Integrated LeanSigma Certification Program—Integrated Systems Engineering

PROGRAM OVERVIEW

The **Corporate Partnership & Corporate-Sponsored** Integrated **Lean Sigma Capstone Projects** program is an industry-university partnership that integrates business realities into the curriculum of seniors and graduate students in the **Integrated Systems Engineering (ISE)** department at **Ohio State** who are concurrently working towards a **Lean Sigma Certification**[1]. As an integral part of the certification program, students are required to apply their knowledge in Industrial Engineering and Lean Six-Sigma to projects that address real-world problems arising in manufacturing or service processes. Each student is supervised/coached by our Program Director and may also draw upon Subject Matter Expertise of other Faculty, Departments, as well as our distinguished program graduates who are now out in the 'real world.'

Each Green Belt certification project runs through **2 academic semesters** a little over **28 weeks**. We provide both Yellow Belt (14 week) and Green Belt (28 week) opportunities for sponsors and for our candidates. Note that all candidates complete Black Belt level, Integrated Lean & SixSigma training and Certificates. Many sponsors are joining our Strategic Partnership and engaging in Integrated/Joint Summer Internships combined with the 2 semester ILSS Capstone Certification Design Project.

OUR VALUE PROPOSITION

Besides providing an opportunity to partner with Ohio State to develop our next-generation of world-class engineers, the program enables corporate sponsors to obtain significant business value through:

- **Proven track record over seven years** of being able to produce results in a timely fashion;
- OSU Engineering Students/Candidates are often able to spark change in teams that has previously been problematic;
- Fresh perspectives and high-impact solutions to their operational problems;
- Low cost, low risk implementations for their "back-burner" and important opportunities;
- Early identification of candidates for future employment;
- Increased corporate exposure on campus;
- Leadership and project management experience for junior employees;
- Project oversight by a seasoned performance improvement leader and Lean Sigma expert;
- Training and development 'on-the-job' training for managers and employees that participate on core teams, e.g. learning about lean sigma by osmosis side benefit;
- Hands on oversight, coaching and direct involvement in all the project Tollgate (milestone) meetings by our program director;
- Commitment to drive projects through to implementation and realization for top priority solution elements that are in scope;
- Identification of follow-on (mid term and/or distant horizon) improvement opportunities for follow on projects
- Networking opportunities with local businesses and Ohio State faculty;
- The potential to couple Summer Internships with this Academic Year Project Program to provide for a longer time frame for larger scoped projects.

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[1] This program is independent from Six-Sigma programs offered by the Fisher College of Business also at Ohio State.

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OUR TRACK RECORD

Our program has developed a track record of delivering substantial value to local businesses. In fact, most firms have chosen to sponsor our projects on repeated occasions attesting to the program's positive impact on their operations. Sponsors have ranged from **Fortune- 500s** to **small-medium businesses** and have spanned **across industries**. We have partnered with select non-profits and government agencies as well. Current, active and recent sponsors include:

- Sherwin Williams
- OSU Office of Business and Finance (OE@OSU)
- **OSU Student Life***
- **OSU Purchasing, Stores, Receiving, and Mail Services***
- Transmet
- Abbott
- Rod's Western Outfitters
- Smiths Medical

- Grange Insurance
- Ohio Health
- **The Wexner Medical Center at Ohio State University***
- Royal Building Products
- **Mettler Toledo***
- Akzo Nobel
- Kroger
- Verizon
- PPG

- **Worthington Industries***
- Diamond Innovations
- Donato's
- Nationwide Insurance
- National Church Residences
- Sutphen
- Emerson Liebert
- Pelatonia
- Amethyst
- Terrier Steel
- Peerless Saw

***Strategic Partners** have sustained engagement with our program and deeper and broader involvements that include, Summer Internships, multi-year program funding support, service on program review board, and hiring of our graduates of the program for full time positions. Strategic Partners receive preferential placement/mapping of candidates to their projects, assistance with recruiting and placement of co-ops/interns and full time positions, and assistance with Operational Excellence Program deployment.

Overall, our partnership with sponsors focuses on helping them grow enterprise value and at a macro level our projects have focused on Position Strategy and Deployment, Value Exchange Optimization, and Operational Excellence. In general, our Lean Sigma projects address some aspect of improving process capability, quality and/or productivity while realizing tangible business benefits. Candidates are prepared to tackle DMAIC (fix a process) or DCDOV (Design for LeanSigma) problems/projects. There is a certification requirement that projects achieve a certain level of Direct and/or Indirect Financial Benefits. Specifically, projects have addressed actual operational problems across the value chain, including:

- Improve capacity, eliminate bottlenecks
- Reduce Working Capital, Inventory Management Improvement
- Improve throughput yield
- Reduce cycle and/or lead times
- Improving forecast accuracy
- Improving Measurement Systems and enabling improved PDSA cycles
- Improving resource scheduling
- Increasing packing accuracy for outbound orders
- Improving on-time shipments
- Improving billing accuracy and reducing delays in receivables
- Understand and reduce process variation and process defects

- Improve Routing efficiency (balanced scrorecard approach)

- Reduce Set-up times
- Reduce patient wait times and increase patient/customer satisfaction
- Eliminate waste from transactional processes
- Designing, Development, Implementing Visible Measurement Systems, Operational Analytics Systems

Since the program was established in 2007, we have successfully completed over 250 projects. Another 27 projects have recently been completed and are in the evaluation phase as of April 2015. All projects are tracked over time (minimum of 1 year) by the Program Director for benefit realization and direct financial benefits. To date, benefits are in excess of **$4.7M in direct financial benefits and an additional $2.5M in indirect financial benefits with an additional $1M of benefits in process** through our projects while improving customer and employee satisfaction. Project selection is a joint process between Dr. Sink and the Sponsor.

Background and Experience of our Program Director

Every capstone project is guided by faculty coach and program director, **Dr. D. Scott Sink**. Dr. Sink brings over **30 years** of experience in industry and academia leading programs in areas ranging from strategic performance improvement to change management. Dr. Sink joined the ISE department at Ohio State in 2007 as Executive-in-Residence. Prior to joining ISE, Dr. Sink was VP, Business Process Improvement at MDS, where he launched a Global Lean Sigma program that realized over **$35M in direct benefits**. Before that, Dr. Sink was VP and Business Solutions Leader at Exchange Solutions, where he advised clients across industries on process reengineering. Before venturing into the private sector, Dr. Sink spent 13 years as a faculty member at **Virginia Tech** where he directed the Virginia Performance Center. Dr. Sink started his academic career as a faculty member at **Oklahoma State**. Dr. Sink is an active member of the **Institute of Industrial Engineers** and served as its **President** from 1993 to 1995. Dr. Sink received his PhD in Industrial Engineering from Ohio State in 1978.

In addition to Directing the Integrated Lean and SixSigma Program in the College of Engineering (ISE), Dr. Sink is active with the Council on Industrial Engineers and benchmarks Operational Excellence Programs in Boeing, Chrysler, UPS, Walmart, Kraft, Hershey's, Campbells, Intel, and others on an ongoing basis.

OUR APPROACH

Over the 28 week period, each student project will progress under the guidance of the faculty mentor while adopting the **DMAIC (IR)** methodology or **DCDOV**:

1. **Define**: Select the right project and scope the work to ensure successful and timely completion

2. **Measure / Analyze or Concept Design**: Measure the current state of operations, confirm and analyze major causes for performance gaps (e.g. root cause analysis), and design the future state or concept.

3. **Improve / Control or Detailed Design and Optimize:** Build solution elements, develop implementation and control plans, finalize business case and gain approval to proceed.

4. **Implement / Realize or Verify**: Monitor the implementation, confirm the future state is achieved and sustainable, and realize the business benefits.

Each student enrolled in the program is required to complete the following:

- In-class training and coaching towards a green belt and/or black belt certification
- Rigorous project planning with disciplined tollgates for each stage of DMAIC(IR) that are monitored by the faculty mentor
- Data gathering and fact-finding work in coordination with key stakeholders at the sponsor

- Providing ongoing progress and performance updates to sponsors
- Completing final tollgate which must include a professional report and presentation for the sponsor and project highlights poster-board to be shared in the classroom.

SPONSORING OUR PROJECTS

The level of commitment and the quality of communication are key determinants of project success. The program has more impact when a **project champion** is assigned to oversee the project and act as the first point of contact for students and faculty mentors. Candidates work closely with the Value Stream Owner, Process Owner(s), and a Core Team. They will be self-managing to a large extent.

Project champions typically commit **1-2 hours per week** for the following activities:

- Defining project scope with faculty coach
- Facilitating on-site visits for students, when appropriate
- Interacting regularly with students (Email communication is preferred and found to be effective in most cases)
- Navigating students through the organization or systems during fact-finding or data collection phase
- Reviewing reports and providing feedback on deliverables (e.g. progress reports, data analysis, final report).

Sponsorship Support

Candidates understand they are essentially engaged in an unpaid internship and that the benefit to them is the certification and the additional coaching support provided by the coach. Sponsors are funding the cost of the student's certification.

Candidates understand that the projects are scoped such that they can be completed in roughly 28 weeks and that the level of effort requirement is roughly 15 hours per week or a .33 full time equivalent level of staffing. They see these capstone projects as an unpaid co-op. Total labor budget that students have to work with is roughly 450 hours over the elapsed 32 week period.

COSTS: Our primary objective is to provide value for our sponsors and to provide an outstanding developmental opportunity for our students. The program, however, does have costs that need to be covered in order to sustain this certification option for our students—in short a subset of our sponsors provide funding to cover the certification costs for our students.

1--Sponsors are required to reimburse candidates for all project related expenses such as mileage, per diem as appropriate, and any printing costs or other supply costs required in the course of the project. Typically, students are on-boarded as either contractors or part time employees and bill time at a rate agreed to to cover mileage and other out of pocket Expenses or sponsors just pay them a monthly amount to cover the cost of mileage.

2—Strategic Sponsors negotiate multiple year commitments and 'give-get' arrangements with Dr. Sink and Julie Sills-Molock, the Department's Development Officer.

3—Regular Sponsors provide a base level of support of at least $8,000 up to $10,000 per project depending on the business case for the project to cover the cost of the candidate certification. (note that this equates to the average hourly rate for internships for ISE students) This support is provided directly to the department/program and is utilized by the Program Director to cover direct program related costs that are above and beyond the base degree, e.g. certification related.

If a project has substantial direct financial business impact (e.g. >$50,000), sponsors are requested to provide a performance based bonus level of support to the program/department that at matches the base level of support (or some portion of the base level of support); e.g. become a Strategic Partner. All projects are selected on the basis of having a significant 'size of prize'.

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4--**Non-profits** and small businesses, as determined by the Program Director, may qualify for a waiver or partial-waiver of any support expectations. **We do not want cost to get in the way of providing our candidates with great developmental experiences** and have never turned a sponsor down if sponsorship was an issue, for whatever reason.

5—**Other forms of program support:** It is also feasible, and has been done in the past, for a sponsor to provide support to the program by providing a Summer, paid internship, to a candidate in this program. Often a certification project is preceded by a paid Summer Internship which then allows for ramp up time for the candidate.

If for any reason, we (the coach and candidate) fail to deliver, then all funding support will either not be invoiced or will be reimbursed.

Confidentiality Issues

All students and faculty mentors agree to abide by the terms and conditions of the non-disclosure agreement entered with the sponsor at the start of the project.

Project information is discussed in class as part of the learning and development process but business sensitive or confidential information is protected in all cases. In some cases, projects may be submitted for publication in relevant academic or trade journals. In such cases, all company-confidential information will be removed and explicit permission will be requested from the sponsor.

ABOUT INTEGRATED SYSTEMS ENGINEERING (ISE)

The Integrated Systems Engineering (ISE) department is the home of the Industrial and Systems Engineering degree programs at Ohio State. The **US News and World Report ranked the department #14** out of over 100 undergraduate programs in the nation. ISE is comprised of 27 full-time faculty members who serve an enrollment of over 500 undergraduate and 185 graduate students. ISE has established several areas of academic excellence, including manufacturing processes, human factors and ergonomics, and operations research.

The department's annual research expenditures are in excess of $6 million. Approximately 60% of the research funding is from federal sources (including the Department of Energy, the Department of Defense and the National Science Foundation) and the remaining is from industry.

Find out more at **http://ise.osu.edu/**

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