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THE FUTURE OF HUMAN ROLES IN THE EMERGING AGE OF INFORMATION

Introduction: A new turning point in history

Allow me to open with a rather presumptuous statement: Due to the progress of our technology, mankind has reached a new turning point in history.

From the very beginning of civilization, machine power has gradually replaced the physical roles formerly fulfilled by humans or animals until it has come to predominate in the tasks concerning the majority of mankind. Our discipline has continued this radical change in all kinds of undertakings excepting those requiring human creativity and empathy. The ongoing third industrial revolution is accelerating this shift with economic rationality – in present-day, ordinary workplaces, sophisticated, smart automation is increasingly cheaper, more reliable, and more easily manipulated in comparison with the human workforce. The earlier shifts from agriculture to industry and services occurred according to ruthless social forces, resulting in tragedies for masses of people but new opportunities for those who were skilled and fortunate enough to be able to adapt. The changes in social structures and in technology worked conversely.

Some antecedents

The feeling of this historical relevance goes back to ancient times. To quote Aristotle[1], if every instrument could accomplish its own work, obeying or anticipating the will of others, like the statues of Daedalus, or the tripods of Hephaestus, which, says the poet, "of their own accord entered the assembly of the Gods," and if, in like manner, the shuttle would weave and the plectrum touch the lyre without a hand to guide them, chief workmen would not want servants, nor masters slaves.

Taking a great leap in time to a little more than one and a half centuries ago, Marx[2] comments:

> *But to the degree that large industry develops, the creation of real wealth comes to depend less on labour time and on the amount of labour employed than on the power of the agencies set in motion during labour time… but depends rather on the general state of science and on the progress of technology, or the application of this science to production. … Agriculture, e.g., becomes merely the application of the science of material metabolism, its regulation for the greatest advantage of the entire body of society. ... Labour no longer appears so much to be included within the production process; rather, the human being comes to relate more as watchman and regulator to*

[1] Aristotle. *Politics First Book*, 1253b. (Trans. Benjamin Jowett.) Internet Classics Archive
[2] Marx, Karl. *Grundrisse*, Notebook VII. (Trans. Martin Nicolaus.)
http://www.marxists.org/archive/marx/works/download/Marx_Grundrisse.pdf

the production process itself. … [The worker] steps to the side of the production process instead of being its chief actor. In this transformation, it is neither the direct human labour he himself performs, nor the time during which he works, but rather the appropriation of his own general productive power, his understanding of nature and his mastery over it… it is, in a word, the development of the social individual which appears as the great foundation-stone of production and of wealth.

I must also refer here to Keynes[3], who in the time of the Great Depression had a message for us in his *Economic Possibilities for our Grandchildren* (1930):

In quite a few years – in our own lifetimes I mean – we may be able to perform all the operations of agriculture, mining, and manufacture with a quarter of the human effort to which we have been accustomed. … We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come – namely, technological unemployment. This means unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour.

But this is only a temporary phase of maladjustment. All this means in the long run [is] that mankind is solving its economic problem. I would predict that the standard of life in progressive countries one hundred years hence will be between four and eight times as high as it is to-day. There would be nothing surprising in this even in the light of our present knowledge. It would not be foolish to contemplate the possibility of a far greater progress still. …

I draw the conclusion that, assuming no important wars and no important increase in population, the economic problem may be solved, or be at least within sight of solution, within a hundred years. This means that the economic problem is not – if we look into the future – the permanent problem of the human race.

Turning point: The price of working power

This is where we stand at present. According to the above statement, a radical change is taking place concerning human roles, in the relationship between humans and work, and in the shortages of goods necessary for global welfare. Now there are many more palliatives – a far greater range of medical, psychological, and social solutions – to the problems that were previously a curse of human coexistence. Although this change has been in progress for over two centuries now, it is soon going to reach a turning point due to our technological progress. This is why it is our professional obligation to draw attention to this circumstance.

The turning point should be the moment when the cost of any available and appropriate human labour force is higher than that of the automated machine substitute. As will be discussed later in greater detail, the problem is less that of unemployment but rather that of re-employment, i.e. the aforementioned human role.

[3] Keynes, John Maynard, 1963. *Essays in Persuasion*. New York: W.W. Norton & Co., pp. 358-373.

A "rough" calculation

Let us attempt a small calculation. The analogy is the car. The car is basically a mechanical device, in which respect it is no less complex than any robot – nor, with its current array of electronic, sensory, and control features, is it any less sophisticated. Due to mass production and modular design, a mid-range car is available for around USD 20,000. Producers offer a five to seven-year guarantee. If we suppose only four years of service for a robot at about 5000 hours a year (fewer than two shifts, no free days), this means an investment of $1 per hour. That could be calculated as the wage equivalent! The minimum wage in the industrial regions of China[4] is now at the same level! If we remain with the car analogy, support, maintenance, and other expenses cannot be more than about the same, although they are presumably much lower. Much lower than the overheads, social expenses, and social problems related to the human workforce[5].

This is a cruel calculation, as inhuman as it is common in the profit or power oriented world. Its reality is undeniable, yet such a reality could only be upheld in the cases of despotic dictatorships or social retrogression.

The problem primarily affects the low-paid population, those mostly working in mass production industries and related occupations, yet it further influences the future of the present underclass[6] all over the world and, in developing countries, those millions who suffer from or enjoy the outsourcing processes of wealthier countries.

Unemployment, dubious approaches, open problems

The problem of unemployment is even more far-reaching than as it was outlined in the quotation from Keynes. In our times, the questions it poses are much more broadly discussed and they occupy politicians, economists, journalists, and the general public alike. We on the side of creating technology should also contribute with our points of view.

The first question refers to the nature of current and future unemployment – is it generally increasing, or does it only fluctuate according to economic cycles?

Why does unemployment affect the younger generation so significantly? Is this a result of an "easy-life" social phenomenon or a sign of generational oppositions? Is it in any way connected to advances in technology?

How structural is it – due to changes in conventional technologies, and rapidly obsolescing professional knowledge and learning preparation methods?

Does a danger of some kind of modern Luddism exist, and is that related to political trends in the artificial slowdown of the introduction of new technology?

Are there any forecasts of how the restructuring of employment can maintain or upset current balances? Are service opportunities able to absorb the masses freed from traditional production? Does the increasing automation of services influence this trend?

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[4] http://en.wikipedia.org/wiki/List_of_minimum_wages_in_China_(PRC)

[5] The extrapolation of future smart robot prices for the next one-two decades is rather cautious. Intelligent educational robots with visual and tactile feedback today cost about USD 1500; flexible, multipurpose industrial robots start at about USD 30,000. Current price lists can be found on the web using the search term "robot prices".

[6] Myrdal, Gunnar, 1963. *Challenge to Affluence*. New York, NY: Random House, p.10: "*An underprivileged class of unemployed, unemployables and underemployed who are more and more hopelessly set apart from the nation at large and do not share in its life, its ambitions and its achievements*."

How does the restructuring of employment influence social inequality (e.g. as measured by the GINI index)?

All these questions are more or less influenced by the achievements of our technology of automation and it is for this reason that the answers should be firmly based on those phenomena.

Contradictory answers

The current literature on this issue is rather contradictory. Most of it argues with statistics implying that unemployment is basically influenced by economic crises and that in normal conditions new technologies create sufficient new jobs to absorb the fallout. I cite only a few representative opinions from the abundant material available.[7]

There is even less consensus regarding the root causes of the specific issue of unemployment among young people. Some authors, the cited sources included, attempt to explain it by alluding to demographics and social behaviour; others refer to inappropriate or inadequate education.

Several authors of markedly different professional standing suggest that the changes in social and economic systems are consequences and requirements of the future. Paul Krugman is one of the most competent daily commentators. There is a contemporary reference to Marx by Chris Farrell[8]. A philosopher's view is illustrated in a blog by Michael Sanders[9] and Karl Smith contemplates the borders between robot fiction and reality[10].

According to my own analysis, the period of radical changes is to be expected within one or two decades, as the economic consequences of the changes become irreversible.

As previously mentioned, the spectre of the Luddites, the early 19th century machine-breakers, looms anew in modern forms. Some politicians recommend artificial slowdowns in the introduction of human-replacing technologies. Our reply to this is borrowed from John von Neumann: "For progress there is no cure. Any attempt to find automatically safe channels for the present explosive variety of progress must lead to frustration."[11]

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[7] Robert Skidelsky, Professor Emeritus of Political Economy, Warwick University:
Recently, automation in manufacturing has expanded even to areas where labor has been relatively cheap. In 2011, Chinese companies spent ¥8 billion ($1.3 billion) on industrial robots. Foxconn, which build iPads for Apple, hopes to have their first fully automated plant in operation sometime in the next 5-10 years.
Now the substitution of capital for labor is moving beyond manufacturing. The most mundane example is one you will see in every supermarket: checkout staff replaced by a single employee monitoring a bank of self-service machines.
...structural unemployment – the unemployment that remains even after economies have recovered – has been on an upward trend over the last 25 years. We are finding it increasingly difficult to keep unemployment down.
Chiodo, Abbigail J. & Owyang, Michael T., 2001. *Low Unemployment: Old Dogs or New Tricks?* Federal Reserve Bank of St Louis, The Regional Economist, October 2001
Paul Krugman, Nobel Prize Winner and Op-Ed Columnist for The New York Times, *August 3, 2013, 2:27 pm: 129 Comments:Structural Humbug*
Borenstein, Jason. Robots and the changing workforce. *AI and Society*, Volume 87/1, Feb. 2011, pp. 87-93

[8] Chris Farrell: What would Karl Marx think?, Bloomberg Businessweek, June 27, 2013

[9] **Sanders, Michael. Seizing the Utopian Possibilities of our Robot Future. *The Philosopher's Beard***, http://www.philosophersbeard.org/2013/05/avoiding-our-dystopian-robot-future.html, May 31, **2013**

[10] Smith, Karl. Inequality in the Robot Future. *Forbes*, May 13, 2013

[11] von Neumann, John. Can We Survive Technology? *Fortune*, June, 1955. Reprinted in Brody-Vámos: *The Neumann Compendium*, *World Scientific*, 1995, pp. 658-673

Beyond technology

This issue goes further than technology. It is the question of the human role in an abundant society where automatic or automation-driven production and other economic activities require the input of only a minority of the human population and, generally, only a minimum of human effort. Several visions are now taking shape in earnest. One is that of the foresight of Keynes, involving a radically shortened working time, reduced to about fifteen hours a week. The other extreme is the possibility of choosing non-working on a low income – one sufficient to ensure modest conditions for a life with dignity (guaranteed basic income)[12]. What would life mean in such societies?

This problem is very old. It has been raised in numerous contexts: that of the beliefs of religions concerning the mission of mankind; in the social context of the gap between hard-working people and those able enjoy life as a consequence of the former's toil; among the roles of different professions and the division of labour; and concerning the role of working as a main actor in human evolution, an emergent idea after Hegel[13]. All of these contexts are relevant at the advent of a technology-created affluent society – with opportunities for improvement appearing alongside the potential decline of traditional ethical and cultural values – where the avenues of such contexts and the social relevance of those avenues are supported, and in some degree defined, by technology.

According to the income gap as measured by the GINI index, social inequalities are growing larger. This is a widely-discussed problem. Another gap will emerge between those performing familiar tasks over a shorter working time and those who must struggle with the ever-growing ocean of information. These latter are the innovators, entrepreneurs, pioneers of research and development, and managers of various human organizations and large-scale systems, who work at least two shifts a day and always have trouble with time schedules. The emerging instruments of information processing, mostly referred to as Artificial Intelligence, may be helpful but are unable to solve the problem linked to human perception and creativity.

The answers are vague and they vary from one economic and cultural environment to another; nonetheless, I am certain that we creators and distributors of this new world of technology, the imminent radical change in basic human circumstances, have a role to play in finding solutions. Firstly, reliable information concerning realistic eventualities must be gathered. Secondly, the introduction of the new technology must be combined with social analyses, similar to the usual economic treatment of any technological innovation. We have to participate in those analyses and prepare our students and professionals for their roles in the same way as we have worked on economic impacts.

The cultural-geographical dialogue

The present conference could initiate fertile dialogues. It is aimed at the broad spectrum of people involved in technology and the social sciences, and focuses on views from the currently most relevant, creative civilizations which, on the one hand, shape the changes and, on the other hand, will be most affected by the consequences of those changes. These

[12] Chollett, Mona. Money to live. *Le Monde Diplomatique*, English Edition, May, 2013

13 Hegel, Georg Wilhelm Friedrich. *Phenomenology of Spirit*. (Trans. A.V. Miller.) www.scribd.com/doc/.../free ebook

are the historically great civilizations and the majority of present mankind: China, India, and the Atlantics (Europe and most of America being included in this latter group). Such dialogues could be fertile due to a common concept of reality, that of the progress of technology.

Let us return to the advice of von Neumann:

The one solid fact is that the difficulties are due to an evolution that, while useful and constructive, is also dangerous. Can we produce the required adjustments with the necessary speed? The most hopeful answer is that the human species has been subjected to similar tests before and seems to have a congenital ability to come through, after varying amounts of trouble. To ask in advance for a complete recipe would be unreasonable. We can specify only the human qualities required: patience, flexibility, intelligence.

Conclusion

The advent of an epoch of automation in production and all traditional activities on a hitherto unseen scale is inevitably emerging. New human roles and relationships are developing, bearing blessings and ills of varying degree. The constructive, realistic approach of engineering, in addition to discourse within several related sciences, is indispensable.

The transformations in question, just like with all previous great historical changes, will take time (the inertia of societies lasts longer than the time constants of technological development – sometimes for several generations). This colloquium, and many similar ones, may be a significant and responsible step towards confronting the issues such changes raise.