Leadership for Systems Engineers

Perspective and Influence and Leverage, Oh My!

Raise your hand
if you are a
systems engineer

Raise your hand
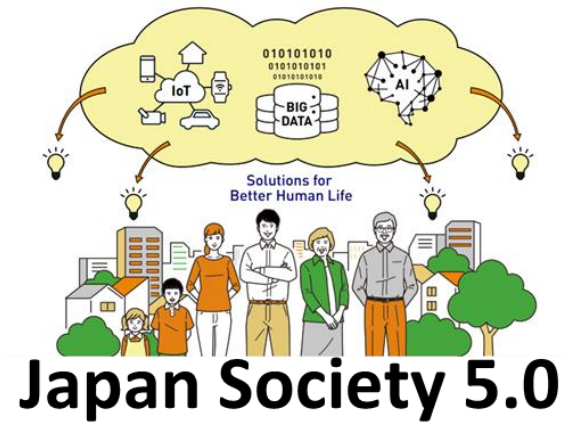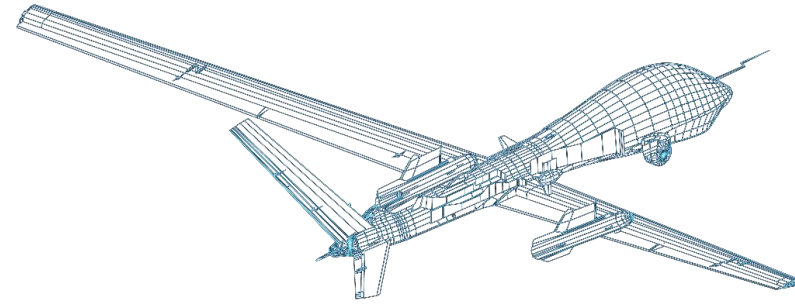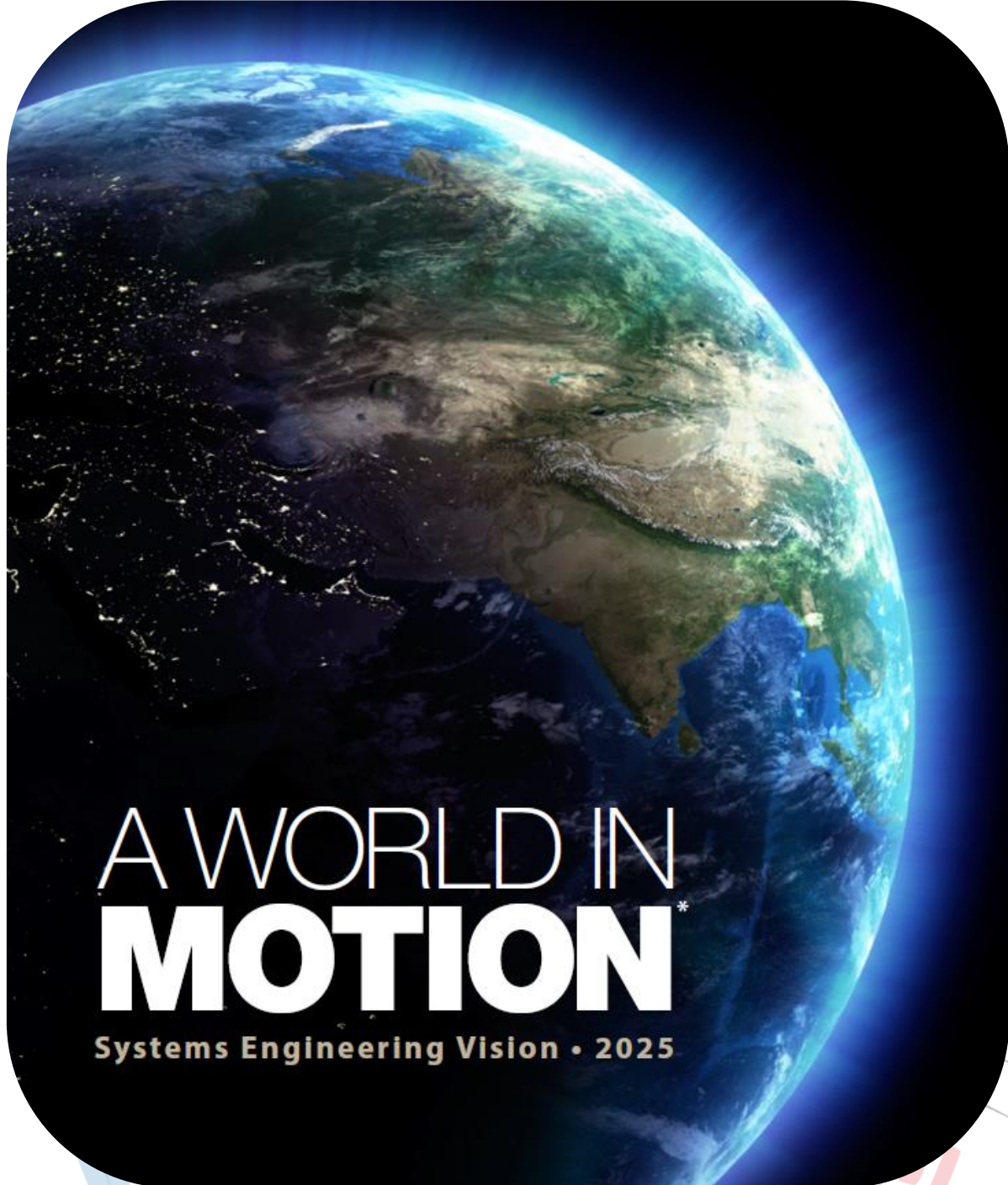if you are a leader

Driving the Big Picture across the Project

In Our Comfort Zone Identifying Context, Defining Parts, Connecting Roles

Requirements
Architecture

One cannot understand a part of a system without at least a rudimentary understanding of the whole.

Functioning in an interdependent environment requires that every team possess a *holistic* understanding of the interaction between all the moving parts.

People can only be empowered if they have enough context to make good decisions.

Quotes from *Team of Teams*, 2015

A WORLD IN MOTION
Systems Engineering Vision • 2025

Solutions for
Better Human Life

Japan Society 5.0

SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD

1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

SUSTAINABLE DEVELOPMENT GOALS

Embracing our Leadership Responsibilities
Transdisciplinary and Integrative Opportunities

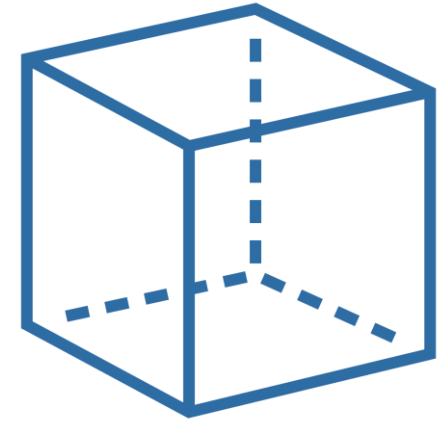❖ Applying the power of perspective

❖ Leading through influence

❖ Understanding our points of leverage

Embracing our Leadership Responsibilities
Transdisciplinary and Integrative Opportunities
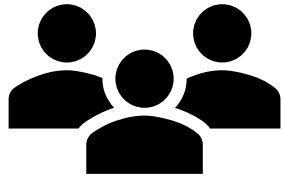
❖ Applying the power of perspective

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Recognizing Perspectives to Collectively Understand
The Importance of Empathy

Mechanical Engineers
Electrical Engineers
Software Engineers
Subject Matter Experts
Human Factors
Social Scientists
Verification & Test
Production
Program Managers
…

Customers
Users (in context)
Business
Regulators
Stakeholders

Political
Economic
Social
Environmental
Legal
NGOs

Thinking Vertically and Horizontally
Unlocking Collective Intelligence

I T TT

Seeing further together

- Diversity of perspectives and thought
- Inclusive, holistic, systemic mindset
- Across concerns
- Through life

# Appreciating the Challenge of Communicating Effectively
A Problem in Two Parts and a Two-Party Problem

Sender

- A lifetime of experiences
- A role
- A specific mindset at a specific moment
- Imperfect encoding
- "Curse of knowledge"
- "Proficiency" in writing and speaking
- Context-sensitive words
- Time pressure

Receiver

- A *different* set of experiences
- A *different* role
- A *different* mindset at a *different* time
- Imperfect decoding
- What was broadcast
- "Proficiency" in reading and listening
- Context-sensitive words
- Time pressure
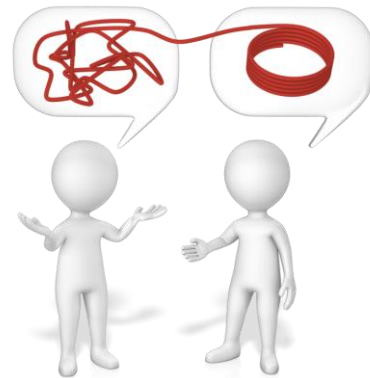
Every act of communication is a miracle of translation.

Ken Liu

The most important thing in communication is hearing what isn't said.

Peter Drucker

Seek first to understand, then to be understood. Seeking real understanding affirms the other person and what they have to say. That's what they want.

Stephen Covey

Applying "Two Ears, One Mouth"
Seeking to Connect as a Systems Engineering Leader

- Remember "why" is not an engineering decision
  - The why behind your system is business, social, or political
- Listen with your ears, eyes, heart, and brain
  - Listen to understand rather than listening to respond or rebut
  - Be present in the conversation and the moment
  - Suspend prejudgment of appearance, background, language barriers
  - Look beyond words to tone, body language, and emotion
  - Understand cultural context and cues

Applying "Two Ears, One Mouth"
Seeking to Connect as a Systems Engineering Leader

- Demonstrate consultation
  - The only way you get permission and engagement
  - Requires engaging the other party on their terms, both perspective and notation
- Leverage the plane of action, the plane of observation, and reflection (especially during conflict)
- Practice humility
  - Ask more questions and make fewer assertions; stay in the problem space as long as possible
  - Seek to understand before seeking to be understood
  - See as the user and stakeholder perceive through their eyes *not how you would perceive from their perspective*

Going Further to Maximize the Power of Many
Applying All Five Perceptual Positions (Gary Koyen)

- ## Self
  - Bring your insights as a member of the team

- ## Other
  - Empathize as you elicit requirements, dependencies, concerns, value frameworks, and corresponding worldviews

- ## Objective Observer
  - Value diversity of thought and seek collective intelligence rather than herd mentality

- ## Contextual Observer
  - See the big picture and understand who to trust when

- ## Personal Observer
  - Champion the lifecycle perspective and consider all phases of development, production, operation, maintenance, evolution, retirement, and disposal

Embracing our Leadership Responsibilities
Transdisciplinary and Integrative Opportunities
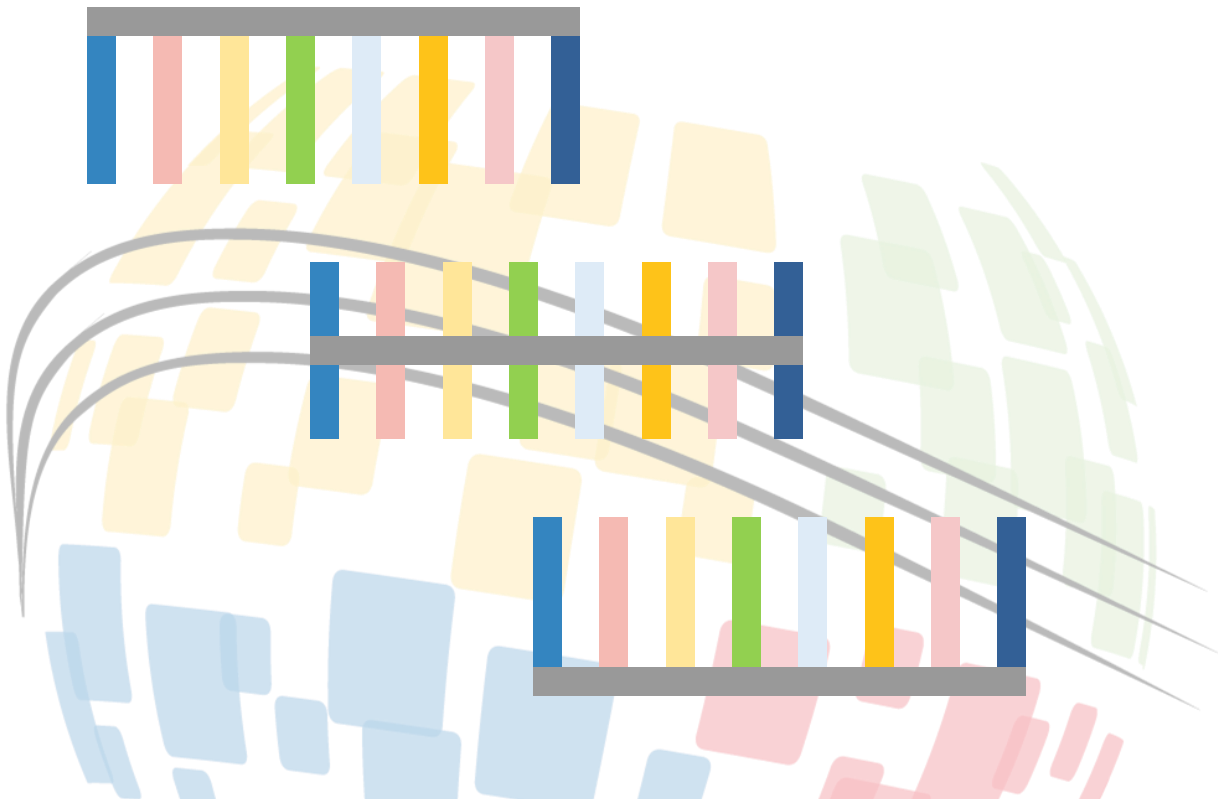
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Positioning Ourselves Correctly

Does it matter where we position the ourselves and the transdisciplinary bar?

Towards a meta-model of SE practice

- Comprehension - understanding
- Communication – translator services
- Coordination – harmonious functioning
- Cooperation – work toward a goal
- Collaboration – stakeholders, partners
- Continuity – over system life cycle
- Catalyst – champion for change and innovation

www.incose.org/emeawsec2023

Credit: Cecilia Haskins, *Systems Engineering support for Industry to meet UN SDG*, 2023

# Leveraging a Different Style of Leadership
Leading In, Out, and Up

- **Physical power** is self-evidently primitive and, unfortunately, often ultimate power, as expressed in fighting and in war

- **Resource power** is that which derives from one person having a resource that the other wants or needs – usually but not always money

- **Positional power** is an authority awarded to a person by the organization

- **Expert power** is that which derives because you have knowledge or a skill that is needed

- **Personal power** is that which derives from the personality of an individual

Influence: the process by which you have an effect on the character, development, or behavior of someone or something

Connecting through Motivation and Belief
Emotion and Rational Thought

ETHOS
Credibility

PATHOS
Emotion

LOGOS
Logic

WHY

HOW

WHAT
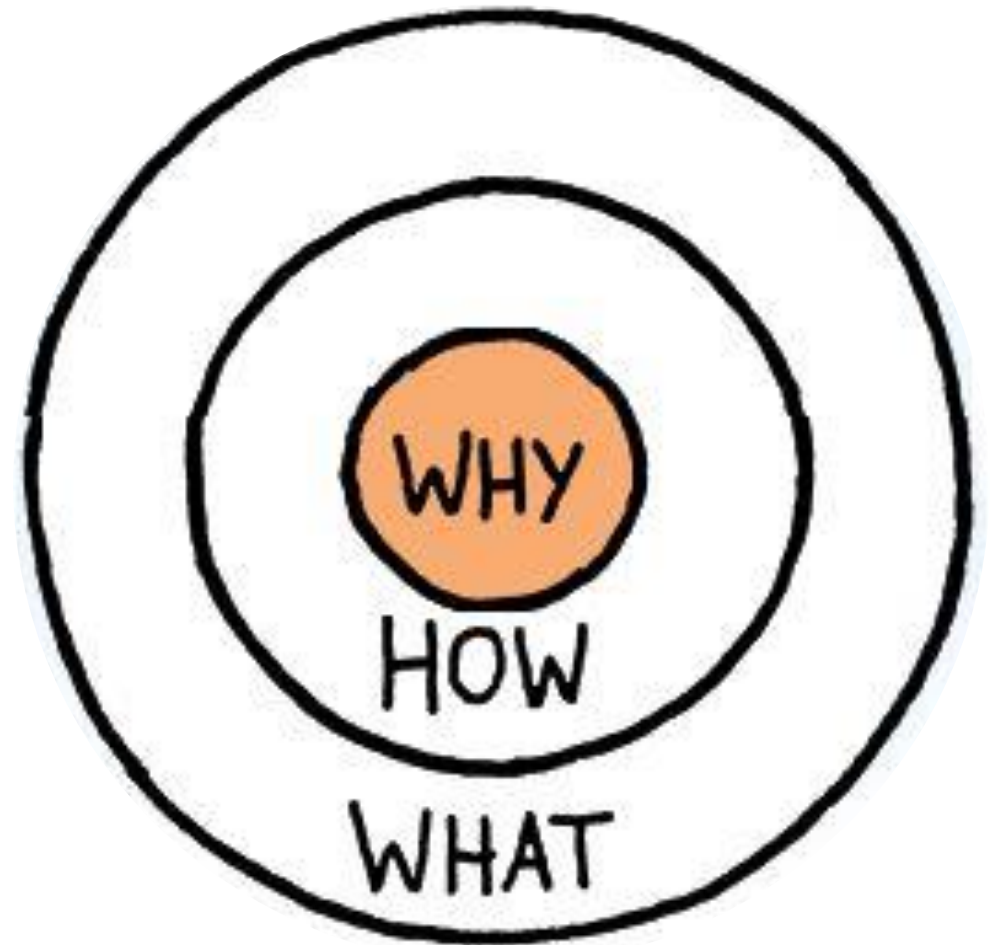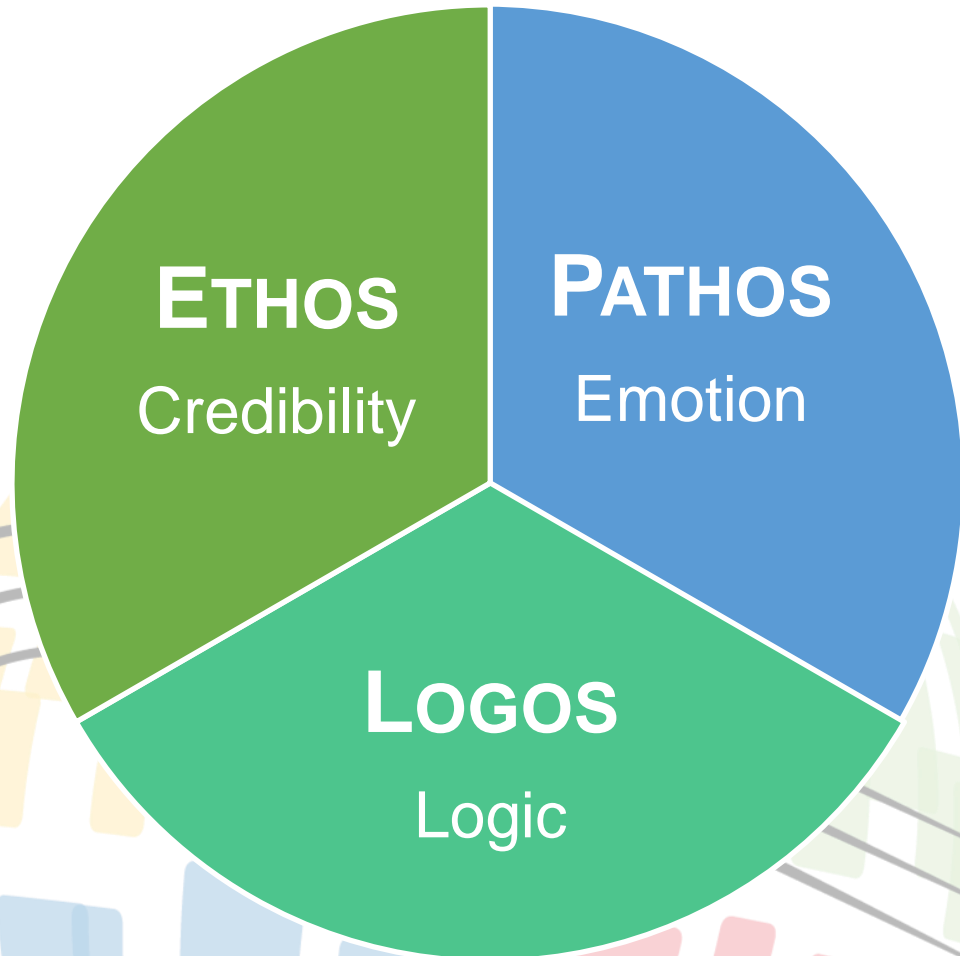
Leading from the Middle – Inward, Outward, and Upward
From Team Members to Customers to the C-Suite

- Drive better solutions through holistic understanding of problem and context
- Honor and leverage diversity for greater insight
- Move beyond positions to interests
- Sell through attunement, buoyancy, clarity – *To Sell is Human* (Pink)
- Highlight (but don't apply scare tactics)
    - Complexity, interactions, and interconnectedness
    - Through-life considerations and concerns
    - The risk of unintended consequences
- Seek elegance over brute force
    - "Elegant solutions resolve complex problems"
    - Brute force often delivers local gain at the expense of systems concerns
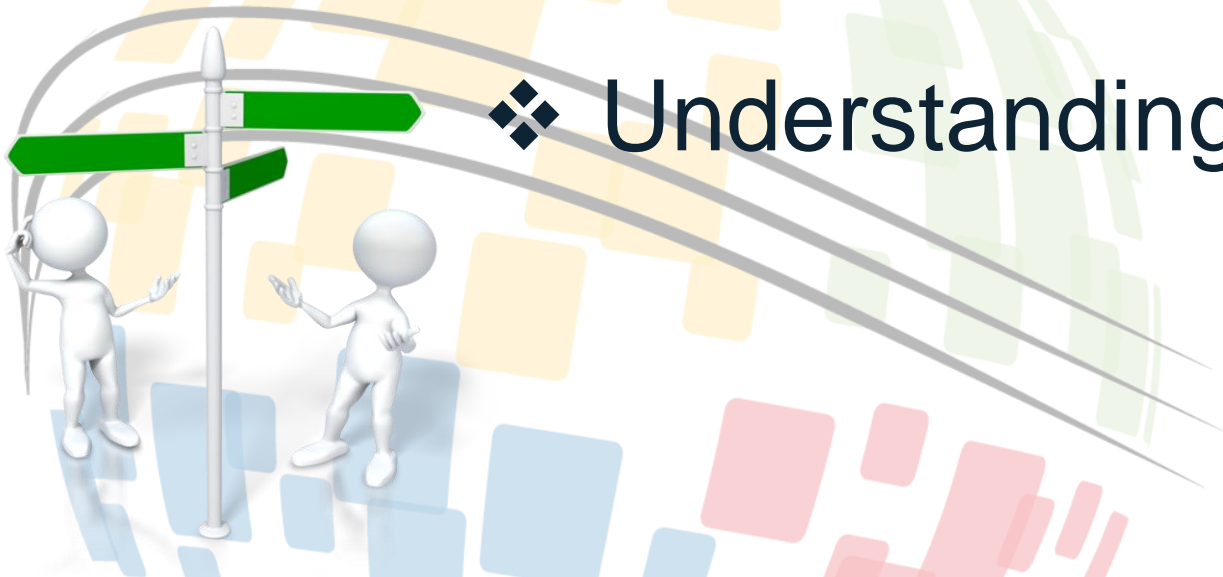- Champion systemic considerations
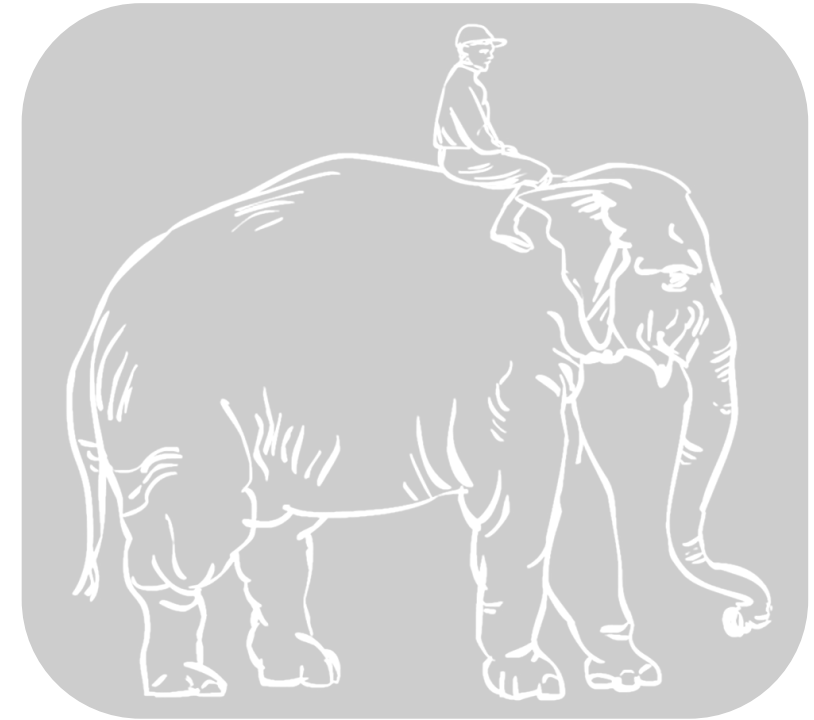
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Defining the Right Problem Right the First Time
Users and Stakeholders, Awareness and Empathy

- Engage stakeholders (those who care and those who understand)
- Identify who will use the system and how it will evolve over time (both context and perception of value)
- Analyze gaps between the as-is and wish-to-be
- Think operationally, both "a day in the life" and through the lifecycle
- Consider sunny and rainy day scenarios
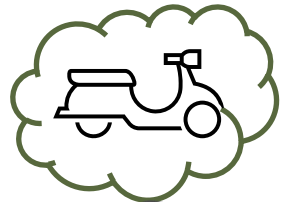- Agree and validate assumptions about "the world"

Defining Success Properly
Moving from Verification to Validation

> Successful problem solving requires finding the right solution to the right problem. We fail more often because we solve the wrong problem than because we get the wrong solution to the right problem.
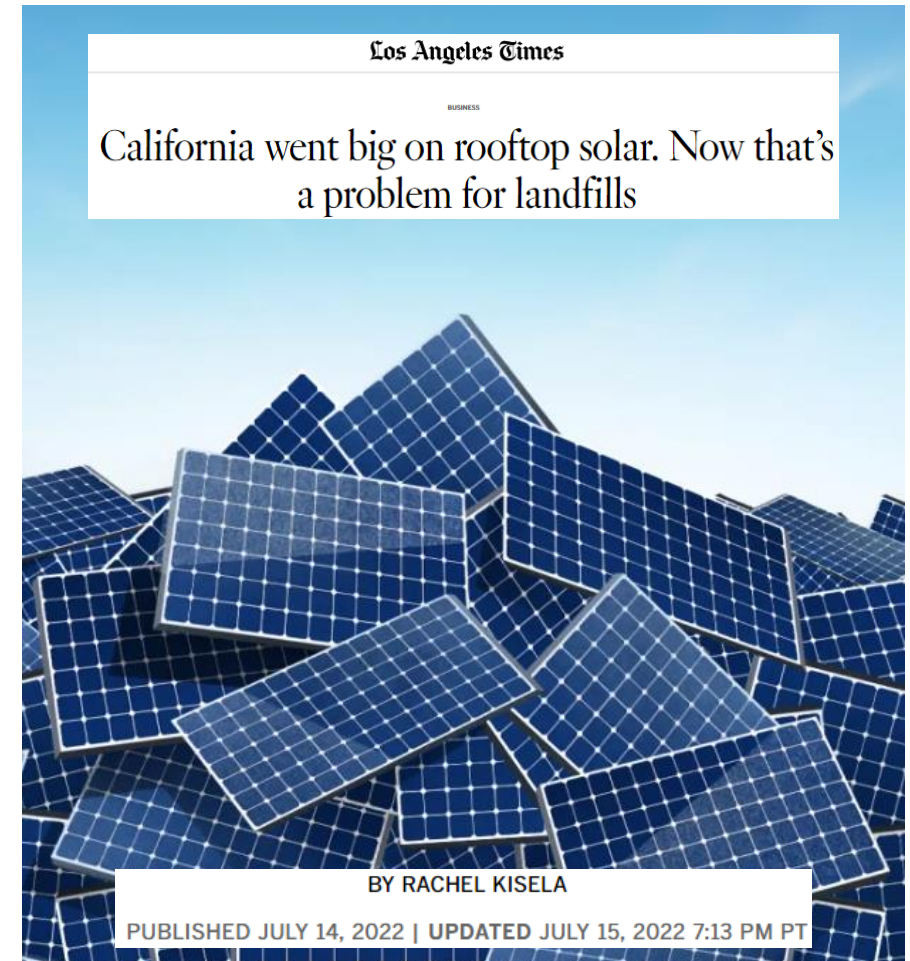>
> Russell L. Ackoff

Thinking across Time
Embracing an Expanded View of "Omega Alpha"

Credit: Tiia Monto

Systems Engineering is an engineering discipline whose responsibility is creating and executing an interdisciplinary process to ensure that the customer and stakeholder's needs are satisfied in a high quality, trustworthy, cost efficient and schedule compliant manner ***throughout a system's entire life cycle***.

- INCOSE

Los Angeles Times

BUSINESS

California went big on rooftop solar. Now that's a problem for landfills

BY RACHEL KISELA

PUBLISHED JULY 14, 2022 | UPDATED JULY 15, 2022 7:13 PM PT

Thinking across Complexity

Complex
the relationship between cause and effect can only be perceived in retrospect

probe – sense - respond

emergent practice

Complicated
the relationship between cause and effect requires analysis or some other form of investigation and/or the application of expert knowledge

sense – analyze - respond

good practice

novel practice

no relationship between cause and effect at systems level

act – sense -respond

Chaotic

best practice

the relationship between cause and effect is obvious to all

sense – categorize - respond

Simple

© Cynefin framework by Dave Snowden

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Thinking across Scale

Interests

Global

Problem

Interactions

Macro

Innovation
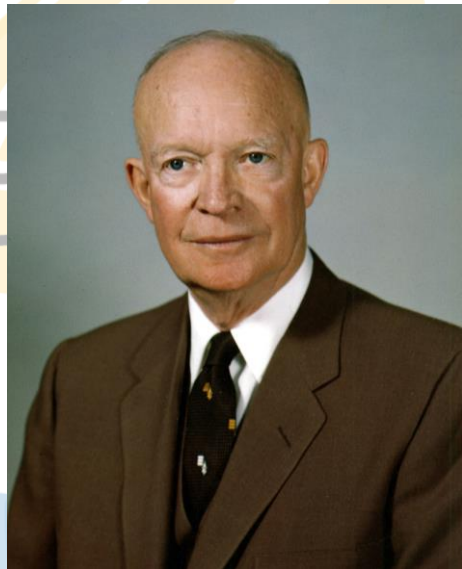
Interfaces

Micro

Solution

Leading for a Better Tomorrow
Perspective and Influence and Leverage, Oh My!

For every complex problem, there is an answer that is clear, simple, and wrong.

H.L. Mencken

Whenever I run into a problem I can't solve, I always make it bigger. I can never solve it by trying to make it smaller, but if I make it big enough, I can begin to see the outlines of a solution.

Dwight Eisenhower

Questions and Discussion

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