

Welcome!

Sound Check – Casual Chat

We will start at 1 pm ET

Please select the speaker you would like to use for today's webinar.

Select a Speaker

Same as System

✓ MacBook Pro Speakers (MacBook Pro Speakers)

Test Speaker & Microphone...

Leave Computer Audio

Audio Settings...

Listen with Computer Audio
(VOIP)

Listen by telephone options
available in the
confirmation email

***Note: Your
microphone
and camera are
not needed and
will remain
disabled.***

Audio Settings



Apply Operations Science to Accelerate Success Now



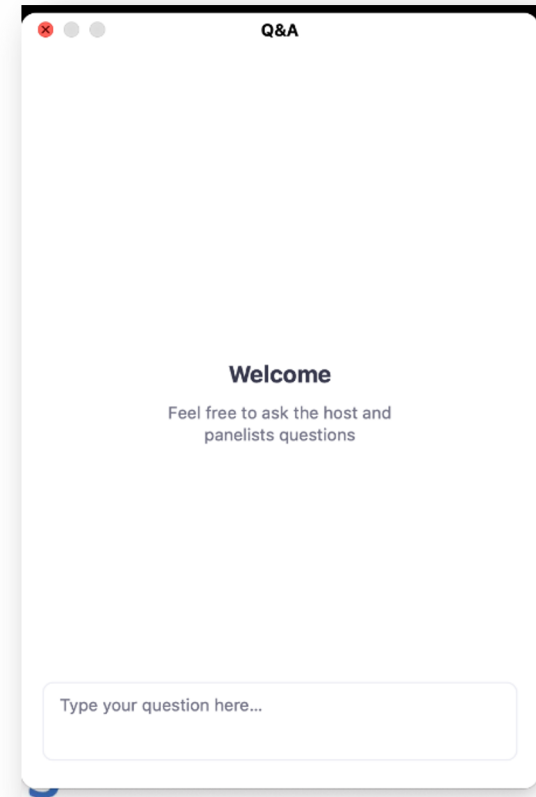
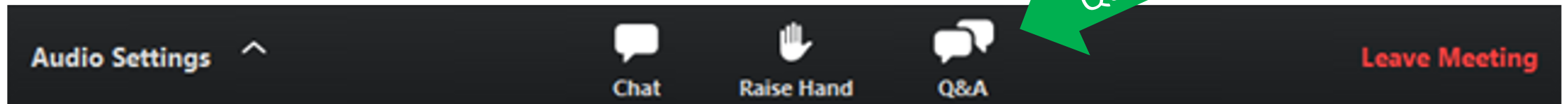
Host: Mark Graban
Senior Advisor, KaiNexus
Mark@KaiNexus.com



Presenter: Ed Pound
Managing Director
Operations Science Institute
espound@opsience.org

Webinar Logistics

- Presentation (40 minutes)
- Q&A (15 minutes)
 - Use the Zoom Webinar meeting panel to submit a question at any time



- Recording link & slides will be sent via email

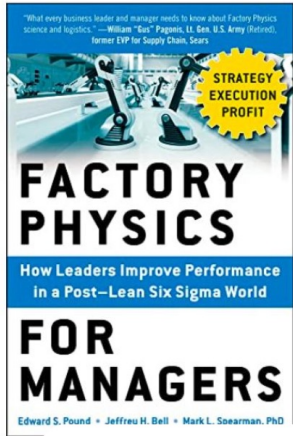
KaiNexus.com

Optimize Your Improvement Work.

KaiNexus is the solution for your Lean and Improvement work where teams can capture, implement, measure, and share in one system that does it all.

[▶ Watch Demo](#)[Get Started](#)

Book Giveaway Contest!



KaiNexus

**Factory Physics for
Managers -- Signed Copies!
via KaiNexus**

Winners:

Mareen Walsh

Samantha Schindler

Jorge Lockwood Nieves

About Ed Pound



- 35 years experience in operations
- Lead author of *Factory Physics for Managers*
- Co-author of upcoming book, *Applied Operations Science*
- BS, MS in Mechanical Engineering (University of Alabama)
- MBA, MS in Engineering Management (Northwestern University)

OPERATIONS SCIENCE

Practical science for your people and your technology to
accelerate success **now**

Operations Science Institute

Inspire. Energize. Sustain.

www.opscience.org

Proven Operations Solutions Lean?

Want to coordinate many or conflicting initiatives?

Harness employee experience rather than hire consultants

Employees apply operations science to improve
performance using current resources

LEARN MORE ?



ONLINE COURSES

- Launching end of March
- Three certificates available
- Operations science concepts and math
- Evaluations at end of most courses
- AI chatbot assistant

OPERATIONS SCIENCE CERTIFICATES

- Flow Leadership
- Inventory Leadership
- Operations Science Leadership
aka, Operations Scientist

A FUNDAMENTAL PROBLEM

COMPLEX TECHNICAL AND/OR ACADEMIC SOLUTIONS

SIMPLE, UNSCIENTIFIC "BEST PRACTICES"



THE SOLUTION

COMPLEX TECHNICAL AND/OR ACADEMIC SOLUTIONS

OPERATIONS SCIENCE



SIMPLE, UNSCIENTIFIC "BEST PRACTICES"

EVOLUTION (2018)

FACTORY “We’re not a factory”

OPERATIONS Everyone has operations

PHYSICS “That sounds cool, but it sounds hard”

SCIENCE Everyone likes science-based solutions, objective and predictive

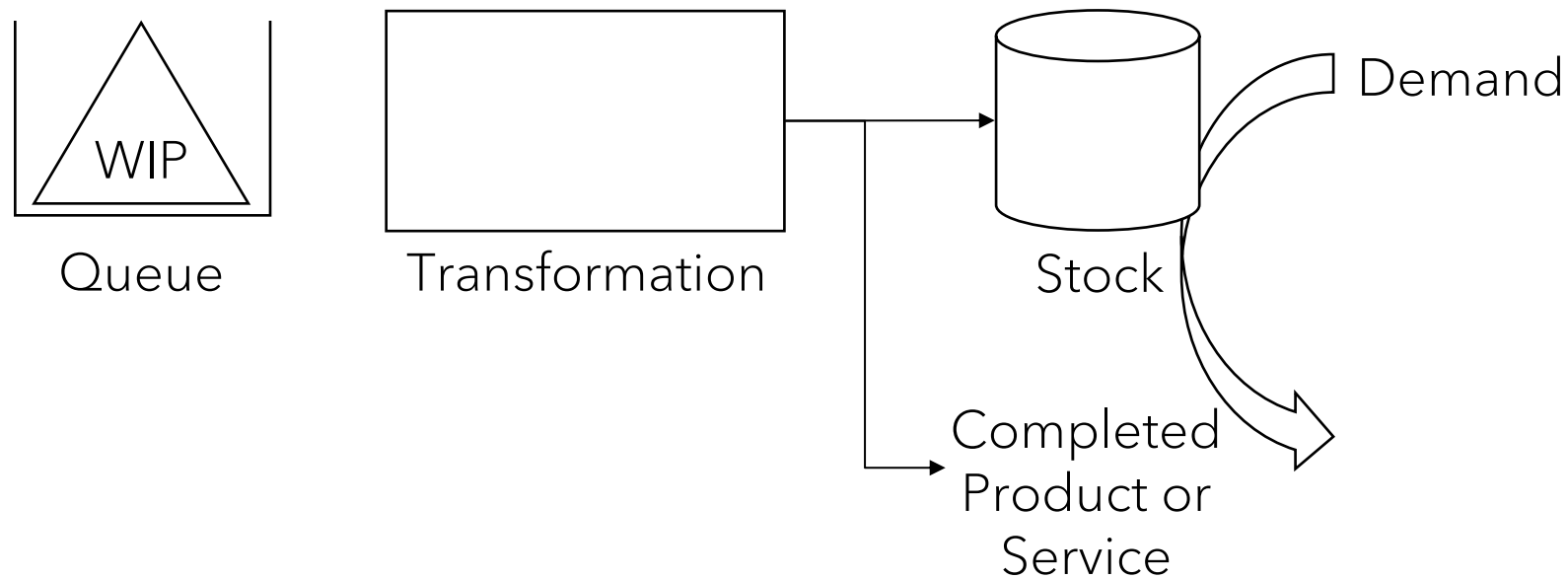
WHAT IS OPERATIONS SCIENCE?

Operations Science is the study of transformation of resources to create and distribute goods and services

Operations Science focuses on the interaction between demand and transformation and the variability associated with either or both

Operations science enables those who do the work to optimize processes and systems to achieve desired objectives

THE BASIC ELEMENTS OF AN OPERATION



DEFINITIONS PROVIDE CLARITY

Work In Process (WIP) – Entities released for work in a transformation flow and are not yet completed. Entities can be physical, such as parts, or virtual such as tasks. Measured in units

Queue – a set of entities (parts, tasks, information) waiting for transformation. Measured in units

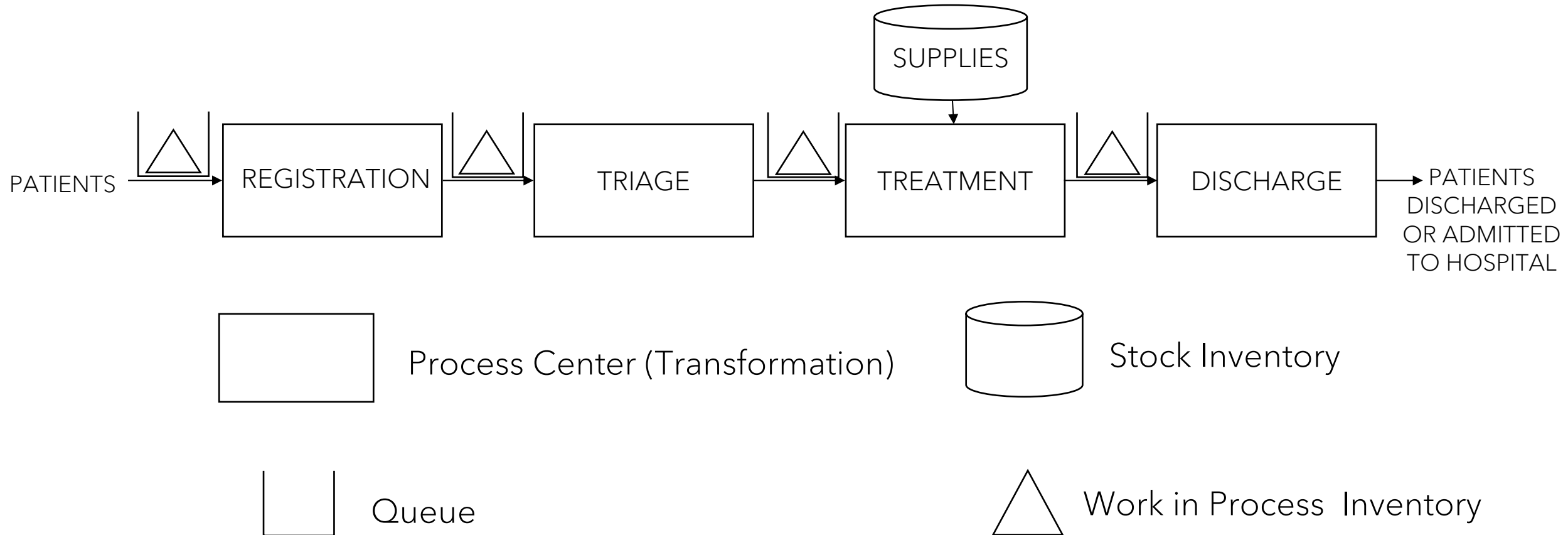
Transformation – the act of changing an entity or set of entities or of changing the entities' status. Measured as a rate, units/time

DEFINITIONS (continued)

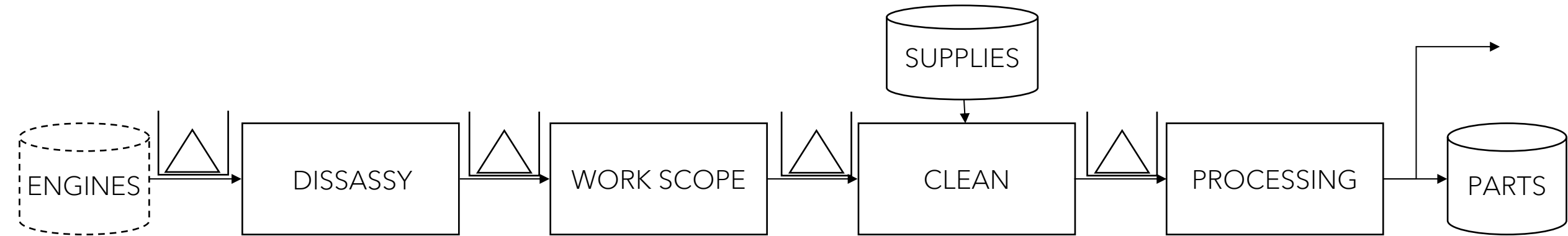
Stock – a set of completed transformations or entities available to satisfy demand. Measured in units.

Demand - the desire of an external customer and/or downstream process for an entity or a set of entities with specific attributes. Measured as a rate, units/time

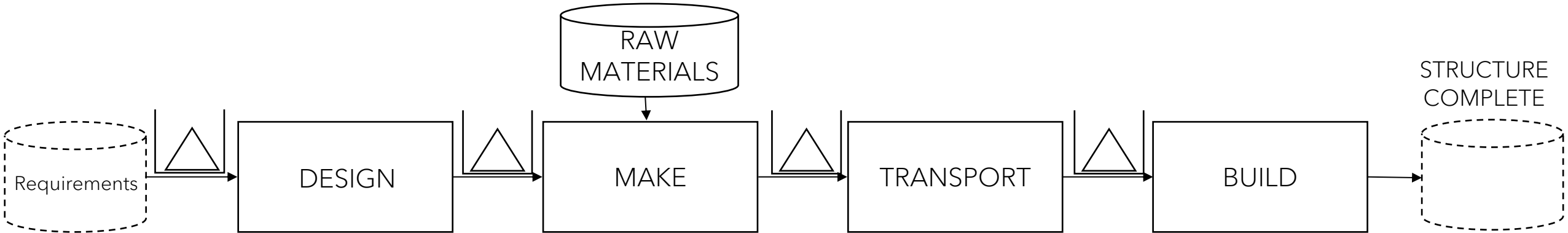
SERVICES - EMERGENCY DEPARTMENT



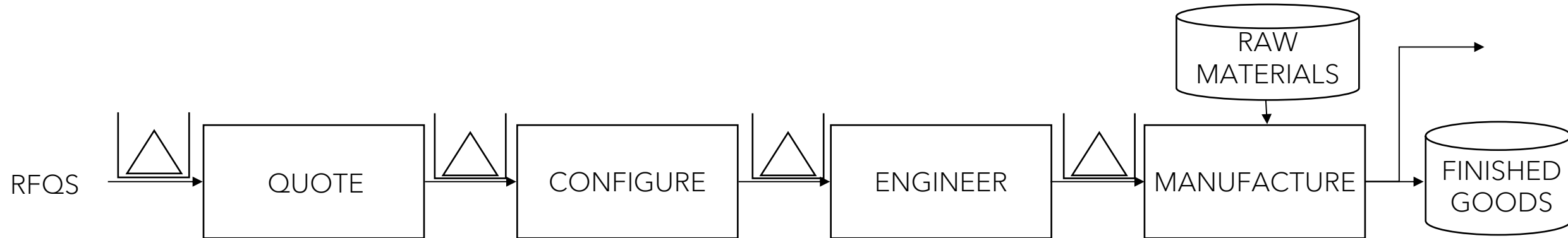
AVIATION MAINTENANCE, REPAIR, AND OVERHAUL (MRO)



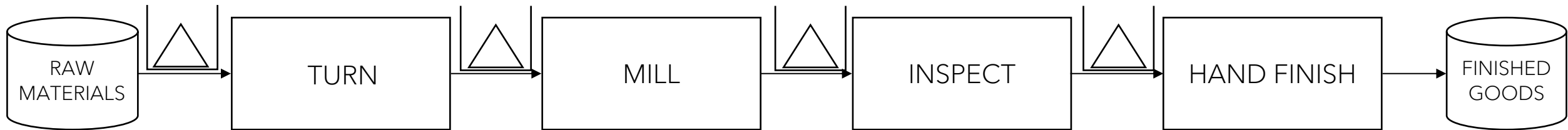
PROJECT MANAGEMENT IN CONSTRUCTION



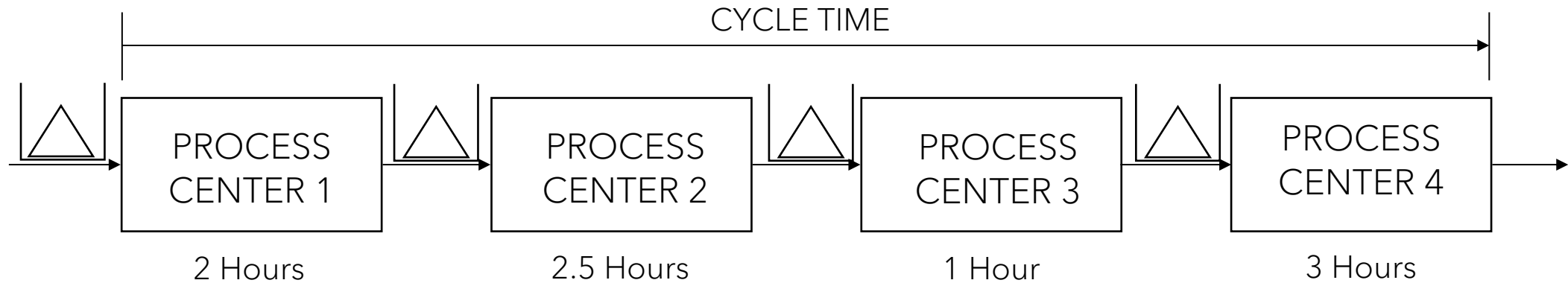
PROJECT MANAGEMENT IN ENGINEERING CONFIGURE TO ORDER



TRADITIONAL MANUFACTURING



UTILIZATION AND CYCLE TIME

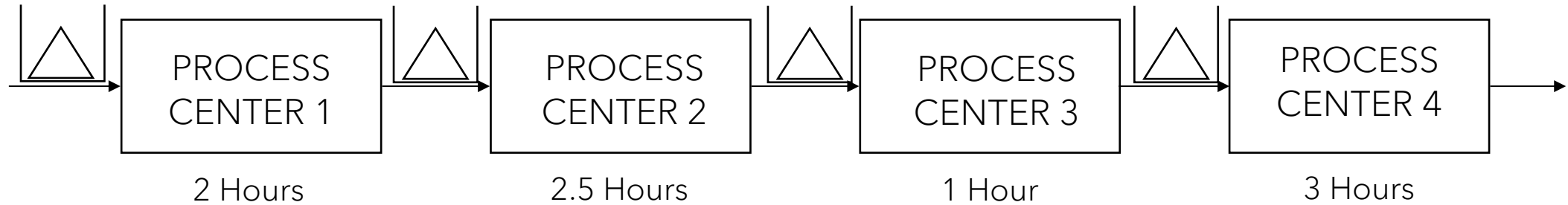


Process Time - time to complete work on one entity at a resource

Cycle Time - time for an entity to complete a routing from start to finish, also called Cycle Time

Usually, cycle time is much greater than the sum of process times

For example, queue time is typically a very large component of cycle time



Demand = 3 parts/day

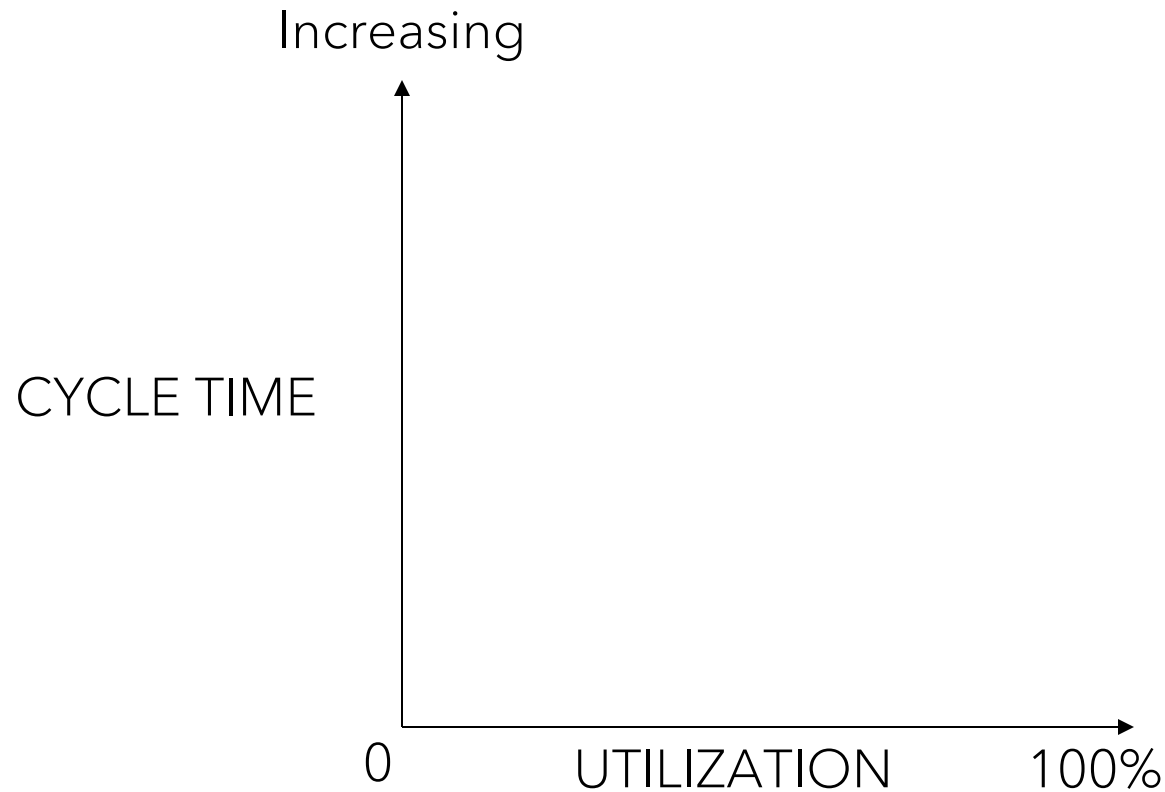
Time Available = 8 hours/day

$$\text{Utilization} = \frac{\text{Time Used}}{\text{Time Available}}$$

$$U(\text{PC1}) = \frac{(3 \text{ parts/day})(2 \text{ hours/part})}{8 \text{ hours/day}} = 0.75 \text{ or } 75\%$$

WHAT HAPPENS IF I HOLD AN OBJECT AT ARM'S LENGTH
AND RELEASE IT?

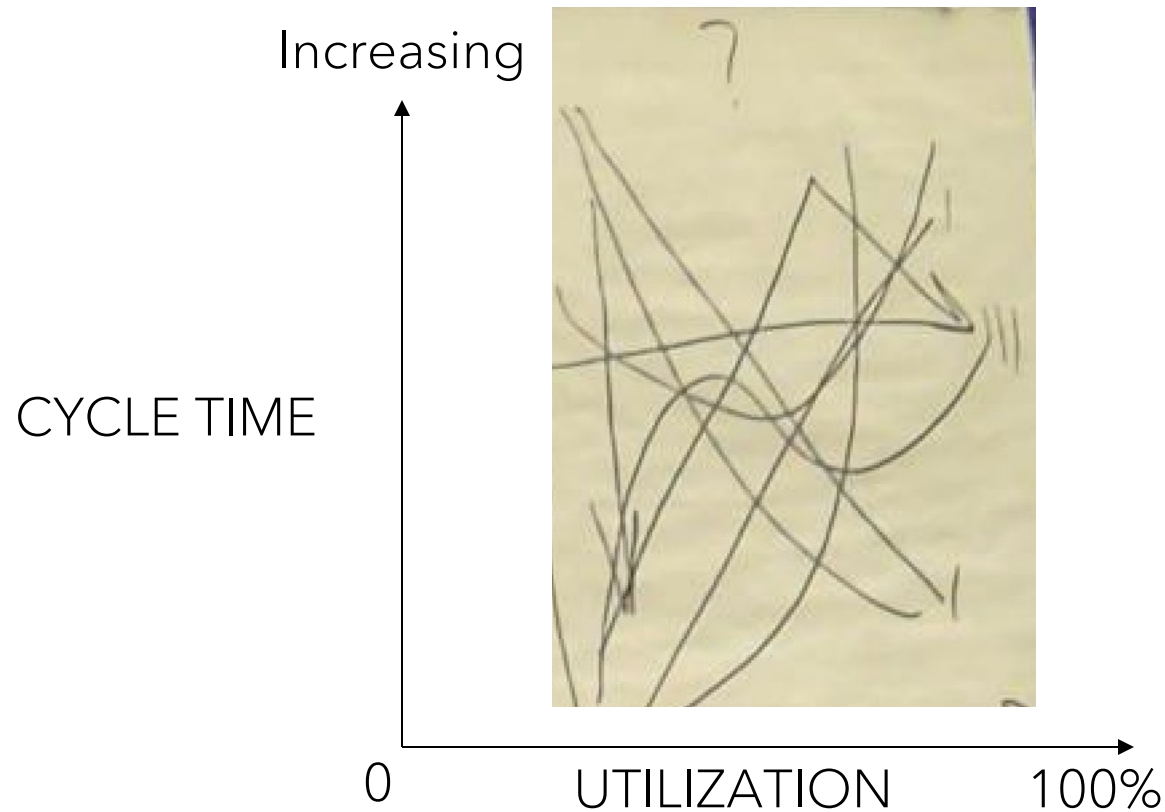
WHAT IS THE RELATIONSHIP?

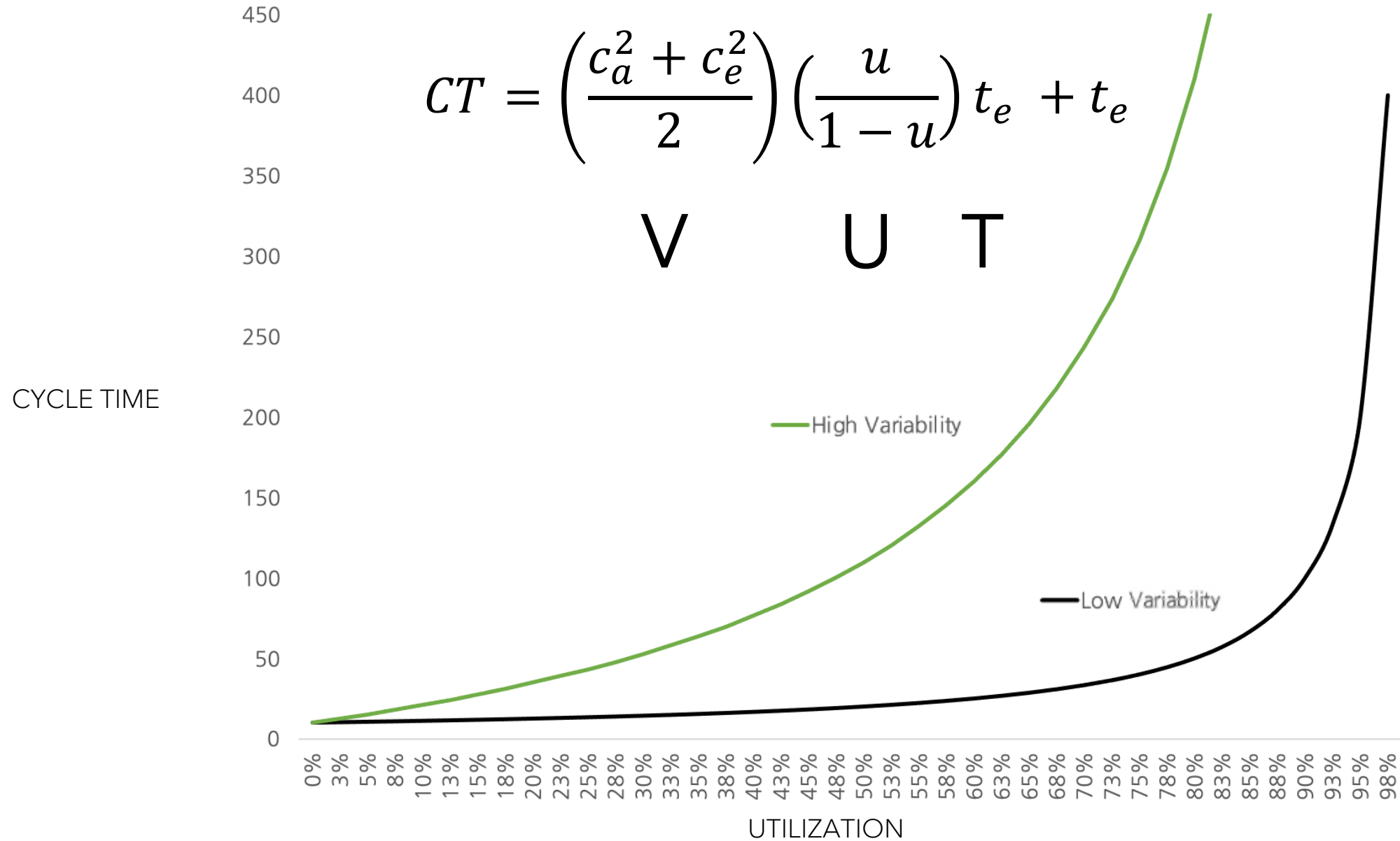






WHAT IS THE RELATIONSHIP?

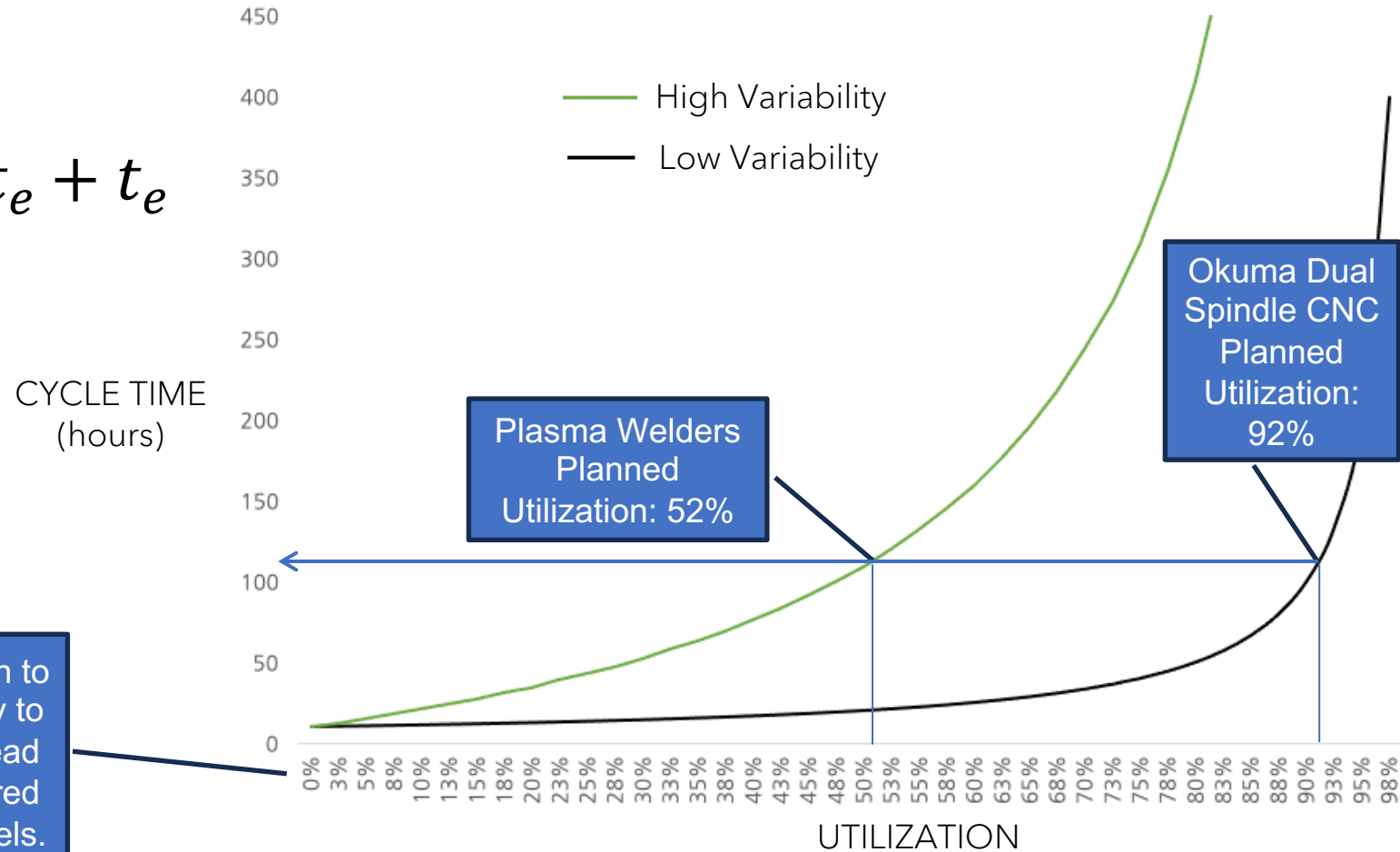




HOW CONAX TECHNOLOGIES APPLIES THE SCIENCE OF OPERATIONS

$$CT = \left(\frac{c_a^2 + c_e^2}{2} \right) \left(\frac{u}{1-u} \right) t_e + t_e$$

Conax uses utilization to account for variability to maintain a 3-week lead time to achieve desired customer service levels.



CYCLE TIME ELEMENTS

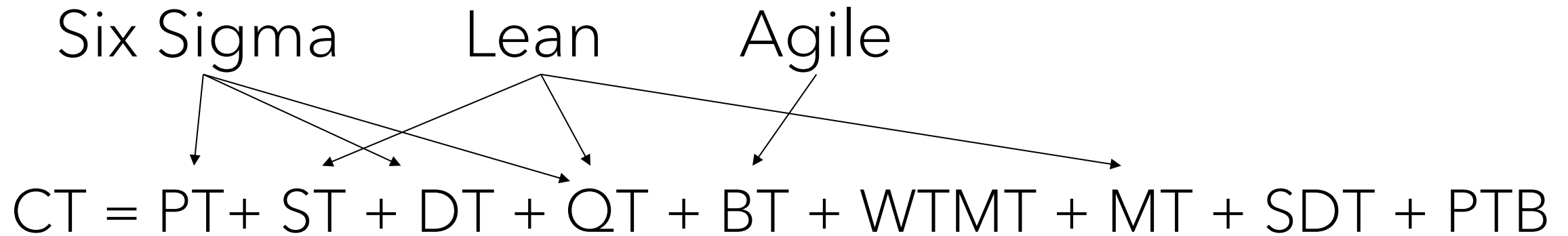
Cycle time elements are known, experimentation not needed

$$CT = PT + ST + DT + QT + BT + WTMT + MT + SDT + PTB$$

- PT – Process Time
- ST – Setup Time
- DT – Down Time
- QT – Queue Time
- BT – Batch Time
- WTMT – Wait To Match Time
- MT – Move Time
- SDT – Shift Differential Time
- PTB – Planned Time Buffer

See glossary at [opscience.org/resources/articles](https://www.opscience.org/resources/articles) for definitions of elements

OPERATIONS SCIENCE POWERS PROGRESS



CI initiatives and tools can be very useful but without operations science, they have knowledge gaps and can create unintended problems

DESIGN. IMPLEMENT. CONTROL.

DESIGN WITH OPERATIONS SCIENCE

Start with your process map, model the process

Optimize the process - determine operating parameters (utilization, WIP, CT)

IMPLEMENT

Train personnel, make changes, monitor results

CONTROL WITH OPERATIONS SCIENCE

Align measures

Establish sustainable control, predictable results

ENVISION A WORLD WHERE...

Cost and resources are practically optimized, highest desired on-time delivery

Achieve sustained success with existing people and technology

Use science-based operations leadership frameworks

Strengthen peoples' skillsets and careers

Manage variability predictably, Opex is an objective norm

Greatly reduce unnecessary firefighting and stress

www.opscience.org

OPERATIONS SCIENCE

Practical science for your people and your technology to
accelerate success **now**

Operations Science Institute

Inspire. Energize. Sustain.

Register or get notified of future webinars: www.KaiNexus.com/webinars

KaiNexus Webinars



NEXT WEBINAR: Kata & C.I.

March 21 — 1 pm ET

Tracy Defoe
The Learning Factor, Inc.



blog.kainexus.com



KaiNexus

[Why KaiNexus?](#)

[Solutions](#)

[Features](#)

[Resources](#)

[Pricing](#)

[Get A Demo](#)



What Is Continuous Flow Manufacturing? Its Keys to Success.

November 21, 2023

Imagine a world where every production process flows seamlessly, like a well-orchestrated symphony, eliminating bottlenecks and delays....

[Lean, Improvement Process, Improvement Methodology, Operational Excellence, Business](#)



Lean Six Sigma: Definition, Principles, and Benefits

November 20, 2023

In a world where efficiency is the lifeblood of success and waste is the silent killer of profits, there exists a methodology that promises...



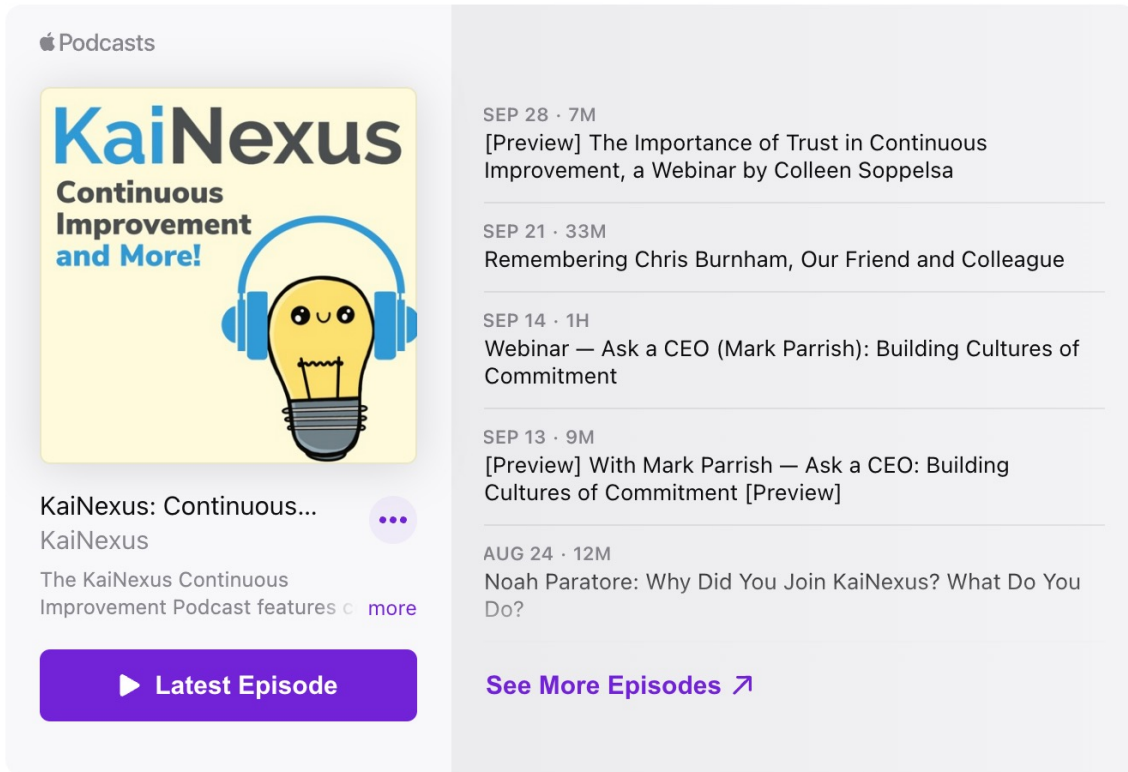
How to Optimize Processes Through Lean Management

November 17, 2023

Lean management is a systematic approach to eliminating waste and optimizing processes to maximize efficiency, improve quality, and enhance...

[Lean, Improvement Culture, Improvement](#)

The KaiNexus Podcast



- www.KaiNexus.com/podcasts
- Subscribe via:
 - Apple Podcasts
 - Google Podcasts
 - Overcast
 - Spotify
 - Other apps & services



Your Feedback Matters!

kainexus.zoom.us/webinar/tZMpd-iurjwuHdSx2jbdpjRjxZ5_gycXA6Yq/survey



Support English ▾

Thank you for attending the Webinar.
Please click Continue to participate in a short survey.

you will be leaving zoom.us to access the external URL below

[https:// info.kainexus.com/webinar-survey](https://info.kainexus.com/webinar-survey)

Are you sure you want to continue?

Continue

Stay on zoom.us

CLICK!

Q&A

- Web:
 - www.kainexus.com
 - blog.kainexus.com
 - www.opscience.org
- Webinars on Demand:
 - www.kainexus.com/webinars
- Social Media:
 - www.linkedin.com/company/kainexus
 - www.facebook.com/kainexus

KaiNexus



Host: Mark Graban

Senior Advisor, KaiNexus
Mark@KaiNexus.com



Presenter: Ed Pound

Managing Director

Operations Science Institute

espound@opscience.org