



**A Brief Introduction to Universal Logic and the Fully Integrated, Fully Interoperable Safe Worlds System**

**By: Alan Metcalfe, discoverer of Universal Logic and Principle Safe Worlds system designer**

**“There is a need for a powerful universal logic language.”**

(Sir Tim Berners-Lee, inventor of the World Wide Web and director of the World Wide Web Consortium (W3C) that manages the Web.

**Why the Need for Universal Logic Exists**

The world’s computer systems are disintegrated; they cannot operate together as required for global e-business. The reason for this is there is no common e-business standard (universal logic). All computer systems operate according to some form of logic.

- "A common model is lacking in the industry, despite all of the projects that have attempted to set standards or guidelines. No matter what you pick for your integration technology, you still have to fight the battle over defining your data model." (Mike Bender, CTO, Sodalía North America.)
- "Large carriers have dreams of integrating the enterprise on some bus architecture. They're saying that's their vision and that's where they want to go. They want a complete, centralized view of their entire operation." (Rosensweig VP solutions architecture, AMS new media and communications group)

The purpose of this document is to provide a general introduction to the discovery of universal logic that underpins the design and working of the Safe Worlds system.

Since 1983, I have been researching and working on the challenge to create a fully integrated, fully interoperable (FIFI) electronic computing system. During this time, my primary goal has been to create a private and secure universal e-business system platform that can be used as the global standard for ubiquitous e-business.

My research in many ways has been similar to that of most of the computer scientists in the world who are working on this challenge. In summary, I believe that the solution must be what Tim Berners-Lee calls “The Semantic Web”. I also agree with Sir Tim that the creation of The Semantic Web is dependant upon first discovering what is called the universal logic language (Berners-Lee, 2002) that I simply call universal logic.

The value of my work is that I ultimately discovered so-called universal logic in 1999. I have not yet published anything about this discovery because of its obvious, considerable commercial value and the risk of destroying this commercial potential that I believe is so critically important to the global economy. Instead, I have focused on designing and building the Safe Worlds e-business system based on universal logic that is now being commercially released.

### **An Historic Quest**

To understand universal or common logic, it needs to be understood that the search for this unique logic of logic is as old as science. Throughout history, this quest has attracted most of the greatest thinkers and philosophers of their time. It is a mistake to think that the need to find universal logic is a recently emerged challenge confined to computer science. After all, every law, even all the laws of physics are some form of logic, as is every mathematical equation. The computerization of the world that now relies heavily on machine logic has simply intensified the need for this discovery.

Although a lot of my work has been in understanding the traditional application of logic in computerization, and in particular electronic business (“e-business”), it needs to be understood that my work differs from all other well-known efforts to identify universal logic, as far as I can tell, inasmuch that I believe that logic is synonymous with what is known as the human mind. I believe, in common with British mathematician and philosopher George Boole (1815-1864), the father of Boolean Logic, that the human mind is the way that we think; it is a law (or spirit), just like any other law. As unique as it may be therefore, this means that it can be computerized, because laws are simply what are generally called algorithms in computer science.

### **Understanding the Human Mind**

In my quest to find universal logic, I was fortunate to realize, very early in the process, that it is essential to first understand how the human mind works, before one can understand how universal logic works and thereby understand how it is possible to computerize the process to create a fully integrated fully interoperable (FIFI) electronic system. To believe otherwise, I suggest now, is akin to trying to create artificially intelligent systems without first knowing and understanding intelligence. As Albert Einstein (1879-1955) said, and I agree, the world is nothing without comprehension, and comprehension is the realm of the human mind.

Logically therefore, the purpose of The Semantic Web can only be to create a system (web or network) that expresses our comprehension (understanding) of reality, because, in terms of computers, semantics is the study of how the meaning of things is electronically communicated. This is what the design and creation of the Safe Worlds system has achieved.

### **The Only Model**

In saying that the human mind is the only model for FIFI systems, it is important to understand that FIFI systems are *complete* systems. This means that as stand alone entities, such systems are capable of achieving their designed purpose. In nature, only the human mind has the ability. In all of nature, only the human mind is capable of self-existence (self-creation) – this is proven by the fact that through the process (logic) of thought we are able to establish and achieve our own purpose in life. No other creature or thing has this ability.

In saying this, it is not intended to suggest however that by understanding how the human mind works that one will be able to create e-systems that are capable of self-existence, in a human sense. Rather, it is intended only to suggest that with knowledge of how the human mind works (i.e., the common steps involved in the logical process of thought), we can create systems that work substantially like the way the human mind works to achieve its goals (purposes). To this extent such systems are “artificially intelligent” and they are fully integrated and fully interoperable.

It also follows logically, I suggest, that such systems ought to be as simple as it is possible for such a system to be, and yet so amazingly powerful, at the same time. This is logical, because, to be universal logic, the law of laws must apply to the smallest and the simplest task in the same way that it applies to the greatest and most complex task in the process of creation.

### **The Way We Think**

This is exemplified for us, I suggest, in the way we think – one moment of thought should quickly reveal to the most ardent skeptic that we use the same process of thought, the same logic, to solve any problem, no matter how large or small it is.

From a scientific standpoint, I suggest that it also follows logically that if thought is a process, then it is a form of logic or what is scientifically called a law; and if it is a law that inspires us to think, then it is what is otherwise called a spirit. This also means that the law of thought must reside at the same level as such foundation laws as Newton’s laws of motion; Einstein’s law of relativity ( $E=mc^2$ ), and binary code that is used in computerization. I say that this is logical because these laws all provide a description of reality (life); they serve to explain how all things work, even though none of these laws has yet been successfully applied to the process of human behavior and thought, even though binary code has been used to create the computerized world in which we now all operate.

Having said this, let me also say that I think it is strange, and to me, illogical, that many believe that these so-called laws of science do not apply to human behavior (including thought). I say this because how can the mind that conceives of a thing be unassociated

with the thing that it conceives? For example, how can an artist be unassociated with his art? The reality is, I believe, that as we think, so we do, including what we see and understand. As Einstein said, nothing exists without human comprehension; and I would add, even human life itself.

### **Semantic Systems and Intelligence**

Another important aspect of my work is based on the belief that to be fully integrated and fully interoperable (i.e. complete), and semantic, systems must be “intelligent”, otherwise they cannot be the complete systems they are supposed to be, because, a complete system should lack in nothing – not even intelligence.

In saying this, it is important to understand that intelligence is knowledge; and human intelligence is the knowledge of knowledge - it is: knowing what knowledge means (=). This is what makes humans intelligent and non-humans, what we call ignorant, because only humans have the ability to know what something means (=). Consequently, for example, we can understand the law of gravity and what it means, whereas non-human things, even the smartest animals, cannot, and never will know and understand these things, because, in the whole of reality, wherein nothing is duplicated (because this is law), it is not their purpose. In the fully integrated, fully interoperable meaningful (semantic) model of life (reality), it is clearly only the purpose of humans to know and understand what things mean. This is why we have a mind that works the way our mind does.

Artificially intelligent systems are systems that are capable of being automated (purposed) by men to do things, including to the extent that they are intended to do so, to fix their selves in basically the same way that the human mind is able to fix itself and its body through thoughtful (conscious) intervention. These types of systems are what IBM's Paul Horn (2001), called autonomic systems, even though Horn does not go as far as to relate his idea of autonomic systems to the human mind. Instead, Horn chose the more politically correct route of linking such systems to the human nervous system. Sadly for science, it is still taboo in many circles to even suggest that the human mind exists – the politically correct approach is to relate thought and human behavior to the unknowable complexity of the brain, or the nervous system, where, I suggest, it is impossible to come to any understanding of how the mind works – so complicated and confusing are the neural networks of the brain.

The truth is, I suggest, that like all things, it is not until we reduce them to a mathematical (logical) model, law, or algorithm, can we understand how they work, and from this knowledge, what they mean – this is to say, why they exist in the first place. This is what Isaac Newton did to lay the foundations of modern science; and what Albert Einstein did to finally open up the atomic realms of science. And this is what I had to do to discover and understand universal logic.

## The Logic of Law

Because human intelligence is: knowing what knowledge means, another name for common or universal logic (the law of laws) is the logic of logic or the logic of law, because every law is a form of logic. Universal logic is the logic (algorithm) that we employ when we think to understand what we do, that therefore may also, in the vernacular of George Boole, be called the law of thought. It is the spirit or force of nature that inspires us to do whatever it is that we do.

I have found it particularly useful when trying to understand how the human mind works, as Boole did, to think of how we think as the law of thought and to understand that all laws are mathematical equations of their parts. I find it useful to think this way, because if one does, then it follows logically, that if the human mind is the law of laws (the logic of logic) then it is also an equation of equations. It means that thought is a combination of three equations (laws) that work together as one equation or one law, the way that Newton's three laws of motion work together as one law, to explain motion (life). And because every law (equation) has, basically, three parts ( $1+2=3$ ), this means that the equation of equations that we call the law of thought has nine ( $3 \times 3=9$ ) parts that together, because they relate to thought, creates a tenth (10) part that is synonymous with what we call the human mind.

## A Digital Analogue

I realize that this can sound very confusing and almost impossible to understand at first, until one understands that the law of thought is the ultimate, digital analogue. By this I mean that it is a process of numerable (nine digital steps) that, together create a mental image (an analogue) of whatever is being considered (thought), and, at the same time, it creates the faith (strength = power = belief) to sustain that vision (analogue). Proof of this is found in the fact that every law works this way and one moment of considering the simple equation (law = table)  $1+2=3$  will quickly confirm to you that this is true. Note how that, when we say  $1+2$ , automatically the vision (analogue) of three (3) appears in our mind. Even the laws of physics work this way, when we know what they mean (=), as does every recipe, plan, and even software package – they all create “some thing” in the form of an analogue or image that is an equation ( $1+2=3$ ) of its parts, that can be envisioned by us in our mind's “eye”.

Now, if we relate this fact to human thought, we see that in the same way that Newton's three laws work, and Einstein's law of relativity ( $E=mc^2$ ) also works, when we think, according to what we are thinking about (where we focus the light of our mind), we create different understandings (beliefs = meanings = analogues) that determine (establish and control) and fuel (sustain) the way we think – in other words, they change our mind in certain directions, in much the same way that different fuels create different types of flames (lights). Burn wood, for example, and you will get a flame that is different in color to that which is created when you burn oil. Einstein's law of relativity

explains how this happens. Like the so-called “light” (enlightenment) of our mind that changes when we think of different things, the lights of this world change according to the fuel that they burn, in much the same way that different atoms release different amounts of energy at different speeds of light, according to Einstein’s law, according to the mass (m) that “feeds” them. When we can see this, we start to realize that the whole world does work according to a certain universal logic; a certain law of laws.

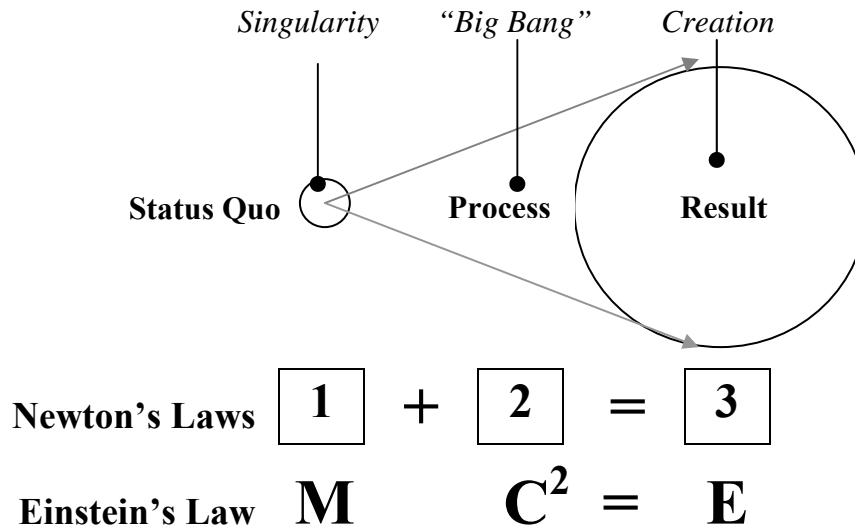
**Intelligence and Binary Code**

Seeing this fact, to see the connection with computers, consider how simple binary code underpins everything that happens in computerization. Note also that binary code (1s & 0s) is said to be two-part code, where in fact there is no such thing as a two-part code, because every code is a law and every law (thing), including binary code, is an equation of three (1+2=3) parts. And one moment of thought about what binary code does will confirm this truth, because, as every computer scientist knows, every combination of 1+0 in binary code means (=) something (i.e., it creates a third part or a certain understanding or analogue).

In mathematics and language, just as in computerization, this is how understanding is created and conveyed. In computers, this is how every computer language is created and how it is able to convey meaning.

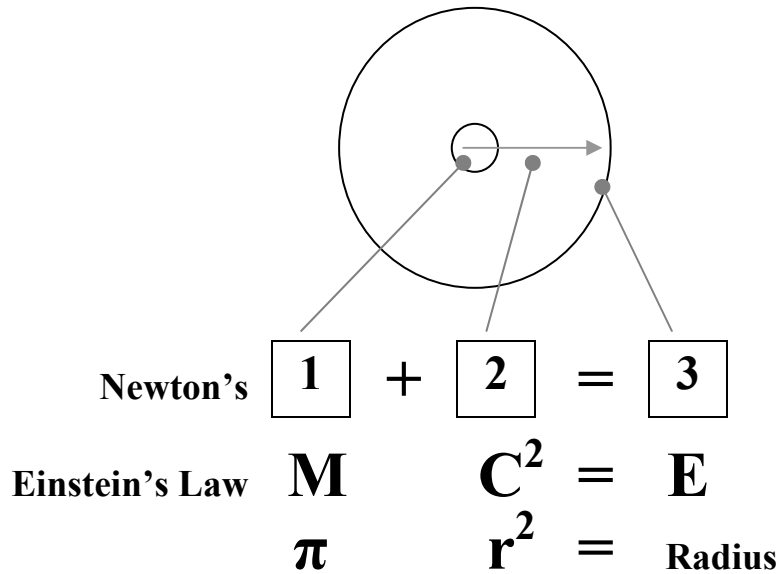
**Identifying the Law of Thought**

This is the science/logic behind my discovery in 1999 of the law of thought that I made in 1999, that I suggest can also be called Universal Logic.

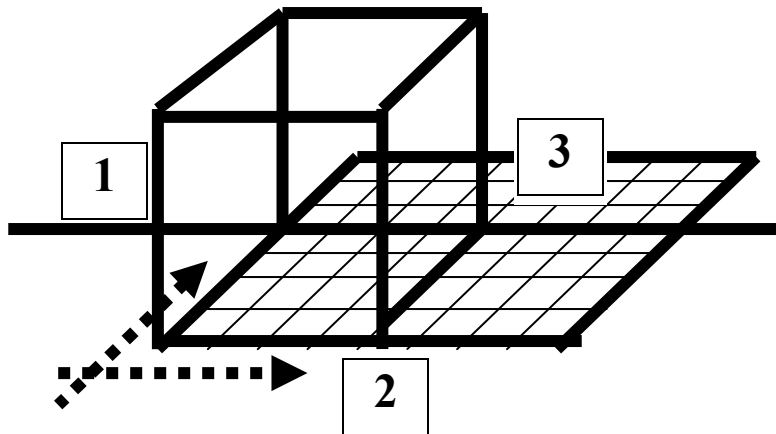


COMMERCIAL IN CONFIDENCE

One look at the above diagram and one should see that this thought is really not confined to computerization because it also conforms to general inflation theory or the “Big Bang” theory of creation where the Singularity (1) explodes (2) into the world [result (3)] that we see today. String theory works the same way, as Einstein’s law ( $E=mc^2$ ) makes readily understandable. In string theory, different things (equations = laws = strings) exist at different levels of vibration (explosion = explanation) – and, just as in both Einstein’s law of relativity and Newton’s three laws of motion, and common mathematical “times” tables, when the second (2) part (that which represents impact) changes, in any equation (thing), so too does the result (3) also change so that, as Newton said, “every action has an equal reaction”.



In the geometric explanation of mathematics we see therefore that there are two (1+2) basically opposite ways of expressing things that also reflect this law. The concept of a circle, for example, which exemplifies the so-called metric system in mathematics, works this way, as shown in the diagram above. As the second (2) part (in this case called the radius) changes, so too does the perimeter of the circle.



Likewise, the concept of a square works the same way, as shown in the diagram above. As the second part changes (in this case called the breadth), so too does the size of the square.

This, I suggest, is universal logic at work; how it exists and controls everything that exists and works (lives) in this universe.

### **Universal Logic and Electromagnetism**

The whole world is a gigantic electromagnetic field, and, I suggest, the most compelling evidence that the law of law is the universal language of logic is that it not only works the same way that the basic laws of science and mathematics work, but also how electromagnetism works. Electromagnetism is the basic measuring stick in creation science, I suggest, because it is generally agreed in science that everything that exists is an electromagnetic field of some kind, even the entire universe. This means that in terms of Einstein's law of relativity ( $E=mc^2$ ), everything is an expression of energy and light (electromagnetism) – or, as we might say in the context of this document, it is a comprehension (understanding or belief) of the human mind.

Electromagnetism, therefore, like every equation, consists of two opposite forces (spirits = laws) – one (1) called the centripetal force and the other (2), the impact one that is constantly changing, called the centrifugal force. These forces work together, as Newton and Einstein both described from their different perspectives of reality, the same way that every mathematical equation works; and every male and female work together, to produce a child (creation) of some sort. The first force (the centripetal, magnetic, or gravitational force) is a constant or eternal force that binds/holds things together as One (1); while the second (2) force (the centrifugal force) tries to tear them apart (destroy them). One is the constructive or creative force of nature (law) that some call God (1), and the other is its opposite, the destructive force of nature (law) that some call the Devil. Together, 1+2, they create all the different forms of life [energy fields (3s)] that there are in existence, according to the ultimately simple law that can otherwise be explained as  $1+2=3$ .

### **Universal Law and Safe Worlds**

This is the law that I call Universal Logic that I successfully applied to the working of the human mind, for the first time in November 1999, and subsequently to the design and construction of the Safe Worlds system. In doing this over some 25 years now, I have found that it works exactly the same way to control computer systems as it does to control the human thought process and everything else in the world.

The big difference in my work, is that I sought first to understand how the singular force of creation that science otherwise calls the Singularity exists and works. In mathematical terms, how the concept of One (1) exists and works. In spiritual/religious terms, how God (1) exists, in the context that: “God is One (1)” (Galations 3: 20). I did not take the route pursued by most researchers in this field which has been to attempt to fit the world into an ontological model (a single ontology) that ignores the existence of the human mind.

## Autonomic Systems and Intelligence

As surprising as it will be to many people, most in the world of science today, ignore the existence of the human mind and the uniqueness of human intelligence. IBM scientists Kephart and Chess, for example, ask in their paper “The Vision of Autonomic Computing” published by the Computer Society of the IEEE: “*Is it possible to meet the grand challenge of autonomic computing without magic and without fully solving the AI problem?*” ... “*We think it is,*” they say, “*but it will take time and patience.*” Personally, I disagree – I respectfully suggest that they will not live long enough to make such a discovery. I say this because I believe it is impossible and illogical to suggest that we can create an autonomic system without first solving the artificial intelligence problem – to create anything artificially intelligent we must first know and understand how intelligence exists. By default, this means that we must know how the human mind works, because the human mind is the only thing that is intelligent.

And, judging Tim Berners-Lee’s statements on the W3C Web site, I suspect that he agrees with me, even though I am not aware of any clear statement that he has made to support this belief. In describing the parameters of the universal logic that he is looking for to create The Semantic Web, he says however that it must comprise the following characteristics:

- A reasonably **compact syntax**.
- Well defined **semantics**.
- Sufficient expressive power to **represent human knowledge**.
- An efficient, powerful, and understandable **reasoning mechanism**
- It must be suitable for building **large knowledge bases**.

Having said this, Berners-Lee admits however that the stumbling block has been to find a form of logic that represents human knowledge, and at the same time, provides an efficient, powerful, and understandable reasoning mechanism. This is because the only form of logic that fits this description is the human mind.

## The IBM Autonomic System Manifesto

In his 2001 Manifesto that deals with the serious problem of system complexity and the urgent need for autonomic computing, IBM’s VP of Research Paul Horn says that to create autonomic systems researchers must address key challenges with varying levels of complexity. Here is a partial list of the challenges that he says: system designers face, with my comments.

- **System identity:** Before a system can transact with other systems it must know the extent of its own boundaries. How will we design our systems to define and redefine themselves in dynamic environments?

**AMM:** The universal logic in Safe Worlds provides this capability. It is a self contained process that provides a common methodology to program systems to adapt to any conditions that the human mind can imagine and define in digital code.

- **Interface design:** With a multitude of platforms running, system administrators face a briar patch of knobs. How will we build consistent interfaces and points of control while allowing for a heterogeneous environment?

**AMM:** The Safe Worlds common user interface provides this. It is one interface that can manage an unlimited number of applications and devices. See the system and see that this is true.

- **Translating business policy into IT policy:** The end result needs to be transparent to the user. How will we create human interfaces that remove complexity and allow users to interact naturally with IT systems?

**AMM:** The Safe Worlds common user interface does this by using wizards that reflect the structure of universal/common logic which is ultimately intuitive. These wizards can be applied to any business activity.

- **Systemic approach:** Creating autonomic components is not enough. How can we unite a constellation of autonomic components into a federated system?

**AMM:** The fully integrated, fully interoperable design of Safe Worlds does this. It allows any number of users and their businesses to be fully integrated and made as interoperable, as they choose, as is required in a true federated system. Having an underlying common database that works according to Universal Logic enables this.

- **Standards:** The age of proprietary solutions is over. How can we design and support open standards that will work?

**AMM:** Safe Worlds does this by providing a system of two parts – one part that is fixed (the “horizontal” platform or base system) and the other part that is open to adaptation to any business application or vertical market. While we maintain the fixed (proprietary platform) we allow developers to “virtually” do what they like with the platform to develop vertical market applications that all link seamlessly together, because of the underlying, fully integrated, fully inter-operable platform.

- **Adaptive algorithms:** New methods will be needed to equip our systems to deal with changing environments and transactions. How will we create adaptive algorithms to take previous system experience and use that information to improve the rules?

**AMM:** The amazing truth is that only one algorithm is need – Universal Logic. With Universal Logic every other system can be adapted to this structure to create the fully integrated, fully interoperable, “autonomic” system that Horn envisages. See: <http://www.research.ibm.com/autonomic/research/challenges.html>

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