

A Few Words First

Courtesy – Please mute your phone (*6 toggle).

Upcoming Chapter Meetings:

- Mar 13, Joint Chapter meeting with SOARizona Chapter, Enabling and Facilitating Agility in Systems Engineering and Hardware Development, Rick Dove (at SOARizona Chapter), Paradigm Shift International
- Apr 12, **Lunch Time: 11:45am-13:00pm MST**
What the Systems Community Can Learn from ASME Work in Computational Model V&V Standardization, Bill Schindel, ICTT System Sciences
- May 10, The Art and Science of Systems Engineering – Developing the Next Generation of Systems Engineering Leaders
Dawn Schaible, NASA Deputy Chief Engineer
- May 19 Tutorial, Agile Risk Management, Rick Dove

International Systems Safety Conference, Albuquerque, August 21-25, 2017
<http://issc2017.system-safety.org>

2017 Socorro Systems Summit – Oct 6-7 at NM Tech.

CSEP Courses by *Certification Training International*:

Course details | Course brochure

2016 Course Schedule (close by, but many more locations and dates):

April 24-28 | **Albuquerque, NM**

May 1-5 | **Denver, CO**

Aug 7-11 | Austin, TX

First slide, not recorded but retained in pdf presentation.

And Now - Introductions



35th International System Safety Conference

Albuquerque, New Mexico • August 21-25, 2017

Pushing the Boundaries of System Safety

www.issc2017.system-safety.org/

Call for Papers, Tutorials, & Panels – Abstracts Due March 30th

Domains of Interest

Aviation/Aerospace

Automotive

Conduct of Safe Operations

Environmental/Sustainability

Explosives Safety

Ground Transportation Systems

Hazard Recognition / Risk Management

Human Factors/Ergonomics

Critical Infrastructure / Energy Systems

Medical Device / Healthcare Safety

Manufacturing Systems

Nanotechnology

Patient Safety

Process Safety

Product Safety

Public Safety/ Emergency Response

Quantitative Risk Assessment

Resilience Engineering

Safe-by-Design Applications

Software Engineering/Cyber Assurance

Space Systems

Systems Architecture

Systems Integration

Systems Architecture

Systems Integration

Systems of Systems

Unmanned Systems

Weapons Safety

Work Planning & Control

System Safety Standards

Enchantment Chapter Monthly Meeting



8 March 2017 – 4:45-6:00 pm:

Integration of Agile Principles into the Systems Engineering Lifecycle Model

Alan Benson, Project Manager, Caltrans, alan.benson@dot.ca.gov

Abstract: This presentation is about State of California Department of Transportation (Caltrans) experience integrating Agile principles into the Systems Engineering Lifecycle Model for software intensive projects. Caltrans has found that there is increased stakeholder involvement, immediate validation, faster deliveries of functionality, and reduced rework cycle time by integrating certain Agile principles into the design, development, and integration phases of the project. Traditional (waterfall) software development lifecycle where, the total set of requirements were given to the Contractor, and complete functionality returned created several issues including, the length of time it took to see any demonstration of functionality, and the increased rework cycle times, discourages stakeholder involvement thereby settling for less than envisioned functionality.

Caltrans is not in the software development business but focuses on deliverables, therefore, Caltrans contracts for software development services and provides guidance on what is required and when. By setting up Agile principles as guidance, the Contractor can continue to use their internal development process but required to demonstrate functionality bi-weekly. This good Project Management principle is augmented with good Systems Engineering in that the Contractor must decompose functionality down into 2-week cycles of demonstrable functionality. In addition, the documentation is updated in a timely manner, and the stakeholders are continuously engaged in two ways, one by witnessing the bi-weekly demonstrations and offering immediate feedback or validation of the feature and two, when the feature is completed it is hosted on a test server for the stakeholders to evaluate while the Contractor completes the documentation.

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anytime from the Library at www.incose.org/enchantment

NOTE: This meeting will be recorded

Today's Presentation

Things to Think About

How can this be applied in your work environment?

What did you hear that will influence your thinking?

What is your take away from this presentation?

Speaker Bio



Alan Benson currently serves as the Project Manager for the Caltrans Advanced Transportation Management System (ATMS).

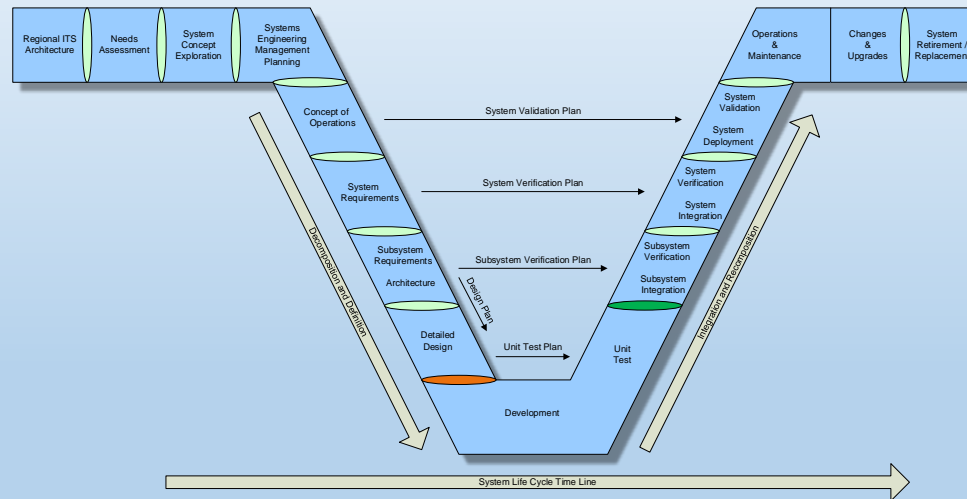
In this role, he is responsible for coordinating all aspects of the project including interaction between Caltrans multi-Division Headquarters and District personnel.

Since 1993, Alan has worked in the Headquarters Division of Traffic Operation where he is responsible for the statewide support of the ATMS.

Alan developed the first Systems Engineering (SE) process for the Division of Traffic Operations in 2000.

Alan received a Bachelor of Science in Electronic and Electrical Engineering with a concentration in Robotics and Automation in 1992 from the California State University, Sacramento.

Integration of Agile Principles into the Systems Engineering Lifecycle Model





Agenda

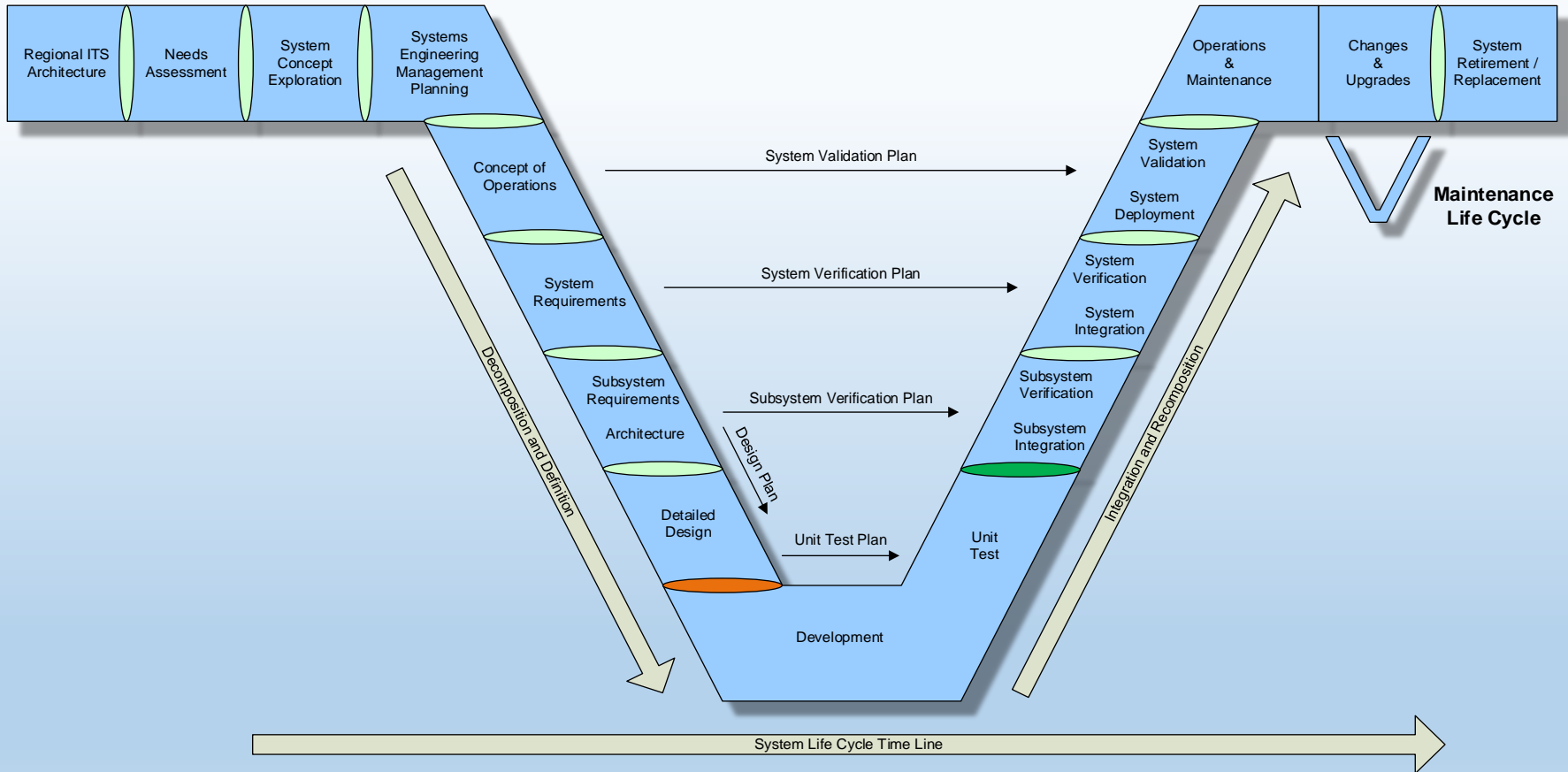
- Traditional Systems Engineering Process
- Integration of Agile into the Systems Engineering Process
- Contracting Challenges using an Agile Process



Brief History of SE in FHWA/Caltrans

- National ITS Architecture – 1990 (Used Concept Exploration Approach)
- FHWA/FTA Federal Rule 23 CFR 940 part 11 – 2000
- Development of the Systems Engineering Guidebook for ITS – 2005
- ISO Systems and Software Engineering Life Cycle Standards are Now Being Used (ISO 15288) – 2015
- Wrote SE Guides Tailored to Caltrans – 2015

Systems Engineering Life Cycle





Issues with Traditional Approach to Software Development

- Takes Years to Deploy a Software Release
- Developed Much Less than Expected
- Progress is Measured from Phase to Phase
- Challenge to Engage Stakeholder Involvement



Agenda

- Traditional Systems Engineering Process
- Integration of Agile into the Systems Engineering Process
- Contracting Challenges using an Agile Process



Principles used from the Agile Manifesto

Caltrans follow these principles:

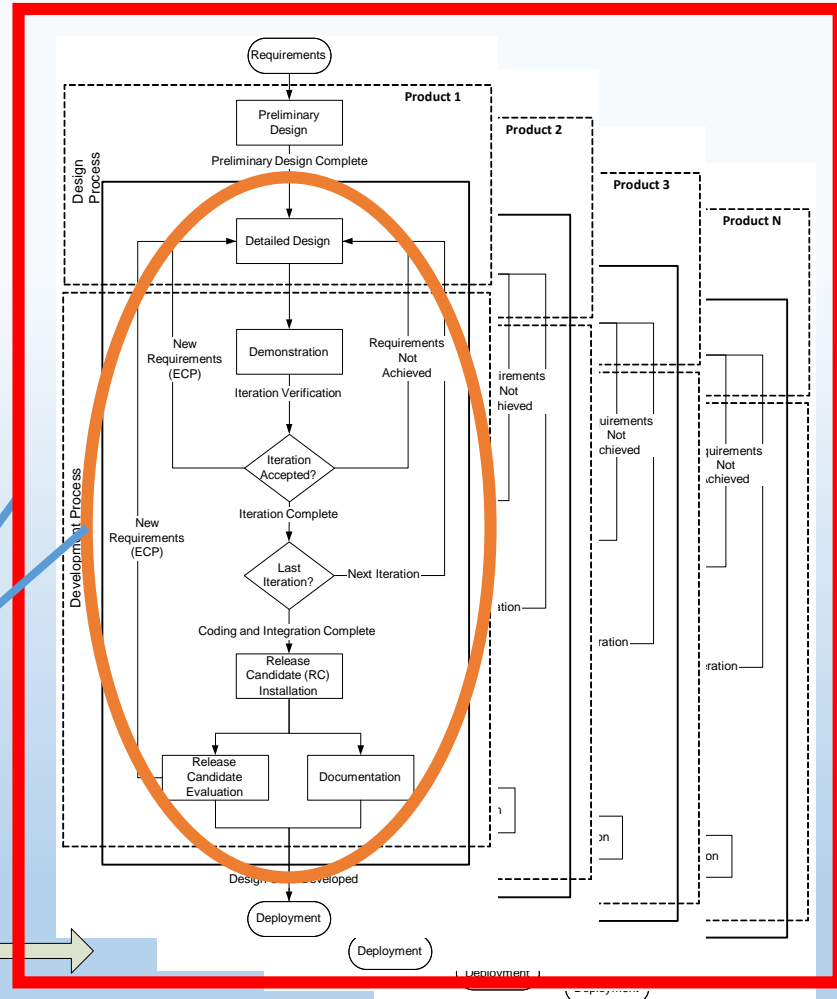
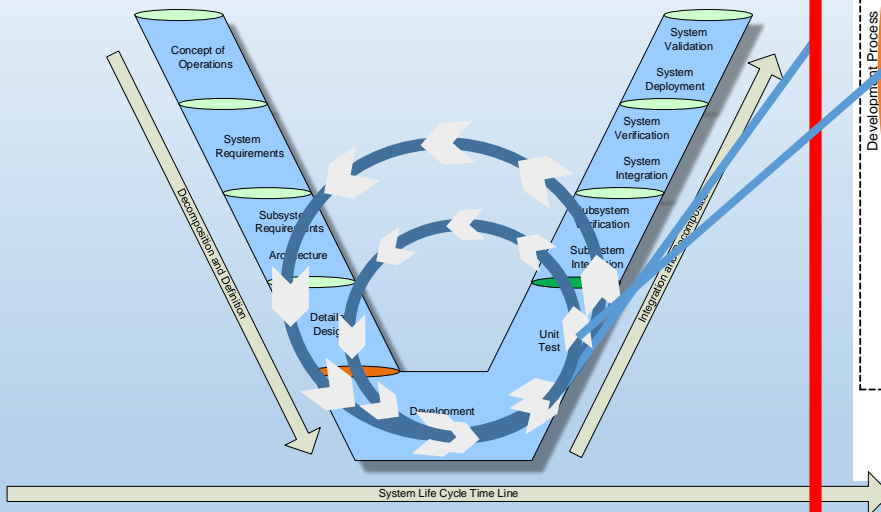
- Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
- Welcome changing requirements, even late in development.
- Working software is the primary measure of progress.
- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.



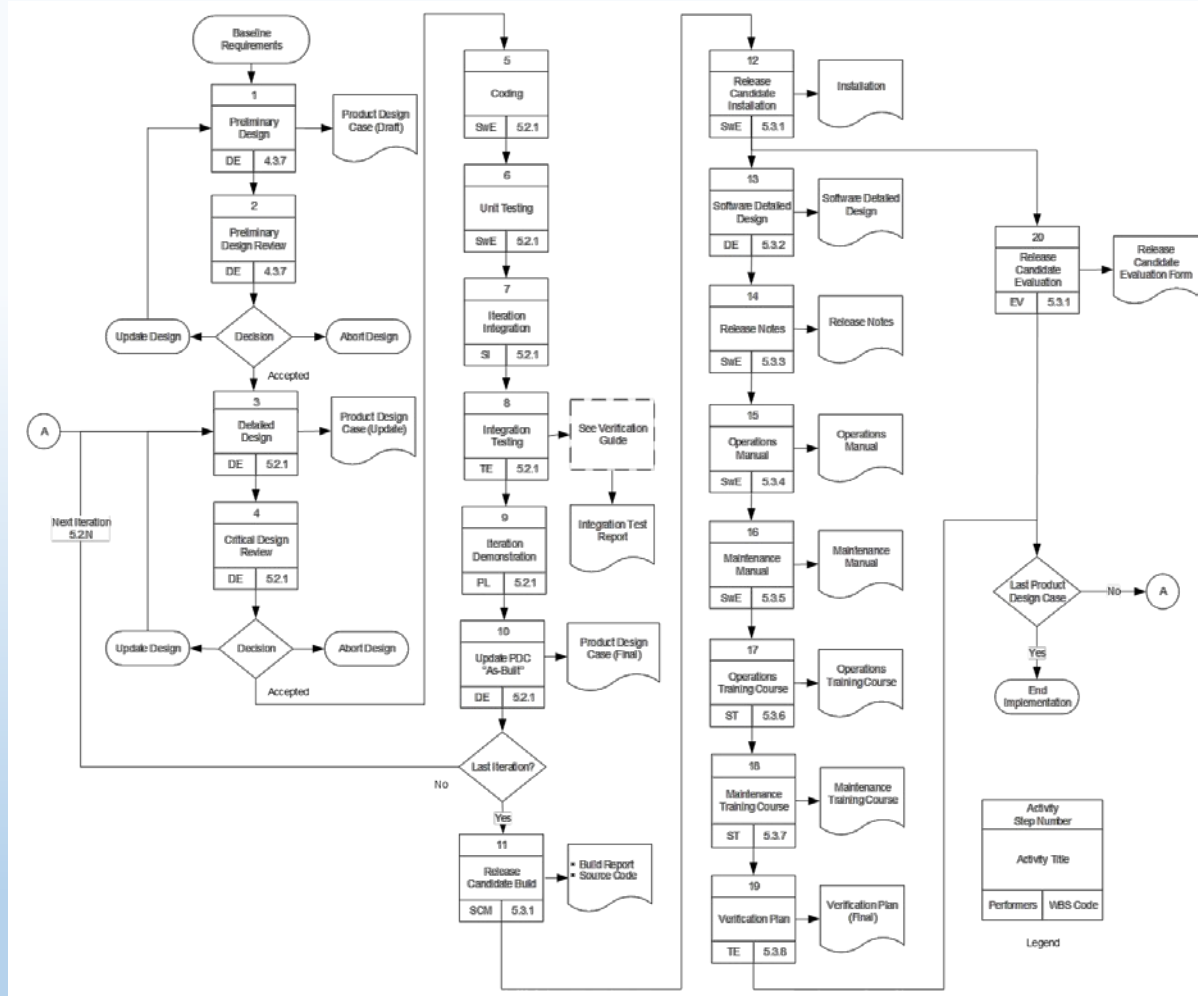
New Approach to Software Development

- Planning and Definition (Concept Exploration, SEMP, ConOps, Requirements, High Level Design)
- Group Requirements into Features
- Establish a Product Backlog from the Features
- Created Product Design Cases – One Per Product
- Decomposed the Product Design Case into 2 Week Demonstrations (Sprints)
- Updated Documentation Concurrently with Product Design Case Implementation – Caltrans Needs Documentation
- Release Candidates are Evaluated by the Stakeholders
- Deploy into Service (System Verification, Deployment, Validation)

Integration of Agile into the SE Process



Caltrans Development Detailed Process





Agenda

- Traditional Systems Engineering Process
- Integration of Agile into the Systems Engineering Process
- **Contracting Challenges using an Agile Process**



Current Contracting Issues

- Current Contracting Practices Do Not Fit the Agile Approach
- Waterfall (A Complete Spec First)
- Fixed Priced Deliverables
- Rarely Works without Schedule Delays



New Contracting Approach

- Task Orders
 - Each Product is a Task Order
 - Each Deployment is a Task Order
- Scope of Product Task Order
 - Product Design Case (PDR)
 - Build-To Design (CDR)
 - Multiple 2 Week Demonstrations (Sprints)
 - Documentation (SDD, Release Notes, Training Manuals, Operations Manuals)
 - Release Candidate for Evaluation
- Scope of Deployment Task Order
 - Training
 - User Acceptance Testing
 - Cutover
 - Go-Live



Lessons Learned

- 2 Week Demonstrations Engages the Stakeholders
- Requirements Fully Realized with Demonstrations
- Documentations Developed with each Product
- Early Evaluation Validates Products
- Regression Testing Built-in to the Process
- Team is Focused on One Product at a Time



References

- National ITS Architecture
 - <http://local.iteris.com/itsarch/>
- FHWA/FTA Federal Rule 23 CFR 940 part 11
 - <https://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0940.htm>
- Systems Engineering Guidebook for ITS
 - <https://www.fhwa.dot.gov/cadiv/segb/>
- ISO Systems and Software Engineering Life Cycle (ISO 15288)
 - <https://www.iso.org/standard/63711.html>



Questions and Answers

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Please

The link for the online survey for this meeting is

www.surveymonkey.com/r/2017_03_MeetingEval

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Look in GlobalMeet chat box for cut & paste link.

Slide presentation can be downloaded now/anytime from:

The library page at: www.incose.org/enchantment.

Recording will be there in the library tomorrow.