



SERBIAN ACADEMY OF SCIENCES AND ARTS

8th DANUBE ACADEMIES CONFERENCE

Belgrade
2018

8th DANUBE ACADEMIES CONFERENCE

8. КОНФЕРЕНЦИЈА АКАДЕМИЈА
ПОДУНАВСКЕ РЕГИЈЕ

СРПСКА АКАДЕМИЈА НАУКА И УМЕТНОСТИ

ПРЕДСЕДНИШТВО

8. КОНФЕРЕНЦИЈА АКАДЕМИЈА ПОДУНАВСКЕ РЕГИЈЕ

Београд, 21–22. септембра 2017. године

Примљено на IV седници Председништва Српске академије наука
и уметности 4. јуна 2018. на основу рецензија академика
Владимира Стевановића и академика *Дејана Поповића*

У р е д н и к

академик Марко АНЂЕЛКОВИЋ

У р е ђ и в а ч к и о д б о р

академик Љубомир МАКСИМОВИЋ

академик Владимир СТЕВАНОВИЋ

академик Дејан ПОПОВИЋ

Б Е О Г Р А Д 2 0 1 8

SERBIAN ACADEMY OF SCIENCES AND ARTS

P R E S I D E N C Y

8th DANUBE ACADEMIES CONFERENCE

Belgrade, 21–22 September, 2017

Accepted at the 4th meeting of the Presidency of the Serbian Academy
of Sciences and Arts, on 4th June 2018, on the basis of reviews by
academician *Vladimir Stevanović* and academician *Dejan Popović*

E d i t o r

Academician Marko ANĐELKOVIĆ

E d i t o r i a l B o a r d

Academician Ljubomir MAKSIMOVIĆ

Academician Vladimir STEVANOVIĆ

Academician Dejan POPOVIĆ

B E L G R A D E 2 0 1 8

Published by
Serbian Academy of Sciences and Arts
Belgrade, 35 Kneza Mihaila St.

Proof-readers for English
Tatjana Ćosović
Žarko Radovanov

Prepared for printing by
Mira Zebić

Text assembly
Nikola Stevanović

Number of copies
400

Print
Službeni glasnik, Belgrade

ISBN 978-86-7025-779-5

© 2018
Serbian Academy of Sciences and Arts

Издаје
Српска академија наука и уметности
Београд, Кнеза Михаила 35

Лектори за енглески језик
Татјана Ћосовић
Жарко Радованов

Технички уредник
Мира Зебић

Прелом
Никола Стевановић

Тираж
400

Штампа
Службени гласник, Београд

ISBN 978-86-7025-779-5

© 2018
Српска академија наука и уметности

CONTENTS

TOPIC 1: Endangered Danube: What can we do?

Thomas Hein, Andrea Funk, Florian Pletterbaue, Daniel Trauner <i>Rivers under threat – challenges for biodiversity conservation in the Danube River</i>	9
Vladimir Stevanović <i>HIPPO effects on biodiversity changes in Danube accumulations</i>	17
Jasmina Šinžar-Sekulić, Aljoša Tanasković <i>Preliminary research of macrophyte production in Danube reservoirs – case study of two invasive plant species – native <i>Trapa natans</i> and alien <i>Paspalum paspalodes</i>.</i>	33
Momir Paunović, Béla Csany <i>Southern Corridor of Aquatic Invasive Network – the Danube river paradigm.</i>	45
R. Kalchev, M. Beshkova, V. Evtimova, R. Fikova, H. Kalcheva, V. Tzavkova, V. Vassilev <i>Long-term trophic changes in Bulgarian–Romanian Danube River section and in adjacent wetland on Bulgarian territory during its restoration.</i>	55
Jovan Despotović, Marko Ivetić, Mihajlo Gavrić, Aleksandar Šotić <i>Integrated evaluation of hydrologic, hydraulic and sediment processes on the Danube influenced by the Đerdap reservoir, aiming at projection of system safety accounting for global and climatic conditions</i>	79

Cristian Hera, Nicolae Panin
*Strategy of Romania Development in the Following 20 Years,
including the Lower Danube Problems –
a strategy proposed by the Romanian Academy* 87

Boris Bourkinskyi, Paul Goriup, Oleg Rubel
Potential of innovation for biomass use in Danube region of Ukraine 91

Pavol Sajgalik
*WATERS initiative “People and water” coexistence
in the Slovakian Danube region* 93

TOPIC 2: Universities in Transition

Ivanka Popović
The role of higher education in developing an innovation spirit 97

Alojz Kralj
Danube regions universities in transition: the issues and challenges 99

Marijana Vidas-Bubanja
Education as a way to prepare Serbia for digitally connected world 119

Georgi M. Dimirovski
*Chinese approach in globalization era:
information-based revolution of education, science and technology*. 143

Dejan Popović
For whom are the Ph.D. schools in Serbia today? 163

CHINESE APPROACH IN GLOBALIZATION ERA: INFORMATION-BASED REVOLUTION OF EDUCATION, SCIENCE AND TECHNOLOGY

Georgi M. DIMIROVSKI*,**

A b s t r a c t. – During the last decade the world is astonished and becoming more and more fascinated by the dramatic progress of P.R. China in all respects, particularly in science and technology. It appears a rather involving quest to understand this process, the roots of which I believe have emanated from the far reaching heritage of Confucius' teachings. For, as Socrates is regarded as the father of philosophy, wisdom and wit in the West, so is Confucius the father of philosophy, wisdom and wit in the East. Although these two streamlines of philosophical thoughts carry considerable differences, still considerable convergence and confluence among them is apparent too. Nonetheless, historical roles of both Chinese revolutions during the 20th century cannot be neglected, and even much less so the 1945-49 Revolution; for, they paved the way for what China is becoming during the 21st century. It became obvious during the last two to three decades that education, science, and technology, in fact, play the central role within the societal process of holistic renaissance of China. Furthermore, by and large it is based on creative information-based revolution of education, science and technology so that in the last few years China emerged as the leading country of AI-based products and services worldwide. This study paper presents personal perceptions and conclusions, hence views, which matured during twenty years of my continuous and close academic co-operation with a couple of Chinese colleagues. Though, standard university publications have been used too. It is focused on the essential

* Faculty of Electrical Engineering and Information Technologies St Cyril and St Methodius University, Karpos 2 - Rugjer Boskovic BB MK-1000 Skopje, Republic of Macedonia

** Faculty of Engineering Dogus University, Acibadem - Zeamet Sokak 21 TR-34722 Istanbul, Republic of Turkey

issues of Chinese approach to advancement and expansion of higher education, scientific and technological research, as well as to general development of culture and economy of the country. The responsibility for the expressed views rests on me alone.

Keywords: Fourth industrial revolution; higher education; information; science; societal development

INTRODUCTION

In 1988 a group of Nobel Prize Winners in Paris have put forward a declaration statement saying:

”If human beings want to survive in the 21st century, they must trace back 2500 years ago to draw wisdom of Confucius (551 – 479 BCE), the founder of the renown Ru School of Chinese thought.”

In a sense, Confucius was a giant thinker whose teachings propagate eternal values for all times and places on Earth and, possibly, within then known part of our universe. Yet, similarly to Socrates, Confucius has left no written books. Nonetheless, his 72 best and closest disciples have elaborated on a precise compilation of his thoughts of wisdom in the famous book Analects of Confucius [1, 2].

From that, by modern standards, small book springs an outflow ideas and moral principles about family hence poverty versus wellbeing, nature hence environment, violence hence wars, cultural attitudes and refined arts and music, religious tolerance and ritual exchange, proper governance hence justice, and proper historical interpretation of the past [1]. Above all and most importantly, Confucius has emphasized morality over and over again. In short, Confucius was a unique philosopher, thinker, educator, and socio-political figure in the age of the first Imperial China, known as Eastern Zhou dynasty 771-256 BCE, which already had developmental heritage of more than 3,500 years [20, 24]. Moreover, most of his legacy of thoughts on how to establish organization of good governance in support to the emperor and his inner circle of army and navy commanders as well as of administration ministers has been largely observed and/or revived until the age of Ming Dynasty when Mongol rule was overthrown and Imperial China emanated (Fig. 5)

It is within such a background that the conceptualization of this study ought to be conceived which, as in the poetry of Pablo Neruda [15] (poems El

Pueblo–The People, and Si, Camarada, Es Hora de Jardin–Right, Comrade, It’s the Hour of the Garden), could not be possible without not bearing in mind the yields of Chinese 1912 Revolution and Chinese 1949 People’s Republic, following more than a decade of Resistance War against Japan and Second Chinese Revolution [5], [6], [7], [9], [11], [16]. Furthermore, understanding the overall Chinese approach in the Globalization Era, and not solely the “Belt and Road” initiative and strategy, requires the considerable generally perceived continuous struggle within Mankind’s history between the world’s ‘Big Powers’ of the time for economic domination and intellectual supremacy [20, 22, 23]. Indeed I believe the understanding and explanation of the unprecedented advancement of Chinese economy along with the outstanding advancement of education, science and technology cannot be understood, and let alone explained, without insight into the wider spectrum of societal changes within P. R. China [7, 11, 16, 20, 23, 26, and 31]. It is the path that this modest, but scientifically-based, investigation discussion followed.

Indeed, I have been lucky enough to observe from within the timely changes [7, 21, and 23] in Chinese society and its Higher Education since the year 1996. A young Chinese colleague, following my openness for international academic co-operation and endeavors to embrace any colleague or student who had asked for my co-operation as well as wish to expand my international circle of collaborating partners, asked me about his postdoc with me. This process expanded considerably since Dr Yuanwei Jing from Northeastern University of Shenyang has completed his postdoctoral project at Faculty of Electrical Engineering and Information Technologies, of St Cyril and St Methodius University in Skopje, under my advice and guidance during the year 1996.



Fig. 1. The year 1988 declaration statement by Nobel Prize Winners in Paris: If human beings want to survive in the 21st century, they must trace back 2500 years to draw wisdom of Confucius (a–Confucius; and b–Confucius debating with his best disciples; traditional Chinese paintings)

Furthermore, I find it fascinating how superior had Chinese maritime technology been (Fig. 4) at times of Ming Dynasty (1368-1644 AD), the seventh dynasty, which was one of the very many yields of then-Chinese Renaissance. However, the successor of Emperor Zhu Di ultimately made a wrong (but far reaching) decision by ordering Admiral Zhen He to return back home and issuing a decree which prohibited further explorations into the 'barbaric' world. Imperial writings suggest that, he had concluded there is no novel or superior culture than one in China following the reports submitted to him, which happened at the time Europe was hardly going out of its darkest ages (Fig. 5). History has demonstrated that period in time after voyages of Treasure Fleets appeared to mark the beginning of long-lasting decline of Chinese Empire [20, 22]. Though, let us leave this issue to historians; solely contemporary Chinese renaissance of education, science, and engineering are of concern here.

In the sense of these settings, during the 1999 IFAC World Congress in Beijing where I met Dr Jun Zhao, and along with him in co-operation with Yuanwei, thereafter I paid my first academic visit to Northeastern University in Shenyang. My network of Chinese academic partners has been enlarging and growing. Along those lines I have been happy to witness (as well as get certain benefits) from my ever expanding academic co-operation with Chinese colleagues ever since [21]. This happened precisely due to the official China's opening for the world-wide co-operation and exchange first in Culture and Economy [23, 27], and soon thereafter in Education and Science as well as in Applied Engineering and in creation of Technology [21]. It should be noted at this point that quite soon the same opening approach has taken place in literally all fields of human knowledge and scientific endeavors [31].

However, I emphasize that, at the same time, Chinese State Authorities introduced for that purpose a network of governmental, provincial and regional funding agencies under very precise requirement criteria and rules as well as defined a variety of incentives to Chinese intellectuals and scientists to return to their home country back and proceed further. Thus the vast majority of them, in fact, every day engage their knowledge, skills and talents contributing to Chinese society at large. For, in parallel with this process both mobility scheme have been developed to the full as well as very generous and rich, albeit highly selective via competition scheme, investments have been input to all universities (and research institutes too) across their country. The proven achievements in all aspects to innovations either in science or in applications or in technology developments have been established as the primary criteria *sine-qua-non* in competition for funds at all levels. Along with these measures, generous individual rewards have been introduced and implemented as well.

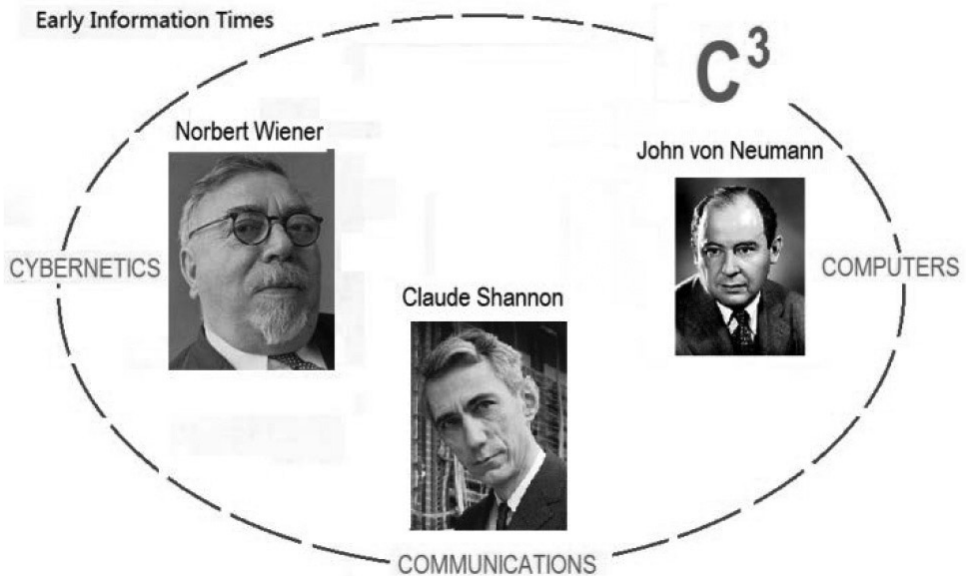


Fig. 2. Widely acknowledged fathers of C^3 paradigm – Cybernetics-Computing-Communications: Norbert Wiener (Cybernetics or Control and Communication in the Animal and Machine); Claude Shannon (Mathematical Theory of Communications); John von Neumann (Computing Automata and Computing Languages)

Furthermore, in addition, also immediately I must point out first to the nine outstanding personalities of Systems and Cybernetic Sciences at large. For, they have laid down the foundations of the contemporary C^3 paradigm – Cybernetics-Computing-Communications– the essential feedback feature and properties play crucial roles for their very existence to all of them [14]. Indeed, I do believe it is this C^3 paradigm precisely that has been grasped by communities of Chinese leadership as well as business and academic communities, and then rooted into the so-called Chinese miracle of becoming world's second strongest economy [20, 23, and 27]. Fig. 2 puts together three of those giants of Systems and Cybernetic Sciences. Figure 3 puts together scientists who made the difference in engineering sciences.

In my humble opinion, one should question herself/himself: How it could have been possible for Chinese Science and Technology to reach such heights as they did during the last couple of decades? In my opinion, one important part of the answer lies within the fact that Chinese scientists were among the first to interlink and unify the fundamental discovers of the giants of Systems and Cybernetic Sciences as well as to continue grasping the respective pragmatic implication to modern economy via relevant technological developments.



Fig. 3. A. M. Lyapunov - General Stability Theory of Dynamic Systems, a); H. von Foerester - Cognition and Cybernetics of Thinking; Hsue-Sen Tsien - Engineering Cybernetics; R. E. Kalman - Mathematical Systems Theory and Signal Filtering; V. Yakubovich - Linear Matrix Inequalities and S-procedure in Adaptive Optimal Control; L. A. Zadeh - Fuzzy Logic and Computational Intelligence; D. D. Šiljak - Complex Large-Scale Systems and Decentralized Control; Scientists who made the fundamental contributions for the C^3 paradigm [12, 14, 28]

Thus, Chinese have been heading towards their Fourth Industrial Revolution for quite some time. The elaboration of the insights into this question, however, is not a straightforward one [12] as I have stated it here. For, inevitably it does require addressing the wider societal issues about P.R. China [3-7,11, 16, and 31], which is beyond the scope of this paper. It should be noted nonetheless, it was the young Dr Hsue-Sen Tsien who has published the very first book on engineering cybernetics; he coined this name too. It happened just before Dr Hsue-Sen Tsien, soon Academician of the CAS, has returned back to P.R. China and undertaken one of the leading roles in building and developing Chinese capacities for science and research in various fields of sciences important for both Engineering and Technology.

In particular, I do believe, the comprehensive teachings of Confucius (551 -479 BC) appear to be most valuable and far reaching ones for all future times regardless of various dynasties. In here I mention only two rather relevant messages of his wisdom: “Learning without thinking is labor lost. Thinking with-

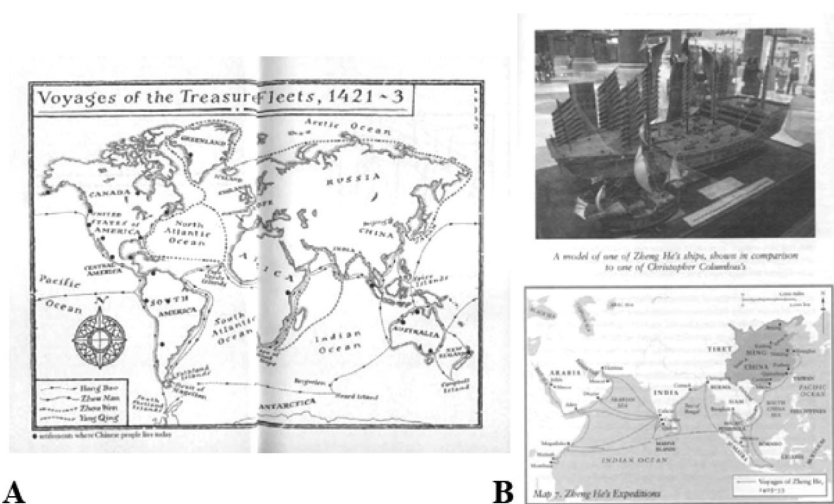


Fig. 4. Chinese maritime technology at the beginning of in the 15th century [24]: (A) Map of world-wide travels during the so-called Treasure Fleets 1421–1423 by several Chinese maritime admiral and captains; and (B) Comparison of museum models of Admiral Zheng He’s and Admiral Christopher Columbus’ ships along with the map of voyages by Admiral Zheng He, who himself personally had accomplished (for details, Gavin Menzies, 2003)

out learning is perilous.” and “To decide and act prudently, one mind is not sufficient.”

The above pointed process of fundamental changes in field of Higher Education and of Science and Research in P.R. China, even to my personal surprise, was almost accomplished to the full by the academic year 2008 - 2009. Ever since, China has been enjoying benefits of even faster overall advance developments in all fields of human endeavors, and not only in education and science. Here it is appoint for me to confess that my discussion in this paper presents personal views based on my firm belief that the third fundamental category – information, standing next to energy and matter, has played the decisive role throughout the history of the Mankind and planet Earth. Personally, in addition to information-based systems and cybernetic sciences, the evidence for this belief of mine I found, on one hand, in the 20th century fundamental discoveries of Physics of Universe [17, 18], and on the other hand in my readings of studies [10] on classical Chinese Philosophy [3, 25] in comparison with those on Western Philosophy [8, 29].

Furthermore, I find it rather fascinating how superior had Chinese maritime technology been (Fig. 4) at times of Ming Dynasty (1368-1644 AD), the

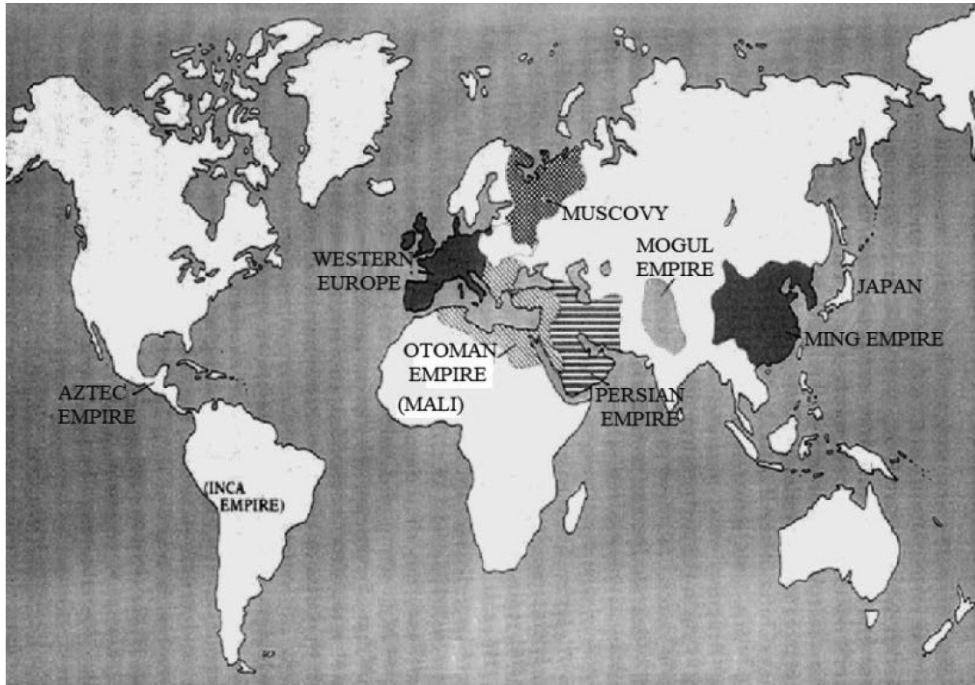


Fig. 5. The 16th Century AD [22]: Known world empires when Western Europe with about 55 million population was beginning to rise after being devastated by religion and sectarian wars by dynasties fighting for feudal inheritance, lands and supremacy, while Imperial China had about 120 million and was far away from her age of Warring States (403–221 BC) and Mongol Rule (1271–1368 AD)

seventh dynasty. I think this was one of the very many yields of then-Chinese Renaissance on the way. However, the successor of Emperor Zhu Di ultimately made a wrong (but far reaching) decision by ordering Admiral Zhen He to return back home and issuing a decree which prohibited further explorations into the ‘barbaric’ world. Imperial writings suggest that, he had concluded there is no novel or superior culture than one in China following the reports submitted to him, which happened at the time Europe was hardly going out of its darkest ages (Fig. 5). History has demonstrated that period in time after voyages of Treasure Fleets appeared to mark the beginning of long-lasting decline of Chinese Empire [22].

WORLD-WIDE BUSINESS, INTELLIGENT MACHINES, SOCIAL NETWORKS AND SURVIVABLE SOCIETAL SYSTEMS: BUZZWORDS OR PERSPECTIVES?

The 2002 UNESCO publication *Encyclopedia of Life Support Systems (EOLSS)* has been marked by the statement: "... a comprehensive, authoritative and integrated body of knowledge of life support systems [30]. It is a forward looking publication, designed as a global guide to professional practice, education, and heightened social awareness of critical life support issues...". Their definition begins with the sentence "A life support system (LSS) is any natural or human-engineered system that furthers the life of the biosphere in a sustainable fashion". It should be noted that the quality of human resources is defined via education, health, poverty, disadvantaged people and human resource management. Furthermore, one of the six goals forming the basis for the design of EOLSS reads "... to elucidate sustainable development, peace, justice, equity and global security..." which clearly supports the stated title of this essay-like discussion on directions of contemporary university in transition.

The research carried out by the world-wide community of systems and control scientists and engineers in the broad areas of expertise, covered by researchers involved in the activities of the IFAC technical committees within the coordination committee on Social and Societal Systems – University is one of them – are supposed to give some of the answers. And even more so: considerable promising hints on how to address the underlying problems of mankind on a global scale of Earth can be found [12, 13]. This way, it is believed, they will contribute substantially to a sustainable and non-endangered development of our only one world. It is their responsibility to "bridge the gap" between the individual perceptions of individuals and the collective perception by OUN-UNESCO [30] on the complexity [14] of interacting natural system (environment) along with the human system (coupling cycle individuals-government-society) and the man-built socio-technological system (interacting economy-infrastructure) where forms of computational intelligence technology [16, 30] constitute essential ingredients.

It is important to note, however, that during the last two-three decades the global ecosystem has been so much impacted by destructive human loads that it has already reacted by patterns of global warming and climate change as well as disasters caused by impact of human societal communities (UNESCO, 2002). Social and societal systems observed in this study are all hybrid and large-scale, i.e. socio-economic and socio-technical, thus their control strategies employ both numerical and linguistic information processing. Yet, the overall system

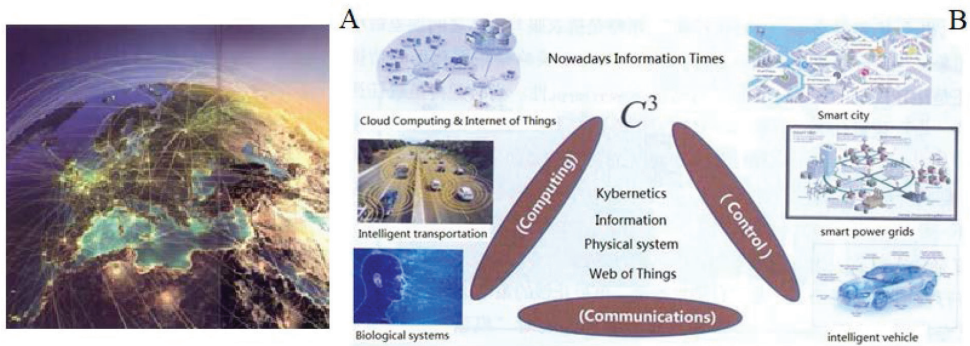


Fig. 6. Two illustration facts of Europe: (a) Geomorphologic one; and (b) Cybernetic -schema depicted one by employing C^3 -paradigm of Control-Computing-Communications [14]

must remain structurally stable in the first place hence the controlled systemic structure must retain its structural reachability as well as decentralized controllability [28]. Information-based sciences have yielded numerous studies that could be fairly well transcended various categories of complex evolving that go beyond decentralized feedback and structural reachability thus including structural controllability, detectability and observability as well as structural decompositions that are integrated as appropriate or needed [14].

Further down, a note on the information-based science and engineering and their usage to create modern technologies is briefly addressed. It appears that not so long before the notions in the title of this section became buzzwords of today's news, considerable world-wide changes had already taken place [12]. The so-called Fourth Industrial Revolution is indeed driven by information-based sciences and engineering. In the heart of this revolution lies understanding the synergies of control, communications and computing. Since the early days of Cybernetics, when information has been gradually adopted by physicist as the third natural quantity next to energy and matter, the quality of knowledge and sophistication of contemporary civilization has moved unpredictably higher during recent two-three decades.

In fact, there has been unprecedented driving near the societal environment in the sense of advanced re-structuring towards man, systems, and cybernetics, which even was not foreseeable only a couple of decades ago. Indeed, living in this field for almost half a century, I may well argue in favor of the Control-Computing-Communication (C^3) paradigm characterizing dynamically evolving entities that, being integrated by means of control functions, decision and supervision, essentially remain at the same time simultaneous systemic information processing, communication and feedback control mechanisms.

These views here are expressed via a symbiotic ‘look back and a look forward’ reasoning according to the words of two great systems and control scientist in the past century. Namely, I am talking about: Prof. Rudolph E. Kalman – “... First get the physics of considered problem right. The rest is mathematics.” and also Prof. Howard H. Rosenbrock – “... mathematics is indispensable... My own conclusion is that engineering is an art rather than science hence implies a higher status.” For, indeed I do appreciate deeply both Kalman’s advice and Rosenbrock’s conclusion in the here presented argument, indicating to which directions contemporary universities and higher vocational school in transition should be oriented, respectively. In any case, my own conclusion is that an all-encompassing science of complex networks and systems is bound to remain an ever-open, lasting quest that appears to have very many facets of complexity as Europe is depicted in Figure 5 (A) and (B).

A CHINESE BLEND OF COMBINED RESPONSIBLE ACCOUNTABILITY WITH GENEROUS SUPPORT INCENTIVES

To the best of awareness I am inclined to believe that in due time Chinese State Authorities have created comprehensive system of both institutions and mechanisms granting combined generous incentives along with strict rules of responsible accountability at all levels of higher education and scientific and/or technological research [21]. By saying “all levels”, it means levels of: universities, colleges (schools) within universities, specially dedicated centers (i.e., institutes and or laboratories) of excellence, regional and provincial funding agencies/councils, and federal funding agencies/councils. State policies of scientific and technological research, which follow pre-planned state-priorities and target goals in each and every field of science and technology research, are implemented via that comprehensive system and publicly announced competition scheme for each of these levels. Of course, there are special science and technology institutions for the state’s strategic important areas in strategically important fields of which I am not informed and have only some indirect awareness; thus, my talk does not touch upon specific strategic areas and fields.

In general, my impression was and still is that the bulk of annually available funds for both scientifically oriented and technologically oriented research each year are assigned in a well-established balance, subject to revision every 5 years (maybe less form time to time), between federal and provincial councils for science and research. Similarly, my impression was and still is that

such a well-established balance is carefully achieved between institutional and individual-groups levels of funding. However, precise standard requirements and rules of competition for funding have been established, also subject to revision every 5 years (maybe less from time to time), in each and every level funding competition. Furthermore, as a rule all funding is closely linked with the funding of master and doctoral level of education and training, including scholarships for candidate-students and students towards the final stage of the respective graduation projects. It is this framework that the funding of prominent individuals as leading researchers and their relevant groups of combined younger colleagues and graduate students is based strictly. In addition, during the past couple of decades the level of postdoctoral research projects and/or research specialization has been also developed as natural follow-up standard but with more rigorous requirements and rules. Furthermore, all funding is implemented via publically announced competition calls open to each eligible subject accordingly.

It should be noted however, that it takes real achievement of a world-wide recognized status of prominent and verified researcher based on internationally approved evaluation means and standards. Then and only then such an individual can hope to be successful in their respective competitions for funding. Then and only then such an individual can make reasonably successful attempt to form her/his own group with one or several oriented teams of researchers. It should also be noted however, failing to achieve delivering at least certain satisfactory level of scientific publications may easily cost such leading researcher losing grant(s) and disbanding her/his research team while graduate students may well be assigned to another mentor. Furthermore, mechanisms of controlling reports and on-site examination visits several time during the period of the funding grant have been established.

Last, but not least, I would like to point out that younger researchers of postdoctoral level are free to apply and compete for postdoctoral positions in any country and university of their choice. Furthermore, along with this possibility, there is even a funding scheme under which such postdocs and/or younger academic personnel could receive funding from Chinese State Institutions or certain Governmental Bodies for their advanced postdoctoral training in a country and university of her/his own choice. Of course, there are also certain imposed obligations towards returning back to China and serving/working for state academic and/or industrial institutes. Nonetheless, funding agencies and councils at every level from regional to provincial and governmental state level have special funding scheme to support young people who have returned back to their homeland China.

In general, there are also special laboratories/institutes funded from State and even some Provincial Governmental level for industrially oriented technology research and development. It should be noted, almost as a rule they all co-operate with academic institutions in some precisely defined allocation division of work and delivery responsibilities. Moreover, as a rule, only the leading researchers who have been proven and verified as scientists have chance to receive funding grants for technologically oriented research projects.

MAIN MESSAGES OF THIS STUDY: A SUMMARIZED PRESENTATION

In my opinion, across Europe, since the early 1980s it may be noted that contemporary universities have been pushed onto a transition process largely in the opposite direction than the one compatible with the driving forces paradigms of societies and their economical as well as cultural developments worldwide. For, evolution of Mankind and its societies on Earth already then has reached the era of globalization. Simply, it could not be feasible to have successful both the non-selective orientation guide of younger generations towards university institutions by name while simultaneously neglecting higher vocations schools. Largely, certain developmental confusion and deterioration were the main yield effects. It is therefore that in the transformation of the higher education in both conceptual strategies of leadership should be implemented in a compound fashion mode.

The so-called Fourth Industrial Revolution is by and large driven by information based sciences and engineering. In the heart of this revolution lies understanding and exploiting the synergies of control, communications and computing. Likely, these can be the only domain for the very existence of and subject only of the “Universitaet” in the precise meaning of the word. The consequence that yields the “Universitaet” by exploring the information based sciences and engineering, on the other hand, are naturally emerging domain of existence and subject of the “Fach-hohschule”. Perhaps solely universities in Central Europe have to a certain extent avoided the tendency to proclaim all the institutions of the higher education as university education thus degrading the essential contents of the universities while scarifying up-to-date modernization of vocational school. In my opinion, this was due to rather positive outcome that yielded both “Fach-hohschule” and “Universitaet” in Germany.

At the age of information-based science and engineering technologies more than ever before Mankind societies need a trend of the realistic devel-

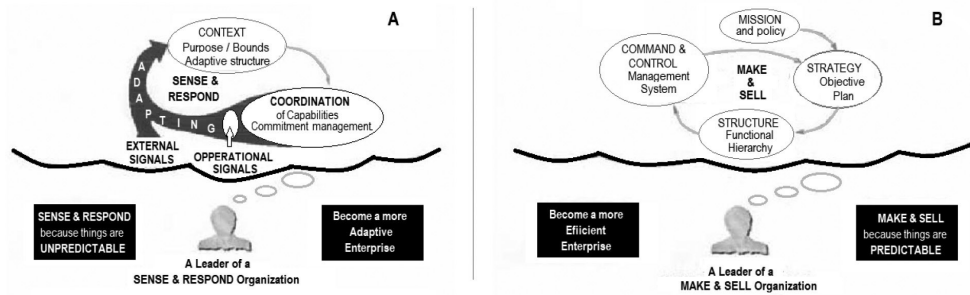


Fig. 7. Two methods for running an organization [13, 27]

opment forward of both “Fach-hochschule” and “Universitaet” simultaneously. For, by all means, both are desperately needed not at the expense of each other but to complement each other. Nowadays conferences and workshops on engineering innovations and creativity appear rather fashionable but these seldom contribute to new substantial knowledge. Since the early days of Cybernetics, when information has been gradually adopted by physicist as the third natural quantity next to energy and matter, the quality of knowledge and sophistication of contemporary civilization has moved unpredictably higher during the past two-three decades.

The “Universitaet”, in here referred to as University in Transition, must evolve towards capacity of spreading the essentially comprehended fact about the information is the third fundamental natural quantity next to tangible energy and matter albeit it is most often hidden with the fluctuation of energy and matter. The only difference comes out from the fact that energy and matter are reachable by our physiological sensors while information is reachable only by intelligence perceptions. It is therefore that Systems and Control Science represents the fourth fundamental science standing next to biology, chemistry, and physics. Thus such a place ought to be assigned within the entire future education; notice, not - should but ought to be assigned.

However it is the university first and foremost that has to undergo such a transition and paradigm change. For, it is this science precisely to which Mankind owes inventions and technologies of all kind of systemic networks, from computing and communications to business and socio-economic organizations to public media and broadcast networks to transportation networks. Yet, in order for this to happen the needed decisions to be taken by the brightest leading personalities in education, science and technology, accompanied by relevant follow-up brave decisions by powerful leaders in governments and industries, which is illustrated in Figure 7.

CONCLUDING REMARKS

Education, science and technology in China continues to make giant advancing steps very much the same way as their economy has become the second largest as well as fruitful and powerful. Perhaps, they have foreseen what remarkable Italian artist Mimmo Paladino has imagined when painting his “Testa Algebrica” (Fig. 8). Indeed I am inclined to believe, in present times since the year 1999 and nowadays, P.R. China is undergoing a Second Renaissance based on Information Science and Technologies as no other country in the world has managed to do. To put it in other words, China is undergoing its Fourth Industrial Revolution. We Europeans typically perceive Europe as per geographical maps and its past colonial times usually referred to as European Expansion. Yet by now, due to my interacting communications with tens of Chinese colleague-professors like me, I have realized they perceive globalized world hence Europe too within the context of communications, roads and railroads, as well as air and maritime routes essentially.

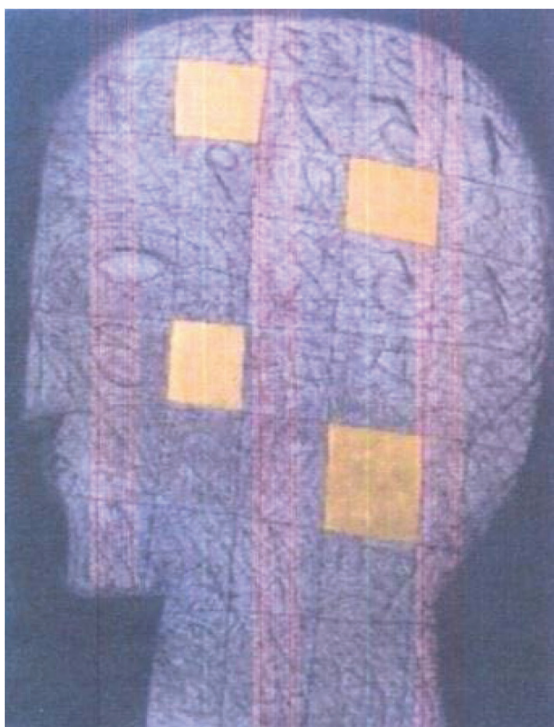


Fig. 8. Mimmo Paladino – Testa Algebrica, 2006; for the European Academy of Sciences and Arts, Salzburg

It is therefore that Chinese proposal of a kind of universal macro-project for a multi-faceted revival of the famous Silk Road, nowadays called “Belts and Roads Initiative”, does not seem surprising to me at all. It is therefore that I do believe, largely Chinese do perceive Europe as depicted by the overnight photo in Figure 5 (A), clearly demonstrating various communication channels and air routes. And also I believe they perceive the world as in Figure 5 (B), since these all represent certain implementations of complex but controlled dynamic networks, the nodes in which are all nonlinear dynamic systems themselves [14, 28], some being a reality and some to become reality in the near future.

REFERENCES

- [1] Anonymous Editor, *The Analects of Confucius*. Beijing; Yuanfang Press, 2005 (A Chinese-English Bilingual Edition).
- [2] Anonymous Editor, *Confucius and His Wise 72 Disciples*. Beijing; Yuanfang Press, 2005 (A Chinese-English Bilingual Edition).
- [3] Anonymous Editor, *Confucius a la Confucianisme*. Beijing, CN: Nouvelle Etoile, 1995.
- [4] Anonymous Editor, *La Chine et l'ONU*. Beijing, CN: Nouvelle Etoile, 1995.
- [5] Anonymous Editor, *45 Years of Economic Success 1949–1994*. Beijing, CN: New Star Publishers, 1994.
- [6] Anonymous Editor, *15 Years of Economic Reforms in China 1978–1993*. Beijing, CN: New Star Publishers, 1994.
- [7] Bell, Daniel A., *China's New Confucianism: Politics and Everyday Life in a Changing Society*. Princeton, NJ: Princeton University Press, 2008.
- [8] Benson, Hugh H., *Socratic Wisdom: The Model of Knowledge in Plato's Dialogues*. New York, NY: Oxford University Press, 2000.
- [9] Blanco, Lucien, *Le Origine da la Revolution Chinoise*. Paris, FR: Galimard, 1967.
- [10] Coplestone, Frederick S. J., *A History of Philosophy*. New York London Toronto Sydney: An Image Book Doubleday, 1985.
- [11] Deng, Xiaoping, *Textes Choies (Un etat, deux systems)*. Beijing, CN: Editions en Langues Eternes, 1994.
- [12] Dimirovski, Georgi M., A. Talha Dinibutun, Frederick Kile, Rainhard Neck, Johan Stahre, Ljubo Vlacic, “Control system approaches for sustainable development and instability management in the globalization age.” *Annual Reviews in Control*, vol. 30, is. 1, pp. 103–115, July 2006.

- [13] Dimirovski, Georgi M., A. Talha Dinibutun, “Decision and control approaches to socio-economic and socio-technical systems in the globalization age.” In *The 11th IFAC Symposium: Synergy of Computational Economics and Financial and Industrial Systems* (G. M. Dimirovski and F. Ulengin, Editors), Istanbul, Turkey, 9–11 October 2007, pp. 3–16. Istanbul, TR: Dogus University and the IFAC, 2007.
- [14] Dimirovski, Georgi M., Editor, *Complex Systems – Relationships between Control, Communications and Computing*. Cham, CH: Springer International Publishing AG, 2016.
- [15] Eisner, Mark, Editor, *NERUDA Esencial*. Santiago de Chile: Pehuen Editores, 2006 (Spanish-English Bilingual Edition).
- [16] Editorial Board, *White Book on Socialist Democracy in P.R. China*. Beijing, CN: Chinese Academy of Social Sciences, 2005.
- [17] Editorial Board, Stephen W. Hawking and the Theory of Everything (DVD). Cambridge, UK: Cambridge University, 2011.
- [18] Hawking, Stephen W., “Conservation of information and estimation of time for black holes.” archive paper, pp. 1–3, January 2014.
- [19] Hogan, Martin T., B. Demuth Howard, Mark Hudson Baele, Orlando De Jesus, *Neural Network Design*. Stillwater, OK: Oklahoma State University, 2012.
- [20] Jacques, Martin, *When China Rules the World* (Second edition). London, UK: Penguin Books, 2012.
- [21] Jing, Yuanwei, Jun Zhao, Georgi M. Dimirovski, *Twenty Years of Academic China-Macedonia Cooperation: An Overview of Joint Publications*. Skopje, MK – Shenyang, CN: FEIT of St. Cyril and St. Methodius University, and CISE of Northeastern University, 2017 (A Report to the attaches for culture, education and science in the Embassies in Beijing and in Skopje).
- [22] Kenedy, Paul, *The Rise and Fall of Great Powers: Economic Change and Military Conflict from 1500 to 2000*. London, UK: Fontana Press, 2000.
- [23] Lorens, Bram, *The Century of China - Awakening of New Economic Superstate*. New York, NY: Chinese Information Intern Center, 2002.
- [24] Menzies, Gavin, *1421 – The Year China Discovered the World*. London, UK: Bantam Books – Transworld Publishers, 2003.
- [25] Ozdemir, Ibrahim, *Rumi and Confucius – Messages for a New Century*. Clifton, NJ: Tughra Books, 2013.
- [26] Pomeranz, Kenneth, *The Great Divergence: China, Europe, and the Making of the Modern World Economy*. Princeton, NJ: Princeton University Press, 2000.

- [27] Roderik, Dani, *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*. Princeton, NJ: Princeton University Press, 2007.
- [28] Siljak, Dragoslav D., *Decentralized Control of Complex Systems*. Cambridge, MA: Academic Press, 1991.
- [29] Silverman, Allan, *The Dialectic of Essence: A Study of Plato's Metaphysics*. Princeton, NJ: Princeton University Press, 2002.
- [30] UNESCO, *Encyclopedia of Life Support Systems: Knowledge for Peace, Progress and Sustainable Development*. London, UK: EOLSS Publishers, 2002.
- [31] Wang, Xiaodong, *Chinese Youth's Views on the World: A Survey Report*. Beijing, CN: China Youth Research Centre, 2003.
- [32] Zadeh, Lotfi A., "From computing with numbers to computing with words – From manipulation of measurements to manipulation of perceptions." *IEEE Transactions on Circuits and Systems – I Fundamental Theory and Applications*, vol. 45, no. 1, pp. 105–119, 1999.

КИНЕСКИ ПРИСТУП У ЕРИ ГЛОБАЛИЗАЦИЈЕ: ИНФОРМАЦИОНА РЕВОЛУЦИЈА У ОБРАЗОВАЊУ, НАУЦИ И ТЕХНОЛОГИЈИ

Георги М. ДИМИРОВСКИ

Резиме

Током последње деценије свет се изненадио и постаје све више и више фасциниран драматичним напретком Н. Р. Кине у сваком погледу, посебно у погледу науке и технологије. Показује се да је веома захтевно истраживање за разумевање овог процеса, за чије корене ја верујем да су произашли из далекосежног наслеђа Конфучијевог учења. Јер, као што се Сократ на Западу сматра оцем философије, мудрости и духа, тако се и Конфучије сматра оцем философије, мудрости и духа на Истоку. Иако ове две струје философске мисли носе значајне разлике, показује се да међу њима такође постоји и значајна конвергенција и сливање. Осим тога, историјска улога обе кинеске револуције почетком 20. века не може да се занемари, а у знатно мањој мери ни улога Револуције 1945–49; јер, оне су поплочале пут за оно што је Кина постала током 21. века. Током задње две до три деценије постало је очигледно да образовање, наука и технологија стварно играју централну улогу у друштвеном процесу холистичке ренесансе Кине. Штавише, она је у целини заснована на револуцији у образовању, науци и технологији на бази креативних информација, тако да се ових година Кина појављује као водећа земља с производима и услугама широм света заснованим на вештачкој интелигенцији. Овај студијски рад презентују личне перцепције и закључке, односно погледе који су сазревали током двадесет година моје непрекидне и блиске академске сарадње с неколико кинеских колега. Међутим, коришћене су и стандардне универзитетске публикације. Рад је фокусиран на суштинска питања кинеског приступа унапређењу и ширењу високог образовања, научног и технолошког истраживања, као и општем развоју културе и привреде земље. Одговорност за изражене погледе лежи само на мени.

Кључне речи: Четврта индустријска револуција; високо образовање; информације; наука; друштвени развој