January 1, 2018

**Science, Technology and the Humanities**

Towards a Successful Anthropocene1

For the vast majority of the past 12,000 years, we (humans) have lived in the Geological Time Period (Epoch) known as the Holocene.2 During the last 300 years, technologies evolving from the western Industrial Revolution have had major impacts on the ecology of our planet. As a result, it has been proposed that the Holocene has ended and we are now living in the Anthropocene (Human Epoch).3 To achieve a successful Anthropocene, the impacts of our innovations must be long-term ***blessings*** *and not* ***curses*** to humankind.4 They must foster the evolution of traits necessary for a desirable quality of life for future generations of the people of our planet. For this to take place, it is imperative for science, technology and the humanities to work in harmony with each other.

In concert with a famous philosopher’s mandate, *if you wish to communicate with me, kindly define your terms*:

**Science.-** Science is a body of knowledge and the requisite methodology used to acquire new understandings about how the world works. As a process, science involves the development and testing of alternate hypotheses. It is important to recognize, however, that there are ways to acquire knowledge other than through scientific method.5

**Technology.-** Technology is applied knowledge. As a process, it involves engineering and construction of useful innovations.

**The Humanities.-** The humanities consist of activities related to the *Human Condition*.6 They include history, language, religion, art, music, philosophy, law and many others which impact the thoughts and actions of society.6

Our institutions (academia, government and private business) are not usually designed to foster direct tri-trophic interactions among the domains of science, technology and the humanities. After a recent showing of a film comparing molecular-genetically-modified crop systems with organic agriculture, a panel of elite scientists addressed a series of questions from the audience. Most of the interrogatives required moral/ethical value judgments related to the time-honored question of good versus evil. The panel member responses indicated a distinct need for scientists, technology development experts and humanity scholars to find new ways to foster conceptual synthesis and intellectual interactions related to what will be required for a successful Anthropocene. A January 1, 2018, article in USA Today entitled, *As science marches forward…*, was about technology and contained no information about science.

The technologies required for a successful Anthropocene must abide by fundamental Laws of Science.7

**Law of Conservation of Energy** (First Law of Thermodynamics).- Energy (ability to do work) cannot be created or destroyed. Overtime, energy is transformed from one state (physical, chemical, biological) to another.

**Law of Entropy** (Second Law of Thermodynamics).- When system energy is transformed from one state to another, readily usable energy (high potential energy) is lost, resulting in low potential energy/entropy (process where a system losses more energy than it takes in).

**Law of Complex Non-Linear Systems** (Entities with two or more interactive parts and external sources of energy).- Complex non-linear systems possess feedback processes that impact the system in different ways at different times. These result in emergent properties not present in the system’s parts. These also initiate self-organization attributes within the system.

**Law of Maximum** (System Carrying Capacity).- Successful systems evolve and subsequently become extinct. During this process systems undergo the phases of development (anti-entropic), dynamic equilibrium (slightly above or below carrying capacity) and senescence (entropic). Systems fail when they excessively exceed their carrying capacities.

**Law of the Butterfly Effect.-** System feedback, emergent properties and self-organization associated with small changes in a complex non-linear system can result in major unexpected consequences.

Technologies in violation of the Laws of Science are unlikely to contribute to a successful Anthropocene.

Human-inhabited systems have always been complex. In our world of about 7.5 billion people, electronic communication and modern transportation systems have increased this complexity. It is important to differentiate between science and technology. For a technology to be adopted, it must be facilitated by being readily available, easily understandable or associated with appropriate education, and on occasion, catalyzed through persuasive attributes of the *carrot or stick*. As the envy of the world, the Extension component of the U.S. Land Grant System should be designed to play a major role in the adoption of technologies likely to lead to a successful Anthropocene.

The key question is how to differentiate between appropriate and inappropriate technologies in regards to future human quality of life. Random technology implementation can be dangerous. Processes known as alpha and beta analyses are used to evaluate innovations, but can have short- comings in regards to their broad long-term impacts. Conceptual simulation modeling based on the fundamentals of Systems Science is an option for evaluation of potential impacts of a technology. The question of successful Anthropocene appropriateness, however, should be the responsibility of the **humanities**, interacting with the science and engineering communities.8 In itself, this can be considered an innovation requiring facilitation, education and institutional persuasion. It will most likely mandate change. With humans having the capability of destroying the Anthropocene and beyond, this is not a trivial matter!

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2International Union of Geological Sciences

3Stoermer, Eugene F. 1980s and Paul Crutzen, 2000.

4Paraphrased fromAlbert Einstein

*5What Do Science, Technology and Innovation Mean from Africa?* Chapperton Mavhunga, 2017, MIT Press.

*6The Meaning of Human Existence*, E. O. Wilson, 2014, Liveright Pub. Co. N.Y.

7*The Myth of Progress: Towards a Sustainable Future*, T. Wessels, 2013, University Press of New England, Lebanon, N.H.

8Social Sciences such as Economics, Political Science etc. are intentionally not considered in Micro-Essay 105. They may, however, be the topic of a future MicroEssay.