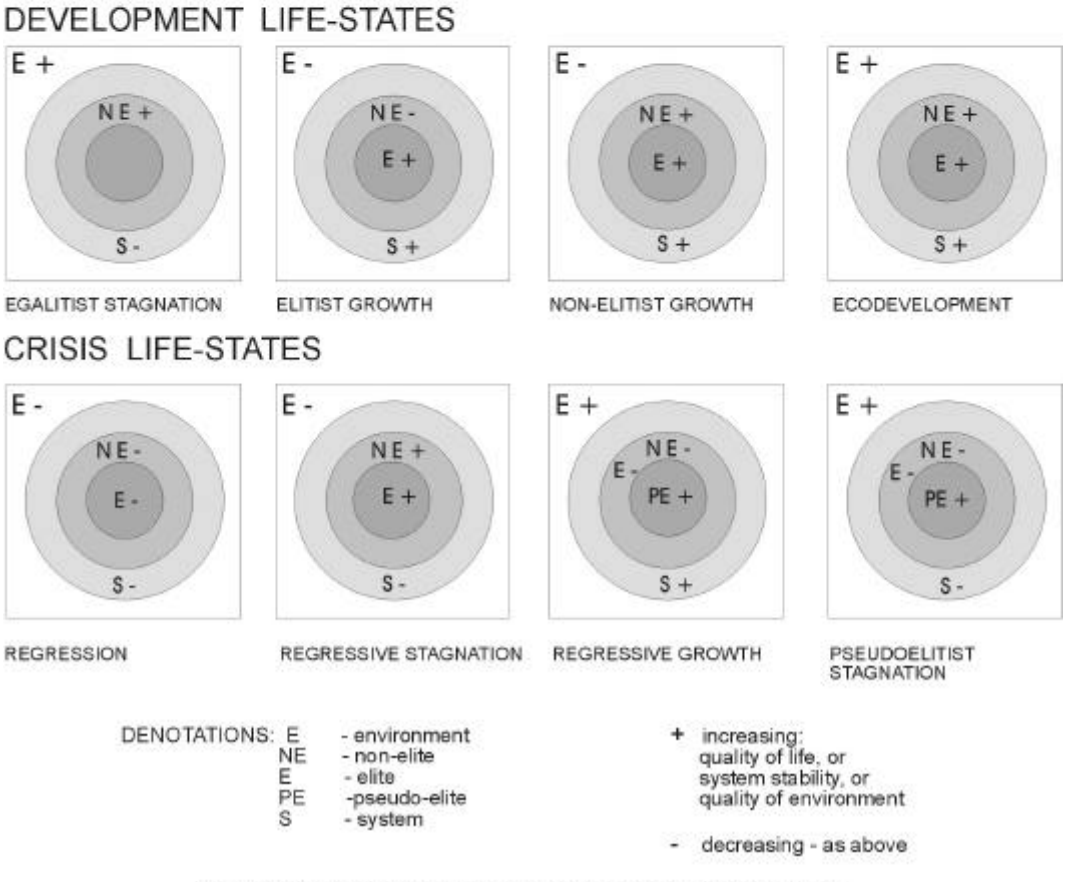


Fig.6 The eight quality life states of a life-system

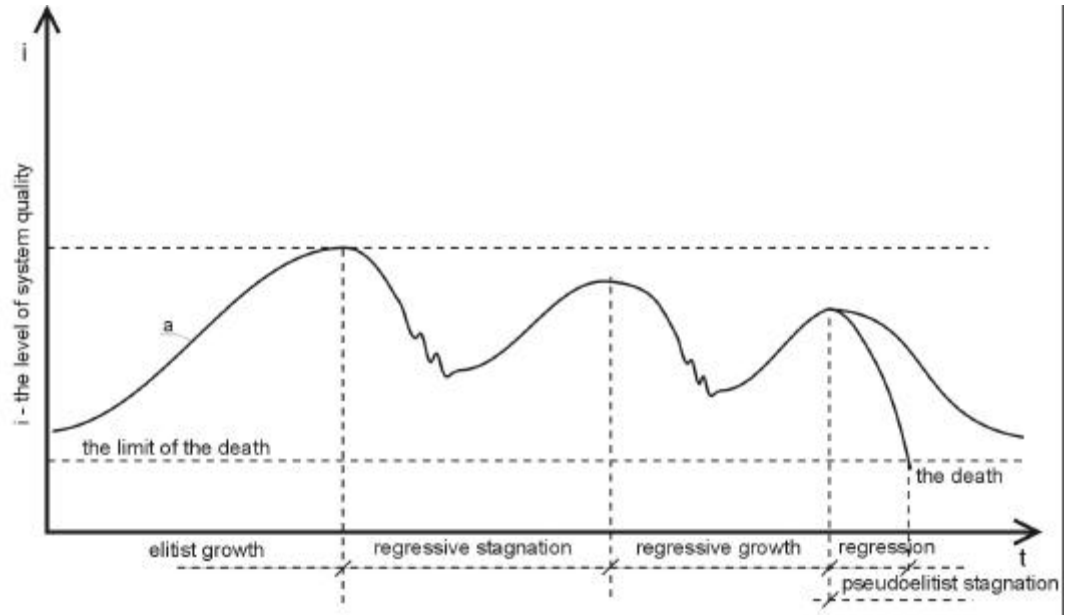


Fig. 7 The crisis after the elitist growth state

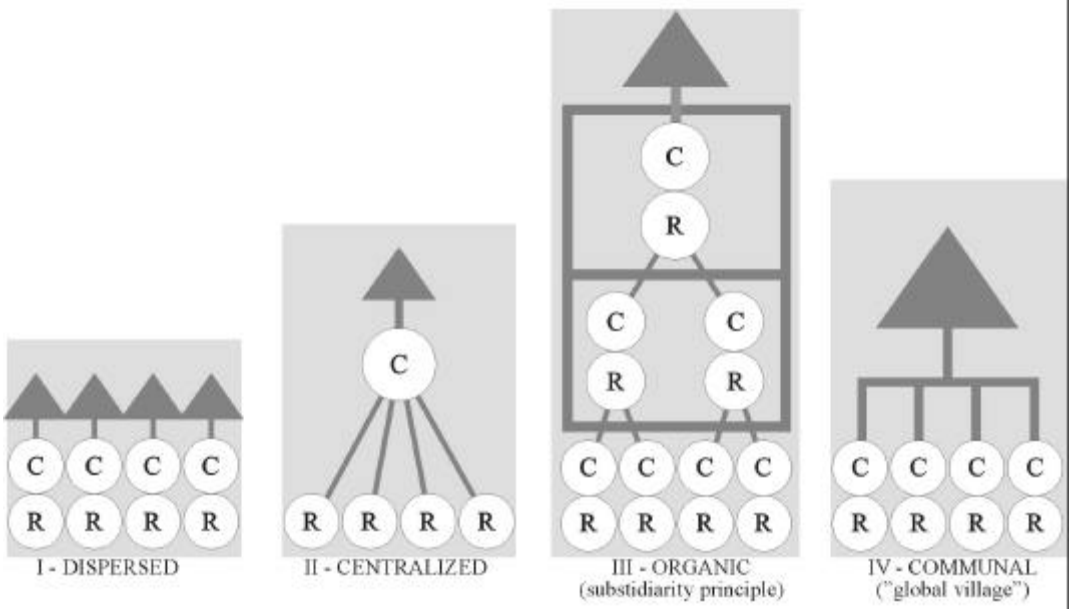


Fig. 8 Stages of development of a control-subsystem

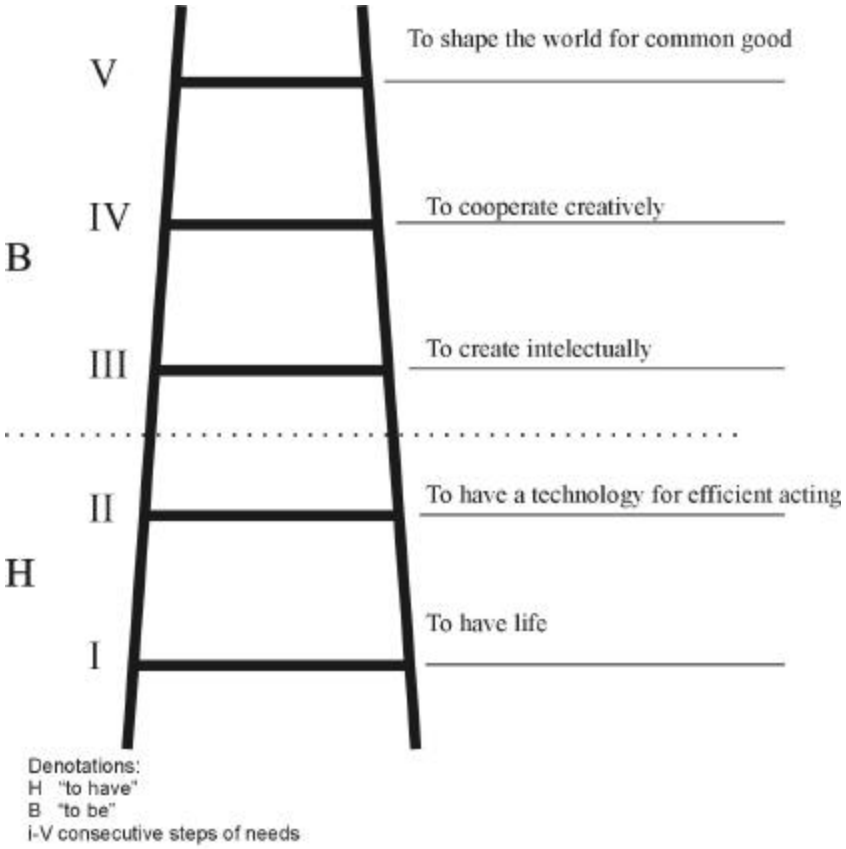


Fig. 9 The ladder of human needs

Appendix

Appeal
for Ecohumanism
and the Creation of Information Basis for Sustainable Development

To all people of good will!

We speak to you because we are concerned about the fate of the Human Race and of the Earth.

The World is in crisis.

We are exploiting our natural resources of minerals and fuels faster than we are gaining access to alternative sources. We are polluting the natural environment and soil faster than the environment can regenerate itself to reach the level suitable for human needs. Depreciation (devaluation) - moral degradation of the existing forms of living - is procceding faster than new forms, consistent with new living conditions for humans and for nature, are being introduced. This situation is complicated also due to demographic expansion, especially in those parts of the human family that are lagging in their development.

This crisis results mainly in the lack of adjustment of the two dominating systems - the system of values and the economic system - to the contemporary state of changes in the living conditions of humans and nature. These changes are proceeding very fast with the development of science and technology.

At the same time, there is no absolute deficit of material resources (minerals, fuels, ecological resources). However there is a lack of knowledge, technology, active intellectual potential and human conscience, and time - the factors that are necessary for limiting the futile utilization of scarce resources, as well as for developing alternative sources, whilst the resources which are currently under exploitation are being drained.

This crisis not only constitutes a serious hazard for everybody; it also constitutes an opportunity. This opportunity will occur if we carry out a radical reconstruction of the mentality and social relations, which could create the possibility for sustainable development. Currently two methods of overcoming the global crisis seem to be possible.

The first, traditional method is based on decreasing the number of consumers of the resources that are in deficit. This method represents a pathology of social Darwinism - eco-fascism that leads to ecological holocaust of the weak, and subsequently - to the extinction of all humans.

The second method is based on the popularization of intellectual creative activity aimed at the common good and supported by science and high technology. This would be an ecohumanistic method.

Ecohumanism is a partnership-based co-operation for the common good of all people (rich and poor, from countries highly developed and behind in development), their descendants, and natural environment - commonly supported by science and high technology.

The first, traditional method may seem effective only at first glance. Social Darwinism does not allow the elimination of the crisis-provoking results of the moral degradation of the life forms that are not adapted to the new, quickly changing conditions.

The higher the level of development and the application of scientific and technological achievements, the faster is the pace of changes in living conditions for people and nature. This implies a very large acceleration of moral degradation pace for diverse, previously well-

functioning forms of life. Moral degradation is as dangerous as the overexploitation of natural resources. This type of degradation, which is almost invisible, only to an insignificant extent depends on the number of people. It is caused mainly by the development of science and technology. This development cannot be stopped.

In order to eliminate the third factor of global crisis - the moral degradation of life forms, which in fact constitutes the basic factor - it is necessary to undertake stability-oriented solutions, which are radically different from traditional solutions.

These are:

I - increasing far-sightedness and the flexibility of the methods of human activities,
II - supplementing calculations of the costs and benefits of social and economic activity with comprehensively assessed social and natural components.
III - implementation of a system of stimulating ecohumanistic and intellectually creative activity and its popularization.
IV - increasing the intellectual potential of the human race (i.e. through popularization of the at least medium-level, comprehensive education of the youth, what would ensure intellectual independence, responsibility and the ability to participate in the development of science and technology).

This requires the further development of system dynamics - computer simulation methods for large-scale environmental and social (ecosocial) systems, flexible automation of production, and development of information technology (teleinformatization). It is impossible to prepare the appropriate economic statement without forecasting and a measurable assessment of comprehensive, broad in time and space, results of human activities and of the other changes in living conditions of people and nature.

The information problem is a key issue in overcoming the global crisis and in the creation of possibilities for sustainable development of the whole global society.

Both, contemporary and forecasted development of science and technology, especially of information technology, makes the possibility of a significant increase of the level of cognizability of human activity results more real. However, we are not able to predict fully all life hazards. Therefore, there is a necessity of the parallel development of flexible automation of production, advanced construction of diverse expert information systems, data bases, and collection of other intellectual, scientific, and technological reserves that are indispensable for the quick elimination of the hazards, which were impossible to predict in advance.
The second key problem is harnessing people's wealth to make it serve creative, innovative input to the common good. This is a potential for releasing enormous intellectual creative activity, which is so indispensable for eliminating the deficits in material and spiritual life resources.

It is impossible to solve both of these key problems related to global crisis at the local level. Joint public activities are necessary, with support from the world intellectual elite and powerful authorities.

Undoubtedly, for the development of the capability of forecasting and for a measurable assessment of the results of human activities, and for appropriate stimulation of ecohumanistic and innovative, creative activity it would be helpful - and this is what we are proposing - to create a World Center for a Strategy of Sustainable Development, under the auspices of the United Nations. This would be a professional center, for large-scale scientific, technological and organizational operations (Apollo-type), based on a subsidiarity principle. The main goal of this Center would be to create information foundation of ecohumanism and sustainable development for the world society.

Its official establishment might take place in 2002, during the Special Session of the General UN Assembly - "Rio+10".

The first task for the Center should be improvement and popularization of the methods for forecasting of the changes in conditions on Earth and in local societies, as well as in the natural environment.

It is necessary to create urgently, as a priority, the information basis of ecohumanism and sustainable development in order to prevent the development of eco-fascism and ecological holocaust of weaker parts of the human family that might lead to the ecological extinction of the whole human race. Without creating the information foundation of activities for our common good, such effort will not be effective!

The Sustainable Development Creators' Club
The Polish Federation for Life

Back to the Top