



*Cultivating the Systems Engineers
of tomorrow . . . today!*

Applied Human Systems Leadership Program

SYSTEMS ENGINEERING EDUCATION AND DEVELOPMENT PROGRAM

NASA / Goddard Space Flight Center

The SEED program (Systems Engineering Education and Development) is about developing superior Systems Engineers who are outstanding Leaders; people who have integrated the technical and human skills necessary for working at the human-system and human-human interfaces.

The AHS Program was designed by Dr. Stuart Heller, Ph.D., 6th Dan

*“I view Stuart Heller as a scholar and teacher
of the most complex systems-of-systems that exists: the human.
In that sense, he is truly a systems engineer. “*

Jim Andary, Senior Systems Engineer,
NASA Goddard Space Flight Center

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PREFACE

It is well known *but not yet fully appreciated* that there is no single, universally accepted definition of Systems Engineering or Leadership. In fact, there are a plethora of definitions that differ according to the company, project, or temperament of the people involved.

It seems as though every attempt to create the definitive definition of Systems Engineering or Leadership runs into the same difficulty. Systems Engineering is about **Systems**, Leadership is about **Human Systems**, and systems, by their very nature, cannot be reduced to singular, simplistic definitions.

The Applied Human Systems Leadership Program has been rigorously designed to fulfill the promise of systems thinking. A key building block of the program is the realization that very few technically trained systems thinkers take what they know professionally into their everyday lives.

This has shaped our strategy of continually pressing the participants to recognize the unnecessary partitions and limits they place on their versatility and creativity. As Michael Griffin, the current NASA administrator has said, “*(Systems Engineering is about) dealing with people as much as hardware or software.*”

What makes this program concretely different is the unshakeable belief that there is no inherent conflict between science and people. Instead of asking technical thinkers to change their whole way of being to acquire people skills, we are encouraging them to extend what they know to include people.

A major turning point in the program, one that demonstrated the value of this way of teaching systems thinking, was the following assignment. 1) **Identify** a “difficult” human interaction; 2) **Analyze** the dynamic in the language of engineering/science; 3) **Translate** the human interaction via the scientific model; 4) **Express** the new opportunities for transforming the situation that emerge from the science. Not only did they find this assignment easier than they imagined, the broad and deep implications were astounding.

Without question, there have been many excellent words written and spoken about various leadership qualities and competencies. But the question remains: How can we cultivate them?

Building on over forty years of cross-cultural and multi-disciplinary research into the inherent connections and interfaces between thought, feeling, movement, posture, and attention, we have designed and tested a workable process that delivers rapid and real results at a very reasonable cost.

The purpose of this paper is to introduce you to the philosophy and design of the Applied Human Systems Program as well as offer several of our success stories. If you wish more information, please contact Dr. Stuart Heller at drmove@earthlink.net or Carolyn Casey at Carolyn.A.Casey@nasa.gov

PROGRAM PHILOSOPHY AND DESIGN

When first asked, engineers and other technical thinkers often state that technical competency is, overwhelmingly, the most important factor for professional success. However, in practice and after serious thought, the answer usually expands to include leadership competencies as well.

There is an ongoing project at Goddard Space Flight Center/NASA that demonstrates the inseparable connection between technical and human skills. SEED (Systems Engineering and Education) is the NASA project to rapidly develop the next generation of Systems Engineer-Leaders. Over the course of one to two years, the participants will:

- Gain a grasp of Systems-Thinking that ordinarily takes many years to attain;
- Exponentially enhance their communications and leadership skills;
- Develop a deeper appreciation and skill working with the politics of leadership;
- Develop the technical skills required to be a superior Systems Engineer.

A team of senior Systems Engineers came together to engage in a discovery process that led to a list of ten mission critical leadership skills. As the discussion deepened, it became obvious that the most essential skills that a systems engineer – leader at NASA required were the crucially important people skills that happen to be difficult to quantify. These are often mislabelled as the “soft skills.”

Facilitated by a team from Transition Fitness (www.TransitionFitness.com), they explored a matrix of sixty-seven leadership competencies that were organized around the questions:

- 1) Was this competency easy or difficult to learn?
- 2) Was this competency mission critical?

The competency set chosen for the SEED project includes: functional/technical skills, dealing with ambiguity, decision quality, integrity and trust, interpersonal savvy, priority setting, problem solving, building effective teams, conflict management, and timely decision-making.

Our company, WALKING YOUR TALK, was contracted to develop The Applied Human Systems - Leadership Development component of the SEED program. Our mandate was to develop an integrated set of models and practices to bridge the difficult to navigate gap between leadership goals and their actual attainment.

The AHS Program is a human technology that bypasses the historical and stylistic problems of teaching analytically oriented thinkers to develop the necessary leadership skills and qualities. The method can be used to enhance confidence, team building, emotional intelligence, conflict management, leadership presence, and cross-cultural communication.

The approach we've taken focuses on cultivating the habits of thought, feeling, and muscle that are necessary to transform the leadership goals as words into concrete skills. It is based on multi-disciplinary Human Factors research. Our core premise is that the same principles that we use to study and optimize any system can be applied to the human system.

“Your first and foremost job as a leader is to take charge of your own energy and then help orchestrate the energy of those around you.”

Peter Drucker, *The Effective Executive*

The core strategy is to use oneself as the laboratory for learning. We use analogue simulations of core leadership issues and communication skills as a concrete and testable way to build the habits that naturally support the desired qualities and competencies.

Working in this way maximizes the objective component of human interaction while simultaneously developing the subjective dimension. In addition, the participant develops an embodied appreciation and grasp of systems thinking that strengthens their ability to work more effectively with any system, at any level.

Dr. Stuart Heller, Operations Research Analyst, Martial Artist, and Psychologist, developed the basic models. This technology is described in his book, *Retooling on the Run: Real Change for Leaders with No Time*. He is currently completing an intensive knowledge capture process to create the next generation for this radically simple approach, *The Encyclopedia of Becoming: Your Multimedia Guide for Cultivating Excellence in Everything You Do*.

Our methods have been tested and applied with individuals, teams, and organizations across the U.S.A. and abroad.

For the NASA project we have developed a program with three major components:

1. A three-day intensive workshop to communicate the principles, strategies, and models as well as teaching the core techniques for producing rapid and real self-retooling.
2. Monthly group sessions to teach people how to use what they are learning for real time situations as well as team and individual skill development.
3. Monthly one-on-one sessions where each participant focuses on his or her unique situations and goals.

Said in another way, there are many things you are called upon to do for which you were not trained. Of greater and greater importance is the human equation. Regardless of your personal opinion, you have to be able to deal with this. You have to deal with your own and others' moods, attitudes, reactivity, etc.

You do not have to change who you are to acquire these skills. You do not have to share your personal feelings and history. You do not have to verbalize your experience. **You do have to apply what you know when you need it.** This is what we mean by practice.

You cannot do this with just your intellect. But you already know this. It is accomplished by learning with mind and body together.

This is not a right brain thing to do. It is a whole brain activity: left brain analysis combined with right brain synthesis; neocortical thinking combined with limbic feeling and reptilian movement; central nervous system processing combined with autonomic responsiveness.

You can acquire the leadership skills you seek by extending what you already know.

“Nothing happens until something moves.”

Albert Einstein

*We become just by performing just action,
temperate by performing temperate actions,
brave by performing brave action.*

Aristotle

*“... a good leader is ... alert and sensitive to the thoughts and feelings
of the people working with him. He knows even before the individuals do
which emotional chemicals are at this moment coursing through their bodies.”*

Rear Admiral Dave Oliver, Jr., U.S. Navy
Lead On: A Practical Approach to Leadership

*“To realize the principle within your own heart,
do not just read, memorize, or imitate,
instead, study hard so as to absorb these things into your body.”*

Miyamoto Musashi
A Book of Five Rings: A Classic on Strategy

PROGRAM CURRICULUM

Underlying the methods and practices of Applied Human Systems are four core topics:

- 1. Human Systems Thinking**
- 2. Dealing with Conflict**
- 3. Mindset Versatility**
- 4. The Art of Influence**

1. Human Systems Thinking

A SYSTEM IS A SYSTEM IS A SYSTEM.

Applied Human Systems takes a living systems perspective to link the basic ideas of systems thinking to the task of cultivating leadership skills. Embedded in our movement-based, experiment-oriented curriculum is a sophisticated theory of: boundaries, interfaces, and life cycles as well as a holistic view of conflict, mindset, mood, style, and communication.

Senior systems engineers often say that at a certain point in their lives they realized that systems-thinking was not a technique, but instead, it had become a way of being. Given that the goal of SEED is to develop systems engineers in under three years instead of the usual ten to twenty, we designed this segment to purposefully build the connections that lead to realizing systems thinking in a profound way.

2. Dealing with Conflict

BOTTOM-LINE, WHENEVER PEOPLE COME TOGETHER, WHENEVER THERE ARE MULTIPLE GOALS AND VALUES, AND WHENEVER TIME AND RESOURCE CONSTRAINTS ARE PRESENT, CONFLICT HAPPENS.

In other words, conflict is a fact of life. Our problems with conflict lie in how we deal with it. This involves more than learning the “correct” tactics. Working effectively with conflict is a function of upgrading our habits of thinking, emotional intelligence, handling tension, and responding to stress and encounters.

Our curriculum is built on an integrated system of movement-simulations that: 1) teaches how to make non-judgmental, testable, and action-oriented observations of conflict patterns – one’s own as well as others; 2) teaches easy to use techniques for upgrading habits that can be applied in the midst of daily life.

3. **Mindset Versatility**

ACCOMPANYING EVERY ACTION IS A MINDSET THAT SHAPES, GUIDES, EMPOWERS OR SABOTAGES THE RESULTS.

Mindset is often defined as an attitude, habit, or tendency that influences interpretations and responses. Attitude is itself defined as a state-of-mind, feeling, or carriage. A tendency is often understood as a disposition or readiness to move in a particular way. A habit is a complex systems function involving thought, feeling, and action as well as neurological processes. In other words, mindset is a core human systems function.

To be a successful leader you must be able to meet situations, people, and events with the appropriate mindset. This segment of the curriculum is designed to draw out the participants' natural capacity to possess and utilize a wide range of mindset possibilities. The goal is to assist each person in cultivating versatility.

4. **The Art of Influence**

YOUR EFFECTIVENESS IS DIRECTLY INFLUENCED BY YOUR ABILITY TO INFLUENCE.

Bottom-line, influence is about having impact – delivering as well as receiving. Influence is a real power, with real consequences. We are always influencing and being influenced – by people, events, and things. The real question is are you using your power of influence well or poorly?

It is often said that a systems engineer has to lead without necessarily having or using authority. This is also known as political savvy. The focus of this segment is to assist the student in developing the authenticity, integrity, credibility, and versatility to meet and transform conflict and difficulty so as to open the way for mission accomplishment.

SUCCESS STORIES

Here are six success stories from our work with the SEED program.

- The long shot comes in first
- Taking the edge off of being perceived as intimidating
- The cross-cultural dimension
- Growing from caught in either/or – to real control
- The posture of being taken more seriously
- Grasping the reins of her own power

THE KEY POINTS

- 1. There is no real separation between technical and the human.**
- 2. Extend what you know in the sciences to your personal life.**
- 3. The context or unifier is the body-mind as a whole**

THE LONG SHOT COMES IN FIRST

A. was assessed as requiring a long development process for her leadership skills when she was chosen for the SEED program. A woman in her mid-30s she was perceived as indecisive, not focused, not solid yet she definitely had the technical strengths necessary to be a NASA systems engineer.

Here are some of the highlights of practices she was given followed by her demonstration of learning.

1. I noticed in one of the first sessions that she was doodling while speaking. Since this was a recurring behavior I decided to use it as an opportunity for learning. Note: the non-verbal dimension includes much more than the “physical.” It extends to the cognitive arena. Visual thinking like movement thinking is non-verbal. Remember the SAT exam, it had two sections: verbal and math --- a non-verbal mode of cognition.

Her doodle began as a square and rapidly became an expanding field of squares partially overlaying squares. Note: In the history of symbols, squares correspond to concreteness, containment, details, and/or analytical logic.

Beginning with a single detail, she saw more and more details and ways to examine them --- an excellent perspective for a systems engineer. However, the details and choices kept expanding. We approached her doodle as an analogue of what appeared behaviorally as indecisiveness.

Her first practice was to draw one square on top of another, thereby containing her expansive thinking to a single focus. She used this during meetings and began to report greater control over her indecisive – too many choices – tendency.

2. Another project was how to balance her personal relational orientation with the professional requirements for being a decisive thinker. She was taught a pair of simple body-based meditations that shifted her center of gravity in two distinct ways. One encouraged her natural relational style. The other brought forth her less used decisiveness, necessary for meeting head-to-head in an “it’s just business attitude.” After purposefully shifting back and forth between the practices, she was able to recognize the muscular signature of her normal state. Now, she could more clearly ascertain when it was appropriate to shift to a less emotional orientation. She applied this in large group meetings, one-on-one conversations, and in preparation for meetings.
3. The next project was how to purposefully (yet authentically) project an authoritative, no nonsense, and powerfully solid presence. The goal was to walk into a meeting and without saying a word become the gravitational center of the groups attention.

She was given a practice based on the intrinsic connection between stance, attitudinal readiness, strategic options, and perceived presence. Using the language of strategy offered by Miyamoto Musashi in *A Book of Five Rings*, she wanted to access the Ring of Ground. Anyone who holds this state with their muscles as well as their “mind” shows up as decisive, independent, authoritative, and powerfully effective. This is especially true in the United States. In some parts of the world, a very different set of qualities demonstrates power.

4. The proof ... last year, she applied for a senior systems engineering position at NASA/Goddard, one that she “knew” she was not ready for yet, both from the perspective of experience and technical know-how. As an important and intriguing aside, 95% of the questions she was asked by the interviewing panel were about her leadership skills, not her technical understanding.

She was awarded the position, based primarily on how she presented herself during the interview and how she handled the difficult leadership questions posed by the panel. A technical tutor was chosen to help her catch up on the “much easier to acquire” engineering knowledge.

In a follow up conversation, one of the panel members spoke of how impressed he was at her calm and solid presence, especially given his memory of her just a year ago. She reports that under the verbal surface, she was paying attention to keeping her feet on the ground, her hands solid and strong, her breath in her belly, and sitting slightly forward in the chair. When her focus wavered she visualized drawing a square.

Since these kinds of awareness and internal effort were non-verbal, they did not distract her ability to listen clearly to the words. In addition, because she had practiced these subtle actions in less charged situations, she came across as naturally and authentically solid, dependable, and able to handle the conflicts and stresses of the new position.

TAKING THE EDGE OFF OF BEING PERCEIVED AS INTIMIDATING

B. is a senior systems engineer and technical administrator. He is tall, athletic, passionate, very bright, and very politically astute. The issue he brought to our first meeting was that all too often he seemed to intimidate many of the engineers and scientists he worked with.

Observing him, with his feet planted flat on the ground, he often leans directly into the listener's personal space while speaking and listening. What he learned:

1. To recognize when he has "scared" the listener by watching their face and posture change, and when he realizes that they have stopped listening to also recognize his own tendency to push even harder when listeners shut down or pull away.
2. He also discovered that when he simply shifted back in his chair or shifted his weight to his back foot when standing, all of a sudden, the intensity of his presence was dramatically decreased without him having to "stuff" his own passion. He immediately applied this in his next meeting and incorporated it into his normal way of relating.
3. He reported that our work together prepared him, in a difficult meeting, to be able to recognize when it wasn't working and shift his style, attitude, stance, etc. This opened the boundaries for communication. And when the way got blocked again (with either the same person or another one at the meeting), he repeated this procedure until all objections were handled. "I could not tell you how I did it except that it involved awareness and non-verbal versatility."

THE CROSS-CULTURAL DIMENSION

C. is a brilliant engineer with an endless thirst for knowledge. He was born in Puerto Rico yet most all of his technical studies were in English. Not feeling fluent enough in English to express his real thoughts and feelings he developed a carriage and way of responding to "better fit in" with his American colleagues. Given his desire to be a leader in the field of systems engineering, we decided to deconstruct his old method to find a more effective way of interacting while honoring his cultural background and source of authenticity.

We began with the key non-verbal difference between the presence of power as recognized in “Latin” cultures versus in the U.S.A. In America, an individual is immediately acknowledged as being powerful when the center of gravity of their composure is located in their lower belly. As a note, this relatively broad stroke observation is the product of thousands of real time experiments with executives around the country and abroad.

In Puerto Rico, as in many Latin countries, the center of gravity of the presence of power is located higher, almost in front of the chest. The cross-cultural misunderstanding begins here, because for an American, such a high center of gravity can immediately produce the assessment of arrogance.

By recognizing these non-verbal cultural differences, he has brought forth into his everyday conversations and meetings his “true” self. Being himself, he finds it much easier to modulate this presence, gestures, and speaking to maximize his communication effectiveness. As an additional bonus, he feels much more comfortable relating to his non-Latin colleagues and neighbors.

These changes were dramatically obvious to his Division Chief who has known him for many years. He described someone who lived in his office and if fed enough pizza and soda would solve any problem he was given. Now he saw a very different man, a confident, expressive, and responsive leader.

GROWING FROM CAUGHT IN EITHER/OR – TO REAL CONTROL

D. is an experienced systems engineer who joined the SEED program to further round out his understanding and skills.

In the earlier sessions he spoke of himself as being slow to respond when asked to speak in meetings or give quick answers, especially concerning leadership issues. Observing him, it was easy to see that he had developed the habit of holding himself back.

The downside of his habit “of being nice” revealed itself in a Conflict Simulations adapted from the Philippine martial art of Arnis that uses hollow plastic sticks. Once he learned the simple pattern he instantly changed from being mild mannered to acting wild, fast, strong, and aggressive in his movements. You could always tell if someone had been practicing with him because the soft covering of their sticks would be shredded or the stick itself would be broken.

He had a very strong separation between “nice” and “powerful” and between “control” and “berserk”. He was given a series of movements designed to teach him “gentle yet powerful” and “slow and controlled”. Now when he engages in the Conflict Simulations he can express himself with calm, clear, strength and controlled coordination. He is also more comfortable with speaking and expressing himself in front of a group. He has successfully graduated the SEED program and is now a mentor for the current group.

THE POSTURE OF BEING TAKEN MORE SERIOUSLY

E. is a senior systems engineer. Although not directly connected to the SEED program she supports it whenever possible. She and several other supporters attend the AHS classes and schedule individual sessions whenever their schedule permits.

She is representative of a surprising large number of women engineers who have a clear and powerful intellect and still have maintained their strong feeling nature. The challenge, of course, is how to balance the two. She asked for assistance in “being taken more seriously” in meetings, especially with male (thinking type) engineers and administrators. She was tired of working so hard to prove herself when her record proves the point.

In the context of one of the typology systems used at NASA (4-D Leadership), she is oriented towards “relationship” and “connection”. This often shows itself by the individual over-emphasizing the need to build bridges of empathy even when (and especially when) the other people involved are task oriented (and often connection-phobic). This automatic behavior “weakened” her in their eyes – requiring her to work extra hard to demonstrate her skill and value.

Taking into account the following two factors:

- i. The amount of information necessary she must hold and deliver requires maximal use of the available intellect, will and memory; and
- ii. The necessity of conveying the presence of “solid power” nonverbally, immediately, and authentically

we devised the following procedure based on the familiar research that states that only 10% of one’s impact is through the words alone.

She was led through a series of experiments based on the “Ground” that enabled her to:

1. Tell the difference in her attitude and way of expressing herself;
2. Make the shift, consciously and quickly;
3. Make and hold this carriage-strategy-attitude-style-presence in a meeting;
4. Do so authentically, naturally, and without anyone realizing.

Our research has demonstrated that there is a strong correlation between one’s physical attitude (carriage) and one’s mental and emotional attitude. This correlation extends to issues of style and perceived presence.

Being perceived as “solid, dependable, authoritative and powerful” corresponds to the behavior style variously labeled as “dominant, controller, or driver”. This in turn corresponds to the attitudinal states of “calm, unflappable, able to say ‘no’, and detail thinking”.

These in turn correspond to the strategy of Ground (as introduced by Musashi's *A Book of Five Rings: A Classic on Strategy*). Viewed non-verbally we find that in order to access this quality of power, response, strategy, etc., the individual's pattern of neuro-muscular organization shifts predictably in a way described by vector addition as combining "front and down".

GRASPING THE REINS OF HER OWN POWER

F. is a 24 year veteran of Goddard whose responsibilities include overseeing the continuing education of engineers and administrators. She develops and leads successful programs within the technical community. She has applied her skills in the fields of psychology, OD, coaching, and education for decades and functions as a bridge or interpreter between the technical and the non-technical communities.

We began with her desire to make fundamental changes in the ways she responds and deals with conflict, fear, personal power, self-expression and relationships in general. She wanted to broaden her range of responses and acquire new responses while upgrading some of the older ones.

She was asked to work with the "Exercising for Versatility" videotape, which covers a wide range of practices. At each meeting, we discussed current issues and patterns as well as working with the general questions of change and power.

Over this past year, she has radically overhauled her entire life and way of being. People notice and comment on those dramatic changes, especially how she looks, acts and responds. The way she handles fear, conflict, personal power, self-expression and personal relationships are very different and challenging in some instances. For when you change, you create opportunities and challenges for everyone else around you.

One of her greatest learning's came in the realization that not being in the hard sciences did not mean you couldn't be a systems thinker. She discovered that she is a systems thinker and can now engage more confidently with the scientific systems thinkers.

DR. HELLER'S BIO

Dr. Stuart Heller earned his B.A. in Mathematics, M.S. in Operations Research, and Ph.D. in Psychology and Health Systems Science, as well as sixth degree black belts in two different martial arts. He is certified in Hypnotherapy and as a teacher of the F.M. Alexander Technique. He has also studied the full range of Somatic (body) disciplines.

He has over two decades of study in Classical Chinese Medicine and is acknowledged as a true master of Qi Gong (Chinese Therapeutic Exercise) and Qi Healing. In addition, he was a scholarship student with Alvin Ailey's American Dance Center.

His specialty is helping individuals and teams develop the habits and versatility necessary to meet the changes they face, to upgrade their ability to communicate effectively under pressure, and to rapidly acquire the skills and perceptions necessary to accomplish their visions, goals, and desires.

"You are the first organization you must master" is the cornerstone of his approach. His commitment is to teach you to use the secrets that make the masters the masters. He has developed a simple, easy-to-use language of strategy and movement that will give you a whole new world of skills and strengths.

Dr. Heller has trained executives, consultants, coaches, educators, artists, and healers around the world. His company, WALKING YOUR TALK, has a long history of successful collaborations with other organizations, including: Salus International, California Association for Acupuncture Tutorials, Rosen Method International, Education for Living Seminars, and the Executive Coaching Institute.

We are currently involved in a multi-year Applied Human Systems project with NASA to train the next generation of systems engineer-leaders. In addition, we are developing a range of programs for The Newfield Network, one of the first professional coaching training organizations and the preferred provider of coaching services to NASA.

In the early 1980's, at John F. Kennedy University in Orinda, CA, Dr. Heller developed courses to share his East/West classical studies with students in Transpersonal Psychology and Arts and Consciousness. He also co-founded the first accredited master's program in Clinical Holistic Health Education where he designed a specialization in Movement Psychology.

People often say that Dr. Heller gives word and form to what they have always known or felt but could not verbalize. He is adept at making the profound and subtle become tangible and practical. His grasp of the material is both broad and deep.

He is the main author of *Retooling on the Run: Real Change for Leaders with No Time* and *The Dance of Becoming: Living Life as a Martial Art*. His article, "An I Ching of the Body" was published in *Who am I? Psychological Types for Self-Discovery*, edited by Robert Frager.

He is currently completing an intensive knowledge capture process to create *The Encyclopedia of Becoming: Your Multimedia Guide for Cultivating Excellence in Everything You Do*.