

Profit And Common Good: Friend Or Foe In Technology Transfer?

By Lukas Madl

Abstract

Many Technology Transfer Organizations have been implemented around the world in recent years. What is their purpose? Usually a dual scope is defined, namely to increase economic value and social value by ensuring the fullest use of the R&D results. This raises some essential questions. Does society *per se* benefit from an accelerated innovation process? How are the economic values and social values interconnected, how do they imply each other? What does benefit to people mean? To approach some possible answers to those questions, we take a closer look at two major problems humanity has to face—the ecological crisis and the extreme poverty on earth—and we investigate what part Technology Transfer could play to help.

The views expressed in this paper are the author's alone and do not necessarily represent the views of Tectnet Equity Technologiemanagement GmbH.

What is Technology Transfer Good for?

The Grand Endeavor

It was about 1.5 million years ago when early humans learned to control the use of fire. Since then, human history has unfolded a never ending story of discoveries in new ways to use nature's forces and materials to improve living conditions. The humans invented stone tools, made clothes out of hides, painted caves and buried their dead in artifacts. As time went by, the complexity of the tools and the knowledge increased. Sophisticated hunting techniques were developed; humans learned how to cultivate the earth and even how to domesticate wolves. They adorned themselves with jewelry made out of gold; they learned to build shelters, forts and cities, roads, streets and the internet.

It was the tireless activity of the human spirit through all the ages which has led to this huge progress in cultures, technologies and arts, in sciences and humanities—an enormous endeavor. In our time, the efforts to explore the secrets of the material universe and to apply the gained knowledge in practical innovations are un-precedentedly successful.

Innovations—the introduction of new or significantly improved technologies, methods or products

and their wide adoption by society—have accompanied human history from the beginning. However, their pace, their vital implication for economy, their political relevance, and their impact on our daily life have never been so high as today. And the importance of innovations will still increase in the near future. Where do the reasons for that development lie?

Innovation to Strengthen Economy and Tackle Global Problems

There were times when companies were famous for their well-known products which had not been changed for a long time and yet, the market demands were satisfied. Nowadays, this is hardly possible. The reasons for that are manifold: proceeding globalization, boosting competition, continuous technology changes, changed lifestyles and increased customer demands to name but a few. Thus, many companies and whole industries find themselves under increasing pressure to develop innovative products in ever shorter cycle times. Today, the life of a new computer model is for example measured in months, complex products such as motor cars take less than three years to be developed. A successful innovation strategy and the regular launch of new products play a vital role in the economic performance of modern companies. Innovators are more than ever the winners in the market. If a company is not capable of launching continuously new products, its long-term survival is doubtful.

Today, the world societies face severe economic challenges. The recent economic downturn has led to rising unemployment and soaring public debt. To recover from the crisis, companies and countries need to find new and sustainable sources of growth. Innovation is seen as one of the key ingredients to generate jobs, to regain economic growth and to keep the gained wealth. Hence, measures to increase innovation performance of market participants have a very high priority on the political agenda of many countries and regions of the world today.

This applies more and more also for the emerging economies. The international innovation landscape shifts massively to new players. The rapid economic growth in China has been accompanied by a dramatic increase in R&D expenditure, a vital prerequisite

for innovation. China alone accounted for almost a third of the global increase in R&D between 2001 and 2006, as much as Japan and the EU together. Brazil, India and others are also following rapidly on the global innovation landscape.

Moreover, the very poor regions of the world start to adopt this concept, too. Very recently, in June 2010, the second Science with Africa conference, entitled Science, Innovation and Entrepreneurship, explored policies, measures and mechanisms to meet Africa's development goals and aspirations by harnessing the potential of entrepreneurship and innovation to transform ideas and technologies into new or improved products, processes and business.

However, strengthening the economy is only one of many reasons why so much hope and trust is put into innovation. The economic challenges come together with enormous social and ecological challenges. Every day, thousands of children die from waterborne diseases, more than a billion people starve and more than one thousand women die in pregnancy and childbirth. At the same time, future generations will face huge ecological threats. Meeting these inter-linked global challenges of poverty reduction, social justice and environmental sustainability are the great imperatives of our time. Science, technology and innovation of many kinds play essential roles in finding appropriate solutions. For example, climate change mitigation will depend on the creation and on rapid implementation of a range of eco-efficient technologies and innovations all across the globe.

Technology Transfer to Enable Innovation

But where should all those concepts, technologies and innovations to help economy and to address global challenges come from?

Traditionally, innovation was regarded as a linear process: from basic research to technology development on to prototyping, deployment, commercialization and ultimately, market penetration—and if successful, it will result in market saturation, obsolescence and finally replacement. Human and social factors, like **the needs and desires of customers**, played only a marginal role in the innovation process.

Today, this has changed completely. Users and consumers play an important role for companies which involve them in the innovation process in order to better satisfy their needs. Companies recognize this as a way to explore new growth opportunities at lower risk and to offer greater flexibility without necessarily incurring high costs. User's experiences with products can help future innovations.

Whether innovation is mainly “supply-pushed“

(based on new inventions and technical possibilities) or “demand-led“ (based on user needs and market requirements) is a hotly debated topic. However, most successful innovation projects require a sensible conjunction of those two complementary factors. It depends on the type of innovation which factor will be more focused on. “Technology push” strategies strive for “breakthrough” or “radical” innovations through their massive R&D investments, which are usually involved. Conversely, a “market pull” approach leads to more incremental innovations, based on the existing product range. Therefore the length of the innovation process may be quite different from those two strategies. A “technology push” innovation can encompass a time period of over ten years, whereas a “market pull” project is generally more a short-term activity due to its higher market focus.

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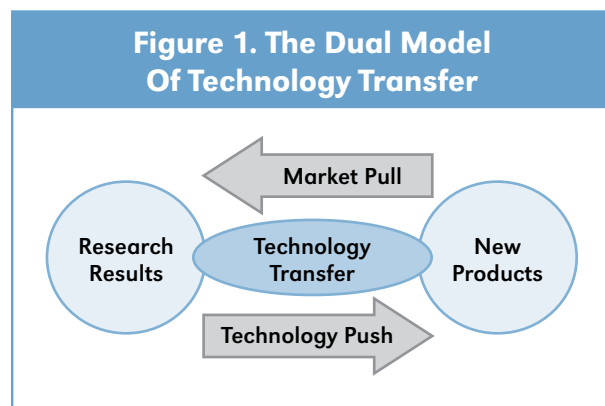
Obstacles In the Way

Thus, science and research still lie at the heart of most innovation processes and will continue to be essential elements. Scientific findings are seen as an everlasting resource for new ideas and technological concepts which can nurture the value chain of innovation if channeled properly. Then, concepts are transferred into inventions, inventions into useful real-world applications and those are finally transferred into eligible products and services. However, converting research results into the marketplace is not easy. An invention is by far not an innovation. Frequently, good ideas and inventions fail to become commercial reality. The way from the lab to a successful product is long, demanding and rife with significant roadblocks—so severe that it is called “the valley of death.”

One major obstacle is certainly a gap in funding. Often, financing is not sufficiently available to take new inventions out of basic research and transform them into commercial products; therefore, many innovation projects will shrivel half the way. Even if new technologies explicitly address market needs, a level of risk remains around their implementation, which can prevent industry partners from participating. Today, investors usually demand relatively low-risk opportunities and require proof-of-concept before they are willing to sign on.

Another major obstacle in the transition from lab to market is the deficiency in knowledge and awareness of how to bridge the two disparate worlds of science and business. Research is the vital starting point but innovation encompasses much more. Additional skills and complementary activities are needed to facilitate the transfer process—no matter if it is in the field of marketing, product development, testing, prototyping, business development or also expertise in legal, financial and patent issues. Innovation needs a dense interaction and collaboration across a diverse network of stakeholders, institutions, companies and potential users, which all have to be initiated and managed.

As the efforts to convert scientific findings to real-world application have often failed and society has shown concerns about the convenience of public



money invested in basic and applied research, it has become obvious that there is a need to focus on the transfer process itself. Thus, there has been a marked increase of organizations specialized on this purpose in recent years. Today, many universities, research institutes and even international companies have implemented a “Technology Transfer Office” (TTO). The TTOs may work on behalf of research institutions and governments or act independently. Many more TTOs will be established in the years to come—also in the emerging and developing countries.

TTOs are dedicated to identify research results which have potential applications and develop strategies for transferring them to the market—or explained in an allegory: TT professionals are like gardeners. They choose a healthy, but still vulnerable seedling (identify embryonic inventions) from the controlled conditions of the greenhouse (the research lab) and may transfer it to a hotbed (proof of concept study) with the intention to acclimatize the young plant stepwise to the harsh environmental conditions (markets). They try to understand which

potential the little plants have already got (technical features), why they would sustain against other species (USP), which kind of nutrition they would need (financing) and what kind of care the plants need to grow best (product development). The goal is to sell the plant to a garden friend (interested company), that it develops strongly in the new environment, flourishes (market launch) and yields many fruits (financial return).

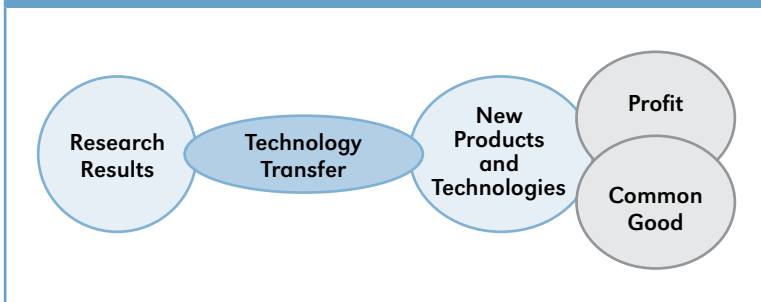
Dual Scope of Technology Transfer

How to measure the performance of Technology Transfer activities? Some people think that generating profit is the only sensible metric for TTOs. In the book “Making Money Out of Technology,” the authors state quite strictly, “*Technology exploitation is not about creating companies, nor jobs, nor benefits for mankind, nor even short-term income for the University—it is about creating commercial value and ultimately, is measured in money.*” Other people, including the author of this paper, believe that the role of TTOs in society is broader. Apart from generating **economic value**, they think that TTOs should generate **social value** by aiming to facilitate innovations which are responding to the urgent social and ecological needs. In fact, many TTOs have both goals defined in their mission, namely to increase **the economic value and the social value** by ensuring the fullest use of the R&D results.

Some Examples:

- The mission of the TTO from the Johns Hopkins University (U.S.) is to “...**bring the benefits of discovery to the world**...by moving university inventions **into the marketplace** where they can be developed into useful products for **the public good**...”;
- The TTO of California Institute of Technology, U.S. states that “*the primary mission of the Office of Technology Transfer is to promote and facilitate the transfer of useful technologies to the **commercial sector so that the public can directly benefit from the ingenuity and creativity of our outstanding researchers**...*”;
- The Association of University Technology Managers (AUTM), an international nonprofit membership organization, launched the Better World Project in 2005 to “...*promote public understanding of how academic research and technology transfer **benefits you, your community and millions of people around the world**. It contributes to a **stronger economy**, supports new research and encourages tomorrow’s breakthroughs*”;
- And also the African Technology Development

Figure 2. The Dual Goal Of Technology Transfer



and Transfer Network aims to “*generate economic and social value*” from R&D outputs.

The fact of the dual scope of Technology Transfer—and innovation in general—raises some essential questions. Does society *per se* benefit from an accelerated innovation process? How are the economic values and social values interconnected, how do they imply each other? What does **benefit to people** imply? How can the benefit be measured? Which innovations benefit society and which not? How to differentiate?

To approach some possible answers to those questions, we take a closer look at two major problems humanity has to face—the ecological crisis and the extreme poverty on earth—and we investigate what part Technology Transfer could play to help. It is obvious that solutions cannot come from technology alone. It will rather need new and strong partnerships between policy, business and civil society—a global solidarity—to facilitate effective efforts in protecting the ecosphere and promoting an integral human development. However, within the context of this paper, we focus on the question how—or if—the innovation business could contribute to solutions.

Innovation and the Ecological Challenge

The Problem

The ecological crisis is severe. Problems such as climate change, desertification, the loss of productivity in vast agricultural areas, the pollution of rivers and aquifers, the loss of biodiversity and the deforestation of equatorial and tropical regions are a reality. The Millennium Ecosystem Assessment found out that 15 of the 24 evaluated ecosystems had been degraded over the past half century. A rapid and continuing rise in the use of fossil fuel-based energy and an accelerating use of natural resources are continuing to affect key ecosystems threatening supplies of food, freshwater, wood fiber and fish. Severe weather disasters, droughts and famines are also impacting communities around the world. Our world is on a

dangerously unsustainable track today. If we continue on the business-as-usual path we are on, we will consume the resources of 2.3 earths in 2050! The current pace of environmental exploitation is seriously endangering the supply of certain natural resources not only for the present generation, but also for future generations.

How Can Technology Transfer Help?

We have to call upon the human intelligence in scientific research, in technology development and in innovation to tackle the ecological challenge. A variety of scientific developments and innovative approaches are quite promising in providing satisfactory and balanced solutions to some of the problems. Encouragement needs to be given to research into effective ways of exploiting the immense potential of solar energy. Similar attention also must be paid to the worldwide water problem and to the global water cycle system, which is of prime importance for life on earth and whose stability could be seriously jeopardized by climate change. Suitable strategies for rural development centered on small farmers and their families should be explored, as well as the implementation of appropriate policies for the management of forests, for waste disposal and for strengthening the linkage between combating climate change and overcoming poverty. There is a high need to encourage research into and utilization of forms of energy with lower impact on the environment and a world-wide redistribution of energy resources, so that countries lacking those resources can have access to them.

Where there is a challenge, there is an opportunity. The indispensable transformation process ahead represents vast opportunities in a broad range of business segments. The global challenges of growth, urbanization, scarcity and environmental change can become the key strategic drivers for business in the coming decades. Opportunities range from developing and maintaining low-carbon technologies, zero-waste cities, mobility and infrastructures with lower impact on the environment, technological and structural improvements in the use of resources and materials and many more.

Rather than being late followers, business should be part of the spearhead in the transformation process by doing what business does best: creating cost-effective solutions that people **need and want**. The difference is that new solutions will be based on a global and local market place with “true values and costs,” the “truth” being established by the planet’s limits. When using natural resources, we should be concerned for

their protection and consider the cost entailed—environmentally and socially—as an essential part of the overall expenses incurred.

The economic growth has to be de-coupled from ecosystem destruction and material consumption, and re-coupled with a sustainable economic development and societal well-being. We need a model of growth and progress that is based on a balanced use of renewable resources and recycling those that are not. At the same time, it is evident that the environmental problems challenge us to examine our lifestyle and the prevailing models of consumption and production, which are often unsustainable from a social, environmental and even economic point of view. We have to reconsider the notion of prosperity and successful lifestyles, as well as progress and value creation to include more long-term and holistic considerations such as common good and environmental impacts. If taken seriously enough, the ecological crisis offers an historic opportunity to develop a common and holistic plan of action aimed towards greater respect of natural environment including the application of advanced technologies.

Innovation and the Societal Challenge

The Problem

Many areas of the globe have considerably evolved in recent decades, thereby taking their place among the strong economic powers destined to play important roles in the future. However, extreme poverty continues to exist; some studies report that it still increasing today. Poverty and the unequal distribution of wealth are one of the most severe problems humanity has to face. Although global wealth has almost doubled since 1990 to an average GDP per capita of US\$6,000, almost 90 percent of the world's wealth is held in the OECD countries. Since the world's population is projected to reach nine billion by 2050 and the developing world will be home to over 85 percent of people, the scale of the growing inequity is dramatic.

Social Entrepreneurs

What can business and innovation contribute to rescue people from hunger, deprivation, endemic diseases and illiteracy? What can be done to enable a life in dignity to everyone? The most radical innovation is the understanding that low-income communities can be business partners, customers and workforce. The poor are not any more considered as a “burden” but as a resource, even from a purely economic point of view. After all, these are often considered as the growth markets of tomorrow.

Today, innovative business models are developed

around human and social needs that have not been addressed by governments or companies in the past. Those inclusive business models aim to be profitable and serve the needs of the low-income communities at the same time. Companies try to find synergies between development goals and the company's core business operations. Therefore, they deliver higher socio-economic value for communities while opening new avenues for growth for the company. The World Business Council for sustainable development reports that by now, some 60 member companies and regional network partners have embarked on this journey.

We are just at the beginning of a process in which those **needs-oriented business models** are evolving. Some experiences from such companies from around the world are very encouraging. These companies' important innovations are still young, many more experiences have to be made to test and improve them. Nevertheless, the enthusiasm and the professionalism that many business leaders around the world are showing towards this new business model is very promising. It shows not just a theoretical approach but a practical way through which companies can help people and society to solve some of their most pressing problems.

Playing a more active role in narrowing the gap between rich and poor will ensure their **long-term success** for companies. Success will depend, as Prahalad writes in the book “The Fortune at the Bottom of the Pyramid,” on their ability to “*nurture local markets and cultures, leverage local solutions, and generate wealth as the lowest level of the pyramid. To do these companies must combine their **advanced technologies** with **deep local insight**. New business models must not disrupt local cultures and lifestyles. An effective combination of local and global knowledge is needed, not a Western system.*”

Technology Transfer Contribution to Social Development

If the poor are the market for the future, it is vital to ensure that the products offered truly **meet the people needs** and contribute to the local development. The goal is not to sell only cheap products to poor communities—this has already been done. The innovation challenge is to offer products with better value for money. This will be more widely accepted among low-income communities. One may see the different characteristics of low-income markets as a negative restriction for product development. However, quite contrary, the history of innovation has shown that limitations of the past have led to many

of today's innovations. Some bold changes in products and also distribution methods that are required for addressing low-income markets may bear solutions of "disruptive innovations," which may change the rules of the game also in other markets.

Focusing on functionality to increase the product value will be an additional approach to recognize the specific need of low-income customers. The main task is not to find the best product to sell but rather to find out what problems a new product can solve. Dedicated R&D programs can provide answers to functionality questions such as: How are the needs currently satisfied? Can the product operate in the environment given; e.g. fluctuating electricity, high moisture, dust? Can it be easily maintained? Can it be operated by an unskilled person? By responding to these questions, companies can take the lead in developing innovative and affordable products and services that improve the overall quality of life in low-income countries. Business can also take a leading operational role in the provision of **basic needs** such as water, sanitation, energy, housing, health care and communication services. Finally, business can work with others to improve the investment climate, root out corruption and improve overall health and education levels in the developing world.

Profit Embedded

"Our vision is a world where science and technology work more directly for social justice, poverty alleviation and the environment"—STEPS Centre; Innovation, Sustainability, Development: A New Manifesto

We have asked how the dual scope of Technology Transfer initiatives—increase in **economic value and in social value** by promoting innovation—fit together. Do both goals point into the same direction? Do they overlap each other? The answer is: it depends.

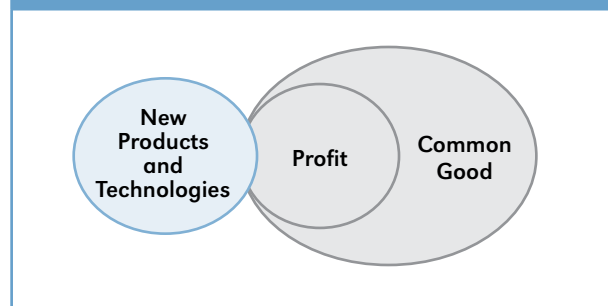
Change and innovation are not desirable ends in themselves, but depend on an overall goal in which they are embedded. Innovation can be the key—on the one hand—for employment generation, but can also—on the other hand—lead to substantial job losses if not embedded in well-functioning labor markets. Innovation can be—on the one hand—a powerful engine for addressing social and global challenges but can—on the other hand—even further threaten the environment if guided purely by short-sighted economic interests.

Therefore an array of questions should be addressed quite from the beginning of innovation processes: What is the innovation for? Which kind of innovation is it? Along which way will it disseminate into society,

towards what long-term goals? As the new OECD report on innovation also states: *"The objective of innovation policy should not be innovation as such, but its application to make life better for individuals and society at large."* Meeting human and societal needs does not happen automatically or incidentally.

According to the author, however, the goal of common good can be aligned with economic goals of Technology Transfer Organizations if it is ingrained in their strategy and respected from the outset as the commercialization process unfolds. In that vision, Technology Transfer works like normal business, based on entrepreneurial drive and with an economic goal—the generation of economic value. Yet, profit is not the only motivation. What comes first and foremost is the overall goal of common good in which profit is embedded. Profit is not an end in itself, but is considered as means for achieving human and social goals.

Figure 3. Profit Embedded



How can this vision be realized? Considering the following aspects may help on the way.

Technology Transfer Mission

Technology Transfer can enable both **economic and social value** when the responsibility towards society is perceived and anchored as core dimension of the business strategy. By that, Technology Transfer will solve social problems as well as provide great business opportunities. Technology Transfer organizations implementing thoughtful measures will become relevant societal actors for potential customers and so they will develop tomorrow's markets. However, if social responsibility is purely understood as a means to enhance corporate reputation but will not be ingrained in the essence of the mission, it becomes a disposable dimension. However, by integrating social and environmental objectives within the company's goals, TTOs will also aim to sustain long-term company value.

Long-Term Goal

The comprehensive and long-term goal of technol-

ogy transfer activities should be real growth in an integrated sense—including all aspects of **human needs** and all social ranks. That means the innovation output should be a benefit to everyone and genuinely sustainable. Thus, responsible Technology Transfer cannot ignore future generations. The overall goal has to be marked by solidarity and inter-generational justice. We must recognize our grave duty to pass the earth on to future generations in such conditions that they can worthily live on it and continue to cultivate it, too.

Partnerships

Technology Transfer initiatives could expand their existing relationships with science, business and governments and engage in collaboration with civil society groups and all stakeholders of innovation with the goal to foster systemic thinking and explore solutions for a desirable and sustainable world. The different aspects of the global problems, e.g. the financial crisis, the unregulated exploitation of the earth's resources, the poverty, the large-scale migration of people, the technical forces in play etc. are increasingly interconnected and imply each other. Thus, its solutions—measures with a decisive impact upon the present and future good of humanity—require new efforts of holistic understanding and a new humanistic synthesis.

Tools

New does not mean good. It will be important to develop evaluation metrics which help for a better understanding of the long-term impact of technology transfer projects on society. How to differentiate between constructive and potentially destructive innovations? Which criteria have to be considered? Also the newest Ministerial report on the OECD innovation strategy from 2010 proposes to *“promote the measurement of innovation for social goals and of social impacts of innovation. The current measurement framework fails to measure the social impacts of innovation. The development of measures that provide an assessment of the impact of innovations on well-being, or their contributions to achieving social goals, needs to be promoted. This includes better measurement of the people dimension of innovation.”*

Ethics

Most people of our time marvel at the huge variety of technological achievements and have at the same time the urgent wish that progress will be oriented towards the true good of humanity of today and tomorrow. The spheres of science, innovation and economy are not ethically neutral. They are part of the human endeavor and therefore, they should be

structured and guided in an ethical manner. Our present crises—be they economic, food-related, environmental or social crisis—are ultimately also ethical crises, and all of them are interrelated. They want us to rethink the path on which we are on: What can we do, what should we do and how should we do it to solve pressing problems of today?

Technology Transfer and Cultures

It is true that the export of investments and the transfer of skills, know-how and technologies can benefit the populations of receiving regions. Labor and technical knowledge are valuable and universal goods. However, we should be cautious not to oversimplify reality in artificial ways, but objectively explore the full human dimension of the problems. The picture of development has many aspects which stand in connection with each other. The actors and the causes in both underdevelopment and development are manifold, the faults and the merits are different. We should realize that innovations and economic activity alone cannot solve all social problems through the simple application of commercial logic. This needs to be directed towards the pursuit of common good. Innovations may supply the material for human advance but is powerless to achieve it by itself. If cultures are reduced to the technological dimension, even if it may favor short-term profits, in long terms, it will impede reciprocal enrichment and the dynamics of cooperation.

Human-Driven Innovation

Men and women are the essence of innovation. It is mankind who is inspired by visions, who generate ideas and who reach decisions along the value chain. It is mankind who gains knowledge and applies it on technologies, products and services. It is mankind who will use the technology as customer at work places and in leisure time.

People are the cause, the meaning and the scope of innovation. An innovation model should be developed and promoted in which the integral development of the single human person, of society and whole humanity stands at the center. This will serve the paramount **needs of humans**, including the economic, social, cultural and spiritual aspects.

When we search deeper for what **people need**, we come to an underlying question which has accompanied the way of men and women from the beginning: “What is the human being?” This question gains new importance in our time because of the multitude of challenges we have to face and the momentous decisions we have to take. Our relation to nature, to economy, to technology, and to ethics will rely on the answer. ■

The author welcomes any kind of comments and contribution to discussion regarding the outlined topics of this paper.

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