

CRITICAL THINKING

Lunch and Learn
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***“We cannot solve our problems
with the same thinking we used
when we created them.”***

Albert Einstein





DOD INNOVATION INITIATIVE

“In order to maintain our technological superiority as we transform from one war fighting regime to another, we must begin to prepare now. In addition to new technologies, a third offset strategy will require innovative thinking, the development of new operational concepts, new ways of organizing, and long-term strategies.”

Robert Work – Deputy Secretary of Defense, NDU Convocation, 2015



DEFINING CRITICAL THINKING

Active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further conclusions to which it tends. (Dewey, 1909)

(1) An attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experience; (2) knowledge of the methods of logical enquiry and reasoning; and (3) some skill in applying those methods. Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends. (Glaser, 1945)



DEFINING CRITICAL THINKING

Critical thinking is reasonable, reflective thinking that is focused on deciding what to believe or do. (Norris and Ennis, 1989)

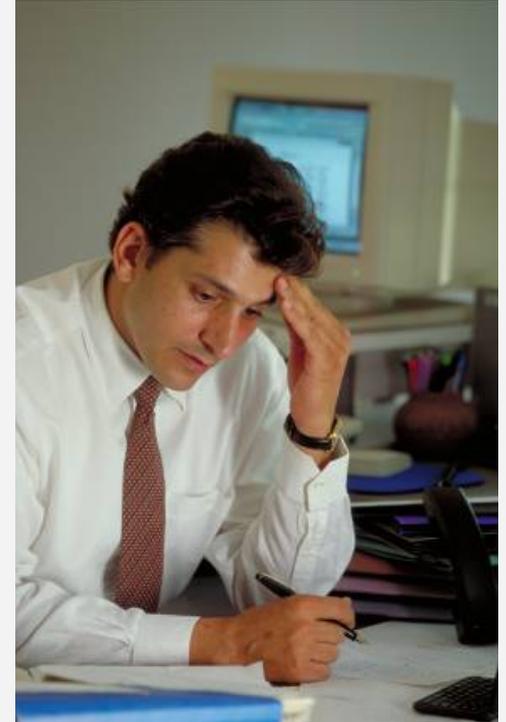
Critical thinking is that mode of thinking—about any subject, content or problem—in which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in the thinking and imposing intellectual standards upon them. (Paul, Fisher and Nosich, 1993)

DEFINING CRITICAL THINKING

- Critical thinking is skilled and active interpretation and evaluation of observations and communications, information and argumentation. (Fisher and Scriven, 1997)
- Critical thinking is the process of examining underlying assumptions; interpreting and evaluating evidence; imagining and exploring alternatives; and developing reflective criticism to reach a conclusion. (DAU faculty member, 2007)
- Critical thinking is the art of analyzing and evaluating thinking with a view to improving it. (Paul and Elder, 2006)

CRITICAL THINKING

The art of thinking about your thinking while you are thinking in order to make your thinking better





THINK

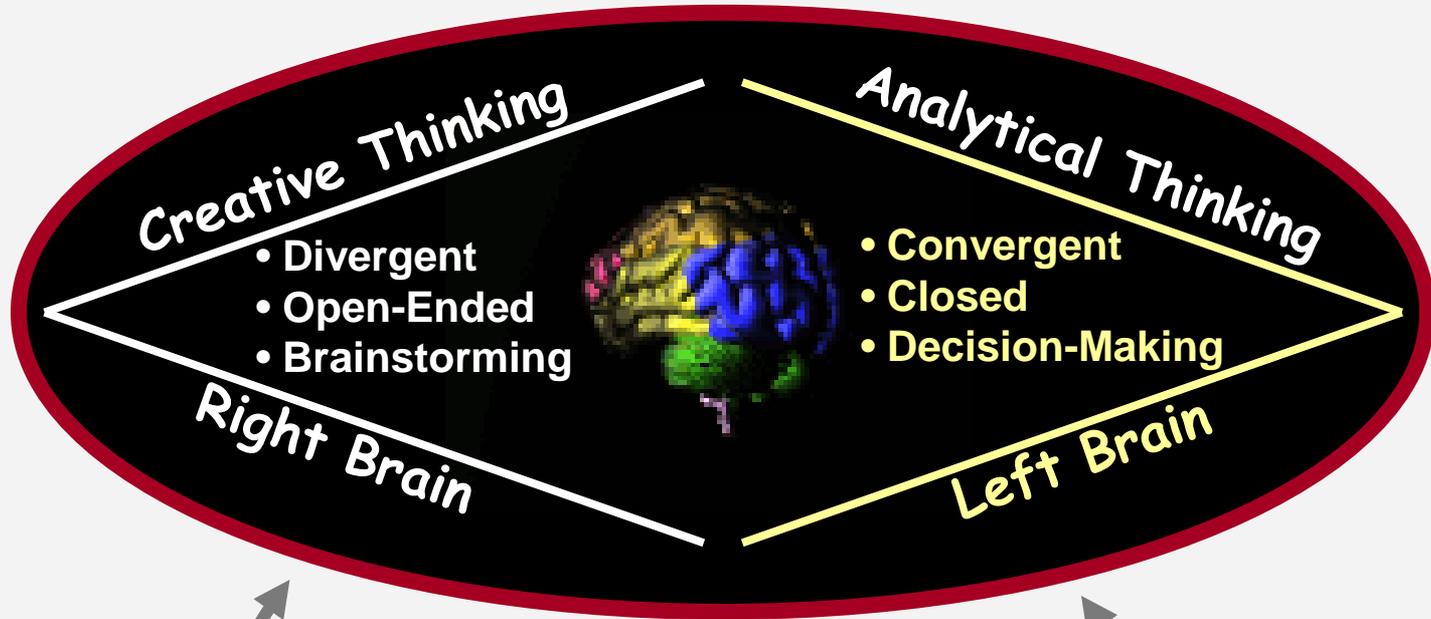
“One of the dominant characteristics of defense acquisition is its scope and complexity. There are no simple solutions to all the myriad problems acquisition professionals have to solve. There is no short “rule set” that will tell us all we need to know. Acquisition professionals have to be able to think on many levels, integrate inputs from many perspectives, balance competing needs, and satisfy many stakeholders and customers.”

CRITICAL THINKING?

The process of:

- examining underlying assumptions (beliefs and perceptions);
- interpreting and evaluating evidence (context and values);
- imagining and exploring alternatives (different views and ideas);
- developing reflective criticism to reach a conclusion.

CRITICAL THINKING AND THE BRAIN

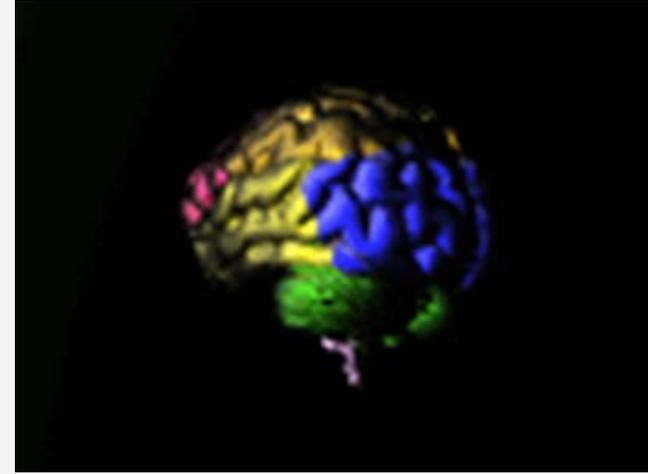


The Right Side of the Cerebrum also Controls Things Such as Imagination and 3-D Forms

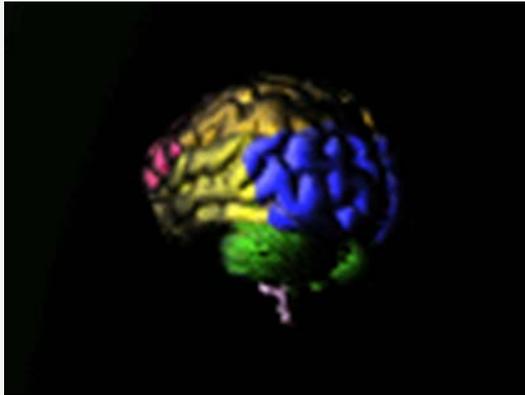
The Left Side also Controls Numbering Skills, Posture, and Reasoning

THE BRAIN - LEFT HEMISPHERE

- Analysis
- Abstract
- Computations
- Measurement of time
- Verbalization
- Sequential procedures
- Logical

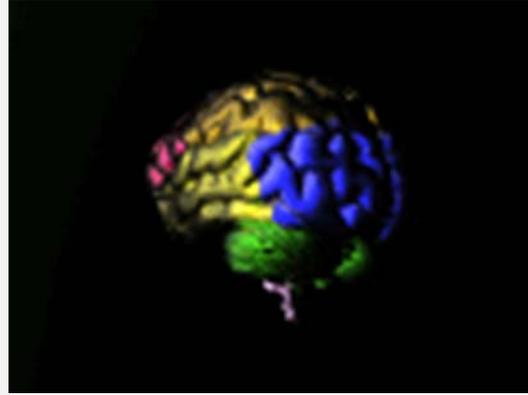


THE BRAIN - RIGHT HEMISPHERE



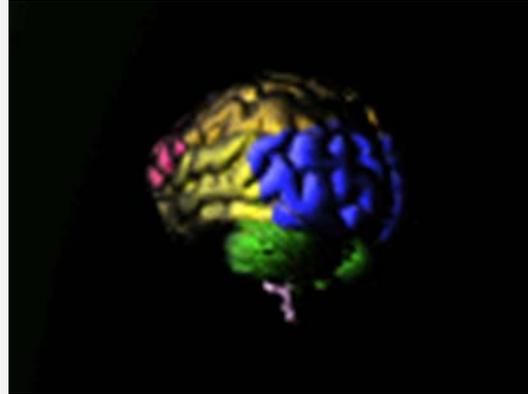
- Imaginative
- Intuitive
- Subjective
- Relational
- Symbolic
- Holistic
- Creativity

THE BRAIN - CEREBRAL



The outer part of the brain, where more abstract, intellectual thought takes place

THE BRAIN - LIMBIC



Beneath the cerebral system
where more concrete and
emotional processing occurs



CRITICAL THINKING

*“We cannot solve our problems
with the same thinking we used
when we created them.”*

Albert Einstein



HOW IT ALL COMES TOGETHER

THE STANDARDS

Clarity
Fairness

Precision
Relevance

Breadth
Completeness

Accuracy
Depth

Significance
Logicalness

Must be applied to

THE ELEMENTS OF THOUGHT

Purposes
Questions
Information

Inferences
Concepts
Assumptions

Points of view
Implications

As we learn to develop

INTELLECTUAL TRAITS

Intellectual Humility
Confidence in Reason
Intellectual Courage

Intellectual Perseverance
Intellectual Integrity
Fairmindedness

Intellectual Autonomy
Intellectual Empathy

INTELLECTUAL STANDARDS

Clarity - A gateway standard relevant to all others. A statement or question must be clear to determine accuracy, relevance, logicalness.

Accuracy - A statement may be clear but not accurate. Ask questions to determine truth, source legitimacy.

Precision - A statement may be clear and accurate, but not precise. Precision is achieved by asking for more details or specific explanations.

Relevance - A statement may be clear, accurate, precise, but not relevant to a discussion or issue. Probe how the stated position connects to the question or bears on the issue

INTELLECTUAL STANDARDS

Depth - A statement can have clarity, accuracy, precision, relevance, but is superficial. Ask yourself how you are addressing complexities of an issue. Consider if you are addressing the most significant factors.

Breadth - A line of reasoning may be clear, accurate, precise, relevant and deep, but one-sided. Ask if there is another point of view; another way to look at the question; a differing perspective.

Logicalness - A combination of thoughts that is mutually supporting and makes sense in combination. Ask if your thoughts make sense, or if, and how, they follow from what you said

INTELLECTUAL STANDARDS

Logicalness - A combination of thoughts that is mutually supporting and makes sense in combination. Ask if your thoughts make sense, or if, and how, they follow from what you said.

Significance - Concentrating on the most significant and important information. Address: what is the most significant information; how it is important in context; and which questions/ideas are most significant/important

Fairness - Justifying thought by thinking fairly in context . Many questions to consider: What justifies your thinking? Are you considering all evidence? Is your purpose fair? What is my “agenda?” Is it an obstacle?

Critical Thinkers Apply Standards to Thinking, especially when asking Questions

Clarity

- Could you elaborate further?
- Could you give me an example?
- Could you illustrate what you mean?

Accuracy

- How could we check on that?
- How could we find out if that is true?
- How could we verify or test that?

Precision

- Could you be more specific?
- Could you give me more details?
- Could you be more exact?

Relevance

- How does that relate to the problem?
- How does that bear on the question?
- How does that help us with the issue?

Depth

- What factors make this a difficult problem?
- What are some of the complexities of this question?
- What are some of the difficulties we need to deal with?

Breadth

- Do we need to look at this from another perspective?
- Do we need to consider another point of view?
- Do we need to look at this in other ways?

Logic

- Does all this make sense together?
- Does your first paragraph fit in with your last?
- Does what you say follow from the evidence?

Significance

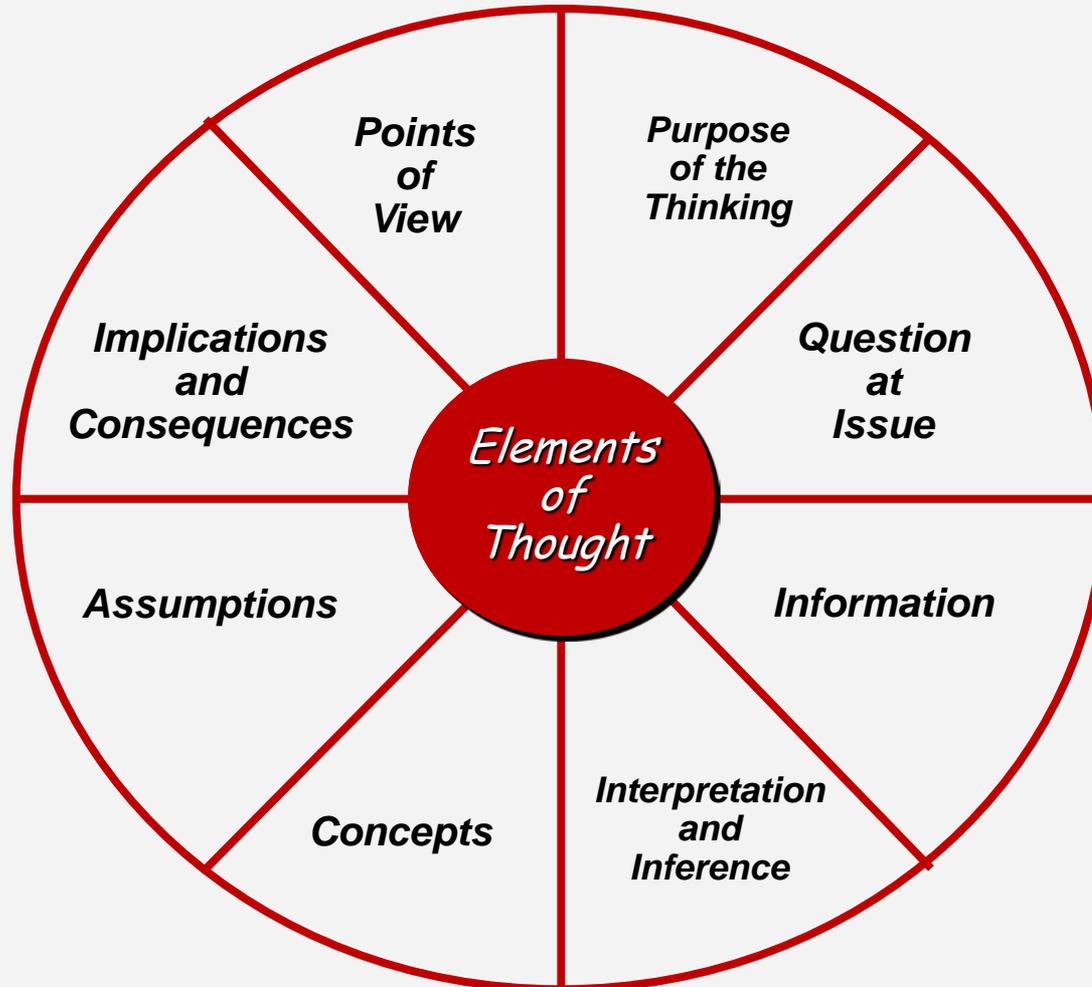
- Is this the most important problem to consider?
- Is this the central idea to focus on?
- What of these facts are most important?

Fairness

- Do I have any vested interest in this issue?
- Am I taking into account the thinking of others?
- Have I examined by thinking for biases?

Which of these could you work on?

ELEMENTS OF THOUGHT



ELEMENTS OF CRITICAL THINKING

Purpose - Reasoning has an end, or objective. Ask yourself about clarity of purpose, and how it's stated. Is the purpose significant? Achievable? Realistic? Justifiable?

Question at issue – Is it the right question and are there other relevant questions? Probe what are the fundamental issues, the precise question(s), its complexity and why it's so. Ask if there are other questions needing to be explored

Point of View – a frame of reference. You should ask, from which point of view do you start? Are you “locked” to a view, allowing no inclusion of other views in your thinking? Are there multiple views to consider?

ELEMENTS OF CRITICAL THINKING

Information/Data - probing veracity, significance. Ask if your data is accurate, clear, and fair. Ask what data is most important, and if sources are reliable. Ask if you have avoided personal bias. What are alternate, valid sources of information?

Concepts, Theories and Ideas – these contribute to depth of thought. Determine most fundamental concept to consider. How does it connect to key concepts in your life? How might clarity of your concepts be altered to change your point of view?

ELEMENTS OF CRITICAL THINKING

Assumptions - reasoning starts with certain assumption(s).

You should ask if your assumptions are justifiable or should be questioned. What are you taking for granted?

Implications/Consequences - understanding decision implications. Tracing logical consequences in advance. Considering most significant implications of a decision. Affecting whom, when, where and how?

Inferences - reasoning proceeds by steps. Perceiving a situation, reviewing facts, and coming to a conclusion, or inference. Who makes the inference? Is there more than one inference that can be made? Can you conclude your inference is sound in your reasoning?

INTELLECTUAL TRAITS

1. *Intellectual Humility*
2. *Intellectual Autonomy*
3. *Intellectual Integrity*
4. *Intellectual Courage*
5. *Intellectual Perseverance*
6. *Confidence in Reason*
7. *Intellectual Empathy*
8. *Fair-mindedness*



1. *Intellectual Arrogance*
2. *Intellectual Conformity*
3. *Intellectual Hypocrisy*
4. *Intellectual Cowardice*
5. *Intellectual Laziness*
6. *Distrust of Reason/Evidence*
7. *Intellectual Close mindedness*
8. *Intellectual Unfairness*

INTELLECTUAL TRAITS

Intellectual Humility	I acknowledge my biases and the limits of my knowledge
Intellectual Autonomy	I independently think through questions and problems
Intellectual Integrity	I hold myself to the same standards of thinking and behavior which hold them
Intellectual Courage	I dare to question and challenge popular or long held beliefs in the face of new information or evidence
Intellectual Perseverance	I continue to struggle with confusion, frustration and uncertainty to gain understanding
Confidence in Reasoning	I rely on the critical thinking process and trust its results
Intellectual Empathy	I consider other's perspectives in order to accurately reconstruct the viewpoints
Fair-mindedness	I strive to treat every view point in an unbiased way without reference to my own interests



CORE CRITICAL THINKING SKILLS

1. Interpretation
 2. Analysis
 3. Evaluation
 4. Inference
 5. Explanation
 6. Self-regulation
- 



INTERPRETATION

Comprehending and expressing the meaning or significance of a wide variety of situations, data, events, judgments, conventions, beliefs, rules, procedures and criteria.

Includes the skills of categorization, significance and clarifying meaning.





ANALYSIS

Identifying the intended and actual inferential relationships among statements, questions and concepts intended to express belief, judgment, reasons, opinions, etc..

Includes examining ideas, detecting arguments and analyzing arguments.



INFERENCE

Identifying and securing the elements needed to draw reasonable conclusions; to consider relevant information and to determine the consequences from data, evidence, questions, etc..

Includes examining querying evidence, conjecturing alternatives and drawing conclusions.





EVALUATION

Assessing the credibility of statements or representations which are accounts of a person's perception, opinion, or judgment; and to assess the logical strength of the actual or intended inferential relationships among these statements or representations.





EXPLANATION

Presenting in a cogent and coherent way the results of one's reasoning. Includes describing methods, evidence, concepts, and contextual consideration presenting full and well reasoned arguments in seeking the best understanding possible.





SELF-REGULATION

Self-consciously monitoring one's activities, the elements used in those activities and the results, with a view toward questioning, confirming, validating or correcting one's reasoning or one's results.

Includes self-monitoring and self-correction.



CRITICAL THINKING

Critical thinking occurs whenever you judge, decide or solve a problem. It happens when you must figure what to believe or what to do, and do so in a reasoned and reflective way.

Why is critical thinking important for leaders?

It enables them to analyze, evaluate, explain, and restructure their thinking, thereby decreasing the risk of adopting, acting on, or thinking with a false belief for the organizations they lead.

CRITICAL THINKING IN ACQUISITION

“ . . . increased emphasis on helping acquisition professionals think critically and make better decisions as they confront the myriad, complex situations we encounter in defense acquisition.”

“nothing is more important to our success than our professional ability to understand, think critically, and make sound decisions about the complex and often highly technical matters defense acquisition confronts.”

VUCA ENVIRONMENT

V U C A

VOLATILITY

Equity, bond and currency market volatility; the lack of stability and predictability.

UNCERTAINTY

The potential change in the inflation index calculation, the potential switch to "smoothing" for pension funds calculating their recovery plan; the lack of ability to foresee what major changes might come.

COMPLEXITY

In understanding these financial markets in the era of the "new normal". The proliferation and increasing complexity of new financial instruments and regulation to deal with increasingly complex markets, moving in ways experts have never seen before.

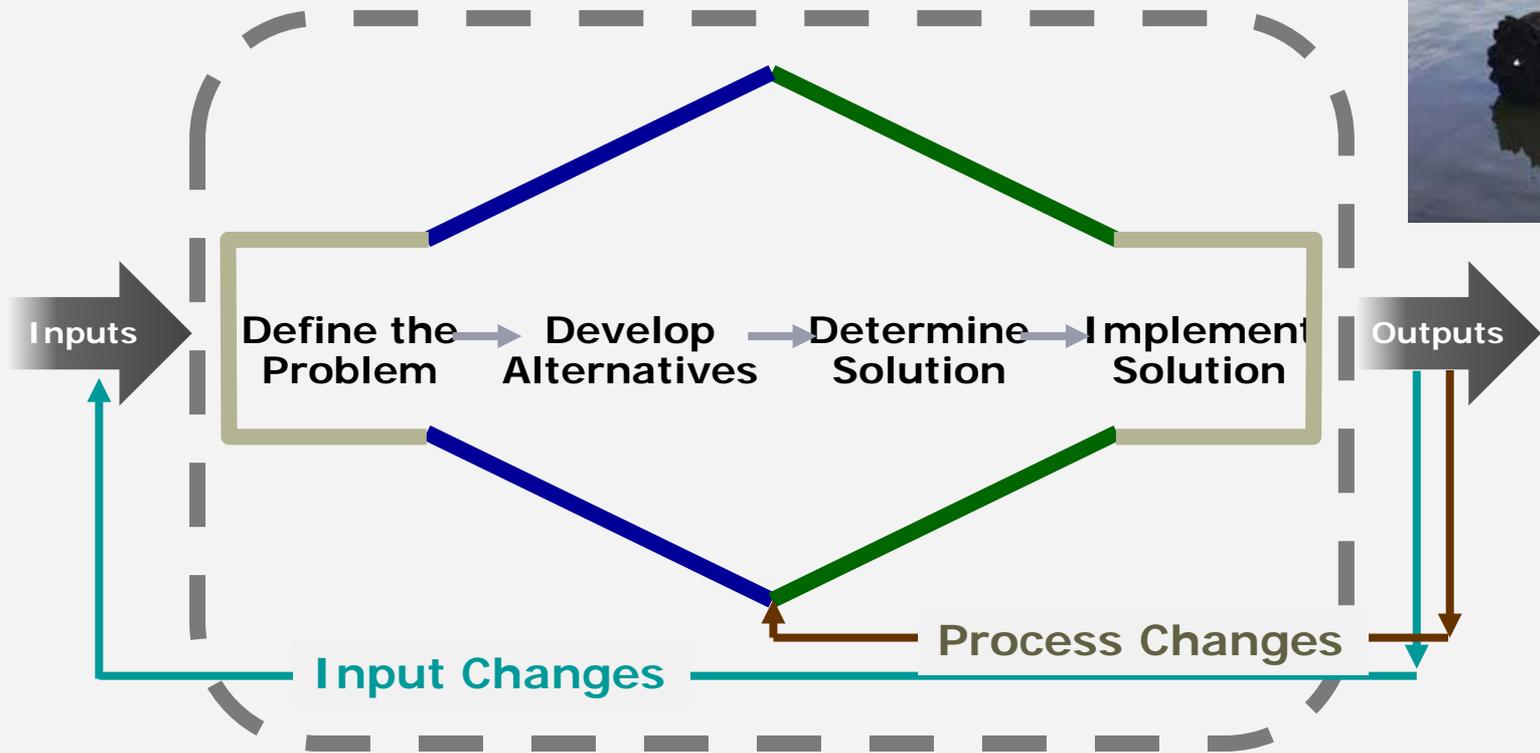
AMBIGUITY

The resulting feeling. Is this the great rotation from bonds to equities? Or will bond yields stay low for longer? What is the best course of action?



DECISION-MAKING AND CRITICAL THINKING

Decision-Making//Problem-Solving Process





THINKING/DECISION MAKING TOOLS

Affinity Diagram

Force Field Analysis

Brainstorming

If . . . Then

Benchmarking

Imagineering

Cause and Effect Diagram

PERT Chart

Five Whys

Role Playing



CRITICAL THINKING IN ACQUISITION

The first responsibility of the acquisition workforce is to think. We need to be true professionals who apply our education, training and experience through analysis and creative, informed thought to address our daily decisions. Our workforce should be encouraged by leaders to think and not to automatically default to a perceived “school solution” just because it is expected to be approved more easily.

Mr. Frank Kendall

The Optimal Program Structure
ATL Magazine, July 2012

Think ... don't default to “school solutions.”



AN INTEGRATED RELATIONSHIP

Understanding the Relationship
Between Critical and Creative
Thinking



CRITICAL AND CREATIVE THINKING

“The critical & creative functions of the mind are so interwoven that neither can be separated from the other without an essential loss to both.”

anonymous



WEBSTER'S SYNONYMS

“The word ‘critical’ when applied to persons who judge and to their judgments, not only *may*, but in very precise use *does*, imply an effort to see a thing clearly and truly so that not only the good in it may be distinguished from the bad and the perfect from the imperfect, but also that it as a whole may be fairly judged and valued.”

WEBSTER'S NEW WORLD DICTIONARY

The word 'creative' has three interrelated meanings:

1. Creating or able to create,
2. Having or showing imagination or artistic or intellectual inventiveness
3. Stimulating the imagination and inventive powers



CRITICAL AND CREATIVE THINKING

Critical and creative thought are both achievements of thought.

Criticality assesses; creativity originates

Criticality masters a process of assessing or judging; creativity masters a process of making or producing

CRITICAL AND CREATIVE THINKING

In critical thinking we assess thinking to make improvements. Thus critical thinking has a creative component: to produce a better product of thought

In creative thinking we generate thinking based on our sense of how to make things better. Thus creative thinking has a critical component: to reshape thinking in keeping with criteria of excellence.

Intellectual discipline and rigor are at home with originality and productivity



CRITICAL AND CREATIVE THINKING

Critical thinking without a creative output is merely negative thinking.

Creative thinking without a critical component is merely novel thinking.

Achieving useful products of one's thinking requires a sense of how to make, or recast, one's thinking at a higher level.





CRITICAL AND CREATIVE THINKING

Achieving quality requires standards of quality---and hence criticality

To achieve any challenging end, we must have: criteria, gauges, measures, models, principles, standards, or tests to use in judging whether we are approaching that end.





CRITICAL AND CREATIVE THINKING

We don't achieve excellence in thinking with no end in view. We design for a reason

With standards that enable us to generate a product that meets crucial criteria. Our creative thinking must be tested against critical standards.



CRITICAL AND CREATIVE THINKING

The judiciousness of our thought represents its criticality and the generative power of our thought represents its creativity.

Generativeness must be married to judiciousness to achieve excellence.

Every genuine act of figuring out anything is a new making, a new series of creative acts, however mundane. To come to understand anything requires that the mind construct new connections in the mind.

CRITICAL AND CREATIVE THINKING

No one can be given knowledge or understanding; they must all create or construct it for themselves. The mind learns by acts of construction in the mind. At even the most fundamental level of learning, at the earliest age of learning, the learner must actively construct (create) to learn. We must abandon the notion that knowledge can be “transmitted” without active creative construction on the part of the learner.



CRITICAL AND CREATIVE THINKING

In understanding the mundane nature of critical and creative thinking, creativity should not be mystified.

Much of what appears to be inexplicable can be explained by mundane accounts. The great creative thinkers were great critical thinkers, and vice versa. The interrelation and interdependence holds for all learners and thinkers at all levels.





CRITICAL AND CREATIVE THINKING

Stimulating intellectual work develops the intellect as both creator and evaluator: as a creator that evaluates and as an evaluator that creates. The result is fitness of mind, comprehensive intellectual excellence.





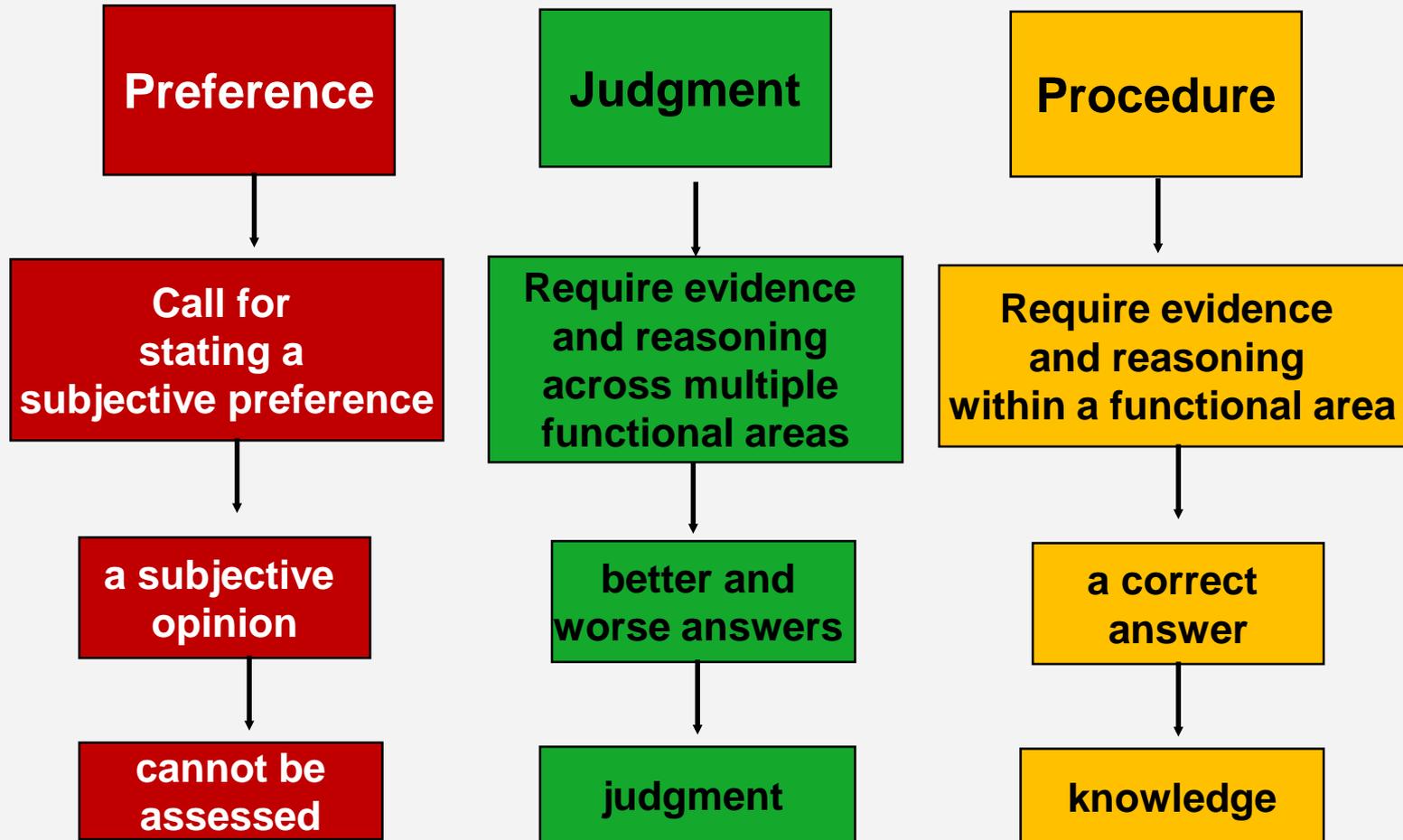
CRITICAL AND CREATIVE THINKING

A Necessary Condition to the
Development of Critical and
Creative Thinking is:

A Questioning Mind



THREE TYPES OF QUESTIONS



DIFFERENTIATING AMONG QUESTION TYPES

Are there relevant facts we need to consider?

- If there are no quantifiable facts to consider, then the issue is a matter of personal preference.
- If the facts can be interpreted in different ways, then it is a question of judgment.
- If the facts settle the question, then the issue is one of procedures.



QUESTIONS

Questions define tasks, express problems and delineate issues.

Answers, on the other hand, often signal a FULL STOP in thought.

“If I had an hour to solve a problem I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions.” Albert Einstein

CRITICAL THINKING IN ACQUISITION

What is the purpose of the Defense Acquisition Workforce?

What key questions should we be asking as Acquisition Professionals (that should drive our analysis)?

What information should we use to determine how we should approach decisions?

What other viewpoints should we consider when defining the problem or making a decision?

What key ideas or concepts should guide our analysis?

If we make a decision, what are the important implications – for our warfighters?

What should we assume, or take for granted, about what it means to be an Acquisition Professional

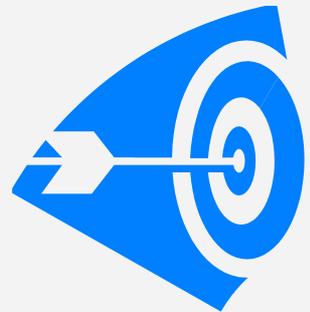


THINK

“Did you ever stop to think, and forget to start again?” — Winnie the Pooh

KNOW YOUR SUSCEPTIBILITIES

Just as a skilled archer's aim must be adjusted to compensate for the wind, so too must a critical thinker's focus include awareness of assumptions, blind spots, and personal biases.



THE AFFECT ON CRITICAL THINKING?

Instinct

Natural or inherent aptitude, impulse, or capacity

Intuition

Quick and ready insights based on past experiences

Bias

An inclination of temperament or distortion in thinking that leads to a pattern of judgment

■ IMPORTANCE OF ASSUMPTIONS

You frame what you do based on them

- What / the Why / the How
- Concepts
- Points of View / Perspectives
- Your personal "Rules-of-Thumb" (heuristics)
- Context
- Implications
- Expectations
- Wisdom from Above

Which of these do YOU rely on the most?

MORE ON ASSUMPTIONS

The best defense is awareness — uncover thinking errors before they become errors in judgment

“At every stage of the decision-making process, misperceptions, biases, and other tricks of the mind can influence the choices we make”

How? By communicating clearly and building tests and discipline into your decision-making process

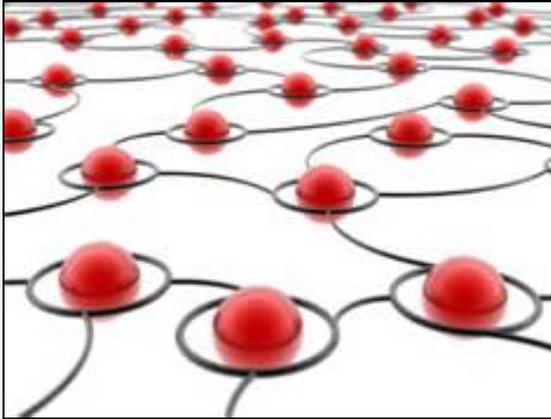


HOW DO YOU CONNECT DOTS?

**What do
you
think?**

Statement #1: To make sense of a situation, we draw inferences from the data

Statement #2: We make sense of data by fitting them into stories and other frames, but the reverse also happens: our frames determine what counts as data



What data or metrics do you (or should you) collect to help you quickly determine the health of your organization?

Source: Gary Klein *Streetlights and Shadows*; Klein *Sources of Power*; Klein *Working Minds*

A CULTURE OF CRITICAL THINKING

Knowledge is not enough to create
wisdom

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graph BT; A[Ability to acquire and apply the best knowledge] --> B[Effective Outcomes]; C[Willingness to assess and improve thinking skills] --> B;
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Effective Outcomes

Ability to acquire and
apply the best knowledge

Willingness to assess and
improve thinking skills

COMMUNICATIONS SKILLS

Critical Listening: Listening to maximize the accurate understanding of what others say



Critical Reading: An active, intellectually engaged process of reading, interpreting and understanding text



Critical Writing: Arranging our ideas in a logical order to express ourselves in a disciplined manner



COMMUNICATING CLEARLY

- Say what you Mean, Mean what you Say
- Use Examples (sea stories, similes, metaphors) to bring people along
- Encourage Broad Team Thinking
- Use Role Playing (Perspectives)
- Ask Clarifying Questions

**Seek first to understand,
then to be understood**

STAGES OF CRITICAL THINKING

Good habits of thought are becoming second nature

I advance in keeping with my practice

I recognize the need for regular practice



I try to improve but without regular practice

I am faced with significant problems in my thinking

I am unaware of significant problems in my thinking



Critical Thinking: The Possibilities are Endless



We landed a man on the moon on 20 July 1969 only ...think of all the Critical Thinking it required

DAU RESOURCES

Websites

BBP 3.0 <http://bbp.dau.mil/>

Leadership and Management Tools and Resources

<https://acc.dau.mil/CommunityBrowser.aspx?id=527456&lang=en-US>

Program Managers e-Tool Kit <https://pmtoolkit.dau.mil/>

Continuous Learning Modules

HBS 303 Leading Team with Emotional Intelligence

HBS 304 Managing Difficult Conversations

HBS 409 Decision Making

HBS 416 Feedback Essentials

HBS 421 Innovation and Creativity

HBS 434 Process Improvement

HBS 437 Strategic Thinking

Workshops

WSD 004 Myers Briggs Type Indicator (MBTI) Workshop

WSD 005 Crucial Conversations®

WSD 011 Critical Thinking for Decision Makers and Teams

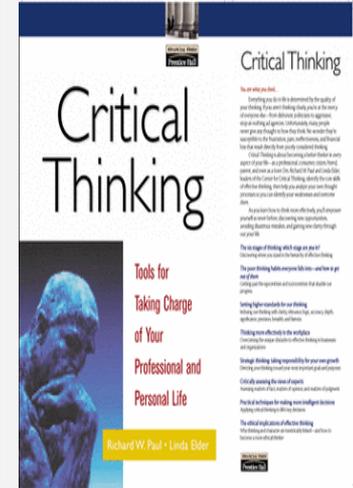
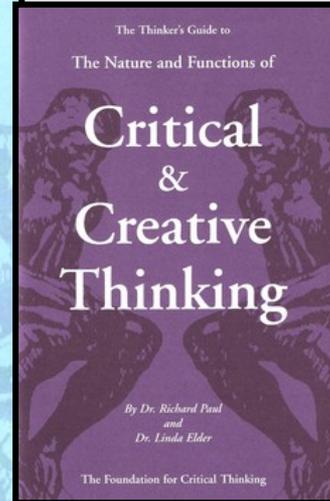
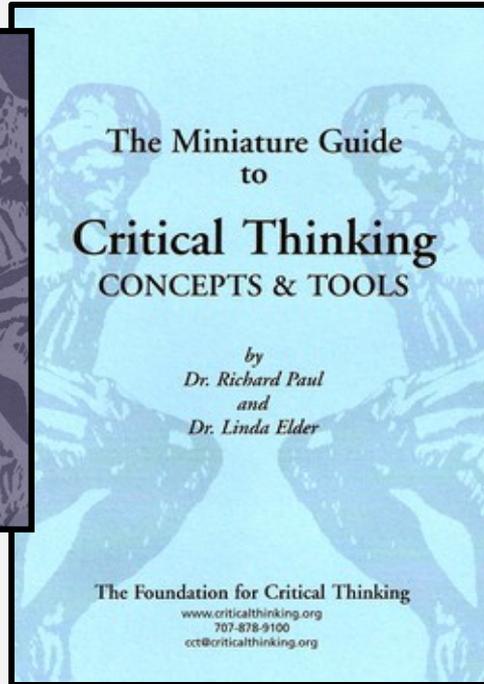
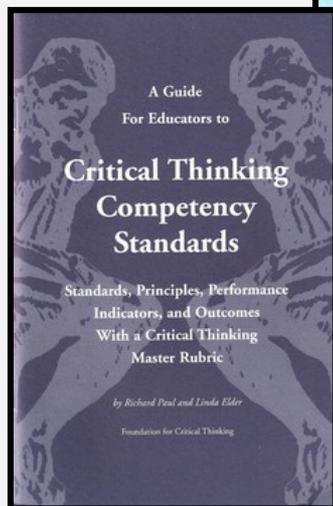
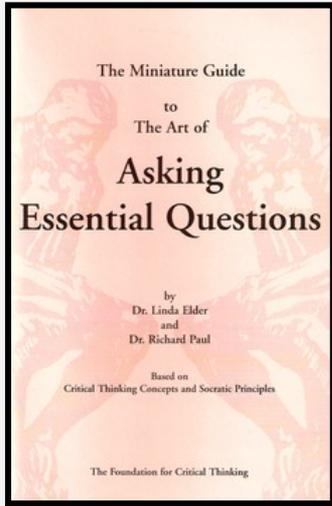
WSD 014 Introduction to Critical Thinking: Six Thinking Hats Workshop

WSE 002 Problem Solving Techniques for Quality Improvement (PSTQ)

WSM 007 Stakeholder Management



A WEALTH OF REFERENCES



The Foundation for Critical Thinking: www.criticalthinking.org

QUESTIONS

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FALLACIES

What is a fallacy?

An argument that appears sound, at first glance, but contains a flaw in reasoning which makes it unsound

THINKING TOOLS: AFFINITY DIAGRAM

Affinity Diagram: An affinity diagram is a technique for organizing verbal information into a visual pattern. An affinity diagram starts with specific ideas and helps you work toward broad categories.

Affinity diagrams can help you:

- Organize and give structure to a list of factors that contribute to a problem.
- Identify key areas where improvement is most needed.

THINKING TOOLS: BRAINSTORMING

A group activity designed to generate spontaneous ideas without risk. Offers a lot of information in a short time, stimulating creative thought and teamwork.

Brainstorming is a group technique for generating a “shopping list” of ideas about a specific problem or topic. It can help you:

- Generate a variety of ideas in a short time.
- Produce new, creative ideas.

THINKING TOOLS: BENCHMARKING

Benchmarking is the process of measuring products, services, and practices against the toughest competitors or those known as leaders in their field. Benchmarking can help you:

- Understand how you compare with similar organizations.
- Identify areas for process improvement

How to do it:

Identify the process to be benchmarked.

Study other organizations.

Compare and evaluate.

THINKING TOOLS: FISH BONE DIAGRAM

The cause and effect diagram is a graphical illustration of the relationship between a problem or goal (the effect) and its potential contributors (the causes). Sometimes called the “Cause and Effect” or “Ishikawa” diagram.

Used for analyzing problems, a cause and effect diagram can help:

- determine root causes of a given effect
- identify areas where there is a lack of data.

THINKING TOOLS: FIVE WHYS

Five Whys is a technique for discovering the root cause (or causes) of a problem by repeatedly asking the question, “Why?” Five is an arbitrary figure. You never know exactly how many times you’ll have to ask why.

The Five Whys technique helps you:

- Identify the root cause(s) of a problem.
- See how different causes of a problem might be related.

THINKING TOOLS:

FORCE FIELD ANALYSIS

A Force Field Analysis (FFA) illustrates the relationship and significance of factors that may influence the problem or goal. This analysis helps us better understand driving and restraining forces.

Used for making decisions, force field analysis can help:

- identify realistic improvement opportunities;
- develop systematic action plan for problem resolution; and
- create criteria for evaluating effectiveness of improvement actions.

THINKING TOOLS: IF ... THEN

“If ... Then” is a project tool used for prediction of consequences of proposed changes. It is used when a team or individual needs a safe method to compare and study the ramifications of proposed changes in a system.

If ... Then:

- allows people to look further into the future rather than just identifying the next step.
- helps everyone in an improvement process understand the ramifications of change.
- can be used to prioritize suggested improvement by studying the consequences of change.

THINKING TOOLS: IMAGINEERING

Imagineering is a brainstorming technique used to identify what an individual or group envisions as the perfect project, process, or system. Imagineering can be used when individuals or groups do not have shared vision of what the perfect project, process, or system will look like. It can help identify characteristics of a vision, goal, or aim. Another term used for Imagineering is idealized redesign.

Imagineering:

- identifies individual perceptions of what perfect is and aids in the construction of a shared vision among members of an organization
- Is a great tool to use when people are having trouble envisioning a perfect outcome they may be working toward.

THINKING TOOLS: PERT CHART

Program Evaluation and Review Technique (PERT) Chart reveals which items can be done at the same time, and reduces delays by showing the sequence of tasks to be performed. PERT Charts are valuable for use in management scheduling, planning, and mapping the progress of a process.

PERT Charts:

- give each person a picture of the whole project, defining their job and position.
- increase efficiency by revealing which tasks can be done simultaneously.
- are great for wicked problems where you are using systems thinking and project management.

CRITICAL VS. CREATIVE THINKING

Critical Thinking	Creative Thinking
analytic	generative
convergent	divergent
vertical	lateral
probability	possibility
judgment	suspended judgment
focused	diffuse
objective	subjective
answer	an answer
left brain	right brain
verbal	visual
linear	associative
reasoning	richness, novelty
yes but	yes and



TEAM DISCUSSION QUESTIONS

Is there a thread connecting Critical Thinking and Creative Thinking? If so, what is it?

What would be the outcome if you applied the tenets of Critical Thinking to ethical decision making?

Can you identify at least one process in your work environment where applying Critical Thinking would result in a different business decision? If so, what is it?

