ISE Innovations:
Integrated LeanSigma Certification in ISE

CIEADH/IIE Innovations in Curriculum Award Committee Review

D. Scott Sink, Ph.D., P.E.
22 May 2011
Introduction and Agenda

- Champion, Innovator, Champions, Sponsors/Customers, Beneficiaries
- Quick Overview of the Innovation
  - Program Design Highlights
- Addressing the Evaluation Criteria/Questions
- Results to Date, multiple dimensions
- What’s Next
- Thank You and Closing Questions
The Champion for the Innovation

Dr. Julia L. Higle
Professor and Chair

Contact Information
Office: 210 Baker Systems Engineering
Phone: (614) 292-6841
Fax: (614) 292-7852
Email: higle.1 @ osu.edu

Education
Albion College: BA (Math and Physics), 1981
University of Michigan: BSE (Industrial and Operations Engineering), 1982
University of Michigan: Ph.D. (Industrial and Operations Engineering), 1985

Areas of Interest
Operations Research: Models and methods for decision making under uncertainty; Enterprise modeling and optimization; stochastic programming; optimization; stochastic processes.

Courses Taught at OSU
Graduate course: ISE 730

Julie Higle joined the department as chair in 2006. Prior to joining OSU, she served as a faculty member in the department of Systems and Industrial Engineering at the University of Arizona from 1985-2006. She is a member of INFORMS and IIE
The Innovator

Dr. D. Scott Sink

Executive-in-Residence/ Visiting Professor

Contact Information

Office: 298 Baker Systems Engineering
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Email: sink.22 at osu.edu

Education and Professional Experience

The Ohio State University, BSISE, 1973
Eastman Kodak, Service Systems Engineer, 1973-1975
The Ohio State University, MSISE and Ph.D., 1978
Oklahoma State University, Associate Professor, 1978-1984
Virginia Tech, Full Professor, 1984-1997

Areas of Interest

Business Process Reengineering, Large-Scale Organization Transformations, Performance Measurement/Analysis/Improvement, Lean Sigma, Quality and Productivity, Strategic Performance Improvement Planning (strategy and policy deployment), Change Leadership and Management, Management Systems Engineering

Scott Sink rejoined OSU as an Executive in Residence in the Fall of 2007. Scott spent 19 years in academia teaching, writing, consulting and leading Quality and Productivity Centers. He ventured out into the private sector in 2000 and led Business Process Improvement programs at Exchange Solutions (Boston/Toronto) and MDS (Toronto). He successfully launched a best in class Lean Sigma program at MDS (globally) from 2004-2007. Scott served as President of IIE in the early 90’s and has been active with IIE his entire career.

Courses Taught at OSU

Scott teaches the Introduction to Industrial and Systems Engineering class in the Fall and Spring and also is running the Lean Sigma Certification program in the ISE department.
Major Developmental Assignments that laid the foundation for this innovation

- 1984-1997 Va Tech, Virginia Senate Quality and Productivity Award Board
- 1985-1994 Department of Navy—Navair, Navsea (all the shipyards) TQM Policy Deployment
- 1992-1997 Loblaw Companies Ltd. (Canada)—Enterprise Transformation, Strategic Performance Improvement Planning and Deployment, 90’s version of Integrated LS
- 1995-1998 Hudson’s Bay Company (Toronto)—Enterprise Transformation,
- 2007-2009 Noske Kaeser (Hamburg) Corporate Turnaround
The real focus of the story about this innovation--Some of The Champions 2007-2011
The Sponsors/Customers and our Impact

$2.8 M in Hard Benefits (Audited) in 4 years from 70 projects
The Beneficiaries of the Innovation

Feedback from Candidates:

- Performing and Progressing faster than I think I would have been able to;

- this first job is not typical entry level job, I’ve skipped 3-5 years of work in trenches;

- Disciplined presentation and meeting management practice is paying off;

- the hard work and frustrations have paid off.
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- Thank You and Closing Questions
Our Students are “best of the best” at creating value for the organizations they join.

“I have been very successful in my first year, the preparation at OSU/ISE allowed me to ‘hit the ground’ running and become a ‘go to person’ immediately.”

“The decision of our Department to provide LeanSigma exposure and belt certification has really helped me compete for the best jobs. I got interviews I would not have gotten otherwise. My career has been accelerated faster than otherwise possible.”

“I see how all my education, all the things I learned in the core curriculum fits together to position me to solve important business problems.”
A View of the Current State circa 2007

Voice of the ‘Customer’ and Student

• Segment 1 Employers (CIE and my view based on hiring process at MDS—not OSU ISE specific): the students aren’t ‘seasoned’ well enough. They’re not prepared to enter the world of business (manufacturing and service), government, industry and to contribute in a reasonable period of time. Why do we have to do the initial seasoning?

• Segment 2 Students (exit interview data): feel they don’t understand how all their learning integrates to solve critical business problems in a timely fashion, they don’t know how to integrate the ‘tools’ they’ve learned. Many don’t, in fact, feel seasoned enough in spite of internships and co-ops.
Quick Overview of the Innovation

- Catalysts for the Innovation—Vision, My experience, CIE, Exit Interviews with Sr.’s
- Program Design Highlights
  - Conceptual Design Principles and Tactics
  - Seasoning Method (work on the ‘Other Four Disciplines’)
  - Blended Training Model
  - Integrating three types of learning (Core to ISE 685 to ISE 680LS)
  - Building on a Solid Core Foundation (something I didn’t have in the private sector)
  - Ensuring Integrity, Portability/Reciprocity, Oversight
  - Augmenting Core with Integrated LeanSigma
    - Web-based Black Belt w/Minitab
    - 3 Saturday Labs
    - Case Study Approach
    - Tailored Capstone
      » Fishbowl Model, broadens and deepens experience base
Evolution of the Innovation

- 1991-1997 NG ‘98 Supply Chain Transformation with David Poirier at Loblaws
  - Integration of Personal and Professional Mastery (change leadership and management) with System and Process Capability Improvement

Change Agent/Mastery Aspect of Professional ISE Development with Traditional ISE

- 2000-2007 Exchange Solutions, Business Process Reengineering and MDS, Operational Excellence/BPI
  - Extensive benchmarking coupled with rapid design and deployment of a Global, Enterprise Wide OE program enabled with LS methodology
  - Deep, broad understanding of what industry best practices are in OE and LSS

Integrated Lean & Six Sigma
Key Design Features

Foundation Course (5 credit hours, UG):

- Blended Training Model
  - Best in class, web-based curriculum, Black Belt w/minitab (140 hours approx.)
  - Augment with 10, 4.5 hour sessions (mix of traditional classroom and reduction to practice labs)

- Method/Tool Skill Development
  - iGrafx to support VSM
  - Minitab 16 (lot’s of work with this)
  - Process Capability, Testing and Evaluation, Design
  - DMAIC roadmap (chef versus cook approach)

- 3 hands-on, experiential Saturday Labs
  - Lean
  - SixSigma
  - Change Management

Project Course (2 quarter, 4 credit hours per quarter)

- Essentially a half time unpaid internship type ‘position’, the flight school portion of certification
- Candidates meet twice a week, 3 hours total, as a team
  - Team planning and problem solving
  - Dry runs for Tollgate Meetings
  - Project management skill building
  - Other Four Discipline Reinforcement
- Scott attends all Tollgates for all candidates (e.g. if there are 10 candidates, then that’s 50 TG meetings)
Final Requirements & Deliverables for Certification

Deliverables:
- iSixSigma Final Tollgate ready for publishing article
- Final Tollgate (powerpoint) deck that capstones the entire project
- Formal, comprehensive Business Case with Evaluation Study

Requirements:
- Must be in Control Stage and positioned for roll-out and/or realization with Champion and ‘CFO’ sign-off to gain certification
- Very challenging in 20 weeks for the candidates but doable and will be ‘easier’ to achieve in 2 Semester version
Intent is to publish as many of these as possible

Reduction in Egg Roll Temperature

BY SCOTT SIEK WITH BENJAMIN CHEN AND JEFF MICHALSKI

Kahiki Foods Inc. manufactures Asian-style frozen foods. In 2008, Kahiki produced more than 5 million egg rolls. Of the company's product assortments, egg rolls took the longest time to ready for shipping because the temperature of the cooked egg rolls was too high and variable after initial freezing. To address the issue, Kahiki had inserted a second freeze step, but this created large amounts of work in process (WIP) and required significant additional material handling. Now faced with a waste issue, Kahiki focused a DMAIC project on improving the process capability of the first freeze step, post-frying. A cross-functional team, led by an industrial engineering student and Green Belt candidate from the integrated systems engineering department at The Ohio State University, successfully applied Lean Six Sigma to the egg roll temperature problem.
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The Creative Tension that Sparked this Program* goes beyond LS Certification

**Junior (‘composite’)**

**PERSONAL MASTERY**
- don’t listen well
- Action junkies
- don’t stay focused, can’t juggle multiple balls well
- don’t communicate well
- judgment mode common
- Parent-child lingering, still, with Teacher-Student, which will carry over to boss to subordinate if not corrected

**PROFESSIONAL MASTERY**
- do not exhibit ideal learning behaviors
- do not understand what it takes to succeed in the ‘real world’
- struggle mightily to ‘reduce to practice’, sloppy, undisciplined practice
- can’t manage projects successfully
- do not manage relationships proactively
- cannot produce results, lose sight of the end-game
- have heard the talk on ‘ethics’ and values

**ISE Core Curriculum:**
Essential Foundation for Systems Improvement

**The New Offering**

**ISE 500:** Initial Exposure

**ISE Capstone Senior Design**

**Senior (‘composite’)**

**PERSONAL MASTERY**
- can deep listen, can active listen, seek to understand
- Plan before acting. Context, Possibilities, Action
- practiced focus and persistence with something difficult for 6+ months
- communication skills (written, oral, body language) enhanced for success
- spend less time in judgment more time in evaluation and difference, consciousness about tendencies
- made the switch of making the switch to Adult to Adult

**PROFESSIONAL MASTERY**
- improved consciousness and practice with ‘ideal learning behaviors’
- clear understanding of ‘flat world’, competitive World requirements for success, more real world savvy
- lot’s of opportunities for perfect practice
- demonstrated program and project management skill to gain certification
- relationship management skill development initialized, understand importance
- Capable of producing results in timely fashion and understand them in context of the system or higher good
- have had to walk the talk on ethics and values

* A generic composite, not representative of any one student.
Blend Collins and Senge to tackle the four quarter ‘seasoning’ transformation and integrated focus on O4D’s with ISE

Greatness is a lot about disciplined people (thought, word, deed)

Disciplined about what?

Systems & Statistical Thinking (Industrial & Systems Engineering)

Personal Mastery

Mental Models

Creation Skillful

Team Learning
Conscious and Logical Migration from Knowledge Acquisition (education) through Skill Development (training)

- Blended Training
- Individual Projects with ‘fishbowl’, case study blend
Definitions: **Education**—focus on what you know, knowledge transfer; **Training**—focus on what you can do, skill, reduction to practice, behaviors

**Blended Training**—the use of multiple ‘modalities’ (mode of training) to achieve the intended learning/behavioral objectives. Illustrations of different modalities:

- Web based curriculum with some degree of self-paced/managed learning
- Internet
- 2-way video/audio interaction (e.g. skype, polycom)
- Instant messaging
- Voice over Powerpoint shared desktop (e.g. webex, go2meeting, etc.)
- Experiential physical and/or virtual simulations
- Traditional classroom/workshop face2face interaction
- EDMS (electronic document management systems, e.g. Carmen, TRACtion, Enterprise Trac, etc.)
Curriculum Requirements: Total Cost ~ $600 plus portion of tuition—cost in industry or market place $5,000-$10,000

Rath and Strong LeanSigma Roadmap: $10/
George LS Toolbook: $25
Six Sigma and Minitab: $50
iGrafix: $90
Minitab: $90

$300

$14 Required for BB:
I have purchased 40 copies that we can use as loaners
Fishbowl Model—multiple way ‘give and get’

Hi-Flo Stopcock Torque Factor Identification and Elimination Project
**UG ISE is the perfect place and perfect timing to get that first certification because the prerequisites are all in place!!**

- Stat 427-8; ISE 510 & 610; ISE 540, 541, 542; ISE 501, 520, 521; Accounting 501 & ISE 504; ISE 560 & 670 (many, many HFE aspects in projects) w/ ISE 685

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### SELECT/Define
- Value Stream Map
- Various Financial Analysis
- Charter Form
- Multi-Generational Plan
- Stakeholder Analysis
- Communication Plan
- SIPOC Map
- High-Level Process Map
- Non-Value Added Analysis
- VOC and Kano Analysis
- QFD
- Pareto Charts
- RACI & Quad Charts

### Measure
- Operational Definitions
- Measurement & Analysis Plan
- Pareto Chart
- Histogram
- Box Plot
- **Statistical Sampling**
- Measurement System Analysis
- Setup Reduction
- Generic Pull
- Kaizen
- Control Charts
- Process Capability, $C_p$ & $C_{pk}$

### Analyze
- DOE Full & Fractional Factorial
- Conjoint Analysis
- Response Surface Methodology
- Taguchi
- Scorecards
- Pareto Charts
- C&E Matrix
- Fishbone Diagrams
- Brainstorming
- Supply Chain Accelerator Analysis
- Non Value-Added Analysis
- Hypothesis Testing
- Confidence Intervals
- FMEA
- Simple & Multiple Regression
- ANOVA
- Queuing Theory
- Analytical Batch Size
- Brainstorming
- Benchmarking
- Process Improvement Techniques
- Line Balancing
- Process Flow Improvement
- Constraint Identification
- Replenishment Pull
- Sales & Operations Planning
- Poka-Yoke
- FMEA
- Pugh Matrix
- TRIZ
- ‘To-Be’ Process Maps
- Human Factors
- Piloting and Simulation

### Improve
- Brainstorming
- Benchmarking
- Process Improvement Techniques
- Line Balancing
- Process Flow Improvement
- Constraint Identification
- Replenishment Pull
- Sales & Operations Planning
- Poka-Yoke
- FMEA
- Pugh Matrix
- TRIZ
- ‘To-Be’ Process Maps
- Human Factors
- Piloting and Simulation

### Control/REALIZE
- Control Charts
- Standard Operating Procedures (SOP’s) Standard Work
- Training Plan
- Communication Plan
- Control Plan
- Visual Process Control
- Mistake-Proofing
- Process Control Plans
- Project Replication
- Business Case Realization

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*Tool Array, based on LSS for Service by Michael George*
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Ensuring Program and Certification Integrity, Credibility, and Portability

Program Initial Review Board Members:

- Dr. Julie Higle, ISE Department Chair
  - Dr. Sharukh Irani, Associate Professor ISE, Lean Speciality

- Ph.D.’s, Master Black Belts and Deployment Leaders from best-in-class deployments
  - Mr. William Hathaway, President, MoreSteam Inc.
  - Ms. Stephanie Viehman, Mettler Toledo, BSISE, Certified Pitt program, Duke Executive MBA
  - Mr. Ashley Veisz, MBB and Director Operational Excellence, Cardinal Health
  - Mr. Paul Brown, MBB, BMGi (first MBB at Dupont 20 years ago)
  - Dr. Charlene Gawlak, MBB
  - Mr. Mike Blenk, BSME Va Tech and BB, Diamond Innovations
  - Mr. Alan Hoover, President and Deployment Leader, Kahiki Foods
  - Mr. David Kirkman, COO, Deployment Leader, Baesman
  - Dr. George Smith, Professor Emeritus, ISE
  - Mr. Joe Cerrato, BS/MS ISE OSU, BB, Kahiki Foods (Alumni)
1. Review the program and certification design and advise of deficiencies if they exit;

2. Serve as the ABET Capstone External Review/Evaluators

3. Review, periodically, program and certification execution and advise of deficiencies, as appropriate;

4. Stamp of ‘approval’ so that the program and certification stands up to rigor in the ‘community of practice’.

5. Oral Defense Participation for Black Belts

6. Meet twice a year, March and June, to review ‘wave’ GB decisions, ‘judge’ projects, meet and mingle with candidates.
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Cut to the Quick Self-Assessment

- Creativity—degree of innovation
- Effectiveness—as supported by Measures
- Impact on Meeting Needs of the IE Profession
- Potential for Widespread adoption
- Other
  - Building/strengthening relationships from Department to ‘regional’ stakeholders
  - Improving/supporting Summer Internships and Co-op opportunities
  - Generating discretionary incremental revenue to support the program
Cut to the Quick Self-Assessment

- Creativity—degree of innovation
  - **Moderate**—nothing creative or innovative, content wise, in the Lean Sigma curriculum itself other than the ‘seamless’ integration of the ‘other four disciplines’ and change leadership/management. But the LS foundation training is best in class but ‘off the shelf’.
  - **High**—Integrated LeanSigma is cutting edge real world, blended training is cutting edge, integration of ‘The Fifth Discipline (the five disciplines)’ is innovative and needed, and reengineering capstone has been needed for 30+ years in my view. The how the course is executed in terms of Saturday Labs for skill building is also innovative, in my view.

- Effectiveness—as supported by Measures
  - Demand has been steady, solid segment of total population (25-30%) (data follows)
  - Sponsor satisfaction has been high, have only ‘lost’ 3 sponsors (Limited, PPG, Big Lots) due to what I would consider under delivering while 6 are ‘net promoters’ (raving) and 4 are new and excited to be part of the program
  - Certifications (data follows)
  - Student Experience, Evaluations
  - Exit Interview Observations (Dr. Higle)
Response/demand for this has grown and is steady and solid in spite of the level of difficulty

<table>
<thead>
<tr>
<th>Year</th>
<th>Summary</th>
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<tbody>
<tr>
<td>2007/08</td>
<td>28 candidates in Foundation Course</td>
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<tr>
<td></td>
<td>12 took first certification project class, 7 certified</td>
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<td></td>
<td>Initial Sponsor group was foundational and solid</td>
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<tr>
<td>2008/09</td>
<td>31 (max) in Foundation Course</td>
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<td>17 candidates in the projects course, 12 certified</td>
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<td></td>
<td>Sponsor base grown and strengthened</td>
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<tr>
<td>2009/10</td>
<td>Oversold situation in the Foundations Class (31+)</td>
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<tr>
<td></td>
<td>28 candidates in project class, 13 Au-Wi, 15 Wi-Sp</td>
</tr>
<tr>
<td></td>
<td>17 certified</td>
</tr>
<tr>
<td></td>
<td>Projects very successful overall</td>
</tr>
<tr>
<td></td>
<td>Sponsor based significantly grown and enhanced</td>
</tr>
<tr>
<td>2010/11</td>
<td>ISE 685, Wi 2011 at max 31</td>
</tr>
<tr>
<td></td>
<td>18 candidates in certification/project class; 8 Au-Wi, 10 Wi-Sp</td>
</tr>
<tr>
<td></td>
<td>8 certified</td>
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<tr>
<td></td>
<td>Project Success and Impact Solid for 12 of 18</td>
</tr>
<tr>
<td></td>
<td>Sponsor base for 2011-12 grown significantly, 4 very impressive additions</td>
</tr>
<tr>
<td>2011/12</td>
<td>ISE 685, Wi 2012 enrollments trending to sell out</td>
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<td></td>
<td>20 candidates signed up for the projects course and 20+ signed up for 2011-12 cycle (next year)</td>
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<tr>
<td></td>
<td>Solid class of candidates for the 2012-13 certification class emerging</td>
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<tr>
<td></td>
<td>Sponsors lined up for all candidates</td>
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</tbody>
</table>
ROM Breakdown of types of Problems and ISE methods employed

Problem Type:
- WIP Reduction
- Process Capability Understanding and Improvement
- Order Fulfillment Improvement (either quality or timeliness)
- Operations Performance Measurement System Improvement
- Lean—Flow, waste reduction, balancing
- Set-up time reduction
- Design for Lean and Six Sigma
- Inventory Optimization/Rationalization
- There are Human Factors issues in many of the projects that at times come to the forefront of Solution Development
- Wait time problems
- Standards Development
- Key Performance Indicator Error/Variation
- Throughput Yield Loss and/or Rolled Throughput Yield Loss reduction

ISE Methods Employed:
- Designed Experiments
- Simulation
- Queuing Theory
- Balancing, bottleneck/choke point analysis
- Value Stream Mapping and Analysis
- Extended System Value Stream Mapping and Analysis
- 5-S but only a small part of a certification project
- Modified DMAIC to meet requirements of a DFLSS project
- Lot’s of Statistical Analysis with minitab in all stages of DMAIC
- Data collection/acquisition and mining (a real weak spot in curriculum)
- Engineering Econ for business cases
- Skill development with program and project management
- Measurement System Design
- Work Measurement/Sampling
- Measurement System Analysis (Gage R&R)
## Program Scorecard

<table>
<thead>
<tr>
<th></th>
<th>07-08</th>
<th>08-09</th>
<th>09-10</th>
<th>10-11</th>
<th>11-12</th>
</tr>
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<tbody>
<tr>
<td>BB Foundation Training</td>
<td>28</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>TBD</td>
</tr>
<tr>
<td>Certification Project Course</td>
<td>12</td>
<td>15</td>
<td>27</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>BB Certified</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sponsors</td>
<td>5</td>
<td>7</td>
<td>13</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Program Funding</td>
<td>$50,000 (Sink)</td>
<td>$40,000 (Sponsors) &amp; $10,000 (Sink)</td>
<td>$50,000 (Sponsors) &amp; $10,000</td>
<td>$40,000 (Sponsors) &amp; $10,000 (Sink)</td>
<td>$65,000 (Sponsors) &amp; $10,000 (Sink)</td>
</tr>
<tr>
<td>Program Audited Benefits</td>
<td>~$300,000</td>
<td>~$1.1M</td>
<td>~$2.1M</td>
<td>~$2.8M</td>
<td>TBD</td>
</tr>
</tbody>
</table>
Cut to the Quick Self-Assessment

- Impact on Meeting Needs of the IE Profession

  - Responds directly to a felt, expressed need from a subset of the Council on Industrial Engineers (catalyzed by Kraft but a growing need)
  - CIEADH ‘partial’ survey indicates some support (50% of those responding) for doing something like this in IE departments (data support follows)

- Potential for Widespread adoption

  - Not sure. There are a number of different ways to do something like this. I think bits and pieces of the innovation do have widespread adoption potential. The ‘whole’ innovation is doable and sustainable in certain departments. The key would be a ‘champion’ for it (e.g. like Dr. Higle) and then a ‘leader’ for it (e.g. like Dr. Sink, which is doable, there are lots of 50 something, very solid MBB types out there that would do very well with something like this)
Typically an organization will view Lean Sigma as a means to an end and a key component in their quest for Sustainable Operational Excellence.

<table>
<thead>
<tr>
<th>Process</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td><strong>Business</strong></td>
<td><strong>Outcomes</strong></td>
</tr>
<tr>
<td>Performance</td>
<td>Action oriented decision making</td>
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<tr>
<td>Reviews</td>
<td>Tighter accountability</td>
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<td>Customer responsive</td>
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<td></td>
<td>Weekly EMT teleconferences</td>
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<td>Monthly business reviews</td>
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<td>Disciplined annual plans</td>
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<td>Biannual talent reviews</td>
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<td>New executive compensation plan</td>
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<tr>
<td><strong>Talent</strong></td>
<td><strong>Outcomes</strong></td>
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<tr>
<td><strong>Management</strong></td>
<td>Better understanding of “A” performers; enriched career path</td>
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<td></td>
<td>Expansion of variable compensation opportunity</td>
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<td></td>
<td>Alignment of shareholder and management incentives</td>
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<td>Longer range growth agenda</td>
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<td></td>
<td>Focused R&amp;D investments</td>
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<td></td>
<td>Capital matched to growth</td>
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<tr>
<td><strong>Customer</strong></td>
<td><strong>Outcomes</strong></td>
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<tr>
<td><strong>/Competition/</strong></td>
<td>Standard approach across the Enterprise</td>
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<tr>
<td><strong>Capital</strong></td>
<td>Building global quality competitiveness, productivity improvement, process and cost efficiency, compliance and assurance</td>
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<td></td>
<td>Simplify processes</td>
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<td>Customer responsive</td>
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<td></td>
<td>Business unit/Corporate strategy</td>
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<td></td>
<td>Detailed industry analysis</td>
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<td>Customer value led process</td>
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<td>Lean Sigma Roadmaps and Toolkit</td>
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<td>Compliance Programs (EHS, Quality, etc.)</td>
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<td>Lean Sigma Practitioner Development</td>
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<td></td>
<td>Balanced Improvement Portfolios</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td><strong>Outcomes</strong></td>
</tr>
<tr>
<td><strong>Excellence</strong></td>
<td>Standard approach across the Enterprise</td>
</tr>
<tr>
<td></td>
<td>Building global quality competitiveness, productivity improvement, process and cost efficiency, compliance and assurance</td>
</tr>
<tr>
<td></td>
<td>Simplify processes</td>
</tr>
<tr>
<td></td>
<td>Customer responsive</td>
</tr>
</tbody>
</table>
IIE and Enterprise Transformation—the context within which our graduates will be contributing

IIE is launching an Enterprise Transformation Conference and Journal in response to industry interest in having ISE play a stronger role in the transformation process. MIT has laid foundation for future developments.
Current State

- Continuous Improvement/employee engagement culture
- Safety, cost, quality, delivery are the business drivers
- Lean and Six Sigma are the key tools (survivors)
  - Six Sigma - 15 year journey - 1200 Black Belts, 8000 Green Belts
  - Lean – 10 year journey - Deere Production System
    - Rigorous assessments at every manufacturing facility and PE center
- Important underlying concepts
  - Process, waste, data/variation, leading change

➢ Embedded into the way we do our work – becoming part of our DNA
Going Forward

Close these GAPS:

- Breadth, depth, and cost of training
- Time and availability to train new hires
- Integration of the tools set – Lean, Six Sigma, Change Management
- Meaningful project experiences
- Breadth of deployment beyond the factory

Vision:

New hires in all functions come to Deere with the basic lean and six sigma skills. They can immediately contribute to project teams where Deere internal experts further their development while working on real projects. The incoming level of skills is known and consistent and we can plan our internal training and development accordingly.
Like to have: Industry/Academic wide standard requirements/training for: Green Belts, Black Belts and Master Black Belts.

- This would include DMAIC process and what’s include in each phase, along with an understanding of: opportunities, defects, statistical tools, mini-tab, etc.

How are we approaching: Utilizing an outside consultant to train internal candidates, Hiring from the outside and retraining.

- We have been on a year plus training, hiring and training continuum.
ISE Departments Participating and High Level ‘Summary’ of POV’s

Supportive, with conditions, different approaches to addressing the CIE ‘felt need’

- Auburn
- Oklahoma State
- Minnesota-Duluth
- Texas A&M
- Arizona State
- Western Michigan
- NC State
- Milwaukee School of Engineering

Not-supportive, for numerous reasons

- Florida
- Northwestern
- Air Force
- RIT
- UTEP
- RPI
- Michigan
Summary of ‘Supportive’ Points of View

1. Industry values the certification;
2. The certification is an AND not an OR, augments our core preparation;
3. Students do not understand how all the core principles and methods come together, ala the DMAIC methodology;
4. We can and should help them get more skillful at that;
5. Some Departments will want to and can pull this off, some won’t and can’t, we are working at it;
6. Integrated LeanSigma belongs in ISE, we have lost it to Business Schools and should selectively recapture it;
7. The ISE foundation is the right pre-req’s to ensure best in class LeanSigma Practitioners and Leaders of Operational Excellence.
Summary of ‘not supportive’ Points of View

1. Industry values the certification, that’s great, but not our niche or our mission;

2. Our core preparation far exceeds the knowledge content of LS training/certification programs;

3. Students do understand how all the core principles and methods come together, the DMAIC methodology is something they can learn when they get out if they need to;

4. Our Capstone Courses are just fine, working;

5. Some Departments may want to do this, we don’t;

6. Integrated LeanSigma is in ISE now but this isn’t recognized by industry, that’s not our problem, I’m tired of defending ISE;

7. The ISE foundation is the right pre-req’s to ensure best in class LeanSigma Practitioners and Leaders of Operational Excellence but DMAIC, etc. should be taught elsewhere.
Cut to the Quick Self-Assessment

Other

- **Building/strengthening relationships from Department to ‘regional’ stakeholders**
  
  - This has created some very positive and deepening relationships with Krogers, Smiths Medical, Diamond Innovations, Akzo Nobel, and other organizations in the Greater Columbus (to include 90 mile radius) area.

- **Improving/supporting Summer Internships and Co-op opportunities**
  
  - The existence of the program has sparked some growing interest in our department from Walmart, Caterpillar, Swagelok, Thematriu, Kraft, Nestle, Unilever, to mention a few.
  - I’m funneling or channeling an increasing number of Internship and Co-op opportunities to candidates

- **Generating discretionary incremental revenue to support the program**
  
  - Data provided
Thank you and any Last Minute Questions?

Our Students’ and Faculty Hall of Fame
BACK-UP MATERIAL
Key ISE Leadership Stakeholders

Council on Industrial Engineering

IIE’s Council on Industrial Engineering (CIE) is comprised of 30 individuals who are ranking executives of industrial, commercial, or government organizations. CIE members have extensive experience in the management and practice of industrial engineering. Their current activities influence the image and practice of the profession, and their span of control includes the function of industrial engineering at the corporate level.

The purpose of the CIE is:

• To **further the sharing of information among its members** regarding best business practices and processes in the profession of industrial engineering.
• To **be a forum of learning for emerging technologies and new practices and processes** through guest lectures, plant visits, and other appropriate means.
• To **be an information advisory group to IIE** and its constituent groups in support of the profession and IIE’s

Council of Industrial Engineering Academic Department Heads

Members of CIEADH include people in charge of accredited industrial engineering and related programs.

The purpose of CIEADH is:

• to **receive and act on recommendations from members**;
• to **sponsor activities and meetings**;
• to **discuss industrial engineering education, curriculum, accreditation, student activities, research, faculty development**, and other appropriate matters and their relation to the technical development of industrial engineers;
• to **make recommendations resulting from such activities and discussions to IIE**.
Similar to my experience at MDS trying to ramp up a BPI team with IE’s:

- Kraft, “can’t find IE’s who are prepared, right out or even 3-5 years out, to do pragmatic process improvement work. Want IE’s with LS certifications so we don’t have to do that training.”

- My boss doesn’t want us to hire IE’s right out of school because he believes they aren’t ready to add value, aren’t seasoned. He says let somebody else do that work and then steal them from them. I’m thinking why can’t IE Departments deliver graduates who are seasoned?

- If we had BSISE’s with their first, initial Lean and Six Sigma certification, it saves us a year or more, we can throw things at them that we wouldn’t have otherwise been able to do. The BSISE is great, the BSISE with a LeanSigma Certification is awesome and a department and program that can do this well will really stand out and attract more companies recruiting your candidates and more internships and co-ops.
1—Do you have a formal certification program in the following areas of specialization?

- a) Lean
- b) Six Sigma
- c) Integrated Lean Sigma
- d) Other (please specify)

2—If the answer to question 1 is no, do you have any focused, specific initiatives, curriculum wise, aimed at developing knowledge and skills in the area of lean, six sigma, and/or integrated lean sigma? Please elaborate.

3—Does the Business College at your University have a formal certification program in the following areas of specialization?

- a) Lean
- b) Six Sigma
- c) Integrated Lean Sigma
- d) Other (please specify)

4—If the answer to question 3 is yes, does your department participate in any significant way in these educational and training initiatives?

5—Does your department (or selected faculty) provide any continuing education through your University CE unit in the areas of Lean, Six Sigma, Integrated Lean Sigma?

6—Do you feel that the foundational/core curriculum in your department (e.g. DOE, SPC, your production and manufacturing systems courses, etc.) are adequate to prepare your UG’s to immediately contribute in a Process Improvement (e.g. lean and six sigma) role? In other words, do you feel that the ISE curriculum as it now stands should be sufficient to prepare a student to handle the roles that industry have created for certified belts? Explain your point of view briefly if you would.

7—Do you think that creating a formal certification program for UG’s in ISE in the areas of Lean, Six Sigma, Integrated Lean Sigma, should be a priority initiative in your department or in other selected departments around the country?
Sampling of Points of View:
Conditional Support

Is Core Curriculum Sufficient: No, they can contribute with the tools they have but will not understand the process of LeanSigma (DMAIC) and be able to lead a project or effort.

In my opinion (based on course content and performance in senior design projects) I believe we do a reasonable job with this but that it can improve. Our manufacturing faculty are planning to revise our required coursework to better address process improvement and other issues.

I do not think the foundational courses are enough. Students would be prepared for these roles only if they take the Lean and Six Sigma elective courses.

Should ISE Departments offer formal Certification? Yes, it is not about the use of specific tools such as SPC, DOE etc. It is more about the operating strategies and processes with people and teams. The prescribed rigid process of discovery and strategy that lead to results is fundamental to success. Without following the “system”, results will rely on the charisma and influence of the individual and his/her ability to apply logic to the direction the team embarks upon. Lean Six Sigma ensures proven structured approaches are utilized to ensure success to the organization hence success to the UG’s new role in industry.

I think certification programs are extremely valuable for students seeking jobs because industry seems to have a great deal of respect for certificates as a way to validate credentials and knowledge. Creating a broader certification program across the US may help to link Lean and Six Sigma more closely to IE. Industry seems to value these improvement programs but not acknowledge the connection to IE.

Not sure, but if there is one it would be nice if IE/ISE would own it. (CIE view also)

Already exists at the UG and grad level. ASU

We feel that our curriculum does prepare our students for six sigma and lean. However, many job postings ask for specific certifications for which our students have the in depth knowledge but no certificate. In many cases, our students are losing the jobs to graduates (from programs such as integrated supply management in the business school) which have the certifications but not the in depth knowledge. As a reluctant first step we have begun to offer the six sigma green belt training so that the students can learn how their IE/ISE tools are used in the context of six sigma and understand the vocabulary of six sigma for interviews and future projects. We may consider other voluntary certification offerings in the future based on our findings from the current six sigma training. Our very small anecdotal sample of students to date suggests that the certification may help to open the door or at least get them the interview. They can then win the job with their IE degree. How long this trend will last is the question we are asking?
Sampling of Points of View—Not Supportive

**Does Core Curriculum Prepare our Graduates to be major players in Process Improvement?**

*No*, it does not. But this is an unlikely career path for our students. Our students who have interest in this area can get some foundation from us and be prepared to fill out their education and experience in other ways.

**Should ISE Departments offer formal certifications in Integrated LS?**

*Certainly not us* (Northwestern). I believe there are other departments where it would be quite relevant.

*NO!* We already teach that stuff and if we need to offer certificates, then there is something wrong with our programs or marketing of our programs.

**Yes.** What you are asking me to do is defend the Industrial Engineering profession and my degree program. The fact is, our students are prepared to study processes – of any kind – and improve (and hopefully optimize) them. However, this is based on a strong foundation of analysis which cannot be accomplished through any certificate program because there are not enough courses, if any, in statistics, simulation, or optimization. My question goes back to the group: would you entrust your processes to someone that received training over a few days and got a certificate? Or would you trust someone with an IE degree from an accredited institution that performed at least one senior design project with a company that involved analysis and process improvement – and most likely had 1-2 internships and/or co-op experiences? I would take the degreed student first every time.

**No**, I’m not sure many of the smaller IE departments could afford to do it. We also have to be sensitive to competing pressures and the diversity of roles that our graduates serve in industry. Specializations like that at the undergraduate level might not attract enough students consistently over a period of several years to justify committing to new, specialized course offerings.

I do not know if this belongs on the undergraduate or graduate level, but yes I think certification programs would be seen by students as having high value. However, doing anything “extra” with university budgets as tight as they are is nearly impossible from the departmental perspective.
2004-2007 Benchmarking and Program Development

- Hired to launch an ISE/Operational Excellence/Process Improvement Program, Globally, in a $1.4B, 5,000 employee Life Sciences Company; reported to President of Enterprise Services and dotted line to CEO.

- Virtually no history of Process Improvement and no culture for it, not 1 IE in the company. Did have solid QA, base of pyramid, ISO 9000 type programs and execution, of course.

- Benchmarked extensively, rapidly internally and externally to determine what future state should/could look like. After a rapid pilot in our Diagnostic Services (like Quest Diagnostics) business, we landed on Integrated LeanSigma ‘program’ as the mechanism to drive Operational Excellence.

- New CEO took over in mid 2005 and we were positioned to withstand his scrutiny and he embraced the program design and supported rapid continued deployment. My mission was to get it stable, successful and sustainable before I left the assignment sometime in 2007.

- Key benchmarks were with BMG, Rath and Strong, George Group, Quest Diagnostics, Cardinal Health, Xerox, Alcan, IBM, and Moresteam.
Tailored Capstone Experience

- 2 Quarters, typically 15-25 hours per week for 20+ weeks
- Key project in a sponsor portfolio
- Work directly with Senior Leadership in the sponsor organization
- Must drive the project to ‘fruition’, business case realized
- Equivalent to a very challenging ‘Internship’
- Intense coaching from me and from Black Belt Candidates (when in process) and from ‘buddy belts’ in sponsor organization
- Case Study, Team Learning approach in 680
“Flight School”

- Currently (until Semesters), we utilize ISE 680 (capstone Senior Design) and have a LS option/path.
- 4 ch, two quarters (8 total)
- Essentially an unpaid, half time, internship for the candidates
- They typically spend 15-20 hours per week on-site
- Class meets Tues and Thurs am the first quarter, then cuts back to just Tues second quarter
- Class is used for interproject sharing, tollgate dry runs, team problem solving, reduction to practice activities, ongoing personal and professional mastery
- TRACtion utilized as the project and program management tool
- Three level business cases with a required sponsor sign-off prior to certification
Program Initialization
Engage the ‘Right’ People
Pick the Right Projects
Best in Class Training
Discipline around Methodology
Celebrate Successes to get the ‘fly wheel’ spinning

Traditional Training Models

*Traditional model (Train-Do) of in-class training followed by work on the DMAIC project*

Enhanced Training Model

*E-Learning / Self Paced learning modules with reduction to practice workshops built in while belt works on a DMAIC project*

**Project flow Approach**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick-off Event</td>
<td>初始化事件</td>
</tr>
<tr>
<td>Initial learning activity</td>
<td>初始学习活动</td>
</tr>
<tr>
<td>Check-in Event</td>
<td>检查申报事件</td>
</tr>
<tr>
<td>Second learning activity</td>
<td>第二次学习活动</td>
</tr>
<tr>
<td>Check-in Event</td>
<td>检查申报事件</td>
</tr>
<tr>
<td>Final Assessment</td>
<td>最终评估</td>
</tr>
</tbody>
</table>

This process may be repeated several times

**Core-and-Spoke Approach**

- On-site Labs
- Mentors
- Web-based courseware
- Classroom instruction
- Web Portals pages
Sustainable Operational Excellence Programs have three major components:

1. **Process and Product Design: Design For Lean Sigma**
2. **Change Leadership**
   - Process Improvement: DMAIC
   - Lean Sigma Workouts and Kaizen Blitzs

The pyramid includes layers such as:
- Innovation
- Strategic Thinking / Planning
- Assessment
- Process Management
- Balanced Scorecard
- Knowledge Management & Best Practice Sharing
- Supplier Management
- ERP/MRP
- CRM
- ISO 9000
- ISO 14000

Base layers include:
- Process Auditing
- Project Management
- Infrastructure Development
- Process Management System
There are different ‘roadmaps’ for different opportunities—’classic’ DMAIC comes first.
124 of the 127 ISE 685 Students received a Certificate of completion for BB ‘Ground School’

Integrated Lean Sigma
Joe Cerrato

Integrated Lean Sigma Black Belt Foundations Course

5 credit hour OSU Industrial and Systems Engineering Group Studio (Hands-on) Training Course led by Dr. D. Scott Sink, PhD, ISE, IIE. 10 hour of classroom instruction on top of the 140 hours of Web-based curriculum study time. Morehouse University Lean Sigma Black Belt w/ Six Sigma is typically the foundation utilized.

Three 6-hour learning laboratories-one detailed Lean Simulation (intermediate production simulation), one Sigma Simulation (Garphalke/Simul8), and one experiential workshop on Change Leadership and Management are additional needed training activities.

Exposure to numerous case study data sets to develop ‘hands-on/practice’ experience and skill.

Exposure to numerous Lean Sigma DMAIC projects done concurrently by candidates engaged in the certification projects course to further develop understanding of how DMAIC projects play out in the ‘real world’. Projects are diverse leading to broad and deep understanding of how Lean Sigma DMAIC plans in different business/industries and with different problem types. Printing Company layout-Time Reduction, Medical Center Lean Time Reduction, Food Processing Lean Waste Reduction, Distribution Center productivity and engineering problems, Payroll Processing, Accounts Receivable-Optimization.

Weekly quizzes to test for comprehension of the material.

Final 5-hour comprehensive Black Belt exam with adequate data set questions to ensure analytic reduction to practice skill has been achieved.

Note: Completion of this training represents the equivalent of posting “ground school.” It does not represent GB or BB certification; which additionally require completion of “high-school” OSS Industrial and Systems Engineering courses as independent Review Board to oversee our certificate and certification process. The Board is comprised of MBB, Deployment Leaders, and LS Training Curriculum Developers.
Candidates can gain GB or BB post graduation with OSU/ISE

Lean Sigma Certification

Joe Cerrato

has successfully completed Lean Sigma Certification at the Green Belt Level

GB Certification (1 successful project), BB (2 successful projects + +)

Lean Sigma Foundation Training Certificate Achieved
Lean Sigma GB Certification Project Final Tallgate
Lean Sigma BB Certification Project Final Tallgate
Lean Sigma BB Certification Date

Candidates can gain GB or BB post graduation with OSU/ISE

GB Certification: 1 successful project
BB Certification: 2 successful projects + +

Joe Cerrato

Lean Sigma Green Belt Certification

Certification Oversight: Certification Oversight: Dr. Sink, ISE at OSU, utilizes an “Board of Reviewers” (Mr. William Hadzic, President, Mondean University; Mr. Paul Brown, MBA, BIM; Mr. Charles Alderdice, MBA) to ensure integrity in the certification process. Dr. Sink has trained over 100 belts, while VP of Business Process Improvement at MCDIC jet and now at The Ohio State University, College of Engineering, Integrated Systems Engineering Department. We benchmarked to best in class training programs and certification processes on an ongoing basis. We believe that this certification will stand up to any in North America or Europe. In short, it is best in class.

1) Black Belt Level Foundation Training: 8 credit hour OSU Industrial and Systems Engineering course (ISE 580) led by Dr. Di. Scott Sink, PhD., IE, PE. This is the most rigorous Black Belt foundation training (DMAIC) module from Mondean University that involves 1,401 hours of web-based curriculum, 50 hours of in-class training over 10 weeks. Three 5-hour learning laboratories, one detailed Lean Simulation (Simul8), one Sigma Simulation (MapleSim) study, and one Change Leadership/Management Workshop. The candidate successfully completed a final exam (120 questions, some of data sets, 8 hours) with a passing score > 78. It should be noted that an IE student takes the following 2 credit hour 10 week classes in addition to this Black Belt Level DMAIC training: a) Statistical Process Control (one of two Engineering Statistics courses), b) Design of Experiments, c) Statistical Process Control, d) 3 course sequence in production and manufacturing systems engineering (inventory theory, queuing theory, work measurement, etc.), e) Human Factors Engineering, ergonomics, and cognitive science engineering, f) Organizational Research (course sequence), g) Engineering Economics. The obvious point is that these IE Belts are far more prepared to tackle a wide range of business process engineering and process improvement opportunities than the average or even above average Belt.

2) Reduced to Practice Exposure: Exposure to numerous case study data sets to develop “reduce to practice” experience and skills. Substantial practice with newly data sets, sparse data situations, and complex data sets, and data collection approaches (field, observational, server data). Exposure to 10 Lean Sigma DMAIC projects being done concurrently with training by 10 of the candidates in close to further develop understanding of how DMAIC projects play out in the real world. Projects were diverse including, Medical Center, Transactional (Financial and IT), and Production/Manufacturing.

3) Green Belt Certification Projects: The candidate successfully completed a 22 + week DMAIC project on a “very real” and important process improvement opportunity with an industrial, business, strategy, government sponsor. Candidates have typically spent at least half time (~5 hrs) on these projects over that entire 22 + week period. Dr. Di. Scott Sink monitored and coached the candidate from start to finish and attended all Stage and Gate meetings with the sponsor. They have demonstrated sufficient proficiency and skill in the Integrated Lean Sigma DMAIC methodology to warrant GB level certifications. All projects must be documented through implementation and validation phases. A Final Tallgate Report (BMG/Industry Standard) and an @Sigma GB Final Tallgate case study have been successfully completed and reviewed/Approved.
Pilot’s License Analogy: the ‘industry’ confuses certificate with certification. WE DON’T

1. Passing the FAA exam is necessary but not sufficient, you can be smart and not earn a pilot’s license;
2. About skill acquisition and demonstration not just about what you know;
3. Instrument Rating isn’t the same as Instrument Competent
4. Can’t have somebody else do your work for you
5. Have to let your Results be your Guru!
Training and Certification Design—
"Ground School" (ISE 685)

- Blended Training Model developed with Moresteam and BMGi while at MDS (best in class)
  - MoreSteam Black Belt (w/ Minitab) is Foundation curriculum for ISE 685 (140 MS Hours)
    - 5 ch, 10 weeks,
    - three 5 hour Saturday Labs (Lean, Sigma, Change management)
    - Case Study approach, ‘in-flight’ candidates and projects used to help students understand DMAIC and reduction to practice
  - Build on ISE BSISE curriculum (as discussed)
- 5 hour, most difficult BB exam MoreSteam offers, 80% pass threshold
<table>
<thead>
<tr>
<th>Cycle</th>
<th>Sponsor</th>
<th>Candidate</th>
<th>Project Title and Description</th>
<th>Primary Type of Problem and Primary Tools Employed</th>
<th>Process Impact</th>
<th>Business Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wi-Sp 2010</td>
<td>OSU Medical Center</td>
<td></td>
<td>Process Improvement for New Admissions to the Rehab Clinic</td>
<td>Work Redesign, Work Measurement, Variation Reduction</td>
<td>6 major pain points in the admission process eliminated, staffing rationalization</td>
<td>Budget over runs justified and staffing levels appropriate for workload established</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>PPG-Coatings Division</td>
<td></td>
<td>Working Capital Reduction via batch size reduction</td>
<td>Small Order Batch Size Reduction</td>
<td>System Modeled allowing for 'simulation' of real time adjustments to include tradeoffs</td>
<td>$175,000 (125,000 Labor, 50,000 Materials)</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>PPG-Coatings Division</td>
<td></td>
<td>Lead Time Reduction via QA Cycle time reduction on Water Based Paint line</td>
<td>Lean, lead time reduction</td>
<td>Process adjustments that decreased cycle time at key spots in the QA process.</td>
<td>$100,000 (90,000 labor, 10,000 materials)</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>Diamond Innovations</td>
<td></td>
<td>Process Variation Reduction</td>
<td>Six Sigma, DOE</td>
<td>Process variation understood, process adjustment approved, Optimized Process Method established</td>
<td>$120,000 4-year NPV</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>Big Lots</td>
<td></td>
<td>Category Sales Improvement in Columbus District</td>
<td>Intra Company benchmarking and work redesign based on best practices</td>
<td>no sustainable process enhancements</td>
<td>Project was basically not successful in excess of $1,000,000 4-year NPV for deployments planned</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>Limited</td>
<td></td>
<td>Order Fulfillment (outbound) productivity improvement</td>
<td>Lean, work redessing, Human Factors</td>
<td>50% improvement in 'order picking'</td>
<td></td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>Kahiki Foods</td>
<td></td>
<td>Reduction of downtime on a 'in-line' production operation</td>
<td>Total Productive Maintenance</td>
<td>downtime variability reduced in half, total downtime now in spec range for best in class</td>
<td>$165,000 3-year NPV</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>Kroger DC--Delaware</td>
<td></td>
<td>2 Projects--1 on loading efficiency improvement and 1 on reduction of sanitation hour requirement</td>
<td>Work Measurement, Work Redesign</td>
<td>Labor Productivity for Loading improved 18%</td>
<td>$320,000 in labor moved from NVA to VA in the DC as a result (from 11 to 9 loaders per shift)</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>Smiths Medical</td>
<td></td>
<td>2 projects--both focused on improvement of throughput yield</td>
<td>DOE, SixSigma</td>
<td>DOE led to updated and improved parameters for welding process</td>
<td>reduction in scrap rates from 17% to 6%--$40,000 (conservative) reduction in scrap cost</td>
</tr>
<tr>
<td>Wi-Sp 2010</td>
<td>Mid Ohio Foodbank</td>
<td></td>
<td>2 projects--both focused on design and development of a measurement system (BSC)</td>
<td>Measurement System Design and Development</td>
<td>A visible measurement system was developed, in excel, to support real time decision making</td>
<td>TBD, in process</td>
</tr>
<tr>
<td>Project Name</td>
<td>Project ID</td>
<td>Who's Desk</td>
<td>Status</td>
<td>Business Unit</td>
<td>Type</td>
<td>Phase</td>
</tr>
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<td>------------------------------------</td>
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<td>--------------------</td>
<td>----------</td>
<td>---------------</td>
<td>-------</td>
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<tr>
<td>Band 2 Salting Cracker Waste Reduction</td>
<td>329-8683</td>
<td>Scott Sinic (222796)</td>
<td>Financial Audit</td>
<td>All</td>
<td>DMAIC</td>
<td></td>
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<tr>
<td>BOO Waste Reduction</td>
<td>329-8690</td>
<td>Scott Sinic (222796)</td>
<td>Financial Audit</td>
<td>All</td>
<td>DMAIC</td>
<td></td>
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<tr>
<td>Controlling Process Variability in Core Components Manufacturing</td>
<td>329-8651</td>
<td>Jacob Miller (197940)</td>
<td>In Process</td>
<td>N/A</td>
<td>DMAIC</td>
<td>Control</td>
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<tr>
<td>Design and</td>
<td>329-8660</td>
<td>Anthony</td>
<td>All</td>
<td>DMAIC</td>
<td>Control</td>
<td></td>
</tr>
</tbody>
</table>
What the career positions me to do here at OSU and in ISE

- Context:
  - Corporate: From Office of President/CEO and Board Room down to specific IE project level
  - Globally: From good old US of A to Canada, Germany, Brazil, China, Africa
  - Enterprise Transformation: had to lead, coach, advise, do multiple transformations and turnarounds—experienced success and failure and learned from both
  - ISE Education: Understand core ISE curriculum and how it lays the foundation to contribute in 2010 and beyond
  - Personal and Professional Mastery—have been systematically working on myself (if you don’t go within, you go without) for past 15 years and understand what’s required to achieve full potential performance
Life and Career Path—series of great opportunities and experiences all made possible by my great education at OSU

- Born and Raised in Findlay, OH
- 1968-1973 OSU Engineering, BSISE
- 1973-1976 Eastman Kodak, Service Systems Engineer
- 1976-1978 OSU MS and Ph.D. ISE & Interdisciplinary Program
- 1978-1984 Oklahoma State Industrial Engineering and Management (Assistant to Associate Professor w/ Tenure)
- 1984-1997 Virginia Tech ISE (Associate w/ Tenure to Full Professor and Director for Management Systems Engineering Option and Productivity and Quality Center)
- 1997-2007 ‘Real World’, VP Business Process Reengineering and Improvement for two different Global Firms in Boston and Toronto
- 2007-current OSU ISE
- Additional Life Experiences: President IIE (1991-92) and World Confederation of Productivity Sciences (1992-2005) and Current Member of Council on Industrial Engineering (2004 to present)