

1 PURPOSE

The purpose of the Lean Systems Engineering Working Group (LSE WG) is to strengthen the practice of Systems Engineering (SE) by exploring and exploiting the potential synergy between traditional SE, Lean Thinking, and Program and Project Management (PPM). To do this, we are applying the wisdom of Lean Thinking into SE and PPM practices integrating people, processes, and tools for the most effective delivery of value to program stakeholders, increasing the product/system/mission quality and reducing the cost, schedule, and frustration of the stakeholders.

Traditional Systems Engineering is regarded as a sound and needed practice but often delivered inefficiently; it is not as good as it can be. We amend (not replace) traditional Systems Engineering with the wisdom of Lean Thinking.

The Lean SE WG (LSE WG) serves as the focal point for all Lean activities within INCOSE.

Two Important Periods of the LSE WG

2006-2011

Initiated in 2006, the LSE WG has become the largest of INCOSE Working Groups, presently counting 200+ members. The first three years were devoted to formulating the new field of Lean Systems Engineering and the development of a major product called **Lean Enablers for Systems Engineering (LEfSE)**. Version 1.0 of LEfSE was released to the public in 2009. During the next two years, a number of important products related to LEfSE have been published, as follows:

- Book: *Lean for Systems Engineering with Lean Enablers for Systems Engineering*, B. W. Oppenheim, Wiley, 2011
- Lean Enablers for Systems Engineering, B. Oppenheim, E. Murman, D. Secor, Journal of Systems Engineering, 2010; also INSIGHT 2009, CrossTalk 2010
- Chapter 3.4 in the *INCOSE Systems Engineering Handbook v. 3.2* on Lean SE
- Sections on Lean SE in the Systems Engineering Body of Knowledge (SEBoK), 2012
- Training video, power point presentation, and INCOSE webinar
- Brochure and Quick Reference Guide

The release of these products has been followed by massive dissemination to 50 venues in 12 countries on three continents, and is ongoing. This work was honored with the INCOSE 2010 Best Product Award, and the Shingo Award.

2011-present

During 2011-2012, a joint project was undertaken by INCOSE, the Project Management Institute (PMI) and the MIT Lean Advancement Initiative (LAI), led by Dr. J. Oehmen (MIT, LAI), to integrate the fields of Lean, SE, and program management into a synergistic, practical, actionable, seamless, and well aligned body of knowledge called *Lean Management of Engineering Programs*, focused on large complex engineering programs.

The work was conducted by thirteen Subject Matter Experts representing INCOSE, PMI, industry (Boeing, Rockwell-Collins, Siemens, ULA, SAP), academia (MIT, LMU and SIT) and government (AFIT, BCAA Canada, and USNNSA). Several individuals from the LSE WG served as members of the SME: Mark Bowie, Josef Oehmen, Bo Oppenheim, and Deb Secor. The LSE WG members participated in several surveys and reviews of the project. The group developed over 300 **Lean Enablers for Managing Engineering Programs (LEfMEP)**. The enablers seamlessly integrate practically all former LEfSE enablers. In March 2012, the group delivered the first complete draft to INCOSE, PMI and MIT of *The Guide to Lean Enablers for Managing Engineering Programs*, Joint MIT-PMI-INCOSE Community of Practice on Lean in Engineering Programs, Josef Oehmen, ed., MIT, Version 0.7.

Authored by 13 experts, the Guide was released in May 2012, jointly by PMI, INCOSE and LAI. It was adopted by the INCOSE LSE WG and listed on the WG web page as version 2.0 of the Lean Enablers. Since that time, the LSE WG purpose has been expanded to integrate the fields of Lean Systems Engineering and Lean Program and Project Management.

2 GOAL

It is our goal to strengthen the practice of Systems Engineering (SE) by exploring and exploiting the synergy between the disciplines of traditional SE, Lean Thinking, and Program and Project Management (PPM).

3 SCOPE

We will apply the wisdom of Lean Thinking into SE and PPM practices integrating people, processes, and tools for the most effective delivery of value to program stakeholders; further expand the Body of Knowledge of Lean SE integrated with Lean PM; update the INCOSE SE Handbook (and other such products) with LEfMEP; and develop and disseminate training materials and publications within the INCOSE and PMI communities, industry, and academia.

4 SKILLS AND EXPERTISE REQUIRED

All Systems Engineers, Program and Project Managers, Product Development Managers, and engineers qualify and are welcomed as members.

Leaders of the Lean SE WG must be experts in Lean, including Lean Product Development, and in Systems Engineering process. They also should be familiar with Program Management.

The names of members and their responsibilities.

- Co-Chairs: Josef Oehmen (MIT), Bo Oppenheim (LMU), Deb Secor (Rockwell Collins)
 - Plan and lead all meetings and all activities

- Report to the Assistant Director for Knowledge
- Manage the website, the TeamSpace, and the new member requests
 - Provide training
- Board Sponsor(s)/Champion(s): Richard "Dick" Wray
 - Responsibilities: The Board sponsor shall be responsible for resource advocacy and status reporting to the INCOSE BOD and external stakeholders.
- Members: 200+ members, too many to list by name. The names are available on our INCOSE Connect site.

5 OUTCOMES (PRODUCTS/SERVICES)

LEfSE (2006-2011) A-G completed

- A. Lean Enablers for SE (Version 1 released online)
- B. Supplementary products (video, PP presentation, brochure, Quick Reference Guide, 3 scholarly papers of different lengths) - all released online
- C. Book Lean for Systems Engineering with Lean Enablers for SE, B.W. Oppenheim, Wiley, 2011
- D. INCOSE SE Handbook, Chapter 3.4 on Lean
- E. Mapping of Lean Enablers for SE onto 26 INCOSE Processes
- F. Sections on Lean in SEBOK and BKCASE
- G. Massive training in LEfSE (3000 people, 50 venues in 12 countries on 3 continents)

Ongoing:

- H. Formulate questions for the INCOSE SE Certification exams - (Deb Secor and Bo Oppenheim)
- I. Competition for students on LEfSE – Joel Harris
- J. Collection of Case Studies - all

LEfMEP (2012-present) A-B completed

- A. *Guide to Lean Enablers for Managing Engineering Programs*, Joint MIT-PMI-INCOSE Community of Practice on Lean in Program Management, J. Oehmen Ed., MIT.
- B. Webinar on LEfMEP, Josef Oehmen, April 26, 2012, MIT KEE
- C. Additional related products and dissemination in the planning

6 APPROACH

- Meeting frequency: each IW and each IS, plus as needed
- Decision making: as needed
- Norms or ground rules: "be active" and be familiar with the WG products

- Accountability: intentionally not spelled out, high level of teamwork and collegiality expected
- Communications: email
- Challenges: the economy lowers the attendance, need increased support by primes and end customers
- Assumptions: Lean Thinking can vastly improve the practice of SE and PM, as it has improved every other field it touched.
- Major phases or milestones, if applicable: see 5 above

7 MEASURES OF SUCCESS

Size of membership: 200+ counted in January 2012 (the largest WG of INCOSE. Started in 2006.

55 major workshops, tutorials, webinars, seminars delivered in US (INCOSE, PMI, MIT, SIT, LMU, Industry, DoD, SME), China, Finland, France, Italy, Israel, the Netherlands, Norway, Poland, Russia, Singapore, Sweden, United Kingdom, all well received

Number of enterprises involved in the project: our 200+ members are active in their firms

Number of products/services delivered: See 5 above. Very popular.

No known complaints.

Participant of first INCOSE-PMI collaboration

8 RESOURCE REQUIREMENTS

One grant per year of \$2K for a grad student to support the research.

9 DURATION

This Charter will remain in effect until rescinded by the signatories.

10 SIGNATURES

Enter the signature block of the submitter Josef Oehmen, Bo Oppenheim, and Deb Secor, 4-20-2012

1st Level of Approval



Technical Director, INCOSE

Date

2nd Level of Approval (Note this will be added by the INCOSE Technical Director when deemed appropriate.)

Chairman, INCOSE Board of Directors

Date

Revision History

<u>Date</u>	<u>Revision</u>	<u>Description</u>	<u>Author</u>
9-17-2010	1.0	Initial Draft.	Bo Oppenheim and Deb Secor, Co- Chairs
4-24-2012	2.0	Revised to include LEfMEP	Josef Oehmen, Bo Oppenheim and Deb Secor, Co-Chairs