World
- Grid Type, Continuously Under-development -
System Dynamics
Why do we need it?[1]

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Abstract

The main goal of the United Nation**s** is realization of sustainable development world society vision. Such society would need to integrate social development with economic development and environmental protection. For this end it is necessary to enable sustained economic growth, internalizing externalities and DECOUPLING the range of economic growth from the range of deficit natural resources depletion growth and degradation of environment. It is necessary also to COUPLE economic growth with popular life-quality growth.

To achieve sustainable development OF THE WORLD SOCIETY we have to build, a commonly accessible WORLDWIDE SUSTAINABLE DEVELOPMENT INFORMATION (SYSTEM DYNAMICS) SYSTEM for:
- dynamic monitoring,
- long range forecasting, and
- measurable evaluation,
of policy, economy, work, and other changes effects in life-conditions of human beings and nature in general.

I propose a research program aimed at describing conditions of creation such big, grid, multi stage built, information system.

Key words: sustainable development, limits to growth, feedforward, social-Darwinism, intellectual evolution, general conceptual model, complex system, internalizing externalities, decoupling, coupling, eco-economy, eco-social justice, fair globalization, Inclusive Globalization, WSIS follow-up.

Contents:

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[1] This paper is continuation of my papers on:
- 20th SDS Conference in Palermo (2002): *World Integrated Warning Forecasting System Based on System Dynamics Principles as a Basic Factor in Sustainable Development* - http://www.psl.org.pl/kte/740Michnowski.pdf , and
- 22nd SDS Conference in Oxford (2004): HOW TO AVOID GLOBAL CATASTROPHE? The Information Basis for Sustainable Development Policy and Economy - http://www.psl.org.pl/kte/howtoavoid.pdf ..

*Another mental 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*** (underlined - LM)***.** At least not in time. That model is self-fulfilling. If the world's people choose to believe it, they will be proven right. The result will be collapse.*

Meadows et. al., ***Limits to Growth, the 30 -Years Update.***

1. Introduction

For at least thirty years warnings that world society is facing global collapse have been voiced regularly. To avoid global catastrophe sustainability transformation is proposed (Meadows and alt, 1972, 1993, 2004, King 1992, Schaff, 1993).

Elements of such transformation are included into United Nations (UN) goals set. The main UN goal - that really subsumes all social oriented UN goals - is the "three pillars" sustainable development of the world society vision. Realization of this vision needs to integrate three, seemingly contradictory, socio-economic activities, for:

- social development;

- economic development and

– environmental protection.

This worldwide (above mentioned activities) integration is dependent on achieving appropriate science–technology. education and ethic development. For sustainable development, very information effective socio-economic infrastructure we need to build. It will allow to substitute intellectual evolution mechanisms for social-Darwinistic one.

For this end we need to employ System Dynamics largely and develop it In new – worldwide, net and grid - form. It allow to include additionally, quite new, feedforward control subsystem into world socio-economic relations,. Nowadays, for life with highly developed science-technology, it is essential.

In 2005 has finished World Summit on the Information Society (WSIS, Geneva 2003, Tunis 2005). It last practically seven years.

WSIS Geneva phase has judge sustainable development as important task for information communication technology (ICT) development. But in WSIS Tunis End Outcome, conclusions -

attached to such ICT development - were not enough. It gives large field for WSIS follow-up activity that is essential to develop ICT methods that will support achieving UN "three pillars" sustainable development goal.

Adequate to sustainable development information needs, large ICT development ought to be strongly politically supported (Annan 2005).

To describe ways of ICT development it might be convenient to analyze the essence of global crisis and world society sustainable development with help of conceptual systemic approach. It ought to get large sustainable development information basis building idea political support.

In this paper I present some new arguments for necessity of sustainable development vision realization. I propose some activities that ought to help in it too[2].

The main cause of global crisis (and overshoot) is lack of world society ability to eliminate obsolete (moral) destruction effects[3].

My new main conceptual argument[4] (on sustainable development vision viable) is logic of the world society limits to growth developmental crossing/transcending. Such crossing ought to be based on proper form information infrastructure development, adequate changes to the dominating value system, and – together with it – economics.

Together with it new international social relations ought to be formed. Currently egoaltruistic, in the future symbiotic, ones.

Together with limits to growth transcending, possibilities for decoupling economic growth from the deficit natural resources depletion growth and degradation of environment, will be created. It allows also to couple economic growth with social development and popular life-quality growth.

Such decoupling and coupling ought to be based on sustainable development-economy (eco-economy).

Sustainable development-economy is an economy that is based on accounting of complex – including long range - costs and benefits of socio-economic activity, that include social and nature long-term consequences of this activity, and stimulate popular for common good – common interest activity. Such complex economic knowledge and common interest axiology would allow to internalize externalities and divide effects of human work on the base of its ecosocial usefulness.

For this ends, large-scale international science-technology operation for WORLDWIDE SUSTAINABLE DEVELOPMENT INFORMATION SYSTEM (on System Dynamics based) building, I propose.

In this paper I try to prove also, to avoid global catastrophe we need to accept the slogan: **wisdom based growth and sustainable development of the world society is not oxymoron**. We need to cooperate – especially in information field, in an eco-humanistic way (Michnowski, 2002) - to create such a durable form of humankind life (Chardin, 1984).

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[2] Other arguments, inter alia see (Michnowski, 2002, 2004).
[3] Moral degradation (outdatedness, obsolescence) it is such kind of loss of life support properties by any form of life (technology, value system, economics, infrastructure and so on) when this loss is the result of changes in environment. This kind of degradation is not coupled with physical destroying of this form of life.
[4] Other arguments, see my previous SDS conferences papers.

2. SUSTAINABLE DEVELOPMENT - the main United Nations goal

The sustainable development of world society vision (United Nations, 2002a, p. 5) is the UN answer to U-Thant's (1969) call for transformation of civilization (Meadows, 1972) in ways that will assure humankind survival.

Above U-Thant warning evaluation of nowadays (currently) pathological, very dangerous world situation was confirmed by the "Limits to Growth" for Club of Rome Report (Meadows, 1972). This Report really stated that world society is in global crisis. This Meadows's Report has supported U-Thant call for radical change of world social relations, as precondition to avoid global catastrophe.

The notion "sustainable development" was introduced into world politics by Gro H. Brundtland Report "Our Common Future": *Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs* (Brundtland, 1986)*.*

The World Summit on Sustainable Development (WSSD, Johannesburg 02') described sustainability transformation. This transformation, ought allow to combine, in long-term way, three - until now mutually contradictory – types of human activity:

- social development;
- economic development, and
- environmental protection[5] (Kozlowski, 2000, p. 113, United Nations, 2002a,
  p. 5).

Such integration – combining these different processes into one socio-economic-environment development – would be impossible without proper science-technology – especially information communication technology (ICT) – development.

WSSD – together with confirmation of Agenda 21 resolutions - has addressed
to World Summit on the Information Society (WSIS, Geneva 2003, Tunis 2005) such task: *harnessing the potential of information and communication technologies for development (*United Nations, 2002b, p. 45.sexties)*.*

The important task of WSIS was to outline sustainable development
supporting methods of ICT development:

WSIS has generated several important resolutions for sustainable development.

According to the WSIS Geneva Outcome (United Nations 2005b):

1. *We declare (…) to build a people-centered, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their*

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[5] *5. Accordingly, we assume a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development – economic development, social development and environmental protection – at local, national, regional and global levels.* (United Nations, 2002a, p. 5)

sustainable development and improving their quality of life (…) respecting fully and upholding the Universal Declaration of Human Rights.

2. *We (…) reiterate our commitment to the achievement of sustainable development and agreed development goals, as contained in the Johannesburg Declaration and Plan of Implementation and (…) other outcomes of relevant United Nations Summits.*

3. *ICTs should (…) contribute to sustainable production and consumption patterns (…). Applications should (…) support sustainable development.*

4. *Establish monitoring systems, using ICTs, to forecast and monitor the impact of natural and man-made disasters.*

According to the WSIS Tunis Outcome (United Nations 2005b)**:**

We recognize the intrinsic relationship between disaster reduction, sustainable development and the eradication of poverty and that disasters seriously undermine investment in a very short time and remain a major impediment to sustainable development and poverty eradication. We are clear as to the important enabling role of ICTs at the national, regional and international levels, including:

a) Promoting technical cooperation and enhancing the capacity of countries, particularly developing countries, in utilizing ICT tools for disaster early-warning management and emergency communications, including dissemination of understandable warnings to those at risk.

b) Promoting regional and international cooperation for easy access to and sharing of information for disaster management, and exploring modalities for the easier participation of developing countries.

c) Working expeditiously towards the establishment of standards-based monitoring and worldwide early-warning systems linked to national and regional networks and facilitating emergency disaster response all over the world, particularly in high-risk regions.

If we compare the WSIS Geneva tasks for ICT aided sustainable development and WSIS Tunis Phase, above mentioned, only national and regional early warning systems building, we see a big gap. Only by building of *monitoring and worldwide early warning systems* it is impossible to long-sightedly realize "three pillars" sustainable development of the world society vision.

Awareness of WSIS Outcome sustainable development shortage has been expressed by Kofi Annan:

This Summit (WSIS - LM) must be a summit of solutions. It must push forward the outcome of the World Summit held two months ago at the United Nations in New York. It must lead to information and communications technologies being used in new ways, which will bring new benefits to all social classes. (…) an "information society"? We mean one in which human capacity is expanded, built up, nourished and liberated, by giving people access to the tools and technologies they need (…) The hurdle here is more political than financial (Annan 2005).

To describe WSIS follow-up on ICT aiding of UN goals realization directed, it is worth remembering that, aside from the sustainable development vision, the most important UN goals:

1. - changing short-sighted economic growth into sustained economic growth (United Nations, 2005a);

2. - changing Pernicious Globalization into Inclusive Globalization - *fair globalization*, *that allow full and productive employment and decent work for all* (CIA, 2000, 2004, United Nations, 2005a);

3. - eliminating the "digital divide" (United Nations 2005b);

4. - achieving other Millennium Development Goals (United Nations, 2005a);

5. - establish an early warning capability (…) a worldwide early warning system for all natural hazards with regional nodes (United Nations, 2005a).

Universal Declaration of Human Rights is also by UN firmly supported (United Nations, 2005a).

All above mentioned UN goals conditions realization of world society sustainable development vision. To achieve sustainable development of the world society means durable overcoming the global crisis.

Therefore I propose to treat sustainable development vision realization as UN over-arching goal, that combines several goals, especially those listed above as UN goals.

To achieve sustainable development (including above goals) we need proper ICT development

The means for achieving such development it ought to be also new, sustainable development economic system. This system should be based on complex knowledge about - possible all (including future) - consequences of socio-economic activity. This new economic system ought to stimulate creative activity by means of dividing (sharing) social work process effects on the base of ecosocial usefulness of individual or organization work.

A new type, sustainable development based, economy (sustainable development-economy) ought to allow to:

- INTERNALIZE EXTERNALITIES (not only natural, but also human one - OECD, 2005, Club of Rome, 2002);

- DECOUPLE (the range of economic growth from the range of deficit natural resources depletion growth and degradation of environment) (OECD, 2005);

- COUPLE (the economic growth with social development, including popular quality of life growth – Brundtland, 1987);

- base policy and economy on common interest principle (Brundtland, 1986),.

Realizing a sustainable development vision requires appropriate ICT development. This has been emphasized by Yoshio Utsumi (Secretary General of International Communication Union – the main organizer of WSIS):

We have shared the vision of an Information Society (…) where information and communication technology is a vital tool to promote sustainable development and to improve the quality of life. (…) we must develop the concept of a new principle for the information society.

(…) In the old world of finite natural resources—like oil, coal or iron ore—one country's exploitation of those resources meant there were less available for other countries. But in the new world of infinite information resources, one country's creation of wealth based on information can be shared by all. The value of information increases, the more it is shared. (…)

(…) In the Information Society, we become richer by sharing what we have, not by hoarding it. (…) The new pact will not obey the normal rules of negotiation of give and take. It will be based on mutual self-interest.(…) we must work together to create a more just and equitable Information Society (Utsumi, 2005)*.*

To achieve Information Society based on sustainable development - Sustainable Development Information Society - we have to build information basis for sustainable development policy and sustainable development economy.

The new D. & D. Meadowss's Report *The Limits to Growth, 30 Years Update* shows on necessity to build appropriately Information Society: *"(…) information is the key to (sustainability - LM) transformation. (…) It means relevant, compelling, select, powerful, timely, accurate information flowing in new ways to new recipients, carrying new concept, suggesting new rules and goals (rules and goals that are themselves information). (…) When its information flows are changed, any system will behave differently"* (Meadows, 2004[6])*.*

To avoid global catastrophe and reach humankind sustainability, the appropriate world information infrastructure change is essential. It should allow to shorten period of sustainability transformation realization and to avoid dangerous consequences of second Meadowss's "non compassionate" mental model prediction (on the beginning of this paper cited).

Nowadays, the main information problem – in the view of the Meadowss's Reports - since is the need to take under control the range of world society (and its economy) growth. This will allow us to avoid global catastrophe caused by "overshoot" (or overdevelopment). In other words, the problem is: how to eliminate - with help of ICT – the global crisis, that would be effect of pathological limits to growth crossing? Therefore we need to build world society control system that allow to take under wise control world society growth.

WSIS outcomes are not enough to build such world society sustainable development control system.

3. False political philosophy - probable cause of sustainable development as oxymoron treating

Seven years of WSIS have yielded little in the way of ICT design for sustainable development. In other words, humankind survival policy is built on a false political philosophy, which will not prevent global crises.

The philosophy in question is based on the Universal thermal death inevitability principle as philosophical interpretation of the Second Law of Thermodynamics. Few people on our planet means increased chances for humankind survival. Steady state in set: humankind–nature, is another conclusion from such philosophy. For sustainability we need therefore to reach growth limits and then curtail further growth of humankind and associated economic activity.

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[6] Compare (Utsumi, 2005).

If we want to enlarge individual access to deficit resources, then we need to reduce the number of consumers (Martin, 1999). If the human population is currently too large, then we need to prioritize reducing population numbers on the basis of the "predator–victim" behavior principle. This philosophy leads to growth of different kind destructive tendencies – wars for access to deficit resources, "clash of civilizations", defense terrorism (Lizardo, 2006), and so on.

This philosophy leads also to false information consciousness. It assumes that super-computers, low-costly working cyborgs and other artificial intelligence forms will substitute wise human work[7].

This false political philosophy leads to treating UN "three pillars" sustainable development vision as an oxymoron.

In this paper I do not analyze in detail such philosophical basis, that - in my opinion - wrongly describes the essence, as well as the means for overcoming the global crisis.

I will present below results of my search for an appropriate, for sustainability transformation, alternative philosophical bases. I use for this aim conceptual model of reality: *System of Life* (Michnowski, 1995, 2002, 2004).

4. Sustainable Development and the global crisis in *THE SYSTEM OF LIFE* view.

4.1. Fragments of *the System of Life* conceptual model

The large part of *the System of Life* conceptual model description, as well as justification of necessity to introduce it into politics has been explained in papers presented in Palermo and Oxford SDS conferences papers (Michnowski 2002, 2004). For the purposes of this paper, I refer only the highlights of this model in relation to the task at hand: how to shape an Information Society adequate to the UN task: "three pillars" sustainable development world society vision realization.

The *System of Life* conceptual model is a complex system model. It reflects general static and dynamic properties of different types life-systems. It reflects - for example - societies, other organizations, or/and systems: man (human)–technology–environment (SMTEnv), as well as its elements. Environment Is the life-system too.

The life-system is firmly connected with environment. Life of the life-system depends on life, high quality and adequate form of environment**.**

$$ls = < E, Ri, Re, \Theta, i, t >$$

where:

ls – life-system.

E – ls elements,

Ri – internal relations

Re – external relations,

Θ – ls life expectancy,

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[7] In the light of *System of Life* model, it is impossible to create such big super-computer that surpass wise human aided by this supercomputer (or net of such super-computers). Computers, cyborgs have not intuition and conscience.

i – level of ls development

t - time

The life-system is built from energy (in lager sense – substantial and waves form[8]). Its structure consists of microstructure and macrostructure. Microstructure is a structure of the life-system elements. Macrostructure combines – by means of its feedbacks – the life-system elements in system wholeness.

The main axiom, that base this model is:

$$i = B(n,q)1/s$$

where:

i - the level of information (Wiener, 1971) – conceptual measure of level of development (and organization, as well as quality) of life-system;

s - the level of ecosocial entropy (Michnowski, 1995) as well as the level of development-reserves of life-system;

n - the number of its elements;

q - quality of elements of life-system, and

B(n,q) - some function connected with quantity and quality of system elements.

Ecosocial entropy (isomorphic similarity to thermodynamic entropy) is:

$$s = k \ln w,$$

where:

k – some constant, life-system kind conditioned;

w – number of different time-space configurations of set: life-system–environment, elements that allow to reach this same life-system quality state.

Life-span (longevity, life expectancy. durability) of life-system is finite but not determined. It is possible to increase its life-span by proper developmental policy. More life-system information level, bigger life system longevity is.
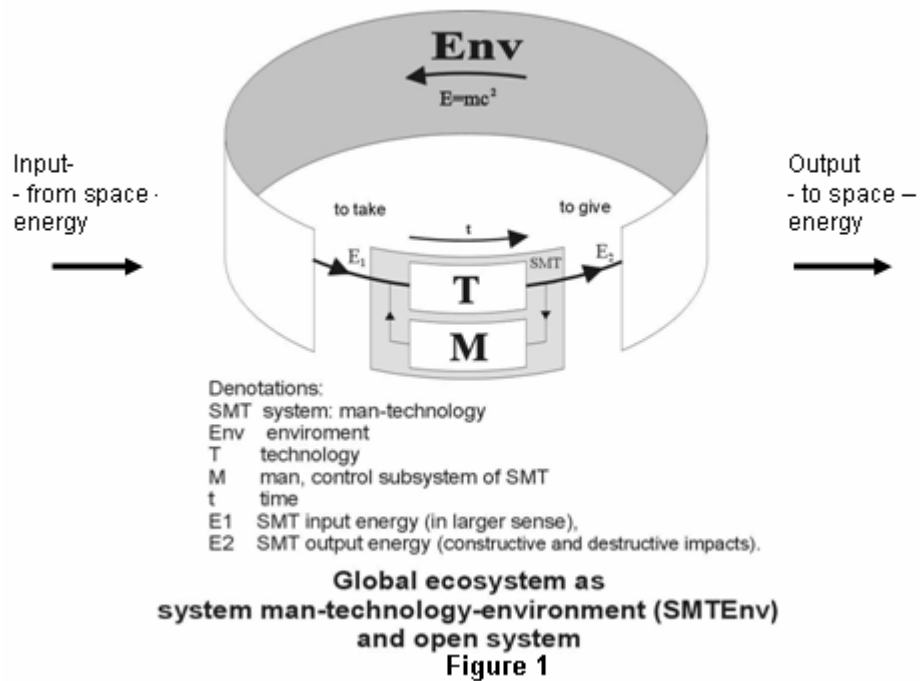
To maximize humankind longevity we have to enlarge humankind intellectual potential. For this end we need also wisely enlarge human population. And when we will cross the real carrying capacity of Earth – the human race ought to expand into Cosmos.

In the view of the *System of Life* conceptual model, the life-process is information creation and entropy growth opposing process.

Life of the life-system depends on the efficient creation of information in set: life-system–environment, and/or putting down the intensity of entropy process that inevitably coexist with all life-support activities.

The creation of information depends on such less-probable changes in time-space configurations of set: life–system–environment, elements that allow to put up life-system quality. Together with it longevity of the life-system grows up.

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[8] Compare (Sedlak,1985, Bogdanski, 1985)

Denotations:
SMT system: man-technology
Env   enviroment
T   technology
M   man, control subsystem of SMT
t   time
E1   SMT input energy (in larger sense),
E2   SMT output energy (constructive and destructive impacts).

**Global ecosystem as
system man-technology-environment (SMTEnv)
and open system
Figure 1**

The life-system – for example system: "man–technology" (SMT, figure 1[9]) - is a dynamic system and open system with homeostatic potential. It takes energy (in larger sense) from environment, transform it for support its life and development, and – after that, already internally useless - emit this energy into environment.

This to environment emitted energy, if is formed appropriately – adequately to environment life-needs – will support life of environment. The form of this energy depends on life-system structure and its value-system.

Life of the life-system depends on a coherence between life-system and environment. For life-system life, environment should have high its life-quality and appropriate form – adequate to life-system structure. When environment changes, life-system structure must be changed adequately also.

The life-system is also general system. (Bertalanffy, 1968). Its elements are mutually

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[9] Compare (Commoner, 1971).

$$\frac{dQ_1}{dt} = f_1 \ (Q_1, \ Q_2, \ ..., \ Q_n)$$

$$\frac{dQ_2}{dt} = f_2 \ (Q_1, \ Q_2, \ ..., \ Q_n)$$

$$\cdots \cdots \cdots \cdots \cdots \cdots$$

$$\frac{dQ_n}{dt} \quad \cdots$$

interdependent in accordance to:

The life-process is strongly non-linear, often exponential, chaotic and catastrophic – In any case, not fully predictable. It is irreversible too.

The life-process consists of both development and regression. Positive synergetic effects of integrating appropriately differentiated elements into new elements is the main agent of development

As a result of life-process there are also different life-system life-states: developmental, and regressive.

In developmental life-state life-system can be:

- internally constructive and externally destructive (immature life-systems. 1th stage of development), or

- internally and externally constructive (mature. 2nd stage of development).

In regressive life states life-system can be:

- internally destructive, externally constructive (1th stage of regression);

- internally and externally destructive (2nd stage).

(Constructiveness – „to give more than to take". Synergy Is main means of constructiveness).

A "young" life-system still under development is internally constructive, but externally destructive. It grows and develops "at the cost of the environment".

Mature life-system – i. e. highly (also ethically) developed - can be constructive both internally and externally, contributing to strengthening the life-giving capability of the environment (Kozlowski, 2000, p. 139). (This maturity is conditioned on access to adequate information and system's skill to use this information in way appropriate for mutual development.)

The life-system develops, when positive impacts on it, surpass negative ones (figure 2).

There are two kinds of negative impact effects on life–system:

- physical destruction, and
- obsolete (moral) destruction.

Sustainable development conditions
Creation over destruction sustained surplus

mc   ls

rc   ls-quality   phd

ic   md

enotations
- life system
c – multiplication construction
: – regenerative construction
- innovative construction
nd – physical destruction
d – moral destruction (outdatedness, obsolescence)

Development (ls quality growth)
$$mc + rc + ic > phd + md$$

Regression
$$mc + rc + ic < phd + md$$

Steady state
$$rc + ic = phd + md$$

Figure 2

Obsolete (moral) destruction (physically not destructed life-forms not adapted to new life-conditions) is a result of environment changes. Higher environment changes rate is, higher intensity of obsolete (moral) destruction is.
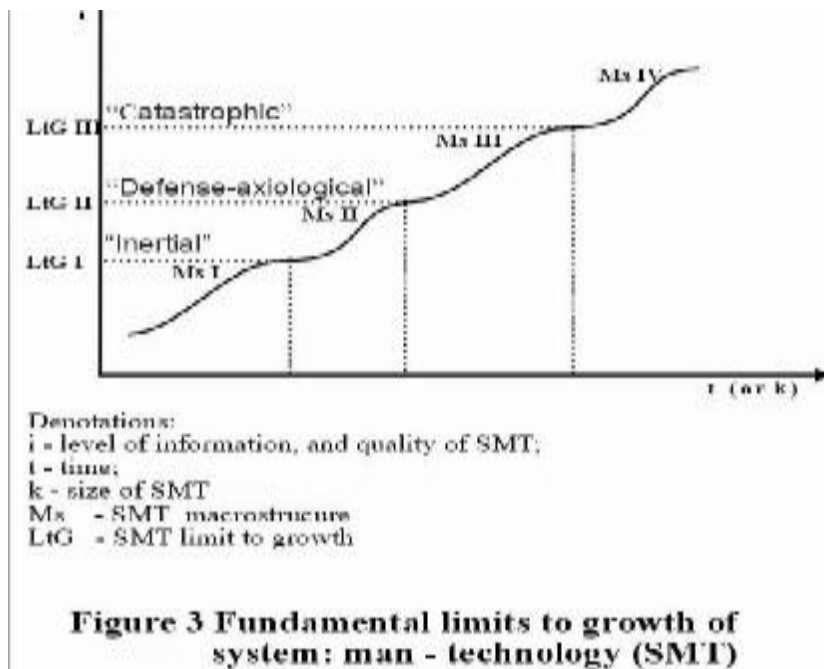
Positive impacts on the life-system can be the result of:

- multiplication of existing life-system elements number;
- regeneration of physically degraded life-system structures;
- innovation activity, modernizing life-system structure.

For short-term supporting life-system life we need at least elimination of negative for it effects of above physical and moral destruction. It includes proper adaptive activity that allow to continue life in the new life-conditions.

To support life-system life in long-term way we need additionally developmental activity that allow for developmental surplus creation. The main source of this developmental surplus is creative synergetic effect of integrating properly differentiated life-system elements into new wholeness.

Developmental surplus – that is an effect of internal life-system constructiveness – is used for:

Denotations:
i - level of information, and quality of SMT;
t - time;
k - size of SMT
Mx - SMT macrostructure
LtG - SMT limit to growth

**Figure 3 Fundamental limits to growth of
system: man - technology (SMT)**

- changing forms of life into forms, which are more effective, less destructive;
- changing environment into form for life-system more friendly;
- accumulating life-reserves for dealing with the "unknown".

From above (*System of Life*) point of view, realization of "steady state" conception would cause lack of possibility to life-system survival in permanently, rapidly and in indeterminist way changed environment.

The life-process, as well as development process, is going through its phases and stages.

In the first phase of life-system development the number of its elements grows.

In the second phase – life-system elements becomes different and achieves maturity;

In the third phase – different and matured elements are integrated into new elements;

In the fourth phase – life-system macrostructure is developmentally changed[10].

As a result of phases first, second and third, the life-system inertia grows and the rate of environment changes grows also. Together with it, life-system reaches the limit to growth and a new macrostructure form is need if development is to continue (Ignatyev).

After the fourth phase of development, the life-system – if it developmentally cross/transcend the limit to its growth – enters new stage of development. An appropriately shaped new form of macrostructure will stimulate further life-system development.

If the life-system, after reaching of above mentioned limit to growth, does not change its macrostructure or changes it inappropriately, then the life-system crosses this limit to growth in a pathological or self-destructive way. This is the so-called development "overshoot" which leads to crisis and eventually to death.

There are three types of qualitatively different fundamental limits to growth which must be consecutively faced by initially "young" life-system (figure 3).

The first limit to growth is "inertial". This inertial limit to growth arises, when the volume of

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[10] Other life-system development phases, see (Michnowski, 2002).

life-system inertia and rate of environment changes are so high, that life-system adaptation to changed environment, when based only on the feedback principle[11], will not be sufficient to assure life-support.

When life-system observes these changes and try to adapt itself to new form of environment – the environment takes a new form. To overcome this limit to growth life-system must implement feedforward (control subsystem). It means the necessity to predict changes in environment and to start adaptation to new life-conditions on such prediction bases. Feedforward allows to finish this adaptation when new environment form arises. It means also to get skill to act very flexible. Enlargement of flexibility is additional essential condition for life of large, big inertia life-system in rapidly changing environment. For feedforward implementation new value system is essential too. It is necessary to include into intellectual – cognitive and innovative – activity a passive until now elements of the life-system.

The second limit to growth is "defense-axiological".

This defense-axiological limit to growth arises when "young" life-system – that was until now normally egoistically motivated (and externally destructive) - reach a powerful ability to get life-resources from environment and destruct environment. This environment destruction would be the result of its unreasonable external impacts. To stay in this egoistic – at the cost of environment - form of life it would be dangerous for both environment and life-system.

To transcend this limit to growth it is especially necessary to change egoistic value system into egoaltruistic one.

An egoaltruistic value system is based on the awareness about interdependence between life of life-system and life of environment, that ought to be high quality and appropriate form. Transcending this limit to growth means that life-system reach its maturity (also ethical one), create its external constructiveness and continue its development in qualitatively new way: "together with environment"[12].

This new, egoaltruistic value system allows to get access to dates and knowledge necessary to human activity effects valuation. It enables change from egoistic economy into egoaltruistic economy, namely sustainable development-economy.

To developmentally cross this limit to growth, the life-system has to change not only its value-system into egoaltruistic one, but also to attain a capability for environment life-process defense control.

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[11] In this case feedback control principle depends on adaptation based on observing in praxis changes in life-conditions (access to resources, state of environment, and so on) and after that adopting forms of life to the new life-conditions.

[12] To carry out sustainability transformation (and eliminate overshoot negative consequences) *visioning, networking, truth-telling, learning, and loving* is proposed: *Individualism and shortsightedness are the greatest problems of the current social system (…) and the deepest cause of unsustainability. Love and compassion institutionalized in collective solutions is the better alternative* (Meadows, 1993, 2004).
For *metanoja* as the survival civilization transformation important agent call Leszek Kolakowski (Kolakowski, 1995).

The high skill of matured, highly developed life-system to environment control is especially caused by "young" (therefore still egoistically motivated) life-systems that exist in environment. Therefore matured life system – continuing development on the principle "together with environment' ought to have defense potential that is necessary not to allow to be damaged by its still "young" (externally destructive) life-systems from environment. The second reason of such control is to reduce probability of future negative effects of other environment impacts on this life-system.

The third limit to growth is "catastrophic".

The change by mature life-system" its relations with environment into friendly one causes acceleration of environment development. An "young" until now environment life-systems reach also – with the help of developed life-system – its maturity. It causes big changes acceleration of both high developed life-system and the environment life-systems (i.e. set: life-system – environment). Together with such acceleration new, catastrophic limit to growth arises. In such rapidly changing situation numerous unpredicted catastrophes might occur. To transcend this catastrophic limit to growth it is necessary to build a capability for assuring effective mutual life-support, based on a symbiotic cooperation in the "life-system-environment" set. A big skill of life-reserves creation is also essential for life beyond this catastrophic limit to growth.

Such symbiotic cooperation is very difficult from information point of view. To adopt life-system life-forms to environment life-needs - when environment is changing very rapidly – life-system ought to have access to information about these also changing future environment life-needs.

During developmental crossing of all above three types fundamental limits to growth, life-system ought to enlarge its far-sightedness, flexibility and life-reserves creation potentials. Together with this transformation homeostatic properties (including informational efficiency and control system) have to be improved too. Also with this transcending - the volume of environment, that should be cared, has to be enlarged.

In "steady state" conception human population ought to reach some maximal volume and stop growing in number of human brains – basic factor of wisdom. In *System of Life* conception it is forbidden to unwisely grow in number of human beings. But this growth is essential for humankind life supporting. This growth ought to be based on world society limits to growth developmental crossing.

If world society unwisely crossed some from above mentioned limits to growth – "overshoot" them – to restore development we ought to upgrade lagged behind societies instead of putting them "beside the board".

As a result of above mentioned three fundamental limits to growth transcending, developed life-system will exist in environment that is not only developing but also externally constructive. In such situation, environment homeostatic activity will radically help to support development of originally developed life-system.

4.2. Essence of the global crisis

The global crisis is caused by the world society pathological crossing – especially by its highly developed part – at least two first fundamental limits to growth: "inertial" and "defense-axiological".

As a result of big science technology progress world society lives currently in qualitatively new life-situation: in the State of Change (Flux) and Risk. The rate of environmental changes is so high, that short-sighted economy and politics not allow for proper, anticipative, changing of life-forms to adopt them to new rapidly emerging life-conditions. Risk is connected with natural lack of full knowledge about human activity complex (including future) effects.

The main cause of global crisis lies in the lack of ability to obsolete (moral) destruction effects efficiently eliminate. We have not also skill (and political will) to decrease intensity of unwise physical destruction (wars, wrong patterns of consumption and production, unemployment, homelessness, and so on).

It is impossible to stop obsolete (moral) destruction intensity acceleration. To eliminate negative effects of moral degradation, science-technology (including organizational) progress is essential. But this progress contributes to further growth of the moral degradation rate. For this reason, to overcome global crisis, we need also a radical growth of intellectual creativeness as complement science technology progress. For support development in the State of Change and Risk – especially for obsolete (moral) destruction consequences eliminating - we need more and more human beings wisely and efficiently working for common good – common interest. It is precondition to cross consecutive limits to growth in developmental way. (For this reason we ought to treat structural unemployment as pathology caused by short-sightedness of political elite and inappropriate educational system.)

To overcome the global crisis we not only have to minimize physical destructiveness of our current forms of life (economic, technology, patterns of consumption and production), but also maximize appropriate innovative activity of world society.

In the State of Change and Risk social-Darwinism is obsolete. It is very costly form of life. Darwinistic selection – by death of unfitted - means big intensity of existing Earth elements socio- and bio-diversity destruction, This diversity is the main synergetic agent of development.

To overcome global crisis substitution of intellectual evolution mechanisms for social-Darwinistic ones is essential.

Instead of selection by the death of unfitted or damp useless commodity we need to do pre-selection with help of intellectual evolution mechanisms - in virtual reality by means of computer simulation methods. .

Introducing intellectual evolution mechanisms will allow to get access to new sources of life-resources before the existing ones are depleted. It will allow to avoid catastrophes predicted in the appropriate time.

4.3.   Sustainable development Information conditions

Sustainable development of already developed part of the world society is conditioned upon restoration of its socio-natural environment development. It will allow us to restore development of the global ecosystem – Earth. For this end, World Sustainable Development Information Society on intellectual evolution principle based, needs to be introduced.

Figure 4 Sustainable development
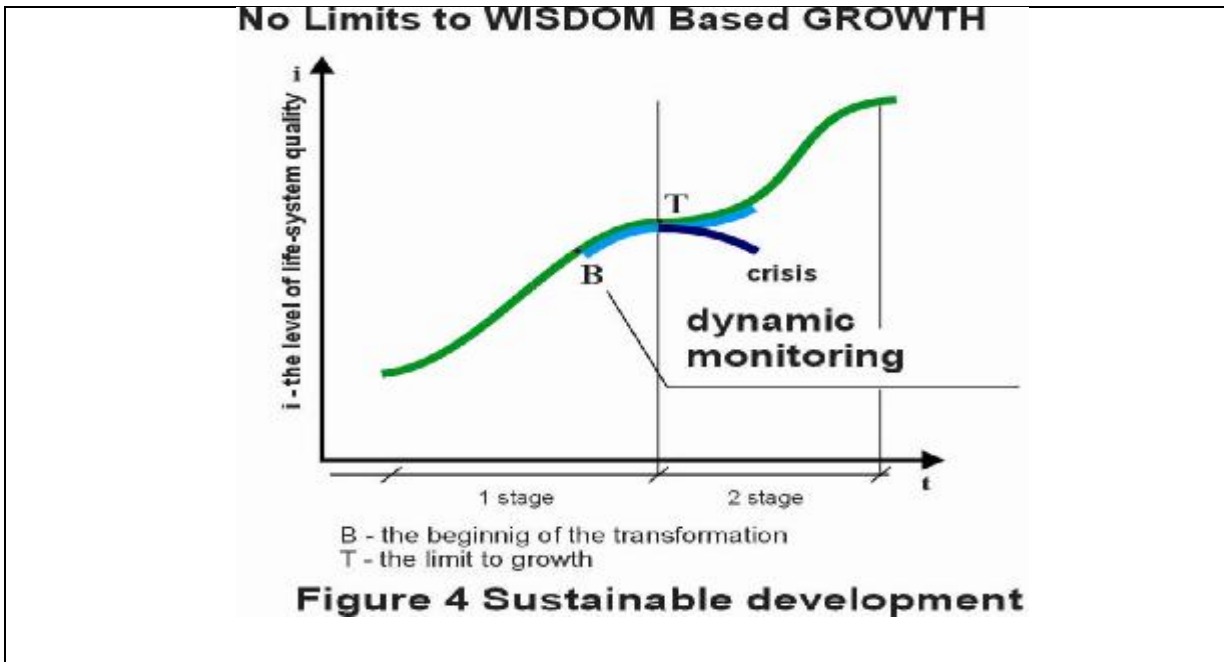
Sustainable development (figure 4) is such new kind of development that omit crises. It allows for life without necessity to restore development by building new socio-economic systems on the ruins of the old ones. For sustainable development to be realized, we need a capability for transcending limits to growth, especially by increasing wisdom creativity potential and accelerating science-technology development (not stopping it). This will allow us to avoid crisis generating "overshoots". In State of Change and Risk global crisis, not overcome, leads inevitably to global catastrophe.

To describe information infrastructure, that is essential to achieve sustainable development of world society we ought to know information basis of such Earth development.

The world information system adequate to sustainable development needs, ought to allow for assessment:

-   what quality of global ecosystem (system: humankind – nature: Earth) and particular parts of world society life-process currently exist?
-   is it development or crisis regression?
-   what is the rate of development or regression?
-   how will change (in the future) the environment, i.e. life-conditions of world society (and particular its parts)?
-   when will society reach its limit to growth (with actual form of macrostructure, i.e. socio-economic relations or other form of its infrastructure)?
-   how to support development without rebuilding existing macrostructure?
-   what kind of science-technology progress for supporting development is essential?
-   what new form of macrostructure is essential to adapt world society to new (including approaching) life-conditions?
-   what kind of science-technology progress is essential for recognizing these new life-conditions and to prepare a new form of society macrostructure?

- when to start rebuilding the existing macrostructure into new form?

To implement sustainable development we need a world information system that allows for:

- dynamic monitoring of global ecosystem – Earth, as well as particular parts of the world society life-processes, including warning forecasting that get information inter alia about approaching limit to growth, the time of meeting it, and consequences of pathological crossing this limit to growth;

- simulation of innovative activity for support development, including designing macrostructure, that is needed for crossing limits to growth in developmental way.

Dynamic monitoring of set: society–environment, life-process is such monitoring that collects dates, that reflect this process, and System Dynamics transforming them into information about its quality, dynamics, and future. It predicts future of monitored process under condition, that any intervention into it will be undertaken. Dynamic monitoring delivers warning forecasting, i.e. long-term early warning information about up to date socio-economy activity negative consequences.

It delivers information about:

- quality of monitored life-process (is it development or regression?), and

- rate of development or regression (is it accelerate or delay?).

Dynamic monitoring is a basic component of feedforward control subsystem.

To stimulate intellectual creative activity, an appropriate information system - that allow to create sustainable development-economy - is also essential.

To build and put into operation world sustainable development information system we need at least conceptual indicators, that would help to generate answer for above questions.

The life-state of any society can be described with the help of assessment of period up to the next limit to growth reaching. The increase of this period means that this society is in a developmental state.

An additional development measure is the change in complex lifespan of society members, This lifespan ought to be measured by means of biological lifespan as well as internally and externally creative lifespan assessment.

Another development measure would be the assessment of changes in the complex unit cost of using different kinds of techniques (CCT). (The main task of technology - and different techniques, that create it - is to aid human in supporting life and development of himself and environment.) The conceptual measure of these cost would be energy that is needed for work to restore set: life-system – environment, destructed as the result of using any technique.

CCT is the unit cost, which take into account all costs connected with production, exploitation, annihilation and rebuilding of socio-natural environment destroyed with using any kind of technique. (For example: the complex cost of one kilometer car driving). This cost includes the cost of getting access to new sources of resources depleted with using of given technique. Together with development these complex unit costs ought to be decreased. If such cost increases it means that this technique ought to be replaced by new one.

Creation of access to above information allows inter alia to direct money on R&D for building new technology that is essential to worldwide change machines and transportation means when sources of oil will be empty.

The next task of the world information system is to describe complex effects of individual and organizational socio-economic activity. This would allow us to stimulate intellectual for common interest creativeness by divide-relations based on ecosocial usefulness and justice principles.

It means that anybody, who is matured (and therefore "gives" for the set: society-environment, "more" then "takes" from it) ought to get, from common wealth, proportionally to its creativity for common good effects. That ones who are still "young" and naturally externally destructive, ought to get from this common wealth so much, that allow them to get maturity and then actively support development of set: society–environment.

Building a world information system, can help us realize the above mentioned functions. But this is impossible without enlargement System Dynamics implementation and further its development.

It is not possible to propose in this text particular forms of System Dynamics implementation and development dedicated to creation of large-scale world sustainable development information system. It is obvious also that such a large-scale information system must be build on a new international research program.

To realize above mentioned world information system functions we need more than just science-technology (including ICT). We need also social, including educational, conditions for enabling a new form of world society, which has an adaptive capability to deal with the State of Change and Risk.

To describe these additional conditions we ought to have awareness of how many information - that reflects rapidly (and chaotically) changing global ecosystem (Earth) as well as outer space - we need for proper dynamic monitor and forecast future of human and Earth life-process. For such prediction we theoretically need to introduce into world information system all necessary, for such prediction, knowledge that still exist and that one which simultaneously gained reflects rapidly changing Earth - i.e. new emerging human life-conditions.

Without awareness of necessity to transcend the "defense-axiology" limit to growth (and change egoism into egoaltruism) the access to full knowledge that is essential for such prediction, will be impossible. But for such change of social relation, that allow for common access to necessary knowledge, we need ecosocial usefulness and justice principles based divide-relations. This big socio-economic development challenge needs to be wisely solved to realize sustainable development vision. This is necessary for our survival.

4.4. Popular wisdom as important sustainable development factor

For realizing sustainable development by introducing into operation world sustainable development information system – the intellectual evolution base - we also need to promote popular wisdom.

From *the System of Life* point of view the wisdom is ability to:

- observe events in global ecosystem and space environment;

- get knowledge about processes combined with these events;

- predict future of these processes;

- assess these processes;

- amplify (support) life-support processes, or

- eliminate processes dangerous for life (of observer and environment).

Agents of wisdom are**:**

- intellect;

- knowledge;

- artificial intelligence (AI); and

- life-support act power. .

Elements of Intellect are:

- reason;

- memory;

- intuition;

- conscience, i. e. ability to life-support assessment, based on adequate value system.

Knowledge consists of:

- systemic-philosophy knowledge;
- science knowledge;
- empirical knowledge;
- intuition knowledge, but also
- knowledge about past,
- knowledge about future. and
- knowledge how to put Into operation life-support processes ("the first step" knowledge).

Life-support act power consists of:

- intellectual and material ability to life-support activity, and
- will to realize such activity.

For life in the State and Risk - i.e. transcending limits to growth - shaping popular wisdom is essential. This shaping ought to be connected with forming, adequate to rate of environmental changes, WISDOM CREATIVITY POTENTIAL.

This potential combine:

- WISDOM (including education and ethic) potential;

- Artificial Intelligence (including simulation methods, System Dynamics) potential;

- Flexibility potential.

Flexibility especially depends on::

- subsidiarity social infrastructure (responsible liberty), and

- flexible automation.

In the State of Change and Risk wisdom based socio-economy activity must be strongly supported by world sustainable development information system.

For popular wisdom shaping we ought to accept the main *System of Life* based conclusion: NO LIMITS TO WISDOM BASED GROWTH AND SUSTAINABLE DEVELOPMENT..

We ought also accept conclusion that Universe thermal death would be effect of errors in human development policy. By means of intellectual evolution mechanisms it is possible to try to reach P. Teilhard the Chardin's Omega Point. This refers to the possibility for humankind to expand into Cosmos and maximize – in this way - its longevity, with help of popular wisdom.

5. Intellectual Evolution mechanisms as sustainable development precondition

For sustainable development, substitution intellectual evolution for social-Darwinism is essential.

Realization of intellectual evolution idea is based on three basic factors creation:
- popular wisdom,
- commonly accessible computer simulation methods adequate to the State and Risk,
- free access to up-to date dates and other knowledge that is necessary to predict and asses effects of human activity and other environmental changes.

Problem of wisdom shaping is addressed to somebody who modernize educational system. This modernizing ought to be based on the knowledge about life-conditions in the State of Change and Risk, including knowledge about future of human labor in this qualitatively new state.

For System Dynamics specialists I refer problem of computer simulation methods development that we need for intellectual evolution mechanisms building.

For this end we need at least two different kinds its applications.

The first one depend on dynamic monitoring introducing. Dynamic monitoring help in getting answer – especially for politicians – what will be the results of previously undertaken political decisions (and other effects of socio-economic activity) – their own and in environment. As a result of such "past state effects" simulation, we would receive inter alia long term early warning communicates. By means of dynamic monitoring we would get also information inter alia about development (or regression) rate increasing or decreasing and limits to growth approaching. (If observed in such way socio-economic-nature life process is going properly, any intervention into it is generally useless.)

Monitored life-process (socio-economic-nature) is strongly non-linear, often chaotic and catastrophic. For this reason it is not enough to do long range early warning prediction from time to time only. Theoretically, it must be done continuously. In such a way the new knowledge (about monitored society statistic and dynamic properties) ought to be introduced into dynamic monitoring computer simulation system. This new knowledge ought be delivered rapidly, for to avoid its moral degradation. Information channels ought to be enough efficient to avoid losses or distortions. Computer simulation system ought to be checked and developed, if there are important differences

between predictions and reality of predicted process. This computer system ought to be also hardware modernized.

Results of dynamic monitoring ought to be efficiently delivered to all societies (and its poticy-makers).

The second kind of computer simulation methods is necessary for "future shaping". It ought to give politicians knowledge about complex consequences of different changes, that politicians want to introduce into set: society–environment. It allows to make an anticipatory and cost low selection of different projected actions in virtual reality.

This second – for "future shaping" - kind of computer simulation methods is necessary for optimizing and correcting policy. It is needed to project new science-technology progress, defense methods, as well as methods of approaching limits to growth transcending.

Equally difficult problems are facing up computer simulation specialists in connection with creating simulation methods that are necessary to create sustainable development–economy,

Computer simulation methods are also necessary inter alia for;

- combining social development with economic development and environmental protection;
- internalizing externalities;
- mastering sustained economic growth (it is such growth that allow to increase quality of life currently as well as for future human generations - World Bank, 2006);
- decoupling the range of economic growth from the range of deficit natural resources depletion growth and degradation of environment;
- coupling the economic growth with social development, including popular quality of life growth.

Introducing intellectual evolution mechanisms is essential for adopt world society to life in the State of Change and Risk,

How to build world information system that allow to substitute intellectual evolution mechanisms for social-Darwinism ones? It is big challenge not only for System Dynamics specialists.

6. **Worldwide Sustainable Development information System – big challenge for politicians and scientists**

To get answers on above formulated strategic, for sustainable development, questions and for building information basis that allow to implement the UN Goals, we need to start as soon as possible big international science-technology and social operation for creation of **commonly accessible**
WORLDWIDE SUSTAINABLE DEVELOPMENT INFORMATION SYSTEM
for:

- dynamic monitoring,
- long-range forecasting, and
- measurable evaluation (assessment),

of policy, economy, work, and other changes effects in life-conditions of human-beings and nature in general[13].

This Worldwide Information System (of systems) would be:

- net and GRID;

- continuously under development, and

- created with help of System Dynamics in multi stage way (Nadler, 1969, Michnowski 2003) [14].

For world society limits to growth transcending, centralized world information system can not be efficient. Delays with getting access to dates (including new knowledge, that reflect changed global ecosystem), transforming them into predictions and sending them to local societies, will make such system ineffective.

In the process of building above information system we will generate additional benefits:

1. – when we start to dynamic monitor, we will open "white map" of our ignorance. This will allow us to conduct research in more effective way – in order to get access to knowledge that is necessary for it.

2. – when we get warning forecasts, we can develop science and technology in such a way, that can enable us to eliminate predicted dangers or decrease its negative effects.

To initiate and coordinate proposed international program of sustainable development-policy and sustainable development-economy information basis building, it would be convenient to create The United Nations Information Center (POLISH COUNCIL … , 2003).

The main tasks of UN Information Center::

- stimulation and coordination of WORLDWIDE SUSTAINABLE DEVELOPMENT INFORMATION SYSTEM building;

- world dynamic monitoring and warning forecasting creating and disseminating.

This UN Information Center would be element of World Center for Sustainable Development Strategy, by UN Secretary General (Polska Inicjatywa …, 1997).

The main tasks of (subsidiarity principle based) World Center for Sustainable Development Strategy:

- predicted dangers overcome methods designing and disseminating,

- other sustainable development world tendency fostering methods designing and disseminating.

Without creating above UN World Center, converting currently Pernicious Globalization (CIA, 2000) into Inclusive Globalization - fair globalization (CIA, 2002, 2004, United Nations, 2005a) - as precondition of achieving world society sustainable development - will not be possible,.

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[13] *To help the world cope with the acceleration of change, it may be necessary to create an international S&T organization to arrange the world.s science and technology knowledge as well as forecasts of potential consequences in a better Internet-human interface.*(GLENN…, 2005).

[14] From many years we call from Poland to start international building information foundations of world society life in the State of Change and Risk (including proper development of flexible – computer- automation). It is precondition for developmental crossing limits to growth (Michnowski. 1985, 1994, 1995, 1999, 2002, 2004, 2006, *Ecodevelopment Message…,* 1993*,* Polska Inicjatywa…, 1997,. Memorial, 2003, Polish Council, 2003, Kleiber, 2003, Stanczyk 2005. Such proposal was submitted by Polish delegate to WSIS during PrepCom process.

7. The stages of Worldwide Sustainable Development Information System building

The Worldwide Sustainable Development Information System needs to be built in the following sequence:

I -.World Dynamic Monitoring and Warning Forecasting System (that include UN world early warning system[15]);

II - World Computer Simulation System - for designing and assessing technological, organizational and environmental changes.

III - Information Basis for sustainable development-economy.

To take the first steps towards building a World Dynamic Monitoring and Warning Forecasting System I propose to:

- arrange the Meadows's (System Dynamics) type world warning forecasting (and comprehensive monitoring of Earth) year by year (Meadows et at, 1972, 1993, 2004),

- Include into World Dynamic Monitoring and Warning Forecasting System building program Global Earth Observation System of Systems (GEOSS) and other early warning systems undertakings[16].

- transform national statistical offices into national offices for statistics, dynamic monitoring and warning forecasting (i.e. long range early warning),

- build an international system of mutual access to forecasting methods, data, knowledge, and forecasts that are necessary for global and local dynamic monitoring, warning forecasting and changes evaluating.

To realize of above proposal it would be timely to convince International Telecommunication Union and UN specialists that Meadows's-Forrester System Dynamics warning forecasting ought to be included into UN program of world early warning system building.

8. International sustainable development information research program – for life in the State of Change (Flux) and Risk

To respond Kofi Annan's call for WSIS follow-up, that would help implement UN Goals, we ought to initiate worldwide research program.

This research program ought to test inter alia the theses:

I – the main cause of global ecosystem degradation is rapidly accelerating obsolete (moral) degradation of existing forms of life - not aligned to the new rapidly emergence life-conditions;

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[15] There are two kinds of early warning systems: far-term early warning systems and short-term early warning systems. To avoid tsunami-like catastrophes we need short-term early warning systems. To avoid for example climate changes negative consequences we need far-term early warning system.
Meadows's early warning system is far-term one. Good far-term early warning system create prognoses that have to change policy that allow to avoid predicted negative consequences of current policy.

[16] It would be convenient also to Include Takeshi Utsumi Globally Collaborative Environmental Peace Gaming (GCEPG) project (with a globally distributed computer simulation system), into above program realization Utsumi, 2006).

II – wisdom based growth and sustainable development is possible and essential for avoiding global catastrophe and achieving sustainable development of world society.

III – without building information bases of sustainable development-policy and sustainable development-economy realization of the main United Nations goals is impossible.

IV – to adopt world society to life in the State of Change and Risk System Dynamics popularization and development is essential.

If these theses prove valid, then we ought to build an information system that is especially essential for recognizing and transcending world society limits to growth.

This research ought to give us answers also to the following questions:

1. How to provide policy-makers - and societies - access to knowledge about complex (and future) effects of current policy (their own and other policy-makers)?

2. How to combine existing forecasting systems and projects in Worldwide Sustainable Development Information System?

3. How to get access to data and knowledge that are necessary for dynamic monitoring, warning forecasting and elimination of negative moral degradation effects?

4. How to transform national and regional statistical offices (e.g. EUROSTAT) into offices for statistics. dynamic monitoring and warning forecasting?

5, How to build the information basis for sustainable development-economy?

6. How to make possible complex accounting of benefits and cost of socio-economic activity (including natural and social - human components)?

7. How to make possible dividing effects of work social process proportionally to ecosocial usefulness of individual and/or collective work?

To get answers to these questions I propose to organize with help of System Dynamics Society at least three conferences:

Conference I: *Information efficiency, dynamic monitoring and warning forecasting as sustainable development-policy preconditions.*

Conference II: *Long range forecasting as transcending limits to growth means.*

Conference III: *Sustained economic growth stimulation information bases.*

The main force for such research ought to be System Dynamics Society family. Without further development of System Dynamics, getting answers on above questions will be impossible. The consequence of this is that we will not be able to identify how to transcend limits to growth and so avoid global catastrophe.

Another challenge must be faced by specialists of automation and relates to the necessity of flexible (computer) automation development in ways that contribute to sustainable development.

It would be desirable also to organize an additional conference on:

"Flexible automation as important agent of sustainable development".

The main questions for this conference are as follows:

1. How to deal (by flexible automation) with the elimination of rapidly emergence dangers?

2. How to deal with negative effects of obsolete (moral) degradation of forms of life?

3. How to accelerate science-technology progress that is essential for sustainable development?

4. How to decrease ecological costs of long-distance transportation?

9. Conclusions

Realization of a "three pillars" world society sustainable development vision ought to be seen as the main UN goal. To realize this vision we need new political philosophy. This philosophy can be based on *System of Life* conceptual model which shows how the limits to growth of human society can be transcended. The model also provides guidance on how to shorten the transition period to sustainability.

Instead of knowledge based society we need wisdom based society. A wisdom society is one that is based on intellectual evolution mechanisms and popular access to information concerning the future consequences of current human activity. A wisdom society will use this information for the common good - common interest.

Achieving sustainable society means also accepting the thesis that obsolete (moral) degradation of life-forms not adapted to new life-conditions is the main agent of global crisis. To overcome the global crisis, we need to find ways of helping world society adapting to quite new life-conditions, to the State of Change and Risk. To live in this State, we need to create popular wisdom and information basis of sustainable development-policy and sustainable development-economy.

To get access to knowledge necessary for implementing "three pillars" sustainable development vision, an large-scale international science-technology and social operation is necessary for shaping an appropriate world information infrastructure.

A **commonly accessible,** net and GRID, continuously under development, WORLDWIDE SUSTAINABLE DEVELOPMENT INFORMATION SYSTEM (on System Dynamics based) ought to be built.

This information system, together with popular wisdom creation, allows to radically enlarge the range of far-sightedness, flexibility and reserves creativity of the world society. It allows to change egoistic axiology into egoaltruistic – ecohumanistic - one.

To start building of an appropriate information system, international research program is proposed. The main tasks of such program is to describe the conditions and methods of creating such a comprehensive Worldwide Sustainable Development Information System.

Without creating access to knowledge about human work complex (including FUTURE) effects it will t be impossible to:

- save environment;
- get access to new resources;
- eliminate unemployment;
- narrow "rich – poor" gap;
- realize ecosocial justice principle (Utsumi, 2006)..
- avoid global catastrophe.

In the State of Change and Risk, feedforward and big, developed wisdom creativity potential

are necessary to eliminate negative consequences of multiply obsolete (moral) degradation – the main cause of global crisis.

To build information bases of sustainable development-policy and sustainable development-economy - WORLDWIDE GRID SYSTEM DYNAMICS is ESSENTIAL.

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