

Systems Thinking & Problem Solving:

(Understanding Our Most Important Messes)

Reinforcing and Balancing Loops
Exponential Improvement
TQM and Systems Thinking

MGM315 4/28/04

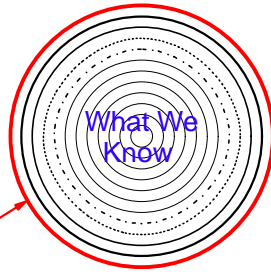
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It Seems Overwhelming

- "There has been an alarming increase in the number of things I know nothing about."

Ashley Brilliant

What We Don't Know



Edge of Awareness of What We Don't Know

M. Scott Peck, *The Road Less Traveled*, 1978, p. 137

Systems Thinking: Fad or Enduring Practice?

- Enduring Practice:
it's based on principles fundamental to the nature of reality
- ➔ feedback (... feedback is ubiquitous)
- ➔ nature integrates (... does integral calculus)
- ➔ primacy of the whole (... systems have emergent properties)
- ➔ our instincts fail us when we face dynamically complex problems (... multiple feedbacks with delays)
- ➔ the generative power of language (languages and tools change the user)
- ➔ reality is objective and subjective (... not everything that's important can be measured, e.g., creativity, morale, burnout, ...)
- ➔ interdependence and the collective nature of self (we exist both as individuals and as part of community).

... but it's not as risky as this ...

Indeed:
"The ability to learn
faster than your
competitors
may be the only
sustainable
competitive
advantage."

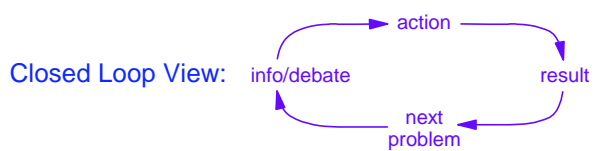
**Peter Senge, quoting
Arie de Geus, in
The Fifth Discipline,
1990**

Feedback Loops & the Building Blocks: Reinforcing and Balancing Loops

Language Helps Us Think

The way we think about the world
depends on our language.

Open Loop View: info/debate → action → result



Exponential Improvement

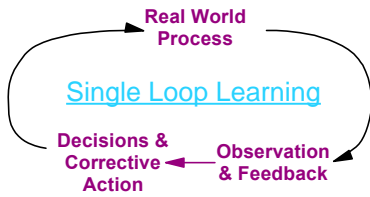
Getting Quality the Old-Fashioned Way

**Improvement:
Why We Favor the Short-term**

- "Getting Quality the Old-Fashioned Way:
Self-Confirming Attributions in the
Dynamics of Process Improvement"

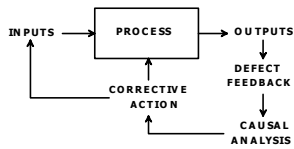
Nelson Repenning and John Sterman
Sloan School of Management
<http://web.mit.edu/jsterman/www/>

Single Loop Learning

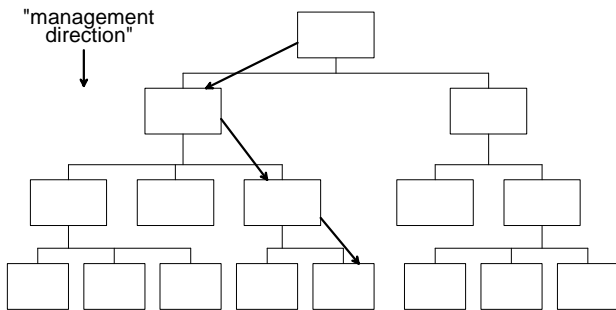


SEI Capability Maturity Model primary evaluation factors (continued)

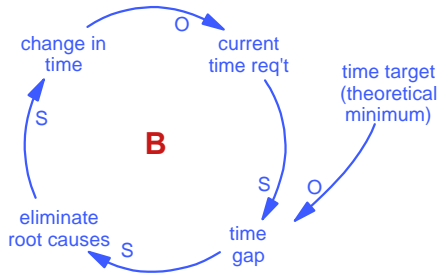
- Level 5. The optimizing level where continuous improvement and organizational learning is possible based on metrics captured in Level 4. Evaluation is relative to whether the organization has:
 - the ability to do causal analysis
 - a formal emphasis on continuous, ongoing process improvement based on metrics



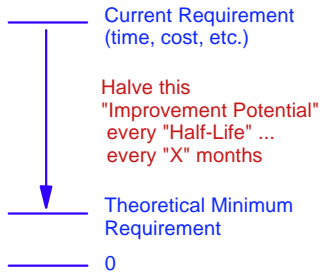
Hierarchical Management



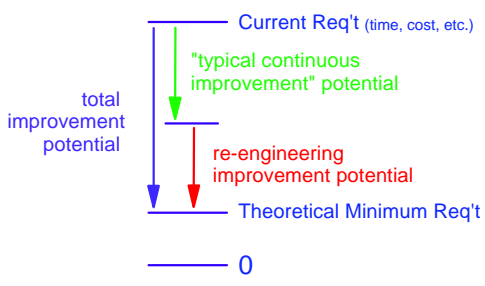
Process Improvement Feedback



Continuous Improvement Potential



Continuous Improvement Potential



Total Quality Management & Systems Thinking

Aspect	TQM	Systems Thinking
Type of Learning	Single-loop	Double-loop
Questions	How?	Why?
Facilitates	Adaptation	Creation
Changes	Processes	Structures, Policies
For Changes in	Ways of doing things	Mental Models
Cause & Effect	Linear	Closed Loop Feedback
Type of Data	Hard, Measurable	Soft, Quantifiable
Type of Inquiry	Analysis	Synthesis

Total Quality Management & Systems Thinking

Aspect	TQM	Systems Thinking
Scope of Problem	Isolate & Solve Problems	Understand & Address Messes
Type of Improvement	Incremental Improvement	Breakthrough Improvement
Direction of Process	Standardized, Convergent	Testing Assumptions, Divergent
People Enhance	Quality of Doing	Quality of Thinking
Develop Understanding	Focus and Convince Using Science	Question and Inquire to Understand
Practitioners Are	Facilitators, Trainers, Teachers, Resources	Theory Builders, Researchers
