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Creationeering™: An Integrated Engineering-Business Paradigm for Technological Entrepreneurship from a Biblical Basis

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Abstract

Creationeering™ is a new paradigm, or worldview, that integrates engineering and business practice for technological entrepreneurship from a Biblical basis. This paradigm subsumes "intelligent design" along with other engineering attributes and business practice. Furthermore, Creationeering™ distinguishes itself from "creation science" in that the former includes the "creation process" while the latter is limited to the discovery of existing physical phenomena. The systems engineering steps of Creationeering™ include the following: design, analysis/synthesis, procurement/making, logistics, assembly, performance/function, sustainability, and death/recycling. The business aspects include the following: human personnel, finances, legal, sales/marketing, and management. The eight steps in engineering and the five aspects of business comprise the paradigm of Creationeering™. God's account of the Creationeering™ process is presented with respect to the creation of the cosmos, and Moses' account of the Creationeering™ process is presented with respect to the Tabernacle. A brief history is given to explain the loss of the Creationeering™ mandate and recovery from the Reformation and consequential industrial revolution. Finally, a modern example of the common automobile is discussed to bring clarification regarding Creationeering™.

Key Words: Creationeering™, engineering, business, design, Dominion Mandate

1. Introduction

Science, design, engineering, and entrepreneurship are considered separate concepts and/or disciplines. We have programs at universities that train students in these different areas where Bachelor's, Master's, and even Doctoral degrees can be earned that were developed from industry needs. The focused training of students in each of the distinct disciplines of science, design, engineering, and entrepreneurship leads to an individual's narrow paradigm when considering aspects of the other disciplines. Currently, there is no holistic perspective that integrates these notions, let alone one that integrates a Christian worldview into the mix.

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Theodore von Karman, an aerospace engineer and the first National Medal of Science recipient given by President John F. Kennedy in 1963, stated the following: "Scientists discover the world that exists; engineers create the world that never was." Hence, science focuses on discovering phenomena in nature using the scientific method, but engineering produces technical innovations, "things," and processes. Based on von Karman's definition (2020), we can add a Biblical basis to science and engineering related to the terms 'creation science' and Creationeering™. Essentially, Creationeering™ is the process that the Creator used to make everything, and creation science is the analysis of the results of His Creationeering™ process to discover physical phenomena.

The Biblical references that lay a foundation for science and engineering are the following, respectively:

> Romans 1:20 (NKJV)—For since the creation of the world His invisible *attributes* are clearly seen, being understood by the things that are made, *even* His eternal power and Godhead…
>
> Proverbs 8:12 (KJV)—I wisdom dwell with prudence, and find out knowledge of witty inventions.

Romans 1:20 specifies the goal of research and discovering things in God's creation to find out more about the Creator. Hence, the knowledge garnered by research and discovery reveals some aspects of the Creator's nature, character, and attributes. Proverbs 8:12 indicates that information is revealed to mankind for a creative purpose to invent "things" for human service. Both science and engineering find their roots as a commandment under the Dominion Mandate for ruling and reigning:

> Genesis 1:26–28 (NIV)—Then God said, "Let us make mankind in our image, in our likeness, so that they may rule over the fish in the sea and the birds in the sky, over the livestock and all the wild animals, and over all the creatures that move along the ground." So God created mankind in His own image, in the image of God he created them; male and female he created them. God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground."

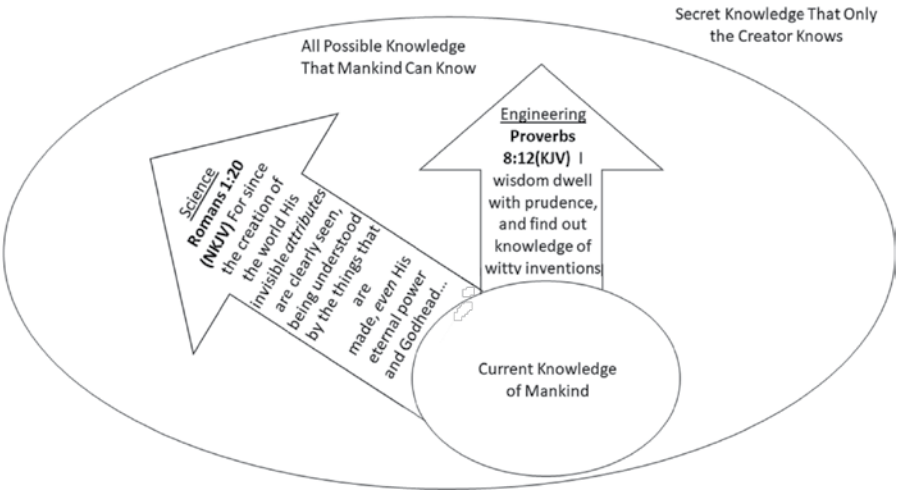

Figure 1. Schematic illustrating how science and engineering arise from a revelation from the Creator as per Proverbs 29:29.

The Biblical basis for creation science and Creationeering™ can be explained from considering a notion that Johannes Kepler, German astronomer and Christian, introduced from the following Bible verse (and illustrated in Figure 1):

> Deuteronomy 29:29 (NKJV)—The secret things belong to the LORD our God, but those things which are revealed belong to us and to our children forever, that we may do all the words of this law.

In Deuteronomy 29:29 the "secret things" relates to information that only God will ever know, but the information that He will "reveal" to us is in two categories as illustrated in Figure 1. One space within the large circle represents all knowledge that He will allow us to have and the space within the smaller circle represents the current knowledge that we have now. We, as Christians, only need to ask for information from God to enlarge the smaller circle as He gives revelation of new knowledge.

It is important to note that while there is no such thing as Christian engineering, there exist Christian engineers who approach the field of engineering from a Biblical perspective. What differentiates a Christian engineer from a secular engineer is that while the latter views the field as a human initiative, the former views the field as a divine initiative. The Christian engineer believes in the existence of a God who fashioned the Earth out of nothing and who created man as an image bearer with the mandate to dominate and steward all of His creation. Therefore, while the motivating factor for a secular engineer will be economic gratification and to glorify self, the Christian engineer is motivated by the desire to serve humanity and glorify God. The Christian engineer sees his or her vocation as a calling and

a form of worship. Creationeering™ is therefore the application of Biblical principles and truth in relating engineering to business.

"Creation Science," as the community of researchers who conduct scientific research related to the Bible, which has spawned several journals [*Creation Research Society Quarterly*, *Journal of Creation*, etc.], since 1960 has focused on research related to the strict Biblical perspective of a "young Earth." These researchers are sometimes called Young Earth Creationists (YEC). The term "creation science" probably garnered its title in contrast to "evolutionary science" in the 1960s when Whitcomb and Morris (1961) published *The Genesis Flood*, and Morris (1979) wrote *The Genesis Record*. Since then, the term creation science has represented more than just the Creation as many "creation scientists" have conducted research on the Genesis Flood (Whitcomb and Morris, 1961) as well. As such, the term "creation science" is a bit of a misnomer, today.

Creationeering™ distinguishes itself from "creation science" since it represents the systems engineering approach that God used in making everything, whereas creation science focuses on studying the creation for evidence either of God's existence or to substantiate the Bible. Typically, creation scientists interpret the Bible literally including the ages of individuals, leading to the conclusion that the Earth is fairly young (6,000–10,000 years) compared to the evolutionary-required time scales (billions of years). Although Creationeering™ in itself does not argue for or against the younger-Earth perspective, the assumption in this writing aligns with a younger-Earth perspective.

Creationeering™ provides a holistic systems perspective that integrates science, design, engineering, and entrepreneurship with a Christian worldview. It also allows for a grander conceptual abstraction than "Intelligent Design" for proof and evidence of the Creator God. Behe (1996) clearly articulated "irreducible complexity" in biological systems where he described the smallest features in a living system are complex engineering systems. If just one component fails, the whole system fails in a symbiotic manner. Hence, you need an intelligent designer to design such an organism. Creationeering™ subsumes the "irreducible complexity" argument since it covers "systems complexity" at every length scale, including the cosmos.

While science goes as far back as the ancient Egyptians, the first science-based educational enterprise did not arise until Socrates (Grant, 2007, pp. 1–26) in the fifth century BC. Engineering education started in the United States with General Washington's order in 1778 calling for the establishment of a school of engineering (Grayson, 1979). Modern engineering was based on the United States' models, although it was formed by morphing several paradigms together from other countries. Marsden (1994) explained that the basic philosophy of an engineering education arose from the liberal arts universities of England, but the engineering curricula was modified from the French models or from professional engineering corporations. Russia initiated shop and manual arts, while Germany led research and graduate education, which led to the secularization of education. Although early developments in the United States were more adaptive than creative, in at least three respects American schools exercised conspicuous leadership. They pioneered the introduction of laboratory instruction for the individual student as an integral part of the curriculum in the provision of distinctive training in the economic and management phases of engineering and in the development of cooperative education. The Accreditation Board for Engineering and Technology, Inc. (ABET, 2012) defines modern engineering in the following way: "Engineering is the profession in which a knowledge of the mathematical and natural sciences, gained by study, experience, and practice, is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of humankind." This definition, we believe, is limited and not based on the Bible. As such, an engineering educational system based upon the Biblical frame of reference is warranted.

The engineering part of Creationeering™ includes the following fundamental, independent, necessary, and sufficient eight required steps in the creational process (see Figure 2):

1. ***Design*:** thinking process that defines the engineering problem, includes ideation of solutions, and creates prototypes related to a product, process, software, or system. In defining the engineering problem, the objectives, constraints, and variables are specified before the solutions are introduced.
2. ***Analysis/Synthesis*:** computational and/or experimental evaluation of the designed prototype by applying scientific analytic principles, processes, and tools to reveal the properties and state of a product, process, software, or system.
3. ***Procurement or Materials Processing*:** the "making" of the products as the final "thing" or for the process or system also including the exchange of funds for the products and/or "things." The key aspect of making the products is the process-structure-property-performance sequence in terms of the information passage to assure that the design is realized within the tolerances (uncertainties associated with the processes of making the products and/or "things").
4. ***Logistics*:** the synchronization process of the distribution, transportation, and warehousing of the products and/or "things" where reliability, maintainability, and availability are dynamically changing before the

products and/or "things" can be assembled.

5. ***Assembly***: the process of putting components together to make a subsystem and putting subsystems together to make a system.
6. ***Performance***: requirements for the life cycle of the product to function properly considering normal and abnormal environments.
7. ***Sustainability***: the operation of an engineering system that employs resources to remain after the process and product are completed.
8. ***Death/Recycling***: operation of performance afterlife in which it will be decided that the product will be either be thrown away or returned as a new product after undergoing a new materials processing method.

The notion of a business and the system of its integrated parts can be Biblically motivated. Trueblood (1961) discussed the role of a Christian within a company. Walsh and Middleton (1984) claimed that the essence of a business is to fulfill the purpose of God, which is redemption. The *Journal of Biblical Integration in Business* (JBIB) (1995) focused articles on different Biblical aspects of a business. Few, if any, of these articles in the JBIB discussed a Biblical perspective on an engineering business. Other seminal works on integrating Christian philosophy into a business include Novak (1996), Cosden (2006), Stevens (2006), Daniels (2012), and Keller (2012). These authors elucidated the theology of work and a business rationalizing through scriptures that although profit matters for the sustainability of a business enterprise, it is not the main reason of its mission. St. Hill et al. (2013) delineated four main areas of a business:

1. Integrating God's purpose in the world of bringing God's kingdom into humanity's kingdom and the economic, financial, and stewardship associated with it;
2. the role of business in serving people;
3. the role of business in caring for creation;
4. the role of business in profiting from wealth creation.

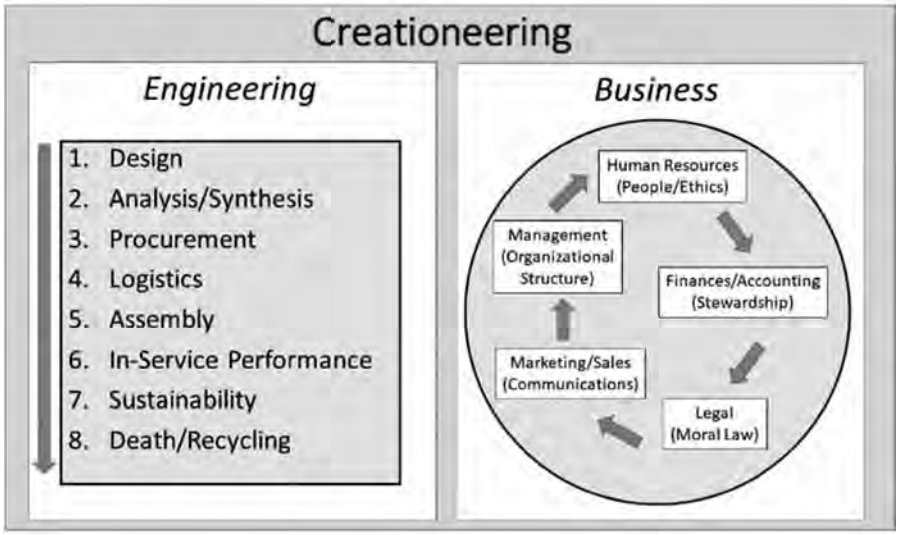

Figure 2. Creationeering™ is defined by integrating two typically separated academic disciplines: engineering and business with a focus on entrepreneurial thinking.

The following quote from St. Hill et al. (2013) provides a nice parable for Creationeering™. "'Give a man a fish; you have fed him for a day. Teach a man to fish and you have fed him for a lifetime'—author unknown. Revised saying, 'Give a man a fish; you have fed him for today. Teach a man to fish and you have fed him for a lifetime. Teach a man how to establish a fishing business; and you not only feed him for a lifetime but bring benefits to his family and the community.'" As a Creationeer™ operating from a Biblical worldview, we can realize the connection from scientific research through the engineering process into the entrepreneurial corporations to genuinely affect the economic, social, environmental, and spiritual transformation of a culture.

The five fundamental, independent features of a business enterprise or entrepreneurship required to start a business as shown in Figure 2 are the following:

9. ***Human Resources***: the hiring, administration, and training of personnel with ethical standards. If the Bible is not used to provide an ethical basis to undergird human relationships, then science, engineering, and entrepreneurship (business) can be self-centered and oriented away from glorifying God to glorifying man.
10. ***Finances***: management, accounting, and stewardship of money as a commodity to conduct the goals of the business. A mindset that begins with the premise that everything belongs to God and that man is just a servant of God will lead to financial success that glorifies God.
11. ***Legal***: an entity requires compliance to laws related to intellectual property, litigation, investigations, and acquisitions. God is a law-giver and demands obedience to his moral directives.
12. ***Marketing/Sales***: the action of communicating and connecting the products with the consumers. Secular marketing has as it goal

Table 1. List of engineering disciplines and their associated examples.

Discipline	Bio-Inspired Example	Historical Man-Made Example	Modern Man-Made Example
Aerospace	birds	airplanes	space ships
Agricultural	garden	tractor	farm bots
Biological	brain	prosthetics	pharmaceuticals
Chemical	trees changing acidity of soil	managing chemical processes	biochemical materials
Civil	beavers making a dam	bridge	building on the moon
Computational	Bible prophecy	analysis	simulation-based design
Computer	human brain	personal computers	cyber-physical systems and data fusion
Electrical	Earth's electrical field	electrical energy	robots
Energy	Sun	engine	nuclear
Industrial	ant hill	assembly line	modern factory operations
Materials	wood as a composite structure	steel	lightweight materials
Mechanical	ram's horns hitting each other	gears	Nature inspired designs
Mining	earthworms	tunnel boring machinery	fracking
Software	Deoxyribonucleic Acid (DNA)	Fortran	Python
Systems	Solar System	car	building

consumerism, whereas Christian marketing focuses on truth, honesty, and meeting genuine client needs.

13. ***Management***: an organizational structure to admit the rules, roles, and responsibilities for individuals to operate. God is all about managing His creation and the Creationeer™ recognizes and embraces their role in God's creation.

These five "business" aspects comprise a system of independent, necessary, and sufficient characteristics and originate in the creative process from God as stipulated in the Biblical Genesis account of creation. Creationeering™ is the nexus where these two domains merge, where the eight engineering steps integrate with the five fundamental features of business. Each of the eight engineering and five business features are independent and necessary to each other in the mathematical and logical sense when thinking about first principles. As an abstract whole, they are sufficient to comprise everything within the Creationeered™ system. In other words, no other concepts other than these thirteen are required to fulfill a Creationeered™ system.

Another thought needs to be distinguished herein regarding the term Creationeering™ and "created." We distinguish Creationeering™ from "created" in the sense that "created" is an action verb attributed to a single component or element of a component. Hence, "create" is the most general abstraction of the sense of the action. Creationeering™ is related to an engineered system and ownership of property where "property" can be a thing, a material, a structure, a process, software, and/or lands.

It is from here that the notion of "personal property" can clearly be defined. It is certainly the Creator who engineered everything and the potential for the Earth (and/or the Moon, Mars, etc., if needed) to be used. Once a human takes something that God made and adds value to it, it becomes "property." Let us consider for example a tree that God made. It is the man that must form it into lumber for a house. The house becomes property for the man. Similarly, God made soil, water, and seeds, but it is mankind that makes it into a garden. Hence, as man engineered the potential from the soil, water, and seeds to make a garden, he added value and the garden has become the "property" of the man.

When the steps of engineering are applied to different categories, mankind has separated them into disciplines. For example, if the engineering process is applied to a bridge, then we would have civil engineering. A more comprehensive list is shown in Table 1.

2. Creationeering™: God's Perspective During the Creation Week

The Creation account can therefore serve as the foundation for engineering

as a discipline because here, we see a Creator-God who laid the foundation for humanity to join in the creational process. In the Creation account, God clearly sets up a hierarchical system of different length-scale engineered systems that interacted with each other in which He designed, analyzed, procured, accomplished logistics, and assembled things for their life performance, sustainability, and death/renewal. Along with the creating process (the business/entrepreneur side), He focused on the human who needed a moral law (legal), a way to communicate with others (sales/marketing), an organized system of living and nonliving entities for life (management), and a method of exchange for commodities (finance). Thus, we see God in this context as the Ultimate Creationeer™ who laid out the process for mankind to be a Creationeer™.

Engineering as a discipline thus garners its foundation in Genesis 1:28 under the Dominion Mandate directly from God our Creator (Morris, 1973). God's first command to mankind was to be a good steward of the Earth's resources.

> Genesis 1:28 (KJV)—And God blessed them, and God said unto them, be fruitful, and multiply, and replenish the earth, and *subdue* it: and have *dominion* over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.
>
> Psalm 8:6–8 (KJV)—You made him to have *dominion* over the works of your hands; you have put all things under His feet: all sheep and oxen, yes, the beasts of the field; the fowl of the air and the fish of the sea, and whatever passes through the paths of the seas.

While the Creation account in Genesis is often referred to as the main source of information, there exist more Biblical references regarding the creation. These other Biblical references can help provide rich and robust Biblical explanations for each of the stages of the Creationeering™ process. The following Bible verse summarizes it well:

> Isaiah 45:18 (NIV)—For this is what the LORD says—he who created the heavens, he is God; he who fashioned and made the earth, he founded it; he did not create it to be empty, but formed it to be inhabited—he says: "I am the LORD, and there is no other."

2.1. *Design* of the Universe: Step 1 of Creationeering™ process

Design in engineering is a thought process of devising a component, subsystem, system, or process to meet desired objectives while considering the constraints and feasible variables. Although the design process can be slow from a human perspective, because of God's knowledge, He designed everything almost instantaneously from a human-time perspective.

Most often, when we observe an object—the combination of parts and how the different parts each contribute to a complex/complicated function—we intuitively conclude that it was the handiwork of some human designer, which has been argued since William Paley in 1802 (Fyfe, 2002). We immediately recognize complex systems and objects as some contrivance of a sophisticated engineering mind even to the most basic building blocks of life, which has been termed 'irreducible complexity' (Behe, 1996). That is the same way we might view the Universe—the combination of various parts with each part contributing to a complex function to meet certain objectives. By observing the extraordinary and unpredictable ways organisms adapt, thrive and survive not only suggests an intelligent designer but elicits some form of intentional design. The sense of order and well-being is suggestive of a well thought-out structure and the Creation account in Genesis provides, in Paley's opinion, the best explanation for this. It depicts a picture of God as the creator, maker, and overseer, as a skilled builder who values His work (Genesis 1:31). The Creation account portrays God's overflowing goodness through His devotion and care, sequentially ordering the Universe with the final creation of humans, made in the divine image, at the apex. As image-bearers, there is therefore, a transcendental dimension to humankind's existence and that is to have dominion over the Earth just as God does (Genesis 1:26–28). To "subdue" and "have dominion" means for mankind to live productively by using the resources of the Earth. The stewardship of the Earth was given to mankind at this point to prosper life and fulfill the destiny of each person. Some have called this the "Dominion Mandate" (Otabil, 2013), which gave mankind authority over the creation to steward it for its highest good.

Holding firmly to the doctrine of *Creation Ex Nihilo* (creation out of nothing), we see God's *design* from the beginning of Genesis 1. The entire Bible (Old and New Testament) opens up with the sentence:

> Genesis 1:1 (KJV)—In the beginning, God created the heaven and the earth.

This opening verse depicts God's majesty, power and unsearchable wisdom, who out of His goodness and love created everything. The whole of creation therefore reflects intelligent design and coherent systems, made from nothing, yet crafted to reflect virtues to be celebrated throughout culture. The systematic ordering of the Universe as seen in the structure of the Creation Week in Genesis 1:1–2:3, portrays a transcendent God, who intelligently sets everything in their proper place, the three days of shaping the void and three days of filling the void, to support each other in conformity to His grand design. Lennox (2011) explains the particular sequence of creative and organizational steps by which God shaped the world

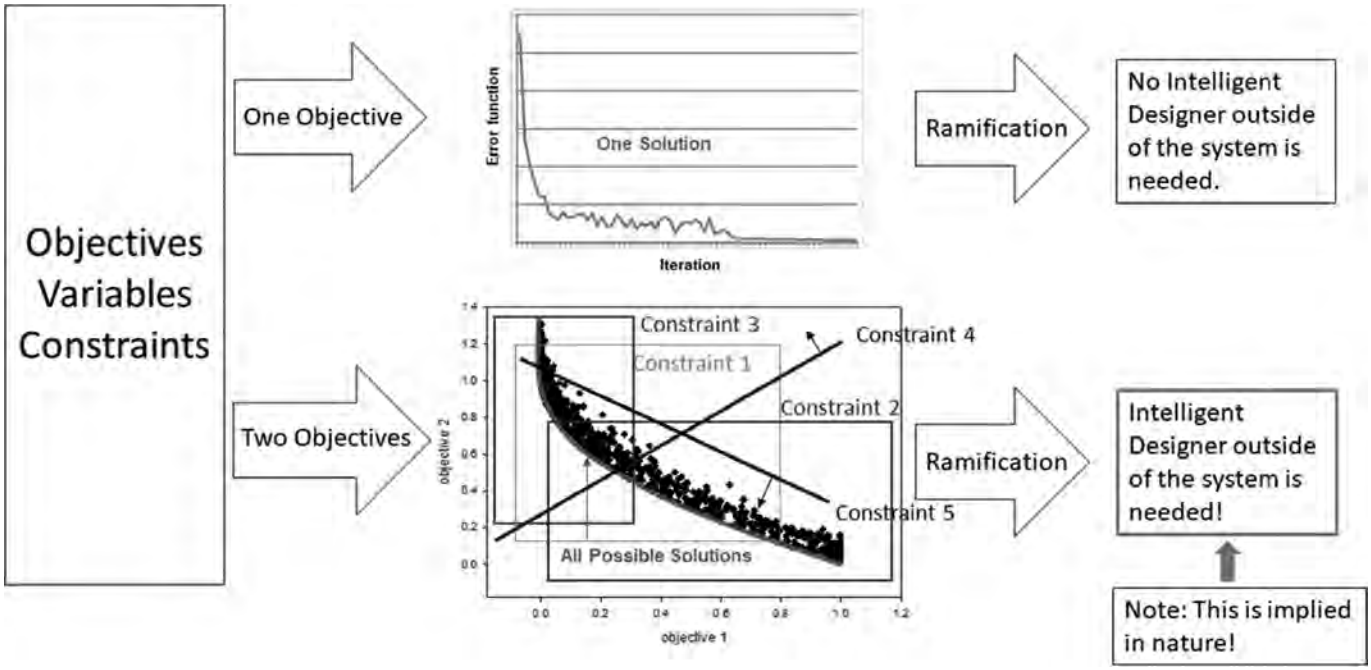

Figure 3. A multi-objective design process demands an intelligent agent outside of the engineered system. Here, the Pareto (1920) frontier is the maroon line that allows for all possible optimal solutions with the most efficient solutions (van den Berg and Friedlander, 2009).

and filled it with living things. Mankind is the most unique of all of God's creation because as image-bearers, we are called to be co-creators. This means that we also possess, at a lesser level, the creative and organizational abilities to tend to and cultivate the Earth.

The design process includes objectives, constraints, and variables that are interrelated in a mathematical equation(s) with metrics that are optimized (c.f., Fang et al., 2005; Johnson et al., 2016). There is a continuum *from strong* and *to weak* sensitivities of the variables and constraints on the objective(s), which gives rise to uncertainties related to the solution (Coleman and Steele, 1999). How large the uncertainties are is directly related to the reliability of the solution (Pidong et al., 2017).

An *objective* can be a numerical value or function that can increase or decrease. For example, a designer may wish to maximize profit or minimize weight. Many mathematical equations can work with single objectives. As Figure 3 illustrates, a simple calculus differentiation can allow a gradient model to easily capture the minimum in the equation, which signifies the optimal solution. When using simple mathematical gradient methods, the designer normally weights the various objectives and sums them to form a single objective. However, Figure 3 also illustrates that a designer can have two or more objectives, which mathematically will introduce what is called a "Pareto Frontier" or sometimes "Pareto Front" (Pareto, 1920). The Pareto Front is the maroon line in Figure 3 illustrating that multiple solutions can satisfy the minimization, meaning they are multiple solutions. However, Figure 3 also illustrates that different constraints can come into and limit the solution space.

A *constraint* is a condition that must be satisfied for the design to be feasible. Examples include physical laws, limited human capital, funds, user requirements, or bounds on the validity of the mathematical models. Constraints in the mathematical equations can be used directly or can be incorporated into the objective using Lagrange multipliers (Lagrange, 1764, 1811; Rockafellar, 1993) to garner the optimal solution. The different constraints illustrated in Figure 3 limit the solution space and eliminate other possible solutions in the Pareto Front. Constraints complicate the mathematical equations and decrease the number of possible solutions. Some constraints may be very limiting and others may not.

A design *variable* is a parameter that is controllable by the designer but could

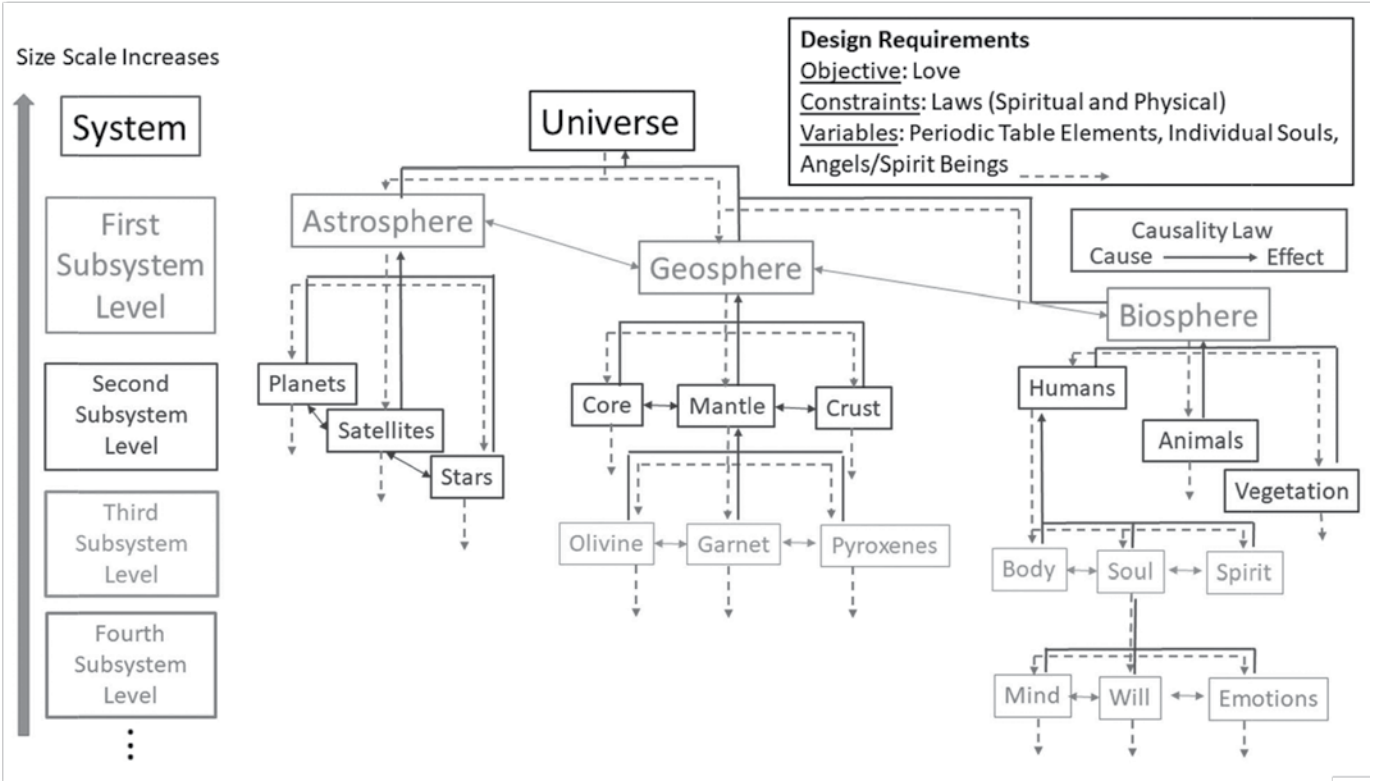

Figure 4. The Creationeer's perspective is that the Universe is a multi-size scale, multi-objective, interactive, complex system including the astrosphere, geosphere, and biosphere.

vary depending on the constraints and minimizing (or maximizing) the solution with respect to the mathematical equations (e.g., thickness or a material type), and is often bounded by maximum and minimum values. In Figure 3, the possible solutions that are admissible after considering the constraints are still many. As such, the solution is typically decided by an engineer in practice. When only one objective is employed in the design analysis, then convergence on a single solution is possible and an engineer is not necessarily required, because the mathematical equation will decide on the optimal solution. However, when more than one objective is included, then, by definition, since multiple answers are possible, it takes intelligence outside of the engineered system to make the decision on the design, so, hence, an engineer is required. This is consistent at any and every length scale. Hence, evidence for a Creationeer™ at the largest size scale like the cosmos is warranted.

Mathematics is the language by which to describe a design. The designer must choose an equation or set of equations to relate the constraints and objectives to the design variables. They may include complicated finite element analysis (cf., Fang et al., 2005b) and/or reduced order metamodels (cf., Fang et al., 2004, p. 4487). In the context of engineering or Creationeering™, a design is not the "thing" but only a representation of the "thing." Making the "thing," will occur later in the Creationeering™ process.

Reliability relates the probability of a component or system to perform its required designed functions under the stated conditions for a specified period of time. In the Creationeering™ paradigm, design and hence the reliability of the designed "function" will consider the procurement of the "thing," the logistics of the components of the "thing," the assembly of the "thing," the in-service life performance of the "thing," sustainability of the "thing," and the death or recycling of the "thing." In each step of the Creationeering™ process, the design variables and constraints can be mathematically characterized with respect to their sensitivities and uncertainties on the final solution so that the reliability of the design can be quantified (c.f, Acar and Solanki, 2009).

Figure 4 schematically illustrates the Creationeer's perspective: the Universe is a multi-size scale, multi-objective,

interactive, complex system including trinitarian concepts throughout the cosmos revealing His nature as per Romans 1:20. Whether an entity or "thing" is God-made or man-made, the first step in the Creationeering™ process is to define the system design objectives, constraints, and variables at each size scale. At the grandest length scale of the Universe or in engineering terms "the overall system," the Creator/Creationeer™ made everything. At the largest length scale is the cosmos, love can be argued to be the overall objective based on Jesus' statement about the most important thing in Matthew 22:37. The constraints would include the spiritual and physical laws, where the spiritual laws could pass in and out of the space-time-matter cosmos, but the physical laws are bound to the space-time-matter cosmos. The variables would be the elements of the Periodic Table, individual souls that he would create, and the angels/spirit beings.

Figure 4 shows at the first subsystem level that the trinitarian designs include the astrosphere, geosphere, and biosphere. The astrosphere's objectives, constraints, and variables can be described by the following:

- objectives: to maximize signify/seasons for humans and to stabilize environments for humans (Genesis 1:14);
- constraints: obey physical laws, fit geosphere appropriately into astrosphere to meet objectives;
- variables: number and size of planets in the Solar System; number and size of satellites in the Solar System; number and size of stars in the Solar Systems and cosmos; number and size of galaxies; and number and size of galaxy clusters.

The geosphere's objectives, constraints, and variables can be described by the following:

- objectives: to maximize life giving environment and to stabilize environment for humans (Genesis 1:9–13);
- constraints: obey physical laws, fit into astrosphere appropriately;
- variables: size of Earth, geometry of the Earth (Isaiah 40:22, Psalm 104:5), Periodic Table elements to be used on the Earth for humans to fulfill the Dominion Mandate (Genesis 1:26–28).

The biosphere's objectives, constraints, and variables can be described by the following:

- objectives: to maximize life for humans, plants, and animals;
- constraints: obey physical laws, fit into geosphere appropriately;
- variables: humans, animals, and plants, geometry of the Earth, food for life, light for life, shelter for life, clothing/protection from environment.

As Figure 4 illustrates, the second subsystem level includes trinitarian designs including the planets, satellites (moons), and stars for the astrosphere; the core, mantle, and crust for the geosphere, and humans, animals, and vegetation for the biosphere. Each of the individual second level subsystems have their own objectives, constraints, and variables. As an example of the third subsystem level for the human, the trinitarian design includes the body, soul, and spirit. Again, each of the individual third level subsystems have their own objectives, constraints, and variables. Finally, for this illustration, a fourth level subsystem under the soul includes the mind, will, and emotions, and each of these includes objectives, constraints, and variables.

In an engineering system, downscaling provides the requirements as constraints for the lower length scales (see Horstemeyer, 2012). For example, at the highest systems level of the cosmos, the constraints were physical and spiritual laws. Hence, they would also apply to any lower length scale all the way down to Planck's constant (Planck, 1901) related to quantum effects with electrons.

The multiscale, multilevel, and multi-objective design process also exists in the Scripture, where God, the Master Designer, works with the human designer in the planning and execution of physical structures. For example, in Genesis 6:14–16, the design of the Ark can be considered a marine engineering project where God designed the materials definitions and geometry. In Exodus 26:1–40, we see God providing design instructions for the building of the Tabernacle, which might be considered a civil engineering project. In Exodus 35:30–36:1, God specifically calls Bezalel and Oholiab and fills them with His Spirit and with the skills, intelligence, knowledge, and craftsmanship needed to devise artistic designs. In Job 38:4–6, God himself clarifies that He is the One Who laid out the spatial dimensions of everything in the Creation.

2.2. *Analysis/Synthesis* of the design

Analysis of information or synthesis of complex disparate information within a design includes the application of scientific principles and methods to assess the feasibility of the design. This includes analyzing the properties and state of the component, subsystem, or system. Careful evaluation and deliberation are fundamental to the analysis and/or synthesis of any design. This may include experiments or modern-day computational tools. The engineer has a challenge of not only meeting technical functions, but also of creating the right aesthetic design (Burgess, 2001). Getting the right balance of form and function is an art as well as a science. The supreme example of the right balance of form and function is observed in the design of flowers (Matt 6:28).

God analyzed His design instantaneously:

> Isaiah 41:20—That they may see, and know, and consider, and understand together, that the hand of the

> Lord hath done this, and the Holy One of Israel hath created it.

Seeing, knowing, considering, and/or understanding are fundamental to the analysis and/or synthesis of a design.

2.3. *Procurement* of the materials for the design

Procurement is the process of obtaining and the making of materials along with getting the equipment to make a component, subsystem, or system. Detailed knowledge of the definitions of the materials and the materials processing method are required. For example, components can be made from metals through wrought processes (stamping, forming, forging, etc.), casting, and additive manufacturing processes. Different metal chemistries that make up the metal alloys can be used almost in any of the materials-processing methods, which admits now multiple billions of variations of materials.

The creation account shows God's display of power by calling the Universe into existence out of nothing and shaping the world in a way that supports life and vegetation. The author of Psalm 33 portrays it thusly:

> Psalm 33:6–9 (KJV)—By the word of the Lord the heavens were made, and by the breath of his mouth all their host….For He spoke, and it came to be; He commanded, and it stood firm.

While material procurement is a stage in the engineering process, it is important to be careful not to imply that God modeled procuring materials that were pre-existent. In other words, God created "*ex nihilo*," out of nothing. God did not procure materials in creating, because He is infinite and has no limitations, but engineers must because we are finite beings with limited resources. Exodus 25:1–7, however, provides an example of God participating with humanity in creating a physical structure. Here, He instructed Moses to ask the people to make an offering unto Him, to procure materials for the construction of the Tabernacle, and the people responded generously. This means that despite the limited resources, engineers are still tasked with the responsibility of procuring the best and the right materials for the project life. Procurement, however, comes with its own challenges and hence the need for the fourth stage of the engineering process.

> Isaiah 43:1—But now thus says the Lord that created thee, O Jacob, and He that formed thee, O Israel, Fear not: for I have redeemed thee, I have called thee by thy name; thou art mine.

After God brought to man every living creature to name,

> Genesis 2:20–22 (KJV)—There was not found a helper fit for him. So the Lord God caused a deep sleep to fall upon the man, and while he slept He took one of his ribs and closed up its place with flesh. And the rib that the Lord God had taken from the man He made into woman, ….

Creating requires analysis of the design and responses from this analysis. This does not imply that God lacked the foreknowledge for the eventual need of a helpmate, but instead models for us the analysis/synthesis stage of creation. In the creation account, we therefore see God as a skilled craftsman or builder, carefully appraising His work and pronouncing it fit for use/purpose:

> Genesis 1:31a (KJV)—And God saw everything that He had made, and behold, it was very good

Forming is a materials-processing method in-order to make a structural metal or polymeric component in engineering practice.

2.4. *Logistics* of the different components and subsystems

After something is designed and analyzed and ready to be made, then logistics is required to piece together all of the different personnel and materials to "systemize" the finalized design. Logistics can be defined as the selective application of scientific and engineering efforts undertaken during the acquisition process. The objectives of the design, not only of the product for the performance environment, but for logistics can be time efficiency so that each step is coordinated together in time.

Moving materials from one location to another requires logistical wisdom. God in His sovereignty did not have to "worry" about this in creation because He created by His powerful word. However, we as humans cannot do that and thus, we must concern ourselves with the times, seasons, and availability of resources. While we have similarities with God as image-bearers, we also have to understand the dissimilarities, He is infinite and we are not, and this should bring us to a place of humility.

> Isaiah 4:5—And the Lord will create upon every dwelling place of mount Zion and upon her assemblies, a cloud and smoke by day and the shining of a flaming fire by night: for upon all the glory shall be a defense.

The Lord logistically organized the military defenses based upon the environmental conditions in-order to reach the transportation goals.

2.5. *Assembly* of the different components and subsystems

Once the finalized designed parts are ready at hand, then they are ready to be assembled. Assembly refers to a number of parts or subassemblies or any combination thereof joined together to perform a specific function, and subject to disassembly without degradation of any of the parts (Hanifan, 2014, p. 23). Simply, it is putting parts together.

The design of creation models how God assembled the Universe. The astrosphere, biosphere and geosphere are finely tuned according to His design and assembled in balance and harmony to work according to His set purposes (Genesis 1:1–2:3). The orderly way in which the Universe was assembled, portrays

God as a master builder. Engineers must also assemble their projects with conscientious attunement to the requirements of the design. Once a product or project is assembled, it must be routinely evaluated for effectiveness.

> Isaiah 40:26—Lift up your eyes on high and behold who hath created these things, that brings out their host by number: He calls them all by names by the greatness of his might, for that He is strong in power; not one fails.

The Lord assembled the host together into a complex, interactive system for life.

2.6. Function or in-service life *performance* of the engineered system

Once the validated designed "thing" is put together, then it is ready to perform its designed-for function. This entails the real-life performance of the "thing" so that it fulfills its objectives for which it was designed.

Engineers are not only interested in getting a product to market, but in determining how effectively that product accomplishes the goal that it was created for and how it survives through its routine use. The creation account in Genesis 1–2 does not just tell us how the Universe came into existence, but just the ultimate objective for its existence. It places emphasis not only on the processes involved in the creation, but how the cosmos was organized in order to ensure human life thrived and functioned as God intended. Therefore, in creation, God provided everything necessary for that intended purpose.

> Genesis 1:31 (NKJ)—Then God saw everything that He had made, and indeed *it was* very good. So the evening and the morning were the sixth day.

2.7. *Sustainability* of the engineered system

Sustainability means how does the engineered component, subsystem, or system continue on to the next generation. Sustainability can be thought of as the ability of current generations using resources so as to not compromise the environment or deplete the materials for future generations. To enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising quality of life, affects future generations. Ordered sustainability and stability are the characteristics of God's creation of the Universe. The creation story reveals how God creatively fashions the Universe to provide the right environment suitable for sustaining life and vegetation (Genesis 1:1–2:17). The ordering of the material Universe is such that can allow living organisms to thrive and adapt to new situations. God through His divine providence sustained all things He created so they can continue in the properties implanted in them from creation. So also, the astute engineer must see the need to consider sustainability in the creating systems. Creationeers™ create and construct through this entire process in hopes that the cycle can be re-energized for a second and third round. This sustains the creational goals of the product by thinking how it might live on as needs change and new potentials arise. The engineer must apply prudence in ensuring that they are building things that matter and last with long-term repercussions.

> Genesis 1:21—And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind: and God saw that it was good.

The long-term sustainment of life-giving animals was developed at the very beginning. Regarding the Flood of Noah's day the following verse is appropriate.

> Genesis 6:19—And of every living thing of all flesh, two of every sort shalt thou bring into the ark, to keep them alive with thee; they shall be male and female.

2.8. *Death/Recycling* of the engineered system

The final stage that an engineer must consider is what to do with the materials once the designed performance of the product is over. Recycling is converting an already existing product or material into a new product. One could consider a system of materials circulation when a materials first objective is over, that there can be a secondary objective of the used product. At this point, the secondary product might need to go through reprocessing to reach its objectives.

Just as death came through the fall (Romans 5) to humanity, it also comes to created products. Ecclesiastes (Eccl. 1:4–7) provides us with descriptions of the endlessly repetitive cycle of seasons and time as it relates to creation. However, through Christ's saving work, redemption has been achieved through an effective recycling of time, thereby making the believer a new creation (2 Corinthians 5:17). This demonstrates how valuable humanity is to God. This concept can be applied on a much lesser scale to created products/systems. For engineers, it is important to value systems and resources and rather than put them to waste, creatively find new ways of deploying and putting them to use.

> Jeremiah 18:1–6 (ESV)—The word that came to Jeremiah from the Lord: "Arise, and go down to the potter's house, and there I will let you hear my words." So I went down to the potter's house, and there he was working at his wheel. And the vessel he was making of clay was spoiled in the potter's hand, and he reworked it into another vessel, as it seemed good to the potter to do. Then the word of the Lord came to me…
>
> John 6:12 (ESV)—And when they had eaten their fill, He (Jesus) told his disciples, "Gather up the leftover fragments, that nothing may be lost."

2.9. *Human resources (ethics)* used in the Creationeered™ system

Since God is interested in people as a key objective in His creation, the stewardship of humans to help fulfill the Dominion Mandate of Genesis 1:26–28 is important. The term "Human Resources" for a business is to recruit, train, develop, compensate, team-build, conduct performance appraisal, communicate worker health and safety issues, and identify methods for selecting staff for the business system.

The first half of the creation account in Genesis (1:1–2:3) provides a cosmic description of God's activity, while the second half portrays a God of the anthropic principle who providentially ordered the Universe to suit the climax of His creation, making humankind in His own image (Genesis 1:26–27), so that they might alongside with Him rule and dominate the Earth. It provides a picture of a God who is loving, personal, relational, and communal and unlike other creatures, only mankind has and enjoys a special relationship with God; hence, ethics is a given from the very beginning. From the beginning therefore, humanity was tasked with the responsibility of having a loving relationship with God through worship and with the rest of creation through service. As co-creators, humanity was to imitate God's character and attributes in ruling His creation and developing it to its full potential. Relationship and community are God's purpose for creation, hence the command:

> Mark 12:30–31—"And you shall love the Lord your God with all your heart and with all your soul and with all your mind and with all your strength. The second is this: 'you shall love your neighbor as yourself.' There is no other commandment greater than these."

Our love for God should translate into how we treat other people. God has bestowed dignity on humans and as Creationeers™, we are to bestow dignity on those who work with us. We should see them as image bearers who have worth and dignity.

> Genesis 1:26–27 (KJV)—And God said, "Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth." So God created man in his own image, in the image of God created He him; male and female created He them.

2.10. *Finances/Accounting (stewardship)* used in the Creationeered™ system

Our Creator has expressed his concern through Jesus in humans being good stewards of the resources that the Creator has supplied for us. Finance and accounting can be defined as the management, allocation, and exchange of resources for the business system. The notion of stewardship carries three aspects as illustrated in the following Bible verses: (1) the Creator owns it all; (2) the Creator demands responsibility of the human's stewardship; (3) rewards from the Creator come when good stewardship occurs.

> Psalm 24:1–2 (NIV)—The earth is the Lord's, and everything in it, the world, and all who live in it; for He founded it on the seas and established it on the waters.
>
> Deuteronomy 8:18 (NKJV)—And you shall remember the LORD your God, for *it is* He who gives you power to get wealth, that He may establish His covenant which He swore to your fathers, as *it is* this day.
>
> Matthew 25:21 (KJV)—His lord said unto him, "Well done, thou good and faithful servant: thou hast been faithful over a few things, I will make thee ruler over many things: enter thou into the joy of thy lord."

The description of how God created man, in His image and likeness demonstrates mankind's worth in God's eyes. It shows how valuable humanity is to God and as creaturely creators, humanity is called to rule, dominate, and steward the world the Creator made. Genesis 1:28–30 and Genesis 2:15 provides that cultural mandate and while money as a means of exchange was not in existence at the time of creation, mankind was tasked with the responsibility of stewarding creation and everything that existed within creation. It was a calling for man to use his unique abilities to establish a community that will reflect God's wisdom, benevolence, and creativity and this includes not just the creation of wealth but the proper management of it. Wealth, just as every other thing God has put under our care, must be carefully stewarded towards love for God and love for others.

> Genesis 2:11—The name of the first is Pison: that is it which compasseth the whole land of Havilah, where there is gold.

Finally, Jesus mentioned about counting the civil-engineering cost in designing a tower:

> Luke 14:28—"Suppose one of you wants to build a tower. Won't you first sit down and estimate the cost to see if you have enough money to complete it?

2.11. *Legal* (moral law) of the Creationeered™ system

Most humans have the tendency to believe in moral obligations and responsibilities. Almost everyone (with a few exceptions) believes that it is right to show kindness and wrong to inflict pain on another person. What best explains this tendency/belief? The Creation account provides the best explanation for this: because God is holy, as image-bearers (Genesis 1:28–30), humanity was created with the moral responsibility to be accountable to God hence the feeling of accountability we experience as humans. God through His divine providence in creation directs and regulates the affairs

of humanity in accordance to His goodness, justice, and wisdom for His glory and for human flourishing. So also, the engineer must act within the frameworks of the moral obligation laid out for humanity by God. The Creationeer™ must exercise care in ensuring that their work does not lead to immense human suffering but promotes humanity's well-being in both engineering practice and business acumen. The starting point of any invention must first be the understanding that things have intrinsic value and there are values and norms that must be respected and therefore the Creationeer™ is called to be accountable *for* their invention and accountable *to* the Ultimate Creationeer™.

From an engineering and business perspective, God has made it clear that there are domains to work and other domains where not to spend energy. In the following Bible verse, God expressly told Adam to conduct work in a certain part of the garden but not in another part of the garden.

> Genesis 2:16–17 (KJV)—And the LORD God commanded the man, saying, Of every tree of the garden thou mayest freely eat: But of the tree of the knowledge of good and evil, thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die.

This substantiates that God has a moral law associated with work from the very beginning. It was further elucidated under Moses with the Ten Commandments, when God referred to keeping the Sabbath with original Creationeering™ process:

> Exodus 20:2–7 (NKJV)—I *am* the Lord your God, who brought you out of the land of Egypt, out of the house of bondage. You shall have no other gods before Me. You shall not make for yourself a carved image—any likeness *of anything* that *is* in heaven above, or that *is* in the earth beneath, or that *is* in the water under the earth; you shall not bow down to them nor serve them. For I, the LORD YOUR GOD, *am* a jealous God, visiting the iniquity of the fathers upon the children to the third and fourth *generations* of those who hate Me, but showing mercy to thousands, to those who love Me and keep My commandments. You shall not take the name of the LORD YOUR GOD IN VAIN, FOR THE LORD WILL NOT HOLD *him* guiltless who takes His name in vain. Remember the Sabbath day, to keep it holy. Six days you shall labor and do all your work, but the seventh day *is* the Sabbath of the LORD YOUR GOD. *In it* you shall do no work: you, nor your son, nor your daughter, nor your male servant, nor your female servant, nor your cattle, nor your stranger who *is* within your gates. For *in* six days the LORD MADE THE HEAVENS AND THE EARTH, THE SEA, AND ALL THAT *is* in them, and rested the seventh day. Therefore, the LORD BLESSED THE SABBATH DAY AND HALLOWED IT. HONOR YOUR FATHER AND YOUR MOTHER, THAT YOUR DAYS MAY BE LONG UPON THE LAND WHICH THE LORD YOUR GOD IS GIVING YOU. You shall not murder. You shall not commit adultery. You shall not steal. You shall not bear false witness against your neighbor. You shall not covet your neighbor's house; you shall not covet your neighbor's wife, nor his male servant, nor his female servant, nor his ox, nor his donkey, nor anything that *is* your neighbor's.

2.12. *Sales/Marketing (communications)* related to the Creationeered™ system

Sales and marketing are communications of information from the business system to those outside of the system. In other words, interpersonal communications are key to sales and marketing. If sales and marketing personnel can determine the needs of those outside the business system, help the business to develop technologies to the meet the needs, and then communicate back to the potential buyers, then seamless communications occurs.

The Creation account in Genesis 1–2 depicts a relational God with formation of relationships as the core of His nature. The account of humanity's creation (Genesis 2:8–25) emphasizes a special relationship between God and humanity and by implication a special relationship between humans. Christianity believes in a God who is both personal and active in the world, Who continues to support and sustain the world He created (i.e., the transcendence and immanence of God). If relationship matters to God, then it must matter to the Creationeer™. Sales and marketing efforts build genuine and lasting relationships rather than simply selling products. The Creationeer™ ought not to be detached from the products and clients but be willing and ready to offer the required support needed to sustain the life of the product.

2.13. *Management (organizational structure)* of the Creationeered™ system

Management is an organizational structure of the business system. The Creator ordered from the very beginning an ordered, organizational structure that started with the family unit, where the father was the accountable entity of the family unit. The ordering of the material Universe in the Creation account in Genesis 1–2 shows God's care and devotion to the world He created in an organized manner. The Creation account provides a picture of a universe sequentially created with utmost care, and a hierarchical structure, with man, made in the image and likeness of God, at the apex. God's intention from the beginning was that humankind will fill the Earth, this includes filling it with systems, products and processes that create culture:

> Genesis 1:28 (KJV)—And God blessed them, and God said unto them, Be fruitful, and multiply, and

> replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.

He also charged man with the task of taking care of the world He created:

> Genesis 2:15 (KJV)—And the Lord God took the man and put him into the garden of Eden to dress it and to keep it.

A good management structure is therefore key to the success of any system.

3. Creationeering™: Moses' Example of Creationeering™ in the Building of the Tabernacle (Exodus 26:1–40)

There exist various examples of civil-engineering projects in the Hebrew Bible. Two of these projects however stand out: the building of the Tabernacle in Exodus and the construction of the Temple in 1 Kings. There exists significant comparable contrast between the construction of both structures. While both structures were meant to serve as a place of worship for Yahweh, the Temple may have been built more on human initiative and imagination and not God's initiative. Forced labor was used in the construction process, the architects and builders were not Israelites, and the building was more to the glory of Solomon rather than to the glory of God. In contrast, the Tabernacle was God's initiative as He provided the design and directions for the construction, willing and Spirit-filled Israelites carried out the construction work, and the building was ultimately to the glory of God. It is important for the Christian engineer to note that the builders of the tabernacle were not architects but only craftsmen carrying out God's plan (Fretheim, 2010).

The Tabernacle thus stands out over against Solomon's Temple in very significant respects. It clearly shows how God, the Ultimate Creationeer™, bestows on man the knowledge, skill, and wisdom to be Creationeers™. Bezalel, the main builder, through divine inspiration, acquired three important qualities: skill, intelligence, and knowledge to devise artistic designs (Exodus 35:31) or as Dozeman (2010) put it: wisdom (*hokma*), understanding (*tebuna*), and knowledge (*da'at*). In addition to these qualities, God also inspired him to teach his assistant Oholiab (Exodus 35:34) the skills to do any work of construction. The question we may then ask is how does a person move from current knowledge to future allowable knowledge? As Christians, we believe in a rational God who created the Universe and endowed humanity with the intellectual faculties capable of gaining knowledge by exploring the Universe. Therefore, moving from current knowledge to future allowable knowledge requires humbly trusting in God's grace and sovereignty. Whether the information requested is related to discovering what exists (science) or knowledge for new innovations (engineering) does not matter. In either case, asking for information for discovering something (science) or for creating something new (engineering) requires faith as per Hebrews 11:6.

> Deuteronomy 29:29—The secret things belong unto the Lord our God: but those things which are revealed belong unto us and to our children forever, that we may do all the words of this law.
>
> Proverbs 8:12—I wisdom dwell with prudence and find out knowledge of witty inventions.
>
> Hebrews 11:6—But without faith it is impossible to please him: for he that cometh to God must believe that He is, and that He is a rewarder of them that diligently seek him.

A good example of demonstrating each aspect of Creationeering™ as a civil-engineering project as stated earlier is the building of God's Tabernacle described in Exodus 26:1–40 where Bezalel executed, albeit in a lesser manner, the divine creative role described in the creation account, in the construction of the Tabernacle. Here, we see a God-driven initiative where He used craftsmen to carry out His plans ultimately for His glory. As Christian engineers, we are nothing but craftsmen used by God to show forth his beauty in creation and to bring Him glory. Therefore, a Christian engineer ought to understand that his/her vocation is only valuable if it has both a secular and sacred purpose.

3.1. *Design* of the Tabernacle

The Spirit of God called and filled Bezalel and Oholiab with the creativity and craftsmanship needed to devise artistic designs. The same power that laid behind the completion of the project, was the same power that laid behind the creation process. Meaning that their intricate craftmanship reflected God's own work (Fretheim, 2010). The emphasis placed on the design and details of every aspect of the Tabernacle (Exodus 26–27:20) mirrored the orderly and intricate account of creation in Genesis 1. According to Fretheim (2010), the end product of the "construction" in both instances was a material reality that was precisely designed, externally beautiful, and functionally "literate" showing a careful attention to the relationship between form and function (Fretheim, 2010). Therefore, just as God created the Universe, Creationeers™ are called to recreate a world in the midst of chaos that glorifies God and leads to human flourishing. We might add that part of the objective in design is the idea of beauty (or aesthetics) as God added beauty to flowers (Matthew 6:28) in the most brilliant way.

> 1 Kings 5:18—The inside of the temple was cedar, carved with ornamental buds and open flowers… then he carved all the walls of the temple all around, both the inner and outer sanctuaries with carved

figures of cherubim, palm trees, and open flowers.

3.2. *Analysis* of the Tabernacle

In any civil-engineering structure, one must analyze the location for many different environmental reasons, foundational reasons, and functional reasons. The Tabernacle was meant to be the place where God met with His people. It was a shift from dwelling on the mountain (Exodus 24:15–18) to dwelling in the Tabernacle. This however does not mean that God can be confined to a single space; instead, it shows that because humans are not just spiritual beings, but thinking and feeling beings, there was a need for tangible place of worship of which the Tabernacle provided. Fretheim (2010) notes that the emphasis placed on the process of making the Tabernacle and its portability depicts the nature of the divine-human interaction which stresses process, not end.

3.3. *Procurement* of the materials for the Tabernacle

The Israelites were responsible for the provision of the financial resources needed for the construction of the Tabernacle (Exodus 38:21–30). They provided all the materials—precious metals, yarns for embroidery, spices for the anointing oil, etc.—needed for the construction of the Tabernacle as a freewill offering to the Lord (Exodus 35:4–29). The craftsmen worked with all these materials to create something new and beautiful. It is important for the Creationeer™ to understand that every material procured for a project is a product of God's beautiful creation and thus whatever the material is used for must give a new shape to that beauty within creation (Fretheim, 2010).

3.4. *Logistics* of the different components and subsystems for the Tabernacle

God provided the builders with logistical wisdom to move the different materials from the source to the construction site. He gave Moses every single detail (Exodus 26:1–31) needed for the construction of the Tabernacle.

3.5. *Assembly* of the Tabernacle

There were so many different components and subsystems to the Tabernacle that assembling occurred by joining several components into a subsystem and then joining together the subsystems. God provided every detail required for the completion of the Tabernacle. The order, shape, structure, visual appeal, furnishing, etc., were of utmost importance. This reflects a God who is creative, orderly, and intricate as depicted in the Creation account, Who works in and through His creation. The creative abilities of the Creationeer™ to assemble various components and subsystems to create beautiful and functional designs therefore reflects the divine-human relationship.

3.6. *Performance/Function* of the Tabernacle

The Tabernacle was to serve as the tent of meeting, where God met with the Israelites. Fretheim (2010) stresses that both the Creation account and the construction of the Tabernacle show a careful attention to the relationship between form and function. That is, God's creative work ranges widely across the physical order of things, integrating the world of nature and that which is built with human hands to create property. The completion of the Tabernacle was according to the divine pattern thus corresponding to the divine will, which is to glorify God. For the Creationeer™, new technology should not be pursued just for the sake of it, but for its performance and function—how does it address a need, solve a problem, take care of the poor, ensure human flourishing, and ultimately bring glory to God.

3.7. *Sustainability* of the Tabernacle

The glory of the Lord sustained the Tabernacle (Exodus 40:34–38), even as He instructed Moses on how on who were to take care and maintain the tent of meeting.

3.8 *Death/Recycling* of the Tabernacle

The 'death' of the Tabernacle engineered by Moses was superseded by Solomon's Temple over 440 years later. Moses' Tabernacle moved from place-to-place, but Solomon's Temple was stationary, fixed in Jerusalem.

3.9. *Human resources* (ethics) related to the Tabernacle

As stated earlier, the Lord Himself appointed the laborers for the construction of the Tabernacle and filled them with His Spirit and the necessary skills required to get the work done. These men and women were willing servants endowed with various gifts to carry out God's plan to His glory (Exodus 36:2). Bezalel who was the project manager and his assistant Oholiab recognized the uniqueness of every craftsman's skills and channeled those skills in the proper place to get the work done. Therefore, the most valued forms of labor are those that recognize other humans as having worth and dignity and are thus treated as such.

3.10. *Finances/Stewardship* related to the Tabernacle

As mentioned above, the children of Israel were responsible for the financial resources needed for the construction of the Tabernacle (Exodus 38:24–30). Moses, Bezalel, and Oholiab ensured that all the resources were put into adequate use. Even though Moses oversaw the architectural plans, the lead craftsmen were responsible for every aspect of the Tabernacle including its furnishing and the vestments and how resources were allocated.

3.11. *Legal*/Moral law related to the Tabernacle

The directions and instructions for the construction of the Tabernacle ended

with the Sabbath law (Exodus 35:1–3). The Sabbath law was God's way of reminding and reaffirming His holiness to the Israelites, it was meant to bring the knowledge of God to them and the intensity of the consequences of being disobedient to God. The penalty for breaking the law was death because profaning the Sabbath was now a capital offense against the sanctuary (Dozeman, 2010). The law therefore gave an ethical shape, able to create order out of disorder. Fretheim (2010) notes that, "the Sabbath brings out the underlying rhythm of creation….and there is a sense in which by involving one's self in all the joining and weaving of the tabernacle, one is involved in the creation of a new world. Hence the value of the Sabbath as a sign." Fretheim's point here is important for the Christian engineer.

3.12. *Marketing/Sales/* Communications related to the Tabernacle

All that the Lord had instructed Moses, he communicated to the people (Exodus 35) to convince them to build the Tabernacle. This display of both sales and marketing helped the Israelites see the Tabernacle as a place of worship, where the Lord met and communicated with His people. This meant that everything that God's people did should be a form of worship.

3.13. *Management*/Organizational structure of the Tabernacle

We can deduce a hierarchical structure from the construction of the Tabernacle. Moses was to oversee the entire architectural design/plan; Bezalel was to serve as the lead-builder (project manager); and Oholiab was Bezalel's assistant. Furthermore, the responsibility of the Levites was to be under the direction of Ithamar, the son of Aaron the priest (Exodus 38:21–23).

4. Historical Loss and Redemption of the Creationeering™ Model

Now that we have shown that Creationeering™ was initiated by God and followed through by different examples by mankind (e.g., Moses and the Tabernacle), there was a loss of the God-ordained ethics basis with science, engineering, and business practice over time. It was not until the Reformation in 1517 that the renewal of the Creationeering™ model (although the term was not used then) started. Herein, we show that the rise of science and the scientific method in Europe was inseparably linked to the Reformation and the Industrial Revolution, which started in 1760 because of the technological basis from the science arising from the scientific method. Prior to the Reformation, true science based on testable hypotheses did not exist due to an authority-based paradigm from Aristotle all the way through to the fifteenth century.

When Luther pinned his 95 theses to the church door of All Saints Church at Wittenberg on October 31, 1517, it began the lifting of Europe out of darkness, not only in terms of understanding the glorious truth of the Gospel and true salvation, but also in freeing men's minds to think for themselves. Generations of men and women in Europe had been continually in darkness with little understanding of what the Bible teaches on every aspect of life. Wherever the Bible is honored, it frees men's minds and lifts man from his imaginations to understand the reality of his true condition. With the liberation of mind brings with it civilization and order in society, and with this true art and science eventually flourish.

In the early part of the sixteenth century, Europeans had no real freedom to think. Literacy was low, and only the rich gentry and monks in monasteries received even a basic education to enable them to read and write and understand the foundation of cultures of the past, such as Greece and Rome. For those who could afford to go to the universities, they would possibly receive lectures on natural theology based on the Greek minds of twelve hundred and more years before. There had been no revolution in the world of academia since the writings of Aristotle, Plato, Pythagoras, and on to Ptolemy. Though it is unlikely that Luther was anticipating such a major change by his stand against the Pope, it is certainly true that all the changes that ensued after this across Europe can be traced back to this moment.

October 31, 1517, is reckoned by most to be the beginning of the Protestant Reformation in Europe. Undeterred by opposition, Luther continued his attack on the papal system and after a three-day church trial in 1518 when Luther ably defended himself against the Papal envoy sent against him, he slipped away from arrest. Then after increasing opposition against him, he was excommunicated by the Pope in 1521, and appeared before the Diet of Worms before the Emperor Charles V, to respond to attacks from Johann Eck who especially derided Luther, and led the persecution against him. Were it not for the support and intervention of Prince Frederick III, Elector of Saxony, Luther would probably have been murdered on his way back to Wittenberg, but Frederick had masterminded a kidnap by friends to keep him safe in Wartburg Castle at Eisenach, and it was here that Luther wrote much that would encourage others to not seek primarily an outward revolution, but an inner change of heart based on conversion of the soul. His main work in many ways was probably not the 95 theses for which he is most remembered, but his translation of the whole Bible from Hebrew and Greek into vernacular German, which undoubtedly freed the common people to now begin to see for themselves what was the way of Truth. The New Testament was completed and published in 1522, and the full Bible was published in 1534.

Hence, the Reformation in Europe, which sprang primarily from Luther's actions, freed minds to think carefully about the world and the Universe around them. It enabled a new Biblical consideration of non-material reality, reason, and mind, and finally the material Universe.

4.1. Non-Material reality—the overthrow of the "Great Chain of Being"

R.G. Collingwood (1945, p. 3ff.) says in his study entitled *The Idea of Nature*:

> Greek natural science was based on the principle that the world of nature is saturated or permeated by mind. Greek thinkers regarded the presence of mind in nature as the source of that regularity or orderliness in the natural world whose presence made a science of nature possible. The world of nature they regarded as a world of bodies in motion. The motions in themselves, according to Greek ideas, were due to vitality or "soul"…
>
> Since the world of nature is a world not only of ceaseless motion and therefore alive, but also a world of orderly or regular motion, they accordingly said that the world of nature is not only alive but intelligent; not only a vast animal with a "soul" or life of its own, but a rational animal with a "mind" of its own. The life and intelligence of creature's inhabiting the earth's surface and regions adjacent to it, they argued, represent a specialised local organisation of this all-pervading vitality and rationality, so that a plant or animal, according to their ideas participates in its own degree psychically in the life processes of the world's "soul" and intellectually in the activity of the world's "Mind" no less than it participates materially in the physical organisation of the world's "body."

This way of thinking inevitably leads to a dualism since in the worldview of the Greeks, which dominated academic prior to the Reformation, the Creation was not of the original formless matter but only involved deity bringing *form* to what was already existing. In their thinking, *matter itself is not created*, which then leads to matter and bodies themselves being regarded as base. As Hebden Taylor (1968, pp. 89–90) states:

> …the Greek idea of the origin of the world is both dualistic and dialectical since pagan immanence thought cannot fully grasp the intrinsic unity and coherence of reality which derives from God's creation of the world.

So, matter is regarded with disdain while mind and thought are abstract and revered. There is no proper Creation account of the physical world, and importantly the Biblical concept of the soul is not present in their thinking. Their idea concerning all life is that it is in a state of progression, the "Great Chain of Being" which significantly influenced later, in post reformation days, the view of Erasmus Darwin, the grandfather of Charles Darwin. Thus Erasmus Darwin in his book *Zoonomia* (1796) wrote that the living 'filament,' or living strand, was the cause of all life:

> Would it be too bold to imagine, that in the great length of time, since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, would it be too bold to imagine, that all warm-blooded animals have arisen from one living filament, which THE GREAT FIRST CAUSE endued with animality, with the power of acquiring new parts, attended with new propensities, directed by irritations, sensations, volitions, and associations; and thus possessing the faculty of continuing to improve by its own inherent activity, and of delivering down those improvements by generation to its posterity, world without end!

This thinking, which is a reflection of the false Greek view of origins, heavily influenced Charles Darwin in the mid-nineteenth century many years later, and shows that the future enlightenment was ***not*** connected with Biblical thought, but actually was a throwing away of the Biblical worldview, the true cause that allowed experimental science to flourish in the sixteenth and seventeenth centuries. The so called enlightenment of the eighteenth century was actually an 'endarkening' of minds which had been freed in the sixteenth century to think for themselves by the Biblical reformation.

It was the Biblical view of the human body and soul—that body *and soul* are made in God's image that gave rise to a sense of dignity of all humanity and a realization that all men and women, whatever station, are made in God's image and to be respected, that a true ethical standard is based on the Ten Commandments, and that the sanctity of life is heavily connected to the God's revelation in the Scriptures. It is when men and women applied the Scriptures to all areas of life that civilized society grew and was established using codes of ethics based on Biblical principles (Mitchell, 2013), and which enshrined the basic and fundamental truth that all men were equal before God (United States Declaration of Independence, 1776) and that there should be justice and equity to all men.

4.2. Mind and reason

Along with dignity and the true recognition that man is more than an animal, came the realization that man's reason is not something that evolved from mud over "millions of years" as Erasmus Darwin (and Charles Darwin after him) would wrongly postulate later (Burgess, 2001; Nevin, 2009, pp. 158–165; Barnard et al., 2011; McIntosh, 2017). That idea came from Greek thinking, which the Reformation had fundamen-

tally overthrown (Deason, 1985), but it seeped back through those rejecting the Biblical testimony. Evolutionary ideas are more closely connected to the medieval "chain of being" thinking that had considerable resonance with classical Greek thinking (Taylor, 1968—see particularly discussion on p. 94, 2nd paragraph). The Reformers had a much firmer grasp of the reality of the creation of all things (including mind) by God and regarded reason and logic as a gift from God to be used in submission to His will—they are an extension of man, and a reflection of His Creator who declares Himself as the ever-existing One to Moses in the burning bush,

> Exodus 3:13,14—…and they shall say to me, What is his name? what shall I say unto them? And God said unto Moses, I AM THAT I AM: and He said, Thus shalt thou say unto the children of Israel, I AM hath sent me unto you.

In the New Testament, with the same all-encompassing majesty, Christ is the supreme revelation of the Logos, the Word (John 1:1), and the Christocentric nature of the Reformation is self-evident from the writings of Luther (1535), Calvin (1536), and the torrent of Reformed and Puritan closely argued writing that emerged from then on. Connected with this is the whole concept of information, which has been shown repeatedly by careful scientific investigation to be *not* part of matter (which would be the Greek Aristotelian way of thinking), but is itself a creation transcendent to matter (Gitt, 1989; McIntosh, 2009; McIntosh, 2013, pp. 179–201) and a reflection of the Mind which made all (the Logos of John 1:1). Supremely in creation, man is endued with mental powers that, though not omnipotent, give him the ability to think and reason as the Creationeer™ Himself. The rise to freedom of thought and reason though had been blocked severely by a false church selling salvation to an enslaved people who were made to believe a false gospel of works presented by a false priesthood that would never save them in the life to come and would further suppress them in life here and now.

The Reformation began to not only show that the Catholic system was hideous and enslaving, but also showed men and women that they were indeed made with minds to think for themselves, which brought us back to the Dominion Mandate of Genesis 1:26–28. As soon as men and women began reading the Bible in their own language, they realized themselves what Truth really is, and that they did not need a priest to tell them what was good and what was evil. They could use their own minds to test all things in the light of Scripture in their own tongue. The true Gospel of redemption, though it does first paint the awfulness of the Fall of man in Eden, nevertheless shows the greatness, of God's love placed upon man even in his fallen condition, and the freedom that is extended once man comes to Christ:

> John 8:36—If the Son therefore shall make you free, ye shall be free indeed."

There is a strange and deep paradox in Christian thinking concerning Man himself. In his desire to be free in the garden of Eden and yet listening to the lie of the Devil:

> Genesis 3:4,5—Ye shall not surely die: For God doth know that in the day ye eat thereof, then your eyes shall be opened, and ye shall be as gods, knowing good and evil.

Adam did not realize that he was already a god, though created, in holy submission to the Creator.

> Psalm 82:6,8—I have said, Ye are gods; and all of you are children of the most High. But ye shall die like men, and fall like one of the princes.

Adam had great freedom in his original innocence and was not enslaved. In his desire to be 'free,' his whole being, including his mind, became enslaved. And now, in his fallen estate, man is again wrongly evaluating the Gospel, as though it would enslave him, because he does not realize that he is already enslaved to sin and death. Hence, mankind must see that it is indeed sin and a lie of the Devil that has enslaved not only their bodies (which now must go through death and if unredeemed are in peril of judgment to come), but as a consequence of the Fall, their minds are also enslaved and are thinking wrongly concerning their very existence and why they were made to begin with.

The paradox is that by submitting to Christ as our redeemer, He not only saves our souls from the judgment to come, *but frees our minds to again think correctly*. This is the real jewel often missed in writing today concerning the Reformation. Deason (1985) draws attention to this in his discussion of the new empiricism that would overthrow the dominance of Aristotelian thinking. On pp. 232 and 233, he states:

> The parallel that I have drawn between biblical empiricism and scientific empiricism did not go unnoticed in the seventeenth century. The acceptance of science in Protestant countries rested in part on the perceived similarity between inductive study of scripture and inductive study of nature, both in opposition to the deductivism of Aristotle. The new science appeared to follow the lead of the Reformation by turning directly to the original, by-passing the corruptions introduced by the Greek philosophical tradition.

This freeing of the mind to think correctly, not only leads to establishing individual lives again on the rock of Christ from the bottom up, but then flows out into whole communities, which begin to show the care and love for God and to one another instead of selfishness and greed, and all the evils so evident in much of sixteenth-century Europe before the Reformation, and increasingly again in a post-Christian and post-modern Europe.

The freeing of the mind in post-Reformation Europe would also free the mind to think correctly concerning science. As has rightly been stated by Hebden Taylor (1968—see pp. 93–94):

> Both Luther and Calvin set themselves against the medieval synthesis which had taken place in Scholasticism between Classical and Biblical modes of thought about reality. They insisted that the Scriptures alone revealed God directly to men. In so doing they stressed the biblical teaching that the Triune God is sovereign over all things. In this great Reformation doctrine of God's sovereignty may be found the key to the Reformation.

By stressing this issue of God being sovereign over all things, they laid the groundwork for approaching the world and reality itself as being rational and intelligible. By so doing, they laid the true foundation for modern science.

4.3. The Universe and the material world

From such a freedom of thought flowed the explosion of interest in the natural sciences, in astronomy, botany, biology, zoology, the beginnings of medicine, and the principles of physics and chemistry (Randell, 1924; Masters, 2003; Mahon, 2004). It is no accident that the sciences did not grow first in the eighteenth century as so many teach incorrectly (implying that this growth was connected with the so called Enlightenment) but in the sixteenth and seventeenth century under the leadership of reformers and the puritans who followed them. These were the days of the Renaissance where true unshackled thinking emboldened by the Reformation threw off Catholic darkness and Papal authoritarianism, rediscovered the freedom of true Biblical thinking and spawned great scientific discoveries, as well as great Music and the Arts.

Great names of this early period were the following:

- Leonardo da Vinci (1452–1519)—Polymath who was brilliant at Mathematics, Engineering, Invention, Anatomy, Painting, Sculpture, Architecture, Botany, Music
- Galileo Galilei (1564–1642)—Physics, Astronomy
- Johannes Kepler (1571–1630)—Mathematics, Astronomy, particularly with respect to planetary motion
- Sir Isaac Newton (1643–1726)—Dynamics; Calculus; Gravity; Reflecting telescope; Light. He wrote perhaps the most influential book in the history of Science in 1687—*Principia Mathematica*
- Sir Robert Boyle (1627–1691)—Chemistry and gas dynamics
- John Ray (1627–1705)—Natural History
- Nehemiah Grew (1641–1712)—Medicine, Botany
- Blaise Pascal (1623–1662)—Hydrostatics, Barometry
- Walter Charleton (1619–1707)—President of the Royal College of Physicians
- Gottfried Wilhelm Leibnitz (1646–1716)—Mathematician, co-inventor of Calculus
- John Flamsteed (1646–1719)—Greenwich Observatory Founder; Astronomy
- Cotton Mather (1662–1727)—Physician
- John Harris (1666–1719)—Mathematician
- John Woodward (1665–1728)—Paleontology
- William Whiston (1667–1752)—Physics, Geology
- John Hutchinson (1674–1737)—Paleontology
- Jonathan Edwards (1703–1758)—Best known as a leading theologian, but also Physics, Meteorology, Immunology
- Carolus Linnaeus (1707–1778)—Taxonomy; Biological classification system
- Jean Deluc (1727–1817)—Geology
- Richard Kirwan (1733–1812)—Mineralogy
- William Herschel (1738–1822)—Galactic astronomy; Uranus
- John Dalton (1766–1844)—Atomic theory; Gas law

Leonardo da Vinci famously stated:

> Anyone who conducts an argument by appealing to authority is not using his intelligence; he is just using his memory.

It was notable that in the latter part of the seventeenth century the Royal Society was formed in Britain, which has as its motto "*Nullius in verba*" which translated means 'on the authority of no one.' In other words, test all things (as directed by 1 Thess. 5:21). Do not just believe something because someone has said it (Acts 17:11). That is exactly what had happened in pre-Reformation Europe. Where the Bible was honored, it freed men and women to think straight. This humble spirit is typified by the following saying attributed to the brilliant Isaac Newton:

> To myself I am only a child playing on the beach, while vast oceans of truth lie undiscovered before me.

and that of Kepler who stated (Tiner, 1977, p. 172):

> The World of Nature, the World of Man, the World of God—all three fit together. We see how God, like a human architect approached the founding of the world according to order and rule, and measured everything in such a manner.

This period of immense growth in the sciences led into the nations of Europe coming into great expansion associated with inventions and industry thus leading to the Industrial Revolution. Along with the sciences, the concept of the Protestant work ethic began to take shape, as businesses and companies began to trade between nations and across the world. The Reformation was resisted by many Catholic nations and the wars of the 1500s and 1600s were mainly centered around resisting the

grip of the powerful Catholic Empire in central Europe dominated by France, Spain, the Vatican in Rome, and Austria.

In England the turmoil of the 1500s as monarchs favorable to Catholicism persecuted Christians and burnt them at the stake, eventually gave rise to a time of relative peace and security with the rise of Elizabeth 1st (1533–1603) to the throne. These days established England as a country that in the main would follow Reformed thinking in terms of government independent of Rome. Though it would go through deep difficulties in the civil war of the mid-seventeenth century as Catholic ideas resurfaced, it was essentially never going to return to subservience to Rome. Preaching of the Reformed faith across the land of England increased, and in the eighteenth century true revival broke out in England, Scotland, Wales, and in the colonies of America. But the 1700s were also the days of the rise of the so-called 'Enlightenment,' when human reason would be placed above Biblical authority and no longer would be seen as subject to the Lord who had created man. This was particularly noticeable in France where Rousseau, Voltaire, and others trod the path of elevating man to a place without God in his thinking. France, that had never known the full force of reformation and revival and had long been in the grip of Catholicism, suffered the dreadful French Revolution, which killed thousands and caused many good Biblical preachers to flee to other lands. Though France produced great men of science (Pascal, Pasteur, Descartes…), it sadly also spurred on atheistic ideals and much of modern evolutionary thinking finds its roots in such wrong thinking which firmly took route in England in the mid-nineteenth century with Charles Darwin.

The Renaissance of the sixteenth and seventeenth centuries essentially flowed on into the nineteenth century where in England arose some of the finest minds in science, despite the root of evolutionary thinking also developing in that same century. Notable scientists, many of whom were strong Christian minds, were the following:

- John Harrison (1693–1776)—Inventor of the marine chronometer
- Mikhail Lomonosov (1711–1765)—Russian scientist, poet, artist and historian, founder of Moscow State University. Mikhail Lomonosov first postulated the law of mass conservation in Chemistry, and showed the idea of the existence of phlogiston in the chemistry of combustion was wrong.
- James Watt (1736–1819)—Developed the steam engine and laid the basis of the Industrial Revolution.
- Sir Humphry Davy (1778–1829)—Chemistry
- Michael Faraday (1791–1867)—Electrochemistry, Electrolysis, Electromagnetism, Combustion
- James Clerk Maxwell (1831–1879)—Theory of Electromagnetism, prediction of speed of light. Kinetic theory of gases. Most would put Maxwell, Newton, and Faraday as the three greatest scientists of all time. Even Einstein looked up to Maxwell and built on his brilliant theory of electromagnetism.
- Louis Pasteur (1822–1895)—French microbiologist and chemist noted for discovering the principle of vaccination and pasteurization. He understood that life could not come from non-life and thereby disproved the notion of spontaneous generation.
- Nikola Tesla (1856–1943)—Serbian inventor and engineer who immigrated to USA. The alternating current induction motor was his invention and is used widely today.
- Max Planck (1858–1947)—German physicist awarded the Nobel prize in physics in 1918 for his work in quantum theory.
- Alfred Einstein (1879–1955)—German theoretical physicist, who first understood the direct correspondence between mass and energy. He is noted for his understanding of the principles of relativity in physics and astronomy. He also immigrated to the USA.

So many more could be listed here, but much of the rise of the scientific achievements was due to a reinvigorated Europe freed from an ideology that smothered original thought, a freedom that flowed inexorably from the Reformation of 1517.

4.4. The danger of the reversal to Aristotelian thinking

It was important 500 years ago for men to throw off the shackles of false ideology when making scientific investigations, and the Reformation in Europe was a decisive factor in doing this. It is similarly important today that the shackles of false ideology are again thrown off to aid thorough unprejudiced scientific inquiry. But what we learn from events that unfolded after the Reformation is that throwing off the Bible, paradoxically puts man back into the shackles of wrong thinking and not only endarkens his soul as regards salvation, but thoroughly undermines even the very definition of what it means to be human. Whereas Catholicism was the battle 500 years ago, evolution versus creation is certainly the battle today, and a naturalistic evolutionary view of origins represents an insidious ideology that is not true science, though it passes itself off as such (1 Tim. 6:20). Rather it is a false ideology overlaying the true science. True experimental science actually undermines evolutionary dogma and shows from all the areas of engineering, medicine, astronomy, biology, botany, and geology that the Biblical worldview is the only one that is consistent with the evidence (McIntosh, 2017; Burgess and McIntosh, 2018).

It is therefore a reformed view of reality, with the Bible giving the framework for studying the world around us that then frees us to think correctly in all walks of life. This has had a tremendous

influence in the culture of the United States of America, which has based its founding values on the Bible.

5. Creationeering™: A Modern Example of a Car

Because of the Reformation and Industrial Revolution, modern technologies were birthed, and the twentieth century admitted the greatest inventions known to man. One of mankind's greatest engineering inventions in the twentieth century was the modernization of the assembly line by Henry Ford. This modern example of a Creationeered™ complex system relates to the automobile. The automobile typically comprises around 30,000 components made of different materials that have gone through different materials processes. Henry Ford helped forge a major invention related to mass-production manufacturing to bring automobiles to almost every household in the USA.

5.1. Car design process

Three different phases exist in the design of a car. The first phase does not include detailed analysis, but the next two phases both include detailed analysis where Design-Analysis are iterated back-and-forth. The first phase, called the "Conceptual Design," albeit operated differently in each corporation, essentially is focused on the "art" of the car. The Conceptual Design includes the following steps (usually): sketching, styling, clay modeling, interior model, ergonomics, surfaces, color/trim, and vehicle graphics. Once Phase-One Conceptual Design is completed, the design is sent to the engineers for analysis. Once the iteration designs are completed for shock, vibration, etc., then the final design phase is related to crashworthiness, where more iterations on the design can arise.

5.2. Car design analysis

Now that the overall car "system" has been conceptualized, analysis of the whole system, subsystems, and components is undertaken by a group of engineers in "normal" environments. Normal environments reflect the car functioning in its normal operations. Each engineering team will have different roles and responsibilities related to the engineering requirements "downscaled" from the whole system to the subsystems to the components. The second Design Phase, sometimes called the Preliminary Design or Detailed Design, is accomplished by the engineers based on their analysis. Each engineering team will consider the design for manufacturability (procurement), logistics, the assembly of the components and subsystems, its function/performance environments, sustainability of the car, and death/recycling.

Once this Detailed Design phase is finalized, then the cars will be designed for "abnormal" environments. Abnormal environments reflect the scenarios that can occur by accidents. For the car, the worst abnormal environment is a crash. As such, the most important focus in the final design phase is studying the crashworthiness of a vehicle. Once the final design has been experimentally validated, then the components are ready for procurement.

5.3. Procurement of car parts

Because there are approximately 30,000 components in a car, the Original Equipment Manager (OEM), like Ford Motor Company, General Motors Company, etc., having Tier 1, 2, and 3 suppliers is very important. Hence, each component is made a different way.

5.4. Car part logistics

Related to logistics, the automotive supply chain for an Original Equipment Manager (OEM), for example Ford Motor Company, includes the following: dealerships, manufacturers, Tier 1 suppliers, Tier 2 suppliers, and Tier 3 suppliers. Hence, the 30,000 components come from these companies, so organizing the scheduling of these components through different corporate bureaucracies is an effort. Logistical scheduling of the supply chain products is very complex.

5.5. Car assembly

Ford's first venture into automobile assembly with the Model A involved setting up assembly stands on which the whole vehicle was built, usually by a single assembler who fit an entire section of the car together in one place. This person performed the same activity over and over at his stationary assembly stand. To provide for more efficiency, Ford had parts delivered as needed to each workstation. In this way each assembly fitter took about 8.5 hours to complete his assembly task. By the time the Model T was being developed Ford had decided to use multiple assembly stands with assemblers moving from stand to stand, each performing a specific function. This process reduced the assembly time for each fitter from 8.5 hours to a mere 2.5 minutes by rendering each worker completely familiar with a specific task.

5.6. Car Performance/Function

The reason that different Ford vehicles exist is because their performance or function is different. For example, the Ford Escort's performance objectives are related to increased gas mileage and lower vehicle cost in contrast to the Ford F-150 truck's performance objectives, which are reliability, ability to pull heavy weights, off-road stability, and lower costs. These different objectives clearly have motivated the completely different designs of these vehicles.

5.7. Sustainability

Each engineering team for each car provides minor adjustments to the next year's version to continuously improve the car's usage. Reports from consumers come back to the design team, who then

start the Creationeering™ process over for the next-generation vehicle.

5.8. Death/Recycling

Each vehicle is designed for a particular lifetime. For example, a Ford F-150 truck will typically meet an objective of 150,000 miles while some will reach a stretch objective of 300,000 miles. However, a Ford Escort can last between 100,000 and 200,000 miles. Because the environmental conditions and road usage are different, 'death' of the vehicle will occur at different times.

Vehicle recycling comprises the dismantling of vehicles into separate parts, some for reuse and others for different reprocessing. Approximately 12–15 million vehicles reach the end of their use each year in just the United States alone. The vehicles are shredded, and the metals, polymers, and glass are recovered for recycling, while in many areas, the rest is further sorted by machine for recycling of additional materials. The remainder, known as automotive shredder residue, is put into a landfill. The shredder residue of the vehicles that is not recovered for metal contains many other recyclable materials including 30% of it as polymers, and 5–10% of it as residual metals. Modern vehicle recycling attempts to be as cost-effective as possible in recycling those residual materials. Currently, 75% of the materials can be recycled, with the remaining 25% ending up in landfill. As the most recycled consumer product, end-of-life vehicles provide the steel industry with more than 14 million tons of steel. A car crusher is often used to reduce the size of the scrapped vehicle for transportation to a steel mill.

5.9. Human Resources

Along with managers, the auto industry requires different sets of requirements for the working team. Related to the engineering process, the auto industry requires designers, analysts, materials producers, logistics operators, assemblers, and recyclers. There are different roles and responsibilities for the Original Equipment Manufacturers (OEMs), Tier 1, Tier 2, and Tier 3 corporations throughout the whole supply chain.

5.10. Finances

The largest market in the world is the automotive industry, so different jobs related to money are typical of almost any industry. The following positions are needed: accountants, insurance agents, financial planners, ethics, and auditors, etc.

5.11. Legal

Legal issues arise from governmental laws and certification boards. Automotive companies have lawyers that address intellectual property, personnel employment issues, insurance, corporate policies, and immigration.

5.12. Marketing/Sales

As mentioned, the largest market in the world is the automotive industry, so marketing and selling to the different nations/cultures is a key job. For example, crossover vehicles represents the largest market in the USA [https://www.statista.com/statistics/276506/change-in-us-car-demand-by-vehicle-type/]. The Volkswagen Golf was the number one car sold in Europe in 2019 [https://www.best-selling-cars.com/europe/2019-full-year-europe-best-selling-car-models/] and the number one 2017 vehicle sold in China was the Wuling Hongguang [https://www.goodwood.com/grr/road/news/2018/4/axons-automotive-anorak-chinas-best-selling-cars/].

5.13. Management

Ford Motor Company has a fairly low number of management levels as they believe that it provides a faster, efficient, and integrated approach to customer service (Moynihan and Titley, 2000). Their structure is outlined as follows: Chairman, President, Executive Vice-President, and Functional Heads. The functional heads have the direct relationship with the workers in each of the categories of the personnel structure. Each company is different based on its ethics and human personnel strategy.

6. Creationeering™ and Education

From an educational perspective, when the engineering process and business/entrepreneurship process combine, a modern industrial revolution can arise. Creationeering™ produces three types of students that can address technological issues in the twenty-first century:

1. Those who start new technology companies, who will focus their creative energy on building profitable businesses that lead to human flourishing (creating good products and providing job opportunities).
2. Those who progress up the management chain in a technology industry, who understand the *imago Dei* and will respect the diversity in other people's talents and skills; and
3. Those who lead engineering projects for industry and government labs, who will see their talents as God-given gifts to glorify God and serve humanity.

Hence, Creationeering™ is a paradigm, as a theological and discipline-oriented concept, that will equip students to lead in like manner after their Creator Who leads them into their creativeness.

7. Summary

Creationeering™ is a paradigm, or worldview, that integrates engineering and business practice for technological entrepreneurship from a Biblical basis. It is a paradigm that subsumes "intelligent design" along with other engineering attributes and business practice arising from the Dominion Mandate in Genesis 1:26–28, in which the Creator commanded mankind to "rule" and "reign." Because of mankind's sin over time, the

Creationeering™ paradigm was lost but regained arising the Reformation, which led the technical industrial revolution in the nineteenth century and the massive increase in technology in the twentieth century.

Creationeering™ distinguishes itself from creation science in that the former includes the "creation process" while the latter is limited to discovery of an existing physical phenomena. The systems engineering steps include the following: design, analysis/synthesis, procurement/making, logistics, assembly, performance/function, sustainability, and death/recycling. The business aspects include the following: human personnel, finances, legal, sales/marketing, and management. The eight steps in engineering and the five aspects of business comprise the paradigm of Creationeering™. God's account of the Creationeering™ process is presented with respect to the creation of the Cosmos and Moses' account of the Creationeering™ process is presented with respect to the Temple. Also, a modern example of the common automobile is discussed providing a good example of the Creationeering™ process.

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