



# **Conceptual Design of Targeted Scrum: Applying Mission Command to Agile Software Development**

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# Agenda

- **Introduction**
- Background of Scrum
- Targeted Scrum
- Proposed Experiment
- Initial Observations
- Questions



# Problem Statement

- How do you successfully develop working and reliable software, within budget and on time, given ever changing requirements?



# Mission Command as Similar Field

- Attempts to bring order to chaotic, complex human endeavors
- Followed similar evolution (industrial-age decomposition to agility)
- Assessments critical to success



# Mission Command as Similar Field

Step	Military Decision Making Process	Waterfall Method
1	Receipt of Mission	System Requirements
2	Mission Analysis	Software Requirements
3	COA* Development	Analysis
4	COA Analysis (War Game)	Program Design
5	COA Comparison	Coding
6	COA Approval	Testing
7	Orders Production	Operations

**\*COA = Course of Action**



# Research Hypothesis

Modifications to agile software development based on inspirations from mission command can improve software engineering process in terms of the planning, prioritizing, and communication of software requirements and progress, as well improve the overall software product.



# Approach Summary

- Propose to use mission command as inspiration to improve a specific agile software development method (Scrum)
- Addresses two specific weaknesses: lack of initial planning and lack of architecture
- Introduces Product Design Meeting, end state, and Lines of Effort (LOEs)



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# Scrum

- Developed by Ken Schwaber (1996)
- Management process classified as an agile software development method
- Premise: change is unavoidable
- Approach: iteratively build software in increments, conduct continuous assessments, review finished increment

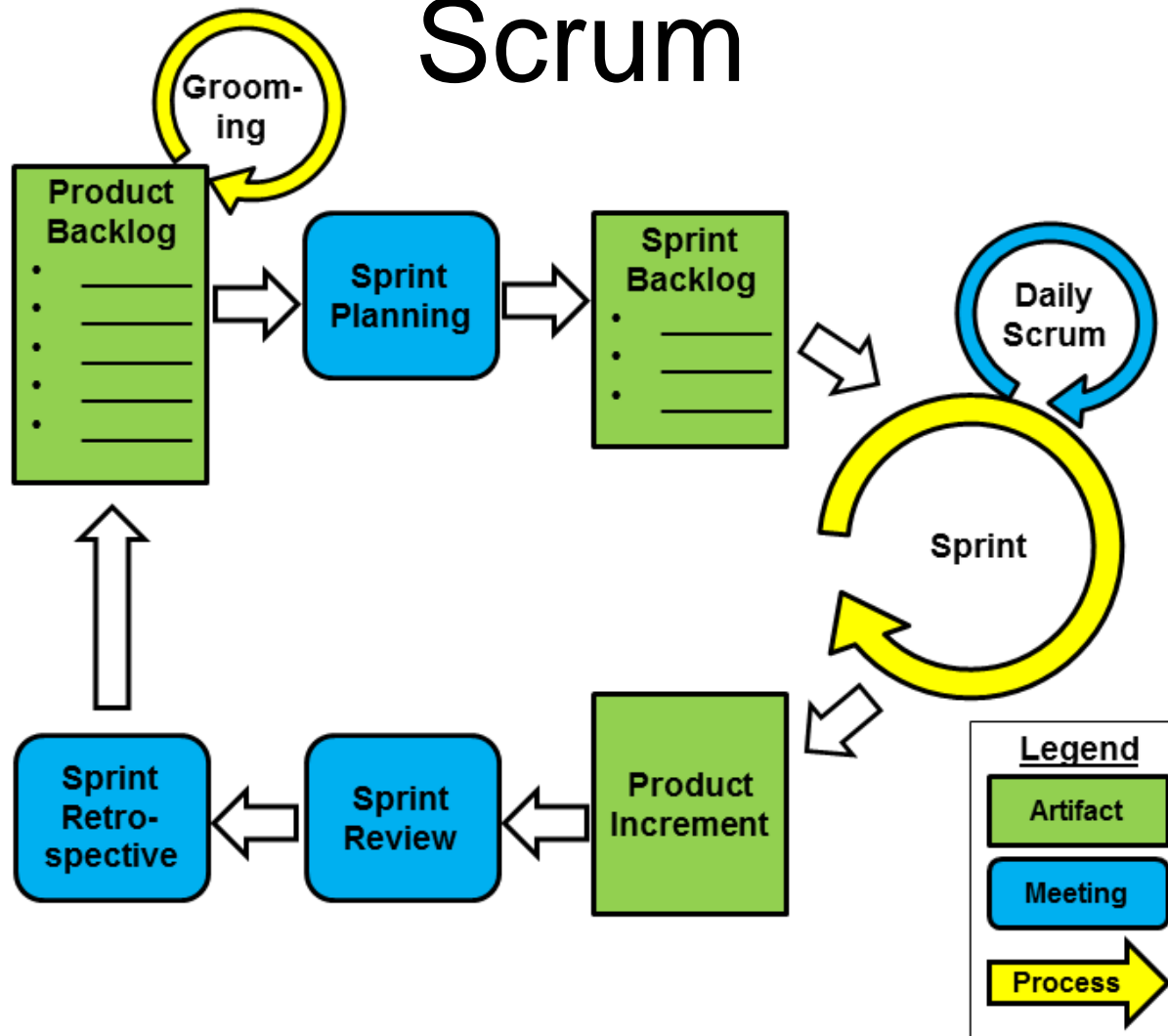


# Scrum

- Scrum Team consists of approximately seven people
- Team is cross functional, self-organizing
- Scrum Master – ensures adherence to Scrum principles and removes obstacles
- Product Owner – software client's representative to Scrum Team



# Scrum



# Strengths of Scrum

- **Iterative releases and feedback** lead to earlier discovery of defects (Sutherland *et al.*, 2007)
- **Continuous feedback** leads to greater software quality (Li *et al.*, 2010)



# Weaknesses of Scrum

- **Initial identification of requirements**
  - Creating software before identifying requirements → unnecessary change (Hochmüller & Mittermeir, 2008)
  - Multiple Sprints required before architecture is established (Overhage & Schlauderer, 2012)



# Weaknesses of Scrum

- Wrong choice of **Product Owner** hurts team responsiveness  
(Hochmüller, 2011) (Hoda *et al.*, 2010)
- **Lack of design focus** → Planning decisions more tactical than strategic  
(Drury *et al.*, 2012)



# Enhancements of Scrum

- Merge Scrum into more formal methodology such as **CMMI** (Sutherland *et al.*, 2007) (Lina & Dan, 2012) or **PSP** (Rong *et al.*, 2010)
- Develop external framework to manage multiple teams (Maranzato *et al.*, 2012)
- Use Line of Balance (LOB) to chart progress (Miranda & Borque, 2010)



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# Approach

- Specific weaknesses to address:
  - Lack of initial planning and overall design
  - Prioritization of Product Backlog
- Ways to address weaknesses:
  - Addition of Product Design Meeting
  - Use of Lines of Effort (LOEs)



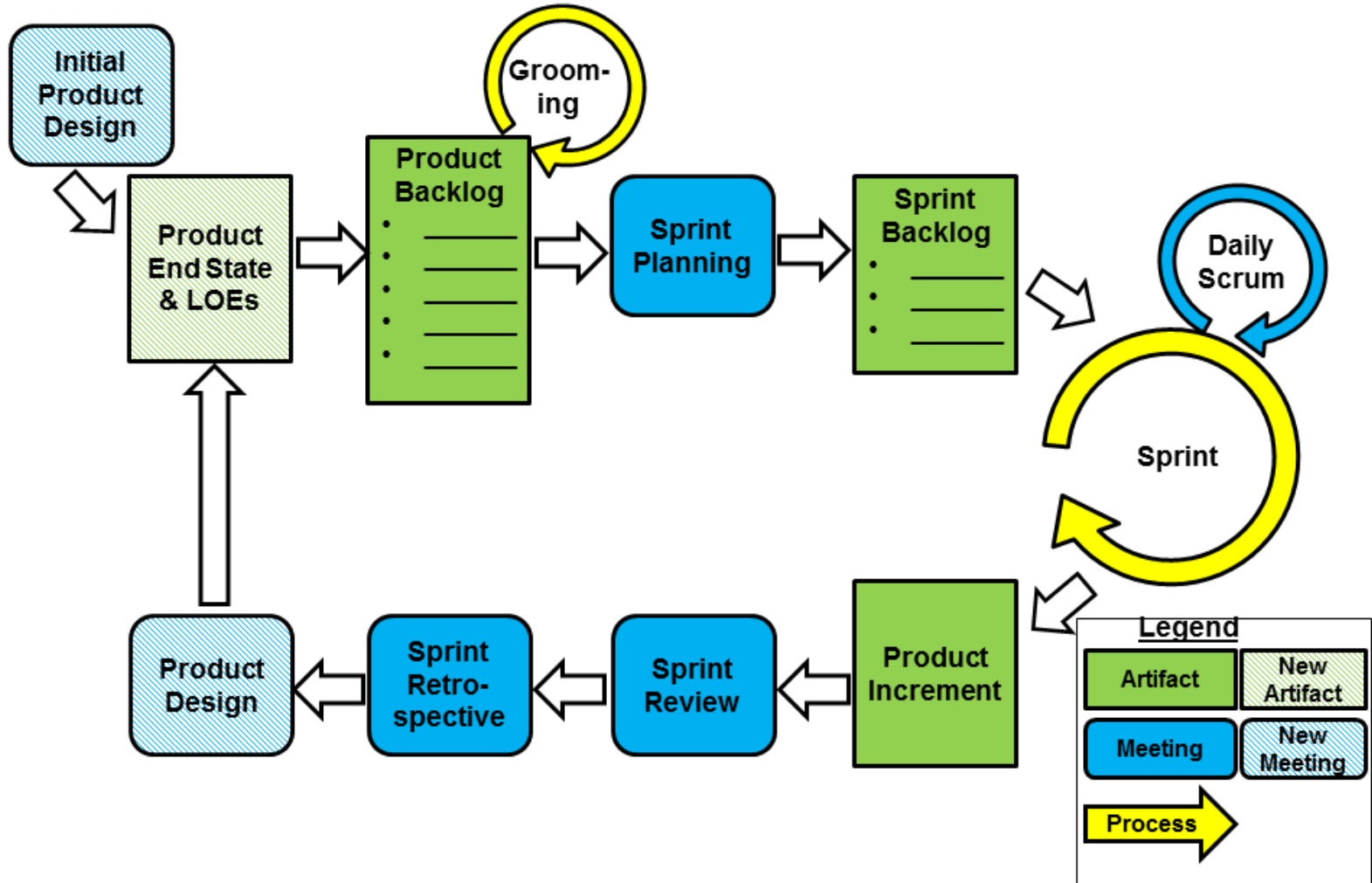
# Approach

Targeted Scrum will enhance Traditional Scrum by:

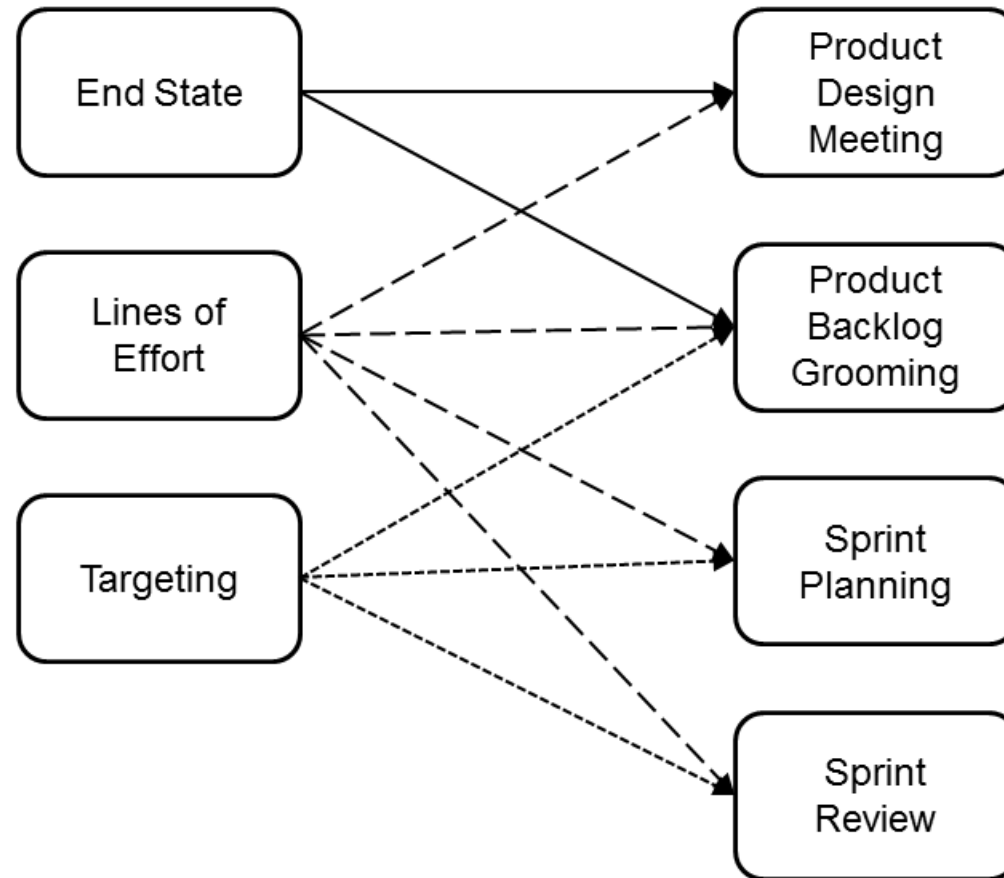
1. Product Design Meeting will establish Product framework
2. Product Design Meeting and LOEs will better groom Product Backlog
3. LOEs will improve Sprint Planning
4. LOEs will better communicate progress



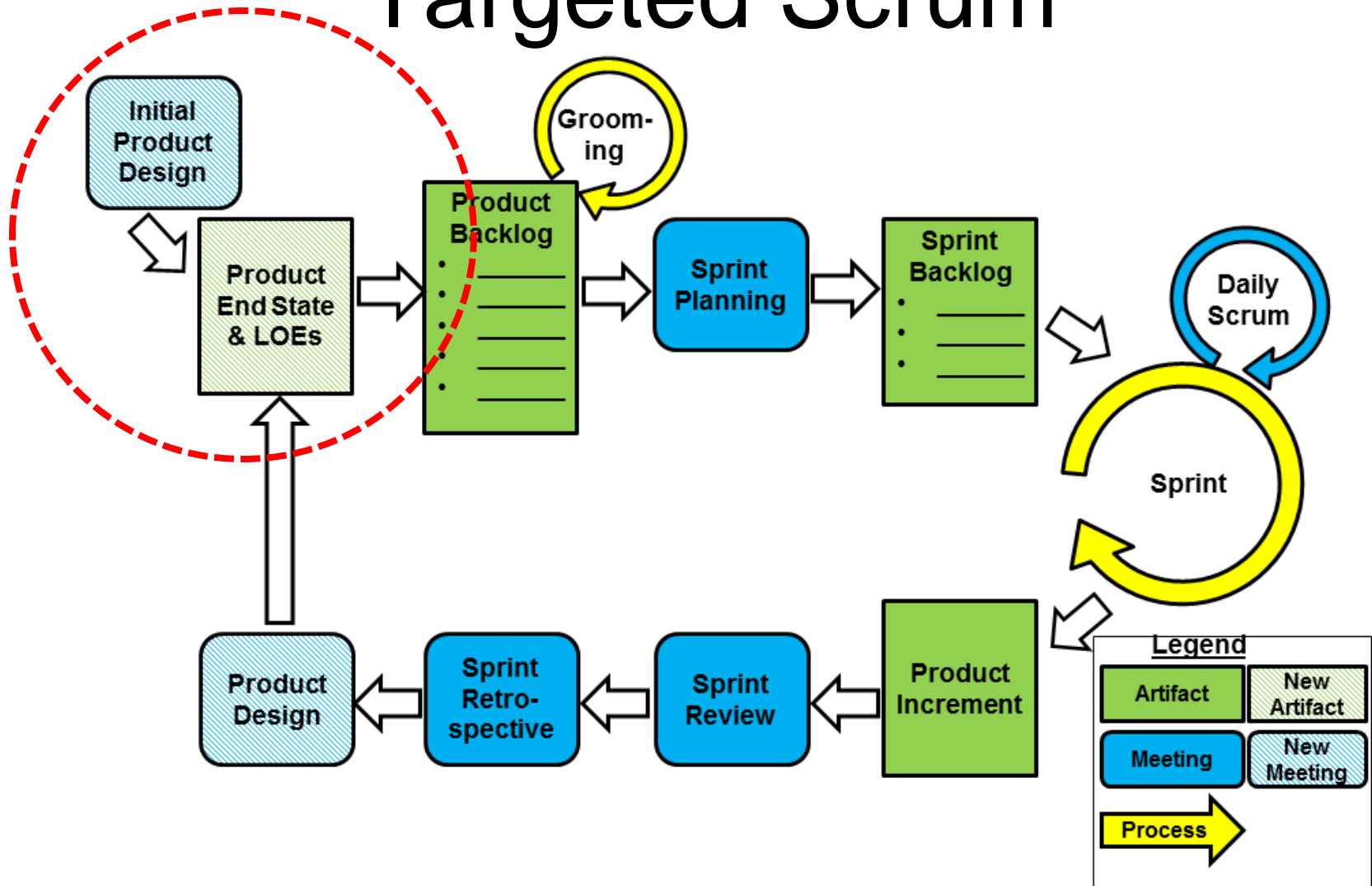
# Targeted Scrum



# Mapping Mission Command to Modifications



# Targeted Scrum

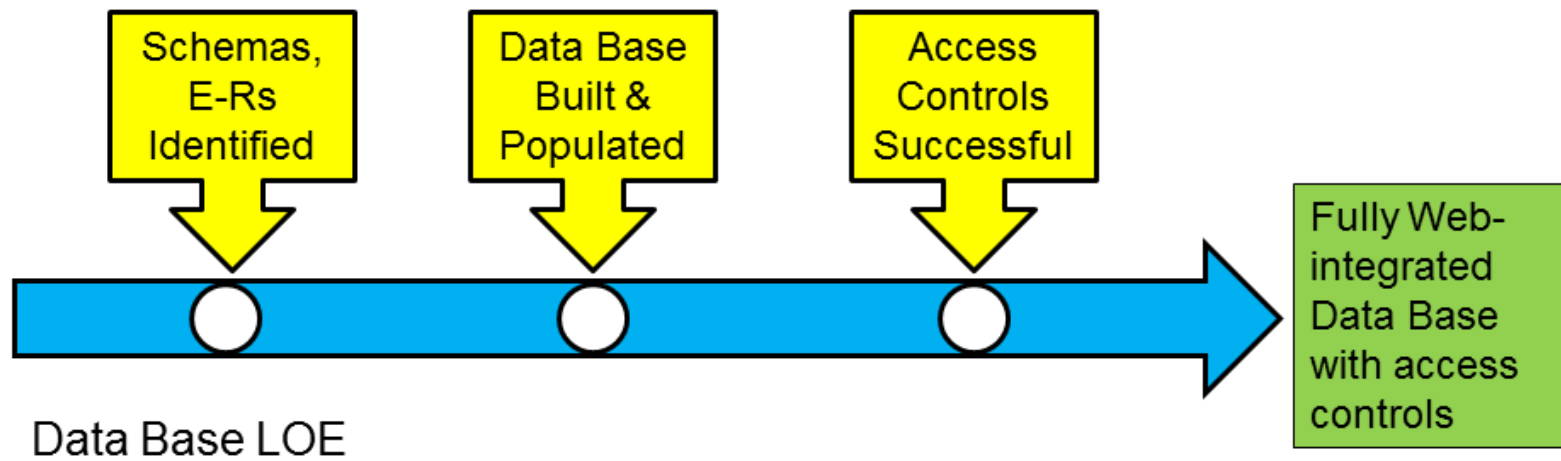


# Product End State

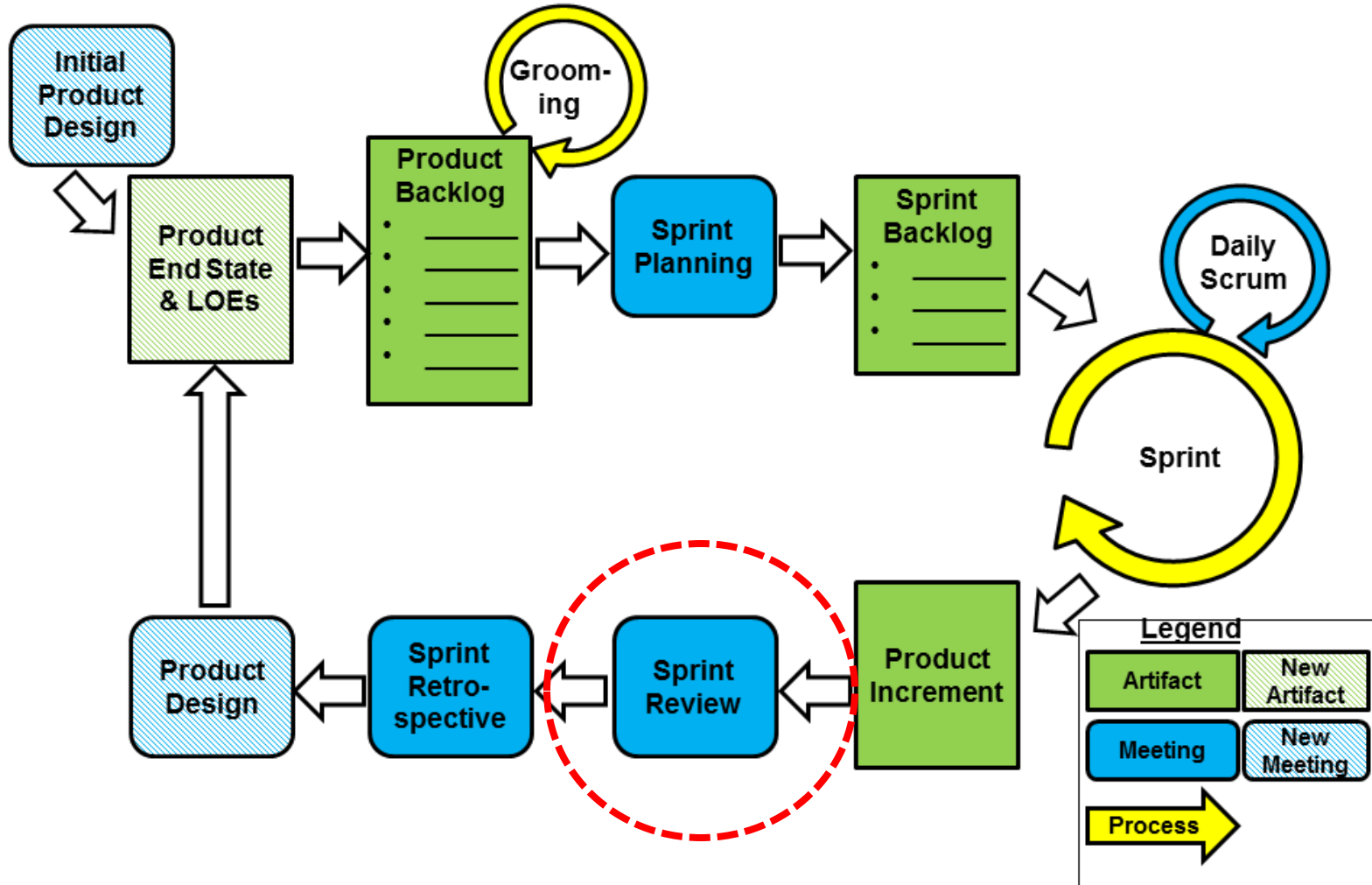
A secure, efficient, and easily adaptable personnel management system for an organization of 50-200 people that can be accessed and modified via a Web browser.



# Data Base LOE

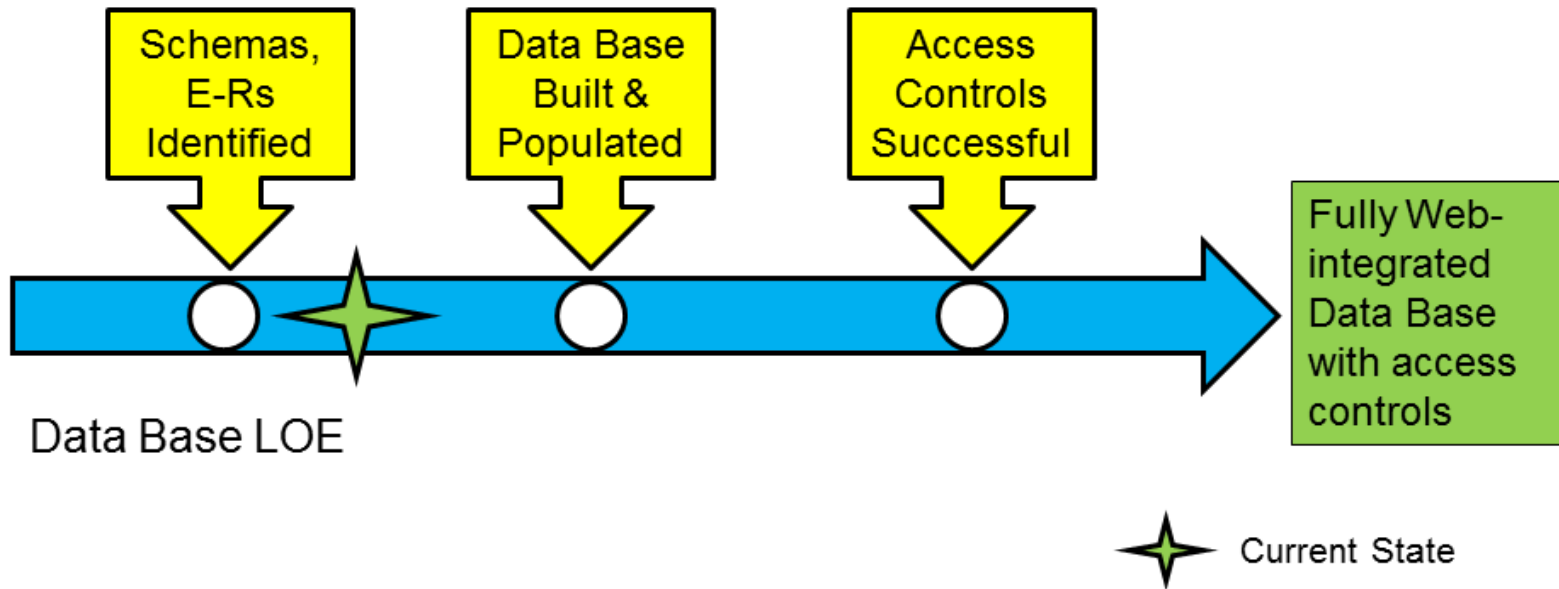


# Targeted Scrum

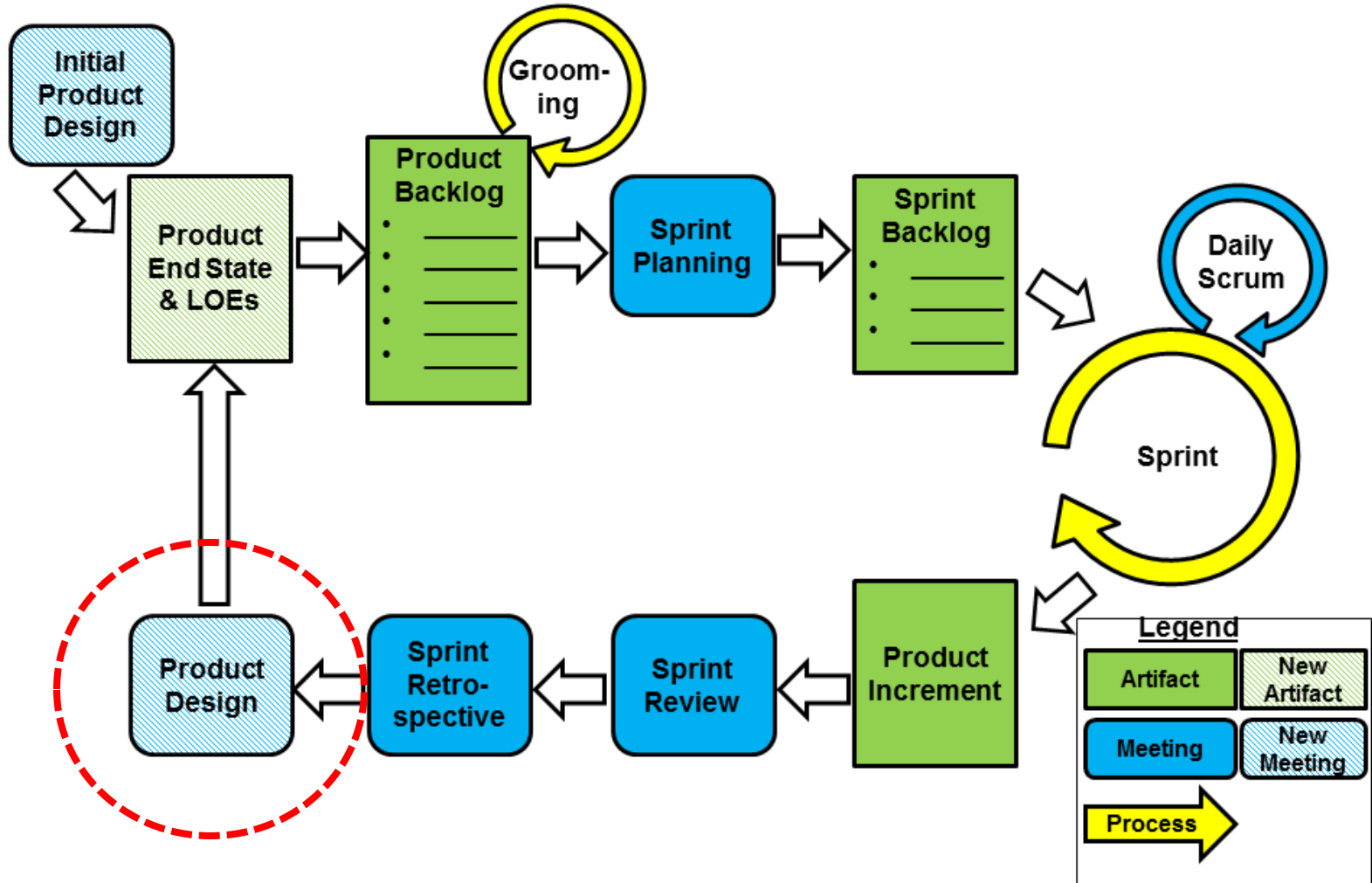




# Updated Data Base LOE



# Targeted Scrum



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# Protocols

- Develop similar software with both methodologies
- Conduct experiments in Spring 2014
- Set Sprint duration to 2 weeks
- Assign Scrum teams of 3-4 members
- Develop with Java utilizing Eclipse IDE
- Immediately archive all artifacts



# Gathering & Assessing Data

- Each project conducted with split of Traditional/Targeted Scrum teams
- Students surveyed at completion of each project and at end of course
- Outside observers surveyed after the course to focus on artifacts produced
- Product evaluated using automated metrics

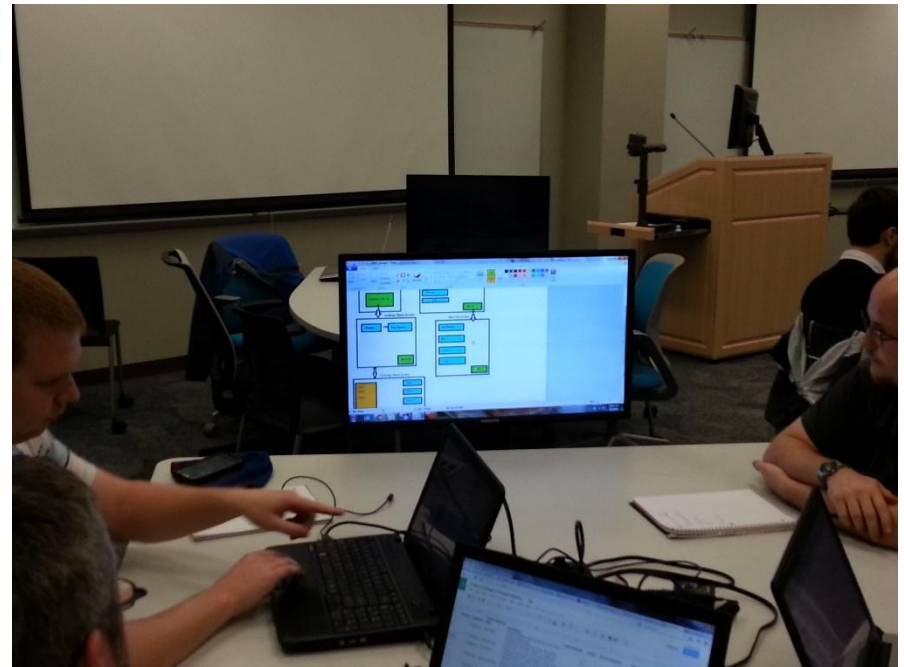


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# Initial Observations



# Initial Observations

- 26 students divided into 7 Scrum teams (junior and senior level undergraduates)
- Student surveys completed at this time
- Utilized model classroom design for new engineering education building





# Future Work

- Outside observers assess the artifacts
- Assess the results of the student surveys
- Publish the results and lessons learned from the experiments



# QUESTIONS?

