BUDDHISM AND THE FOURTH INDUSTRIAL REVOLUTION

by Rev. William Beaumont Edwards*

What is the Fourth Industrial Revolution? Who says that such a thing even exists? And if it does exist; what factors, if any; indicate that we are already in it. So, before I launch into a discussion of the effect of artificial intelligence in the Fourth Industrial Revolution, some background is in order concerning how each industrial revolution caused massive shifts in the dynamics of human civilization.

I think we can all agree that the resiliency of Buddhism, unlike many of the world religious traditions, has had the ability to obligingly adapt and easily survive any change in those dynamics with which it is presented. An example of what I mean by that is a comment by the Dalai when an interviewer asked him, "What would Buddhists do if something in science proved something in the Buddhist texts to be incorrect?" The Dalai Lama simply said, "We would go with the science."

We would go with the science: The Buddha said that the first of the five signs of a fool is someone who believes in the infallibility of a religious text (Panca Ligani Jayde: *Vedapramanayam Kasyacit,kartivadah, snana dharmeccha jativadavalepah, sanatapraambhah papahanaya ceti, dhavasttapraina nam panca ligani jadye.* Vedas was the term he used, but it applies to any religious text; that includes our religious texts. Remember? The Buddha said not to accept His teachings until you have first hammered them out on the anvil of reason.) I realize

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this particular concept is rather controversial. And it may seem that bringing this up is out of the context of the topic at hand. But I maintain its importance, and include it, because I want to emphasize the fact that Buddhism is not based on faith, it's based on reason. Faith, or confidence, (Saddha) in Buddhism comes later. Faith based on reason is shatterproof. The ability to approach this new era of the Fourth Industrial Revolution with logic, reason and understanding is of paramount importance. And, simply because it is rooted in reason, the Buddhist religious tradition can provide that.

A further example of this uniqueness is that Buddhism indicates that sentient beings exist not only on planet earth, but 'permeates the entire universe,' a claim which is, tragically, rejected by many other major world religions. Once again, this uniqueness pertains to Buddhism's natural preparedness to accept the Fourth Industrial Revolution's civilization changing dynamics, which will in the very near future, bring us in contact with other civilizations in the cosmos due to the human technological advances such as the quantum computer's ability to plow through billions of bits of data entry supplied by "smart" telescopes. So, if this is to be the case, what is to be the response and responsibility of the world's Buddhist community?

A notable grandparent of all four industrial revolutions is the ancient trade between our early nation states, in particular the silk trade. The silk trade was an industry, which originated with the Han Dynasty in 207 BCE, about 280 years after the passing of the Buddha. By 114 BCE, the trade routes of this early industry extended from China into Korea, India, Japan, South East Asia, Africa and Europe. Different cultural and religious ideas were exchanged as silk merchants moved their wares from nation to nation. Prior to that time, most religious traditions were of local character. Therefore Buddhism, being a religion of Asian origin, was extended out of its locale due to these merchants move westward, even as far as Europe.

In any event, the first, supposed, industrial revolution years were characterized by the creation of more intricate mechanical devices and power generated by water and steam. And, in this era, the burning of coal, the soon-to-be, first, extensively used fossil fuel, began to replace wood, as a more efficient energy source.

Just prior to the First Industrial Revolution, early water turbines, known as water wheels, were built near fast flowing streams or waterfalls. Their drawback was their dependency on this fast flowing water source. But, by the time of the First Industrial Revolution, individuals like John Smeaton and Benoit Fourneyron addressed this problem with more modernistic and efficient water turbines. These water mills finally fell into disuse in favor of coal fired energy. However, in the 20th century, large water turbines like those in the Aswan Dam and the Hoover Dam began to be used to generate gigantic amounts of energy to power not only towns and cities, but entire countries. (Incidentally, water power, in the form of tidal forces, is being used again as an alternative to the burning of fossil fuels.)

I don't want to give the impression that the First Industrial Revolution was the first time coal was used as an energy source. Coal has a fascinating history. The Roman Empire, albeit to a lesser extent, used coal as a fuel in the 2nd Century ACE. The British began mining coal in the 18th Century. This practice soon spread to Asia and the Americas as well as the rest of Europe. By the 19th Century underground coal mining operations came into being, and the many common people were employed by this new industry; but not without serious occupational dangers and health risks. The coal moguls oppressed their workers (some of whom were children) with unbearable hours of hazardous work for less than adequate wages, as they, themselves, became astonishingly wealthy. These coal moguls created credit based "company stores" which provided the coal workers, or coal miners, with goods and services, but at a substantial cost; so that the credit could never be paid off; thus forcing the miners and their families into an economic slavery. The rise of labor unions began to reverse the tide of virtual slave labor in these coal mines; but not without the loss of the lives of many mining-labor leaders, who became targets of the coal moguls who refused to provide their workers with a livable wage and safer working conditions.

The years of the Second Industrial Revolution were characterized by scientific innovations, mass production through Henry Ford's concept of the assembly line, and the expanding use of electricity. Also, a large part of this second industrial revolution was the

introduction of gasoline – a volatile, unstable fossil fuel – used mainly for fueling automobiles. The telegraph, the first source of mass communication, came into being. And railroads, the first truly viable source of mass transportation, were developed. In December of 1903, Orville and Wilbur Wright created the first gasoline-powered aircraft, which would in the future become an enormous source of mass transportation as well.

Also in the later part of this second industrial revolution, a new and frightening power source was discovered, "nuclear energy." Unfortunately, its first use was in the form of a devastating weapon which was dropped on the Japanese cities of Hiroshima and Nagasaki. Although this form of energy was considered to be clean and efficient, one mistake and this efficiency and cleanliness are gone, e.g. Chernobyl, Fukushima and Three Mile Island.

Thus the Third Industrial Revolution (often referred to as the 'Nuclear Age') was characterized by the creation of nuclear power plants, with the continuing promise of newer more efficient nuclear power plants on the horizon. In spite of that promise, the inherent dangers still exist. Hopefully, we will soon see the introduction of cold fusion power plants to replace the fission power plants, an enormously less dangerous energy alternative. In addition to the fission and cold fusion power plants; solar, wind, geothermal and tidal force energy sources offer safer seemingly endless sources of energy, as opposed the recognized risks in fossil and nuclear fuel sources.

With the creation of computers and automation, the third and fourth industrial revolutions seem to overlap. (Indeed, the first seems to overlap with the second; the second seems to overlap with the third.) So at this point I'll jump ahead and discuss the Fourth Industrial Revolution – keeping in mind it overlaps somewhat with the Third.

The late Ven. Dr. K. Sri Dhammananda wrote a chapter in his book, What Buddhists Believe called, "You are Responsible." The Buddhist Educational Foundation deemed the message in that chapter so significant that they printed that chapter into a small booklet and distributed it as such. So, you are responsible, I am responsible, we are responsible, humanity is responsible; not a god or a goddess who lives in the clouds above us. If we are

irresponsible with this amazing, but volatile, new frontier, we will destroy ourselves. So this responsibility is imperative as we embark into this new adventure called the Fourth Industrial Revolution, which is, for the most part, characterized by "artificial intelligence."

In a book, appropriately named, The Fourth Industrial Revolution, Claus Schwab characterizes this fourth industrial revolution as *cyber physical systems and; smart factories, the factories of the future*. Therefore, the Fourth Industrial Revolution is exemplified by the rise of artificial intelligence. This fourth industrial revolution, although fascinating, presents a moral dilemma for the world Buddhist community due to this rise of this artificial intelligence.

The wonders of the 3D printer's ability to replicate virtually anything one could put into it has the potential to fundamentally change the very foundations of human civilization. Indeed, the 3D printer's ability to replicate food from waste products has the potential to make starvation, the scourge of centuries, virtually non-existent. According to an article in the February 21, 2018, issue of USA Today, if; in the near future; someone is in need of a heart transplant, a process called "bio-printing" can be used to 3D print the patient a new heart. The blood cells of the patient are fed into the printer and then, using the measurements from an MRI of the patient's heart, the new heart is replicated by the 3D printer.

However, as with all great scientific industrial advances, its hazards walk hand in hand with its miracles. So I'm going to coin a term: "ASB;" which stands for "Artificial Sentient Beings." Scientists have even been able to 3D print models of the human brain. In fact, instructions can be found on the internet on how to 3D print a model of your own brain. Which begs the question: If a 3D printer can make edible food, and a new useable heart, how long will it be before a useable human brain can be printed; assuming that it hasn't already been done? A team of neuroscientists at the University of Wollongong in Australia are developing brain cell tissue to combat degenerative brain conditions.

Apparently, one of the challenges of developing an artificial human brain is being able to mimic the electro-chemical processes of an organic brain. But in an article by Bridget O'neal, in 3Dprint.

com, the use of nanotechnology with electricity could solve that hurtle. However, the organics of a human brain are a slower form of electricity than electricity in general. It would appear that if such a brain could be created, it would function more quickly than our organic human brains, probably at the speed of light.

If the ability to create a useable human brain can be 3D printed; wouldn't it follow that the ability to 3D print a human body in which to put the brain could also be created? This 'Frankenstein narrative' appears to no longer be science fiction, but soon to be science fact. How will we, as Buddhists, handle it? The implications for us are stark. The end of the Metta Sutta reads: *As a mother would risk her own life to protect her only child, even so for all living beings one should cultivate a boundless heart …* This passage from the Metta Sutta would seem to suggest that any intelligent being, artificial or not, should be respected as an equal.

Therefore, would it not follow that if a human ASB is created and contains the five aggregates of 'form, feeling, perception, mental formations and consciousness' wouldn't it, also, be deserving of the same veneration which we would afford to a human being of organic origin? Interesting questions begin to arise: Will this ASB have the same potential to attain nirvana (nibbana) as an individual of organic origin? If, in fact, it follows the organic human schematic, would it not have a sense of self and the power of conceptual thought as we do? Could it laugh and weep as we do? Could it enjoy and create music and art as we do? These are questions society should ask itself before we go much further with this technology. We may be stepping into a realm where we, organically originated human beings, will, for lack of a better term, have become creator gods. The implications are astounding.

Consider the next generation of electronic automobiles, which is now in development within this fourth industrial revolution. The fear of anthropomorphic climate change, due to the burning of fossil fuels, sparked the search for other sources of energy with which to drive our vehicles, heat our homes, etc. With the dawn of this innovation came automobile computer technologies, which are developing to the point that cars are becoming self-driving. Soon people won't be driving the cars at all; the artificial intelligence of

the vehicles will do the driving and the people will just sit there. How intelligent should our cars become? We can already talk to our cars; that is, ask the dashboard for directions to our destination and the dashboard will answer back. Will a person one day get into an argument with his or her artificially intelligent dashboard making the car get angry, so that it pulls over to the side of the road, in a temper tantrum, and refuses to move? Although a humorous thought, it's also a worrisome possibility.

If intelligent automation – in Clause Schwabs, *smart factories* – takes over that which we call "work," we, humans, could possibly see working become a thing of the past. If artificial intelligence, or the ASBs, eventually dominates all the workplace environments, what would we have to do? It would seem that we would have a lot more idle time on our hands. Would our next occupations become categorized by activities like perpetual education and exploration?

Enter the moral issue: Will the ASB humans become slaves to the organic humans? If that turns out to be the case, will the ASB's revolt, as the coal miners did with the coal moguls? Slavery has a vicious stain in our human history. In some areas of the planet the scourge of slavery still exists. The subjugation of another intelligent being, be it an ASB or otherwise would be an ethical issue.

On the other hand, will the ASB's with their quicker, more efficient electronic brains, than our slower organic brains, begin to see us, organic human, as a nuisance and decide to get rid of us, causing a war between the ASB's and the organics? It brings to mind the Terminator movies, in which, Dr. Miles Dyson who invents a military satellite with artificial intelligence called "Skynet," turns on humanity, and creates its own ASB's; called terminators; which it sends out to destroy the organic humans. This is science fiction, of course. But, once again, science fiction often becomes science fact; as in the writings of Jules Verne and H. G. Wells.

There have been warnings about this particular technology by scientists such as the late Dr. Steven Hawking who has said in an interview with the BBC that efforts to create thinking machines poses a threat to our very existence; he said, "The development of artificial intelligence could spell the end of the human race." He

urged those developing this technology to proceed with a great deal of caution.

Is the only other alternative to not allow the further development of artificial intelligence technology? We all know that won't happen. If there is a way to do something, the inherent nature of human beings is to do it. So this technology is coming whether we like it or not; it's unstoppable. So we will have to learn to live in peace and harmony with the soon to exit ASB's.

Along with that caution of which Stephen Hawking spoke, it may be wise to instill in artificial intelligence a sense of love, empathy and generosity; human emotions. On the other hand, the human emotions such as anger, hatred and jealousy are emotions which creators of ASBs should avoid; but is that even possible? Since positive and negative emotions are triggered by their polar opposites would it be prudent to avoid, if possible, introducing emotions into ASBs? In addition to that, consider that most of our scientific advances have come about through military needs in wartime, as with nuclear weapons. Would a rogue nation attempt to create legions of emotionless killer ASB soldiers?

This is an area where, in contrast to the doctrines of other world religions, Buddhism and Buddhists can be the stalwart moral leaders of the direction taken by the intricacies of this Fourth Industrial Revolution. We can put forth a doctrine of equal rights for the artificial sentient beings. And we, as Buddhists, would be well advised to begin the effective advocacy for such a task.

That, of course, begets the obvious question, "how?"

Let's start by considering this issue with regard to the Three Marks of Existence and the Mahayana concept of the Four Dharma Seals. The Three Marks of existence are defined as suffering, impermanence, and not-self. The Four Dharma seals are defined as suffering, impermanence, not-self and nirvana. (I should point out that another Mahayana term "Three Dharma Seals" is synonymous with the Three Marks of Existence.)

Suffering, or dukkha, is a universal experience. Any creature that possesses a body, feelings, memories, thoughts and consciousness

experiences dukkha, whether it's a small experience like stubbing your toe or a large experience like the loss of a loved-one or a serious life illness or accident. I don't want to side-track and bore you with a remedial discussion about dukkha; but, for the sake of clarity in this discussion, it should be remembered that dukkha – suffering, unsatisfactory conditions, unfulfilled wishes, and insecure feelings – is a universal experience. And it will be experienced by the ASBs. So the scientists are who engineering the creation of the ASBs would be well advised to take dukkha into consideration while doing so. And be sure to install in the ASBs the psychological tools with which to deal with it.

Impermanence is another issue which tends to plague the human experience; nothing remains the same; everything is in a state of flux, everything. As we age and loose our youth, we experience the dukkha within this loss; we become unable to perform the tasks which we were able to perform with ease when we were younger. And we begin to visualize the coming of our own demise, death.

How will the ASBs deal with impermanence? Obviously their physical forms, their bodies, will be more durable than our organic ones. They could be in existence for a thousand years or longer; depending upon their karmic actions. Would they fear damage to their bodies, or short circuits in their electronic brains, leading to their demise? Would impermanence inflict pain as they experience the emotional the loss of a loved-one. And, if the loss of a loved is caused by a malicious organic individual, would the ASB seek revenge? Care should be taken to establish in the ASBs an ability to deal with the psychological implications of impermanence.

Not-self, the last mark of existence is, according to Venerable Nyanatiloka, the central doctrine of Buddhism on which the entire structure of Buddhist teachings stands or falls. Will the ASBs have this concern, and if they don't, should they? A self, as such, is an illusion. We organic humans are colonies of cells all working together for survival. The early life on our planet was comprised of simple one celled organisms. But these organisms began to work together for each other's benefit thus evolving into creatures, such as us. But, of course, the colonies of cells within us eventually fail to replicate themselves and we die. For an ASB this scenario would

probably not be the case; unless, of course, an artificial aging process is introduced into their initial programming.

Consider their electronic brains, which would move and analyze more quickly and efficiently than our slower organic brains. Would they have a more realistic and deeper grasp of the Buddha's doctrine of not-self than us? Should we enter the doctrine of not-self into their programming (artificial DNA) as an unsolvable philosophical puzzle, but a puzzle in which the implications can eventually come to fruition for them?

Nirvana, Nibbana or enlightenment is the last in the series of the Four Dharma Seals. The Dhammapada says:

Rare is birth as a human being,

Hard is the life of mortals,

Do not let slip this opportunity.

In consideration of that scripture, here is the big question: will an ASB have the ability to attain enlightenment? I now want to bring up the concept of Buddha Nature, a somewhat controversial subject between the Mahayana and Theravada Buddhist traditions.

A venerable monk, Ven. Huei Ming once told me Buddha nature is everywhere. It's in us; it's in the floor; it's in the walls. It's everywhere. That definition of Buddha nature is interesting. Of course, Theravada Buddhism rejects the Buddha nature construct, and I consider myself basically a Theravadin, but I do find that interpretation of Buddha nature intriguing. It reminds me of neutrinos in particle physics. Neutrinos are very, very tiny sub-atomic particles. Right now, as you read this essay, neutrinos are passing through you, they're passing through the floor on which you're standing, they're passing through the walls around you. They're everywhere. And, of course, neutrinos will be passing through the ASBs as well.

Could there be a correlation between Buddha nature and neutrinos? If there is

(and I am only postulating my unscientific observation) wouldn't it follow that any being with the power of conceptual thought have

the ability to attain enlightenment (Nirvana) whether it's human being or an ASB? I once had a dharma teacher who said that a dog has the Buddha nature; but a dog has no way to tap it. Obviously a dog has more control over its destiny than a worm or a bug, but it doesn't have the ability to attain nirvana; at least as far as we know.

Will the ASBs with their speed-of-light, electronic brains be more acute at attaining enlightenment than we are. So, another question arises: Will they ultimately become our teachers; our masters; our gurus? This Fourth Industrial Revolution postulates more questions than it does answers.

So the overwhelming question is: What are the moral implications of developing artificial intelligence e.g. Artificial Sentient Beings? The theist religions would insist that we're playing god. But, if we look at evolution, life only comes from other life. So in a sense we are by this intelligent design, simply continuing the evolutionary process. God, or gods, doesn't have anything to do with it; unless, of course, you consider life itself to be god.

In the PBS series "Nova;" a robot, with a face designed to look human and software giving it the ability to speak; was created by roboticist David Hanson. Hanson named his creation "Dick." A reporter from Nova interviewed Dick. When asked if robots would take over the world, Dick responded, "So don't worry, even if I evolve into a terminator, I'll still be nice to you. I'll keep you warm and safe in a human zoo." Does that mean that we bizarre, unpredictable organic creatures need to be controlled or exterminated or kept in a zoo? There are so many serious questions about this Fourth Industrial revolution and very few answers.

In the beginning of this discussion I spoke of our eventual contact with other civilizations in the cosmos due to this Fourth Industrial Revolution. Should our attitude toward the ASB's be equal to the same attitude we would afford to the extraterrestrials? The answer to that is definitely and unequivocally, "Yes." However, we will obviously be confronted with exactly the same serious questions we have about ASB's that we would have about extraterrestrials.

If, due to our fourth industrial revolutionary advances, we find and communicate with extraterrestrials, will we similarly be putting

ourselves in the same danger as we would with the ASB's. Dr. Steven Hawking had an impressive opinion in this area as well: "If aliens visit us, the outcome would be much the same as when Columbus landed in America, which didn't turn out well for the Native Americans." Dr. Hawking went on to say, "We only have to look at ourselves to see how intelligent life might develop into something we wouldn't want to meet." I agree. We could be putting ourselves in a position of slavery and servitude; maybe even annihilation.

The entry into our society of the ASBs could be wondrous or terrifying. The decision is ours.

With Metta,

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