Perspectives in Biotechnology and Morality: Using Macintyre's Theory of Practice

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How far can human creativity go? Can people simply create as long as they can; without even asking if they morally should? These questions ought to be answered in order to provide a moral compass to anyone who is pushing further the current technological boundaries as expressions of human creativity.

Alasdair MacIntyre's *meaning or theoretical structure of practice*[1] can potentially, if not actually, be a tool in discerning the moral theological concerns surrounding the controversial new directions in biotechnology.

MacIntyre's Theory of Practice

One of the moral insights of MacIntyre that has imprinted an indelible mark among his colleagues and even among other scholars across multi-disciplinary interests is his reformulated virtue morality, and practice is one of its core; including narrative and tradition.

As an answer to the flaws of current moral theories that he himself has detected, MacIntyre presents his *Virtue Theory* or the 'virtues-based practice morality.'

The theory of practice, as MacIntyre himself calls it, is the first stage in his own reconstruction, reformulation, and revival of the morality of the virtues. MacIntyre's project of renewal for a more adequate morality based on virtues proceeds in three distinct stages.

According to MacIntyre: "there are no less than three stages in the logical development of the concept" of virtue morality. They have to be presented and analyzed in logical order so that the core conception of a virtue is understood well. Each stage has its own conceptual background. Practice figures as the first stage. Then, follows what he characterized as 'a narrative order of

[1] Elizabeth Frazer and Nicola Lacey, "MacIntyre, Feminism and the Concept of Practice," pp. 265-282.

a single human life.' He completes these with the notion of what constitutes a moral tradition as the third stage. Essentially, an adequate morality that is based on virtues needs these MacIntyre triptych: practice, narrative, and tradition.[2]

Unlike many contemporary theorists on practice who do not explicitly write what they meant, MacIntyre, nonetheless, does not leave us orphans when he illustrated what he meant by practice. MacIntyre defines practice as:

> *"any coherent and complex form of socially-established cooperative human activity through which the goods internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity, with the result that human powers to achieve excellence, and human conceptions of the ends and goods involved, are systematically extended."*[3]

MacIntyre believes that such a definition, tortuous as it appears, "does not completely agree with current usage."[4] More so, the concept of practice used in this paper is even different from the way MacIntyre has used the term prior to the publication of his book After Virtue.

Key constitutive elements are embedded in MacIntyre's definition of practice. A cursory investigation of the concept of practice would surface the following elements:[5]

a. It exhibits coherence and complexity and requires theoretical acumen.
b. It is socially established, hence, it is formal and objective.
c. It is a shared activity, public, institutionalized, and carried out through human cooperation, not only participation.
d. It involves technical skills which are exercised within evolving traditions of value and principles, norm and standards of authority. This minimizes moral subjectivism.
e. It is organized to achieve certain standards of excellence or beyond such.

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[2] Alasdaire MacIntyre, After Virtue: A Study in Moral Theory, pp.187 and 191.
[3] Ibid.
[4] Ibid.
[5] T. L. Cooper, "Hierarchy, Virtue, and the Practice of Public Administration," pp. 320-328.

f. Certain internal goods are produced in the pursuit of excellence, not external goods.
g. Engaging in the activity increases human power to achieve the standards of excellence and internal goods.
h. Engaging in the activity extends human conceptions of its internal goods.

Below is a breakdown of the key concepts that MacIntyre forwards in his theory of practice.

People who would like to lead a virtuous life in a particular field or profession ought to first understand what the practice has been. Practice lays down the background from which a person ought to learn how to act accordingly so that he could lead a virtuous life. In essence, practice is a 'human activity' because it takes people to act rationally and work towards a common goal. Such 'human activity' is what gives meanings and values to an individual who would form, inform, and transform his environment so that he can help himself acquire necessary qualities. In turn, the activity will lead him to achieve goods internal to the practices. It is in society that a moral agent does become virtuous.

Such moves/actions of people are directed toward achieving the following: (1) meeting the rules and demands required in the activity, (2) pursuing the internal goods or the intrinsic benefits that humans experience as they perform such activities, and (3) going beyond the set standards of excellence in their respective particular field. Note that one of the internal goods is about (4) realizing man's telos or one's conception of 'what is good for man.'[6]

Four adjectives are mentioned in MacIntyre's definition of practice. These four other adjectives in the concept of practices — cooperative, socially-established, complex, coherent — are explained in-depth below.

First, the human activity is 'cooperative' because the moral agent who is pursuing a virtuous life is being helped and guided by people who can already be considered virtuous in that particular field or profession. Somehow, the assistance they give come in the form of (a) the set rules and demands that they have also passed thru during their time and (b) those they have earlier added or created as they continue to pursue excellence in the field. The moral agent is also cooperating as he willingly submits himself to the demands and the

[6] D.Z. Philips, "Critical Notice: After Virtue." In Mind, p. 113.

rules that are particularly required in the field.

The 'cooperative human activity' is also 'socially-established' because it takes at least a group of people to create actions that are long-lasting and continuous. MacIntyre stresses that any moral agent, which has a 'narrative self,' includes 'cultural roots' from which humans participate in a 'socially established human activity.' The practice is not established by any single individual but by a community from which it draws its authority. This idea is largely different from the liberal individual conception of the self. Within a practice, a human being is born, does live in multiple relationships, fulfills his social roles, and gets habituated in that sort of activity. So, doing morality is a communal activity. Practice does "display some degree of complexity and coherence so as to show an aiming at some goal in a more or less organized manner."[7]

The 'socially-established cooperative human activity' is 'complex' because other people in the past interplay as the moral agent relates with his people's narrative as well as the past concepts/theories/events that are passed on thru tradition. In a person's narrative, the complexity can lie on the human person's activities on being (a) relational, (b) embodied, (c) historical, and (d) unique but fundamentally equal. In a person's tradition, the complexity can be deemed in the act of transmitting what has been created, shaped, defined, and identified as what people in that particular field or profession have considered as the 'relevant goods for man' and/or the 'goods of excellence.'

Such 'complex socially-established cooperative human activity' is also considered 'coherent' because it is a meaningful whole that is directed towards common goals. Such goals were mentioned earlier. Practice, as a background/context for one to lead a virtuous life, is described as meaningful because the people doing the 'activity' are not left on their own. They are supported by and integrated to their respective 'narrative' and 'tradition.'

The Practice of Technology

Technology as a human activity

Technology is the sum total of the material resources produced from the human inventions that have been accumulated thru time.

[7] D.F. Pilario, Back to the Rough Grounds of Praxis, p.81.

Eventually, they become widely-used by a particular generation of people and shape that society's way of life.

From the primitive age down to the present age, humans have strived to make his existence better in order to achieve the ideal human flourishing; both as an individual and as a member of a community.

Human beings have engaged in biotechnology for thousands of years. To produce technology, people engage in the act of inventing. To invent is to deliberately or unconsciously manipulate resources in order to create something new. Such new invention has to be useful and a product of a non-obvious process.

Table 1 below shows a sample from a comprehensive survey of particular technological inventions used in history. Notice that the source materials that were used to come up with a technology are those that are readily available within the people's immediate environment. Resources that are abundant and within humans' reach are stones, woods, and plants and animal parts like bones and skins.

As time passes and as communities are bridged and become more connected, humans are able to explore places that are far from their abode, excavate minerals under the soil, separate the fibers in plants, and even navigate bodies of water in order to gather sources from other territories.

Moreover, instead of starting from scratch, a lot of inventors create something new by building on the ideas behind previous technology and inventions. So, after a straight sickle, a curved sickle is developed. From a wooden post-mill, to a tower-mill, and then a wind mill. Producing textile started from the manual throwing of the flying shuttle from side to side, to the 8-spindle spinning jenny, to the water frame machine, and to the water-driven mill which pioneered the factory system. Before Wallace Carothers can invent the nylon, he has to build on from his own ideas of earlier inventing the neoprene and the synthetic equivalent of silk.

Table 1. *Source Materials and Manipulation Used in the Inventions of the Past*

Technological Invention &Inventor	Source Materials	Kind of Manipulation Used
1. axe and spearhead	wood, bone, stone	shaped
2. bow	flint and bone	shaped and assembled
3. simple rafts	leather garments	woven by hand
4. hand axes, scrapers, knife	siliceous stones	heavy blow
5. hoe and plough	stones and rocks	combined& assembled
6. utensils	pottery, glass, metals	heated and shaped
7. Chinese block printer	linen oil	fired& stone axed
8. water-frame machines	water, metals	horse-driven
9. newcomen engine	fixed stator motor	assembled
10. giant iron waterwheel	gas and flame	fueled and ignited
11. multiple unit train	chloride, sodium, iron,gold	gilded
12. hammer-drill machine	tin plate	heated
13. synthetic plant fertilizers	heavy chemicals, nitrogen, quinine drug, black deposit	chemical combination
14. vaccum tube technology	radio waves	triangulated
15. tool that separates precious metals from waste water	cottonseed oil, water, sulfuric acid	agitated the mixture
16. offset litho process	microwave & radiation	
17. powerful explosives	nitroglycerine, kieselguhr clay, magnetite, ore particles	mixed into a dough separated by electromagnets

As seen on Table 1, the source materials that have been used in inventing are manipulated in varied ways. The types of manipulation done can be classified to: (a) physical, (b) mechanical, (c) chemical, and (d) electrical processes.

Physical manipulation is largely done during the early periods. Here, one or two objects are put together and fashioned in order to be the humans' tool to relate with the environment. Physical changes are done thru cutting, pressing, scraping, crushing, chipping off, separating, wiping, splitting, connecting, hollowing, rubbing, trimming, cutting, battering, kneading, chopping, weaving, and engraving. Others involve giving a hard or soft blow, laying in succession mud bricks and stones, connecting irons to form magnets, building stones and rocks in layers,

pressing linen and expressing oil for the first European printing press, holding together wooden pegs, shaping by stone axes, and carving with a sharp knife.

There are also sample chemical changes involved in bringing forth technological advancements throughout history. To produce dyes, plant and animal sources undergo a complex fermentation process as they are treated with alkaline lime and wood ash. Elements and compounds like malachite, salt, soda, and cobalt are fired and given a lead oxide finish to form glazes for ceramics. Mixtures are also common.

A sample of the inventions done in the history of technology shows that people, particularly inventors, tried to combine characteristics of the environment so as to produce a desired end. The primary source materials are what are readily available in nature — wood, metal, plants, animals, minerals, water, or soil. Note that what are manipulated by the inventors then were the characteristics or features of the material. They did not manipulate the exact elements that make up the source material. For instance, they just fashioned the wood so that it can be a part of a mechanical machine that works. They simply shaped the steel in order to align it to the proper assembly of a computer.

In short, the inventors only manipulated the features that make up the source material. It is only lately in the history that some inventors tamper with the nature of their living source materials — microorganisms, plants, and animals.

The socially-established cooperative human activity

After having described the human activity of technology, particularly that of inventing, it is important to identify why such human activity is socially-established and cooperative.

In drawing out particular attributes and experiences of the inventors, the researcher detects patterns that inventors commonly share and go thru. They have been socially-established from generation to generation.

It has been a pattern that inventors are creative people. They use their imagination to produce something out of their available resources. That output must be an original work. That is, it has not yet been created before. Coming up with something new is a result

of either an accident or a deliberate effort. In his study of 1/5 of the available data of United States patents from 1837 to 1957 and 900 "important inventions" anywhere in the world since 1800 to 1960, Jacob Schmookler[8] realizes that "some technological change is accidental, and some of it clearly originates from the efforts of pure scientist — men whose only goal is understanding, but who produce useful knowledge as an unsought-by product."

An examination of historical records reveals that people continue to invent objects, materials, machines, and structures with the genuine desire to answer their needs and wants. Inventions were a product of one's effective adaptation to his environment. Being able to create and produce something is a contribution to the larger community. Thus, technology becomes an instrument of people to improve lives; and thus, contribute to the common good.

There are also geniuses who invent not because they were assigned to do so. They independently try to unravel the mysterious or respond to the needs and demands of their particular context. For instance, Bessie J. Blount's experience in helping her patients whose arms were amputated in World War II led her to invent an electrical feeding device for people who have no arms.[9]

There are thousands of stories behind inventions where the inventors came up with their creation out of a necessity to do so. In generally, one's study of inventions per era will reveal that inventions depict the needs of people at the particular time that the creation was invented.

Eventually, individual inventors create their inventions based on their fervent enthusiasm to solve a puzzle or a mystery. There is a genuine desire to really push the border of knowledge and find out what can be reproduced. So, an invention becomes a pioneer to all other creations that followed. Or, someone invents out of improving the inventions one was exposed to. That is because he has found another need or a loophole out of the existing inventions in technology.

Later on, the monetary value of the inventions come out at the fore. Inventions are usually patented and then used for commercial purposes. The entrepreneurial businessmen were

[8] Alderson, W., Terpstra, V., Shapiro, S.J., eds., Patents and Progress, p. 5.
[9] Ibid.

able to capitalize on the inventions and make money out of mass producing the patented inventions. Companies have used inventions to improve their products and services. Households have used inventions to have the tiring and perennial household activities be accomplished by machines.

Realizing the commercial value of inventions, some inventors become later on transformed into inventor-entrepreneurs. Other inventors, on the other hand, concentrate on the rigorous process of searching and creating novel works. There are also other inventors who are financed by individual or group patrons; or later on, by large companies. Some inventors have even already contracted and sold their present and future inventions.

The significant contributions of scientists to the society have made them gain a prestigious status. They are usually given rewards, trophies, social titles, and even key positions in the decision-making committees of the government. Here is the third socially-established activity of scientists. When inventing, it is typical of scientists to set a goal and search backward to achieve it. They apply various scientific ways like observing, experimenting, and controlling variables. From an idea, they come up with something tangible. From something abstract, something concrete is produced. No doubt, the self-educated inventors of the past used to be craftsmen. They can skillfully transform an idea to a material.

Generally, they used the empirical approach. They relied on organized knowledge and experimental techniques. They painstakingly review technical journals, pertinent books, and scientific articles in the field. They carefully analyze the volumes of patents and inventions published. They also look at the weaknesses of other scientists' inventive process; as reported and published in the literature they read. They try to detect why things worked and why they did not work. They combined ideas, identified gaps of knowledge, and tried to charter the uncharted. From these eager countenance and determination to pursue something that is still vaguely defined, they gathered insights. Thru hundreds of trial and error experiments, inventors eventually had control and able to 'tame the beast.'

Another socially-established attribute in the development of technology in the past is the willpower of inventors. The

willpower they have exhibited in the inventive process is not commonly shared among humans. It must have been a painstaking and grinding process for them to still pursue and expect that something will come out from their relentless efforts. Somehow, it is reasonable to assess that they comprise only a very small percentage of the human race. Amongst inventors, there seems to be a tireless devotion to contribute to the body of knowledge available. They devote so much sweat, time, and money in trying to create something that is not certain to produce something remarkable and useful. To look for potential loopholes, they even study their own experiments and investigations over and over again. They passionately worked on their visions and go thru a comprehensive search from the available limited resources at that time.

The fifth socially-established attribute of technology in its history is in terms of how inventors have used patents to protect themselves and their inventions. When inventors patent their inventions, they own only the prototypes of such invention. Not all inventors patented their inventions though.

To recapitulate, here are what were socially-established in the practice of technology. The inventors are creative people. They have the will power. They are responsive to the technological demands of their respective context. When they innovate, they set a goal and search backward to achieve their desired output invention. When they patent their respective inventions, they owned only the prototypes of such invention.

Cooperation, as another criterion of MacIntyre's definition of practice, is also characteristic of the inventive human activities of earlier times. Among inventors, cooperation is magnified when they collaborate in different forms. First, the act of cooperation comes in when inventors depend on the works of pioneers and other succeeding inventors. Dependence here refers to the use of prior results of earlier inventions. Successes and loopholes of inventions become springboards of other inventors to take a leap for more innovations.

Second, a synergy of minds, talents, or hands is employed in their respective work areas. During the time of Edison and Sperry, there are large workshops where the lead inventors do partner or group according to objective and enthusiasm. In corporations,

there are also laboratories equipped with apparatuses and with raw materials for experiments.

The third set of cooperation that can be deduced from the experiences of the inventors is the use of empirical data. Reading and learning from previous publications of the others, inventors submit themselves to the learned experiences and treasured knowledge of the people before them. Inventors used the available technical journals and scientific articles of their time.

How the inventors pursued excellence

The inventors of technology are in constant pursuit of excellence. Accounts of the activities of the inventors prove that they are individually and collectively working towards improving what was earlier perceived to be already excellent.

A comprehensive survey of inventions can reveal how inventors really push the perceived boundaries and limits of knowledge in order to just improve the way things are; during their respective time. Amongst the technology movers, pursuits of excellence come as an individual effort to continuously improve from either one's own invention or someone else's. More so, the coverage or application of the invention continues to widen.

The pursuit of excellence in technology is also largely evident in the Industrial Revolution. The inventors of that time are practical men of affairs with little or no formal education. Informally, they strived to learn on their own or thru the help of others.

Comparing the drive of the contemporary learned and literate people that we have at present but are not inventive, such drive of the people at that time during the Industrial revolution must be so tremendous. Typically, they are self-educated. Especially during the time of Edison and Sperry, inventors read voluminous number of books and technical journals on their own as groups. Others rely on their work experiences as venues to hone their skill. Some of them are craftsmen who are able to concretize abstract ideas into efficient mechanical objects.

The systematic extension of the inventions

The desired results of technology to humans are systematically

extended or are developed throughout its long history. If you will look into the cumulative development of inventions, you will realize that humans continue to make the processes involved as more complex, the function achieved more efficient, and the coverage reached as wider and more lasting.

Aside from this, the coverage and applications of inventions continue to expand. Although, what is more important to pinpoint here is the continuous, perennial, and cyclical drive of people to recover, recycle, re-invent, and get inspired by the technological inventions and personalities that have emerged ahead of them. These aforementioned cases represent the increasing complexity on the nature of inventions as time passes.

Developed through their respective long history, inventions have been complex.

As represented by the spinning machine, the complex process that evolved was about what drives the machine. The spinning machine used to be driven by human strength, then to mule-driven, to steam from water. The increasing complexity in the invention of clocks and the printing press has been dependent on the type of source material used. Clocks emerged from observing the regularized count of dripping water, and from monitoring nature like the shadow movements of the sun and the moon, to the mechanical weight-driven cords, then to spring-driven cords. Many inventions have been developed systematically through time. From bulky machines, inventions became smaller, more detailed, more intricate, more accurate, and more precise.

Inventions have also been systematically extended in terms of their efficient functions. Locomotives used to be power-driven, then are driven by gears, then by combined engines, and then by the steam-powered locomotives. The electrochemical processes in mining and metals started with isolation which is a costly production to the less expensive electrolysis procedure. The efficiency of inventions have also progressed in terms of the increasing number of functions that the machine was used for — from the scrubbing board, to the laundry wringer, and then to the mangles with roller. Furthermore, the inventions have also evolved in terms of the increasing wide coverage that their functions have reached. For instance, there were inventions that work only in a particular location then reaching far out to

broader locations. For instance, trains started with the "catch-me-who-can" entertainment machine made by Trevithick for people visiting a town festival. Because it is just a loop-shaped structure that few people can ride on, it is an endless chase and a source of entertainment at that time.

Because of the progress on train inventions, people have been geographically connected. The coverage of the television also increased when it started with the scanning disc viewed by very few to the television which is now witnessed by millions of people from all over the globe. The form of transportation has also been developed through time. People got mobilized from one location to another by having used horses, wheels, bicycles, and then to motor vehicles. Aside from location, technology has also been systematically extended in terms of the fields it can be of use and penetrate. For instance, the invention of X-rays have improved the medical practice, and then it became widely-used in atomic physics; especially in the release of atomic energy.

Notice that amongst all these systematically extended inventions in the practice of technology, different names of persons arise in the lineage of developing the inventions.

That is, other people are free to improve existing inventions. There was no curtailment whatsoever about issues like no one can touch or improve the invention without asking permission from the pioneers. There was no monopoly of a particular line of invention. That attribute must have also contributed to the continued refinement of inventions that have made them systematically extended.

Inventions were historically developed in accordance with the people's pursuit to continuously improve existing technology that they have in their particular time. The long and gradual progression of inventions have been cumulative.

Those who pioneered some inventions generated their ideas from the needs of their time, the demands of adapting to the environment, and the genuine desire to be contributory to the objectives of the larger community. Succeeding inventions popped up as other inventors got inspired by the achievements of previous inventors and the technology they get in contact with. Eventually, the process of continuously improving and refining technology has been cyclical, and then turned over to the next generations,

until technology became technologically-ingrained in the day-to-day lives of the people.

So far, this paper has illustrated technology as a human activity that is socially-established, cooperative, does pursue excellence, and with technological inventions as systematically extended. In the above breakdown of MacIntyre's definition, what has not yet been discussed is about achieving the internal goods and the motives involved in the course of trying to achieve those standards of excellence.

The motives involved in the inventions

A thorough examination of the history of technology reveals that the motives of people who pushed the innovations can be categorized in few patterns. The inventors of technology had the following a motives: food accumulation, adjustment to climatic changes, security, organization, convenience, enthusiasm, found need, challenge, assignment, exposure to other scientists and learned people, genuine desire to push knowledge, and money.

The internal goods that are promoted in the inventions

The eleven aforementioned motives for inventing something can be classified into two of the three types of MacIntyre's concept of the internal goods. The identified motives — food accumulation, adjustment to climatic changes, security, organization, convenience, responding to one's enthusiasm, surpassing a challenge— are the internal goods that technological inventions have brought to the individual. On the other hand, the internal goods that enhanced the 'profession' or the practice of the inventors are these achievements of being able to successfully respond to a found need, generously fulfilling a role or an assignment, triumphantly performing at par with other people one got exposed to, and the ecstatic feeling derived from a genuine desire to push knowledge.

The third internal good that is achieved in the practice of technology is the internal good for the community. Without doubt, technology has helped humans achieve their current comfortable status of well-being. Technology has been the sign of the

development and of a particular society. Technological progress has fulfilled some hopes and dreams of people. It can also be said that technological innovations have also been a nightmare of those who are uncertain about the potential effects of introducing a particular technology.

As a whole, it can be judged that the practice of technology has brought forth a lot of internal goods to humans. Here are few of those internal goods that were given birth to by technology and its inventors.

Human survival is one of such internal goods to the community that is forwarded by the practice of technology.

In essence, technology has also liberated humans from the physical boundaries set by nature. If people did not learn to write and invent the current writing tools and equipment, they would have been bound to simply verbal communication. Documents would not have been stored and even civilizations might not have even flourished. In around 1448, the moveable type printing press has been born. Along with this is the mass production of books, letters, and other written documents. Had the printing press not been invented and continuously improved, the society must have been limited to stone tablets and papyrus sheets. Moreover, communication and transportation have allowed humans to simply not rely on their feet and the animals around them to move from one location to another. Now, cities have been connected and countries seem to be only neighbors in what we all call the global community.

Technology has also rewarded humans with tangible outputs of creative expression. Technology has been an instrument for humans to fulfill their lives and to exude their innermost self and their God-given intelligence to shape the world. Technology meets basic wants. At the same time, it encourages inordinate wants that later get transformed into hopes for the community. Somehow, it mends and bridges the brokenness and gaps between nature and society. Roads, buildings, bridges, and other technological inventions mirror how complex inventive creations can be made by human minds and hands.

Technology has also lowered the prices. The mechanization that is largely established by the Industrial Revolution provided enormous supply of goods. The large supply sent the prices to go

down. For example, when refrigerators were introduced in homes, the housewives got empowered to preserve big amounts of food at a cheaper cost.

Amidst all these cited internal goodness that are generated by humans from their practice of technology, there is a promise of hope that technology can contribute in bringing human lives at present to be a lot better, brighter, and happier in the future and for the generations to still come.

The Practice of Technology: A Synthesis

Technology is a human activity where people manipulate the characteristics of nature using physical, mechanical, and electrical changes in order to meet their needs. What has been socially-established and what were manifested as forms of cooperation are (a) the desired attribute of scientists and (b) the empirical procedures that the inventors go thru in their respective inventive experiences.

Throughout its long history, the inventors of technology have pursued excellence when they recover, recycle, re-invent, and get inspired by the technological inventions and personalities that have emerged before them. Inventions have been systematically extended as manifested by the inventions' increasing complexity, functions, and coverage.

Here are the internal goods that the inventors of technology derived as the internal goods of the individual inventor: food accumulation, adjustment to climatic changes, security, organization, convenience, responding to one's enthusiasm, and surpassing a challenge.

The internal goods that enhanced the 'profession' or the practice of the inventors are the achievements of being able to successfully respond to a found a need, generously fulfilling a role or an assignment, triumphantly performing at par with other people like the inventors' exposure to other scientists, and the peace of mind generated from a genuine desire to really push knowledge .

The practice of technology has also forwarded internal goods to society. These internal goods are about human survival, liberation from the physical boundaries set by nature, having tangible

outputs of creative expression, lowering of prices brought about by mass production, and the creation of hope for the better future of generations to come.

In the latter part of the historical practice of technology, it can be seen that one external good came out. This is about the accumulation of wealth or the desire for money. The concern for money came after the inventors have realized that their inventions can generate a lot of financial gains.

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