Lean Product and Process Development

a free webinar
presented by the

Lean Enterprise Institute
Webinar “Housekeeping” Tips

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Webinar “Housekeeping” Tips

**Asking questions**

- Use the “question” box in the lower right corner

- Submit questions as they occur to you by typing in the box, then click submit

- Questions will be answered during the Q&A session at the end of the presentation.
Question and Answer

We will do our best to answer as many questions as possible in the allotted time.

Answers to the questions that we cannot get to during the webinar will be answered on our website soon.

We will notify you when they are available.
Lean Product and Process Development

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Lean Enterprise Institute
Today’s Speaker

Durward Sobek
Associate Professor and Graduate Program Coordinator of Industrial & Management Engineering
Montana State University
Bozeman, MT

Al Ward’s Ph.D. student
Laid the basic research foundation
Co-formulated many of the initial ideas in the book, *Lean Product and Process Development*
Introducing AI Ward

BA in History, U. of Oregon
Captain of the US Army
Ph.D. in Mechanical Engineering, MIT
Professor of Mechanical Engineering, U. of Michigan
Machine designer
Observer, thinker, philosopher, author
Why publish now?

His insights into the fundamentals of PD are powerful, and relevant.

Today I’m going to share a few of those insights with you. I encourage you to get the book, and read it, as I’ll only be able to give you a few snapshots. You’ll not think about product development the same ever again!
The Fundamentals

Purpose and aim of PD
Useful Knowledge
Set-Based Concurrent Engineering
Entrepreneurial System Designers
Teams of Responsible Experts
Cadence, Flow and Pull
What does development produce?

Operational Value Streams
Three Core Value Streams

RM ➔ Saleable Good

Order ➔ $$

Idea ➔ Hardware
Three Core Value Streams

Operational VS

RM → Saleable Good

Order → $$

Idea → Hardware

Development VS

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Allen Ward’s Insight

Development value streams create Operational value streams!
Allen Ward’s Insight

Development value streams create Operational value streams!

Product Features

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Development value streams create Operational value streams!
Allen Ward’s Insight

Development value streams create Operational value streams!

Manufacturing  ➔  Product Features  ➔  Customer

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Development value streams create Operational value streams!

Suppliers → Manufacturing → Product Features → Customer

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What is a good development system?

One that consistently produces profitable value streams.
From where do profits derive?

Value- Creating Developer Effort → Hardware/ Software → Profit

Lean Product and Process Development
From where do profits derive?

Value- Creating Developer Effort

Useful Knowledge

Hardware/ Software

Innovation

Integration

Good Decisions

Profit

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“Value added” in product development is creating useable knowledge and equipment.
Generate Useful Knowledge

by exploring multiple solutions simultaneously;

by aggressively learning about the solutions, and eliminating weak ones;

by converging on a solution only after it has been proven.

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Set-Based Concurrent Engineering

This:
Set-Based Concurrent Engineering

This:

Not this:

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pick one

synthesize → analyze

improve
Trade-off Curves

by analyzing and testing to learn (not simply to validate)

Useful

Not Useful

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Learning
by validating knowledge through the fundamental learning cycle

Go
See
Ask
Why

(in)
Form

Act
Look
Ask
Discuss
Model

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Capture & Reuse the Knowledge

by synthesizing and documenting

Limit and trade-off curves
Succinct reports
Engineering standards / design guides
Reflection

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Is deep technological know-how enough?

NO!

It must be integrated.
A Story…

Sobek-san, what do you think of the new Taurus?
A Story...

Sobek-san, what do you think of the new Taurus?
A Story...

Sobek-san, what do you think of the new Taurus?

???

All the parts on the are best-in-class…
A Story…

Sobek-san, what do you think of the new Taurus?

???

All the parts on the are best-in-class…

???

…but it is not a great car.
How do you resolve:

Subsystem design convergence?

Subsystem interactions producing desired effects?

Design balance?

Conflicting customer desires?
How do you resolve:

Subsystem design convergence?

Subsystem interactions producing desired effects?

Design balance?

Conflicting customer desires?

Toyota’s Remedy: The Chief Engineer
The Chief Engineer

Leads vehicle development project…
Designs the system architecture…
Plans the development process… and runs it…
Drives consensus and tradeoffs…
Represents the customer…
Makes money.
But most of the developers do not report to the Chief Engineer!

Who does the work?

Teams of responsible experts.
Teams of Responsible Experts

Create new knowledge around a subsystem…
Communicate it…
Represent it to others, esp. the Chief Engineer…
Focus on overall project success…

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Build expert teams by avoiding handoffs

Knowledge

Responsibility

Feedback

Action

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Q: What is your most important job as an engineering manager?
Make Growing People a Priority

Q: What is your most important job as an engineering manager?

A: Helping my people become the best engineers they can be.
Make Growing People a Priority

Q: What is your most important job as an engineering manager?

A: Helping my people become the best engineers they can be.

Technical Knowledge & Problem-Solving Skill
“Lots of conflict makes great cars.”

- Toyota Chief Engineer
Manage the Flow by eliminating *muri*.

**Lean Product and Process Development**
Manage the Flow

by eliminating *muri*

HOW? Target events that “pull” developer effort
Manage the Flow

by eliminating mura

Variability will be buffered by some combination of inventory, capacity and time.

- Hopp and Spearman, Factory Physics
Manage the Flow

by eliminating *mura*

HOW? Cadence.

combination of inventory, capacity and time.

- Hopp and Spearman, *Factory Physics*
Manage the Flow

by eliminating *muda*

Any activity that does not:

- directly result in hardware/software
- produce useable knowledge

should be **eliminated**,  
or redesigned so that it does.
The Basics

The object of the game is to make profit, consistently.

The operational value stream generates the profit.

The rate and quality of output from development depend critically on knowledge.
The Basics, cont.

Generate knowledge through set-based concurrent engineering.

Grow teams of experts who can use, generate useful knowledge.

Establish and support entrepreneurial system designers.

Eliminate overburden, instability, and waste through cadence, pull, and flow.
Al’s Hypothesis

Focusing on these fundamentals will greatly improve product development performance.

Will you help us test the hypothesis?
"Perfection is not attainable. But if we chase perfection, we can catch excellence."

-Vince Lombardi
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Question and Answer

Use the “question” box in the lower right corner.