

ECONOMY 4.0+

SIND WIR VORBEREITET?

Vortrag und Diskussion

mit

Dr. Wolfgang Price

Zur Person:

- Geboren in Berlin.
- Ehemaliger Mitarbeiter am Atomwaffen-Programm im Nuklearbau - *als Präsident Johnston den „Krieg gegen die Armut“ ausrief, bot Price ihm seine Dienste an und verließ die militärische Kriegs-Produktion.*
- Im Auftrag der US-Regierung arbeitete er für die „International Atomic Energy Agency“ IAEA.
- Ehemaliger US Diplomat mit Wohnort in Österreich.
- Als Berater der Organisation der Vereinten Nationen für industrielle Entwicklung (UNIDO) half er beim wirtschaftlichen Neuaufbau der Ukraine.
- Von Washington DC aus leitete er zahlreiche Beratungsprojekte um den "Krieg gegen die Armut" zu implementieren. Tätig für PPM&Co (später KPMG) und das Büro des Präsidenten.
- Autor des Buches „Beyond Jobs, an Era in the Making“ (2014).
- Initiator des "Council for a 21st Century Progressive Economy". Autor des Buches: "Economy in Transition: Are We Prepared?".

Donnerstag, 14. Juni 2018

18:30 Uhr

**Hotel Altstadt/Radisson Blu
Renaissance Saal**

Rudolfskai 28/Judengasse 15
5020 Salzburg

HAYEK-CLUB

SALZBURG

FRIEDRICH A. VON HAYEK-GESELLSCHAFT E. V.

in Verbindung mit der Friedrich August von Hayek-Stiftung für eine freie Gesellschaft

ABSTRACT- Discussion Paper

Europe's economic status is poised for an accelerated phase of transition. It faces economic and social adjustments from diverse unsettling events. Our discussion will examine the nature of the shape-shifting events for their prospect in enhancing (or diminishing) the future of the EU's economic and social order.

Entering the 20th century saw Europe's economy evolve with the advent of the industrial revolution and emerge with its distinct formative characteristics. Spectacular innovation, human exertion, productivity and investment fused to yield steady improvements in living conditions (despite the destructive force of two World Wars, a global depression as well as several recessions.) A ready, durable, and increasingly skilled labor force serviced progressively intricate equipment, production systems, and administrative processes. The progressive matching of man and 'machine' furthered a thriving socio-economic order.

Europe now approaches a 21st century economy which, likewise, will have its own distinctive formative characteristics (and as strikingly disparate as the 20th century economic surge had been.) The particular 'growth' pattern that had shaped the recent past will (is) assuming a new, and yet obscure, nature while in development. *Past* 'growth' inducing practices as means for maintaining a fully-employed wage-labor work-force is likely dim. (Education which in the past was a promising entrée to the job economy will be less likely so as intelligent robots rival their human species.)

Growth will assume new, more diverse, modes of socio-economic activity. Its measure will correspondingly necessitate additional qualitative criteria in meriting living conditions, workforce participation, and civic engagement.

The discussion will examine the distinctive nature of a 21st century 'growth' economy and the effects for individuals during their prime-age productive years. Discussion will: (a) contrast what constituted 'growth' in the 20th century *industrial* era (economics of scarcity) with patterns of growth in a 21st century era (economics of surplus); and (b) contrast what constituted 'standard of living' in the 20th century with patterns of 'well-being' in the 21st century era.

The discussion will assess the changing nature of 'work' in the robot, digital, and nanotechnology era. Classifications of forms of work. Market and no-market based

work. Work as means for satisfying an altering sense of purpose in man's engross in economic and social activity.

Discussion will examine the changing mode of organizing workforce activity. Transition from large-scale, steady job, (wage-labor) employment to small-scale specialized skill and talent activity performed as individual (freelance) and intermittent project/contract work. Deployment of *skilled* robot and humanoid labor in routine, mass output, activity, while diverse digital technology-enabled abstract applications rely on native talent and unique skill for human activity.

Considered also will be emerging forms of social organizations and their prospects for gainful application of distinctly human capabilities. There appear 'social innovation' and 'social entrepreneurship' forms of quasi-economic activity. The expanded enterprise model of the NGO and other not-for-profit forms of organization which more readily enable future gainful human activity.

Meanwhile, INTERNET will continue to increase diverse enterprise modes and re-configure the marketplace structures (e.g., shopping malls, hospitals, inner-city commerce) for conducting business, consumer, and social affairs.

While there is yet uncertainty on the fortunes for the prime-age workforce in the era of robotic and digital technology, mounting displacement of job labor as well as the ensuing increase in 'free time' will yield untold new diversions for engaging man's sense of individual fulfilment and his involvement in meaningful aspects of social life. Conceiving new forms of engaging individuals in work...and in applying free-time...will be essential for an orderly society.

EDUCATION IN AN ERA OF ARTIFICIAL INTELLIGENCE

An obsession with employability runs through education. Such is education's centrality to subsistence.

In the advances of the 'machine age', demand for educated labor steadily mounted as resource in industrial production. With increase in manufacturing technology higher job requirements became all about youth education as access to a steady job. The conventional wisdom (post WW-II) held education at ever higher skill levels would increase the certainty of steady employment. That dynamic industrial capitalism would create a sufficient range of wage jobs and pay levels to keep abreast of education expansion. Growth abetted by a spectrum of worker skills emerging from education institutions, sustained periods of near full employment. To be considered is:

- In a further-evolving industrial period with its distinctly new forms of technology for productive processes and alternative means for employing knowledge-labor (viz., robot/AI workers) will industry even for well-educated continue to yield an ample selection of jobs, and periods of steady full employment?
- Will an increasingly intensive technical (MINT) education for a future generation of workers invariably maintain employment stability?
- What is a future function of public education institutions in the era of extensive application of robot/AI intelligent labor for productive processes?
- Will a 'life-long-learning' lifestyle enable workers to 'race against the machine', constantly striving and intensifying their education (knowledge/competence flows) for the prospect of securing, or holding, a job? Maintain their well-being?
- How would such workers gain compensation and/or capture the benefits for their prime-level knowledge from their employers? Is it conceivable within man's diverse range of ages and humanistic mental abilities to pursue, with intensity, a 'lifelong learning' social paradigm?
- How would education institutions in their instruction regimen prepare themselves for lifelong innovation?
- And, with workers cycling in-and-out between jobs and school enrolment, how should EUROSTAT measure unemployment/under-employment?

The paper aims to *alert* authorities for a critical assessment on the future course of public education in man's desire for purposeful activity in the era robot/AI presence 'in the world of work'; and, inquire into the course of the relationship of public education to student development as students engage other competitive/prominent forms of intelligence in civil society.

In the 20th century educated workers became the resource (factor of production) for servicing intricate tools and machinery as well as for the enterprise's administration and its compliance with state regulatory requirements.

Post WW II with the expansive demand for 'knowledge' workers preparation became an integral function of 'schools' and with costs steadily borne by the individual readying for a 'job'. By the early 1970s nearly 40 percent of the working population in the USA and Canada had become classified as active in 'knowledge occupation' industrial sectors ('white collar' workers) and educated in schools. Preparation of the industrial economy's need for qualified technical skilled workers formerly the province of the enterprise (on-the-job training), in post WW II period had shifted to a public and private-for-profit education sector.

The public education establishment in the post WW-II period shifted from a social service institution to a public-operated employment training establishment for private sector economic enterprise.

Worker education qualifications for jobs steadily advance—even for minimum wage-level jobs. The size, and level, of education for a nation’s workforce became a proxy measure of the might of a nation’s arms potential for securing its geo-political interests. [U.S. public policy was to match the Soviet Union in its surge of engineers

While data for post WW-II period indicates a correlation between education and worker job security, income, recent evidence questions the relation of education to growth, and of education to *future* steady employment and income¹. There is also evidence questioning the relation of education to job satisfaction. Countries with lower wages (those in the South of the EU-15) register a prominent relation between education and satisfaction, the net effect of education on satisfaction is positive and is more significant and positive than in northern countries.

Education certificates assumed licenses for steady paycheck, entry into adult livelihood, family formation, and occasions for leisure. Skilled workers had yielded a prosperous period for jobs, full-employment and economic ‘growth’. Education and select choices for career specialization came to determine the individual’s job, income, employment security, and upward mobility.

ERA OF ARTIFICIAL INTELLIGENCE

The education ‘industry’ confronts a radical transition into a formative 21st century economy and society. Posed are three challenges for education policymakers. (a) How to help *present* generation workers acquire relevant skills/knowledge for completing their working career while yet in employment? (b) How to keep *future* generations of potential workers engaged in industrial activity amidst a robot/AI presence? (c) How to prepare individuals for a satisfying/ purposeful/active social life amidst a divergence among the growing numbers with increasing ‘free time’ periods, and those with steady jobs and employment?

The 20th century economy had machines/systems and man coupled. Only their mix—capable machine and smart worker—yielded staggering productivity. As advent of automated machines, had displaced mid-level educated workers, so new productive forms/systems (‘intelligent robot labor’) now steadily displace higher-level educated workers. Into the 21st century human labor will steadily mingle with ready available diverse forms of substitute ‘intelligent’ labor—trained/skilled labor that constantly, rapidly, and increasingly unerringly performs productive processes the while assimilating data/information for decision processes. Human labor with its limited physical and mental endurance, and its commitments to family life and distractions from social life, will mingle with smart ‘creatures’ in their varied forms, capabilities, and endurance.

Artificial intelligence overcomes the limitations of man’s own application of the human brain and infinitely multiplies an individual’s ready mental power. Andrew McAfee, MIT

Even as in Western demographics the human prime-age workforce into 2050 is projected to decline, the robot/AI industrial and household workforce (e.g., Watson, Siri, Cortana along with complimentary productive technologies) is set to multiply. And while it is commonly reported that these operate at the ‘low-level’ of the knowledge spectrum and compete with unskilled labor, the reality is that these additions to the utility workforce presently operate most efficiently and effectively at the mid-to-high end of the knowledge and communication spectrum.

On the horizon is the appearance of a new, well-educated/trained utility workforce, whose numbers are limited only by the pace of their assembly line, and whose knowledge is instantly reproducible in successive models.

¹ College May Not Be Worth It Anymore, Ellen Ruppel Shell, NYT, May 16, 2018.

There appears no 'natural', or evident, limit to their intellectual and emotional capacity. With their numbers, applications, and instructors (program writers) momentarily limited, the education establishment unthinkingly continues the conventional development of its enrolled for numerous semi-skilled and skilled tasks yet available to human labor.

And there is in progress a new type of education establishment with a new form of enrollment. Yet to be considered are: By who, or by what means, will robots be instructed? Will there be certifications, and qualifications for instructors as is common in public school classes? How to maintain control of the instruction process for advancing robot/AI actions and/or penetration into personal and private decision realms? What are the limits on programmer liability for injurious actions from their robot 'disobedience'? To be assessed is how the education establishment, remains relevant as it confronts yet newer institutional forms serving robot/AI intelligence with customized instruction in pursuit of work and in 'expression of its own desires'.

AIMS FOR FUTURE EDUCATION²

In a 21st century period of industrial and social transformation public education institutions confront questions on: (a) the course for childhood/adolescent education for purposeful participation in society in a period of intermingling with intelligent objects; (b) the course for Universities to remain relevant—beyond channeling cognitive knowledge on industrial occupations—as prospects for financial gain/benefit to youth recipients becomes less certain. To be considered:

- What is the function of the public (and private) education establishment as mass preparation of youths for jobs and favorable employment declines as its central 'commodity' in the resource supply chain for industry?
- What remains the purpose of public education in the era of artificial intelligence?
- What competences remains a distinctive purview for human development?
- What should students be learning for employment as robots/AI engage in work humans performed?
- How should education adapt to the era of 'sozial Wissen' from a highly-sophisticated media and social interaction environment?

What competences remain for an enlightened Academia serving the course of 21st century human development?

In 2012 the EU Commission presented 'Rethinking Education', an initiative to encourage EU states to ensure that young people develop the skills and competences sought by employers. Provided were guidance to the teacher profession and proposed key competences in initial education and training.

Policy proposed an intensive regimen for youths in STEM/MINT type education. Confronted with extensive and rapid pace of technology application (viz., robot, AI, 4.0, digital, 3-D printing, among others). Further policies included 'life-long-learning'. Anticipated is steady race for out-pacing proliferating robot/AI labor applications. A public education industry (with uncertain financial sources) becomes set to dominate the rhythms of human EU social and private life.

Some cite a natural limit to individuals with abilities, and desires, to engage in protracted periods of intensive, and 'life-time' repeated cycles of reeducation and perpetual requalification of skills for the sake of livelihood. While there are in the scientific and industry community those who question across-the-board technical education as future security for industry, society, or the individual. These cite foreseeable diverse human abilities yet well beyond 'robot intelligence, foremost self-directed activities toward 'perceived opportunities' for human action. When jobs are perishable, technologies come and go and people's working lives are longer, social skills

² The Council considered two E.U. Commission Reports which address transformative education proposals: (a) Rethinking Education; (b) Employment and Social Developments.

assume foundation. Such give humans an edge, with work that calls for empathy and human interaction—traits that are yet beyond artificial intelligence.

Urged are wider noncognitive skills (one's useful in social and civic affairs as well as free-time activity) such as working well in teams, using initiative, group problem-solving. Learning that is self-directed, collaborative, and socially-based. The challenge for teaching is to calibrate students with a creative mindset and the mental elasticity to invent, discover, or create something valuable to society; and, afford students insight on how to hold their own distinctly human quality against robot/AI presence. To elicit from the student body perceptions on what remain for humans unique experience and complex expression? Cited are 'higher order' mental skills, like *abstract* thinking including abilities such as reasoning and reflective thinking focused on deciding what to believe or do' and 'artful thinking', which includes reasoning, questioning, and investigating, observing, and describing, comparing, and connecting, finding complexity, and exploring viewpoints.

While such 'higher order' mental skills are present boundary skills for human/robot competitive abilities, these are likely not a certain refuge for preserving man's distinctive human quality. A 'job economy' has afforded employment opportunity to a spread of levels in education for workers. A future industrial economy comprised of robot and freelance workers exercising rare intellectual skills is not likely to realize similar opportunities for employment of the handicap classes. A 21st century EU Authority will need to redefine employment policy questions beyond scaling-up a public education establishment and obligating it with repeated skill-upgrading for individuals clinging to jobs and employment.

If growth and education policy are incapable of settling disruptive technology dynamics, with its limits on industry requirements for human resource, policy initiatives will need to explore new, innovative, methods/activities for engaging human resources and compensating the surplus industrial labor. (Public education was never conceived primarily for its industrial application producing sundry consumer products.)

A transformative society will afford ample opportunities for human (non-industry) activities. It is incumbent on public education officials to identify forms of beneficial education redirected to human engagement in *social innovation* and social enterprises with their activities furthering higher levels of the public's well-being. Expansion of social enterprises would address also an increasing imbalance in the application of human resources favoring commercial industry.

Howard Gardner contributes insight into what is perceived as relevant education for human activities in a future economic and civic order. Proposed for education is the development of 5 mind sets which further development of a disciplined, synthesizing, creative, respectful, and ethical minds.

Project Zero (developed at Harvard University) provides an example of how teachers might assist students to think deeply by viewing works of art, using an 'Artful Thinking Palette'. Students are asked to use six thinking dispositions to view art: exploring viewpoints, reasoning, questioning, and investigating, observing and describing, comparing and connecting, and finding complexity.

Even as education contributed to improvements in organization of industrial processes steady gains in productivity and economic prosperity, the organization of government and ability to govern, and legislate on critical issues for national well-being, has steadily degraded. As robot utility labor yet further advance private sector industrial performance, public education must prepare students for a 21st century society's active engagement in diverse civic activity for coping with environmental, demographic, and geo-political challenges even as public-sector operations for satisfying human social cares are inadequately attended and staffed.

“In common life, we may observe no greater eulogy can be given to any man, than to display his usefulness to the public, and enumerate the services, which he has performed to mankind and society.”
David Hume

EU INVESTMENT POLICY IN EDUCATION

EU education directives lag reorientation for enhanced life prospects on the commons from the ongoing effects of autonomous utility. Even as employment conditions change the EU through diverse directives and program investments in education attempt to promote wage employment. The **Bologna Process** had presented a Qualification Framework for higher Education. The **Amsterdam and Lisbon protocols** had established ways and means for harmonizing labor and labor-education policy. The **Copenhagen process** enhanced EU cooperation in vocational education and training with aims to improve the performance, quality, and attractiveness of labor skills in Europe.

Recently EU has restated program support for: Skills Agenda for Europe. The Agenda’s stated aims is to assure that persons develop the technology skills in market demand for *ready jobs* of today³. A presumption that with just the *right* education a technology-oriented job is at-hand. EU Qualification framework for ‘Life-Long Learning’ (LLP) is said to be designed to enable individuals at any stage of their work life to take part in stimulating skills education/ training experiences for employment. For the privilege of a job (and one’s livelihood) there is deemed one’s staying, relentlessly, a step ahead from the pursuit of robot, AI, and digital technologies. Education in the 21st century is foreseen to engage in a vast market economic enterprise for recycling humans of all ages for any moment’s shift in industrial job demand for continuous recycled workers⁴.

The EU Commission set up SPARC, Public-Private Partnership for Robotics in Europe with €700 million for 2014-20 bolstered by a €2.1 billion investment by industry. An European strategy on robotics and AI is planned. It aims to examine how to promote AI to benefit Europe's people, businesses, and economy. The Commission also has launched a high-performance computing initiative and a technology. Yet to be initiated is an European strategy on education in the era of AI for flagship education essential to human self-development in a modern-day civil society. To be envisioned is an education policy for a future EU society in a new era of human engagement in less ‘organized’ forms of income work.

The EU investment for public education remains set for distinctly commercial missions: (a) to ready ample human technology-trained resources for *possible* industrial applications across the region; (b) to expand education as an economic sector providing refuges during repeated spells of joblessness (viz., life-long-learning) with the presumed achievement of further technology skills for individual employability. The presumption is that the education ‘industry’ will produce a highly skilled labor force that will remain fully employed even as the industrial sector exploits educating (programming) an alternative intelligent robot labor pool. Yet, in measuring the education institution performance the OECD (relying on its PISA evaluation measure) reports significant scope for improving educational efficiency across OECD countries.

In a future 21st century industrial economy where skilled robot labor becomes preferred for its flexible application and productive skills, applications for human work will require from the education establishment

³ The EU skill agenda report discussing: ‘How will formal education contribute to achieving the objectives of the Skills Agenda?’ fully overlooks the basis for personal education beyond jobs. Not cited is the EU education complex’s failed performance with its student drop-out rate of 11 percent; and, 87 million individuals of working age not having completed even upper secondary education.

new forms of intellectual and behavioral proficiency for rendering a new generation of student services with now a distinctly human aptitude for advancement of work in civil society.

In E.U. education policy there is, yet, no stated insight for a future in which humans are educated for ‘higher order’ skills. A period in which individuals may be spared competition for jobs with ‘robot labor’ in performing occupational repetitive action (OCRA). A period when human efforts relieved from draft into the rigors, routines, and tedium of industrial jobs are spared from myoskeletal disorders. A period in which education assumes a new distinction—to prepare individuals to engage in endeavors suited to their native abilities; to explore knowledge for one’s own satisfaction; or, to apply knowledge for communal endeavors in advancing an enlightened civil society. A period of an alternative, one yielding individuals opportunity to develop human abilities for services beyond those applied for industry.

RELEVANT CONSIDERATIONS

Incursion of robot/AI (among other) transformative technologies into communal life is certain to continue. There is no marginalizing the impact on human activity by discrediting their limits. Whatever are presumed today ‘natural limits’ for these robot/AI workers, their indelible memory, rapid information processing (machine learning), and dependable social interaction will mature into 2050 and exceed what are deemed limitations.

We should be alarmed from 'AI' only to the extent that humankind will not learn (be educated) how to extend its own unique capacities for its common social good. Christian de Looper
--

What is said to be in store for human workforce development is a constant perfecting of the more difficult mental abstract competences. Individuals educated for unorthodox ways to find workable solutions to complex problems. One’s possessed of an open mind, insatiably curiosity, and few fixed ideas about how things should be done, and who nonetheless should have a strong conscience. Ones known for integrity and resilience. Yet, are such characteristics in humans likely to become commonplace? And while robot/AI capabilities progress exponentially can political, and governmental, processes respond to these dramatic transformations with aptly and timely policies. Can civil society keep abreast of incessant industrial reformation?

Major changes in education—structure, purpose, social and economic—proceed in slow-motion. For instance, implementation of the ‘goals’ for E.U. universities from **Bologna Process** (1999) has been a lagging and uneven development. For a 21st century socio-economic order it may be in the public interest that industry assume its interest in robot/AI development for productivity growth, while public education devotes its aims to human development for perfecting individual ‘work-rich’ participation in civil society.

Amidst the industrial transformation intermittent *gaps* and unmatched needs (structural imbalances) may create perception of a labor shortage. For sustaining public confidence in the transition process, opportunities for technical education/training efforts to address evident shortages of new technical skills should not be ignored. Education policies for vocational instruction and on the job training for filling-in skills gaps in skilled specialty occupations such as digital technology, computer servicing, additive manufacturing, and machine operations have precedents in earlier human resource development programs such as the EU Center for the Development of Vocational Training (Cedefop)⁵.

⁵ Only 15 years ago, *embedded software engineers* had a specific skillset in demand. Most were electrical engineers who knew how hardware worked and could write assembly language or C code. Embedded software engineer had to understand the hardware and software. It is a skill-set already becoming extinct.

Not to be ignored are EU protocols for a new order of education disciplines for human advancement and relevant for purposeful activity in an era of ever present AI object. And what measure of student performance will be apt as public education assumes its preparation for critical human/AI intelligent interface?

Public interest and investment in pursuit of education required for advancing the performance of future social and political demands of the civil society sector should not be deferred.

Foreseen possible is evaluation of complex psychological processes that enable individuals to solve creatively complex problems. Projects are in design for student assessment methods for *demonstrating* habits of thinking (reasoning discipline). Digital technology will enable instructors to track student projects without passing hours on marking tests. The most vital asset for future society will be individuals educated to prevail over the robot/AI incursion into the industrial and social life pattern while prepared for conceiving their own, distinctly human, endeavors/enterprises

SUMMARY

Advancing into a 21st century industrial economy human labor contends with a smart and ready robot/AI workforce. Meanwhile, present education persists in preparing individuals with knowledge for past era 'jobs'. It is time to ask difficult questions about education's place in a transforming society.

Within the EU there remains to be developed a coherent policy for future youth and adult education. Past diverse EU protocols and programs have sought to correct short-comings in student and adult education through means for more inclusive participation in an industrial job economy. Yet to be considered remains policy for education designed for human intellects in advancing decades of steady industry displacement of human labor with smart productive resources. What is required for development of human intellects to their most distinctly human competence? How to prepare prime-age human resources for gainful, and purposeful, activity in a postindustrial job economy? What does it mean to be literate/educated in the era of artificial intelligence and digital technology?

To be particularized is the *content* for mastering the distinguishing character of the human intellect for man's future security in an era of wide-spread smart utilities. There are frequent pronouncements that would require for humankind more extraordinary *creative* abilities for preparing the individual's role in future economic and social activities. However, there remains to be conceived insight into the education exercises for its development. For education to engage childhood and adult learners in the rigors of creative thought would likely require instructors who themselves demonstrate that capacity.

Similarly, there are pronouncements for LLL *occupational development*. What development is required from life-long-learning to remain abreast of intelligence and abilities of human's destined new companion? What education institutional structures will be required for engaging humans in continuing *self-development*?

Foreseen for public education urgent revisions in *what* is to be learned, *how* it is to be instructed, and at what stages in the maturing development process specific mental learning should be experienced. Yet, sweeping changes in primary and secondary public education take place particularly slowly. To be considered is a joint public/private Institute to conduct research; develop education policy; and, disseminate information on issues that require long-lead-time for implementation. Issues include: public education should merit individual native abilities and avoid student preparations for contests with AI; and, behavioral requirements for communal social life amidst intelligent robot presence. The Institute would develop topics that require long-term, sustained, systematic, programmatic, and integrated research efforts on education requirements for human work and socialization in an era of advances in artificial intelligence.