

全球化进程中的中国方案： 基于信息化的教学、科学和技术革命*

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摘要：过去 10 年间，中国在各个方面，尤其是在科学和技术方面取得了巨大进步，吸引着全世界惊叹的目光。看来，为了理解这一进程，非常有必要进行深入探讨，但我相信，追根溯源，这是源于孔子思想的深刻影响。因为，正如在西方苏格拉底作为哲学、智慧和机智之父，在东方，孔子也被认为是哲学、智慧和机智之父。尽管这两种哲学思想的风格具有相当大的差别，但它们之间的交汇和融合也是显而易见的。20 世纪两次中国革命的历史意义是不能忽视的，尽管其影响远远比不上 1945—1949 年的革命：在 21 世纪目前中国正前进在艰难探索的道路上。实际上很显然，在过去的 20—30 年期间，在中国社会全面复兴的过程中，教学、科学和技术起着至关重要的作用。此外，总体而言，这是源于教学、科学和技术基于创新信息的改革，从而使得这些年中国能以人工智能为基础的产品和服务先行者的身份呈现在全世界面前。本文介绍作者个人的认知和结论（观点），这得益于 20 年来与几位中国同事长期密切的合作。不过作者也使用了众多公开发表的大学出版物。文章的重点在高等教育、科学和技术研究的成绩和进步，以及国家文化和经济发展的一些重要问题。

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

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Abstract: 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 1945-49 Revolution; for, they paved the way of what China is becoming during the 21st century. It became obvious during the last two-three decades 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 a creative information based revolution of education, science and technology so that these year China emerges as the leading country of AI based products and services worldwide. This study papers presents personal perceptions and conclusions, hence views, which matured during twenty years of my continuing and close academic co-operation with a couple of Chinese colleagues. Though, standard university publications have been used. It is focused on the essential 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.



1. INTRODUCTION

In the 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 spaces on Earth and, possibly, within then known part of our universe. Yet, similarly to Socrates, Confucius has let 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*^[1-3] From that small book by modern measures there springs an outflow of 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 important 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^[1,5] (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 Resistance War against Japan’s 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 considerable the generally perceived continuing 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 education, science and technology cannot be understood let alone explained without insight into the wider spectrum of societal changes within P. R. China^[7,11,16,20,23,26,31] It is this path that is followed into this modest, but scientifically grounded, investigation discussion.

Indeed I have been lucky enough since the year 1996 to observe from within the timely changes^[7,21,23] in Chinese society and its Higher Education, 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. 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.

Furthermore, I find it fascinating how superior had been Chinese maritime technology (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 has made a far wrong (but reaching) decision by ordering Admiral Zhen He to return back home and issuing a decree which prohibited further explorations into the ‘barbaric’ world. Reportedly into imperial writings, namely, he had concluded there is



Figure 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 ago to draw wisdom of Confucius (a– Confucius; and b–Confucius debating with his best disciples; traditional Chinese paintings).

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 this issue be left 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. Ever since 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^[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, immediately I do emphasize for that purpose Chinese State Authorities at the same time have introduced 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 primary criteria sine-qua-non in completion for funds at all levels. Along with these measures, generous individual rewards have been introduced and implemented as well.

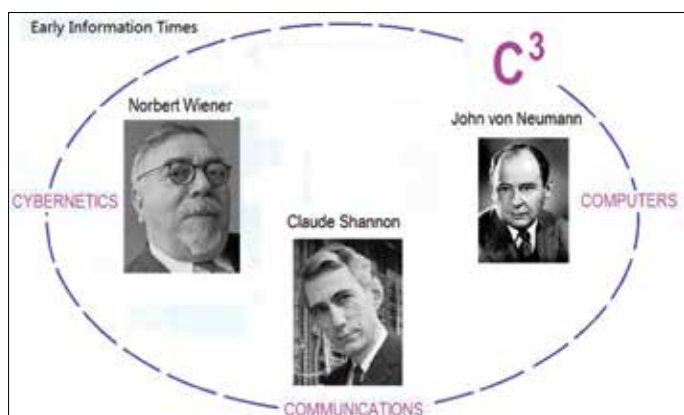


Figure 2 Widely acknowledged fathers of C3 paradigm – Cybernetics-Computing-Communications: Norbert Wiener (Cybernetics or Control and Communication in the Animal and Machine); Claude Shannon (Mathematical Theory of Communications); John von Neumann (Computing Automata and Computing Languages).

Figure 3 A. M. Lyapunov - General Stability Theory of Dynamic Systems, a); H. von Foerster - 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 C3 paradigm^[12,14,28].



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 C3 paradigm –Cybernetics-Computing-Communications– the essential feedback feature and properties play crucial roles for their very existence to all of them^[14]. For, I do believe it is this C3 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 Cybernetics Sciences. Fig. 3 puts together scientists

who made the difference in engineering sciences.

In my humble opinion, one should question herself/himself: How it could have it 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. Thus, Chinese are heading towards their Fourth Industrial Revolution for quite some time. The elaboration

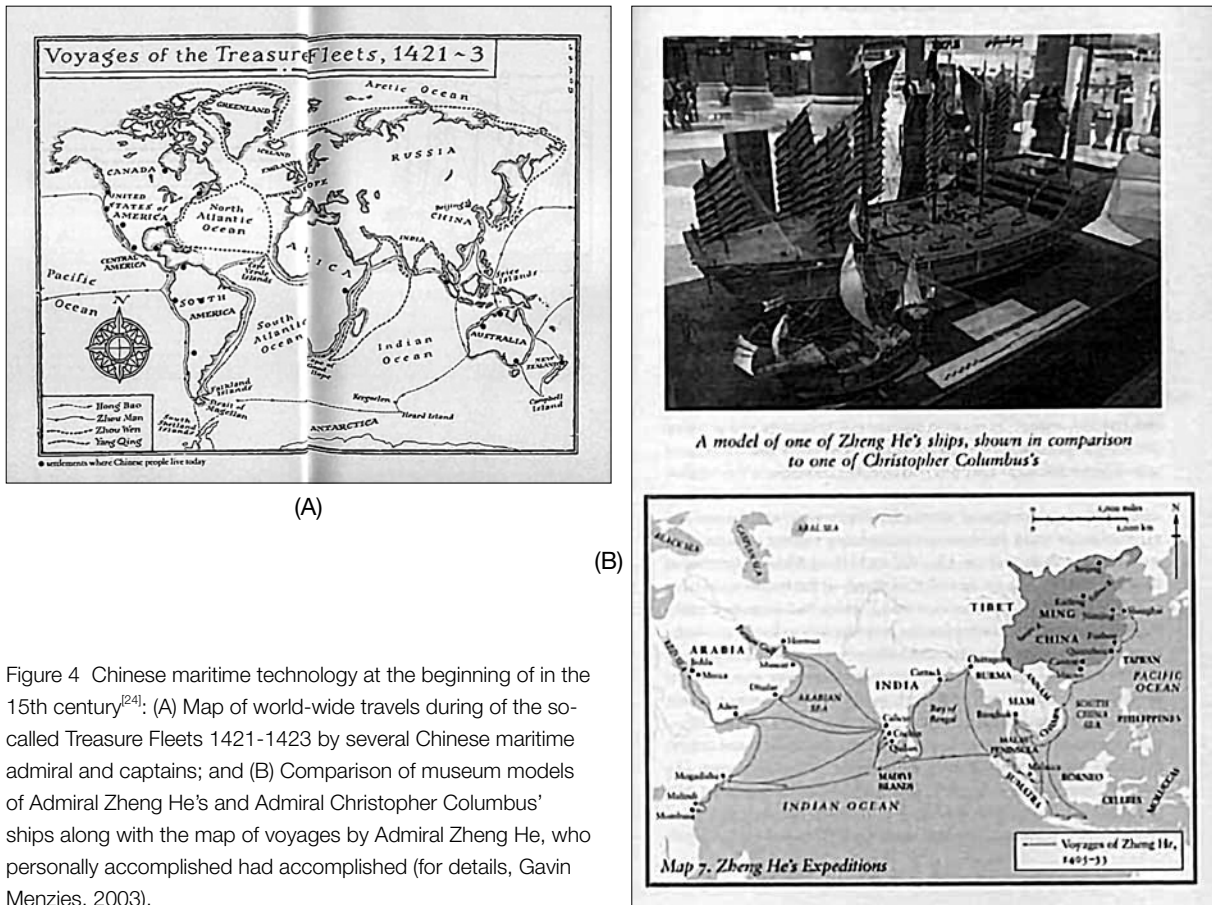


Figure 4 Chinese maritime technology at the beginning of in the 15th century^[24]: (A) Map of world-wide travels during of the so-called Treasure Fleets 1421-1423 by several Chinese maritime admiral and captains; and (B) Comparison of museum models of Admiral Zheng He's and Admiral Christopher Columbus'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

of the insights into this question, however, is not a straightforward one^[12] as I have stated it in here. For, inevitable it does require addressing the wider societal issues about P.R. China^[3-7,11,16,31], which is beyond the scope of this paper. It should be noted nonetheless, it were 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 various dynasties. In here I mention only two rather relevant messages of his wisdom: "Learning without thinking is labor lost. Thinking without 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, daily China benefits even more faster overall advance developments in all fields of human endeavors, and not only 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

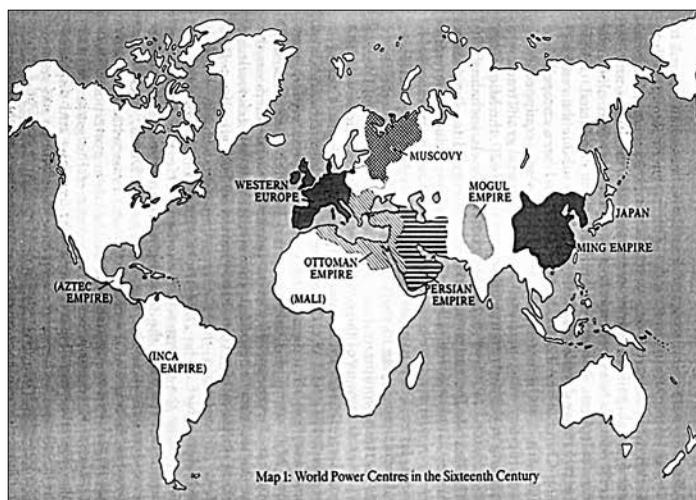


Figure 5 The 16th Century AD^[22]: Known world empires when Western Europe with about 55 million population was beginning to rise after being devastated by religion and sectarian wars by dynasties fighting for feudal inheritance lands and supremacy, while Imperial China has had about 120 million and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

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 fascinating how superior had been Chinese maritime technology (Fig. 4) at times of Ming Dynasty (1368-1644 AD), the 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 has made a far wrong (but reaching) decision by ordering Admiral Zhen He to return back home and issuing a decree which prohibited further explorations into the ‘barbaric’ world. Reportedly into imperial writings, namely, 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].

2. 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 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^[12,13]. In this way they, it is believed, 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 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 built socio-technological system (interacting economy-infrastructure) where forms of computational intelligence technology^[16,30] constitute essential ingredients.

It is important to note, however, 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 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 appeared not so long before the notions in the title of this section became buzzwords of today's news world-wide considerable changes have already taken place^[12]. The so- called Fourth Industrial Revolution is 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

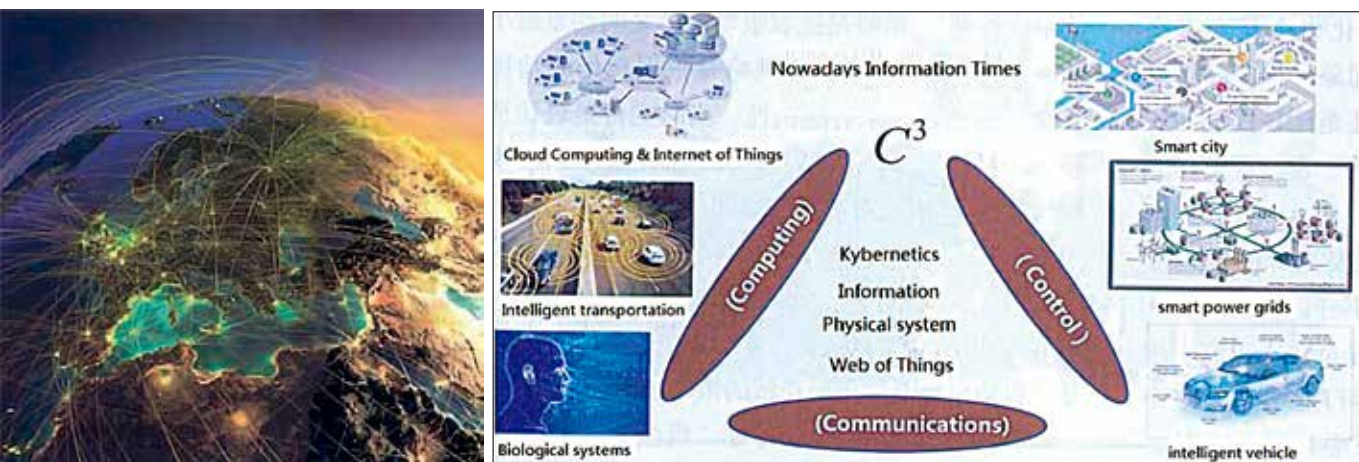


Figure 6 Two illustration facts of Europe: (a) Geomorphologic one; and (b) Cybernetic -schema depicted one by employing C3 -paradigm of Control-Computing-Communications^[14].

to energy and matter, the quality of knowledge and sophistication of contemporary civilization has moved unpredictably higher during the past two-three decades.

In fact, there has been unprecedented driving near the societal environment in the sense of advanced restructuring towards man, systems, and cybernetics, which even was not foreseeable only a couple of decades ago. Indeed, living in this filed for almost half a century, I may well argued in favor of the Control-Computing-Communication (C3) 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, the word is 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 6 (a) and (b).

3. A CHINESE BLEND OF COMBINED RESPONSIBLE ACCOUNTABILITY WITH GENEROUS SUPPORT INCENTIVES

To the best of awareness I incline 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]. When pointing all levels it stands for the levels of: universities, colleges (schools) within universities, especially 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 following pre-planned state-priorities and target goals in each and every field of science and technology research, are implemented via that comprehensive system and publically announced competition scheme for each of these levels. Of course, there exist 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, there have been established precise standard requirements and rules of competition for funding, also subject to revision every 5 years (maybe less form time to time), in each and every level funding competition. Furthermore, as a rule all finding 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 every one eligible subject accordingly.

It should be noted however, 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 the 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, there have been established mechanisms of controlling reports and on-site examination visits several time during the period of the funding grant.

Lastly 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 enabling possibility even their exist 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, also there are imposed certain 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

hometown China.

In general, also there exist 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 rule only leading researchers who been proved and verified as scientists have chance to receive funding grants for technologically oriented research projects.

4. MAIN MESSAGES OF THIS STUDY: A SUMMARIZED PRESENTATION

In my opinion, across Europe, since early 1980s there may be noted 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,

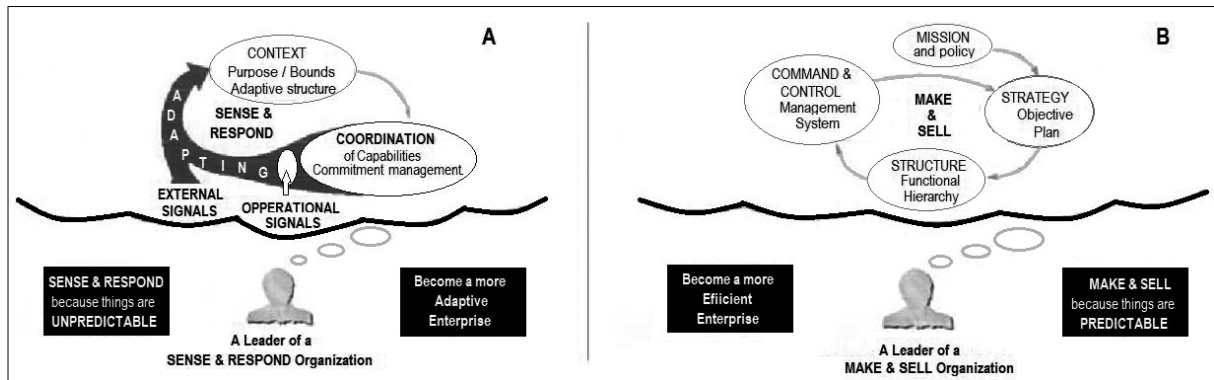


Figure 7 Two illustration facts of Europe: (a) Geomorphologic one; and (b) Cybernetic -schema depicted one by employing C3 -paradigm of Control-Computing-Communications^[14].

are naturally emerging domain of existence and subject of the "Fach-hochschule". 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, thus was due to rather positive outcome that yielded both "Fach-hochschule" and "Universitaet" in Germany.

At age of information based science and engineering technologies more than ever before Mankind societies need a trend of the realistic development forward of both "Fach-hochschule" and "Universitaet" simultaneously. For, by all means these both are desperately needed not on 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 it 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.



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

5. 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 Algebraica” (Fig. 8). Indeed I do incline 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 any other country in the world has managed to do. To put it in other words, China is undergoing her 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.

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 6 (a), clearly demonstrating various communication channels and air routes. And also I believe they perceive the world as in Figure 6 (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.



DEDICATION

This work is dedicated to Academician Si-Ying Zhang, a brilliant scientist of systems and control as well as great teacher and good friend and humanist.

Figure 9 In July 1999 Academician Si-Ying Zhang and Georgi M. Dimirovski at Campus of the Northeastern University, Shenyang, Laoning, P. R. China: A memorable encounter and time together while chatting in Russian, the only common language (photo by courtesy of Prof. Jun Zhao).

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