

Williams Holistic Approach Model (WHAM): Sustainable University Leadership from the Perspective of a Woman Physicist

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Abstract

University leadership from career and organizational viewpoints are discussed from the perspective of a woman physicist. Laws of physics are used, through appropriate analogies, as templates for structuring useful life lessons on holistic WHAM leadership. Interactive university skill sets and program policies based on holistic WHAM approaches are least likely to omit significant factors that could contribute to creation of great students as products—the main goal of university leadership. The holistic WHAM life lessons presented rest upon Five Pillars of Support for Success (or simply Five Pillars). The writer views these five Pillars as encompassing the basic aspects of life and living and defines them as follows: Spiritual (central and most important), Physical, Intellectual, Social, and Financial. The WHAM model is based on nurture in these five areas and demonstrates that the greater collaboration or unitedness in any given endeavor, the greater the yield. Women are natural nurturers and should be considered for leadership roles. Impediments to their progress and ways to help improve the numbers as they relate to women as leaders in the academy are explored.

1. Introduction

What skills make a great leader? What policies lead to great programs? Successful leaders must formulate and implement answers to such challenging questions as these regardless of the type organization that is being led, inclusive of universities. University leadership from both a career and an organizational viewpoint is presented from the perspective of a woman physicist at the technical level of the general public or a typical newspaper article. Implications of laws of classical and modern physics are used in this discussion as tools for tailoring tactics for coarse- and fine-tuned guidance systems for successful university leadership. Specifically, implications of Newton's First, Second and Third laws of motion and his Law of Universal Gravitation from classical physics are applied as generalized guidance tools in university leadership. The results are then interpreted against the more refined findings of both quantum and chaos theories that emphasize the inability to precisely predict outcomes of any event no matter how careful one is. Yet the refined theories support the general notion of using Newton's laws as useful templates to structure useful life lessons for leadership through use of appropriate analogies—giving the life lessons a flavor of scientific backing for increased believability. Newton's classical laws as well as the refined theories either directly or indirectly support the idea that everything in the universe interacts with everything else in the universe at some level, so that nothing is completely isolated from anything else. Therefore, skill sets and program policies based on an interacting, all-inclusive or holistic approach are the ones that are most likely to generate great leaders and great programs, since these are the ones less likely to omit significant factors that could contribute to creation of great students—the main goal of university leadership.

Organizations, including universities, typically are represented structurally as a system of interconnecting rectangles, each rectangle representing a unit or division of the overall organization. The connecting lines are meant to show how the individual units connect or relate to one another. All too often, however, organizations, including universities, do not operate as though such connections between units are a part of their defining structures. Instead, they operate as a collection of discrete, disconnected entities each defining and focusing almost solely on what it sees as its own compartmentalized affairs. Failure to de-compartmentalize and function as a system of interdependent relationships¹ caused by interacting components that affect and are affected by each other continuously, is a major cause of the fall of organizations, including universities.

That the interacting organizational components are both human and nonhuman, further complicate matters because of the additional management constraints on a leader that are associated with human resources relative to fatigue and sensitivity issues that are not encountered in nonhuman components. Because of this, extra care must be taken by leaders not to just manage, but to lead the human resources as such resources must try continuously to strike a balance between career, self, and basic interconnected aspects of life that continuously affects them spiritually, physically, intellectually socially, and financially. These complications comprise the root problem in leading any type organization, such as universities or businesses, in which human resources are a major part.

In these and other types of organizations, the operational line between universities and businesses continues to blur as these entities recognize their own connectedness evidenced through their increasing engagements in alliances and collaborations. They are catching and embracing the vision of how their operational synergy can greatly boost their product quality. Both groups are seeking to use their resources to produce a quality product that the public will buy. The major basic operational difference between universities and businesses is fast-becoming just their product—which for the business is some commercial product line and for the university, of course, the product is the student. Since universities and businesses operate similarly, they are finding more and more that leadership skills and techniques for increasing product quality and yield that are found to be useful in one often is found to be of value in the other, so that sharing leadership skills and techniques is being practiced more and more between the two groups. Thus, common problems between universities and businesses are leading to common solutions between the two, also.

As universities and businesses share problems and solutions, and from the ideology that all things in the universe interact, we enter a new pattern of connections of sharing between the principles of Classical (that is, everyday) Physics, Modern Physics, Quantum Physics (where Modern Physics is the bridge between Classical and Quantum) Chaos theory and business and

¹ *Seven Habits of Highly Successful People* , Steven Covey, Simon and Schuster, New York, 1989.

university leadership skills. Leadership skills are connected with the creation of leadership policies. Taking advantage of these intricate relationships can help create the types of policies that make great university leaders who then create great university programs, which ultimately results in the production of great university students as university products.

In this treatise, skills and programs are based upon a valuable set of interacting Classical Physics and Chaos principles that are easy to envision and to apply to leadership with these laws as “templates”. Through the “templates”, great WHAM leadership plans can be formulated, analyzed, and applied with confidence. Implications using the simple classically-derived “templates” are considered against a background set of simplified more refined non-classical implications but which do not require technical or scientific rigor to understand the connection. This is done for the purpose of showing agreement between the simple and more refined concepts for greater acceptance of the ideas. The implications are derived from a complex set of proven Modern and Quantum Physics and Chaos theories to ground the classically-derived “templates” in the simple and safe reality that nothing in the universe can successfully by-pass its source. This introduces the notion that one should always remain anchored to the source of the universe. By carefully and strategically making analogies between the parameters in these laws and life situations, all of these laws can be used to teach, with a scientific perspective, invaluable life lessons about leadership and any other entity in which an analogy has been constructed.

2. Common Leadership Problem Expressed

2.1 Statement of problem

Any organization, for instance, military bases, hospitals, public schools, businesses, universities, and so on, must have good leadership in order to be successful. Leadership strategies that work for one organization may or may not work for another. However, there are some common threads of leadership that will apply to all, most times, with minor to no modifications required.

Although a discussion of parallels between any organization and universities could have been chosen, businesses were chosen since universities continue to grow in recognition of themselves as businesses whose products are their students. They are also increasingly recognizing that their survivals depend upon producing and marketing quality products that people will pay money to acquire—just as businesses do. Thus, they are very much aware that if they hope to survive, they must identify and solve the problems that threaten their survivals—just as businesses do. Additionally, the problems that businesses encounter are often the same ones that plague universities.

In his paper, *The Modern Physics of Leadership*², author Douglas Saarel, states that: “According

² *The Modern Physics of Leadership*, Douglas Saarel, President, Sky Ranch Seminars, March 2002
<http://www.docstoc.com/docs/44089464/The-Modern-Physics-of-Leadership>

to a joint research study by the Wharton Graduate School of Business and the Harvard Business School, over 50 percent of corporate downsizing has resulted in increased costs, and 80 percent of process re-engineering projects have failed to meet their objectives. Similarly, the majority of quality management and continuous improvement programs have not substantially improved in quality over time. To reduce these figures requires a drastic change in leadership's perception and thinking". Mr. Saagel further states in his paper that, "At the root of the problem is the piecemeal approach American business leaders have taken to operational improvement as their enterprises have become more complex. Rather than treating their businesses as integrated systems, they introduce individual programs or create new pieces, which then fail to fit together. The fact is, it is impossible to deal with something as complex as a business in bits and pieces because business is a non-linear enterprise where all of the elements are connected and constantly affect one another." The same is true for universities.

It is a simple matter to infer from the Harvard and Wharton research results that unsuccessful business leaders are those who do not carefully craft leadership strategies that carefully take into account the many relationships that exist between and among all segments of their organization. An analogous assessment for many successful universities might also be made for their leaders.

A further complication encountered by leaders in general, is that their resources are both human and nonhuman. The human resources pose issues of concern, such as, fatigue and sensitivity that are not encountered in nonhuman resources. This, too, must be considered. Although women have demonstrated that they can be as tough as they need to be, their basic natures tend towards nurture and sensitivity making them good candidates for great leadership.

3. A Woman Physicist's Perspective of the Solution

3.1 Defining great leadership

In today's complex and ever-changing world, traits and skills used to define a great leader are numerous, diverse, and dynamic. It is often through exploration of these characteristics that individuals arrive at their own unique definition of a leader. Regardless of selected definition or style, great leaders are always labeled *effective*. Their effectiveness is largely due to their being an invitational leader³, which is a leader who invites everyone in the organization to have input into the leadership process both on a professional and on a personal basis. They exude collaboration. They have a strong vision and are capable of expressing the vision in such a personalized and collaborative manner that it becomes the vision of the followers, as well. Then leader and followers move and operate in harmony like the parts of a well-oiled engine. Such a leader is a great leader. Women can make great leaders as they typically have the nurturing traits of good leaders.

³ William W. Purkey, Ed.D. and Betty L. Siegel, Ph.D., *Becoming an Invitational Leader: A New Approach to Professional and Personal Success*, Humanics Trade Group, Atlanta, GA, USA, 2003.

3.2 Applying physics to launch and sustain great leadership

Everything at its fundamental level is governed by natural law. The essence at the core of the concept of effective leadership is the ability to generate and sustain the advancement of something that has definition, in reality or in the mind, such as a university. Advancement immediately conjures up in the mind the notion of movement or motion of the central target of interest from one status quo condition to another that is nearer the status quo of higher regard relative to some final such condition defined as a goal. Thus effective organizational leadership always engages forward mobility of the status quo of an organization from one condition to a better one relative to accomplishment of some goal. Therefore, mobility or motion is inherent in the concept of leadership. Thus, the mind of a typical physicist, woman or not, desiring to offer guidance related to effective leadership, is naturally drawn to the physics subject of Mechanics, the study of motion. Mechanics expresses classically Newton's 3 laws of motion, because these laws define and describe motion in simplest or classical terms. Physicists, other scientists, and some others believe that simplest is best. Therefore, they tend to look for simplest solutions first and then extrapolate to levels of greater complexity to the degree necessary to give a desired refinement.

Therefore, as a physicist, moving from simple to complex, the starting point is Newton's classical laws of physics, typically referred to as Newton's First, Second, Third Laws; followed by advancement to Newton's Law of Universal Gravitation followed by discussions of the higher level theories of Quantum physics and Chaos theory.

3.2.1 Newton's First Law and launching a great leadership WHAM plan

Newton's First Law (also known as the Law of Inertia) states that *“Every object continues in its state of rest, or of uniform motion in a straight line, unless it is compelled to change that state by forces impressed upon it”*.

Assume: A leader of a university or unit within a university has created, through invitational leadership style, a well-formulated strategic plan that involves substantial process changes. The plan is ready to be launched. Such a WHAM plan, by definition, will have had input from representatives from all constituencies in the university. Since a university is a society of its constituencies—administrators, faculty and other staff, and students—it will have evaluated the impact that implementation of the new plan will have them. Those impacts will have been considered in the final form of the WHAM plan. A plan in which all of this has not been considered is not a WHAM plan; and therefore, not a good plan.

A good information-gathering procedure that could be used by the leader is to compile and submit surveys to constituent unit/division heads (by email, say) by the leader to be dispersed to individuals within the units/divisions and collected by the heads after completion and returned to the leader. Or there could be face-to-face meetings and discussions among constituencies, as well. The idea is for the university to operate as the interacting system that it is. This action will

promote the notion of people working together like well-oiled machinery to produce the best possible product—the student. It should also be noted that carefully developed plans, by definition, will contain well-defined statements of goal (with accompanying objectives, enabling activities, expected outcomes, and assessment methods in order to determine when, or to what degree, or if a goal has been attained).

The benefits of student participation in the planning process are numerous and include: the feeling that they matter; recognizing that everything interacts so that what they do affects others and what others do affect them; the need to think about and take responsibility for having had input into operations that affect their lives and not merely react to stimuli in their society; understand that collaborating in developing the plan shows consideration of others; encourages them to model such leadership in their lives, as family members, professionals, and so on. Another likely important benefit of the WHAM methodology is positive impact on retention and graduation rates.

In order to apply Newton’s first law to the major plan, consider that each objective in the overall plan has been carefully devised by the leader (with input from all constituencies) for each individual goal of the overall plan—assuming multiple goals in the overall plan. As each plan is substituted for the word “object” in the law, the law will then read: *“Every WHAM plan continues in its state of rest, or of uniform motion in a straight line, unless it is compelled to change that state by forces impressed upon it”*.

3.2.1.1 The implications

Assume: A **WHAM** plan with corresponding goals has been formulated, but has not yet been launched. According to Newton's First Law, the plan will just rest there, immobile. It will not move on its own. So the leader must understand that the plan has to be launched with some nonzero velocity before anything will happen. This should pull the would-be leader out the state of just thinking about launching the plan into actually launching it. Once the plan has been set into uniform motion (that is, motion with a certain initial velocity or impetus in a particular direction or straight line—defined as launch conditions, where the launch direction should be the direction of the goal that is dictated by the plan), it will remain in motion in a straight line towards the goal, unless something acts on it to change its motion in size or direction. Thus, from a classical physics perspective **ideally**, once a **WHAM plan is launched**, based on Newton's First Law (also known as the Law of Inertia, that is, the resistance to change in motion) the **WHAM plan is locked** in direction towards the goal. So the successful leader, university or otherwise, **ideally** needs only to carefully develop and launch plans (each aimed at a specific goal), sit back and wait to hit the target (goal).

You can experience the effects of inertia (which tends to keep objects or plans in the initial direction in action), by getting into an automobile which is at rest, sitting down, starting the

motor, and driving it forward. Your body under the action of resistance to change of motion (inertia) will tend to lean backwards when you take off as it tries to remain at rest as the automobile moves forward. If you stop the automobile, your body under the action of inertia will tend to continue moving forward. If you had chosen to initially move the automobile backwards from rest, under inertia, your body would have tended to lean forward as it resisted change in motion and tried to remain at rest. Thus, inertia tends to keep you in your initial state of mobility—either at rest or in motion in a straight line in the launch direction of your plan. So if you carefully craft a WHAM plan so that your initial movement is aimed at your goal, according to Newton's First Law, with inertia acting alone, you would stay on course towards your goal once you launched your plan and you would be guaranteed to reach your goal. Under these **ideal** conditions Newton's First Law could lead to adoption of a number of Life Lessons, which in a university setting might be:

“Launch a great WHAM plan straight at the goal of graduating every freshman in 4 years and it will happen.”

“Start out with a great WHAM plan aimed at raising \$20 M dollars per year and it will occur.”

“Begin with a great WHAM plan headed towards any goal and you will reach that goal.”

It should be noted that the number of life lessons that can be expressed based on any one physics law is limited only by the imagination. The ones stated here are just samples.

Unfortunately, in real life things are not **ideal**. Not only does inertia exist, which tends to maintain your initial state of motion at rest or moving with straight line speed, but one is also constantly being bombarded by forces of opposition that tend to knock one off course. These are the forces referenced in Newton's First Law as those, when impressed upon a state of motion, can compel an object or a plan to change its straight line launch path motion towards a goal. Such forces are always present in real life as environmental distracters. There is no way to get around them. They must be successfully counteracted to allow goals to be reached. Therefore, for greater reliability the *Life Lessons* above should be modified to read more like:

“Launch a great WHAM plan straight at the goal of graduating every freshman in 4 years, successfully counteract oppositions to the plan, and it will happen.”

“Start out with a great WHAM plan aimed at raising \$20 M dollars a year, exert effort necessary to stay on course, and it will occur that in 2 year you will have raised \$40 M.”

“Begin with a great WHAM plan headed towards any goal, avoid any outside influences, and you will reach that goal, as planned.”

Thus, for best results, there is a need for guidance on what to do to stay on course or how to

maintain a launch situation towards a goal in order to maintain a great leadership plan from the time it is launched to the time it hits the target (goal). Newton's Second Law of motion gives the guidance that is needed to do this.

3.2.2 Newton's Second Law and sustaining a great WHAM leadership plan

Newton's Second Law states that ***"The acceleration of an object is directly proportional to the net force acting on the object, is in the direction of the net force, and is inversely proportional to the mass of the object"***. Written in simple mathematical form, this law can be written $\mathbf{F} = m\mathbf{a}$, where \mathbf{F} is the force on an object, m is the mass of the object and \mathbf{a} is the acceleration of the object. Acceleration, \mathbf{a} , can be thought of as something that causes the state of motion of something to change, such as a WHAM plan to move (forward); or to be implemented; or to be set into motion or advancement. Dividing both sides of the equation $\mathbf{F}=m\mathbf{a}$, by m , we get $\mathbf{F}/m = \mathbf{a}$ or turned around $\mathbf{a} = \mathbf{F}/m$. Now making the analogies that \mathbf{a} is change in the mobility of the plan (as it relates to effecting the desired outcome or goal), the object is the WHAM plan, \mathbf{F} is the effort (exerted on or acting on the plan to move it), and m is the inertia or sluggishness of the plan in its movement towards the desired goal, and as such, gives some indication of how good the plan is. The better the WHAM plan, the more easily its application leads to the desired outcome or goal. With these analogies inserted, Newton's Second Law becomes, ***"The change in mobility of a WHAM plan is directly proportional to the net effort acting on the WHAM plan, is in the direction of the net effort, and is inversely proportional to the inertia of the WHAM plan"***. For best results, remember that when making management changes, the nonhuman resources should be carefully managed; while simultaneously, the human ones must be gracefully managed while being skillfully led.

3.2.2.1 The implications

Newton's Second Law makes it clear that effort must be applied to strategic plans if one expects to keep the mobility of one's plans operating. Effort is the change or accelerating agent that must be applied to keep the plan in route towards the goal. As environmental forces tend to disrupt inertia, effort must be applied to counter this action. This effort must involve all constituents at an institution as change agents. For example, at a university the change agents must steadily exert serious committed effort towards reaching the goals that are set, if a project is to be successful. The change agents must be involved in real decision-making roles. They must make and honor commitments to enhance the probability of eventually reaching goals that are set. The constituencies of the institution must meet and make decisions together. For universities (as for businesses and other organizations), since some of the resources are human, consideration must be given to the spiritual, physical, intellectual, social, and financial aspects of these resources. This is a consideration that is often overlooked by some leaders. When that happens one can look forward to failure as an eventual outcome, if things are not rectified. Some good *Life Lessons* from Newton's Second Law that can be applied to sustaining a great WHAM

leadership plan are:

“Procrastination makes bad matters worse.”

" As procrastination increases, good results decrease."

"The only thing one should expect on a silver platter is tarnish."

"You must input effort in order to output change."

3.2.3 Newton’s Third Law and self-sustaining a great leadership plan

Newton’s Third Law states that *“whenever one object exerts a force (referred to as an action) on a second object, the second object exerts an equal and opposite force (referred to as a reaction) on the first object”*. If we let the action force in this statement of Newton’s Third Law represent the WHAM plan that has been launched towards a goal, then the reaction force is the naturally occurring force that opposes that plan. It is exactly the same strength as the force launching the plan toward the goal, but is directed opposite the goal and so opposes with equal magnitude the plan that has been launched. It represents the opposition that exists in all things. This law can also be stated *“To every action, there is an equal and opposite reaction”*.

This law can be written in mathematical form as $\mathbf{F}_{12} = -\mathbf{F}_{21}$, where F_{12} is the force on the first object or body exerted by the second body and F_{21} is the force on the second body exerted by the first body, where the negative sign indicates that the forces are oppositely directed. It should be noted that since the forces act on different bodies they cannot ever cancel each other. Thus, opposing forces always exist.

3.2.3.1 The implications

Since opposition to any action always exists in equal size to the effort and is always present, according to Newton’s Third Law, it might seem at first glance that it is impossible to accomplish anything. However, upon closer examination, Newton's Third Law can be used to execute a great leadership plan that is self-sustaining just by thinking positively at all times. Consider that a great plan has been launched. We can consider execution of that plan as exerting an action or force or effort towards reaching a goal. But, the opposing forces that pervade the universe exert an equal and opposite force on the action towards reaching a goal. In the framework of positive thinking, that is alright because the opposing forces or efforts do not overpower your own efforts, they just match them. So you are not beaten. So if you are not beaten, you are not a loser yet. If you are not a loser, you must be a winner or at worse still in the race at all times. As one imagines oneself struggling against opposition, but with positive thoughts they can imagine themselves strengthening their muscles of resistance to adversity and so growing more and more capable of being a winner. Some great self motivational and character-building *Life Lessons* that, in themselves, are self-sustaining just because they are motivational and character-building follow:

“If someone has touched you, you have touched someone”

“You cannot touch without being touched.”

“Do unto others as you would have them do unto you.”

"You reap what you sow"

"Expect and prepare for opposition, because it coming, if you exert effort in trying to do anything whatsoever."

3.2.4 Newton's Law of Universal Gravitation and maximizing results of leadership efforts

Typical university leaders don't intuitively understand that they must approach university leadership as "a fully-integrated complex adaptive system" brought about because everything in the universe interacts with everything else in the universe. Rather, they tend to pride themselves on achievements within a specific segment of the university without regard to the effects on other parts of the university. They focus on cause-and-effect ratios within the individual units of the university without regard to how these internal changes affect the university mission and goals as a whole. Thus, they tend to make decisions that may be effective for the part of university on which their attention is momentarily focused, but are totally ineffective on other parts. Such leaders do not typically think about relationships between parts in the fully-integrated complex adaptive system that a university represents. But, in the words of Nobel laureate Werner Heisenberg, who developed the uncertainty principle in quantum mechanics, "If the physics of our universe is revealing the primacy of relationships, is it not reasonable to reconfigure our ideas about our effectiveness in relationship terms?" University success, as defined in terms of power and effectiveness, are based upon relating to competencies and applied resources for which the customer is willing to pay. From the perspective of choosing a university to attend, the customer is the student; and from the perspective of choosing an employee to hire, the customer is the employer.

Newton's Law of Universal Gravitation states that "*Every body in the universe attracts every other body in the universe with a force that for any two bodies is proportional to the product of the masses of the bodies involved and inversely proportional to the square of the distance separating them*". Every body has some mass to it. If we let m represent the mass of a body, then in simple mathematical form, this law can be written, $F \sim (m_1 m_2) / d^2$, where F is the (attractive) force or combined effort between any two masses, represented by m_1 and m_2 ; "~" means proportional to; and d is the displacement of the two masses which encompasses the distance separating them.

If we now let the masses m_1 and m_2 be, respectively, analogous to *any two different bodies or entities* in the universe, for example, two different single individuals; or one individual and a groups of individuals; or one corporation and a groups of corporations; or a university faculty member and an administrator; or a university faculty member and a group of university students; or two groups of universities; or two partners in a collaboration; just as long as there are simply any two different entities to represent m_1 and m_2 . Let d be analogous to the difference between the stances or opinions of m_1 and m_2 on some issue. **With these analogies, Newton's Law of Universal Gravitation can now be expressed as "Every entity in the universe attracts every**

other entity in the universe with a force that for any two entities is proportional to the product of the masses of the entities involved and inversely proportional to the square of the difference of opinion separating them". Applying these analogies to $F \sim (m_1 m_2)/d^2$ shows that the smaller d is the larger the combined force or effort or influence of the entities on a task; the larger d is the smaller the combined effort or influence of the entities on a task. Thus, the greatest combined effort on any task is approached when the entities involved are moving towards one accord. The combined effort actually would become infinite if the entities could completely reach one another so that d becomes zero which represents m_1 and m_2 being completely on one accord.

3.2.4.1 The implications

Just recently a leading well-known Foundation advertised sponsorship of a large monetary award to the non-profit organization demonstrating that collaboration brings the largest yield. Newton's Law of Universal Gravitation can be used to execute a great leadership plan that supports the idea of working together as a best practice to get greatest yield from effort on any task done by multiple workers, as is or should be the case in university settings.

Some excellent *Life Lessons* that emerge from this law are:

"Unity always produces the best result."

"Strive to live and work in harmony with your fellow beings."

"Form collaborations and partnerships to increase the mileage of your efforts."

So far we have seen that Newtonian (or classical Laws of motion) give introductory or gross or macroscopic guidance in the lessons of leadership and life. Quantum Physics and Chaos theory give a more refined or sub-microscopic (or spiritual) level of guidance in leadership and life than classical physics theory does, so that the two complement each other.

3.2.5 Quantum Physics and Chaos theory and engineering the greatest WHAM leadership plan

Regardless of specific definition, every aspect of a person's life (e.g. Spiritual/ethical, Physical, Intellectual, Social, Financial) can be impacted by leadership. Recent research has shown that knowledge and skills account for only 15% of the success experienced by people in their careers, the rest is based upon attitudes and interactions with people. Chaos Theory and Quantum Theory can help highlight some reasons for this. Deeper reflection requires the physicist to incorporate these theories and their new findings that are revolutionizing the pivotal role played by chaos and disorder in the physical realm² into any strategically designed leadership plan.

Chaos theory, sometimes also referred to as the "new science" is the theory of finding the

underlying order in apparently random data. Edward Lorenz (in 1960)⁴ was the first true experimenter in chaos. He was a meteorologist working on the problem of weather prediction using computer modeling to theoretically predict what the weather might be. Later, during the following year, when he wanted to observe a particular sequence again, but also wanted to save time and paper, he started to run the original program in the middle of the sequence, instead of at the beginning. He entered a number from his printout with three decimal places and left it to run, not immediately considering that the computer had stored the number to six decimal places instead of the three decimal places that he had entered. By all conventional understanding at the time, that should not have made a difference, but it did. This demonstrated that just a small change in initial conditions, one that falls into the size category of experimental background noise or equipment inaccuracy—things that are impossible to avoid in the most carefully isolated laboratory—can cause extremely large changes in the behavior of a system over time. On the basis of this, Lorenz concluded that it was impossible to accurately predict the weather. This discovery led him on to other aspects of chaos theory.

Modern quantum physicists have come to recognize the impossibility of making an accurate prediction of the weather just as one mathematically proven example of the impossibility to maintain enough control over experimental variables to make accurate predictions about any physical system. This is not inconsistent with the predictions of the Heisenberg Uncertainty Principle of quantum mechanics which places an upper limit on the accuracy with which certain physical parameters can be measured. It is recognized in modern quantum physics that many random factors and influences are in operation in every system and environment and that principles of chaos spill over into all sciences and even has applications outside of science. Through experimentation in “chaos theory”, it has been observed that chaotic systems can move from disorder to order and back again; and that they can show up virtually anywhere around the world: in water and wind currents, in tree branches, in fractal blood vessels, and others systems. Chaos has received much notice by scientists and the general public. It is now considered a part of modern science and many scientists now believe that twentieth century science will be known for only three theories: relativity, quantum, and chaos. Such theories help generate leadership guidance tactics in businesses and other complex operating system, such as universities—the main focus of the current work.

3.2.5.1 The implications

Chaos theory can remind us that little things can matter much and that what works well for one person may not work well for another. So in dealing with people, leaders should be mindful of the individuality of those that are being led. For university leaders, these include faculty, , students, staff (inclusive of administrators), visitors to campus, and those that they encounter elsewhere, especially the stranger. In visiting strangers or entertaining visits by strangers, it is

⁴ *The Modern Physics of Leadership*, Douglas Saarel, President, Sky Ranch Seminars, March 2002
<http://www.docstoc.com/docs/44089464/The-Modern-Physics-of-Leadership>

very important to be careful to interact favorably with them—just because they are strangers. This is true because the stranger just might be the person you are going to see, if you are traveling to meet someone you do not already know, or a person from whom you may need to ask a favor later.

Quantum and Chaos theories are probabilistic in nature and are in harmony with the predictions of the Heisenberg Uncertainty Principle of quantum mechanics, which states that for quantum objects described by probability waves, we can never simultaneously measure values of certain sets of physical parameters with arbitrary accuracy. Thus, we should use predictions for what they are worth; remembering that although they are not perfect, they can be useful in crafting aids for charting paths through life.

4. Policies That Lead To Great University Programs

By considering the university as a society, it can be viewed as a collection of individuals interacting at some level with all other individuals in the group, since according to Newton's Law of Universal Gravitation, everything interacts at some level with everything else in the universe. A university, for example, is an institution of its society (students, faculty, administrators, staff...), therefore, it has the responsibility of setting up policies that can “best” serve all of its constituency. Thus, policies that lead to the best/great university programs must be based on holistic⁴ or balanced service and education approaches. Models may differ since the whole person should be considered and people differ. However, as mentioned earlier, they are fundamentally comprised of five aspects of life, which the author fondly refers to as the five pillars of support for success (or simply Five Pillars) : Spiritual, Physical, Intellectual, Social, and Financial. These five aspects of life come together at the time that a person is born and remain with an individual throughout his life. Thus, it is only natural that policies that lead to great programs are ones that nurture these five aspects of life.

A policy is a principle, plan or course of action, as pursued by government, organization, or individual. Great programs are those that lead to the production of great products. Great products provide fullest customer satisfaction. Customers look for a range of features in their products to give them satisfaction. Therefore, careful, holistic⁵ study in the crafting of program policy aimed at producing the desired product features that the customer wants gives the best hope for producing such a great product.

In the case of the university, where the product is the student, the current market calls for product features that reflect not only intellectual savvy, but also those who are of good character with

⁵ Williams, Elvira, *WHAM: The Physics of Successful Living*, Self-published by author, 2005. (Note 1: WHAM is an acronym for Williams Holistic Approach Model, Note 2: Temporarily out of print while in process of being updated and expanded for web publication Summer 2011).

good interpersonal skills. As mentioned earlier, recent research reveals that in today's society, knowledge and skills account for only 15% of the success experienced by people in their careers, while the other 85% is attributed to attitude and how they interact with other people. A successful belief system model against which great policies can be crafted is: ***“We believe in being honest, true, chaste, benevolent, virtuous, and in doing good to all men, Indeed, we may say that we follow the admonition of Paul, we believe all things, we hope all things, we have endured many things and we hope to be able to endure all things. If there is anything virtuous, lovely or of good report, we seek after these things.”*** Leaders of a university who practice this and set up policies that encourage, strengthen, and instruct other staff, students, and even visitors to do the same, have a great chance to create great programs.

This belief system sets up an internal guidance system that will not allow the follower to be satisfied until he or she has done his/her best in not only the Intellectual aspect of his/her life, but also in the Spiritual, Physical, Social, and Financial aspects of his/her life. They will see the connection between these aspects and that one depends on the other. They will understand, for instance, that they cannot function at their Intellectual best, if they have abused their Spiritual or Physical being by, say, drugs, insufficient rest, etc. Or, for instance, they do not have enough money or Financial stamina to provide proper shelter, food, warmth, etc. for the body, while recognizing that money, in itself, is only a medium of exchange for goods and services, and not a provider of happiness in itself. Or if they have family or other Social problems, and so on.

Since a university is a society of its constituencies: administrative and non-administrative staff, faculty, students, visitors, all of them should be involved in setting up good or WHAM program policies. The WHAM policies should be reflected everywhere across the campus: the chapel or lyceum programs to fight moral danger; the cafeteria to fight obesity and malnutrition in those who eat there (faculty, students, staff), the campus security to guard against physical danger in the campus society, etc. Such a system will help keep leaders and their followers within their organizations and, thus, their organizations diverted from paths of unethical behaviors that can lead to scandals. Scandals can cause distrust and disrespect of leaders, their followers within the organizations, the organizations themselves, and the products of the organizations. All of these factors can combine to result in failure of the organization. On the other hand, abiding by the precepts of the character-building WHAM guidance system, can create factors that can combine to result in great success of the leader, the organizational constituencies, organization, and the products of the organization—the students.

Thus the policy design for great programs should be based on a holistic approach in which all aspects of the student, as the ultimate product, are considered. To uphold these ideals, when students first arrive at the university, as part of policy, administrators, faculty, staff and even other students should join together to make sure that the incoming students will find at the University, either already in place, or a plan to put into place:

A written WHAM handbook on policy (hardcopy/online) containing all of the rules and regulations that are in existence at the university (or another means of accessing each policy) with the full understanding that they may have input into the setting up of future rules and regulations, through carefully spelled out channels, as they move through their specific business with the university, which if they follow, they can graduate in x number of years depending on the specific program that they have chosen. They should be instructed in the handbook that one rule will never change and that rule is that people function as free agents—free to choose whatsoever they want, but that there are consequences of their choices which they are not free to choose.

The WHAM handbook should also include, but not be limited to:

- (i) Specifics on proper behavior (that include politeness and courtesy) being modeled by all administrators, professors and other campus authority figures and leaders,
- (ii) Specifics alluding to the expectation that every element of the university views itself as interdependent on every other element, from the President to the janitorial and other maintenance staff,
- (iii) Indicators that there are built-in feedback systems for evaluating and updating all programs in operation on campus and that they will be able to have input in decision-making processes of all such future systems,
- (iv) Indicators that new programs must be piloted before full implementation in order to check their impact on all other programs at the university before they become operational,
- (v) Ways to insure that policies that have already been set up are being enforced in order to gain respect for following policy themselves, (
- (vi) Ways of teaching and assessing the learning of ethics and respect across the curriculum in word, and deed,
- (vii) Indicators that students are being taught that cheating will not be not tolerated on campus and that plagiarism, stealing, and lying are all forms of cheating,
- (viii) Indicators emphasizing that students are being offered a balanced education that nurtures the spiritual, physical, intellectual, social, and financial aspects of their lives so that they will see that money and materialism are not proper measures of true success in life,
- (ix) Indicators that they are being provided programs that teach tolerance of diversity and respect for the rights of others,
- (x) Means of stressing to them the benefits of laboring for what one gets in order to generate less feeling of general entitlement,
- (xi) Indicators that they are highly discouraged from defacement of property (such as requiring the person proven doing this to restore the property to the state in which it was first met by the defacer, if possible or replace it, if it is not),

- (xii) Indicators that they should be able to see in operation and be encouraged to abide by the *each one teach one method of learning* (making students feel that they are their brother's keeper, and that it is a good practice despite the bad things that are observed in the media. It should be emphasized that, despite what they see in the media, many societies in the world along with some people in every society still practice this, and
- (xiii) Indicators that practicing appropriate interpersonal behaviors at all times is the general campus rule. It should be noted that some of the items listed here seem trivial, but it has been the writer's experience that some students, especially Freshmen, just simply do not know them.

5. Impediments To Women's Progress As Leaders And Ways To Improve The Numbers As They Relate To Women Leaders In The Academy And Elsewhere

Some elements of a report on the under-representation of women in Physics is now examined. The report is from the Second IUPAP (International Union of Pure and Applied Physics) Conference on Women in Physics (2005, Rio de Janeiro Brazil). In this meeting a delegation of women physicists, including the author, representing the United States, from 42 countries gathered to continue the topic of "Getting Women into the Physics Leadership Structure Nationally and Internationally"⁶, which had begun 3 years earlier at the First IUPAP Conference on Women in Physics (2002, Paris, France). The Second group reviewed, revised, and revamped the material gathered at the First conference in which 65 countries were represented. Discussion items in the 2005 report included: why women should be in leadership positions.

5.1 Why women should be in leadership positions

Both nationally and internationally, women in the academy have many similarities and parallels with Women in Physics when it comes to paucity of leadership roles. In both cases, there is a dearth of women in leadership roles compared to men. Thus, what was said at the 2005 IUPAP Conference on leadership of women in Physics has parallel applicability to what can be said of women in leadership roles in the academy:

- (i) Health of the field—physics/academy must draw on the widest possible spectrum of talented individuals from both genders,
- (ii) Diversity of views—women can bring a valuable perspective to the decision-making process,

⁶ Elvira S. Williams¹, Lilliam Alvarez Diaz², Katharine B. Gebbie³, and Karimat EL Sayed⁴[¹Dean of the College of Arts and Sciences, Professor of Physics, Shaw University, USA; ²Ministry of Sciences, Technology and Environment, Cuba; ³Director, Physics Laboratory, National Institute of Standards and Technology, USA; ⁴Faculty of Science, Ain-Shams University, Egypt⁴], Topic 3: Getting Women into the Physics Leadership Structure Nationally and Internationally, Proceedings of Second IUPAP Conference, Rio de Janeiro, Brazil, (2005)

- (iii) Visibility—a position of leadership gives women the visibility in the scientific community that they could not otherwise have the opportunity to influence others and to affect scientific policy,
- (iv) Societal support—women are half the population and must feel part of a technological society,
- (v) Promotion of qualified women—a leadership position gives women the opportunity to assure that qualified women are promoted and that all women are treated fairly,
- (vi) Diversity in leadership styles—women tend to have quite different and often more effective styles of leadership than men,
- (vii) Improving the research environment—women in positions of leadership have the opportunity to improve the research environment for men and women alike.

5.2. How to help increase participation of Women in Physics

The Physics group discussed best practices that could help increase the numbers of women in leadership roles in Physics (which are applicable to academia) as follows:

- (i) Be proactive in developing a pool of female candidates for leadership positions,
- (ii) Improve the mechanism of the selection process for leading positions,
- (iii) Sponsor workshops for developing leadership and communication skills,
- (iv) Seek opportunities for women leadership experiences,
- (v) Support women when they get into leading positions,
- (vi) Engage women in mentoring and networking.

6. Conclusion

We have used classical laws of physics as templates for predicting certain behaviors and outcomes and from these we have fabricated certain useful, scientifically-supported behavioral guidelines to help as successful guidance tools through certain life situations. It has been emphasized that when these holistic classical results are interpreted against Modern Physics theories, Quantum, Physics and Chaos theories⁷, attention is called to the inability of man to predict precisely outcomes of any life event. However, like Classical Physics, the refined theories of Quantum and Chaos, do support the notion that everything in the universe interacts with everything else at some level, so that nothing is completely isolated from anything else—which causes every outcome to be affected by every action in the universe. This is what gives rise to the idea that nothing is precisely predictable in the first place.

Quantum and Chaos theories are probabilistic in nature. Man's never-ending quest for deeper and deeper understanding of nature has pushed us farther and farther into the world of quantum and chaos (microscopic and sub-microscopic) systems for more and more intricate

⁷ Dawoody, A. 2003. *The Monarch as a Leader of the Metaphors of Chaos and Quantum Theories*. Authorhouse Publishers.

understanding. In the process, it has taught us along the way that, the smallest of changes in one system may, under certain threshold conditions, move us almost instantly into unknown territory that could take us from a feelings of nearing maturity in our understanding of nature to feelings of not yet having left infancy in our understanding. This remains true despite the fact that man has made remarkable gains in understanding to a certain depth many very complex systems.

We have seen that Newtonian (or classical Laws of motion) give gross or macroscopic guidance in the lessons of living life as leaders, while Quantum and Chaos theories give a more refined (or microscopic, or sub-microscopic, or spiritual) level of guidance. In either case, to extract life lessons from natural laws, one must: **Think** (about the life situation), **Make an Analogy** (between the life situation and the law), and **Apply the Law** (to the life situation) to get valuable **science-based** guidance in life and living. Physics Laws can be applied universally across all disciplines by using the '*Think-Make Analogy-Apply Law*' procedure.

This allows one to **integrate the teaching of physics lessons and those of life**. The detectors in Newtonian or Classical physics are the everyday physical detectors, such as the eyes or ears for observations; while in Quantum Physics the detectors are mathematics principles. Modern Physics is the bridge between the Classical and Quantum. In Chaos theory the detectors are greatly refined or approaching the reflection of a spiritual level. Perhaps one day we will be able to see enough of the spiritual in all of the areas life to develop a unified, spiritually based, scientific theory of life, since ultimately everything is spiritual; and also everything interacts.

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