The Innermetrix Technical Manual

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Instrument Validity and Reliability for the Innermetrix Family of Products (Attribute Index™, DISC Index™ and Values Index™).

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INTRODUCTION

The Innermetrix family of instruments, hereby referred to in this document as the *IMX Family of Products**, consists of:

- The **Attribute Index** (AI) – a decision-making instrument based on the work of Dr. Robert Hartman
- The **DISC Index** (DI) – a behavioral style instrument based on the work of Dr. William Marston
- The **Values Index** (VI) – a motivational insights instrument based on the work of Drs. Eduard Spranger and Gordon Allport

*Each of these three instruments is a separate and distinct profile.

The purpose of this technical manual is to explain:

- The background and history of the IMX family of products
- The foundations of the sciences behind the IMX family of products
- The instruments in each profile
- The purpose of the IMX family of products
- The statistical and validity evidence supporting psychometric or valuemetric quality of the IMX family of products
- Instrument protocols and utilization

The intended audience is:

- The Certified Innermetrix Consultant (CIC)
- Potential clients and customers
- Researchers and academics

Note: The research and statistics provided in this manual have been conducted and written to the specifications established by the American Psychological Association. These guidelines provide the standards by which many assessments are designed and validated.

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Section 1 – The Attribute Index (the what of human performance)

1a. The background and history of the Attribute Index

Due to the relative obscurity of the science of Formal Axiology– due to its newness - I think it important that I give a more extensive background on the science than may be normal for older, more established, sciences.

The Attribute Index is based on Dr. Robert S. Hartman's Formal Axiology, which in an abbreviated sense is the measurement of intangibles. What are intangibles and how can they be measured? The important choices we have to make in life and in business are based on intangibles. Think, for example, of the choice of your wife. How in the world do you choose her? What do you have to go by? You know very well that if you would have a list of specifications of wives and you would carry that along when you were looking for girls and you would find one with all the specifications, then you wouldn't marry her because you wouldn't like her. There have been cases like this.

What is it then that you base your choice upon? It is an intangible. In business, suppose you have to choose a laborer. There isn't much difficulty in doing that because you can put down in writing the specifications of that job and if he raise a hammer and carry a heavy load than he will be a good laborer. But how do you choose the president of a company? What specifications can you write down for a much more complex position? .

Intangibles and Tangibles in Natural Science

So, what are these tremendously important choices based upon? Can the intangibles be measured? You will say, "of course not, it is impossible, it can't be done." However, we should remember that also in the natural sciences, where you have very precise measurements, there was a time when all the tangibles of measurement today were absolutely intangible. That was before Galileo had invented the marvelous application of mathematics to nature.

For us today, it seems absolutely natural, a tangible thing, that if you go a hundred miles in two hours you have a speed of fifty miles. But for Galileo to produce the equation $v = s/t$ was a tremendous achievement, and of such importance that it actually hastened the end of the medieval world in many ways. Why? Because he did something tremendous. He made the intangible tangible and he did it in such a way that those who liked the intangibles more that the tangibles didn't like it.

What was the intangible that he made tangible? Before Galileo, motion or movement was defined by Aristotle, in his *Physics*, as the transition of potentiality into actuality. This was the Aristotelian definition of movement of things, of animals, of the soul, of God, of the limbs of the human body, and so on. This was called Natural Philosophy and on this none of the advances we know today could have been built.

Galileo did something absolutely unique and at that time unheard of. First of all, he said, "I am only interested in the motion of objects," mechanical motion as we call it today. Therewith he toppled the whole Aristotelian world picture; he "secularized" movement. Secondly he said, "I will measure such motion with measuring instruments," and therewith he toppled the metaphysical view of the world. Since falling was too fast he put balls on inclined planes, designed a water clock and made his measurements. The result was the little formula, that "**v**" equals the mathematical division between space and time, $v = s/t$.

Then he said the following. "If this formula is correct according to my measurements, then I don't have to look at observations of mechanical motion any more at all. All I have to do is look at what this equation means. And what does it mean? For example, it means that $vt = s$. If this is true, then it is also true that **s** is a rectangle with the sides **v** and **t**. If this is true, I will try to see what are the properties of this rectangle and that, then, will give me the space of motion."

And when you opened Galileo's great book, *Two New Sciences* (1638), all you find is drawings of rectangles, triangles, and so on and, as you know, he said, "The book of nature is written in rectangles and triangles, in geometrical symbols," and this is the beginning of modern science.

Now, this was the development from natural philosophy to natural science, and on this little formula is based the whole of modern science. It formulates uniform motion, then came the formula for accelerated motion, $a = 1/2\ gt^2$, then the system of Newton, combining Galileo's and Kepler's formulae, the system of Einstein, and the atomic bomb. All this was based on the break by Galileo with Aristotelian physics. The book called *Physics* by Aristotle contained intangibles which Galileo made tangible.

The Notion of a Value Science

Aristotle also wrote a book called *Ethics—the Nicomachean Ethics* (his son was Nicomachos). The ethics taught today in universities all around the world are still the ethics of Aristotle and similar moral philosophies. Thus today we combine Einsteinian physics with Aristotelian ethics. We have an disequilibrium of tremendous proportions: technological development in natural science and absolute standstill in moral philosophy. We are morally at the stage of Aristotle.

To correct this disequilibrium philosophy must do to Aristotle's Ethics what Galileo had done to Aristotle's Physics. The philosophical definition of goodness of Aristotle must therefore be changed it into something that means as much for value as the Galilean definition for motion.

The first task in this course is to find an exact definition of value, of goodness in terms of either a mathematical or logical relation which would be as applicable and as developable as the Galilean definition of motion. Dr. Hartman's Formal Axiology holds the promise of providing this definition.

The Nature of Science

What is a science? A science is nothing but the application of a formal frame of reference to a chaos of phenomena. In other words, you have the chaos of moving things. Aristotle tried to order this by words like "potentiality," "actuality," and the like, but these words themselves are disorder. For what is potentiality? If you want to define it you have to define it by words, these words have to be defined, and the definitions defined, and the definitions of the definitions defined, and so on ad infinitum. Such a nest of definitions within definitions itself represents no order, or only a very rudimentary one.

However, if you take a system like mathematics—and the great achievement of Galileo was the line between the **s** and the **t** in the formula for velocity, $v = s/t$ which represents the arithmetical division—then you are within a framework that is systematized and you can then apply this system to the chaos. You take points in the system and apply them to points in the chaos, and the order between points in the system is the order between the points in the chaos.

On this relationship between a formal system and phenomenal chaos is based all scientific definition. The minute a ray of light was defined as a straight line, the science of optics was born: the system of geometry could be used to account for rays of light, for "**straight line**" is a notion in the system in geometry.

Thus, a science is a combination of a formal system, whether it be mathematics in physics or theory of harmony in music or axiology in value, to a chaotic set of phenomena, be they natural phenomena or musical sounds or value situations. So today we have the following view of science. You have the various natural sciences which are ordered by mathematics, namely physics, chemistry, astronomy, and so on, each applied to a set of natural situations. For example, a situation such as a bicyclist bicycling, is ordered by the science of physics which is ordered by mathematics and mathematics is itself ordered by logic; so that in the last instance the mechanical situation is ordered by logic. All natural science is, in the last instance, applied logic.

The Nature of a Value Science

There are also value situations (e.g., choosing your spouse, choosing the president of a company, etc.) A significant example would be the flight of the **Enola Gay** to Hiroshima. The pilot wrote in the log book the wind velocity, the weather and everything, at the exact minute when he released the atomic bomb, angle so-and-so, weight so-and-so, weather so-and-so, etc., all the details mechanically, aerodynamically, meteorologically, of the flight.
But at the end of these entries in the log book are these words, "My God, what have we done ?"

Everything in this log book entry up to these last words is natural science, mathematics, physics, astronomy, chemistry—but these last words, "My God, what have we done ?" —that is a moral question, something in the field of value. If we had value sciences, say, ethics, religion, aesthetics, and so on, all these value situations would be ordered by the corresponding sciences. But if they are to be sciences then there must be a formal frame of reference which must order these sciences as mathematics orders the natural sciences; and this formal frame of reference is what we call formal axiology, from the Greek word "*axios*" meaning "valuable."

This notion "*formal axiology*," was coined in the year 1903 by the German philosopher Husserl. Formal axiology must be a kind of logic just as mathematics is a kind of logic and this was the foundations of the science of formal axiology, as that science which does for value situations and value sciences what mathematics does for natural situations and natural sciences.

Moral Value and Axiological Value

Before we discuss the formal definition of Axiology, we must be absolutely clear that what will be defined is good in the general sense and not in the moral sense. In other words, the phrase "He is a good murderer" does not mean that morally a person is good. It means he murders well. A murderer is good if he murders well but that does not mean that he is morally good; on the contrary he is morally bad. We have two levels of language here which must not be mixed up. Their mixing up has been the curse of ethics for two thousand years.

In that same year 1903 there was an English philosopher by the name of G. E. Moore. After much reflection Moore wrote a book called *Principia Ethica*, the title patterned after Newton's *Principia Mathematica Philosophae Naturalis, The Mathematical Principles of Natural Philosophy.* Moore wrote *Principia Ethica* as the preface to any future ethics that pretends to be scientific. However he didn't get very far in founding the science of Ethics. The gist of the book is that there is good and that it is indefinable. The book, therefore, is very short. Yet, what it says is fundamental, namely, (a.) there is good and good is not anything else but

good, nothing like satisfaction, pleasure, and so on; and (b.) but nobody can possibly know what it is.

Then Moore goes back into the history of ethics and shows how everybody had messed up things, mixing up goodness itself with things that are good, starting from Aristotle up to Moore. Moore himself gave us some definition in 1943 when he stated: "Two things are true of goodness - (1.) it is not a natural property and (2.) although it is not a natural property it depends entirely upon the natural properties of the thing that is said to be good."

1b. The foundations of the sciences behind the Attribute Index

Goodness is an intangible. It's none of the descriptive properties that you can see or hear or small or taste, yet you can measure it with absolute precision. The measure is no more tangible than is mathematics. It's the concept of the thing that you learn by learning language. In other words, language itself has within it the measurement of value, it is value measurement. Let us see what this means.

Take a chair as an example. The concept "chair" is in quotes, the chair is standing there. The concept chair is not a chair. The concept is in the dictionary, you look it up if you don't know it. So the concept chair has one, two, three, four properties - "knee-high," "structure," "a seat," and "a back." The set of these properties is called the intension or meaning of the concept and the set of chairs that are, have been, or will be, is called the extension or class of the concept.

You learn the intension or meaning of the concept as a kid. How? By asking mother. What's this? A Chair. What's this? A girl. What's this? A mirror. You learn the words of the language learning their meaning as a set of properties and this set of properties is the measurement of value for the things named. Those of you who have read the autobiography of Helen Keller will remember the tremendous excitement of a child on learning names, when her tutor Miss Robinson spelled into her hand the word W-A-T-E-R. The excitement is not only because the name names, but also because it values.

A good chair, then, has all the properties you learn chairs have. It is a knee-high structure with a seat and a back. Now if a chair is nothing but a back it's a pretty poor chair. It's a good back but a bad chair. Anything which is good if it has the totality of its properties is not good when it has less than the totality of its properties. But it is also true that any set of properties can be looked at in terms of some concept. Take any set of properties and you can always find a concept for them. So that a bad chair with legs and a seat but no back is a good stool because it fulfills the properties of the stool and a bad house is a good ruin, and a bad car is a good jalopy. Here you have the difference between the pessimist and the optimist. The pessimist always finds the concept which is not fulfilled by

the properties at hand, and the optimist always finds the concept which is fulfilled by the properties at hand. So the pessimist says, "I have a lousy car" and the optimist says, "I have a lovely jalopy."

In other words, the famous saying that for the optimist the glass of water is half full and for the pessimist it is half empty, means in logical terms, that for the optimist the concept is half full and for the pessimist it is half empty.

The Calculus of Value

The measure of the value of a thing is the set of properties which defines the thing. So let's take our chair again, one, two, three, four properties, "knee high," "structure," "a seat," and "a back." If it is not knee-high it is not a very good chair. If it is not a structure but wobbles it is not a good chair but it's a good contraption for circus acrobats. If it has no seat it's not a good chair and if it has no back it is not a good chair either. Thus, if a particular thing is what it is named to be, for example something called a "chair," then we call it a good such thing.

If the thing has all the conceptual, or intentional, properties, we call it good. Let us say that the number of properties contained in any conceptual intension is P, whatever that may be. A good chair, or a good anything, has P properties. If it has half the properties it is a so-so or average thing and has P/2 properties. If it has more than half the properties it is a fair thing and has P/2 + m properties, where m is less than P/2, m < P/2. In other words, in the case of the chair, m would be less than P/2, and since P = 4, P/2 is 2 and less than that is 1.

The chair would be fair if it had P/2 + m = 2 + 1 = 3 properties. In other cases, of course, fair would be something else. Bad is less than half, P/2 - m, in the case of the chair only one property; it would be pretty bad.

All this is extremely simple. But now look what's happening. Let us put a girl on the chair so we get some differences of opinion, for if four people look at a chair it is difficult to get real differences of opinion. There she is sitting with four fellows sitting around her. One says, "Boy, that's a girl!" What does he mean? She's got all the girl properties; she is P. Another says, "Aw, I don't think she's so hot." What does he mean? Well, she's so-so, not so hot, and not so bad either. He says she's P/2. The other says, "I think she's pretty good." She's P/2 + m. The fourth says, "I don't know what you're talking about. I think she's awful." She's still a girl, but she doesn't have much of girl qualities. He doesn't mean to say she's a bad girl, that wouldn't be so bad maybe. No, to him she's P/2 - m.

The true question is, what is the value of the situation of the fellows saying this about the girl? Or, what is the value of the girl in the situation with these fellows? What does what they say add up to? Very simple. The one said P, the other P/2,

the third P/2 + m, the fourth P/2 - m. So let us add up what they say P + P/2 + m + P/2 - m. The result is 2 1/2 P.

This is a peculiar result. Remember, P is the totality of all her qualities. Does she then have more qualities than she has? Indeed she does. And this is the core definition of value: valuation is a play with pure properties. You abstract from the thing itself and take the properties of the thing as a set with which you play around. Depending upon how you play, you call the thing good, bad, indifferent, and so on. In other words, fact is only one of the sets of properties that a thing has, and it is that set upon which people most readily agree. However, when it comes to valuation, you abstract from that factual set and just take the properties of the thing by themselves, playing around with them, arranging and rearranging them in your imagination.

Evaluation is an imaginative play with properties and not looking at the thing itself. And fact itself is only one set of the thing's properties. This means that valuation is a function of the imagination. You have the capacity of valuation in the degree that you have imagination. If you lack imagination you will see only facts. But facts, being themselves sets of properties, are not factual at all. Valuation is a play with pure properties; and axiology is the score of that play, just as music is a play with sounds and musical science is the score of that play.

Now, let us continue our play. We can do much more with the sets of girl properties or of chair properties or any other set of properties than merely add. We can subtract, multiply, divide, arrange and rearrange these sets in sub-sets, and the result of all this is value. Let us ask ourselves how many different values a thing can have. Since the set of properties and each of the sub-sets of this set is a different value, and since according to a well-known formula, a set of P items has 2^P - 1 sub-sets, a thing with P properties can have 2^P - 1 sub-sets of properties. This number, then, 2^P - 1 is the totality of different values which a thing can have.

That means that our chair, for example, has four properties, 2^4 - 1 = 15. A chair with four properties can have 15 different values. Why? Because it can have one value of goodness; there's only one set of all properties. In combinational analysis $_4C_4$ = 1. There are 6 ways in which the thing can have two properties, because $_4C_2$ = 6; hence there are six different ways in which the chair can be so-so; it can be knee-high and have a seat but wobble and have no back; it can have a seat and a back but not be knee-high and wobble, and so on. There are 4 ways in which the chair can be fair; and there are 4 ways in which it can be bad, for $_4C_1$ = 4. Thus, our chair can have one goodness, four fairness's, six averagenesses, and four badness's. In toto, a thing can have 2P - 1 values because every sub-set of properties is, by definition, a value.

In another example if we apply this to a job evaluation. Suppose you have evaluated a job as so many properties, let's say ten. Then in how many ways can the employee fulfill or not fulfill this job... in 2^{10} - 1 = 1,023 ways. There are 1,023 ways in which the employee can perform or not perform one particular job which is defined by ten properties.

To be exact, there is one way of good performance, 385 ways of fair performance, 252 ways of average performance, and 385 ways of bad performance. By dividing the possible number of performances through the possible total of all performances, we get the percentage of performance expectation: 0.098% for good, 37.64% for fair, 24.64% for average, and 37.64% for bad.

The difference between this theoretical expectation and the actual performance in your shop is an objective measure of your shop performance.

Or the calculus can also be applied to gauge the acceptance of a product. If the product, in the mind of the public, is determined by 10 properties, the theoretical expectation of evaluation of it are 2^{10} = 1,024, adding one evaluation {equal to} zero; and there are 385 ways in which the product may appear fair or bad and 252 ways in which it may appear so-so. These ways may in turn be broken down; of the 385 ways in which the thing may appear fair, there are 10 ways in which 9 properties may be accepted, 45 ways in which 8 may be accepted, 120 in which 7 and 210 ways in which 6 properties may be accepted. *The corresponding percentages of expectation are, respectively, 0.98, 4.4, 11.73, and 20.53.* Again, the actual acceptance as against the possible acceptance is an objective measure of your product's success.

Here already you have a calculus of value, measuring much that at present is intangible.

THE DIMENSIONS OF VALUE

However, the calculus has much wider scope. The above application is valid only if properties can be enumerated. But how if they cannot, as in the case of the company president or my wife? Here, it seems, matters become really intangible. Yet, even these values can be made tangible, even they can be measured. Let us see how.
So far we have spoken only of one kind of concept, abstract concepts such as "chair" or "girl." There are two other kinds of concepts which give rise to two other kinds of values. The three kinds of values are the dimensions of value.

EXTRINSIC VALUE

Let us look first at the abstract concept again. Abstract concepts are concepts which are abstracted from the space-time empirical things. In other words, in the world we have all the chairs or girls or whatnot and we abstract those properties which all these kinds of objects have in common. The result is the properties of the concept "chair," "girl," or "what-not" or "X".

We had before my little boy who saw the ocean and thought it was a mirror. I had to tell him, "No, it's liquid, and such a thing is called water or ocean." I gave him a new concept. Such concepts, abstracted from sense reality, have the following important characteristic: their properties are denumerable, or enumerable, one by one. For they have been abstracted one by one. You have to take common properties and you just have to learn one by one, one after another, all these properties. A set of items which can be identified one by one is mathematically called a denumerable set. The properties of an abstract concept, thus, are a denumerable set.

If I couldn't enumerate and thus identify them I would not know the thing. Denumerability is the essence of discursive knowledge. But, secondly, how many properties can I abstract that things have in common ? If I have a huge number of things they will have very many properties in common; if I have only two things I can abstract an almost infinite number of common properties. The range of the number of properties that can be abstracted, then, is between one and infinity. Or, the properties of an abstract concept are, at most, denumerably infinite. There is a mathematical sign for such an infinity which is "$\aleph_0$" meaning the Hebrew A with a zero. This is mathematically as exact a symbol as any you know.

When an abstract concept is fulfilled or not fulfilled there appear degrees of valuation, goodness, badness, as we have seen. Such values are called extrinsic values because what is valued is not the thing itself but its belonging to a certain class. A good chair is good because it is a good member of the class of chairs.

SYSTEMIC VALUE

The second kind of concept is constructions of the human mind—constructs. Have you ever. wondered why there are no bad geometrical circles? Because the geometrical circle is defined with such precision in the system of geometry— as "plane closed curve equidistant from a center"—that if a curve does not have all these properties and lacks just one of them it is not what it was defined to be. It's not a bad circle; it's not a circle.

Why aren't there bad electrons? For the same reason. When a thing seems like an electron and lacks an electron property we cannot call it an electron; and the main endeavor of modern physics is to find out about these "bad" electrons and give them new names: positron, neutron, meson, and so on. Why are there no

bad square roots of minus one? For the same reason. Why is there equity in the law? Because even in the law there are such exact definitions that when a thing lacks a part of the definition it is not what it is defined to be, and in order to relieve the tension between the system and reality, jurists have invented equity and other institutions.

If the systemic rule remain unrelieved you have legal injustices, as in Menotti's powerful opera <u>The Counsel</u>. Again, you have moral injustices if, for example, you define a human being by a system, say, the system of spectroscopy If you define a human as "white," and all "non-white" as "non-human" you use a minimum of properties to define a very complex being. Such a definition is a transposition of frames of reference and hence, as we have seen, not good.

Constructs have the following characteristics:
    The number of properties is finite. It is a minimum number of properties, say, n. A construct gives rise to only two values, either perfection or non-existence. There are no degrees such as good, bad, indifferent, and so on. This kind of value is called systemic value.

I can apply systemic value to anything, say, my wife, I look at her systemically when I see her as my housekeeper and get mad when the soup isn't on the table or when she pushes the toothpaste from the top and I at the bottom. But that is not the right way of looking at my wife.

I also can look at my wife extrinsically as a member of the class of wives, compare her with other wives, and so on. But that's not the right way either.

INTRINSIC VALUE

When I really think of my wife the way I should, she's unique. The concept "my wife" is a singular concept. How many properties does she have? She has an infinity of properties and I cannot put my finger on any one of these properties. I see her, as the psychologists say, as a "gestalt" or as the mathematicians would say, as a "continuum." I neither abstract from nor construct her. I live her life, identifying myself with her. She is an intrinsic value. Logically, this means that the properties she has are non-denumerably infinite, and the sign of this is $Aleph_1$.

Let me explain this sign and then give you an example. When we come to transfinite numbers most peculiar things happen. If you take all the rational numbers to infinity you have the odd and even numbers, 1, 2, 3, 4... Now take only the odd numbers, 1, 3, 5, 7... How many odd numbers are there? Infinitely many. This means that there are as many odd numbers as there are odd and even numbers. How many even numbers are there? 2, 4, 6, 8... Again, infinitely many. There are as many even numbers as there are odd and even numbers. So

the mathematical definition for a transfinite number is that the part equals the whole.

This is a most peculiar arithmetic, yet, it is as exact an arithmetic as any other arithmetic. Actually, it is much simpler than finite arithmetic. Suppose you deduct an infinity from an infinity, what is the result? Well, an infinity. Now add an infinity to an infinity - again an infinity. Whatever you do you always get an infinity: Aleph - Aleph = Aleph, Aleph + Aleph = Aleph, etc. The most significant thing is that no subtraction is possible. The only thing that may significantly happen is rise to higher infinities, by exponentiation: $Aleph_0^{Aleph_0} = Aleph_1$.

This is all we need as foundations of axiology. To summarize:
- Value is the degree in which a thing fulfills its concept.
- There are three kinds of concept: abstract, construct, and singular. Correspondingly, there are three kinds of value:
  - Systemic value is the fulfillment of the construct
  - Extrinsic value is the fulfillment of the abstract
  - Intrinsic value is the fulfillment of the singular concept.

The difference between these concepts is that a construct is finite, the abstract is denumerably infinite, and the singular is non-denumerably infinite.

1c. The Attribute Index instrument

Axiology is the science of value. The word "Axiology", derived from the two Greek roots 'axios' (worth or value) and 'logos' (logic or theory), means the theory of value. The development of the science makes possible the objective measurement of value or literally the act of making judgments about ourselves and the world around us. It is a mathematically accurate assessment that objectively identifies how our minds analyze and interpret our experiences. It also identifies how we are most likely to react in any given situation. Basically, it examines "how we think". It helps us to understand the patterns we use to make judgments. In turn, this allows us to translate these measurements into quantitative scores that can then be more easily understood, compared, and applied to the daily world.

These processes determine how and why we act as we do. It provides a common language that we can then use to compare individual against each other, a position, or an environment.

Ours is a world of concepts. We live in a world where anything we can name, or think of, is a concept. Whether a chair, a plan, a person: no matter what, each individual has a concept of what that item is and should be. Building on the work

of many of his predecessors, Dr. Hartman's research showed that there are three ways in which humans can perceive any single concept.

We can see the structure of a thing, the application of a thing and the individuality of a thing. We will cover these three perspectives in a moment. He also discovered that the properties of these different perspectives (which he titled the "dimensions of value") had a direct correlation to the properties of the different sets in set theory. Adding calculus from his doctorate in mathematics, Hartman created the ultimate culmination of philosophy, human science and mathematics to create formal axiology.

Thus was born the beginnings of the Hartman Value Profile, which lead to the profile you will be selling today and into the future. He helped to do for social science what Galileo and Newton did for the natural science, to make a natural science out of natural philosophy. Before this there was no natural science, there was only the natural philosophy of Aristotle. The difference between natural philosophy and natural science is like the difference between alchemy and chemistry, or between astrology and astronomy. Philosophy applies theories with no quantitative system to verify the suppositions.

It was the work of first Galileo, Kepler, and Newton (further developed by G. Moore, Einstein and now Hawkings) to apply a mathematical structure to natural philosophy that led to the creation of a natural "science". Something quantifiable, valid, reproducible, and objective.

The root of Dr. Hartman's discovery was in his identification of three distinct dimensions of value (different ways of judging or valuing things). They are the intrinsic, extrinsic, and systemic value dimensions. Everyone has different strengths and weaknesses in how they are able to apply these different dimensions when making decisions. No one uses each dimension, or thinking module, equally to make a decision.

While some prefer the intrinsic dimension, others are more inclined to think in an extrinsic sense, or in a systemic way, and the results of any one individual's thought process depend on the amounts of focus they place on the combination of these three dimensions. Although all are used in the process of making a decision, some are more highly valued than others and it's this combination of perceptual dimensions (the number of combinations possible reaches over 50 million) that defines how we think, and differs our thoughts and decisions from other's.

Therefore, everyone skews reality in their brains, only seeing part of the picture when making decisions, evaluating things, and thinking about one's self. The key is to understand how they skew them, which dimension is it that they value more or less, and to what percentage.

For example: Someone that has a greater focus on the Intrinsic dimension, and uses this "sense", or aspect of judging things, will tend to be more empathetic than someone who make decisions using a more Systemic thinking pattern. The Intrinsic dimension is one of individual uniqueness. It is the capacity to be in touch with one's self and others through feelings and intuition, whereas the Systemic dimension of processing information is more aligned with structure, order, rules, ideals, goals, laws, black and white, wrong and right. The end result is someone thinking with an intrinsic focus is much more likely to take into consideration the feelings and emotions of a situation than someone thinking in the Systemic dimension who doesn't see people as much as he sees the process.

The trick is being able to measure how developed each of these dimensions are in an individual and then measuring how they apply them to their daily thought processes. By knowing, scientifically, which dimension plays a larger role, in relationship to each other dimension, we can accurately predict why and how someone might tend to make judgments. And…judgments about a concept control reactions to a concept (e.g., if I focus Systemically and judge people less significant than a given result, then that shapes how I will approach interacting with them, managing them, working for them, etc.).

Our actions are not unlike one big chain of thoughts starting with how we perceive something, which affects how we value it, which affects how we decide to deal with it, and then how we choose to act or interact with it. It is a chain of links and Axiology is examining the first link from which all the other links feed.

This is not to say that the other links are not important, rather the overall ability they possess to shape who we are lessens as the further they are from the beginning of the chain. The results of working at this level are exponential. Changes made at this level require less effort to create greater impact on the individual. People are different. They do not look alike. They do not all sound the same. In addition, they do not think the same either. Axiology is the science that studies how people think. Specifically, how people determine the value of different things. How individuals compare things and how those value assignments either represent or distort reality.

The Attribute Index contains a two-part instrument, each part consisting of 18 phrases which the respondent is to order from "1" to "18" based on which they feel is better or worse. This forced ranking *covertly* measures the focus and clarity with which they exercise each of the three dimensions of thought.

Each dimension can be valued in one of three ways: intrinsically, extrinsically or systemically. Therefore; three dimensions, multiplied by three subsequent

valuations equals nine possible combinations (e.g., a statement that represents the intrinsic valuation of an extrinsic item or E^I). In addition to such valuations, each dimensional combination mentioned above can be made in both a positive and a negative way. This takes the nine combinations to eighteen (nine positive and nine negative), and the result is the eighteen phrases or words you see on each part of the instrument today. These statements represent Dr. Hartman's Hierarchy of Value.

Below is one such statement from the instrument, and a complete definition as it relates to its position in this hierarchy:

A Token of Love: An extrinsic valuation of an intrinsic dimension (I^E).

The intrinsic value is the person being loved. This is valued by the token, which is a thing, that is, an extrinsic dimension. Part I contains phrases or statements that assess the individuals dimensions of thought as they relate to the world around them, while Part II assesses how they think about themselves.

The single most important characteristic to this instrument is that its intentions are hidden from the respondent. I mention "covert" measurement in the opening paragraph of this section because unlike most instrument available today, the respondent can neither understand or identify any pattern to the task before them other than the stated purpose (i.e., rank the statements from better to worse).

The result is a higher level of validity since the respondent cannot skew the results based on what they "think" they should say. Without knowing how their ranking works, they are at a loss to attempt to affect the results. Basically…we are measuring the real thinking process that they employ.

1d. The statistical and validity evidence supporting valuemetric quality of the Attribute Index

EEOC Requirements

The Equal Employment Opportunity Commission (E.E.O.C.) has established that screening instruments, psychological testing, personality tests, and all other evaluation procedures that are used in industry are to fulfill the Uniform Guidelines on Employment Selection Procedures (1978).

"Employer policies and practices which have an adverse impact on the employment opportunities of any age, race, sex, or ethnic group are illegal…

Employer decisions include, but are not limited to hiring, promotion, demotion, membership, referral, licensing, and certification."

[Federal Registry, Vol. 43, No. 166, 8/25/78]

Age Discrimination Study

The Age Discrimination in Employment Act of 1967 states that employers may not discriminate against employees and applicants older than 40 years old in their hiring and promotion practices. Therefore in order for a test to be legal, it must be found to have no statistical bias between people older than 40 years old and people under 40 years old.

Two separate sample populations of 340 persons were randomly selected from a group of 1,983 individuals. The groups represented adults between the ages of twenty-eight to forty and forty to sixty seven. A two-sample parametric interval data T-test was used to measure statistical significance.

The Attribute Index instrument generated 12 core scores on each participant. In order to show discriminatory results the T-test needed to exceed 1.362 (resulting in a $p > 0.20$). For all 12 items the results were a $p < 0.01$, thus proving that the instrument does not discriminate against persons of particular ages or age groups.

Discrimination by Sex

Title VII of the 1964 Civil Rights Act stipulates that an employer may not discriminate in hiring and promotion practices or the terms and conditions of employment because of the individual's sex.

Two separate sample populations of 340 persons were randomly selected from a group of 1,983 individuals. The one group was males and the other females. The two-sample parametric interval data T-test was used to measure statistical significance.

12 scores for each participant's profile were measured and compared. The results were that all 12 scores, using the T-test, were found to have a $p < 0.01$.

This study proves that the instrument does not discriminate between males and females.

Discrimination by Race

Title VII of the 1964 Civil Rights Act stipulates that an employer may not discriminate in hiring and promotion practices or the terms and conditions of employment because of the individual's race.

Two separate sample populations of 340 persons were randomly selected from a group of 1,983 individuals. The groups represented adults of Caucasian race and African American race. The two-sample parametric interval data T-test was used to measure statistical significance.

12 scores for each participant's profile were used measured and compared. The results were that all 12 scores, using the T-test, were found to have a $p < 0.01$.

This statistically significant result proves that the instrument does not discriminate among different races.

Reliability

Reliability may be estimated through a variety of methods that fall into two types: single-administration and multiple-administration. Multiple-administration methods require that two assessments be administered. In the test-retest method, reliability is estimated as the Pearson product-moment correlation coefficient between two administrations of the same measure.

In the alternate forms method, reliability is estimated by the Pearson product-moment correlation coefficient of two different forms of a measure, usually administered together. Single-administration methods include split-half and internal consistency. The split-half method treats the two halves of a measure as alternate forms. This "halves reliability" estimate is then stepped up to the full test length using the Spearman-Brown prediction formula. The most common internal consistency measure is Cronbach's alpha, but more on that in a moment.

These measures of reliability differ in their sensitivity to different sources of error and so need not be equal. Also, reliability is a property of the scores of a measure rather than the measure itself and are thus said to be sample dependent. Reliability estimates from one sample might differ from those of a second sample (beyond what might be expected due to sampling variations) if the second sample is drawn from a different population because the true reliability is different in this second population. (This is true of measures of all types--yardsticks might measure houses well yet have poor reliability when used to measure the lengths of insects.)

Reliability may be improved by clarity of expression (for written assessments), lengthening the measure, and other informal means. However, formal psychometric analysis, called the item analysis, is considered the most effective way to increase reliability. This analysis consists of computation of item difficulties and item discrimination indices, the latter index involving computation of correlations between the items and sum of the item scores of the entire test. If

items that are too difficult, too easy, and/or have near-zero or negative discrimination are replaced with better items, the reliability of the measure will increase.

While there are numerous methods of establishing reliability, one of the most common and accepted methods is the Test-retest method. Test-retest is a statistical method used to examine how reliable a test is: A test is performed twice, e.g., the same test is given to a group of subjects at two different times. Each subject should score different than the other subjects, but if the test is reliable then each subject should score the same in both test.

There are some concerns with "learning the test" through repeated exposure to the same instrument, but the DISC Index is not subject to an advantage from repeated administration because it asks for self-reported responses. The instrument's scales are therefore stable due to the stability of individual respondent's perception of self-concept as a constant.

The output of a test-retest is an alpha coefficient, which is the expression of an instrument's reliability ranging from +1.00 through zero. An instrument with a perfect reliability would have an alpha coefficient of +1.00 (something not yet seen). While there is no agreed-upon standard as to what makes an acceptable alpha coefficient score (i.e., what makes a good or bad correlation), it is generally agreed that a minimum standard for alpha equal to 0.60 or greater is acceptable. That said, most experts advocate the use of a 0.70 or higher as a standard level of acceptability. Obviously the higher the alpha coefficient the stronger the coherence of items.

Cronbach's α (alpha) is considered by many to be the most robust reliability alpha to date. Cronbach's α (alpha) is a commonly used measure of the internal consistency reliability of a psychometric instrument. It was first named as alpha by Cronbach (1951), as he had intended to continue with further instruments. It can be viewed as an extension of the Kuder-Richardson Formula 20, which is the equivalent for dichotomous items. Cronbach's α measures how well a set of variables or items measures a single, unidimensional latent construct.

Cronbach's alpha was used to determine all of the reliability coefficients for the AI Index instruments.

Reliability Study

A population of 367 individuals were given the Attribute Index instrument. Four weeks later (30 days), the same students were again given the identical instrument. The results of the study prove the reliability and stability of the

Hartman Value Profile. All 12 dimensions measured were statistically the same between the first and second trials. There were no statistically significant differences. "The reliability of the Hartman Value Profile was especially noteworthy in the most complex dimensions: value quotients, balance quotients, self quotients, integration scores, and differentiation scores." These more complex dimensions all had confidence above 99% with $p < 0.01$.

Construct Validity

Construct validity measures whether an instrument in both its forms and results is consistent with the theory behind the instrument. In this case the measure will be to see if the rankings assigned the statements in the instrument (which for Hartman have fixed, universal order of value) provide support for the validity of Dr. Hartman's constructs.

The sample size was 1,983 persons. Analysis was of the profile as a whole, the compositional items (18), the transpositional items (18), and each individual item. The results of the test as a whole, using Friedman's Two way ANOVA by rank, Page's Test for Ordered Alternative, and Kendall's Coefficient of Concordance provided a 99% confidence level that the rankings did match the theoretical order of value. The Spearman Rank Order Correlation also provided a statistically significant indication that a correlation exists between the rank order of the model and the rank order of the obtained rankings.

Concurrent Validity

Concurrent validity is the test as to whether a particular instrument correlates significantly to other valid measures. This validation provides an alternative means of validating an instrument by "piggy- backing" on the reams of validation of previously benchmarked, psychometric instruments.

This study incorporated four different psychological instruments as measuring rods to establish concurrent validation. The instruments were the MMPI, the Cattell 16PF, the CAQ and the Auto Lethality Index. This study was completed in two phases over a period of more than a year. The first study had a sample size of 243 adults and compared the Attribute Index with the MMPI and CAQ. The second study had a sample size of 198 adults and compared the Attribute Index to the Cattell 16PF and the ALI.

Part I: The Attribute Index profile correlated with a high degree of significance ($.05 > p < .0001$) in twenty-four specific measurements to the MMPI, CAQ and ALI.

Part II: The Attribute Index Profile correlated with a high degree of significance (<.05 p <.0001) in twenty-four specific measurements to the 16 PF and CAQ.

Construct and Concurrent Validation

This joint construct and concurrent validation study determines both the individual and comparative validity of the instrument. Because the Hartman Value Profile is axiological in nature and therefore has more robust and useful applications than psychological instruments, it is necessary to insure its axiological validity by validating it against benchmark axiological instruments.

This study was conducted by Drs. John Austin and Barbara Garwood, 1976.

This study incorporated three different values instruments as measuring rods to establish concurrent validation. The instruments were the Rokeach Value Survey (RVS), the Allport-Lindzey Study of Values (AVL), and Kohlberg's Theory of Moral Development (KMD). The population was comprised of 65 university students with an average age of 23.5 years.

The results were obtained by using the nonparametric Median test of the significance of differences between the number of persons in two more subgroups that scored above and below the median. The study indicated that the expected and obtained mean rankings was significant with a correlation of .95. For the compositional vs. transpositional items the confidence is highly significant with a $p<.001$. The individual items test indicated that no significant difference existed among the individual items ($p=.911$).

The findings of this study prove that the Hartman Value Profile measures what it claims to measure and that it is a valid axiological instrument.

Drs. Austin and Garwood presented this study and these findings at the National Association of School Psychologist Convention, March, 1977.

Note: Copyright of this study attributed to Dr. John Austin PhD.

The *Leadership/Management Attribute Index,* designed by Innermetrix, Inc. and Target Training International, is an application of *Hartman's Value Profile.* This assessment focuses on that core instrument. This examination is based on data you provided on 21 January 2005. The data set contained 10,911 cases. In order to allow for multiple hypothesis testing examinations, samples were drawn from these data as described with each inquiry.

The *Hartman Value Profile* is conceptual based on a theory of value science – Formal Axiology.[1] Structurally the instrument is based on individual's variance in rank-ordering of two dimensions of eighteen indicator statements compared with an ideal order. One dimension focuses on external and the other dimension focuses on internal statements. Each of the dimensions is composed of nine positive and nine negative indicators. Each of these nine indicators is a statement of extrinsic value, systemic value, or intrinsic value. The value order of these nine statements is the result of applying theoretical concepts derived from the philosophical frame.

The structure of the instrument is tightly linked to a fusion of philosophical values with theoretical structures. The usual procedures used in assessment of item and scale reliability do not apply given the instrument's structure, since scales are not being constructed through the aggregation of responses. The "Hartman" scales are derived from the deviation of the individual's responses from the ideal order of the indicators as derived from the theoretical model. Given the structure and construction of the instrument, assessment of reliability requires

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[1] Hartman, Robert S. 1959. The measurement of value. Document provided by Innermetrix, Inc.

a non-standard approach of confirming explicit assumptions made in design of the instrument.

Based on the theory provided,[2] it is possible to identify three initial questions for assessment.

- Is there agreement (congruence) in the rank ordering of the indicators by respondents and the theoretical order derived from the conceptual (mathematical) model?

- Are the observed scores and scales distributed in patterns consistent with those provided for interpretation by the instrument design?

- Are the scores and scales statistically independent and dependent in patterns consistent with the theoretical model?

Order ranks

The first assessment question considered is whether there is agreement between the theoretical, ideal order of the items as derived from formal axiology and the order demonstrated by a large number of respondents.[3] In this assessment samples drawn for the total dataset have been used in order to allow for replication, confirmation, and statistical testing.

A primary question arises when one considers which of three rank orders best describes respondents' rankings. One option is the median average, or the geometric center of the distribution in which one-half of the responses are higher and one-half are lower than the median. This value is less sensitive to extremes and outliers. A second option is that of mode, or the most chosen value. This value is indicative of the most frequent choice. A third option is to calculate the mean of the rankings and then rank those means in ascending order. Use of the mean average alone is not appropriate given that the respondent's inputs are rankings (rank-order measurements), and not interval or ratio level. However, in aggregated data the ranking of these choices based on means may provide sensitivity to possible

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[2] Hartman, Robert S. n.d. "2. Theory of the Test" pp 26-36, 43-44, 45-50, 51-60b, 76-82. (A series of pages provided by Innermetrix, Inc. as a description of the instrument structure.)

[3] Hartman. Op. cit. See p. 30, "Theory of the Test" "...the correct answers for a test based on the system of formal axiology are known from the system of axiology itself, that is the mechanism of value thinking." And p. 43 "Scores and scales are derived theoretically and have been validated practically. In sufficiently large samples, the scores follow the Gaussian normal distribution curve." Further, prior assessments of the instrument used rank-order concordance as an important criterion for validation.

equalities found in use of median averages. Since there is no single clear choice, the following assessments used each of the three options and considered similarities in conclusion as a form of confirmation.

Observed rankings

The first step is an examination of the samples. Next, an assessment of the observed rank-order of the statements with the ideal-order is conducted. These examinations involved extensive review of descriptive and statistical procedures.

Two 10% random samples were drawn from the data set. This resulted in samples of 1062 and 1172 cases. These were examined and compared to affirm the representative character of the sample. While one can expect some differences in samples, the medians and modes for most items were consistent. This confirmed consistency in the sampling process.

Sample 1 was then examined for consistency between male and female respondents. For part 1, females, 16 out of 18 medians were consistent with the two inconsistent medians showing adjacent ranks. For part 2, females, fifteen out of eighteen medians were consistent and seventeen out of eighteen modes were consistent. For part 1, males, all of the medians and modes were consistent between the gender breakouts and the combined table. For part 2, males, sixteen out of eighteen medians were consistent and fifteen out of eighteen modes are consistent.

Based on these observations, I conclude that while the median and mode rankings of the items may not be in exact congruence, the observed patterns of medians and modes are reasonably consistent between samples 1 & 2, and between female and male responses. Based on this conclusion, the next examination will consider these observed-ranks compared with the ideal-ranks.

Ideal ranking

Comparison of ideal ranks with observed ranks involves two examinations. A first step is visual comparisons of the item's ideal order with the three measures of ranking, then statistical testing of concordance between those rankings.

A comparison of the ideal order with the median, mode, and ranking of means reveals a high level of agreement between the averages observed and the ideal order. Ten of the 36 comparison have full agreement between the three averages and the ideal rank. Five additional comparisons have agreement between two of the averages and the ideal rank. Ten other items

have agreement of the averages that is ±2 of the ideal rank. Only two items have disagreements in observed average rank orders with the ideal rank that exceed ±2.

In both sets the nine-positive and nine-negative statements are clearly differentiated from the each other. Given each of the ranking options it is clear that collectively the respondents distinguish the differences in these two perspectives. Consultation of the descriptive statistics, however, shows that individual rankings are not always so clearly differentiated. Many times individual rankings show substantial differences with the ideal ranks. This is a positive indication that use of variance from the ideal is a reasonable approach to value differentiation.

Concordance

Statistical testing of the agreement between the ideal order and observed orders requires use of a non-parametric procedure – Kendall's coefficient of concordance W.[4] W describes the association between ordered lists, in this case the ranks. This coefficient can range from 0 to 1 with 1 indicating complete agreement in the rankings. Table 1 and Table 2 list the coefficients. In the first three columns the concordance (agreement in rank order) of the ideal order and average is measured. The far right column is concordance between the ideal and three averages.

Table 1: Kendall's Coefficient of Concordance W, part 1

	Ideal-Median	Ideal-Mode	Ideal-Ranked mean	Ideal, median, mode, ranked mean
Kendall's W	.989	.988	.989	.991
Chi-square	33.614	33.596	33.614	67.355
df	17	17	17	17
Asymp. Sig	.009	.009	.009	.000

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[4] Gibbons, J. D. 1976. *Nonparametric Methods for Quantitative Analysis.* American Sciences Press, Inc.: Columbus, Ohio. pp. 301-310.

Table 2: Kendall's Coefficient of Concordance W, part 2

	Ideal-Median	Ideal-Mode	Ideal-Ranked mean	Ideal, median, mode, ranked mean
Kendall's W	.973	.972	.975	.974
Chi-square	33.074	33.042	33.158	66.225
df	17	17	17	17
Asymp. Sig	.011	.011	.011	.000

The coefficients all exceed .9 with those associated with part 1 being slightly larger than those for part 2. This indicates slightly higher levels of agreement on the external statement ranks than on the internal statement ranks. The differences among the options used to measure respondents ranks are very minor, although it appears that the ranking of the means is slightly more aligned with the ideal order than the other two options. The W's when all three averages are used is a more a function of the agreement among the three averages used to measure the observed rankings than an indicator of a stronger agreement with the ideal order.

Distributions

The *Hartman Value Profile* in its published version lists twenty-three test scales for both the internal and external dimensions, and two test scales that are derived from the juncture of the two dimensions. These scales is theoretically derived and complex in their definition. Since these test scales are theoretically defined, evaluation is beyond the scope of the current assessment project. However, the instrument design documentation does provide tables that categorize scores with assigned qualification (evaluative-judgments). In these articulations sample 1 has been used in order to maintain availability for alternative testing and confirmation samples.

For the purpose of this summary, reporting is limited to the core six scales. These scales are the focus for feedback and interpretation of the instrument.

The following assessment focus on articulating these instrument-standards with distributions of observed cases. In considering these articulations it is important to note that the Value Profile's qualifications are based on theoretical constructs of the scores and errors, and that a "correctness percentage" is used. **There-fore, the instrument's qualification is criterion based, while the listing of the observations is normatively based**. It would be unwarranted to judge the criterion based categories as "in error" using normative distributions. However, since interpretation and feedback is based on the assumptions made from the criterion based qualification it is important to note when observations cluster all cases in just a few of the qualification categories.

Presentation for each of the scales takes the general pattern of presenting a definition then one table listing the scale structure as published and the observed distribution. A second table then lists descriptive statistics and a deciles distribution for the observed responses.

Dimension (DIM-I, DIM-E, DIM-S, DIM)

"The Dimension Score measures the subject's Sense of Proportion, that is, his capacity to see the various value dimensions evenly. The differences in the three numbers I, E, and S, show the subject's value strengths and weaknesses."[5]

Table 3: Sub-Dimension scores - articulation

Value Profile		Observed					
Errors (Score)	Qualification	DIM-I.1	DIM-I.2	DIM-E.1	DIM-E.2	DIM-S.1	DIM-S.2
0 - 7	Excellent	46.6%	42.9%	33.9%	15.4%	14.2%	7.7%
8 - 14	Very Good	48.1%	52%	43.9%	57.6%	53.8%	51.4%
15 - 21	Good	4.3%	5%	9.3%	23.9%	28.3%	34.9%
22 - 28	Average	0.2%	0.1%	0.7%	3%	3.7%	5.8%
29 - 35	Poor	0.1%	0%	0%	0.1%	0%	0.3%
36 - 42	Very Poor	0%	0%	0%	0%	0%	0%
43 +	Bad	0%	0%	0%	0%	0%	0%

Table 4: Dimension I, E, S sub-scores descriptive statistics

		Dim I.1 Empathetic	Dim E.1 Practical thinking	Dim S.1 System judgment	Dim I.2 Self-esteem	Dim E.2 Role Awareness	Dim S.2 Self-direction
N	Valid	1172	1172	1172	1172	1172	1172
	Missing	0	0	0	0	0	0
Std. Error of Mean		.106	.097	.111	.134	.136	.135
Median		8.00	8.00	9.00	12.00	12.00	14.00
Mode		6	7(a)	8	12	12	14
Std. Deviation		3.626	3.317	3.800	4.571	4.643	4.611
Minimum		1	1	0	1	0	2
Maximum		31	23	28	29	28	30
Percentiles	10	4.00	5.00	5.00	7.00	7.00	8.00
	20	5.00	6.00	6.00	8.00	8.00	10.00
	30	6.00	6.00	7.00	9.00	10.00	11.00
	40	7.00	7.00	8.00	10.00	11.00	12.00
	50	8.00	8.00	9.00	12.00	12.00	14.00
	60	9.00	9.00	10.00	13.00	14.00	15.00
	70	10.00	10.00	11.00	14.00	15.00	16.00
	80	11.00	11.00	12.00	16.00	16.00	17.00
	90	13.00	13.00	14.00	18.00	18.00	20.00

a Multiple modes exist. The smallest value is shown

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[5] Hartman. Op. cit. p. 51, section 3.2.7.B.

- Each of the three scales in the two dimensions appears similar to the other two in terms of average values.

- External valuing appears stronger than internal.

- The "Qualification" categories established based on mathematical criterion do not classify the observed cases with sufficient discrimination for helpful feedback. This is based on the observation that 76% to 94% of the cases in part 1 are in the top two categories, and 68% to 72% of the cases in part 2 are in these same top two categories. Percentile distributions provide a normative standard that might be used as reference for revising scale interpretations in a 2005 version.

Correlations

The third and final focus of this assessment is the relationship among the primary scales. Table 5 lists correlations for the six primary scales.

Table 5: Dim I, E, S, parts 1, 2 Spearman rank order correlations

Sample 1: N= 1172		Dim I.1 Empathetic	Dim I.2 Self-esteem	Dim E.1 Practical thinking	Dim E.2 Role Awareness	Dim S.1 System judgment	Dim S.2 Self-direction
Dim I.1 Empathetic	Coefficient	1.000					
	Sig. (2-tailed)	.					
Dim I.2 Self-esteem	Coefficient	-.031	1.000				
	Sig. (2-tailed)	.281	.				
Dim E.1 Practical thinking	Coefficient	.165	-.012	1.000			
	Sig. (2-tailed)	.000	.689	.			
Dim E.2 Role Awareness	Coefficient	.033	.208	.049	1.000		
	Sig. (2-tailed)	.257	.000	.092	.		
Dim S.1 System judgment	Coefficient	.308	-.032	.229	.013	1.000	
	Sig. (2-tailed)	.000	.269	.000	.658	.	
Dim S.2 Self-direction	Coefficient	.051	.110	-.023	.226	.051	1.000
	Sig. (2-tailed)	.080	.000	.437	.000	.061	.

- The greatest correlation is .3 between Dim I.1 and Dim S.1. This represents around 10% shared (or explained variance).

- Nine of the 15 correlations are not statistically significant.

- These six scales appear reasonable independent of each other.

- The external and internal dimensions are independent of each other.

- It is clear in these correlation coefficients that there are no significant relationships between each of the three pairings in the two sets of scales.

Conclusions

I've reached the following conclusions with reference to the *Leadership/Management Attribute Index, an adaptation of the Hartman Value Profile* instrument based on statistical testing of samples drawn from the 10,911 cases provided.

Returning to the three focus questions for this assessment I conclude the following:

- *Is there agreement, congruence, in the rank-ordering of the indicators by respondents and the theoretical-order derived from the conceptual (mathematical) model?*
  - ✓ The theoretical ideal order as predicted by Axiological Value Science is concordant with the observed order evident in populations using the instrument.

- *Are the observed scores and scales distributed in patterns consistent with those provided for interpretation by the instrument design?*
  - ✓ The observed core six scores each show similar distributions with similar median averages for part 1 and part 2. However, the qualification distributions that are mathematically derived are not congruent with the observed distributions in the population. To the extent that feedback and judgments about characteristics are based on the qualification criterion, such feedback may be faulty if norm data is not considered. In order to prevent over and under classification, individuals' interpretations should include the norm references included in each report. These need to be considered in order to avoid a Lake Woebegone bias.

- *Are the scores and scales statistically independent and dependent in patterns consistent with the theoretical model?*
  - ✓ The six primary scales (DIM-I.1, DIM-I.2, DIM-E.1, DIM-E.2, DIM-S.1, and DIM-S.2) are reasonable independent of each other, and may be interpreted as such.

This assessment and review of the *Leadership/Management Attribute Index* instrument initiates a process of quality improvement by Innermetrix, Inc.

Background

Technology advances, styles come and go, and words take on new meanings over time. One casualty of this change is psychometric testing. Therefore, to ensure accuracy, the descriptors used in any such instrument must continually be reassessed to understand what connotations they create in the minds of those using them.

The Hartman Value Profile is conceptually based on a theory of value science – Formal Axiology. Structurally the instrument is based on individual's variance in rank ordering of two dimensions of eighteen indicator statements compared with an ideal order. One dimension focuses on external and the other dimension focuses on internal statements. Each of the dimensions is composed of nine positive and nine negative indicators. Each of these nine indicators is a statement of extrinsic value, systemic value, or intrinsic value. The value order of these nine statements is the result of applying theoretical concepts derived from the philosophical frame.

The original proxy statements used to represent intrinsic, extrinsic or systemic value were created by Dr. Hartman as early as 1940. Due to concern that the meaning of certain statements on the original Hartman Value Profile had changed sufficiently enough over time to skew validity as proxies (e.g., blowing up an airliner in flight), Innermetrix created a parallel instrument by replacing these questionable items with other statements which were felt to have retained their relevance in a contemporary environment. All substitutions were originally created by Dr. Hartman as well, and were believed to have better survived the times. This was done as part of an effort to ensure greater accuracy in measuring the respondent's value hierarchy. This document summarizes the statistical analysis of two separate studies designed to prove the validity and reliability of the Innermetrix parallel instrument (below).

Innermetrix Parallel Instrument

Practice   Final

Part 1 - Directions

On the right you will find 18 words or phrases. Each of these phrases (or words) contains something on which individuals may place different "values" (good or bad)…depending on their own feelings about how good or bad it is.

Read all the phrases carefully. If there is a word or phrase that you do not understand, ask what it means by e-mailing "*question@innermetrix.cc*".

Write the number "1" in the box by the word or phrase which represents the highest (most) value as far as you are concerned (i.e., the one you feel is the BEST).

Write the number "2" in the box by the phrase which represent the next best (second best) value.

Number all of the items in the same way, to show the order of their respective values to you. Use a different number for each of the 18 phrases (3, 4, 5 and so on). The number "18" should be in front of the word or phrase that represents the lowest (least) value to you (i.e., the one you feel is the WORST).

Do not judge the expressions by the IMPORTANCE, but rather ONLY by the goodness or BADNESS of their content.

Use the column of boxes on the left of the phrases for practice. Check to make sure that the number you have assigned to each phrase expresses you're feeling, making any necessary changes. Then copy those numbers in the final column of boxes on the right.

Decide quickly how you feel about each of the phrases. There is not time limit.

After you have finished, please check to make sure that you have used all of the numbers from 1 to 18, without repeating any. (start with your number 1 and find each number up through 18)

Practice	Phrase	Final
☐	A new car	☐
☐	A technical improvement	☐
☐	A foolish thought	☐
☐	A blunder	☐
☐	A wreck	☐
☐	An award for a good deed	☐
☐	Poisoning the city water	☐
☐	Imprisoning an innocent person	☐
☐	A short circuit	☐
☐	A token of love	☐
☐	A lover's embrace	☐
☐	Torturing a person in a concentration camp	☐
☐	A life of adventure	☐
☐	A madman	☐
☐	A telephone	☐
☐	Prostitution	☐
☐	Justice	☐
☐	A decoration for bravery	☐

Check off numbers as you use them

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18

Part 2 – Directions

On the right you will find 18 words or phrases. Each of these phrases (or words) contains something on which individuals may place different "values" (good or bad)…depending on their own feelings about how good or bad it is.

Read all the phrases carefully. If there is a word or phrase that you do not understand, ask what it means by e-mailing "*question@innermetrix.cc*".

Write the number "1" in the box by the word or phrase which represents the highest (most) value as far as you are concerned (i.e., the one you feel is the BEST).

Write the number "2" in the box by the phrase which represent the next best (second best) value.

Number all of the items in the same way, to show the order of their respective values to you. Use a different number for each of the 18 phrases (3, 4, 5 and so on). The number "18" should be in front of the word or phrase that represents the lowest (least) value to you (i.e., the one you feel is the WORST).

Do not judge the expressions by the IMPORTANCE, but rather ONLY by the goodness or BADNESS of their content.

Use the column of boxes on the left of the phrases for practice. Check to make sure that the number you have assigned to each phrase expresses you're feeling, making any necessary changes. Then copy those numbers in the final column of boxes on the right.

Decide quickly how you feel about each of the phrases. There is not time limit.

After you have finished, please check to make sure that you have used all of the numbers from 1 to 18, without repeating any. (start with your number 1 and find each number up through 18)

Practice — Final

- I like my work, it does me good.
- My mind is clear and makes me understand things.
- My mind is not very clear and I don't understand things very well.
- No matter how hard I work, I shall always feel frustrated.
- My working conditions are poor and ruin my life.
- I feel at home in the world.
- I'm so unhappy I'm actually sick.
- I'm so unhappy I can't think straight.
- My work contributes nothing to the world.
- My work brings out the best in me.
- I love to be myself.
- I hate to be myself.
- My good spirits keep me in good health.
- I don't understand things very well and that makes me unhappy.
- The more clearly I think, the better I feel.
- My work makes me unhappy.
- My good spirits keep my mind clear.
- My work adds to the beauty and harmony of the world.

Check off numbers as you use them

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18

The purpose of this study was to assess the ability of the Innermetrix Parallel instrument to accurately measure respondent's value hierarchy, as compared to the theoretical mathematical norm posited by Dr. Hartman in Formal Axiology.

Questions asked of this study:
1. "Is there agreement (congruence) in the rank ordering of the indicators by respondents and the theoretical order derived from the conceptual (mathematical) model?"
2. Are the observed scores and scales distributed in patterns consistent with those provided for interpretation by the instrument design?
3. Are the scores and scales statistically independent and dependent in patterns consistent with the theoretical model?

Conclusions to these questions:
1. "The theoretical ideal order as predicted by Axiological Value Science is concordant (in agreement) with the observed order evident in populations using the instrument." Statistical testing of the agreement between the ideal order and observed orders requires use of a non-parametric procedure – Kendall's coefficient of concordance W. W describes the association between ordered lists, in this case the ranks. This coefficient can range from 0 to 1 with 1 indicating complete agreement in the rankings. Table 1 and Table 2 list the coefficients. In the first three columns, the concordance (agreement in rank order) of the ideal order and average is measured. The far right column is concordance between the ideal and three averages.

Table 1. Kendall's Coefficient of Concordance
W. Part I (World)

	Ideal-median	ideal-mode	ideal-ranked mean	ideal, median, mode, ranked mean
Kendall's W	0.989	0.988	0.989	0.991
Chi-Squared	33.614	33.596	33.614	67.355
Df	17	17	17	17
Asymp. Sig	0.009	0.009	0.009	0.000

Table 1. Kendall's Coefficient of Concordance
W. Part 2 (Self)

	Ideal-median	ideal-mode	ideal-ranked mean	ideal, median, mode, ranked mean
Kendall's W	0.973	0.972	0.975	0.974
Chi-Squared	33.074	33.042	33.158	66.226
Df	17	17	17	17
Asymp. Sig	0.011	0.011	0.011	0.000

The Kendall's W for the Innermetrix Instrument exceeds 0.900 in all instances, proving it to be extremely congruent with Hartman's theoretical model of value.

2. The observed core six scores each show similar distributions with similar median

averages for part 1 and part 2. However, the qualification distributions that are mathematically derived are incongruent with the observed distributions in the population. To the extent that feedback and judgments about characteristics are based on the qualification criterion, such feedback may be faulty if norm data is not considered to establish relativity to the population. In order to prevent over and under classification, individuals' interpretations should include norm references. These need to be considered in order to avoid a Lake Woebegone bias. All Innermetrix profiles graphically incorporate these important normative

references in the form of "norms and standard deviations" to eliminate this very concern.

At the time of publishing of this study, the Innermetrix profile is the only axiological profile on the market that incorporates such normative data to allow for truly accurate classification of respondent results. It is important to have these norms to provide context as to a person's level of development relative to others, outside of the theoretical norm.

3. The six primary scales (DIM-I.1 *Empathy*, DIM-I.2 *Self-Esteem*, DIM E.1 *Practical Thinking*, DIM-E.2 *Role Awareness*, DIMS. 1 *Systems Judgment*, and DIM-S.2 *Self Direction*) are reasonably independent of each other, and may be interpreted as such. This proves that the core six dimensions measure separate things, and that there are no significant relationships between each of the three pairings or the two sets of scales (external or internal). Independence is important to ensure that each scale measures a different aspect of the respondent.

This study provides statistical evidence that the Innermetrix Parallel instrument is valid, reliable and provides you with the best information for your clients available from an axiological profile.

1e. Attribute Index instrument protocols and utilization

Training and interpretation

Innermetrix requires training for the administration and interpretation of the Attribute Index to all consultant distributors. This mandatory certification process involves educating the distributing consultant or interpreting individual (typically from a corporate client) on the history of axiological theory, it's applications, uses and limitations, as well as the ethical considerations of using such tools, and the fiduciary responsibility to be a good steward of the data and its ramifications in real individual's lives.

This involves didactic training in a live residency program, followed up by field practice that involves the interpretation of a minimum number of profiles under the supervision of a master-certified trainer.

Each certified distributing consultant receives a training manual that covers the fundamental information necessary to effectively utilize the instrument in a corporate setting.

Section 2 – The Values Index (the why of human performance)

2a. The background and history of the Values Index

WHAT IS THE VALUES INDEX

The Values Index™ (VI) is the latest interpretation of the work of Drs. Eduard Spranger and Gordon Allport and their study of human value, motivation and drive. The VI is the most contemporary interpretation of these theories available on the market today. It brings with it many new and powerful features that differentiate it from other values-based instruments. Some of these refinements include: increased reliability and validity, an easier-to-use testing interface and expanded dimensions to separate two historically merged factors into unique pieces.

The VI helps people to better understand their unique value hierarchy or belief system pertaining to what motivates them, what they are most drawn to and where their passions lie. Such knowledge helps an individual become more effective in several key areas of their life, including but not limited to:
- Setting and achieving goals that are inspirational
- Creating roles that align well with motivations
- Job selection
- Performance management

Some of the most significant differentiators and improvements made to the VI tool include:
- **The Instrument Interface** – Most other values instruments require you to select a number from a drop down box to the right of each statement on the instrument (to create the order). The new click & drag instrument from IMX allows end users to actually create the list they see in their head on the screen. This creates a more intuitive and user-friendly experience that is faster and easier to use, and more accurate.
- **Return to the True Aesthetic** – Most other values instruments in the market treat Spranger's Aesthetic dimension of value as only being motivated by beauty, pretty, and/or artistic things. The VI returns this dimension to Spranger's original description of seeking form, harmony, and/or balance as well as beauty.
- **Return to the True Political & Individualistic** – Most values instruments either present Spranger's original Political, or Allport's substituted Individualistic, or worse yet actually merge the two into one dimension (combing scores). The VI remains true to original theories and presents both dimensions as stand alone providing you with a more sensitive insight into an individual's motivations.
- **Religious versus Regulatory** – Many have changed Spranger's original *Religious* dimension to the *Regulatory*, but they've kept the instrument items which ask questions about motivation through religion. Aside from the EEOC issues

associated with asking people questions about their religious preferences in a business assessment, it skews the results. The VI has removed the religious references.

HISTORY OF VALUES

In 1914 German philosopher and psychologist Eduard Spranger published a book in German titled, *Lebensformen* (later translated into English in 1928 as *, Types of Men: the Psychology and Ethics of Personality)*. In it, he described his research and observations that lead to his identifying six core attitudes or values he found present in every person. These six values were what he believed created motivation and drive in an individual, and he defined them as, "world views or filters that shape and define that which a person finds valuable, important, good or desirous."

Values are formed through repeated experiences and multiple exposures to your world. Your experiences help determine your attitude or beliefs about what is valuable or good and what is not. The more positive the encounters associated with any dimension, the more reinforced that dimension comes as being valuable and good. Conversely, the more negative the encounters the less reinforced the dimension becomes.

Due to their connection with experiences and environment, our Values are dynamic. With enough time or experience an individual's value hierarchy can change. It is, however, very slow to change outside of a significant emotional event or crisis. This is why it is so important that people understand their motivators and drivers since they are primarily static.

The six dimensions were:
- Aesthetic – The aesthetic person sees highest value in **form** and **harmony**.
- Economic – The economic person is characteristically interested in **what is useful**.
- Political – The political person is interested primarily in **power** and **control**.
- Social – The highest value for this type is **love of people**.
- Religious – The highest value of the religious may be called **unity**.
- Theoretical – The dominant interest of the theoretical person is the **discovery of truth**.

In the 1950's American psychologist Gordon Allport picked up the mantle left by Spranger and became one of the first psychologists to really focus on personality in the United States. He rejected both Freud's psychoanalytic approach to personality, which he thought went too deep, and Marston's behavioral approach, which he thought often did not go deep enough. He placed the most importance on the uniqueness of each individual, and the importance of the present context, as opposed to past history, for understanding the personality.

Allport believed that an individual's personality is largely founded upon people's values, or basic convictions that they hold about what is and is not of real importance in life. From this assumption, he began to work off of Spranger's findings outlining six major value types.

Working from Spranger's model, Allport and his two partners created the first values instrument to allow for measuring a person's value hierarchy (the Allport Vernon Lindzey Study of Values 1956). In so doing, Allport replaced Spranger's original Political dimension with the Individualistic dimension, which he felt was more accurate. It is important to note that this was more than simply a name change. The Individualistic dimension is its own dimension, separate and discrete, from the Political dimension hypothesized by Spranger. Allport took the original Political dimension out and inserted the Individualistic dimension in its place.

In creating the IMX Values Index, we decided that both Spranger's and Allport's work - each having merit – needn't be mutually exclusive, so the decision was made to have a profile that measured both dimensions independently. As a result, the new VI profile has seven dimensions instead of six.

Along with retaining both dimensions, the new VI also replaces Spranger's original Religious with the Regulatory dimension. Unlike the substitution of Individualistic for Political, this is not a replacement, rather a name and instrument change. To comply with contemporary EEOC demands, it is not favorable to have a profile that asks specific questions about one's religious preferences, nor is it really an accurate representation of what the dimension can be about anyway.

The new VI profile uses *Regulatory* in place of the older *Religious* title and removes any mention of religious preference in the instrument itself.

With these changes, the seven dimensions of values in the IMX Values Index profile include:
- Aesthetic (Original) – A drive for balance, harmony and form.
- Altruistic (Spranger's Social) – A drive for humanitarian efforts or to help others altruistically.
- Economic (Original) – A drive for economic or practical returns.
- Individualistic (Allport's) – A drive to stand out as independent and unique.
- Political (Spranger's) – A drive to be in control or have influence.
- Regulatory (Spranger's Religious) – A drive to establish order, routine and structure.
- Theoretical (original) - A drive for knowledge, learning and understanding.

From Drs. Spranger and Allport, here are expanded definitions for each dimension:

Aesthetic: The aesthetic person sees the highest value in form and harmony. Each experience is judged from the standpoint of grace, symmetry, or fit. He regards life as a procession of events; each event enjoyed for its own sake. He need not be a creative

artist, nor need he be decadent; he is aesthetic if he but finds his chief interest in the beauty of life. The aesthetic attitude is, in a sense, diametrically opposed to the theoretical; the former is concerned with the diversity, and the latter with the understanding of experience. The aesthetic person either chooses, with Keats, to consider truth as equivalent to beauty, or agrees with Mencken, that, 'to make a thing charming is a million times more important than to make it true'. In the economic sphere the aesthetic person sees the process of manufacturing, advertising, and trade as a wholesale destruction of the values most important to him.

Altruistic: The highest value for the altruistic person is love of people. In this dimension it is the altruistic or philanthropic aspect of love that is measured. The altruistic person prizes other persons as ends, and is therefore herself kind, sympathetic, and unselfish. She is likely to find the theoretical or economic attitudes cold and inhuman. In contrast to the political type, the altruistic person regards love as itself the only suitable form of human relationship.

Economic: The economic person is characteristically interested in what is useful. Based originally upon the satisfaction of bodily needs (self-preservation), the interest in utilities develops to embrace the practical affairs of the business world—the production, marketing, and consumption of goods, the elaboration of credit, and the accumulation of tangible wealth. This type is thoroughly *practical* and conforms well to the prevailing stereotype of the businessperson.

More than perhaps any other, the economic attitude frequently comes into conflict with other values. The economic person wants education to be practical, and regards unapplied knowledge [often sought by the theoretical person] as waste. Great feats of engineering and application result from the practical demands economic people make upon science and theory. The value of utility likewise conflicts with the aesthetic value except when art serves commercial ends. In his personal life the economic person is likely to confuse luxury with beauty. In his relations with people he is more likely to be interested in surpassing them in wealth than in dominating them (political attitude) or in serving them (altruistic attitude). In some instances he may have regard for the regulatory attitudes, but inclines to consider it as a means to rewards of wealth, prosperity, and other tangible blessings.

Individualistic: The individualistic person seeks to be separate and independent. Her desire is to stand out, to express her uniqueness and be granted freedom over her actions to champion her own bearing. Unlike the political attitude, the individualistic person seeks neither power nor control of others or the environment in general. She is only concerned with controlling her own fate and protecting her own sovereignty. The individual person rails against his subjugation by any external force and when she feels so her only focus becomes her own emancipation.

Political: The political person is interested primarily in power and control. His activities are not necessarily within the narrow field of politics, but whatever his vocation, he

betrays himself as a *Machtmensch* (i.e., control freak.) Leaders in any field generally have high power and control values. Since competition and struggle play a large part in all life, many philosophers have seen power as the most universal and most fundamental of motives. There are, however, certain personalities in whom the desire for a direct expression of this motive is uppermost, who wish above all else for personal power, influence, and renown.

Regulatory: The highest value of the regulatory person may be called unity. She is mystical and seeks to comprehend the cosmos as a whole and to relate herself to its embracing totality. The regulatory person is one whose mental attitude is directed towards achieving structure and is permanently directed to the creation of the highest and absolutely satisfying value of order and constitution. Some of this type finds their life's value in the affirmation of life's systems or processes and in active participation therein. The 'traditionalist' seeks to unite herself with a higher order – to be one with the system.

Theoretical: The dominant interest of the theoretical person is the discovery of truth. In the pursuit of this goal he characteristically takes a 'cognitive' attitude, one that looks for identities and differences; one that divests itself of judgments regarding the beauty or utility of objects, and seeks only to observe, reason and understand. Since the interests of the theoretical are empirical, critical, and rational, he is necessarily an intellectualist, frequently a scientist or philosopher. His chief aim in life is to gain, order and systematize his knowledge.

Now for a more practical set of definitions for each dimension:

Aesthetic

The main motivation in this value is the drive to achieve balance, harmony and find form or beauty. Environmental concerns or "green" initiatives are also typically prized by this dimension.

• Artistic expression

• Harmony

• Form over function

• Balance

• Mutual respect

• Creativity

• Self-fulfillment

• Subjectivity

• Beauty

Altruistic

This drive is an expression of the need or drive to benefit others in a humanitarian sense. There is a genuine sincerity in this dimension to help others, give of one's time, resources and energy, in aid of others.

• Giving of self

• Support of others

• People orientation

• Helping

• Improving society

• Generosity

• Selflessness

• Compassion

• Caring

Political

This drive is to be seen as a leader, and to have influence and control over one's environment or success. Competitiveness is often associated with those scoring high in this motivation.

• Power

• Control

• Influential

• Governing

• Leadership

• Authoritative

• Competitive

• Status and esteem

• Accountable

Regulatory

The Regulatory drive indicates one's drive to establish order, routine and structure. This motivation is to promote rules and policies, a traditional approach and security through standards and protocols.

• Systemic

• Governed

• Orderly

• Traditional

• Regulated

• Principled

• Structured

• Focused

Economic

This dimension examines the motivation for security from economic gain, and to achieve practical returns. The preferred approach of this dimension is a professional one with a focus on bottom-line results.

• Practical returns

• Monetary interests

• Efficiency

• Utility

• Production

• Capitalism

• Maximizing gains

•Results

Individualistic

The Individualistic dimensions deals with one's need to be seen as unique, independent, and to stand apart form the crowd. This is the drive to be socially independent and have opportunity for freedom of personal expression.

• Unique

• Independent

• Special

• Autonomous

• Free

• Relevant

• Sovereign

• Self-governed

Theoretical

The drive to understand, gain knowledge, or discover the "truth". This motivation can often be to gain knowledge for knowledge sake. Rational thinking, reasoning and problem solving are important to this dimension.

• Rational

• Objective

• Fact-based

• Discovering the truth

• Learning

• Solving problems

• Intellectual power

• Analyzing

• Clarifying

Nature Versus Nurture

Spranger championed Nature (genetics) as having the greatest influence on our value hierarchy. He wrote, "Become what you are", which could be interpreted to mean, "Become aware of what motivates you, what you value, what inspires you – and be true to it." Allport, on the other hand, championed Nurture (Socioeconomic influences of childhood) as being of greater influence on our value system.

Most modern researchers today favor something in the middle – a mix of nature and nurture that finds a genetic predisposition to certain traits, tendencies, talents, and abilities, but these must be activated through exposure to certain environmental conditions. It's like having a genetic predisposition to diabetes, but not everyone with those genetic markers contracts the disease. It takes exposure to certain conditions like poor diet, obesity, or illness to bring the diabetes on.

So, while our values definitely change and grow – they do so over the course of our lives, not rapidly over a weekend. In other words, they are pretty much *fixed* for longer periods of time. This means it's important to understand them, so they can be optimally aligned with what, or more accurately, *why* we do the things we do.

If I'm predominantly motivated by altruism, yet my job motivates me most significantly by economic means, I won't find nearly as much passion and reward in what I do. Understanding what drives you, what motivates you, what inspires and is deemed important by you is a vital first step in improving performance, satisfaction, and happiness in any person's life.

2b. The applications for a Vale Science and profile

USES FOR THE VALUES INDEX PROFILE

Interpersonal & Intrapersonal Communication: The VI profile provides a helpful tool that can allow two people to understand what aspects of a situation or environment they both appreciate similarly. Understanding what draws two or more people to a thing can help identify more people who would be likewise inspired, and it helps create synergy and camaraderie. Understanding your own attraction to certain activities or causes can be equally as important when it comes to divining the important in what you do and why you do it. In other words, knowing why you will get out of bed tomorrow morning is not a minor thing.

Role Building and Goal Setting and Achievement: When setting goals for yourself, or others, it helps to know why they would want to achieve the goal in the first place. What is it that the goal addresses that is important to them, or you? Setting a goal that provides monetary rewards to someone with the altruistic dimension as his highest will not likely deliver the anticipated motivation or inspire superior performance. Similarly,

incentivizing a high economic with promises of new relationships and improving society (assuming there is no obvious economic return) will not be a good way to motivate the person. Being aware of and understanding a person's natural motivation style helps ensure that goals are resonating with them maximally.

Job Selection: Much like creating an ideal role, placing a person in an ideal existing role requires the same level of awareness for four aspects of the role:
- What the job requires
- What the job provides
- What the person requires
- What the person provides

When you understand all four sides of this equation, you can make more informed decisions about who would be the best fit in which role. Understanding a person's motivations and drivers is one significant component in filling this need.

2c. The statistical and validity evidence supporting psychometric quality of the Values Index

The reliability study of the Innermetrix Values Index utilized a sample of 1983 individual profiles. These data were made up from 58% males and 42% females and accurately represent the diverse range of those who utilize this instrument. Respondents' age ranged from 20s through over 55 years of age. Occupations include leadership, management, customer service, manufacturing, banking clerk, accounting, attorney, education, entrepreneurs and postal workers. Thus, the sample represents a full range of individuals making use of the instrument in a variety of settings.

The Innermetrix Values Index contains ten sets of seven phrases each. Each phrase is a proxy statement representing one of the seven dimensions of value as defined by Dr's Spranger or Allport. Respondents rank order the seven items from 1=Most like me, to 7=Least like me.

Scales are constructed by first reversing the values, then summing up all related item ranks, and finally adjusting the score upward to avoid zeros.

The scales are Aesthetic, Economic, Individualistic, Political, Altruistic, Regulatory and Theoretical.

Scale reliabilities were calculated using Cronbach's Alpha (α), which is considered to be the most appropriate statistical test for reliability given the ranking of responses used to construct the scales. This statistic models internal consistency, based on the average inter-item correlation, is a more rigorous test than a traditional split-half statistic. Cronbach's α is bounded from 0 to 1. In general an α equal to or greater than .6 is considered a minimum acceptable level, although some authorities argue for a stronger standard of at least .7.

Values Index

Aesthetic	0.84
Economic	0.81
Individualistic	0.83
Political	0.79
Altruistic	0.81
Regulatory	0.79
Theoretical	0.83

Scale Correlations

Ideally, instrument scales should measure independent characteristics, which are indicated by non-significant and minimal positive correlations. Examinations of the relationship among the Innermetrix Values Index scales show only non-significant positive correlations and weak to moderate negative correlations, indicating an acceptable level of independence among the scales.

Spearman Rank Order Correlations Among Scales

		AES	ECO	IND	POL	ALT	REG	THE
AES	Correlation Coefficient	1.000						
	Significance (2-tailed)	0.000						
ECO	Correlation Coefficient	-0.468	1.000					
	Significance (2-tailed)	0.001	0.000					
IND	Correlation Coefficient	-0.032	-0.282	1.000				
	Significance (2-tailed)	0.002	0.000	0.000				
POL	Correlation Coefficient	-0.218	-0.348	0.368	1.000			
	Significance (2-tailed)	0.000	0.000	0.000	0.000			
ALT	Correlation Coefficient	0.469	0.082	-0.164	-0.279	1.000		
	Significance (2-tailed)	0.000	0.002	0.001	0.000	0.000		
REG	Correlation Coefficient	0.248	0.363	-0.368	-0.256	0.082	1.000	
	Significance (2-tailed)	0.276	0.000	0.000	0.000	0.004	0.000	
THE	Correlation Coefficient	-0.098	-0.257	0.367	-0.409	-0.379	-0.323	1.000
	Significance (2-tailed)	0.193	0.000	0.000	0.000	0.004	0.000	

2d. Values Index instrument protocols and utilization

STEPS OF VALUES INDEX INTERPRETATION

Unlike the behavioral dimension in the DI profile, the dimensions of Value in the VI do not mix or create patterns. Each is treated as a stand lone item. Yes, you do want to look at how they all play together, and which are the most and least motivational, but they do not merge to create a style in the way behaviors do. This makes the VI profile much easier to interpret and use for the end user and yourself.

The easiest way to debrief the report is to simply follow the layout of the report and work through the report from front to back cover. The layout and design of the report have been carefully crafted to support you in providing the best interpretation possible. Each page describes the type of information it contains as well as how it is useful. In doing so, there are a few things you should look for in each section.

- **Pages 1 – 4:** These are static educational pages that don't change from report to report based on the respondent's scores.
    - Key Objectives:
        - Educate them on the background theories of Values and the benefits of the Values Index profile.
        - Introduce them to the seven dimensions of value.

- **Pages 5:** this is a key page as it contains all seven dimensions along with their independent levels in each and comparative levels relative to the norms. The graphs on these pages are unique to the end user and reflect the users scores in each, the norm for each and a word descriptor for each that varies depending on the users level in each value dimension.
    - Key Objectives:
        - Review their levels for each dimension (descriptive words and sentences).
        - Identify their two highest value dimensions and *Merge* them
        - Identify their two lowest value dimensions.
        - Identify the three remaining value dimensions.
        (Use the Merged Statements on page 32 of this manual to illustrate the meaning of their merged dimensions.)

- **Pages 6 – 19:** These pages contain five categories that repeat for each of the seven value dimensions. Review each page, starting with the highest two dimensions and working down. Those five categories are:
    - General Traits – typical characteristics or preferences associated with this dimension.
    - Key Strengths – top strengths associate with this dimension.
    - Motivational Insights – key things to keep in mind to achieve optimal motivation and drive.
    - Training/Learning insights – specific characteristics that affect gathering and sharing of knowledge or information.
    - Continual Improvements – ideas where the individual might benefit through self-awareness and authenticity.
    - Key Objectives:
        - Explore each bullet.
        - Qualify as pertaining to them or not.
        - Quantify how well that item is being satisfied or leveraged.

- **Relevance Pages:** The relevance pages are designed to help you connect the information in the report to the end users specific life. By asking targeted questions about each dimension, it provides you with a simple-to-follow list of questions you can use to spark healthy discussions about what behavior means to the respondent.

- **Success Connection Page:** These pages are designed to help you have discussions around how the overall combination of their value dimensions either supports or limits personal success.

Merging the top two values: One way to help the participant's better understand their top two values is to help them merge the two into a single, cohesive message. This starts by making sure they fully understand those two dimensions, and using the expanded definitions from the previous section (pages 25 – 29) will help them do that.

To take it one step further, use the combination statements below to help them create an image in their head of how the two merge. Below you will find the twenty-one merged statements that result from combining all seven dimensions. Once you have identified the participant's top two, select that combination from the list below and add its information to your interpretation.

1. **Aesthetic - Altruistic:** A person who believes in eliminating social ill in order to achieve greater social health and harmony. Helping others find beauty, harmony, and balance in their life. Peace and harmony for all. (The Peace Giver)

2. **Aesthetic – Economical:** Someone who believes that achieving harmony, form, and balance delivers the highest returns. The most practical use of resources is one that is sustainable and non-detrimental to the source. (The Practical Conservationist)

3. **Aesthetic – Individualistic:** A person driven to achieve balance and harmony in his/her own unique way. "I create my own definition of beauty." Prefers to be free to do things that bring beauty and balance to his/her life. (The Independent Artist)

4. **Aesthetic – Political:** Someone who likes to lead others in the pursuit of higher forms of beauty and harmony in life, and that the finer things can improve position, status, or influence. (The Aesthetic Leader)

5. **Aesthetic – Regulatory:** Someone who values beauty, form, and function, but feels there are traditional definitions or means that should be respected and followed. There are accepted norms for what is beautiful, "Beauty is in the eye of the populous." (The Traditional Artist)

6. **Aesthetic – Theoretical:** Someone who seeks to more fully understand what is beautiful and good, and to clarify, define, and classify it. (The Art Expert)

7. **Altruistic – Economical:** Believes that well supported people make for the most productive people; you must give in order to receive. There is giving, but with the expectation of some return. (The Social Investor)

8. **Altruistic – Individualistic:** Thinks, "When I give to others, I am benefited; I like to help others in my own unique way." (The Freelance Humanitarian)

9. **Altruistic – Political:** Believes in leading others in a worthy cause or mission; prefer to be in charge of social aid programs or benefit. (The Humanitarian Leader)

10. **Altruistic – Regulatory:** Someone who thinks it important to create policies and regulations that govern social aid; social aid should be orderly and structured. (The Social Worker)

11. **Altruistic – Theoretical:** A person who prefers to use knowledge to help others; teaching others to fish. (The Mentor)

12. **Economic – Individualistic:** Someone who views himself as the commodity or brand; he is his own best investment; celebrity. (The Star)

13. **Economic – Political:** Believes that being in charge ensures the best results; leading the pursuit of profits. (The CEO)

14. **Economic – Regulatory:** A person who feels that the best results come from having a plan and sticking to it; careful planning and structured processes ensure optimal results. (The Manager)

15. **Economic – Theoretical:** Someone who believes that, "Knowledge is valuable in a monetary sense"; learning and understanding are the best investment there is; quoting Ben Franklin, "An investment in knowledge always pays the best interest." (The Consultant)

16. **Individualistic – Political:** Being in charge ensures that I get to do things my way; believes in being his own boss. (The Entrepreneur)

17. **Individualistic – Regulatory:** Believes that there is a *right* way to do everything, and their way is that right way; thinks it important to follow rules and regulations but typically their version. (The Different Drummer)

18. **Individualistic – Theoretical:** "The more I know, the more I stand apart from the rest"; someone who seeks to possess a rare level of expertise or skill. (The Specialist)

19. **Political – Regulatory:** A person who will lead others in advancing a common cause or mission; prefers to be in charge of compliance to keep order and create regulations. (The Judge)

20. **Political – Theoretical:** Believes that knowledge is power; sees the acquisition of knowledge and understanding as the key to control and influence. (The Authority)

21. **Regulatory – Theoretical:** Seeks to identify, understand, and analyze the best way to do things so the right policies and systems can be put into place. (The Quality Assurance Person)

Quantity/Quality of the Scores: There are certain times when you want to know not only which two dimensions are the highest, but how strong they are. To understand the degree of their passion or motivation, it helps to compare their score against the norm for the rest of the population. To do this you use the norms that appear on page 5. Compared to those norms, an individual can be either:

- Negative motivation (to be avoided) = more than one standard deviation below the norm.
- Mainstream motivation = within one standard deviation above or below the norm.
- Passionate motivation = more than one standard deviation above the norm.

Understanding people's specific level of motivation for any given dimension can be crucial to helping them understand what power it has in their life and how that can benefit them or not. For example; knowing that someone has extreme motivation for the altruistic dimension, but only mainstream levels of motivation for the economic – would help explain why they keep giving away their valuable expertise or products.

The highest two dimensions are the most inspirational. These are the ones that should be focused on making a connection to their work and life. The middle three are situational and may become somewhat motivation at certain times, or in certain circumstances, but for the most part they apply the average amount of motivation and passion as would be seen in most people. The lowest two dimensions are actually more important than the middle three because these can become de-motivational (actually eroding passion and drive). It is important to understand these to make very sure that the person is not being motivated by either of these two means. If present in the environment, the bottom two could actually represent something that is de-motivating an individual.

Section 3 – The DISC Index (the how of human performance)

3a. The background and history of the DISC Index

The DISC Index instrument is one of a family of instruments typically referred to or known as "personality tests." This misnomer is rejected by Innermetrix and its principles due to the fact that the term "personality" is a very generalized and global term that refers to the entirety of an individual or a person as an embodiment of a collection of qualities. The term was originally translated from the Latin *persōnālitās* somewhere around 1400 AD, and has come to represent too wide a range of meanings – everything from a wide bandwidth of behavioral preference to psychological implications. Innermetrix chooses to classify the DISC Index as strictly a behavioral profile, as defined by Marston in his original DISC model.

Historically, there have been a wide variety of models intended to measure one's behavioral style. As early as 444BC, when Empedocles first defined the classical roots or elements (i.e., earth, air, fire and water) people have been trying to define or quantify patterns in nature and mankind. Hippocrates (circa 400BC) applied the root elements to the human body when he defined the Four Humors:
- Black Bile
- Yellow Bile
- Phlegm
- Blood

Galen (circa 130BC) built on Hippocrates' work and created one of the first behavioral theories when connected the four humors to a person's temperaments:
- Those with excessive black bile had a melancholic temperament (thoughtful, perfectionistic, deliberate).
- Those with excessive yellow bile had a choleric temperament (passionate, energetic, aggressive).
- Those with excessive phlegm had a phlegmatic temperament (calm, unemotional, steady).
- Those with excessive blood had a sanguine temperament (light-hearted, fun-loving people person).

The free association methodology, first explored by Kraepelin in 1892, involved subjects being given a list of stimulus words. The subjects were then asked to free associate whatever word first came to mind. Critics of this method cite issues of scoring, inter-rater reliability (i.e., reliability across multiple raters or scorers), and indolence or indifference by the subject.

Addressing the critical issues of free-association methods were the self-reporting inventories that came next. One early form of this technique was developed by

Woodworth during World War I (the Woodworth Personal Data Sheet); the purpose of which was to screen out those who might be unfit for military service. While the Great War ended before the inventory was actually deployed, it served as a prototype for the many inventories that followed.

Leaping forward to 1921 Carl Jung, expanding on Freud's work, added the concepts of introversion and extroversion to the theories on human temperaments. Jung's work advanced these theories to the level of psychological types. Two short years later William Martson, in his seminal piece, *Emotions of Normal People*, made a significant contribution when he incorporated what had come before into a single and more cohesive four quadrant behavioral model.

The DISC Index instrument uses the same self-report methodology that eliminates inter-rater reliability issues through the use of an objective scoring method. This methodology has been widely used and adopted in many academic and commercial applications.

3b. The foundations of the sciences behind the DISC Index

The DISC Index model is based on the four-dimensional model created by Marston, which has received broad acceptance by educational institutions and organizations around the world.

Dr. William Moulton Marston (Harvard 1921) was a professor and consulting psychologist as well as a member of the faculty at The American University, Tufts, Columbia, and New York University. In 1928 Marston published his book, *The Emotions of Normal People*, in which he established the DISC theory that is still in use today.

Marston viewed people behaving along two axes, with their action orientation being either **passive** or **active**, depending on the individual's perception of his or her environment as either **favorable** or **unfavorable**. By placing the axes at right angles to each other, four quadrants form with each describing a behavioral pattern. He termed this theory DISC. The four dimensions of behavior in the DISC model are:
- Dominance: **active** positive actions taken in an antagonistic/**unfavorable**
- environment.
- Influencing: **active** positive actions taken a **favorable** environment.
- Submission: **passive** actions taken in a **favorable** environment.
- Compliance: **passive** actions (designed to reduce antagonistic factors) taken in an antagonistic/**unfavorable** environment.

These four dimensions are depicted in the following figure:

Active
Extroverted

Task Orientation
Unfavorable

Social Orientation
Favorable

D

I

Open   Open

Task Focus ← ↗ Social Focus
Task Focus ← ↘ Social Focus

Guarded Guarded

C

S

Introverted
Passive
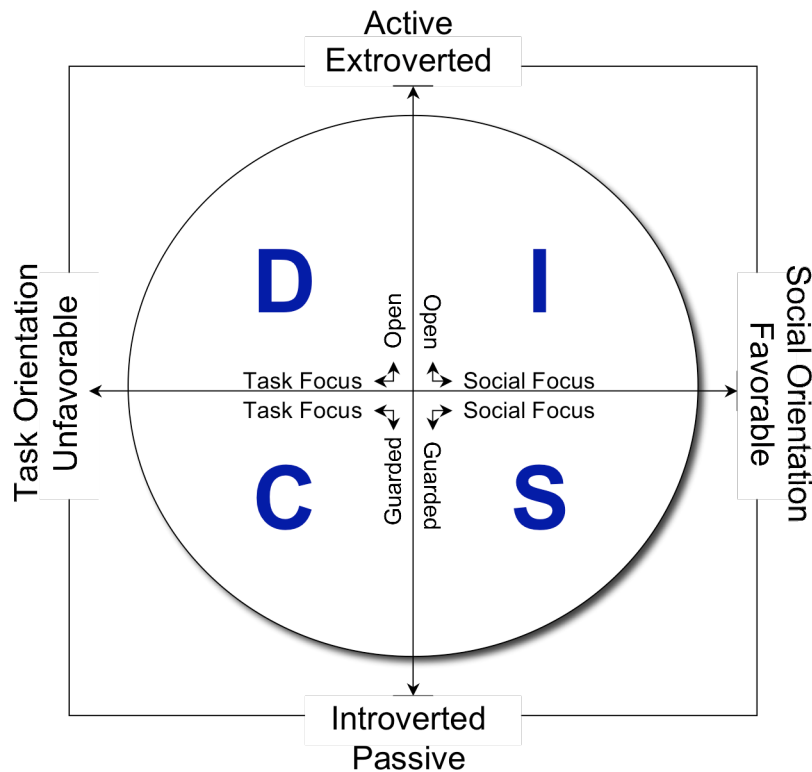
The four quadrants create clusters of behavioral tendencies that result from combining the four dimensions of behavior. Each person will demonstrate some of the behavior for each dimension, but each person will develop their own unique combination of intensity or frequency for each of the four dimensions. In Marston's model:

- The two upper quadrants (D and I) are extroverted and active in nature, seeking to modify, control, influence or shape their environment according to their own particular view. These are individuals who focus on the *what* of a situation more than the how or why and they continually challenge and test the limits of the surroundings and seek new ways.

- The two bottom quadrants (S and C) are passive and introverted in nature, seeking to focus on the *how* and the *why* of a situation and instead of trying to change the existing environment they are more interested in protecting or continuing it.

For example, people with high **Decisiveness** tendencies have a clear picture in their mind of what results they want. Their actions or messages are designed to

promote that idea and get others to capitulate or support those results. They are attentive to actions or communication that will speed up those results. Questions about the *correct* action are not as important as questions about *why* the end result should be. Details of how and why are less important because they already know what they want. These individuals believe in their ability to change the course of actions in their world.

People with high **Influencing** tendencies also want to shape and mold events and have an active voice in that process. Their actions or messages are also designed to promote that idea and get others to support those results, but they tend to do so by working with or through people more. They are interested in people and like to interact with others, understand others and to be understood by others. They are particularly attentive to the personal needs of others and like the Decisives, questions about *how* or details are not as important as the big picture they seek to persuade others to.

Persons with high **Stabilizing** tendencies are more passive and introverted and interested in the *how* and *why*—a product orientation. Their primary interests are in maintaining stability within themselves and the situation. Messages that don't address the specifics, or champion radical change without considered thought are not well received.

Those individuals with high **Cautiousness** tendencies are also more passive and introverted. They take a product orientation, asking for specific reasons behind changes and supporting data to back up the decision to change. *Why* is a favorite question. They are very concerned for doing things *accurately*. They are receptive to messages that reassure them they are doing it correctly.

One part of what makes each person the individual they are is their unique combination of these four dimensions of behavior. Since each of us develops varying levels of preference or tendencies for any of the four dimensions, we are a composite of all these tendencies. The DISC model helps to understand that complicated mix of tendencies and since Marston's original work in the 1920's, support has grown steadily for his model as a means to achieve that understanding. Flanagan (1935), Duffy (1949), Leary (1957), Borgatta, Cottrell and Mann (1958) and Geier (1967) are among those who have contributed to the original research.

Interestingly enough, while he developed the original theoretical framework and the categories of words that describe the four dimensions, Marston himself never actually created an instrument for testing purposes. Walter Clarke was the first to create a true DISC instrument in 1956 that could be used for testing and systematically quantifying a person's behavioral style. John G. Geier, Ph.D. Director and Professor of Behavioral Science and Communication, University of

Minnesota is credited with developing much of the final instrument framework we know of today as DISC.

Behaviors are a unique part of who we are, and they are:
- Observable: Behaviors are something you see or observe on the surface actions of another.
- Silent: Behaviors are not communicated through words directly rather through how we speak, whom we speak to, or what we speak about.
- Universal: Behavioral theory is universal in that it can be applied to all people in all locations

A large body of statistical evidence exists confirming the constructs of Marston's model. A select list of those includes:
- 1967 – Dr. John G. Geier, University of Minnesota. *A Trait Approach to the Study of Leadership in Small Groups.* The Journal of Communication, December, 1967.
- 1977 – Dr. John G. Geier, University of Minnesota. *The Personal Profile System*. Minneapolis, MN: Performax Systems International.
- 1989 – Dr. Russell J. Watson, Wheaton College, *A Statistical Comparison of the TTI Style Analysis and the Performax Personal Profile System.* Wheaton, IL.
- 1983 – Dr. Sylvan J. Kaplan compared the Personal Profile System to the following psychological instruments:
  - Myers-Briggs Type Inventory
  - Cattell 16 Personality Factor Questionnaire
  - Minnesota Multiphasic Personality Inventory
  - Strong Interest Inventory

A selected list of research studies using he DISC model and granted dissertation status includes:
- *A case study which utilizes type indicators to analyze 360-degree performance assessments.* Doctoral dissertation in Educational Psychology by George Landon Anderson, University of Louisville, Louisville, KY, 1995
- *Jury deliberation style and just world beliefs.* Doctoral dissertation by Harry Naifach, Kent State University, 2002.
- *Investigating the effects of behavior constructs on academic persistence in engineering, creativity, and risk-taking.* Doctoral dissertation in Psychology by Viveca K. Deanes, Texas A & M University, 2003
- *Behavioral Style as a predictor of hearing aid return for credit.* Doctoral dissertation in Psychology by Steven A. Huart, Central Michigan Univesity, 2002

- *Market segmentation: Exploring the need for further consumer behavior analysis and behavioral profiling.* Doctoral dissertation in Personality Psychology by James Joseph Kolacek, III, Nova Southeastern University, 1999.

3c. The DISC Index instrument

The DISC Index is based on the same design of prior DISC instruments, but has been updated to more fully utilize the power of the computer. As in traditional DISC instruments, respondents select from four descriptive items; each one representing one of Marston's four dimensions of behavior (DISC). Unlike traditional instruments, however, that limit the respondent to selecting one statement that they feel is "most like me" and one that is "least like me", the DISC Index instrument allows the online respondent to click & drag *all four* statements to create a rank ordering that represents the feeling of "most like me" to "least like me."

The addition of this rank-ordering instrument is a first in the industry as far as the publisher is aware of, and it greatly enhances the instrument design by allowing the respondent to create an actual hierarchy that represents their true feelings, and more importantly it allows for 100% more input from the respondent. By assigning a value to all four items instead of only half of them, the respondent is afforded greater granularity in their ability to represent their true image of their behavioral preferences. Each respondent is presented with fourteen sets of four-item selections or rankings.

The respondent's rank orderings of all fifty-six (56) items are used to build the four DISC scales: Decisiveness, Interactive, Stability and Cautiousness.

The relative value of each dimension is then plotted in two separate graphs, one representing the respondent's natural style, the other their adaptive style. Each graph is accompanied by individualized descriptive text describing certain aspects of the respondent including:
- General characteristics
- Strengths
- Weaknesses
- Motivations
- Preferred culture/climate
- Communication insights
- Training and learning insights

Graphing is based on equating respondent's frequencies of dimensional values relative to similar values in a norm-population.

Scale structure

DISC Index instrument contains fifty-six (56) proxy statements grouped in fourteen (14) sets, each set containing four items each. Each proxy statement represents one of the four scale constructs. Respondents created a rank ordering of each set of proxy statements that is guided by "most like me" on the top and "least like me" on the bottom. Two dimensions of four scales are constructed based on these rank ordering. Those two dimensions are natural and adaptive styles, each of which has the four scales of D, I, S, and C.

Items selected as first or second place represent "most-like-me" and "next most like me" respectively and are used to create the adaptive scales. Items selected as third and fourth place represent "next least like me" and "least like me" respectively and are used to create the natural scales.

For ease of understanding each of the four dimensions of behavior is represented by a constellation of behavioral traits associated with that dimension. Each individual's behavior will demonstrate higher or lower levels of each of the descriptive statements listed below based on the dominance or recessiveness of said dimension.

Decisive	Interactive	Stabilizing	Cautious
Problems: How you tend to approach problems and make decisions	People: How you tend to interact with others and share opinions	Pace: How you prefer to pace things in your environment	Procedures: Your preference for established protocol/standards
High D	**High I**	**High S**	**High C**
Demanding	**Gregarious**	**Patient**	**Cautious**
Driving	Persuasive	Predictable	Perfectionist
Forceful	Inspiring	Passive	Systemic
Daring	Enthusiastic	Complacent	Careful
Determined	Sociable	Stable	Analytical
Competitive	Poised	Consistent	Orderly
Responsible	Charming	Steady	Neat
Inquisitive	Convincing	Outgoing	Balanced
Conservative	Reflective	Restless	Independent
Mild	Matter-of-fact	Active	Rebellious
Agreeable	Withdrawn	Spontaneous	Careless
Unobtrusive	**Aloof**	**Impetuous**	**Defiant**
Low D	**Low I**	**Low S**	**Low C**

Natural versus adaptive graphs

According to Marston's model, each person has two behavioral styles: how they naturally tend to behave (natural style) and how they perceive they should modify their natural tendencies (adaptive style).

The natural graph scales are constructed from the respondent's selection of "least like me" and "next least like me" and these scales are then reversed in valiance (i.e., the more items ranked in this way, the lower the score in a given dimension). In other words, higher scores are the result of *not* selecting a proxy statement associated with a specific dimension.

This is due to the principle of reciprocal evaluative action, which states, "positively and negatively valiant activation functions are reciprocally determined. In other words, on a bipolar scale of agreement, maximum agreement is the reciprocal of minimum disagreement, and vice versa".

The natural graph, therefore, depicts the natural self or how people cope with the environment under stress or pressure. It is how they would prefer to behave if they were allowed to be themselves. Ideally, the dimensional levels represented by the natural graph would be well aligned with the person's environment – allowing that person to be as authentic as possible.

The adaptive graph scales are constructed from the respondent's selection of "most like me" and "next most like me" and these scales are a representation of the respondent's audience or public self (i.e., modified behavior as perceived desirable by the respondent.)

In other words, the adaptive graph reflects how people act in order to meet the expectations of others in their present environment. More correctly, this is how they perceive they must change to better fit their environment. One way to look at the Adaptive graph is as the *role* that people behaviorally assume when attempting to meet what they feel are the expectations of others or their surroundings.

If the natural and adaptive graphs are nearly the same the person is not assuming any *role* or feeling as if they need to change who they are. They are basically saying, "This is who I am and that's just fine." If the two graphs differ significantly, the person feels considerable need or pressure to change their behavior. The impetus for change can come from either internal or external sources (e.g., what others have told you or your own internal desire to be something else).

Validity and reliability

As defined by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education, in *Standards for educational and psychological testing*, validity refers to the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests, whereas reliability is the consistency of a set of measurements or measuring instrument, often used to describe a test.

Reliability does not imply validity and validity does not always imply reliability. That is, a reliable measure is measuring something consistently, but not necessarily what it is supposed to be measuring. For example, while there are many reliable tests of specific abilities, not all of them would be valid for predicting, say, job performance. In terms of accuracy and precision, reliability is precision, while validity is accuracy.

An often-used example that illustrates the difference between reliability and validity in the experimental sciences involves a common bathroom scale. If someone that weighs 200 lbs. steps on the scale 10 times, and it reads "200" each time, then the measurement is reliable and valid. If the scale consistently reads "150", then it is not valid, but it is still reliable because the measurement is very consistent. If the scale varied a lot around 200 (198, 205, 196, 203, etc.), then the scale could be considered valid but not reliable.

Validity

In psychology, validity has two distinct fields of application. The first, and the one we're concerned with here, involves test validity, a concept that has evolved with the field of psychometrics. Test validity refers to the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests. One early definition of test validity identified it with the degree of correlation between the test and a criterion. Under this definition, one can show that reliability of the test and the criterion places an upper limit on the possible correlation between them (the so-called validity coefficient). Intuitively, this reflects the fact that reliability involves freedom from random error and random errors do not correlate with one another. Thus, the less random error in the variables, the higher the possible correlation between them. Under these definitions, a test cannot have high validity unless it also has high reliability. However, the concept of validity has expanded substantially beyond this early definition and the classical relationship between reliability and validity need not hold for alternative conceptions of reliability and validity.

Therefore, an argument is valid if and only if the truth of its premises entails the truth of its conclusion, it would be self-contradictory to affirm the premises and deny the conclusion. There are three primary forms of validity: construct, criterion and content validity.

Construct validity: This form of validity involves the empirical and theoretical support for the interpretation of the construct. Such lines of evidence include statistical analyses of the internal structure of the test including the relationships between responses to different test items. They also include relationships between the test and measures of other constructs.

As currently understood, construct validity is not distinct from the support for the substantive theory of the construct that the test is designed to measure. As such, experiments designed to reveal aspects of the causal role of the construct also contribute to construct validity evidence. Construct validity refers to the totality of evidence about whether a particular operationalization of a construct adequately represents what is intended by theoretical account of the construct being measured (i.e., demonstrate an element is valid by relating it to another element that is supposedly valid.)

Correlation with other instruments is one form of establishing construct validity. There have been a variety of comparisons of the DISC model with other behavioral instruments such as MMPI (Minnesota Multiphase Personality Inventory), MBTI (Myers Briggs Type Indicator), Catell 16-PF (16 Personality Factor), and other instruments. All of these studies assist in establishing the overall constructs of this behavioral model.

One important technique in construct validity is known as factor analysis. Factor analysis is a statistical method used to describe variability among observed variables in terms of fewer unobserved variables called factors. The observed variables are modeled as linear combinations of the factors, plus "error" terms. The information gained about the interdependencies can be used later to reduce the set of variables in a dataset.

Charles Spearman spearheaded the use of factor analysis in the field of psychology and is sometimes credited with the invention of factor analysis. He discovered that school children's scores on a wide variety of seemingly unrelated subjects were positively correlated, which led him to postulate that a general mental ability, or g, underlies and shapes human cognitive performance. His postulate now enjoys broad support in the field of intelligence research, where it is known as the g theory.

Raymond Cattell expanded on Spearman's idea of a two-factor theory of intelligence after performing his own tests and factor analysis. He used a multi-

factor theory to explain intelligence. Cattell's theory addressed alternate factors in intellectual development, including motivation and psychology. Cattell also developed several mathematical methods for adjusting psychometric graphs, such as his "screen" test and similarity coefficients. His research led to the development of his theory of fluid and crystallized intelligence, as well as his 16 Personality Factors theory of personality. Factor analysis is used to identify "factors" that explain a variety of results on different tests. It is linked to psychometrics, as it can assess the validity of an instrument by finding if the instrument indeed measures the postulated factors.

Through the use of factor analysis, the DISC Index instrument has been refined to increase the overall validity and reliability of the instrument and reports.

Criterion validity: In psychometric, is a measure of how well one variable or set of variables predicts an outcome based on information from other variables, and will be achieved if a set of measures from a personality test relate to a behavioral criterion that psychologists agree on.

A typical way to achieve this is in relation to the extent to which a score on a personality test can predict future performance or behavior. Another way involves correlating test scores with another established test that also measures the same personality characteristic.

Another way to look at criterion validity is as the extent to which the measures are demonstrably related to concrete criteria in the "real" world. This type of validity is often divided into "concurrent" and "predictive" subtypes. The term "concurrent validity" is reserved for demonstrations relating a measure to other concrete criteria assessed simultaneously. "Predictive validity" refers to the degree to which any measure can predict future concrete events. These variables are often represented as "intermediate" and "ultimate" criteria. For example, let us say we are conducting a study on success in college. If we find out there is a high correlation between student grades in high-school math classes and their success in college (which can be measured by many possible variables), we would say there is high criterion-related validity between the intermediate variable (grades in high-school math classes) and the ultimate variable (success in college). Essentially, the grades students received in high-school math can be used to predict their success in college.

Employee selection tests are often validated against measures of job performance. Measures of risk of recidivism among those convicted of a crime can be validated against measures of recidivism. If the test data and criterion data are collected at the same time, this is referred to as concurrent validity evidence. If the test data is collected first in order to predict criterion data

collected at a later point in time, then this is referred to as predictive validity evidence.

In the use of the DISC Index instrument and reports, there are multiple studies available from Innermetrix Incorporated that have clearly linked the specific scores and patterns of scores to job success in specific, well-defined areas.

Content validity: This evidence involves the degree to which the content of the test matches a content domain associated with the construct. For example, a test of the ability to add two-digit numbers should cover the full range of combinations of digits. A test with only one-digit numbers, or only even numbers, would not have good coverage of the content domain.

In psychometrics, content validity (also known as logical validity) refers to the extent to which a measure represents all facets of a given social construct. For example, a depression scale may lack content validity if it only assesses the affective dimension of depression but fails to take into account the behavioral dimension. An element of subjectivity exists in relation to determining content validity, which requires a degree of agreement about what a particular personality trait such as extraversion represents. A disagreement about a personality trait will prevent the gain of a high content validity.

Content validity is related to face validity, though content validity should not be confused with face validity. The latter is not validity in the technical sense; it refers, not to what the test actually measures, but to what it appears superficially to measure. Face validity pertains to whether the test "looks valid" to the examinees who take it, the administrative personnel who decide on its use, and other technically untrained observers. Content validity requires more rigorous statistical tests than face validity, which only requires an intuitive judgment.

Content validity is most often addressed in academic and vocational testing, where test items need to reflect the knowledge actually required for a given topic area (e.g., history) or job skill (e.g., accounting). In clinical settings, content validity refers to the correspondence between test items and the symptom content of a syndrome. One widely used method of measuring content validity was developed by C. H. Lawshe. It is essentially a method for gauging agreement among raters or judges regarding how essential a particular item is. Lawshe (1975) proposed that each of the subject matter expert raters (SMEs) on the judging panel respond to the following question for each item: "Is the skill or knowledge measured by this item 'essential,' 'useful, but not essential,' or 'not necessary' to the performance of the construct?"

According to Lawshe, if more than half the panelists indicate that an item is essential, that item has at least some content validity. Greater levels of content

validity exist as larger numbers of panelists agree that a particular item is essential. It is very important to carefully consider all items in the instrument with regard to their level of "social desirability." If there is an imbalance between words that are socially desirable versus items that are not socially desirable, then content validity is negatively affected.

The DISC Index instrument has been carefully screened for content validity to ensure that all items on the instrument are equal from a social desirability standpoint – which boosts both the content validity and the reliability of the instrument.

Reliability

Reliability may be estimated through a variety of methods that fall into two types: single-administration and multiple-administration. Multiple-administration methods require that two assessments be administered. In the test-retest method, reliability is estimated as the Pearson product-moment correlation coefficient between two administrations of the same measure.

In the alternate forms method, reliability is estimated by the Pearson product-moment correlation coefficient of two different forms of a measure, usually administered together. Single-administration methods include split-half and internal consistency. The split-half method treats the two halves of a measure as alternate forms. This "halves reliability" estimate is then stepped up to the full test length using the Spearman-Brown prediction formula. The most common internal consistency measure is Cronbach's alpha, but more on that in a moment.

These measures of reliability differ in their sensitivity to different sources of error and so need not be equal. Also, reliability is a property of the scores of a measure rather than the measure itself and are thus said to be sample dependent. Reliability estimates from one sample might differ from those of a second sample (beyond what might be expected due to sampling variations) if the second sample is drawn from a different population because the true reliability is different in this second population. (This is true of measures of all types--yardsticks might measure houses well yet have poor reliability when used to measure the lengths of insects.)

Reliability may be improved by clarity of expression (for written assessments), lengthening the measure, and other informal means. However, formal psychometric analysis, called the item analysis, is considered the most effective way to increase reliability. This analysis consists of computation of item difficulties and item discrimination indices, the latter index involving computation of correlations between the items and sum of the item scores of the entire test. If items that are too difficult, too easy, and/or have near-zero or negative

discrimination are replaced with better items, the reliability of the measure will increase.

While there are numerous methods of establishing reliability, one of the most common and accepted methods is the Test-retest method. Test-retest is a statistical method used to examine how reliable a test is: A test is performed twice, e.g., the same test is given to a group of subjects at two different times. Each subject should score different than the other subjects, but if the test is reliable then each subject should score the same in both test.

There are some concerns with "learning the test" through repeated exposure to the same instrument, but the DISC Index is not subject to an advantage from repeated administration because it asks for self-reported responses. The instrument's scales are therefore stable due to the stability of individual respondent's perception of self-concept as a constant.

The output of a test-retest is an alpha coefficient, which is the expression of an instrument's reliability ranging from +1.00 through zero. An instrument with a perfect reliability would have an alpha coefficient of +1.00 (something not yet seen). While there is no agreed-upon standard as to what makes an acceptable alpha coefficient score (i.e., what makes a good or bad correlation), it is generally agreed that a minimum standard for alpha equal to 0.60 or greater is acceptable. That said, most experts advocate the use of a 0.70 or higher as a standard level of acceptability. Obviously the higher the alpha coefficient the stronger the coherence of items.

Cronbach's α (alpha) is considered by many to be the most robust reliability alpha to date. Cronbach's α (alpha) is a commonly used measure of the internal consistency reliability of a psychometric instrument. It was first named as alpha by Cronbach (1951), as he had intended to continue with further instruments. It can be viewed as an extension of the Kuder-Richardson Formula 20, which is the equivalent for dichotomous items. Cronbach's α measures how well a set of variables or items measures a single, unidimensional latent construct.

Cronbach's alpha was used to determine all of the reliability coefficients for the DISC Index instruments.

Limitations

The process of self-reporting is referred to as ipsative measurement. Ipsative literally means "of the self", and is used in psychology as in the phrase "ipsative measure" to indicate a specific type of measure in which respondents compare two or more desirable options and pick the one which is most preferred (sometimes called a "forced choice" scale). This is contrasted with measures that

use Likert-type scales, in which respondents choose the score (e.g. 1 to 5) which best represents the degree to which they agree with a given statement (see also Norm-referenced test). "Ipsative Comparisons" are also sometimes used in standardized testing to compare significant differences in subtest scores. All efforts at this type of measurement are somewhat limited by a potential bias of self-reporting that could be either conscious or subconscious in nature. The process of ipsative instruments as a means for gathering behavioral measurements has a long tradition in psychometrics. Such measurement is well accepted as a way to gain insight based on self-perception.

That said, ipsative instruments have limitations, mainly deriving from the honesty of the respondent. Again, this honesty can be either conscious or subconscious. An example of a sub-conscious bias would be the difference between our perception of ourselves and reality or those around us (e.g., when I have a false perception that I am outgoing when most who know me would disagree). In such case my self-perception may be incongruent with the way others view me. An example of conscious bias would be where an individual – believing that certain traits or characteristics would be considered desirable by the company he is completing the instrument for – intentionally falsifies his input in order to attempt to affect the output.

3d. The statistical and validity evidence supporting psychometric quality of the DISC Index

Based on examinations of scale and item reliabilities the DISC Index achieves reliability in the two dimensions (natural and adaptive respectively) ranging from .81 to .90 depending on which of the four scales was examined. All of the 46 items used to construct the scales were found to contribute significantly to both scale dimensions. Furthermore the correlations found between the natural and adaptive dimensions were significantly related but not to the degree that they did not remain independent enough to justify individual interpretation and treatment. Scores on all scales were found to distribute across all scale
points, further supporting the comparison of individuals and a population.

Scale Reliability

Due to the dichotomous nature of the data, Cronbach's Alpha was considered to be the most appropriate statistical test for reliability. The range for Cronbach's Alpha is from +1.0 to 0 Historically an Alpha equal to or greater than +0.60 has been considered acceptable. Innermetrix, along with many others, feels that this minimum level of acceptance must be increased and made stronger. As a result we have set minimum acceptable Alpha levels for our products at 0.75 with the

ideal target range exceeding 0.80 wherever possible.

The statistical findings demonstrate that the Innermetrix DISC Index has a solid construction and reliability.

DISC Index Alphas

Cronbach's Alpha (α) reliabilities

Scale	Natural	Adaptive
Decisive	0.88	0.86
Interactive	0.90	0.81
Stability	0.86	0.79
Cautious	0.83	0.80

Norms and population parameters

The results detailed herein, with regard to the DISC Index specifically, are based on a single study of 749 individuals comprised of 48.5% Female and 51.5% Male respondents. All samples came from the target audience for this instrument (i.e., working adults) and were comprised of approximately 70% North American participants and 30% United Kingdom participants. These users represent a complete range of individuals likely to utilize this instrument.

Language Versions

While work is underway to create multiple translations of the DISC Index, currently it is only available in an English language version. All studies were conducted using this English language version.

3e. DISC Index instrument protocols and utilization

Training and interpretation

Innermetrix requires training for the administration and interpretation of the DISC Index to all consultant distributors. This mandatory certification process involves educating the distributing consultant or interpreting individual (typically from a corporate client) on the history of DISC theory, it's applications, uses and limitations, as well as the ethical considerations of using such tools, and the fiduciary responsibility to be a good steward of the data and its ramifications in real individual's lives.

This involves didactic training in a live residency program, followed up by field practice that involves the interpretation of a minimum number of profiles under the supervision of a master-certified trainer.

Each certified distributing consultant receives a training manual that covers the fundamental information necessary to effectively utilize the instrument in a corporate setting.

Supporting Statistics

	Natural				**Adaptive**			
	D	I	S	C	D	I	S	C
Responses	749	749	749	749	749	749	749	749
Mean	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Std. Dev.	3.89	4.10	3.93	3.91	3.92	4.12	4.20	3.82
Min	0	0	0	0	0	0	0	0
Max	14	13	12	14	14	13	12	13

Percentiles

	D	I	S	C	D	I	S	C
10	1	1	1	1	2	1	2	1
20	2	2	2	3	2	2	1	4
30	3	3	4	3	3	4	4	2
40	5	4	4	5	4	7	6	4
50	6	6	5	5	6	7	4	5
60	7	7	6	7	7	8	7	6
70	9	8	9	8	8	7	8	6
80	11	10	10	9	11	10	8	9
90	12	10	11	9	13	12	14	10
100	14	12	10	11	13	14	12	13

Cronbach's Alpha (α) reliabilities

Scale	Natural	Adaptive
Decisive	0.88	0.86
Interactive	0.90	0.81
Stability	0.86	0.79
Cautious	0.83	0.80

Spearman Rank Order Correlations Among Scales

		AD	AI	AS	AC	ND	NI	NS	NC
AD	Correlation Coefficient	1.000							
	Significance (2-tailed)	0.000							
AI	Correlation Coefficient	-0.786	1.000						
	Significance (2-tailed)	0.001	0.000						
AS	Correlation Coefficient	-0.689	-0.280	1.000					
	Significance (2-tailed)	0.002	0.000	0.000					
AC	Correlation Coefficient	-0.482	-0.832	0.468	1.000				
	Significance (2-tailed)	0.000	0.000	0.000	0.000				
ND	Correlation Coefficient	0.698	0.082	-0.876	-0.279	1.000			
	Significance (2-tailed)	0.000	0.002	0.001	0.000	0.000			
NI	Correlation Coefficient	0.234	0.768	-0.368	-0.625	0.082	1.000		
	Significance (2-tailed)	0.387	0.000	0.000	0.000	0.004	0.000		
NS	Correlation Coefficient	-0.673	-0.257	0.698	-0.409	-0.679	-0.323	1.000	
	Significance (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
NC	Correlation Coefficient	-0.642	-0.478	0.518	0.681	-0.583	-0.692	0.500	1.000
	Significance (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix A – Data