

World Academy of Art and Science

A. Einstein, B. Russell, H.J. Muller, J. Boyd Orr,
H. Boyko, H. Urey, R. Oppenheimer, P. Auger

40 founding fellows: 14 USA, 6 Fr, 6 NL, 5 UK, 3 IL,
2 Be, It, In, Dn, Cn

*October 1956 – International conference on Science and
Human Affairs, Washington – aim to found WAAS*

*“Mankind has become a whole and undividable unit... We have
all become neighbours.... We are starting to trespass the
accepted border of earth, space, matter and energy... If already
these decisive dividing lines of nature seem to disappear before
our very eyes and in our comprehension, how small and
insignificant and negligible seem the political frontiers.... We
need farseeing statemanship in cooperation with leading
scientists...” (H. Boyko)*

Art.III

The objectives and purposes of WAAS are:

- to contribute to the progress of global civilization, human welfare, evolution of global governance, peace, sustainable development and the realization of human dignity through transnational studies, projects, appraisals and recommendations; and
- to function as a transnational forum for interdisciplinary discussion of art and science and the social consequences and policy implication of knowledge.

Leadership in thought that leads to action.

WAAS 700 fellows, 90 countries,

President Heitor Gurgulino de Souza,

Board of Trustees chair W. Nagan, CEO Garry Jacobs

Need for a new Paradigm in Social Sciences

Human being Universe

1 sec - 100 y

10^{-24} s

13.798±0.037 Gy

0.01 - 1000 m

10^{-16} m

8.8×10^{26} m

3×10^{23} stars

Human being

Curious

cause→effect

rational

irrational

Sapere aude! Aristotle

Social

Values - cultures -

- social structures

“The most incomprehensible thing about the world is that it is comprehensible.” A. Einstein

Does it apply only to the physical world, how about socio-economic and political?

“Are we capable of understanding the physical Universe?” M. Rees, Annual Conf AE, Liverpool 2008

“Science cannot develop unless pursued for the sake of pure knowledge. It will not survive unless it is used intensely and wisely for the betterment of humanity.”

“Science progressed when - instead of general - asked limited questions”(V. Weisskopf 1972) → disciplines

☺ "New scientific disciplines", e.g. nuclear medicine, bioarchaeology, scientometrics.

☺ Advances in technology, e.g.:
Information-communication technology (ICT);
advances in life science technologies: CT, PET,
MRI, synthetic biology.

☺ Our understanding and construction of
instruments, and development of novel
institutions, e.g.
Instruments: LHC; Planck satellite;
Organizations: CERN; EMBO

“We know the truth not only by reason, but also by our heart. It is through the latter that we know first principle, and reason, which has nothing to do with it, tries in vain to refute ” (B. Pascal, Pensees, #110) “It is the heart that perceives God, and not the reason.” (#424 - in Pensees))

“No problem can be solved from the same level of consciousness that created it.”

A. Einstein

“Common sense is the collection of prejudices acquired by the age of 18.”

A. Einstein

Planck (March 21, 2013)

4.9% ordinary matter

26.8% dark matter

68.3% dark energy

Matter >> Antimatter CPT

Inflation (phase transition:

at 10^{-35} s increased $\times 10^{26}$

(BICEP2 March 17, 2014 –
inflationary gravitational
waves)

**Physical Laws,
particles and
constants**

- *do they change?*

Dirac's proposal to
explain the ratio of
EM/gravity strength

Experimentally shown
not true

- *did not change for
13.7 Gy*

Natural science proceed thru unifications

- 1) Heaven - Earth: circular - straight lines → gravity
- 2) Electricity - magnetism - optics → Maxwell equa
- 3) Quantum physics → physics + chemistry + biology
(astronomy, geosciences, nanoscience)
[Chance and Necessity + Evolution]
- 4) EM + Weak forces
- 5) Grand Unified Theory (strong+EM+weak)
- 6) Theory of Everything (String theory?)

Axiomatic approach (as geometry) ??:

B. Spinoza “Ethics” - failure

Classical mechanics - OK

Cognitive sciences

Logic - Aristotle

Philosophy - Thales

Theology - Egypt, Mesopotamia, India, China

Law

(Taksasila, Varanasi, Kanchipuram 7th c. BC to 1.c.

AD: Kautilya’s Arthasastra forebodes Il Principe.)

Karl Popper's definition of science: *falsifiable*

Social sciences

Focusing on specific features:

- 1) **Economics:** Mercantilism (16-18c), Physiocrats (18c)- agriculture is the basis, Adam Smith (1776)- political economy, T. R. Malthus (1798), David Ricardo (1817), John Stuart Mills (1848), K. Marx (1867), Alfred Marshal (1890), J. M. Keynes (1936), Chicago school M. Friedman (1970), Jan Tinbergen (1969 NP) – founding trustee Economists for Peace and Security,

Simon Kuznets (1971 NP, GDP), J. Schumpeter,
J. Stiglitz, P. Krugman, A. Sen, N.N. Taleb
[Aristotle, Xenophon, Kautilya, Qin Shi Huang, Th.
Aquinas, Ibn Khaldun

2) **Sociology** (after French Rev: Comte, Ward [1883]
Durkheim [1895 UoBordeaux], Marx, Weber,
Spencer.
Confucius, Plato, Doomsday book 1086, Ibn
Khaldun

3) **Psychology:** W. Wundt (1879 Leipzig), W. James (1890), H. Ebbinghaus, psychoana: S. Freud, C. Jung, E. Fromm, E. Erikson, B.F. Skinner, A. Maslow, W. Kohler – Gestalt psy.

[Thales, Hippocrates, China, India, Persia]

4) **Linguistics:** Panini (5 Bc, India), Sibawayh (Arab 760), Library of Alexandria school first used the word “grammar”, W. von Humboldt, Noam Chomsky

5) **Uncertainty and Game theory**

John von Neumann and Oskar Morgenstern (1944),

6) Complexity Theory

Complexity is the property of a real world that is manifest in an inability of any one formalism being adequate to capture ALL its properties. It requires that we find distinctly different ways of interacting with systems. “Distinctly different” in a sense that when we make successful models, the formal systems needed to describe each distinct aspects are NOT derivable from each other.”(B. Rosen, D. Mikulecky)
[1832 in Germany]

Merryl Flood (1950), Dantzg (1954), S. Kauffmann,
M. Gell Mann “The Quark and the Jaguar”

Humans \leftarrow biological and cultural evolution \Rightarrow **humans change**, and **humans change the world they live in**,
(Crutzen) current geological epoch: Anthropocene.

τ (changes) $<$ τ (human life) \ll τ (changes centuries ago)

Human biological evolution accelerated 100-fold in last 5- 10,000 years. Driving forces: growth of the world's population and world changed due to agricul., animals domestic. and human habitats. E.g. success of mutation causing to digest lactose (over the last 3,000 years). Genes controlling the glucose metabolism in the brain recently evolved, possibly being essential for the human brain growth to the size twice that of our nearest cousin - chimpanzee, and possibly suggesting why humans do and chimpanzees do not have diabetes.

☀ Extensions: e.g. eyeglasses, wooden legs

☀ pace-makers, implants

☀ transplantations

☀ 2020 nanomachines routinely used in medicine - entering the bloodstream: feed cells and extract waste.

☀ 2030 mind uploading will be possible

☀ 2040 human body 3.0 could alter its shape and organs can be replaced by superior cyber implants.

☀ Synthetic biology = design and construction of new biological devices and systems that do not exist in the natural world ← converging technologies: nanotechnology (manipulation with atoms), biotechnology (genes), information technology (bits) and cognitive neuroscience (neurons).

☀️”As man advances in civilization, and small tribes are united into larger, the simplest reason would tell each individual that he ought to extend his social instincts and sympathies to all the members of the same nation, though personally unknown to him. This point being once reached, there is only an artificial barrier to prevent his sympathies extending to men of all nations and races.”

C. Darwin, *The Descent of Man*, (orig. 1871)

Global, interdependent world

“As never before, the future of each one of us depends on the good of all” (Nobel laureates 2000)

Important numbers

- 1** - one global interdependent world
(colonization of outer space ?)
- 7 G** - 7 billion persons → 10 G → 2/3 G
- 5,000** - different cultures
- 8.7±1.3 M** - eukaryotic species on Earth
(prokaryotes: bacteria + archaee ≈ few M)
[C. Mora et al, PLoS Biol 9, e1001127 (2011)]
- 200** - sovereign states + UN (ILO)
- Several M** - NGOs, CSO (civil society org),
QUANGO (quasiautonomous NGO, eg
Intl Org for Standardization)

Human beings are result of biological and cultural (much faster) evolutions.

“Evolution on this planet is a history of the realization of ever more possibilities. Through new knowledge it has defined man’s destiny and responsibility....It is as if man has been appointed the managing director of the biggest business of all – the business of evolution” (J. Huxley, *Transhumanism*, 1957)

Laws of Nature and Laws of Society

Classical tradition (Galileo, Newton) LoN are eternal truths – “thoughts of God” represented by mathematics.

Kant: categories of human mind. Hume: critical !

R. Rorty “truth is made not found”

20c: Feyerabend vs. “laws” in social and political sciences

21c: Are LoN still essential concepts?

1959 gathering of 185 jurists, lawyers and law professors from 53 countries speaking as International Commission of Jurists made the Declaration of Delhi:

The Rule of Law implies certain rights and freedoms, implies independent judiciary and social, economic, political and cultural conditions conducive to human dignity.

Law is a social organization of principles, rules and governance systems to manage relations among people and group of people. Laws evolves in response to ever rising demands of the people – expression of the development of the human capital (Laswell).

Cicero: “We are all servants of the law, so we may be free.”

Unjust law is not a law (Cicero, Augustine, Th. Aquinas, US founding fathers, Gandhi)

World value surveys: 1981-84, 89-93, 94-98, 99-04 and 2005-08 involving 97 countries = 88% world popul

Results:

1) many basic values can be displayed in 2D:
survival-self expression vs traditional-secular/rational,
wide difference in values !!

(Tra = high level of natl pride, family values, against abortion, divorce, euthanasia; S/R = opposite.

Self-exp = rising demand in eco-pol, higher tolerance to diversity, child-rearing – imagination and tolerance >> hard work)

The Inglehart-Welzel Cultural Map of the World



2) Values changed, e.g. (2005 → 2007)

Italy (-0.35, +0.35) → (0.25, 0)

France (+0.1, +0.75) → (0.65, 0.82)

Data for 20 countries show no convergence of values. Societies as distinct in 2007 as in 1981 !!

Knowledge shifts toward higher self-expression.

Survival granted.

- 3) Values crucial for econ development (GDP, but GDP is ?), governance and QoL.
- 4) + correlation: mass S-E value and democracy.
- Democracy = empowering of all citizens: **people able, motivated and entitled to govern their lives**

5) mass conformity (C)-self expression (SE) and effective human rights (EHR) relationship reveal an \uparrow -type pattern: more C/lower SE \rightarrow lower EHR. **Countries with lower level of democracy than their citizens' values are likely to become genuine democracies.**

- 6) Less religious involvement \leftarrow secular/rational
- \leftarrow modernization (knowledge) \rightarrow growing cultural diversity \rightarrow growing religious involvement.
- **Conflicting consequence of knowledge**

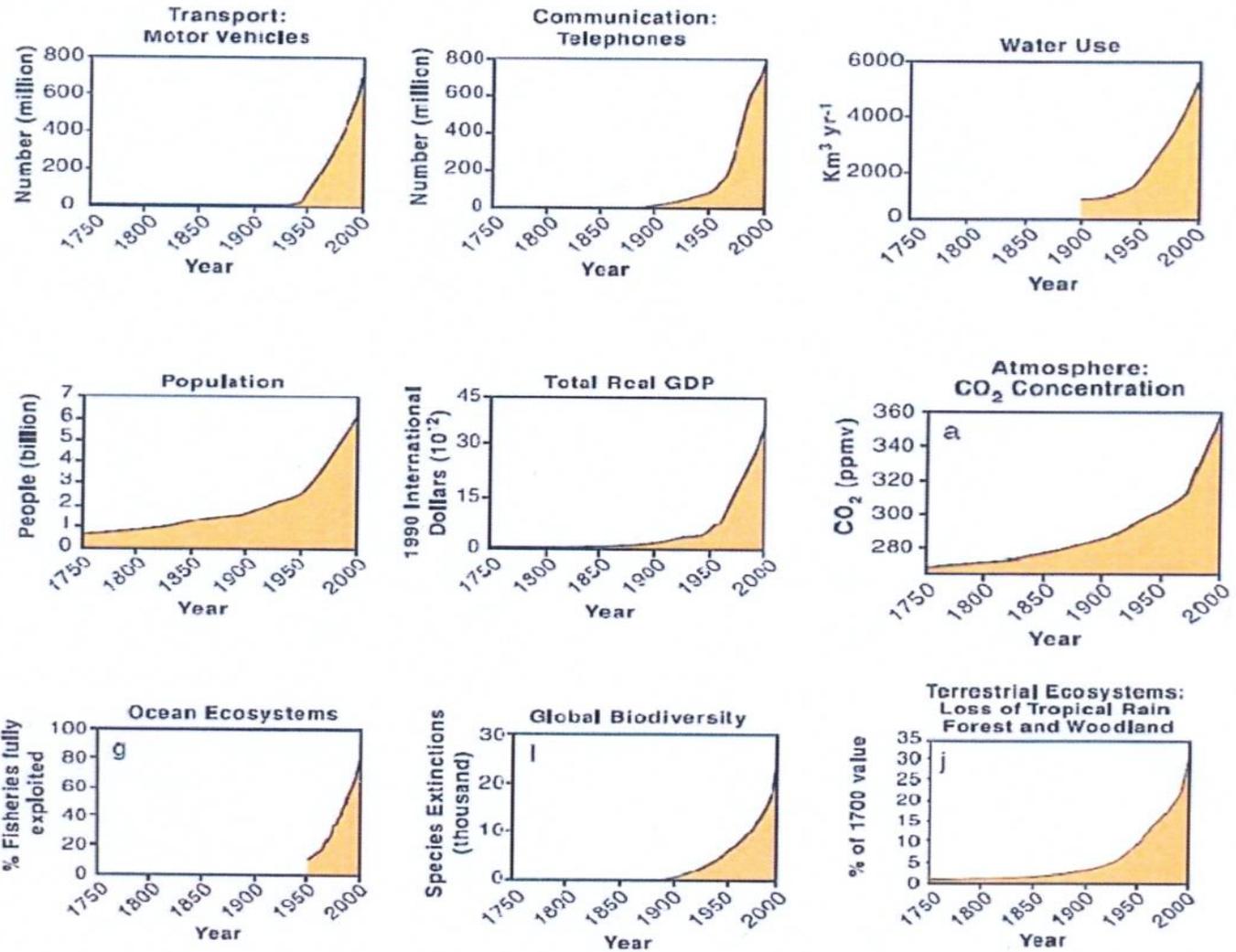


Figure 1: Taken from "Global Change and the Earth System: A Planet Under Pressure" (2004), W. Steffen, A. Sanderson, P.D. Tyson, J. Jäger, P.A. Matson, B. Moore III, F. Oldfield, K. Richardson, H.J. Schellhuber, B.L. Turner, R.J. Wasson, published by Springer-Verlag Berlin Heidelberg New York.

Contemporary world

Life expectancy increased by factor of 2.

GDP increased by factor of 5.

Freedom and democracy encompass a large fraction of humankind.

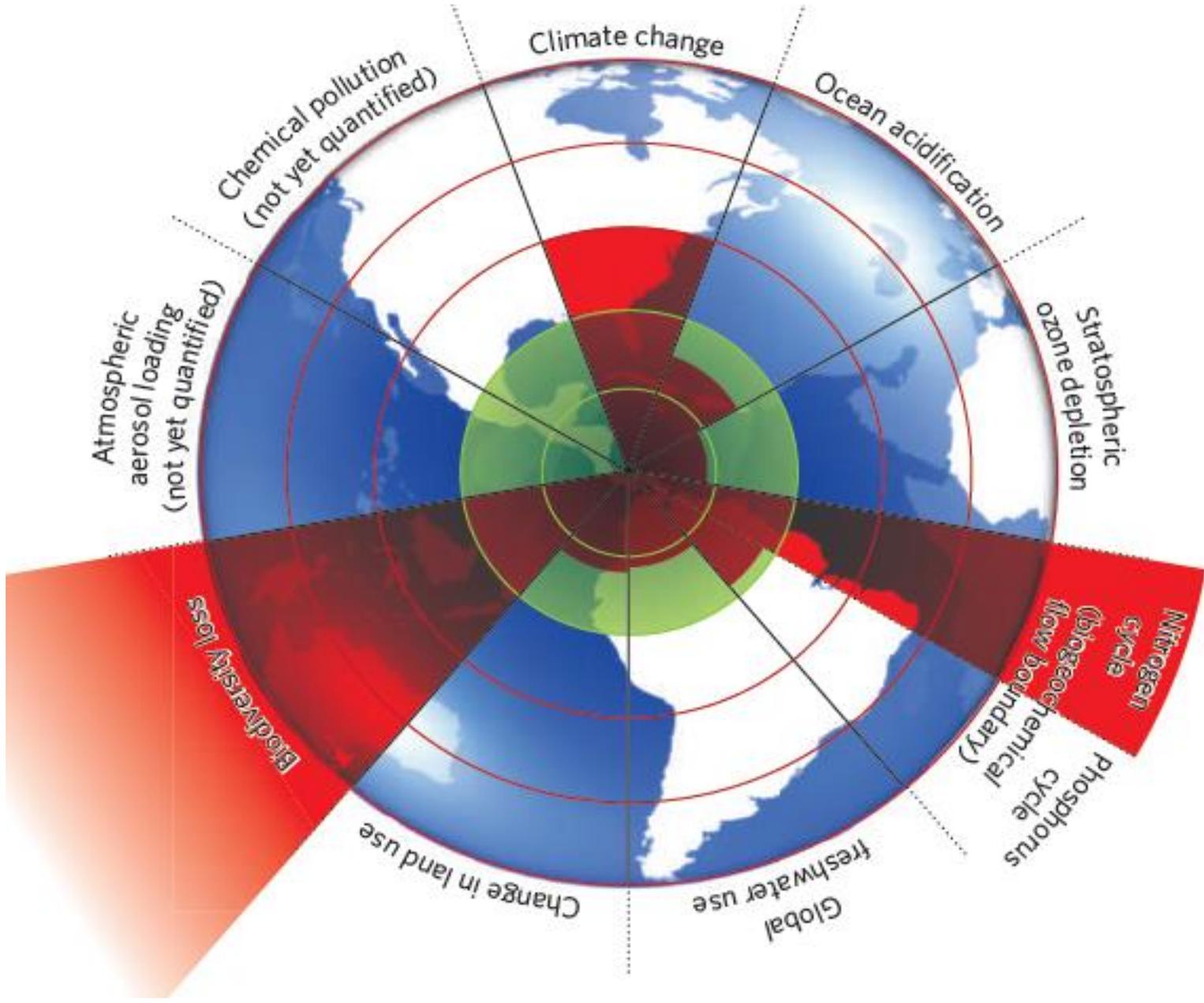
International system of sovereign states has produced notable successes such as UN, ozone treaty.

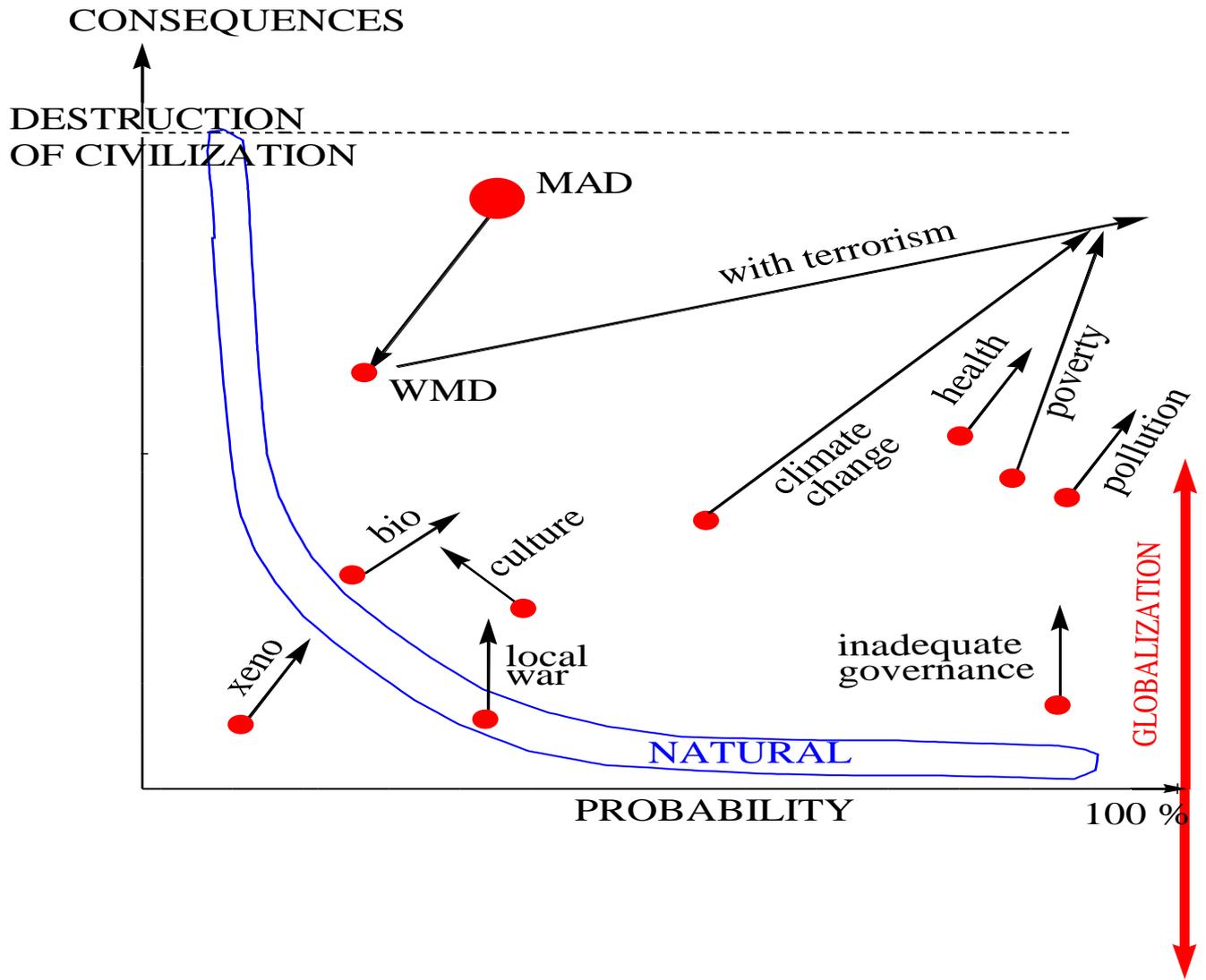


Business-as-usual is a desired system (??)

NO!

- 1) Ecological footprint in 2008 1.27, now \approx 1.5, it will reach 2 in 2050.
- 2) We destroy natural capital (*Bankrupting Nature, A. Wijkman and J. Rockstrom*)
- 3) Economic crisis: low employment rate (below 60%) and large inequalities 1:300 vs J.P.Morgan 1:20. Loss of trust.





D. Browne, G. Jacobs, I. Šlaus

(NATO conference, Splitu, May 2013):

“A new approach, a new paradigm for the 21st century is needed.

New thinking is called for and NATO has a special obligation to take the lead in that thinking.

Many problems subsist on the basis of deeply-seated incorrect misconceptions and prejudices regarding the utility and usefulness of WMD, and the necessity of war.”

Doomsday clock (Bulletin of Atomic Scientists)

1947	7 min to Midnight
1953	3 - 2 min to Midnight (USA and USSR test H-bombs)
1989	17 min – end Cold War
January 14, 2014	5 min (destruction of natural, human and social capitals)
Today	?? 2 min ??

Paradigm change in natural sciences

Natural world unchangeable (or very slowly changing) thruout lifetime of civilization

→

paradigm change is a result of “our seeing more and better” and “freeing ourselves from narrow limits and our prejudices”

Lessons learned

Sin of vanity, arrogance

Scenarios for future world

- 1) Static world - impossible, since it is rapidly changing now
- 2) Business-as-usual – unsustainable
- 3) **Change is inevitable!** The world undergoes incremental and paradigmatic changes and some of them could lead to catastrophe.

“To drift is to be in hell - to steer is to be in heaven.”

Don Giovanni (G. B. Shaw)

Paradigm change in social sciences

*Socio-economic and political world changes **now** quite rapidly and social sciences describing specific aspects are not adequately explaining that world
and*

Contemporary socio-economic and political world is unsustainable since it is destroying natural, human and social capitals and it is inherently unstable

→

paradigm change in social science:

what it is

what it ought to be

Lessons learned

- 2) *Humans have rights and responsibilities, and our basic right and responsibility are to LIVE and assure that future generations live!*
- 3) *Human are social beings living on Earth and preservation of natural capital is our duty.*
- 4) *Humans are social being and Golden Rule is imperative! “There is enough for human needs, but not for greed.”*
- 5) *Need to be active: danger of sin of omission*