Systems Engineering and Critical Reflection

The Application of Brookfield and Goffman to the Common Experiences of Systems Engineers

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Critical Reflection

- Odd subject for systems engineers
  - Not a technical topic
  - Soft subject about being human
  - Applicable to other parts of our lives

- About the hard questions we typically avoid

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Critical Reflection

- Who are we?

- Why study SEs?

- What do others think of us?

- What do we think about ourselves?

- How do we become better systems engineers?

Introduction

- Chucks Madhav

Content

- Define critical reflection
- Conduct critical reflection examples
- Personal and business benefits

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Use critical Reflection as a tool to become better Systems Engineers

What Is CR?

Critical Reflections Definition

- Subset of our thinking and reflection process
- Has a specific meaning and has a specific set of outcomes
  - Reveals who has the power
  - Improves understanding of the subject and complexity
  - Frees us from emotional reactions

Simplified Definition

- Critical reflection is our
  - Ability to evaluate our assumptions
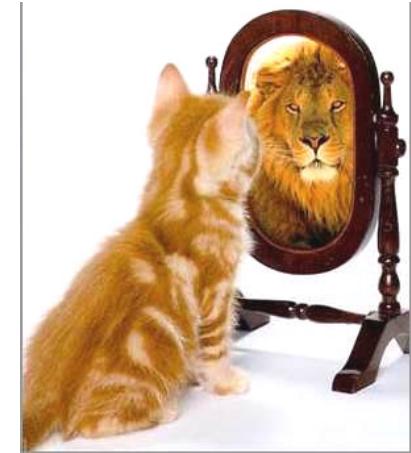 - Come to a better and clearer understanding of ourselves and our environment through self-education

You

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Critical reflection is about improving ourselves by updating our assumptions

Critical Reflection Process

- Evaluate our assumptions
- Ask ourselves the tough questions
- Identify who has the power – who benefits, who loses, and who suffers
  - Note: Power may be hidden and require persistent reflection to identify
- Develop a new set of assumptions – a new way of looking at the issue/ourselves

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Why Should We Do Critical Reflection

- Reduces
  - Kidnapped by emotions
  - Bad judgment, make poor decisions
  - Reaction/action on unexamined or bad assumptions
  - Working without thinking
  - Belief that we know everything and that we are always right

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Demystify the Issue

Assumptions

- Assumptions are the taken-for-granted beliefs, ideas, and understanding about our world and our place within it

- These assumptions seem so obvious to us that we do not believe we have a need to state them explicitly

Thinking-Man**SUZI CALLIHAM** \creative commons

Example

New Job

- Transferred to a new project/company
- Everyone else is an expert
- Feel like a novice / insecure
- Worry others may find out about your insecurity
- Pretend to know what you are doing
- Causes stress and worry

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Ask The Following Questions

- Who has the power?
- What are my assumptions? Are these right?
- What is my need?
- What is the real issue?
- What am I missing?
- What should be my new assumption?

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New Ideas Rejected

- Join a new project
- Notice things that could be improved
- Manager says "that's not how we do things"
- Other don't want to listen to your ideas
- You work harder to convince them
- Over time, they stop including you in their meetings
- You feel rejected

Ask The Following Questions

- Who has the power?

- What are my assumptions? Are these right?

- What is my need?

- What is the real issue?

- What am I missing?

- Is there any truth to what others are saying?

- What is my new assumption?

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Path Keeps Changing

- You have planned everything and have lots of experience from past successes

- You do not expect any problems

- Progress does not match plan

- Unexpected problems creep in

- Two steps forward, one step back

- Sometimes you feel like nothing is going right

- You are frustrated and angry

Ask The Following Questions

- What are my assumptions? Are these right?
  - Politics, personalities, and unintended consequences?
- What is my need?
- What is the real issue?
- What am I missing?
- Is there any truth to what others are saying?
- What are your new assumptions?

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Common Assumptions

1. Systems engineering as a vocation
2. The perfect ten syndrome
3. Deep space nine
4. Must meet everyone's needs

1. Systems Engineering As A Vocation

- Requires selfless service
- Take on more and more
- Cannot say "no" to anything related to systems engineering
- Leads to unbearable workloads, sub-par work conditions, and insufficient resources

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2. The Perfect Ten

- Be the best at everything
- If we are perfect, we will be more likable, others will respect us more
- Sets high expectations we are unable to meet
- Unable to handle feedback and criticism
- Unable to seek out feedback for improvement
- We hide our feelings of incompetence, guilt, and failure

3. Deep Space Nine

- Assuming the answer must be out there somewhere

- Looking for the perfect solution

- What we find cannot be directly applied to our problem

- Look long and hard for answers that may not be out there

- Blame ourselves for not finding the answer

4. Must Meet Everyone's Needs

- End up with too many commitments
- An unattainable goal
- Leave us feeling incompetent and demoralized
- Could be harmful to us in the long run. May leave us
  - Unsatisfied
  - Overworked

Why Conduct Critical Reflection?

Benefits Of Critical Reflection

- Adds to coping skills
- Self-determined personal and professional path
- Able to navigate towards our success as systems engineers
- Account for the risks, challenges, and setbacks of our work
- Learn from our experiences
- Greater appreciation for our work

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How Can It Help Us?

- Leads to a well-grounded rationale for our systems engineering practices and our personal behavior as systems engineers

- Helps us
  - make informed decisions and take planned actions
  - improve our problem solving skills
  - manage ourselves under changing conditions

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How Can It Help Us?

- Frees us from dogmatic ideologies
- Makes it easier to work with others
- Creates a leadership opportunity to help others navigate their work
- Reduces emotional load that may be impacting and consuming our thinking
- Better able to identify and avoid the useless things that interfere with our progress

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A Business Case For Critical Reflection

- Less management and caretaking
- Independent, highly motivated, and better-aligned workforce
- Highly productive, self-directed, and self-motivated systems engineers
- Creative and less distracted employees
- A workforce can better navigate the challenges of engineering and changes in business conditions

More Details In Paper

- Further definition of critical Reflection
- Advantages to applying critical reflection
- Pitfalls of critical reflection
- References

Questions

References

Brookfield, S. (1995). *Becoming a Critically Reflective Teacher*. San Francisco: Jossey Bass.

Critical Theory. (n.d.). In Wikipedia. Retrieved October 10, 2015, from https://en.wikipedia.org/wiki/Critical_theory

Goffman, E. (1961). *Asylums: Essays on the social situations of mental patients and other inmates*. New York: Anchor Books.

Backup

Why is it Difficult to Understand Critical Reflection

- Not taught because it transcends our stove-piped method of subject teaching

- Confusing terminology; two words that mean something very different when put together
  - CR is specifically about you and your understanding of yourself

- We easily lump it with other types of thinking and analysis

- Most difficult of all thinking since it may involve things we do not want to admit about ourselves

A Few Realizations

- Reality is a construct

- Change in constant

- People and things are more complicated than they seem

- That systems engineering is more than a career, it provides us with the language, processes, and experiences that creates and gives meaning to our lives

- Power complicates all human relationships

- The assumptions that got us here may conspire against us in the future

- Just because we cannot control the chaos around us does not mean we are incompetent