Our Expanding Circles of Systems Engineering Influence

An IAB Webinar for IISE

Kevin McManus, Chief Excellence Officer
Great Systems!
www.greatsystems.com

Continuous improvement causes us to think about upstream process not downstream damage control
You are driving down a dark road at night ... Visualize This!

Your accelerator is stuck ...

At a time when we need to be able to see further ahead, we are losing the capability to do so

And your headlights are getting dimmer!!
Three Key Concepts to Explore Today

- Technologies are evolving rapidly that will influence physical, cognitive, and organizational ergonomics
  What technologies are emerging to help improve performance? What technologies might help us NOW?

- Technology is making systems, waste, and innovation more tangible
  How will this trend affect how we as leaders make decisions? If we had better data, how different would the decisions we make be?

- Role and influence options for industrial and systems engineers are expanding
  How can we better utilize the talents of our industrial and systems engineers? What applications have we yet to think of?
How can we best utilize the skills of our industrial and systems engineers?
Who am I?

I won’t show you all 500 of my puzzle pieces, but I will let you take a look at 10 of the more important ones!

- 17 yr. Baldrige Examiner
- Eagle Scout
- IE Dad
- Systems Guy
- Razorback
- Time Freak
- Long distance runner
- Music lover
- Sports fan
- Numbers nut

Plus, I also take continuous improvement way too seriously!! ... or do I?
<table>
<thead>
<tr>
<th>Year</th>
<th>Company Products</th>
<th>Title</th>
<th>New Learnings</th>
<th>Quality Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>Plastic &amp; Metal Toys, Plastic &amp; Metal Pens</td>
<td>IE, IE</td>
<td>Time Studies, Line Layout, Costing, Capital Projects, QCs, Annual planning process, team facilitator</td>
<td>Looking at Crosby, Pay for Ideas / QCs, Self Directed Work Teams, Quality Circles, Suggestion System w/ Teams</td>
</tr>
<tr>
<td>1990</td>
<td>Rubber Roofing, Candy Bars</td>
<td>Senior IE, IE Manager / Production Manager</td>
<td>Front line management, training development</td>
<td>“Build Quality into the Job” Process, “Build Quality into the Job” Process</td>
</tr>
<tr>
<td>2000</td>
<td>Freight Pickup and Delivery, Flavored Syrup</td>
<td>Director of Quality, Plant Manager</td>
<td>Quality process implementation, growth, service work</td>
<td>Quality into the Job, Process Excellence</td>
</tr>
<tr>
<td>Today</td>
<td>Great Systems</td>
<td>Chief Excellence Officer</td>
<td>Intl’ / young workforce, Vast, consistent challenges TapRooT®</td>
<td>Process Excellence</td>
</tr>
</tbody>
</table>

**Mile Posts**
- Completed MBA
- AQP Officer
- 17 Years as an Examiner
**Action Foundation Paradigms**

**COVEY:**
- Interdependence
- Trust
- Discipline
- Win / Win
- Proactive
- Balance
- Synergy

**SENGE:**
- Systems thinking
- Personal mastery
- Mental models
- Shared vision
- Team learning

**DEMING:**
- Systems understanding
- Understanding of variation
- Theory of knowledge
- Psychology

As they are learned, these principles are applied as part of the way one does their job.
Deming’s Profound Knowledge

- Systems Understanding
- Understanding of Variation
- Theory of Knowledge
- Psychology

Profound knowledge is required for sustainability
35 Years of Improvement?

Have We Really Improved That Much?

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It’s tough to sustain great results ...

when you don’t understand the systems that produce them

How can industrial and systems engineers help improve our higher level work systems?
Why Can’t We Go Faster?

If we want to go faster (higher levels of performance), we have to take the plates off.

We ask our people to drive faster, but we leave the restrictor plates on at the same time.

Faulty work systems are similar to restrictor plates on NASCAR vehicles

We have to change our work systems in order to sustain higher levels of performance.
What’s Holding Us Back?

- We have not learned from the past
- We don’t see all work as a process
- We don’t use our process improvement tools
- We only engage a small percentage of our people
- We can’t find time for improvement

<table>
<thead>
<tr>
<th>% of Workforce Involved</th>
<th>% of Processes DMAI'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

Efficient Workplace
High Performance Workplace
Traditional Workplace
Engaged Workplace
Think 21st Century!

Technologies are evolving rapidly that will influence physical, cognitive, and organizational ergonomics
Reeling in the Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Technology</th>
<th>Number of Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1873</td>
<td>Electricity</td>
<td>46</td>
</tr>
<tr>
<td>1876</td>
<td>Telephone</td>
<td>35</td>
</tr>
<tr>
<td>1886</td>
<td>Gas automobile</td>
<td>55</td>
</tr>
<tr>
<td>1906</td>
<td>Radio</td>
<td>22</td>
</tr>
<tr>
<td>1926</td>
<td>Television</td>
<td>26</td>
</tr>
<tr>
<td>1953</td>
<td>Microwave oven</td>
<td>30</td>
</tr>
<tr>
<td>1975</td>
<td>Personal computer</td>
<td>16</td>
</tr>
<tr>
<td>1983</td>
<td>Mobile phone</td>
<td>13</td>
</tr>
<tr>
<td>1991</td>
<td>The Internet</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: National Center for Policy Analysis
Types of Change Curves

- What rate of change is reflected by each curve?
- What type of system would exhibit each behavior?

<table>
<thead>
<tr>
<th>Time</th>
<th>Amount of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>
Exponential Examples

Many common systems exhibit exponential behavior, but we are often unaware of them. In turn, they take advantage of us instead of us using them.

- Population Growth
- Compound interest
- Credit card debt
- Memory Density
- Processor speed

Where will you be on the 29th day?
Paradigm shifts are required to hop from one curve to the next.

Can you think of real life examples where curves have been hopped and performance improved?
Moore’s Law

Memory density and processing speed double every 18 months (or less)

How will this law affect your career and personal life?
The History of Change

Source: "It Ain't Necessarily So," P. Brimelow, Forbes, May 20, 1996
Eight Cognitive Processes

- Memory
- Awareness
- Communication
- Reasoning
- Perception
- Judgment
- Emotion
- Planning
The Eight Human Intelligences

How Fit for Duty Are You?

- Decision Speed?
- Decision Accuracy?
- Physical fatigue?
The New Human-Machine Interface

Next Generation HMI is the Future of Electronics

Voice, Gesture and Facial Recognition

- Voice control of home systems
- Gestures to change TV stations
- Facial security to unlock electronics

Image Recognition

- Advanced Driver Assistance Systems (ADAS) used to detect pedestrians, vehicles, traffic signs
Can You See Systems?

Technology is making systems, waste, and innovation more tangible
At what rate is your process excellence culture gaining or losing momentum?
Example Leadership System

- Job Design Process
- Community Involvement Matrix
- Skill / Behavior Development Process
- Leadership Infrastructure
- Ethics Adherence Process
- Ethics Policy
- Ethics Training
- Formal
- Informal
- Definitions
- Personal Development Plan
- Leadership Effectiveness Measures
- Training Curriculum
- Leadership Effectiveness Measures
- Performance Review Process
- Food Safety
- Environmental Safety
- Personal Safety
- Regulatory Requirements Matrix
- Mission, Vision, and Values
- Communication / Contact Matrix
- Contact Type
- Contact Frequency
- Contact Audience
- Planning Process
- Mission Creation Process
- Project Time
- Relationship Building Time
- Learning Time
- Involvement Selection Process
- Time and Money Allocations
- Behavior Expectations
- Leadership Effectiveness
Systems are a collection of processes.

Systems contain both reinforcing loops and balancing loops.

People tend to be much less aware of the balancing loop activities.
A Common Systems Archetype

If the balancing loop is dominant:
- The focus is on keeping stress in check
- The reinforcing loop still exists, but is unrecognized
- The reinforcing loop has a negative spin

If the reinforcing loop is dominant:
- The loop is recognized and has a positive spin
- The focus is on building up one’s change tolerance
- Insulation is used to control the amount of change experienced
Thoughts on Seeing and Improving Systems

- Start by looking for causal relationships
- Patterns of behavior are similar to process steps
- Try to find reinforcing and balancing loops
- Search for cycle start and end points
- The limiting factor in a system is also a leverage point
- When placed in the system, people, however different, tend to produce similar results
- If you want different results, you have to change the system
Great Lean Data Capture Devices

Bar Coding

Easy to use app interfaces

Quick Response Codes

RFID Bands

Implants
Active versus Passive RFID Use

Passive RFID: $.05 to $5 / tag

Active RFID: $15 to $100 / tag

Source: www.cisco.com
Operating room staff at Celebration Health Hospital in Orlando, FL wear RFID tags to track their movements and time management.

All towels have been tagged at the Best Western Boltons hotel in London to help reduce theft.

RFID tags are replacing license plates and VIN numbers on cars, and ID badges and driver’s licenses on people.

RFID tags can send signals when perimeters are crossed, transactions occur, or environmental conditions have been exceeded.

The most advanced wearable trackers include sensors for motion, sound, and infra-red to support patient safety, security, and behavior pattern analysis.
How Might Wearables Help Find Waste?

- Tracking physical asset location and movement
- Real-time PPE use compliance checking
- Tracking human asset location and movement
- Setting and controlling security perimeters and safe work zones
- Capturing time-based data for use in optimizing asset utilization
Optimizing Our ISE Efforts

Role and influence options for industrial and systems engineers are expanding
Three Important Circles

Covey’s Circle of Influence

Covey’s Inside Out Circle

Organizational Change

Things I Can Influence

What I Don’t Know

What I Know

Personal Change

Things I am Concerned About

The Know / Don’t Know Circle

“The only thing I know is that I don’t know it all.”

- Socrates
What ISE Type are You?

Traditional ISE

- Manufacturing focused
- Time study expert
- Project driven improvement
- More numbers than people
- Utilizes technology

New ISE

- Service focused
- Operations Research
- Process improvement expert
- Left brained team builder
- Creates technology applications
Why is the Service World ‘Different’?

Internal customers are closer to external customers
- External customer feedback is much more immediate
- Internal customer skills make a much greater impact

Process defects are much more contagious
- Process failures impact the external customer during the transaction
- External customers quickly and repeatedly share their experiences

Transactions and processes are more externally visible
- External customers can see your processes and defects
- Service processes are more people, versus machine, driven

Engagement is key!
How Can You Add Personal Value?

Your ISE mission will be counter cultural!!

- Design systems to make work and life easier
- Learn to express intangible benefits in hard dollars
- Create strategies for adopting emerging tech in a cost effective high value manner
- Consistently model what you expect of others
- Strive to help people ‘see systems’
- Improve process capability to achieve sustainability
- Use social media to share ideas and success stories – everyone is good at something
- Help improve systems in your community
### Finding Time for Change

<table>
<thead>
<tr>
<th>Key Job Tasks</th>
<th>Hours / Week</th>
<th>% Value Added</th>
<th>Weekly Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meetings</td>
<td>10</td>
<td>50%</td>
<td>5</td>
</tr>
<tr>
<td>E-Mail</td>
<td>5</td>
<td>65%</td>
<td>3</td>
</tr>
<tr>
<td>Process Documentation</td>
<td>7</td>
<td>75%</td>
<td>4</td>
</tr>
<tr>
<td>Personnel Issues</td>
<td>8</td>
<td>25%</td>
<td>6</td>
</tr>
<tr>
<td>Improvement Projects</td>
<td>10</td>
<td>80%</td>
<td>2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>40</strong></td>
<td><strong>40</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

Convert weekly waste into time for process improvement and learning
The 5 Questions of Highly Effective People

Each day, ask yourself ...

- What have I learned?
- What have I improved?
- In what way could my assumptions be wrong?
- How could I be part of the problem?
- What level of customer service did I provide?
New Books by Kevin McManus!

Pursuing Process Excellence

- 150 pages of ideas and examples that will help you accelerate and sustain your process improvement efforts
- Over 25 examples of ‘best practice’ assessment tools that leaders can use to encourage and support high performance work
- 12 team exercises that can be used to begin applying each concept as it is learned

Vital Signs Measurement

- 128 pages of ideas and examples to help you make your existing measurement systems more meaningful
- Over 30 examples of ‘best practice’ measurement tools and techniques that leaders can use to promote high performance work
- 14 team exercises that can be used to begin applying key concepts as they are learned

Error Proof

- 162 pages of strategies and dialogue questions to help you stop daily goofs for good
- Over 100 proven best practices that you can use to help error proof your key work processes
- Can be paired with the 100 page workshop workbook that contains 13 team exercises to help you begin applying key ideas

Now available on Amazon.com!
Upcoming Industry Advisory Board Engagement Opportunities

- Industry Group Call-in – Friday, August 12th 10:30am ET - Mentoring
- Industry Group Call-in – Friday, September 9th 10:30am ET – IISE VP of Industry
- Industry Group Webinar – Thursday, October 13th 2pm ET – PE Licensure
- Industry Group Call-in – Friday, November 11th 10:30am ET
- Industry Group Call-in – Friday, December 9th 10:30am ET – IISE President
- Industry Group Webinar – Thursday, January 12th 2pm ET – Cross-generational collaboration

 Invite a Friend Campaign – Twin Cities Chapter