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### Harnessing the Techno-Scientific Progress of the 21<sup>st</sup> Century for the Preservation of Life

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#### Abstract

The impact of science and technology today cannot be relegated to the background. There is basically no area of human endeavor that has not been affected directly or indirectly by technology. Advances in scientific research have been able to make life easy for man. Notwithstanding the blessings of technology in the 21<sup>st</sup> century, there is a wide range observation of the abuses of technology. This paper notes that humanity must not lose sight of the negative effects that may come from the abuse of technology and scientific researches. It is a fact that the problems of techno-scientific inventions and researches cannot be easily resolved; however, a direct confrontation between the

discovery and instrumental model of science and technology could be avoided if techno-scientists and users utilize every good technology to the service of the human person. This paper recognizes the implication of techno-scientific progress of the 21<sup>st</sup> century bearing in mind as stated above, the creation and application of knowledge, with deep consideration of the happenstance between the works of those who make discoveries on one hand and those who use those discoveries, with the moral implications in view. It pays keen attention to the many ways man could harness the technology inherent in the 21<sup>st</sup> century to preserve rather than destroy life.

**Keywords:** Evangelium Vitae, Technology, Science, Biotechnology and Artificial Intelligence

#### Introduction

Science and Technology are two related fields of knowledge and the practical application of knowledge. These areas have emancipated since the enlightenment era. However, the 21<sup>st</sup> century has brought huge blessings to humanity with the invention of sophisticated machines, instruments, service extension models in communications and travels and many other inventions that have made the world a global community. Here, there is supposed to be a natural division of labour between the pure scientist who made discoveries and the applied scientist who use them to solve basic practical problems. It must be recognized that certain technical arts, such as gunnery or surgery, provided examples of phenomena about which a great deal might be discovered by fundamental research. One wing of this history of science according to Obler has tended to emphasize the former process by celebrating the appearance of science-based technologies, such as electronics or radiation therapy, which could never have developed at all without fundamental research on electromagnetic theory or nuclear physics (1962). The other wing lays stress on technology-based sciences, such as thermodynamics or physiology, whose main impetus has come from the needs of technical practitioners such as engineers or physicians. (Ziman, 1995) <sup>[10]</sup>. However, in most fields of material activity, this separation between the pursuit of knowledge and the perfection of technique is no longer meaningful. Discovery and invention, research and craftsmanship, are melded into a unified scientific technology, rooted equally in theory and in practice.

#### Science and Technology

Science and Technology refer back to a cultural tradition that grew up as various advanced countries passed through their respective industrial and scientific revolutions. Technology refers to the application of scientific knowledge and tools to create, design, and produce goods and services. It encompasses a wide range of fields, including engineering, computer science, medicine, and biotechnology. Today Technology has virtually changed the face of the earth. It has affected the way mankind thinks and acts, it has affected the natural environment and the relationship between the human person and other creatures-

animals, plants...it has changed relationships among friends, families and relatives..." (Ibekwe, 2020) [8]. Technology has had a profound impact on society, driving economic growth, improving communication and transportation, and transforming the way we live and work. Technology has also revolutionized the way we communicate and access information. The internet and social media have made it possible to connect with people all over the world, while also providing access to an unprecedented amount of information. However, for Ziman 1995, it is generally agreed that the practice of research in science and technology generates quite strong claims to the exercise of particular human rights, and also imposes substantial responsibilities of those involved. The greatest of the human rights that the techno-scientist must take into cognizance is the inalienable right to life. This in essence confirms and brings to context the Boethian definition of the person as rendered in the Latin, *naturae rationalis individua substantia* 'an individual substance of a rational nature'. Technology hence, must see the human person as an "individual" implying the principle of *irreplaceability*, and thus, must aim at preserving and enhancing life in its entirety. Every technology must according to Ibekwe 2020 [8], "become a paramount tool for enhancing the human person, rather than a tool with secularist undertone whose function is to reduce the human person" to a thing. By this, man achieves the vision where technology is *gospel -of life-oriented*.

### The Gospel of Life

The "Gospel of Life" is a phrase adopted as a theme of an Encyclical letter used by Pope John Paul II in 1995 (*Evangelium Vitae*), to refer to the teachings of the Catholic Church on the sanctity of human life and the duty to protect it from conception to natural death. This includes opposition to abortion, euthanasia, and capital punishment, as well as support for the protection of human life in all stages, including the unborn, the elderly, and the sick. The Pope also emphasized the importance of promoting a culture of life and respect for human dignity through education, healthcare, and social policies. In addition to opposing actions that directly harm human life, the "Gospel of Life" also calls for the promotion of a culture of life through positive actions. This includes supporting families and marriage, promoting just economic and political systems, and working for peace and nonviolence. The Pope also emphasized the importance of responsible parenthood and respect for the natural law in matters of sexuality and procreation. The "Gospel of Life" is not only a Catholic teaching, but it is also a fundamental principle of human rights and dignity that is shared by people of many different religious and philosophical beliefs. Pope John Paul II by this document, called on all people of goodwill to work together to promote the culture of life and to protect the sanctity of human life. For him, "to celebrate the Gospel of life means to celebrate the God of life, the God who gives life" (*Evangelium Vitae*, 84). Therefore, it is a call to all to respect and protect human life as sacred, and to work towards building a society that values and promotes human life in all its forms. "Granted that modern biotechnological tools can help reduce human suffering and ameliorate the level of pain, no person is a creative mistake that needs correction. Man must not become more an object of certain technologies than the responsible subject of his own action."

(Ibekwe, 2022) [7]. Here we consider harnessing the progress made in science and Technology to preserve Human Life. The key lies in the capacity to develop technologies that are both efficient and humanizing, effective and dignified. (William B, 2006) [5]. Life is not just a part, but it is holistic, hence, "technology must have a human face" (Ibekwe, 2020) [8], that touches every aspect of life. One of such ways will be beholding the right vision our common responsibility to have dominion over all creation.

### "Have Dominion over all Creation": A Call for Responsible control of Products of Science and Technology

From the very beginning, God gave mankind dominion over all he created. This lordship is a call to responsibility. With the gift of intelligence intact, He is able to collaborate with him in caring for creation. We see this responsible collaboration today more evident in the advances of science and technology. The Church has always valued such progress, but has never failed to take the required precautions so as not to lose sight of the true context in which it is situated. Hence, basic scientific research, as well as applied research, is a significant expression of man's dominion over creation. Science and Technology are precious resources when placed at the service of man and promote his integral development for the benefit of all. Science and technology are ordered to man, from whom they take their origin and development; hence they find in the person and in his moral values both evidence of their purpose and awareness of their limits" (CCC. 2293) [2], knowledge and dominion always bring with it, responsibility and this responsibility is situated within the frame point of certain ethical questions. "For indeed, while technology merely asks, can it be done? Ethics on the other hand brings us one step further and asks, if it can be done, should it be done?" (PS, Manila 2002) [16]. One can answer the latter question in affirmation only if what is being contemplated is truly for the good of the human person. Therefore, the totality of the human person must be adequately considered. A concrete case that needs examination is genetic engineering applied to agricultural products. Along with the noble desire to combat hunger, poverty and disease in developing and applying such technology, scientists have the task of protecting the rest of creation from all possible harms that ensue. In fact, concerns have already been raised that certain experiments and marketing strategies may have detrimental effects on different areas of human existence, such as health and safety, environment and biodiversity, culture, consumer's rights, and proper distribution of food and earnings. Genetic engineering is acceptable only if all risks are minimized. Otherwise, one may easily succumb to temptations of productivity and profit at the expense of the people and the environment. And as long as foreseeable dangers are not fully identified, studied and avoided, safe alternative procedures should be used, or if none, testing and development of the technology should be delayed altogether.

### Communication Technologies

One of the most significant developments in technology has been the rise of the internet. The internet has transformed the way we access information, connect with others, and do businesses. It has made the world a smaller place, enabling people from different parts of the globe to communicate and

collaborate in real-time. Technology has also had a major impact on the way we communicate. The rise of social media has made it easier for people to connect with each other and share information and ideas. In addition, video conferencing tools such as Zoom, Skype google meet and the likes have made it possible for people to hold meetings and collaborate remotely, breaking down geographical barriers. In this century there is a total emancipation of communication technologies, as each day new communication technologies are being developed. Do these new technologies help to preserve or destroy life? Not biased by the blessings of these technologies, it must be mentioned, that the abuses of such technologies in spreading lies and disseminating false information of various degree is every day on the increase. The range and diversity of media accessible to people... already are astonishing: Books and periodicals, television and radio, films and videos, audio recordings, electronic communication transmitted over the airwaves, over cable and satellite, via the Internet. The contents of this vast outpouring range from hard news to pure entertainment, prayer to pornography, contemplation to violence. On this, the Pontifical Council for Social Communications notes that, depending on how they use media, people can grow in sympathy and compassion or become isolated in a narcissistic, self-referential world of stimuli with near-narcotic effects. (*Ethics in Communications*, 2) <sup>[18]</sup>. As noted above already, most times the information and news in these technologies defame, cause violence, instigate fears, spread lies and at the end lead to depression, despair, sicknesses and death. The weakness of these communication technologies lies in the fact that in its impersonal nature, it has been bastardized, many abuses of these means of evangelization have remained destructive such that these means have become “*cacangelophore*” rather than “*euagelion*”. Today, the media is used to block community and injure the integral good of persons: By alienating people or marginalizing and isolating them; drawing them into perverse communities organized around false, destructive values; fostering hostility and conflict, demonizing others and creating a mentality of “*us*” against “*them*”; presenting what is base and degrading in a glamorous light, while ignoring or belittling what uplifts and ennobles; spreading misinformation and disinformation, fostering trivialization and banality. Stereotyping based on race and ethnicity, sex and age and other factors, including religion is distressingly common in media. Often, too, social communication overlooks what is genuinely new and important, including the good news of the Gospel, and concentrates on the fashionable or faddish. (*Ethics in Communications*, 13) <sup>[19]</sup>. Communication should be “communication of the Good News of Jesus Christ”. If it is the communication of the good news of Jesus Christ, it thence, must be *life-giving*. It must be and remain the proclamation of the Gospel as a prophetic, liberating word to the men and women of our times; it is testimony, in the face of radical secularization, to divine truth and to the transcendent destiny of the human person; it is witness given in solidarity with all believers against conflict and division, to justice and communion among peoples, nations, and cultures. (*Ethics in Communications*, 13) <sup>[19]</sup>. The internet through the communication technologies must be at the service of the human person.

### Biotechnology and Agriculture

The development and use of science and technology by man is part of his cultural evolution. Biotechnology is concerned with a central aspect of life: The genetic records of a cell. Information which is necessary for the survival and the multiplication of a cell can be modified. (*David et al 1995*) <sup>[4]</sup>. Theoretically, the cells of all organisms can be genetically modified, whether we are speaking of algae, mice, bacteria or maize plants various organisms play a part in greatly different spheres of human life, and are the subject of scientific research. Many antibiotics are produced from micro-organisms. Beer is brewed with yeast and dough rises with yeast. Plants are used as basic foodstuffs and also as feed for many animals which provide us with meat, milk and eggs. Wherever forms of life exist or provide services for mankind, modern biotechnology and, accordingly, gene technology also have their place. The Agricultural industry is among those industries being greatly impacted by technology through the use of robots and artificial intelligence. Agricultural robots handle various tasks such as harvesting or spraying crops from weeds or pests more effectively than human workers. These are machines and drones with computer vision, machine learning models, or AI algorithms that *monitor* crop and soil conditions, *analyze* the influence of weather and other environmental conditions on plants and *predict* consequences. Since the population on our planet is growing, it will be a challenge to produce more food. The automation of the agricultural industry seems to be the best way to cope with this challenge. However, agricultural technologies should not be misused to harm the human person. Hence, in his address on the jubilee of the agricultural world day 2000, Pope John Paul II reminds the world agriculturists that the “earth is entrusted to man's use, not abuse”. This according to him is a principle to be remembered in agricultural production itself, whenever there is a question of its advance through the application of biotechnologies, which cannot be evaluated solely on the basis of immediate economic interests, they must be submitted beforehand to rigorous scientific and ethical examination, to prevent them from becoming disastrous for human health and the future of the earth. When this sector is under appreciated or mistreated, the consequences for life, health and ecological balance are always serious and usually difficult to remedy, at least in the short term. Science and technology are precious resources when placed at the service of humankind and used to promote our integral development for the benefit of all (*CCC*, 2293) <sup>[2]</sup>. Scientific research and its applications, such as expressed in agricultural biotechnology and genetic engineering, carry a moral imperative. “Science and technology by their very nature require unconditional respect for fundamental moral criteria. They must be at the service of the human person (and) in conformity with the plan and will of God” (*CCC*, 2294). Agricultural biotechnology brings humankind extraordinarily close to upsetting the intricate order of biological and ecological relationships upon which life and health depend. We note here that agricultural biotechnology is altering social and economic relationships within food production. Hence, there is deep concern about the ethical use of intellectual property rights and the patenting of genes and genetically modified organisms. Christian principles inform a way of living and shape a response to genetic

engineering that is respectful to our fellow human beings, the physical world and a loving God.

### Gene Technology

Gene technology is another technology that has kept the progress of life in this century. It refers to the manipulation of genes, including modification, regulation, and transfer, to achieve specific outcomes such as improving crops, treating genetic disorders, or producing bio-pharmaceuticals. The techniques used include genetic engineering, gene editing (CRISPR-Cas9), (Hefner, 2007) <sup>[17]</sup>, and genome editing. Gene technology has numerous applications in fields such as agriculture, medicine, and biotechnology. For example, in agriculture, genetically modified crops are developed to increase yields, resist pests and diseases, and tolerate environmental stress. In medicine, gene therapy is being researched as a way to cure genetic diseases by replacing, repairing, or altering a person's faulty genes. In biotechnology, genetically modified micro-organisms are used to produce enzymes, vaccines, and other products. Despite its potential benefits, gene technology also raises ethical and safety concerns and is a highly regulated field. (Koch et Tononi, 2008) <sup>[3]</sup>, The ethical concerns around gene technology include the potential impact on biodiversity and the risk of unintended consequences, as well as the ethical implications of modifying the human genome. These ethical concerns must be put into consideration so as to put in check the limits of this technology and its wrong or selfish adaptation. Overall, gene technology is a rapidly evolving field that holds great promise for improving human health and the environment, but also requires careful consideration of its potential risks and benefits. There is the need for careful consideration and regulation of gene technology, to ensure that its benefits are realized and its risks are minimized. Hence, all experiments, even experiments with great benefits, which use unethical means must be condemned. Non-therapeutic gene manipulation is unethical. The ends do not justify the means. Hence, we must make effort to proceed cautiously with therapeutic gene manipulation, but staunchly oppose any form of non-therapeutic manipulation aimed at selection or alteration of germinal cells.

### Artificial Intelligence

Another area of technology that has seen significant growth is the field of artificial intelligence (AI). AI involves the use of computers to perform tasks that would normally require human intelligence, such as learning, problem-solving, and decision-making. AI has the potential to revolutionize many industries, including healthcare, transportation, and manufacturing, by automating tasks and increasing efficiency. The 5<sup>th</sup> commandment of God "thou shall not kill" prescribes a responsible stewardship of life by maintaining and enhancing it through various means that are morally acceptable and within the divine vision of the human person. In this line, modern technologies, including robots and AI, contribute to the development of digital health and significantly improve medical care.

Robotic machines have become irreplaceable surgeons' assistants. They enable minimal invasiveness and improved accuracy during operations, which reduces recovery time for patients. AI-based chatbots and consulting applications facilitate the branch of telemedicine. Other intelligent programs can perform precise diagnostics by analyzing

patients' medical records and other data. The potential of intelligent software and machine in healthcare is enormous because of their ability to make medical services more accurate and available. Artificial Intelligence (AI) has made a major impact across a myriad of industries, especially in healthcare. It is evolving technology that has become a part of our daily lives in ways we have never imagined.

The use of AI in the healthcare industry is radically changing the face of the IT industry. Although this technology is substituting humans in a plethora of job roles across industries such as marketing, finance, telecommunication, and more, it is not reducing the job opportunities. In fact, AI is leading to the creation of a range of new job vacancies that did not even exist a few years back. (Clemmitt 2006) <sup>[12]</sup>. AI is being leveraged to deploy efficient and precise inventions that will help take care of patients suffering from deadly diseases like cancer and hopefully find a cure for them. AI provides several advantages over traditional methods of analytics and making clinical decisions.

AI algorithms (Larson, 2002), make the systems more precise as they get the opportunity to understand training data, which helps humans get unprecedented insights into treatment variability, care processes, diagnostics, and patient results. AI offers one of the best Machine Learning and Artificial intelligence tools in healthcare that allows Pathologists to make accurate diagnoses. For example, it reduces errors during the process of cancer diagnosis and offers a range of new techniques for individual medical treatment. With increased accuracy in the diagnosis of cancer patients, most of them can be looked after or be cured at a stage where it does not turn fatal, saving numerous lives. Again, AI proves to be of immense help when it comes to diagnosing possibly fatal blood-related diseases at an early stage.

With the help of AI-enhanced microscopes, doctors are now able to scan for harmful substances and bacteria in samples of blood, such as Staphylococcus, E. coli, etc., at a much faster rate compared to the speed in manual scanning. Scientists used over 25,000 blood sample images so that the machines could learn how they should find the harmful bacteria (David 2015) <sup>[1]</sup>. AI allowed the machines to learn to identify these bacteria in the blood and predict their presence in the new samples with an accuracy of 95 percent, reducing fatality by a large margin.

With the help of technologies such as Deep Learning and AI, Benevolent, AI became capable of providing the correct treatment to the required patients at the right time, resulting in achieving better target selection of patients and offering insights. The company is working on getting its drugs licensed and creating portable medications for rare diseases.

Another significant role of Artificial Intelligence and its tools in healthcare is that it automates redundant, time-consuming tasks. This leads administrators to have some spare time and go on working with other important and necessary tasks. Olive is an AI-based platform that automates several processes such as checking the eligibility of un-adjudicated medical claims, (Bayer, 2004) <sup>[15]</sup>, transferring the necessary medical data to the respective medical professionals, and so on. Olive integrates with the existing tools and software of a hospital easily, eradicating the requirement for expensive downtimes and integrations.

Robot-assisted surgery has gained a lot of popularity in the 21<sup>st</sup> century. Several hospitals are implementing robotics

that assists them in completing tasks that require precision, control, and flexibility. It is used in tasks, including open-heart surgery, exceeding human capabilities. Robots integrated with mechanical arms, cameras, and required surgical instruments augment the knowledge, skills, and experience of the doctors, creating a new form of surgery. (Kurzweil, 1991). This allows surgeons to sit at the console of a computer and control the robot's mechanical arms, while the robot offers a magnified, 3-dimensional view of the surgical site that is impossible to look at with their own eyes. Surgeries that are assisted by AI-implemented robots result in lesser complications, comparatively lesser pain for the patients, and a faster recovery rate.

AI applications make it easy to decipher images to conduct analysis. Using Deep Learning technologies and programs, these AI systems equip themselves with algorithms that offer a quicker reading of complex images, including those from CT scans and MRIs. The automated image diagnosis system offers improved performance to doctors, providing better diagnoses of diseases. Moreover, it is a vital tool when it comes to combating the shortage of radiologists and other medical professionals in hospitals. AI has made tremendous progress in medical imaging in the past years.

The pontifical academy for life is committed to ensuring the development of AI that serves every person and humanity as a whole, that respects the dignity of the human person, and that does not have as its sole goal greater profit or the gradual replacement of people in the workplace. This academy upholds six basic ethical principles (Pontifical Academy for Life, 2020)<sup>[14]</sup>, for the use of AI:

Transparency – AI systems must be explainable; Inclusion – The needs of all human beings must be taken into consideration; Responsibility – Designers and developers of AI solutions must act responsibly and transparently; Impartiality – Systems should not be created or operated according to bias, to protect human equality and dignity; Reliability – AI must be able to operate reliably. The vision of the church is that artificial intelligence should be aimed at the service of each person and humanity as a whole; it should be one that respects the dignity of the human person, so that each individual may benefit from the advances of technology. Furthermore, it must not have as its sole objective the greatest profit or the gradual replacement of people in the work place.

### Evaluation

We cannot exhaust here the inventions and innovations of the 21<sup>st</sup> century, however, we have been able to discuss on how these technologies have been able to have exert impact on mankind and his environment. We must recognize that we have bad technologies and the good technologies. While the bad technologies remain intrinsically bad in themselves and the purpose they attain, efforts must be made to keep the good ones in check so that they are not used wrongly. It is right to rejoice in these advances and to be excited by the immense possibilities which they continue to open up before us, for “science and technology are wonderful products of a God-given human creativity” (John Paul II, 1981)<sup>[23]</sup>, Technology has played a significant role in the field of healthcare, with advances in medical technology leading to new treatments and therapies for a wide range of diseases and conditions. Through the use of technology such as genetic engineering and stem cell research, scientists have been able to gain a deeper understanding of diseases,

develop new treatments, thereby enhancing life.

Technology has made it possible to diagnose and treat diseases more accurately and efficiently. Medical devices such as MRI machines, CT scanners, and ultrasound machines allow doctors to visualize the inside of the body, making it easier to diagnose and treat a wide range of conditions. In addition, electronic medical records have made it possible to quickly and easily access patients' medical histories, reducing the risk of errors and improving the quality of care.

In the context with the *Gospel of Life*, technology can be both a source of great benefit and a source of ethical concern. While technology can help to improve health and well-being, it can also be used in ways that violate the sanctity of human life or compromise human dignity. How can we not be grateful and appreciative for this progress, especially in the fields of medicine, engineering and communications? (Laudato Si, 102)<sup>[20]</sup>, To appreciate the creative functions of technology, we must come to terms with the fact that some technologies like genetic engineering and reproductive technologies raise ethical questions about the manipulation of life and the rights of the unborn. Therefore, it is important to consider the ethical implications of technology and to ensure that its development and use is guided by a respect for human life and dignity.

### Conclusion

This paper concludes by maintaining that every human being is created in the image of God and hence cannot be replaced and substituted. In order to rise to our full human stature, we must first have sufficient food to lead a healthy life. But along with meeting basic human needs, an ethic of human dignity also extends to the quality of a person's life. No one should be subject to another's unfair control, or to labor in conditions which degrade human dignity. To love our neighbor and live fully in Creation these are divine laws. The social consequences of a technology must stay in balance with its intended application, and not benefit some over the exclusion of others. Again, the profound sense that humankind and nature are enfolded in an intricate web of life leads to a sacred regard for the integrity of Creation. Conscious as humans are of nature's workings, we are given the gift of *co-creation* with God and the responsibility to build a new earth that is redemptive. Thus “to till and to keep” the earth does not end in dominion over all life, but in humble stewardship that returns the earth in fullness to God. Men and women ought to approach Creation in awe and fear, knowing that human artifice of the earth can bring bounty or ruin, depending on willful choices and our regard for the sacred. (CCC, 2415).

Finally, the common good comprises “the sum total of social conditions which allow people, either as groups or as individuals, to reach their fulfillment more fully and more easily” (Gaudium et Spes, 26)<sup>[6]</sup>. At the same time, there is a vocation for every man and woman to participate generously in promoting the common good and life. These principles call us to serve a higher purpose beyond immediate self-interests (seen in the adoption of certain life technologies for our own selfish aims) and ensure that no one is prevented from contributing to the common good by the restrictive actions of others, scientific researches or technologies. The need to feed the hungry cannot end when the social processes causing hunger and poverty remain, again, the commandment “*thou shall not kill*” cannot be

obeyed, when human inventions, cause death, debase life and disrespect the human dignity. However, this commandment prescribes the adoption of the *techno-scientific* progresses of the 21<sup>st</sup> century in caring and preserving life, be it in the communication, transportation, manufacturing and health sector. Life in order words must be preserved from the moment of conception to the moment of natural death. Hence, any action, ideology, innovation or invention that does not agree to this divine vocation, must be totally avoided.

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