

Using System Engineering Methods in an Agile Development Framework

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Using System Engineering Methods in an Agile Development Framework

- Topics
 - The Systems Engineering Engine
 - Agile Basics
 - What do Systems Engineers DO in an Agile model?

What Systems Engineers Do

- Activities of Systems Engineering



Healthcare
Working Group

5th Annual Systems
Engineering in Healthcare
Conference
May 1-2, 2019
Minneapolis, MN



SYSTEMS ENGINEERING HANDBOOK

A GUIDE FOR SYSTEM LIFE CYCLE PROCESSES AND ACTIVITIES



FOURTH EDITION

WILEY

Technical processes

Business or mission analysis process

Integration process

Stakeholder needs & requirements definition process

Verification process

System requirements definition process

Transition process

Architecture definition process

Validation process

Design definition process

Operation process

System analysis process

Maintenance process

Implementation process

Disposal process

Technical management processes

Project planning process

Project assessment and control process

Decision management process

Risk management process

Configuration management process

Information management process

Measurement process

Quality assurance process

Agreement processes

Acquisition process

Supply process

Organizational project-enabling processes

Life cycle model management process

Infrastructure management process

Portfolio management process

Human resource management process

Quality management process

Knowledge management process

How Systems Engineering Can Reduce Cost & Improve Quality

1-2 May, 2019 Twin Cities, Minnesota



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NASA/SP-2007-6105
Rev1

NASA Systems Engineering Handbook

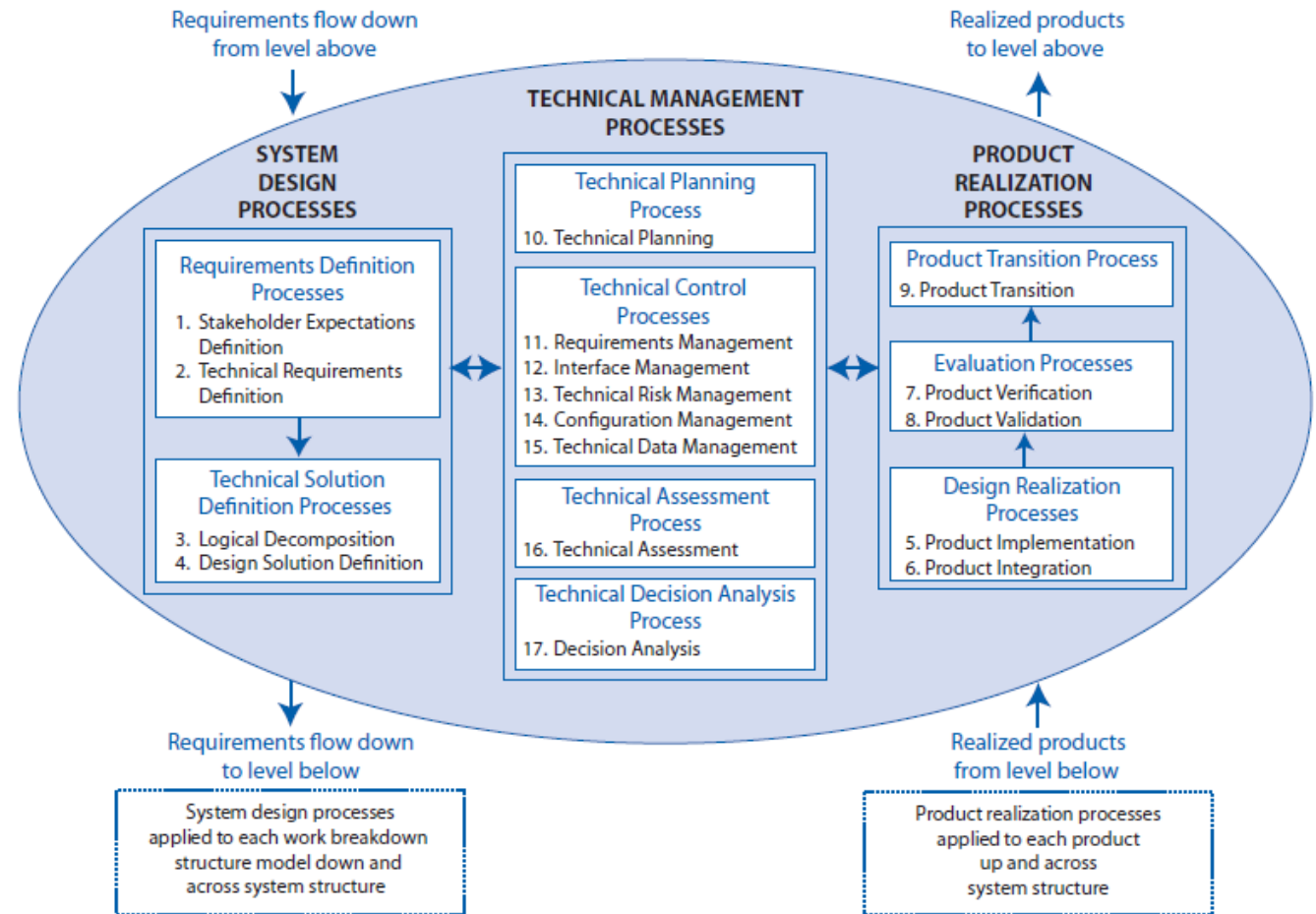
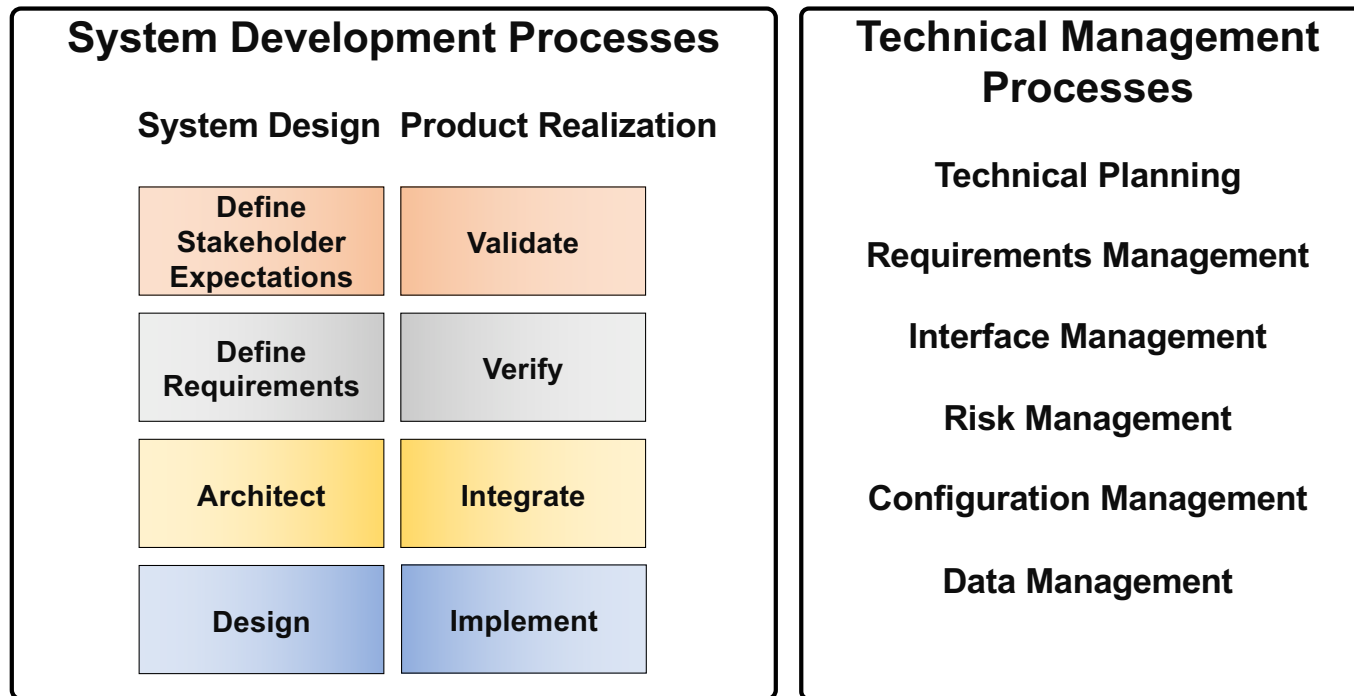


Figure 2.1-1 The systems engineering engine

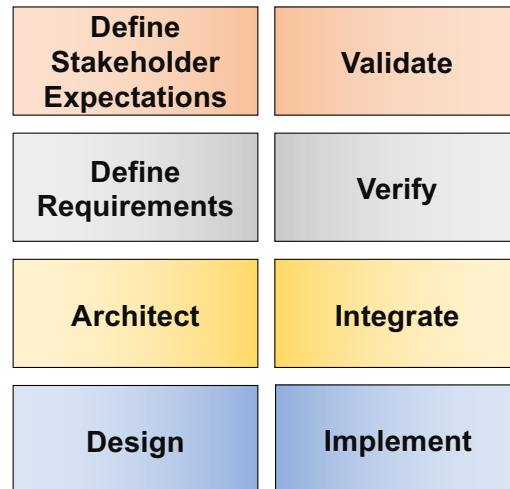
The Systems Engineering Engine



Poll: Which activities do Systems Engineers do in your organization?

System Development Processes

System Design Product Realization



Technical Management Processes

Technical Planning
Requirements Management
Interface Management
Risk Management
Configuration Management
Data Management

What is Your System?

System of Systems

Electrical Mechanical System



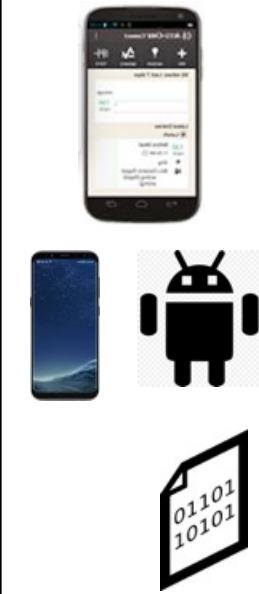
Electrical Mechanical Firmware System



Web / Stand-alone Software System

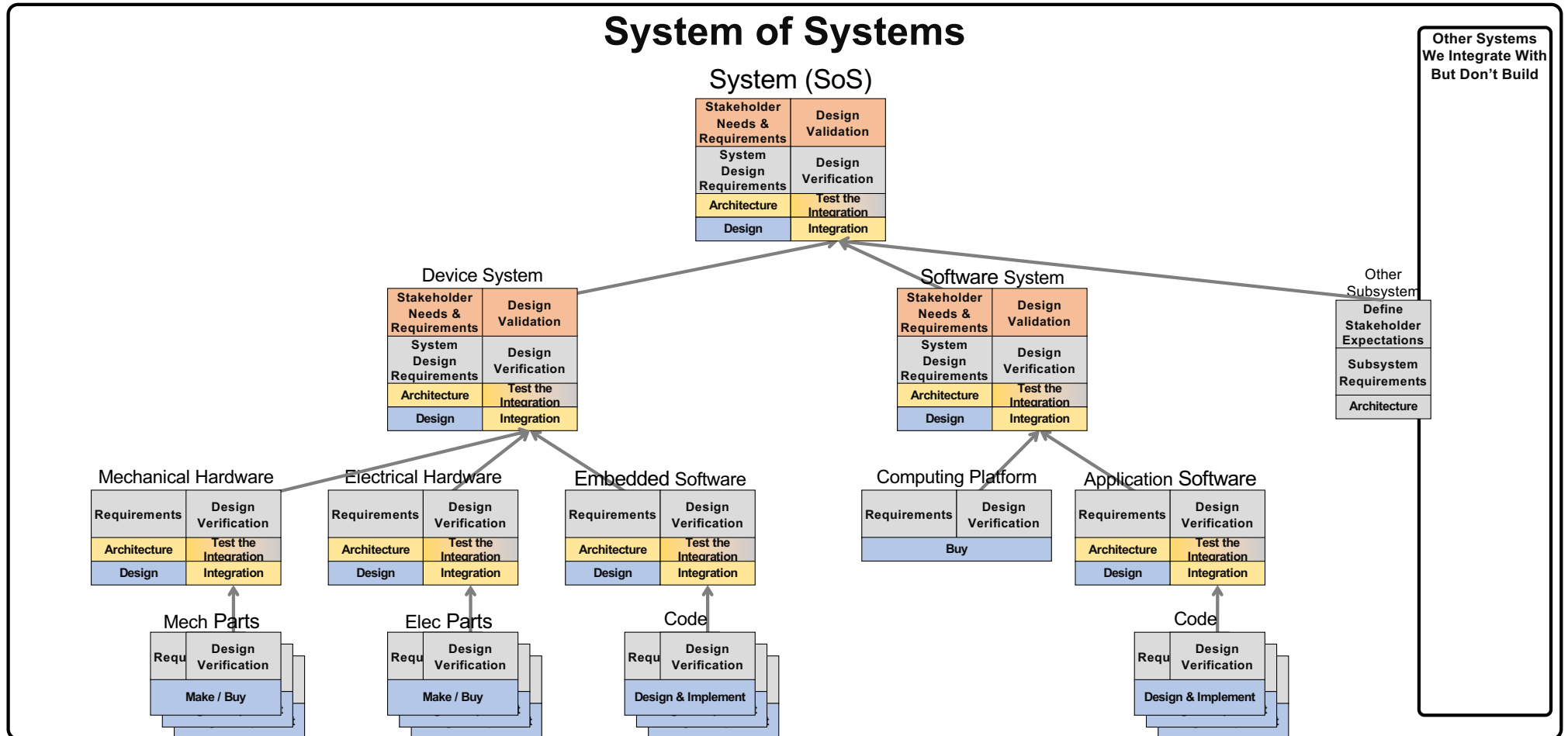


Mobile App System



Other Systems
We Integrate With
But Don't Build

What is the System? And What are the Activities & Deliverables?



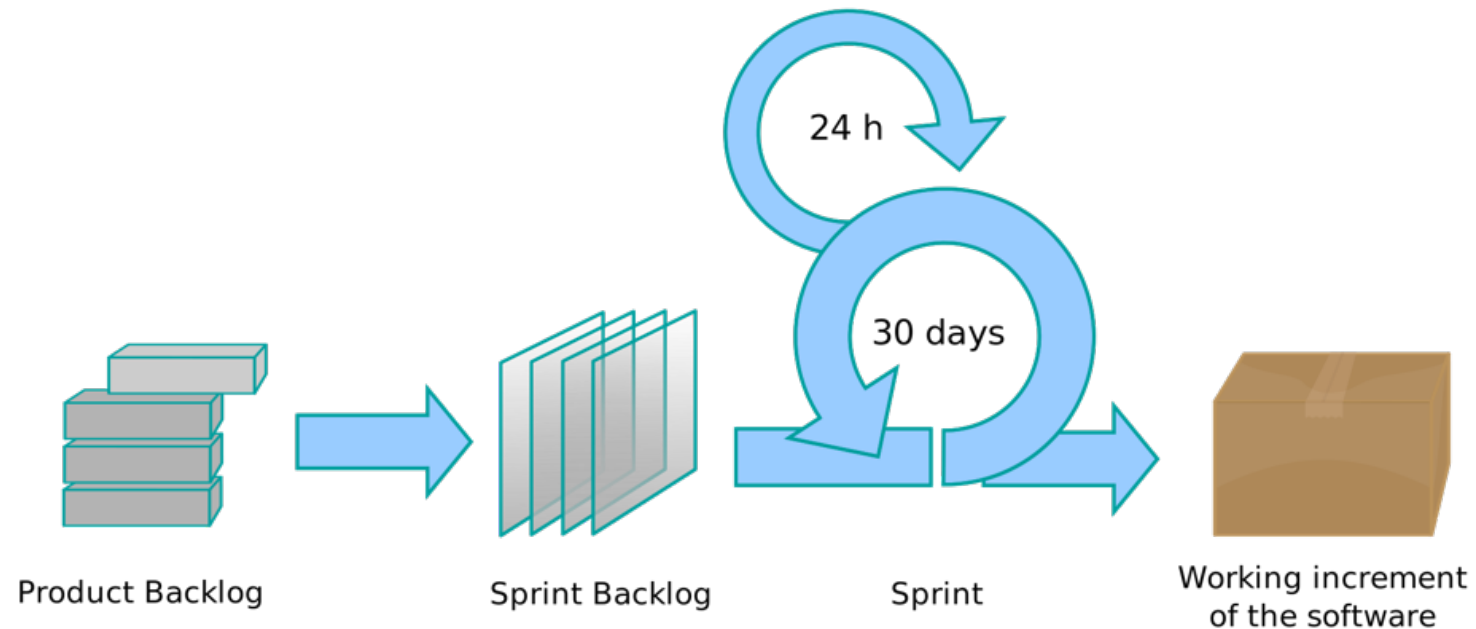
Agile Basics

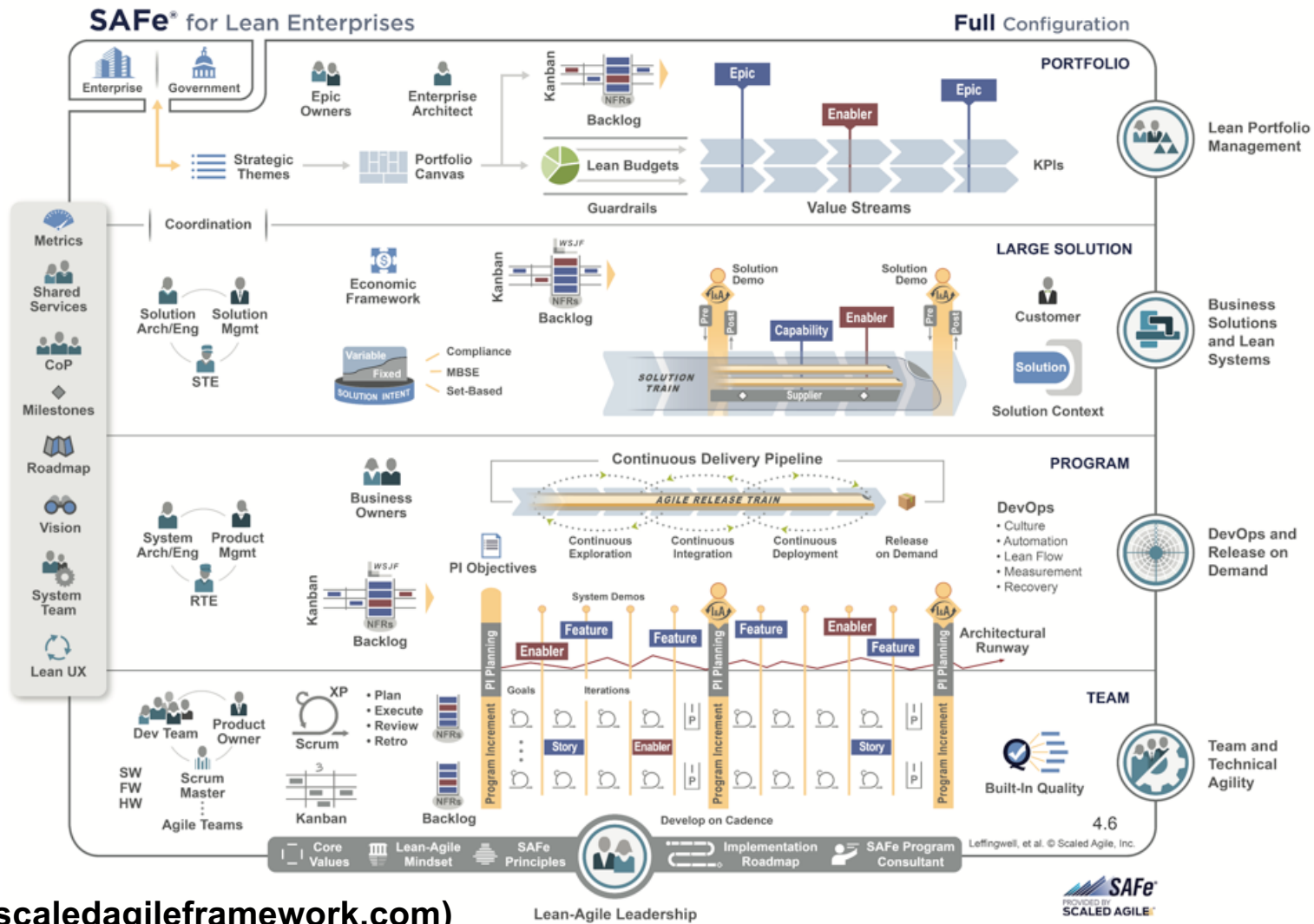
- A foundation for discussions to come



The Scrum Model

(scrumalliance.org)

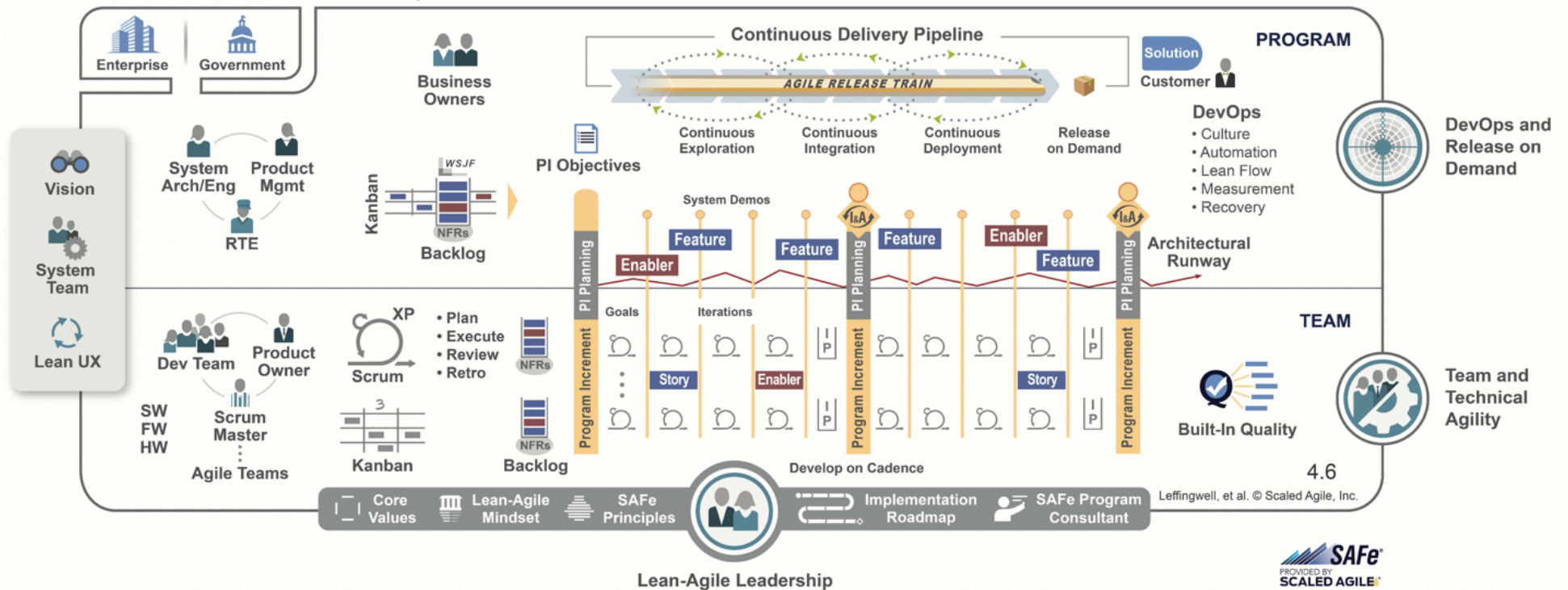




(<http://www.scaledagileframework.com>)

SAFe® for Lean Enterprises

Essential Configuration



(<http://www.scaledagileframework.com>)

For Each Product

- Some activities span the entire life cycle of the product, from initial concept, to the creation of the first version, to ongoing improvements and maintenance.

For Each Product

For Each Release

- Some activities are performed when a version of the product is released, whether that be an external release to the market, a limited release for a field evaluation, or an internal release for internal evaluation.
 - A product could have one or many releases, including large releases of new functionality or small releases for minor enhancements

More releases...

For Each Product

For Each Release

For Each Increment

- Some activities are performed when a meaningful set of features and functionality are complete enough for an internal evaluation, or as needed for synchronization and alignment of activities and deliverables across the software product and/or the complete system.

More increments...

- There could be one or many increments in a release, depending on the complexity of the product and the appropriate frequency of synchronization for aligning development activities.

More releases...

For Each Product

For Each Release

For Each Increment

For Each Small Change

- Most activity happens a change at a time, using the mechanism of Sprints and small Backlog Items.

More Backlog Items...

- There are many Backlog Items in an Agile project
 - Hundreds, even thousands, are possible.

More increments...

More releases...

Agile (over) Simplified:

- We plan,
managing Backlogs
- We deliver,
one Backlog Item at a time

For Each Product

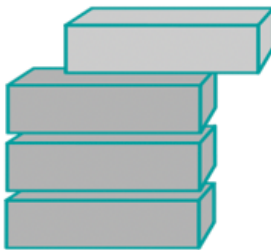


Product Backlog

For Each Release

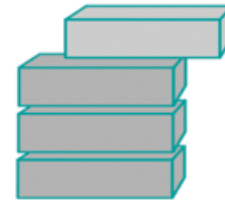
For Each Increment

For Each Small Change



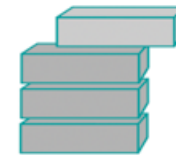
Product Backlog

More Backlog Items...



Product Backlog

More increments...



Product Backlog

More releases...

For Each Product

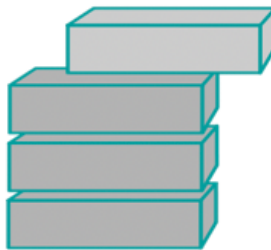


Product Backlog

For Each Release

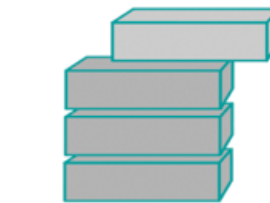
For Each Increment

For Each Small Change



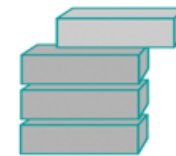
Product Backlog

More Backlog Items...



Product Backlog

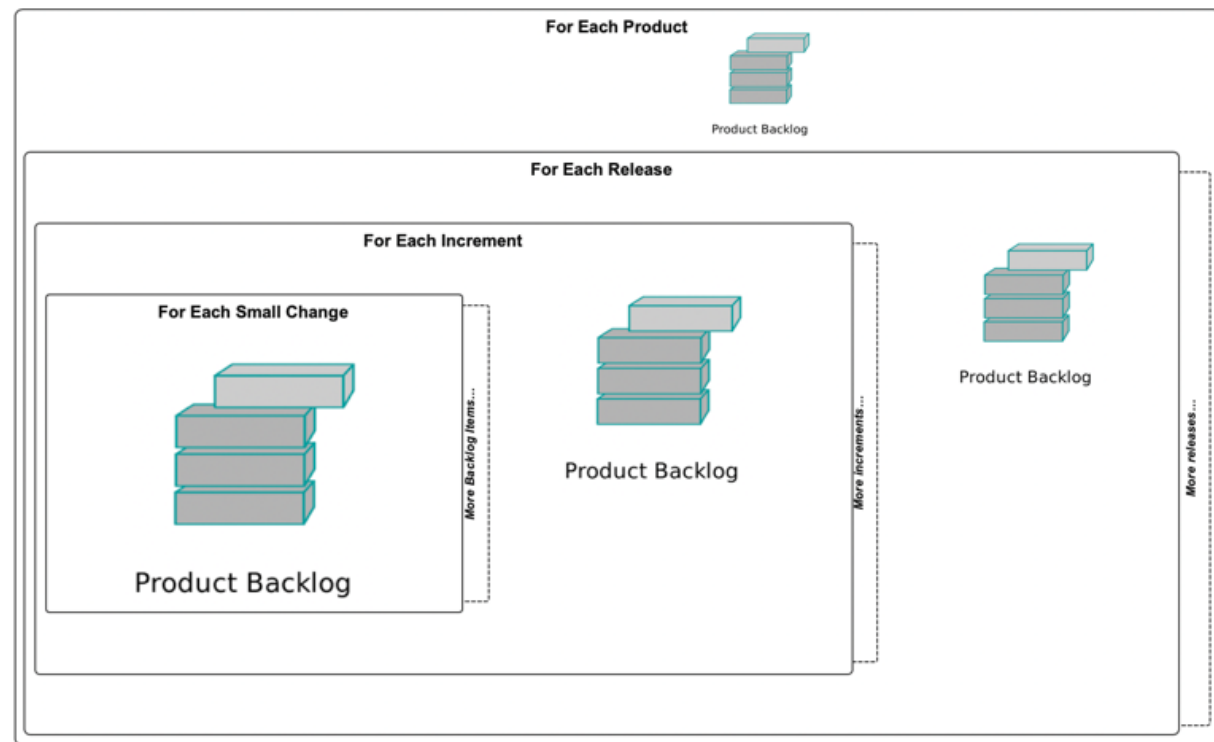
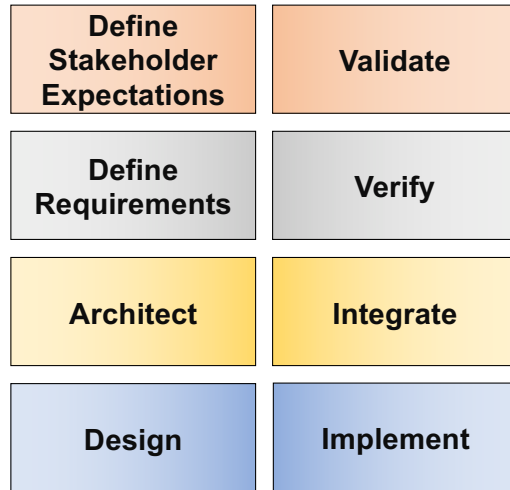
More increments...



Product Backlog

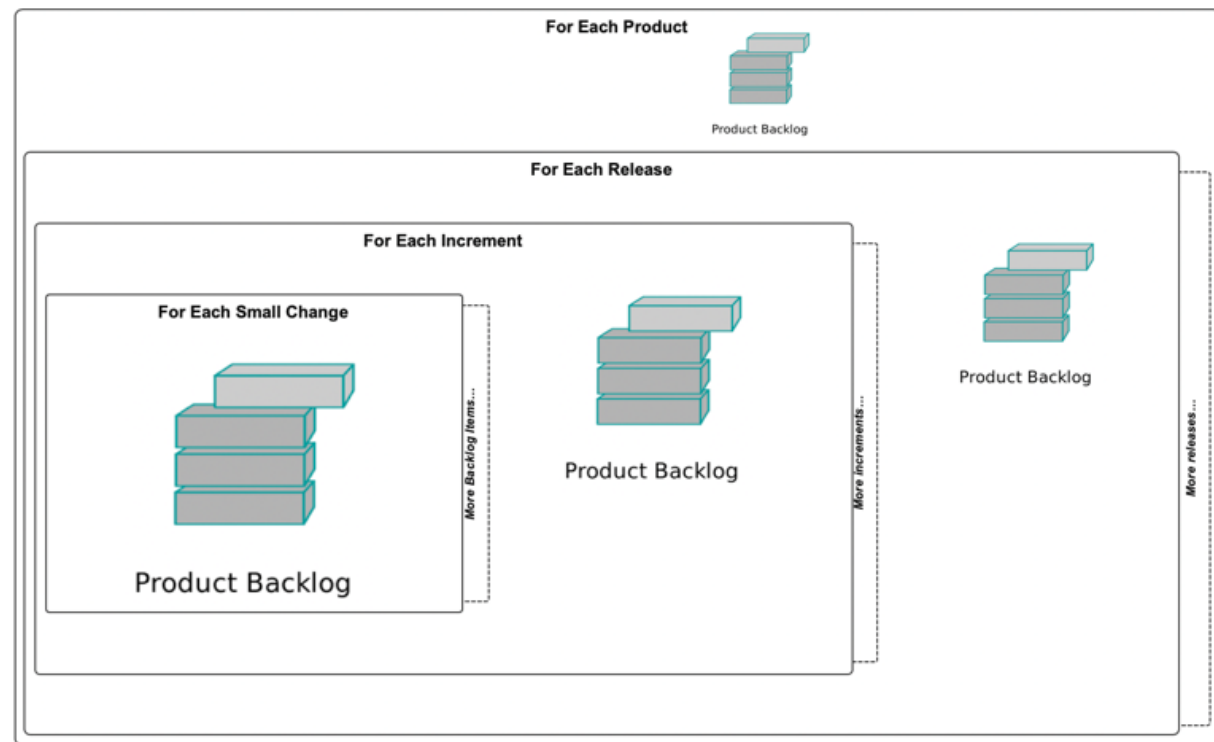
More releases...

What Do Systems Engineers Do in an Agile Development Model?



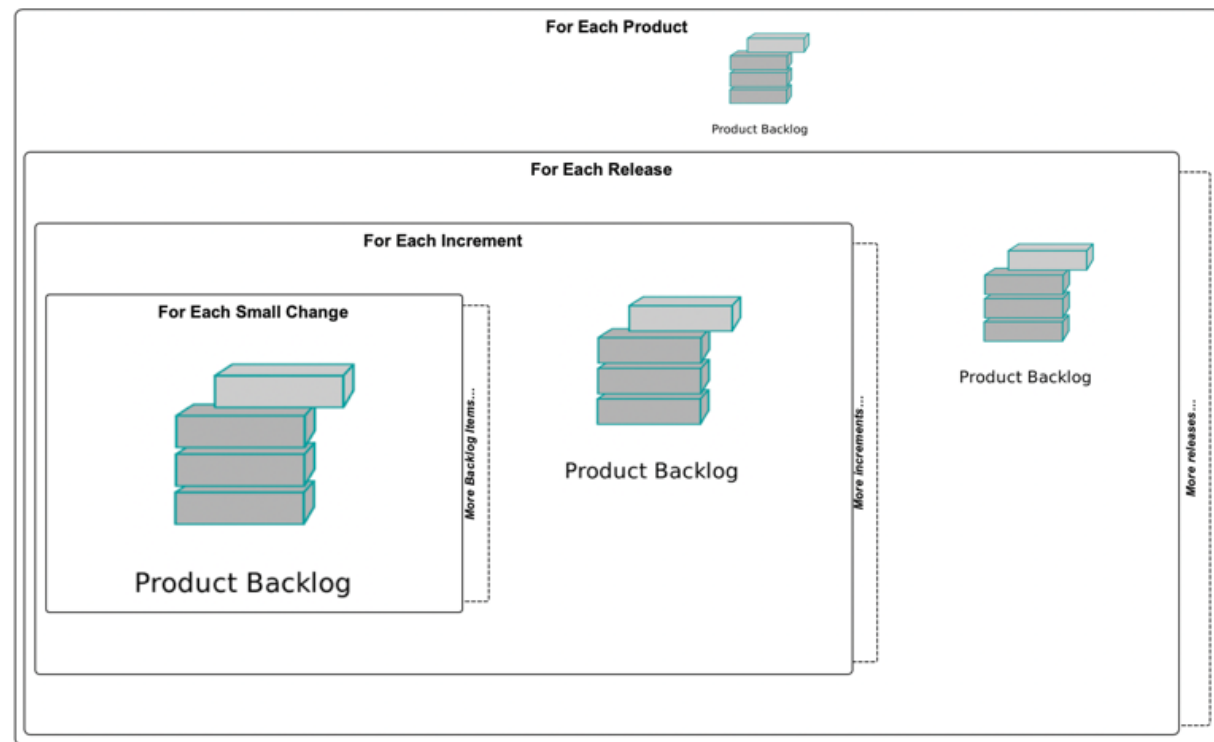
Defining Stakeholder Expectations

Define Stakeholder Expectations	Validate
Define Requirements	Verify
Architect	Integrate
Design	Implement

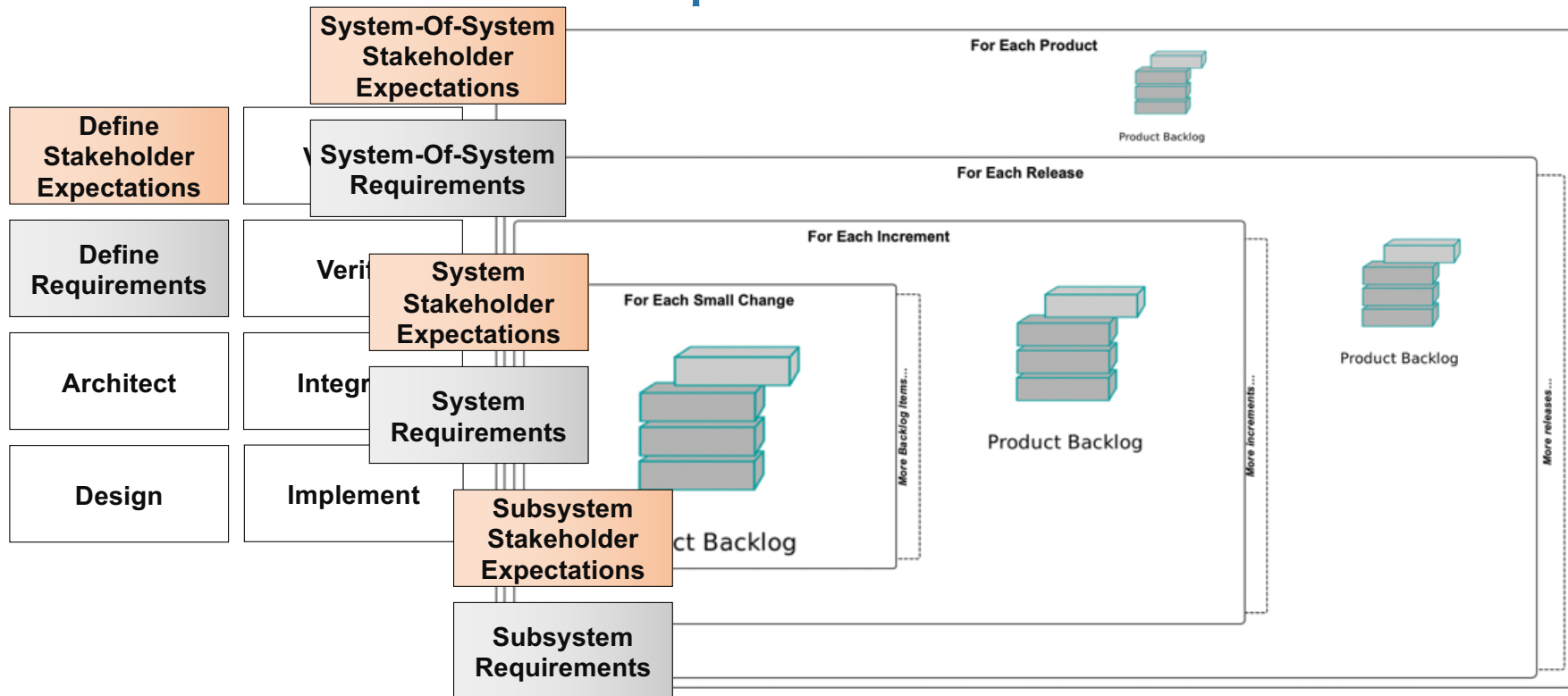


Defining Requirements

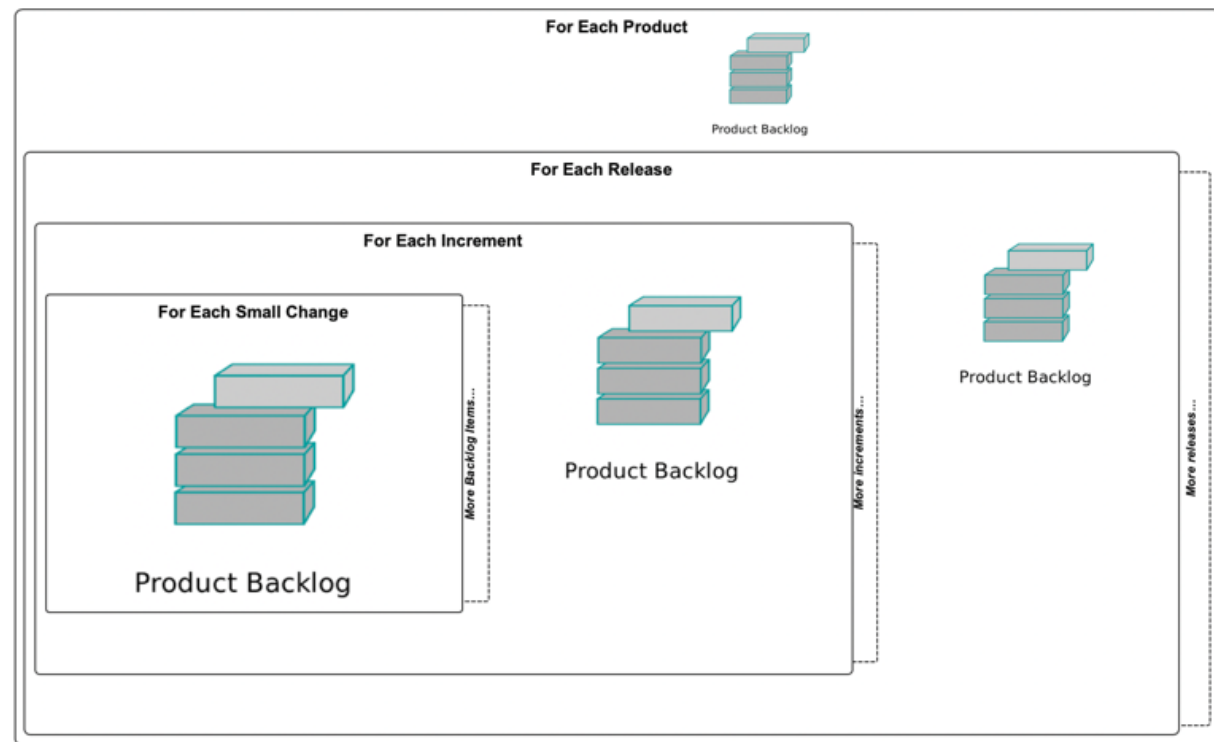
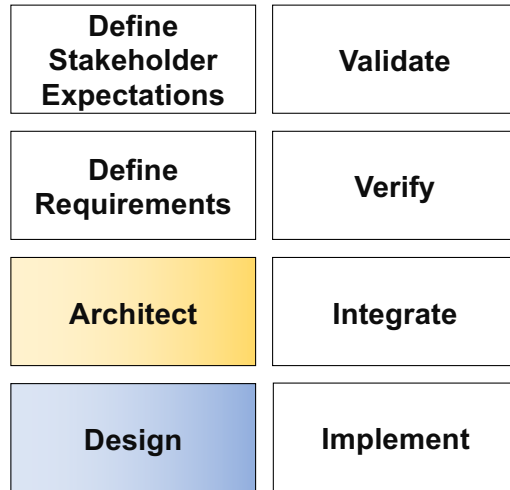
Define Stakeholder Expectations	Validate
Define Requirements	Verify
Architect	Integrate
Design	Implement



Layers of Stakeholder Expectations and Requirements



Architecture & Design



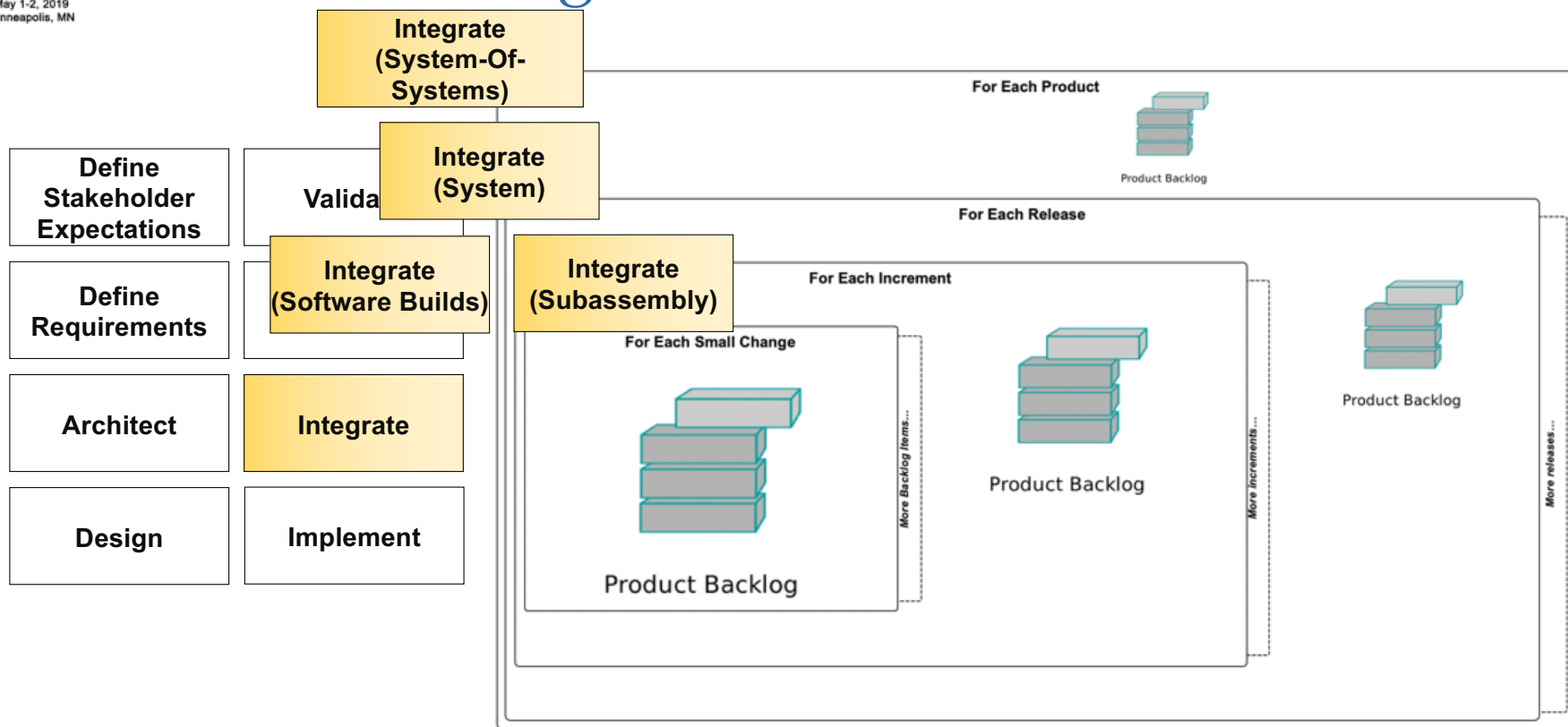


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Integration



How Systems Engineering Can Reduce Cost & Improve Quality

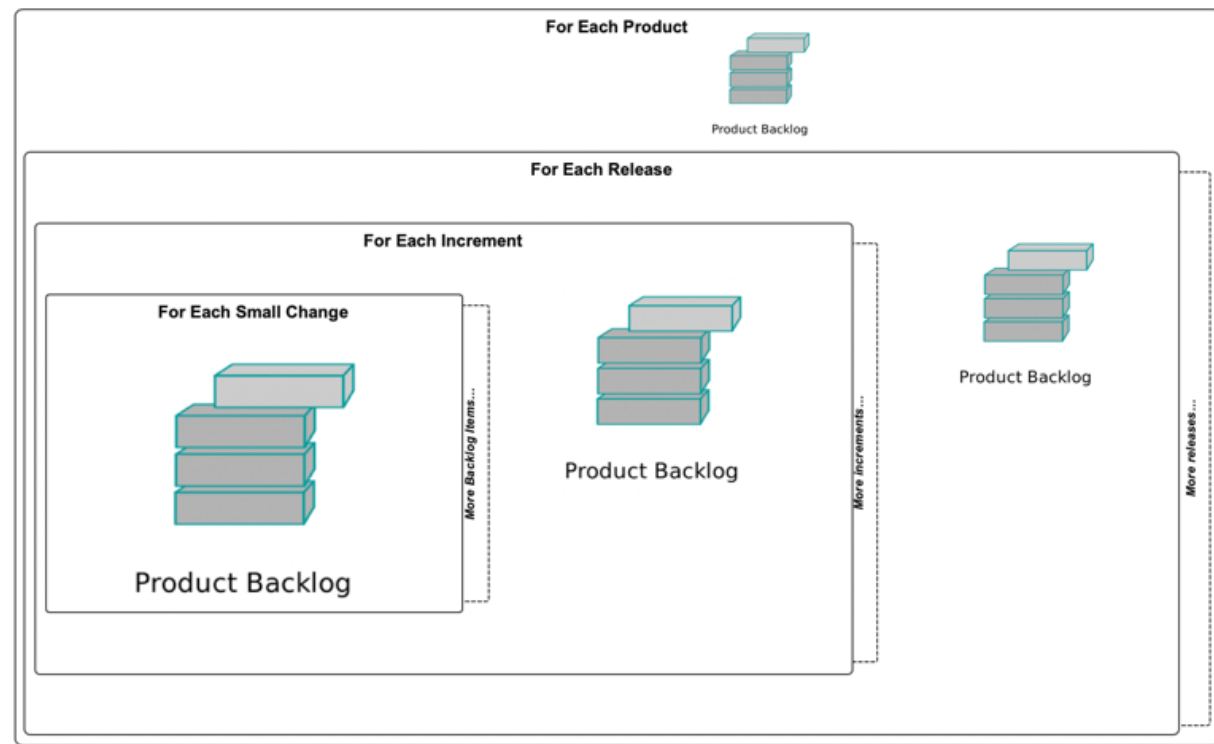
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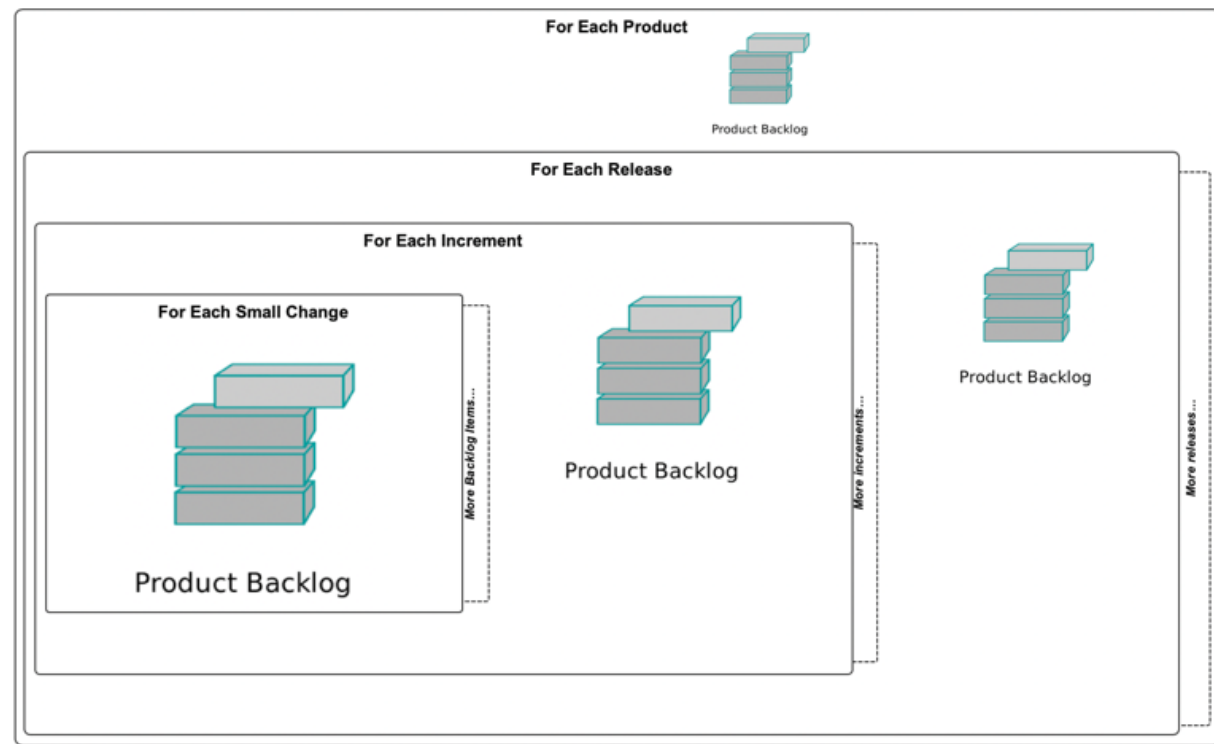
Verification

Define Stakeholder Expectations	Validate
Define Requirements	Verify
Architect	Integrate
Design	Implement

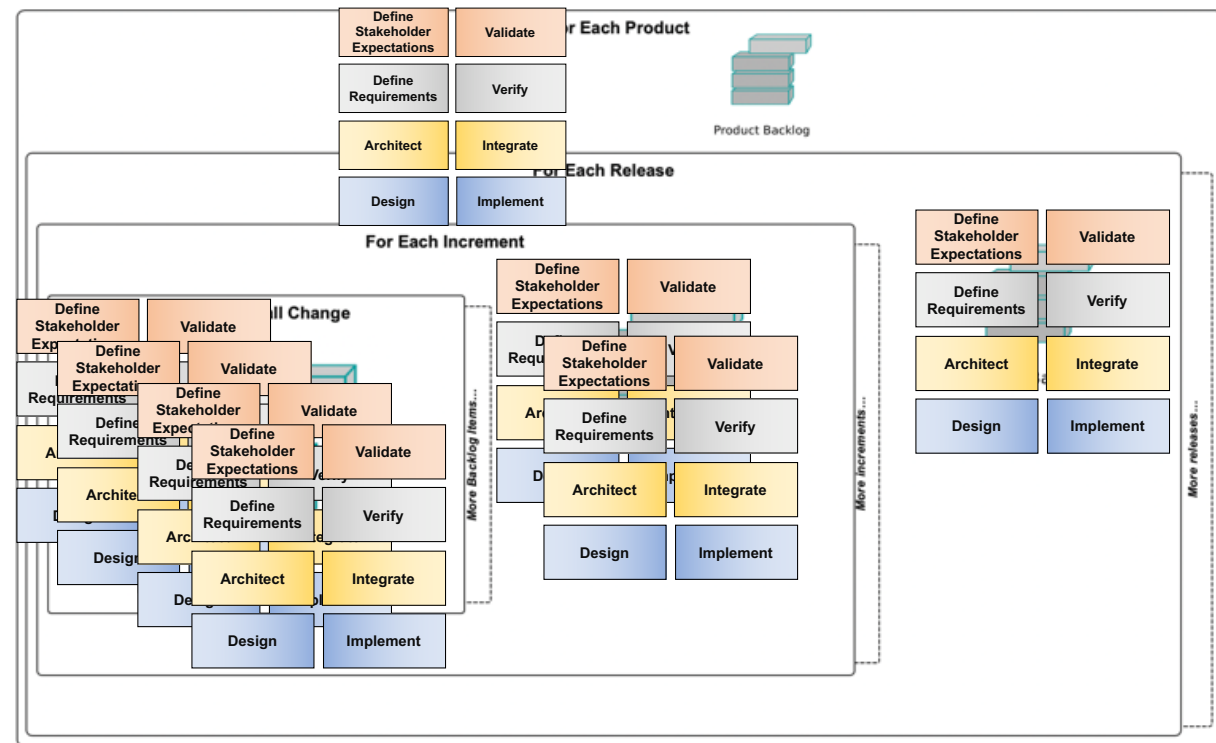
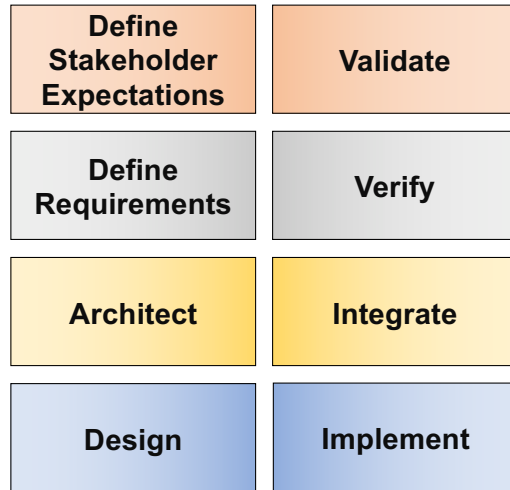


Validation

Define Stakeholder Expectations	Validate
Define Requirements	Verify
Architect	Integrate
Design	Implement



What Do Systems Engineers Do in an Agile Development Model?



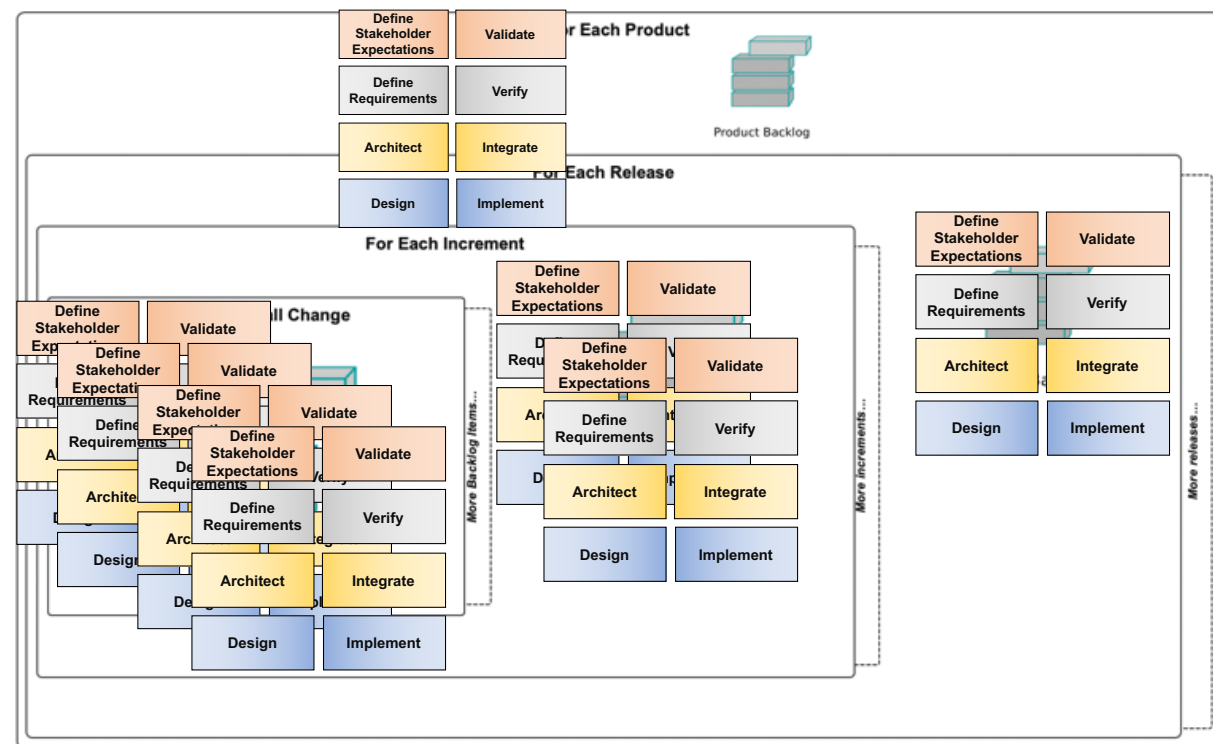
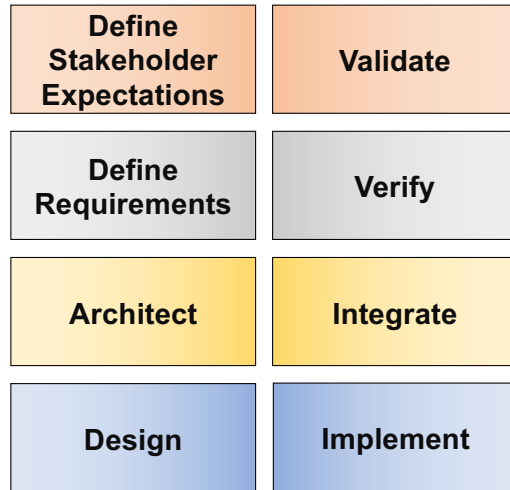
Want More?

- INCOSE Chicagoland Fall Tutorial, Tentative 28 Sept 2019
 - More on this topic, SE & Agile
- AAMI Course: The Application of Agile to the Development of Medical Device Systems
 - Kelly Weyrauch (Agile Quality Systems) and Chris Unger (GE Healthcare)
- Agile Training?
 - Certified Agile Regulatory Specialist™ (CARS™) (Flyer in the program)
 - Talk to me after this session about other Agile training

Contact Information

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Questions? Comments?



Thank you for attending!

Share your experiences at #HWGSEC

