U.S. Army Aviation and Missile Command (AMCOM)

Redstone Arsenal, Alabama

Office of the Chief Information Officer/G6

The Road to Lean CMMI in a Small Federal Organization

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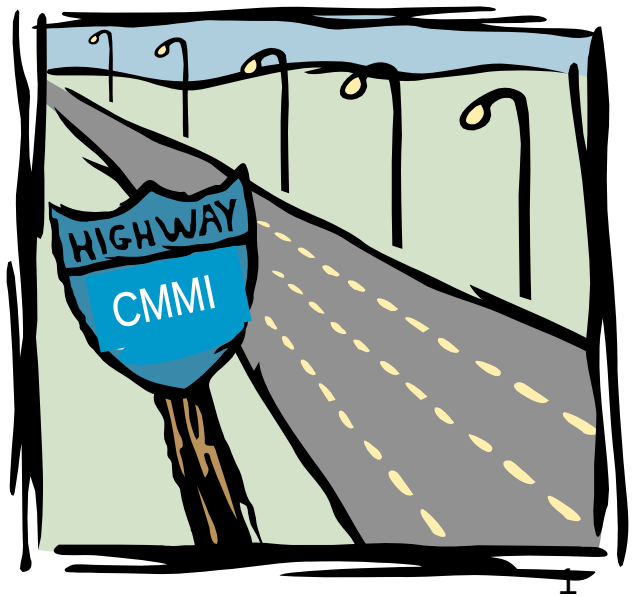
Command Data/Applications Support (Business Area)
Application Information Processes



Agenda

- About Us
- CMMI Status
- Terminology
- Construction Detours
  - Changes
  - Goals
- Navigation
  - Road Map
    - Lean/Six Sigma
  - New Direction
    - Lean CMMI
- Repairs Along the Bumpy Road
- Current Points of Interest
- Future Destination

About Us

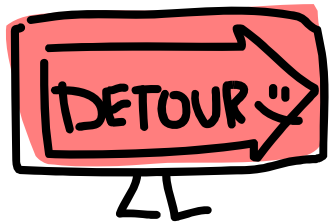
- Small Government Software Development Organization (70 government & 70 contractor employees)
- Develop business applications in support of aviation and missile mission
- Software products consist of web based applications, support of AKO fielded websites, mainframe sustainment

CMMI Status

- Currently assessed at SW-CMM Level 2
- Implemented Lean CMMI activities
- CMMI Appraisals Conducted
  - Class C
  - Class B
- Preparing for SCAMPI A Appraisal in early next year

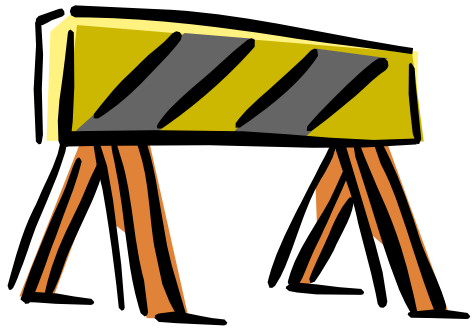
Terminology

- **Value Stream Map (VSM)** – standard method for documenting current and future states of 3 flows in total system: physical product flow, information flow, and time flow.
- **Kaizen** – Japanese word meaning “take apart and make better,” a standardized approach to problem solving.
- **Lean** – concept that focuses on improving customer value by removing the 8 deadly wastes: waiting, underutilized people, defects, extra processing, transportation, motion, inventory, over processing.
- **Lead Time (LT)** – Total flow days from customer order to receipt of full order.
- **Cycle Time (CT)** – hands-on touch time without wastes.



Construction Detours

Barriers



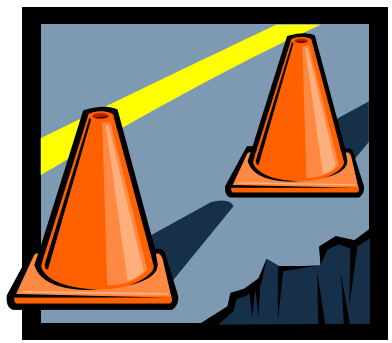
- Worked toward SW-CMM Level 3
  - Technical Working Groups
    - Started and stopped
    - Developed additional documentation
  - Piloted the Level 3 processes
    - Little buy-in
    - Duplication
    - Frustrated employees
- Lengthy development cycle for large products
  - Average delivery 374 days
  - High defect rate
  - Process took too long
- Attempted to define process for multiple project types
  - Urgent, small products
  - Larger products
  - COTS products

While we detoured…

Things were changing

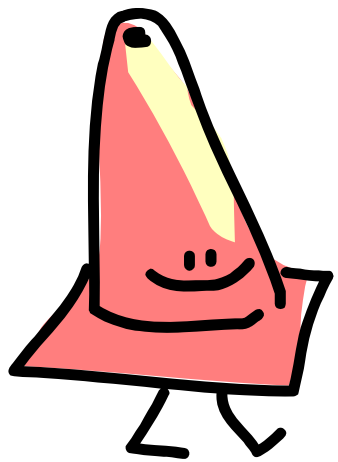
Lean/Six Sigma

- Army Materiel Command (AMC) embraced Lean/Six Sigma and directed adoption by Subordinate Commands
- AMCOM Leadership required continuous improvement using Lean/Six Sigma Tools
- Conducted Value Stream Map in Feb 2005
  - Identified current wastes, delays, duplication
  - Refocused teams on a long term ideal state
  - Developed a near term future state (chunking approach)



Why Change?

- Software Engineering Process (SEP) needed improvements
  - Too complex
  - Duplication across documentation
  - Took too long to complete, especially for small products
  - Delayed product delivery
- Sunset of the SW-CMM
- Keep/increase customer base
- Better utilize our resources
- Improve morale

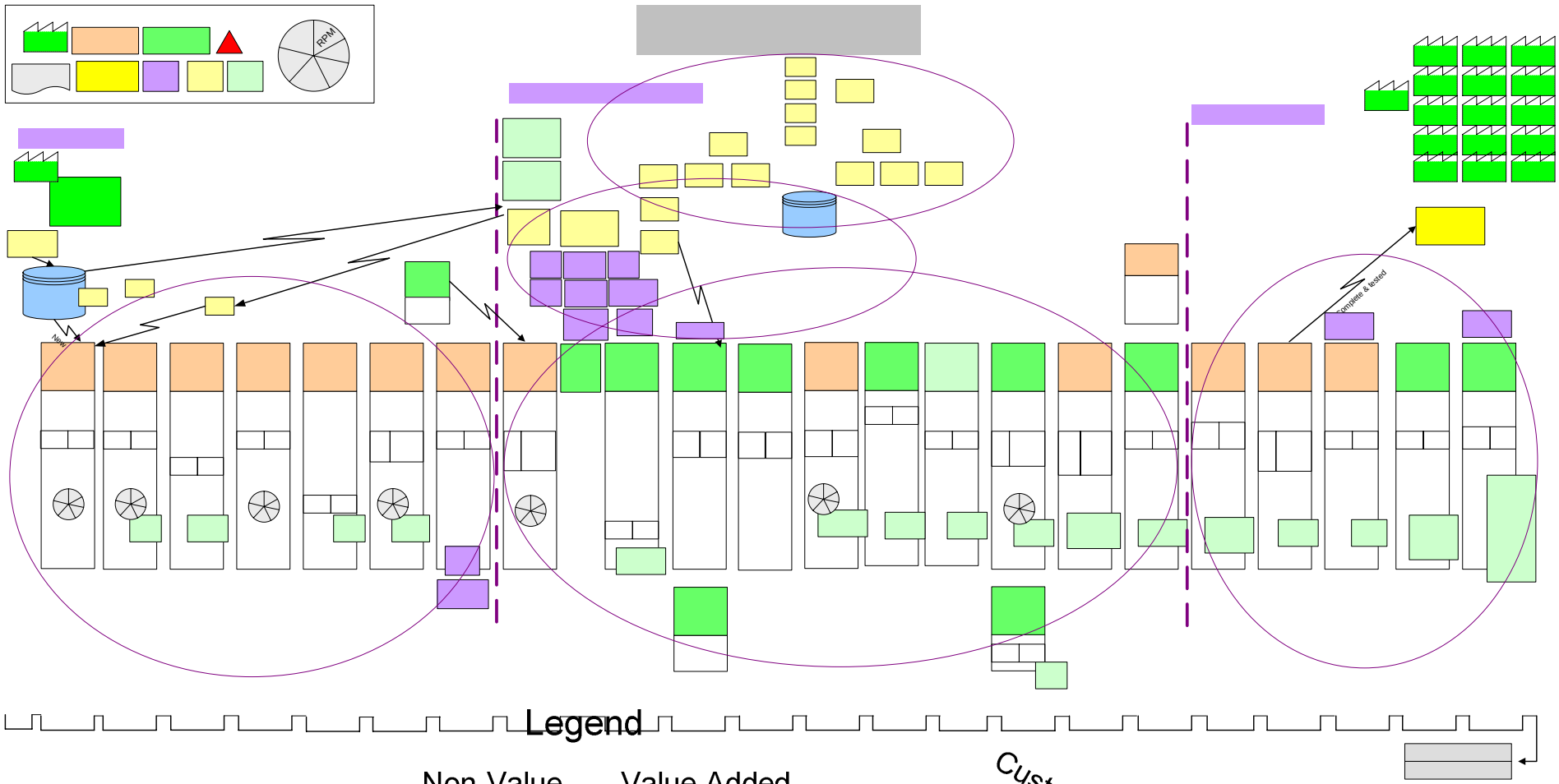


Goals

- Level the workload and share resources to accommodate increasing demands
- Provide first time quality
- On time delivery
- Reduce lead time
- Standard, easy to follow Map
  - Streamline
  - Eliminate duplication
- Collect valuable metrics – Visual at a Glance
- Improve customer and employee satisfaction
- Improve communication within the organization
- Achieve CMMI maturity level

Navigation with a Map and New Direction

Value Stream Map



Software Engineering Process (SEP)

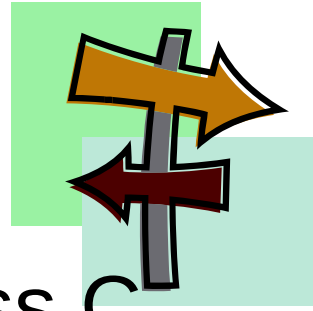
- Loop 0 – Concept Definitions and Product Requirements
- Loop 1 – Job Planning and Analysis
- Loop 2 – Design and Development
- Loop 3 – Implementation and Test

Lean: The Roadmap

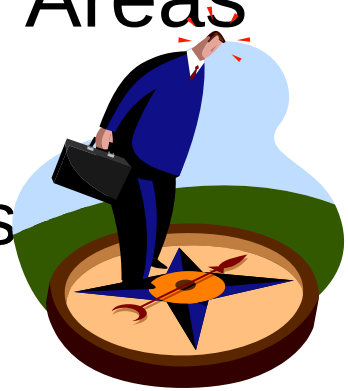
Value Stream Map Event

- Implementation Plan
  - Kaizens, Projects, Tasks
- Insight into Lean Concepts
  - Reduce wastes
  - Eliminate delays and unnecessary approvals
  - Focus on flow

New CMMI Direction



- Performed initial Gap Analysis with Class C
- Trained employees, supervisors, and champions on Intro to CMMI Version 1.1
- Developed first cut at a Lean(er) SEP
- Created Milestone Schedule for future appraisals and process releases
- Conducted Class Bs on ML 2 Process Areas
  - Identified deficiencies
  - Held Kaizen events to address weakness



Business Objectives
(used for appraisal focus)

- Develop lean CMMI software development capability to better respond to customer
- Improve product quality
- Improve process quality
- Increase productivity

Repairs Along the Bumpy Road

Lean Events

- Conducted VSM 31 Jan – 4 Feb 05
- Held 26 Lean Events during 05 and 06
  - Requirements and Planning, Workload Management, Design and Development, Web Standards, QA, CM, Metrics, Risk Management
- Employees empowered to make decisions and quick changes
- Briefed PCCB (formerly known as SEPG) at end of each event
  - Make decisions real-time
  - Accept, reject, modify proposed process changes
  - Reduce delays in implementation

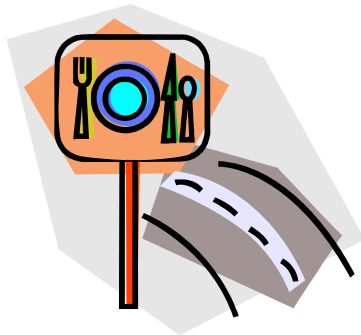
SEP Version Releases

Incremental Implementations:

- Jun 05, Version 5 (Interim)
- Dec 05, Version 6 (Loop 1 Rollout)
- Feb 06, Version 6.1
- Feb 06, Version 6.2
- Mar 06, Version 7 (Loop 2 Rollout)
- Jul 06, Version 8
- Aug 06, Version 9
- Sep 06, Version 10 (Loop 3 Rollout)
- Nov 06, Version 10.1

Celebrations Along the Way

An Afternoon at the OSCARS



Kickoff

Dec 05 Rollout

Final Frontier

Improvements

- Changed Terminology
  - Process to Value Stream
  - Phase to Loop
  - SEPG to PCCB
  - Project to Product
- Introduced Lean Thinking
  - Faster, incremental releases
  - Test driven approach
  - Quality built in from the start
  - Better teaming

Supervisor's Working Group (SWG)

- Both Government and Contractor Reps
- Develop Enterprise Plans for customers
- Meet weekly to balance the workload and staff jobs
- Record Lead Time status per job

Process Configuration Control Board (PCCB)

- Membership from each role (Champion, SWG, TL, SPL, LAD, QE/Tester, CM/IA)
- Communicate Value Stream Map changes to peers
- Facilitate buy-in throughout the organization
- Approve SEP Change Requests and manage SEP Version Releases
- Assist in training the workforce

Changed Metrics

Metric	Baseline	New Process
Lead Time	374 days	105 days
Phases	9	4
# Activities	63	22
# Documents	25	0 (Collect data)
# Approvals	65	6

Lessons Learned

- People resist change – prepare for CAVE people
- Focus – minimal task switching
- Collect measurements often, check against goals
- Visual status boards help manage workload
- Pros/Cons to Interim Rollouts
- Peer Groups – key to successful continuous improvement
- Teaming with Wagon Wheel approach
- “Test-First” Approach reduces defects

Standardization: What's in it for me?

- Makes decision-making easier!
- Reduces errors, defects, rework, cost!
- Improves quality and customer satisfaction!
- Reduces frustration!
- Is the baseline for improvement! (no standardization, no systematic improvement!)

Standardization is key to teamwork!

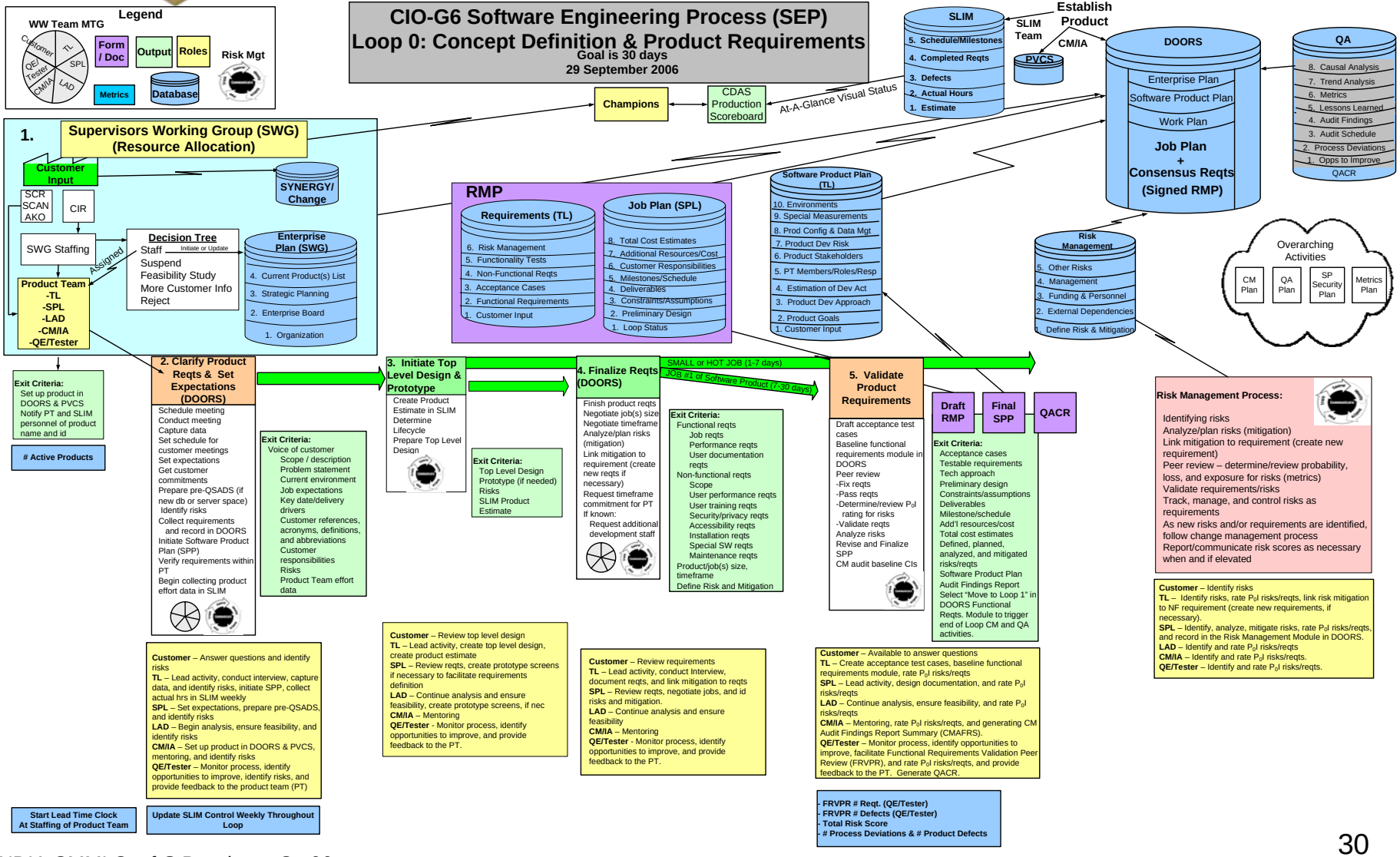
Current Focus

Visual Management

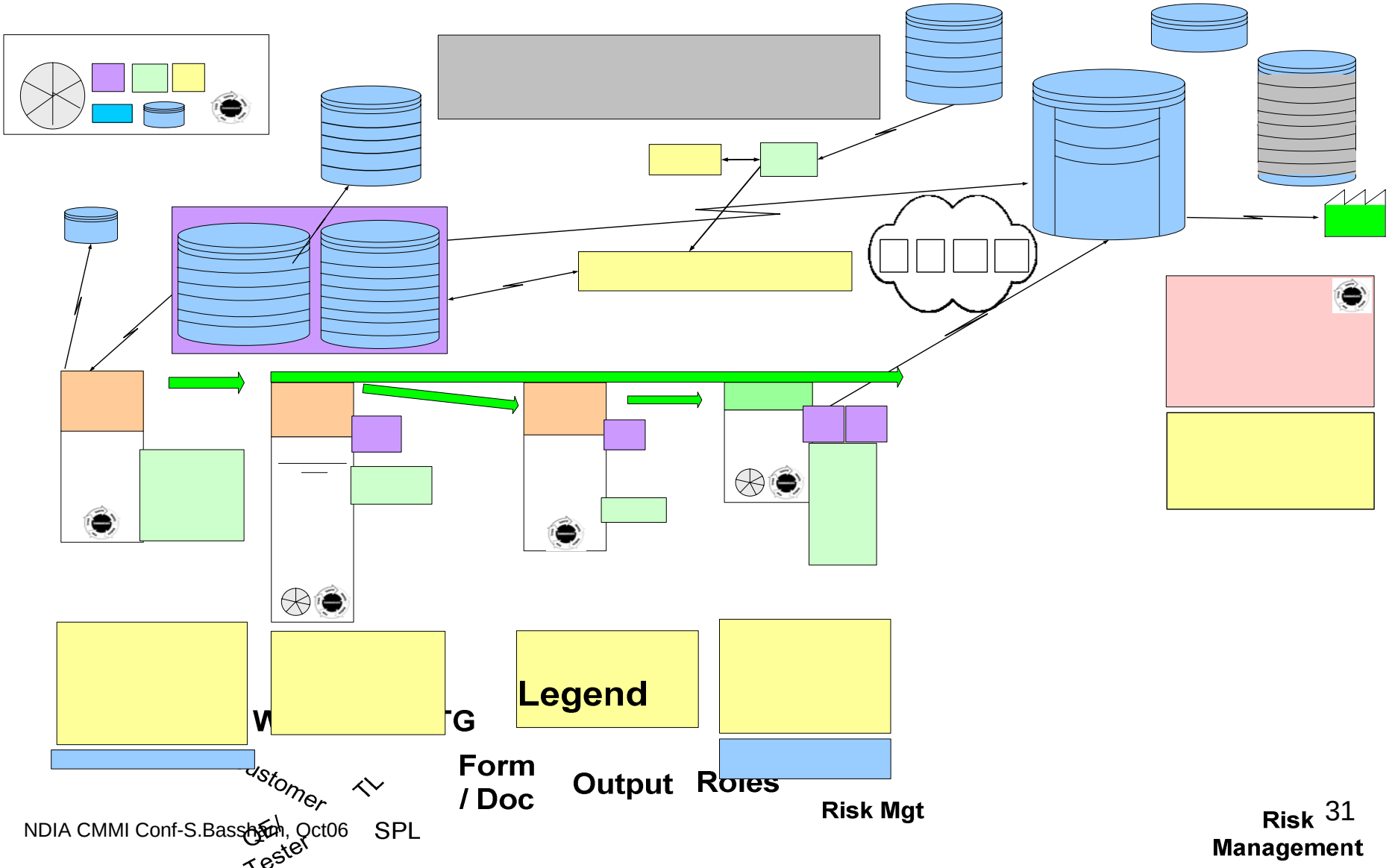
Reduce wastes of searching, defects, waiting:

- Visual graphical flow for each Loop
- Visual Online Help with drilldown
- Step by step checklists by activity and role

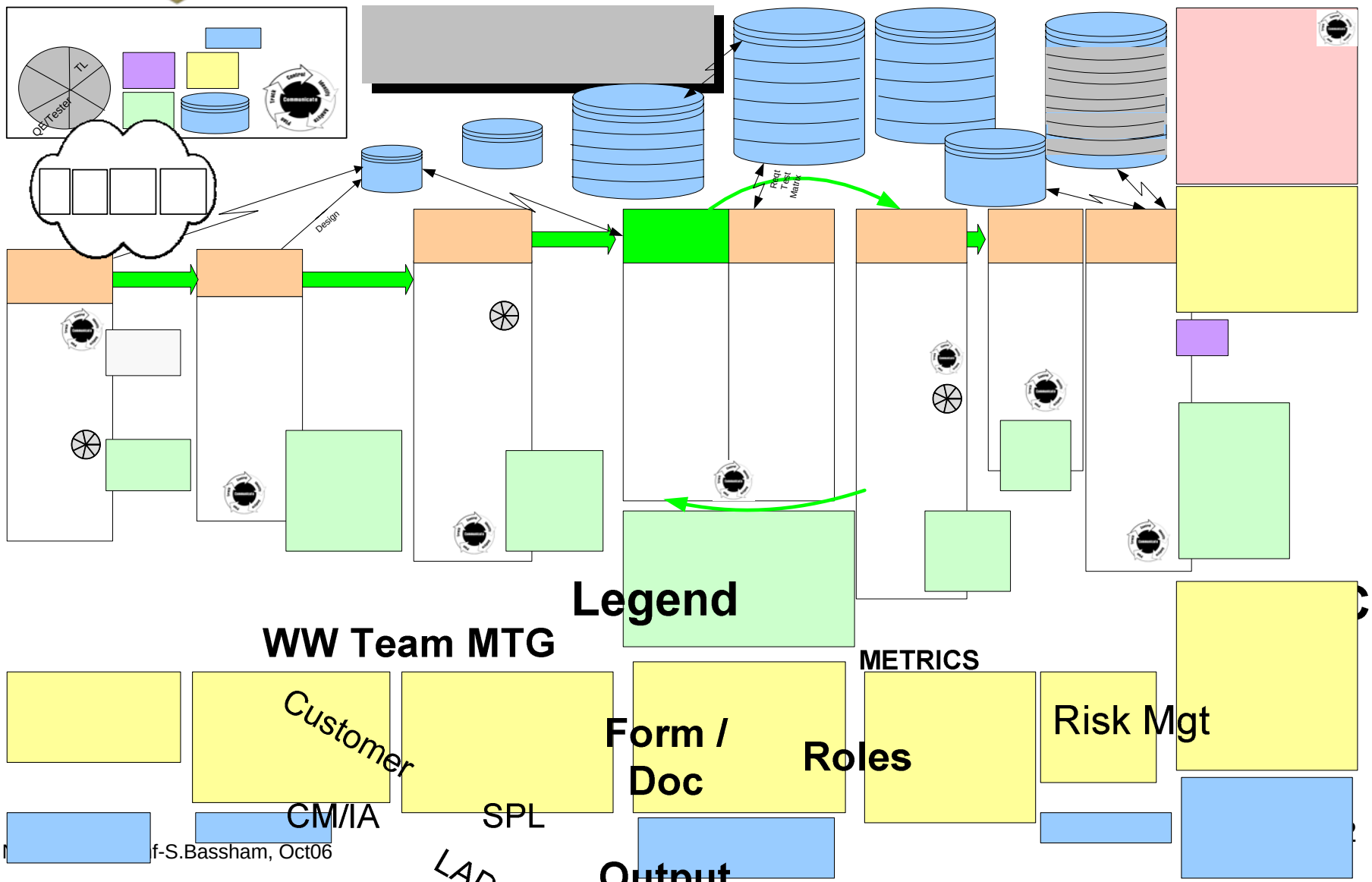
Loop 0 SEP VSM



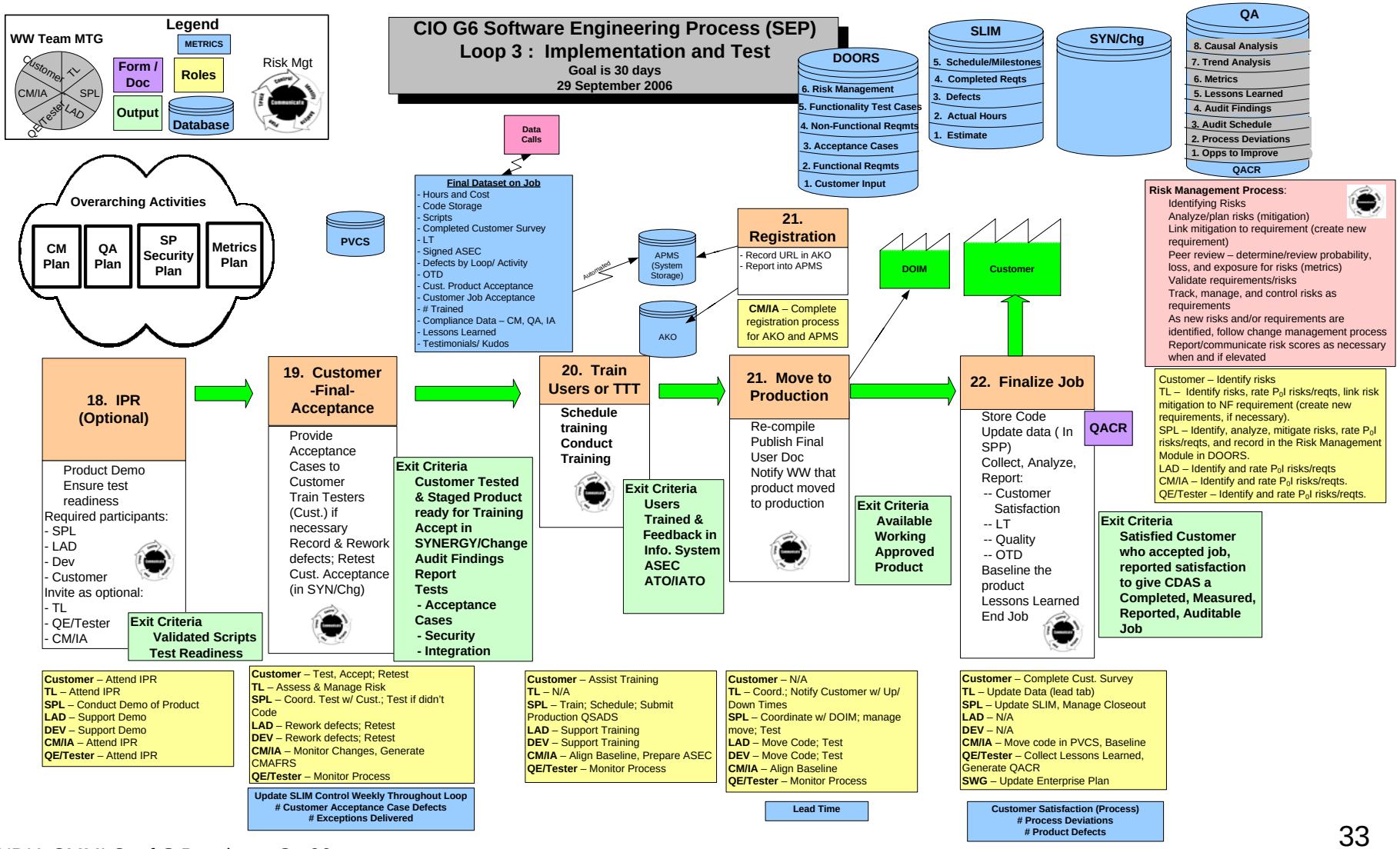
Loop 1 SEP VSM



Loop 2 SEP VSM



Loop 3 SEP VSM



Lean Internal Training

- Continuously improve
  - Add, Change, Modify, Delete
  - Innovative deliveries and celebrations
    - Rollout Celebrations
    - SEP Fair
- Provide high level overview
- Specialized Peer Group training sessions
  - Hands on tools
  - Simulate!
  - Role expertise

Future Steps
on
Our Lean Journey

Visual Status “at a Glance”

- Visual Management using metrics data
  - Enables better decision making
  - Insight into opportunities to improve
  - Allows monitoring of lead time and other metrics
- Dashboard concept
  - Data at your fingertips
  - Information for all roles
  - Meet the needs of managers and data calls

Continuous Improvement!

- Utilize Lean/Six Sigma Tools
  - Apply creative problem solving
  - Put SEP controls in place
  - Measure results
- Lean CMMI
  - Enhance business/management processes
  - Standardize
  - Improve Customer Satisfaction (product and SEP)
  - Plan/prep for Level 3-4 appraisals

Questions?

Contact Information

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Glossary

- **PCCB** - A collection of specialists from each role including management who facilitate the definition, maintenance, and improvement of the process(es) used by the organization.
- **SWG** - An authorized group within the organization that balances the workload across the organization; provides product tracking and oversight; and assists in the implementation, sustainment and continuous improvement of the Software Engineering Process.
- **TL** - Leadership role on the Product Team who is responsible for Loop 0 (Concept Definition & Product Requirements) and ensuring the success of software product development.
- **SPL** - Technical leadership role on the Product and Development Team responsible for success of software product development.
- **LAD** - Leadership role on the Product and Development Team who is responsible for design and development of the software product.
- **QE/Tester** – Technical role on the Product and Development Team who is responsible for Quality Assurance and Testing activities during the software product development.
- **CM/IA** – Technical role on the Product Team who is responsible for Configuration Management and Information Assurance activities during the software product development.