Super Models, Mental Models, and Interdependent Value Streams
(Ideas for How to Improve Teamwork)

Presented by Bill Bellows

Associate Fellow
InThinking Network, Aerojet Rocketdyne
Email: william.bellows@rocket.com, Cell: 818-519-8209

Cal Poly San Luis Obispo
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Abstract

The aim of this presentation is to present a proposal for “better thinking about thinking” as it applies to how resources are managed, both individually and collectively. Beginning with a series of seemingly simple questions, this session offer insights into how Genichi Taguchi’s ideas on “Quality Loss” have been integrated with W. Edwards Deming’s “New Economics” to establish a new approach to resource management, termed “Purposeful Resource Management.” The foundation of a radical departure from “Reflexive Resource Management” lies in a transformation of the way we think about our thinking.
Agenda

• Actions & Interactions
• Quiz
• Modes of Thinking
• Purposeful Resource Management
• Opportunities to Act
• Opportunities to Think
Thinking Together…

Increase individual awareness on thinking (InThinking)

Evolve the way we work together

Evolve the way we learn together

Evolve the way we run our organizations
Product / Program / Project

As Conceived

The top 5 uses:
1. Replacing the screwdriver
2. Pilot holes
3. Hole saw
4. Drywall installation
5. Concrete
Product / Program / Project

As Conceived

As Managed
Super Models
Mental Models

…ideologies are the shared framework of mental models that groups of individuals possess that provide both an interpretation of the environment and a prescription as to how that environment should be structured.

Source: Shared Mental Models, Denzau, A. and D. North
Mental Models

...mental models are the internal representations that individual cognitive systems create to interpret the environment and the institutions are the external (to the mind) mechanisms individuals create to structure and order the environment.

Source: Shared Mental Models, Denzau, A. and D. North
Mental Models

Essentially, all models are wrong, but some are useful.

Professor George Box
Resource Management Model

Ownership

Proactive

Reactive

“Mine”

“Ours”
Resource Management

Proactive – applying effort while “good,” “OK,” “well,” or “correct” is happening

Reactive – applying effort after “bad,” “not OK,” “sick,” or “incorrect” happens
Resource Management

“An ounce of prevention is worth a pound of cure”

“A stitch in time saves nine”

“Every dollar we invest in high-quality early education can save more than $7 later on”
Perception & Thinking

“What we see depends on what we thought before we looked.”

Myron Tribus
Actions & Interactions

“A system is never the sum of its parts. It is the product of the interactions of its parts.................the art of managing interactions is very different indeed than the management of actions, and history requires this transition for effective management.”

Russ Ackoff
Actions & Interactions

**Actions - Parts**

**Interactions - Gaps**
Quiz
Horse Trading

“The secret to selling a horse is…”

Mark Twain
Time Management

How much time is spent discussing parts, tasks, activities, program milestones, etc. which are good and completed on time?

How much time is spent studying for the final exam, questions from weekly quizzes and the mid-term which were correct?
Time Management
Buying Watermelons and Briquettes
Grades

What letter grade is required for all purchased parts and services, as well as tasks completed internally?
Task Flow

Handoff Requirements?

D → E → F

I ← H ← G

P
Task Grades
Task Grades
Task Management
Macro System Model
Macro System Model

Task Completion

- Step 1
- Step 2
- Step N

**GOOD**

Task A

- Step 1
- Step 2
- Step N

**GOOD**

Task B

- Step 1
- Step 2
- Step N

**GOOD**

Task O

- Step 1
- Step 2
- Step N

**GOOD**

Task P

Assembly

- FIT

Sub-Assembly 1

- FIT

Sub-Assembly 2

Final Assembly
Task Grades
Interactions, not Actions

One inspiration for challenging the mental model of “good parts” is the 1983 discovery by Ford Motor Company of a dramatic difference in warranty claims between automatic transmissions designed by Ford and built in two locations, one in Batavia, Ohio, the other by Mazda in Japan. Much to the surprise of Ford’s corporate warranty office...
Interactions, not Actions

the number of complaints associated with the erratic shifting of the transmissions produced in Batavia were a factor of 3 greater than the complaints against the transmissions built by Mazda.

Upon close examination, Ford realized that Mazda’s manufacturing focus was to actively manage the gap between the outer diameter…
Interactions, not Actions

of the valves within the transmissions and the corresponding diameter of the valve bore. In doing so, Mazda’s efforts realized the existence of an ideal gap, resulting from ideal ("target") values for both the bore and valve diameters, with an awareness that variation in gap size matters.
Examples of Action Management

**BORE DIAMETER**
- MIN
- MAX

**PAGE COUNT**
- 20
- 25

**VALVE DIAMETER**
- MIN
- MAX

**DISTANCE FROM THE DOOR**
- 0 FT
- 100 FT
Macro System
Action Management

HOLE DIAMETER

MIN = MAX

OUTER DIAMETER

MIN = MAX

PAGE COUNT

20 = 25

DISTANCE FROM THE DOOR

0 FT = 100 FT

Bill Bellows, william.bellows@rocket.com, 818-519-8209
Resource Management Contrast

- **BORE DIAMETER**
  - MIN
  - MAX

- **VALVE DIAMETER**
  - MIN
  - MAX

- **BORE DIAMETER**
  - MIN
  - MAX

- **VALVE DIAMETER**
  - MIN
  - MAX
Resource Management Contrast

BORE DIAMETER

MIND THE PART

MIN MAX

MIND THE GAP

MIN MAX
Isogrids
Taguchi’s Quality Loss Function

“Loss to Society”

Lower Specification Limit

TARGET (desired value of parameter)

Upper Specification Limit

“Loss to Society”
Micro System Model

Task Completion

- Step 1
- Step 2
- Step N

- Task A
  - Degrees of GOOD

- Task B

- Task O

- Task P

Assembly

- Degrees of FIT
  - Sub-Assembly 1

- Degrees of FIT
  - Sub-Assembly 2

Final Assembly

- Degrees of FIT
  - Product Assembly

- Degrees of WORKS

Micro System Model

Bill Bellows, william.bellows@rocket.com, 818-519-8209
Modes of Thinking
Modes of Thinking

- **Categories**
  - Absolutes
  - Discrete / Digital
  - How many students at UCLA? How many faculty?

- **Continuum**
  - Relative
  - Wholeness / Analog
  - Better/Faster/Cheaper/Smarter/etc.
  - Students are different, faculty are different
Modes of Thinking

- **Categories**
  - Absolutes
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Purposeful Resource Management
Resource Management

Activity

Proactive

Reactive

Ownership

“Mine”

“Ours”

REFLEXIVE

PURPOSEFUL

PURPOSEFUL
Opportunities to Act
Opportunities to Act
(differences that make a difference)

- Category Thinking vs. Continuum Thinking
- Macro Systems vs. Micro Systems
- Attention to “Good” elements
- Manage interactions, not actions
Perception & Thinking

“How the world we perceive works depends on how we think.

The world we perceive is a world we bring forth through our thinking.”

H. Thomas Johnson

Source: (article) A Different Perspective on Quality, Johnson, 1997
Opportunities to Think
An InThinking Roadmap
AKA The Hotel California

Leading Systems
(12 hrs)
(AKA the “Organization Workshop”)

The New Economics Study Session
(14 hrs)

Managing Variation as a System
(9 hrs)

Resource Leadership
(8 hrs)

InThinking Together
(9 hrs)
(Formerly known as “ET” and “Understanding Variation”)

Kepner-Tregoe
(24 hrs)
(Problem Solving and Decision Making)

Six Thinking Hats
(8 hrs)

Lateral Thinking
(16 hrs)

DATT
(16 hrs)

Understanding Taguchi Methods – Part 1
(40 hrs)

Understanding Taguchi Methods – Part 2
(40 hrs)

Design of Experiments & Taguchi Methods – An Overview
(16 hrs)

Prerequisites

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TARGET AUDIENCES: Members of management, individual contributors, suppliers, and customers who are providing leadership in InThinking activities. Family members, "members of the community" and students are welcome to attend. "Members of the community" are citizens who are involved full or part time, or in a volunteer capacity, in community related work. Examples include hospital employees, teachers, religious leaders, scouting leaders, and youth sports volunteers.
An InThinking Roadmap
AKA The Hotel California

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OD (4th week, Th/Fri, 12-2pm PT)

BTA…webinar (2nd week, Th/11:30-1pm PT)

Design of Experiments & Taguchi Methods – An Overview (16 hrs)

Understanding Taguchi Methods – Part 1 (40 hrs)

Understanding Taguchi Methods – Part 2 (40 hrs)

Distance Learning Opportunities

Prerequisites

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Monthly Announcements

Aerojet Rocketdyne's Better Thinking About...Webinar Announcement

Good morning from the Los Angeles campus of Aerojet Rocketdyne, located in Canoga Park, California, on the western end of the San Fernando Valley.

In our first session of 2014, Doug Krug, from Centennial, presented on Thursday, February 13th, from 11:30-1pm. Doug's topic is "Better Thinking About Leadership," with "Living in the Question," a fitting prelude to this year's In Thinking Together Seminar, set for June 18-22 in Los Angeles, which "Succeed with Inquiry: Insights, Knowledge, Action."

As for his background, Doug's primary role is helping top teams create and sustain the focus and alignment necessary to successfully deal with today's most pressing leadership challenges. This includes three Governor's Cabinets, the top executive education firm in the world, and two of the world's largest and fastest growing companies.

Aerojet Rocketdyne’s Ongoing Discussion Announcement

Good morning from the Los Angeles campus of Aerojet Rocketdyne, located in Canoga Park, California, on the western end of the San Fernando Valley.

Aerojet Rocketdyne’s InThinking Network welcomes Gipsie Ranney, from Brentwood, Tennessee, to lead our first Ongoing Discussion conference call of 2014 on January 30th and 31st and also our 169th session since we began in January 2000. As a topic, Gipsie has selected "What World Are We In?" in her sixth time with us as a Thought Leader.

Gipsie has been a friend and a source of inspiration for making a difference "from where we are" since our paths first crossed in the mid-1990s. I don't recall where we met, but I do recall attending a 2-day "Walter Shewhart" seminar she co-presented at Fordham University.
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<tr>
<th>Macro System Model</th>
<th>Micro System Model</th>
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<tbody>
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<td><em>(Part Work)</em></td>
<td><em>(Team Work)</em></td>
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<td>Quality Focus:</td>
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<td>Conformance</td>
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<td>Between Parts</td>
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<td>Goal: Defect-Free</td>
<td><em>(Target Thinking)</em></td>
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<td>Parts</td>
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<td>Activities:</td>
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<td>Easy to Understand</td>
<td>Difficult to Master</td>
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InThinking Terms & Concepts

- Category and Continuum Thinking
- An InThinking Roadmap
- Mixed Model Management
  - Macro System and Micro System Models
- Mind the Gap – Mind the Part
- Purposeful and Reflexive Resource Management
- Purposeful Resource Leadership
- Management by Extremes
- Red Pen and Blue Pen Companies
- One-Line and Two-Line Thinking
- Investment Thinking
- Paradigms A, B, C, D, and E
- Continuous and Connected Learning