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Introduction to Agile Practices

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Current State of Intelligent Transportation Systems (ITS)

- ITS projects are becoming more software-intensive; some are 100% software
- Many ITS projects involve public-facing mobile apps, plus new services that are not fully “predictable”
- The SE V process may be used to manage the project, but it is not always well suited to some of these projects.
- The Information Technology (IT) profession has widely adopted Agile processes for many software projects.

FHWA-Calif. S.E. Guidebook for ITS

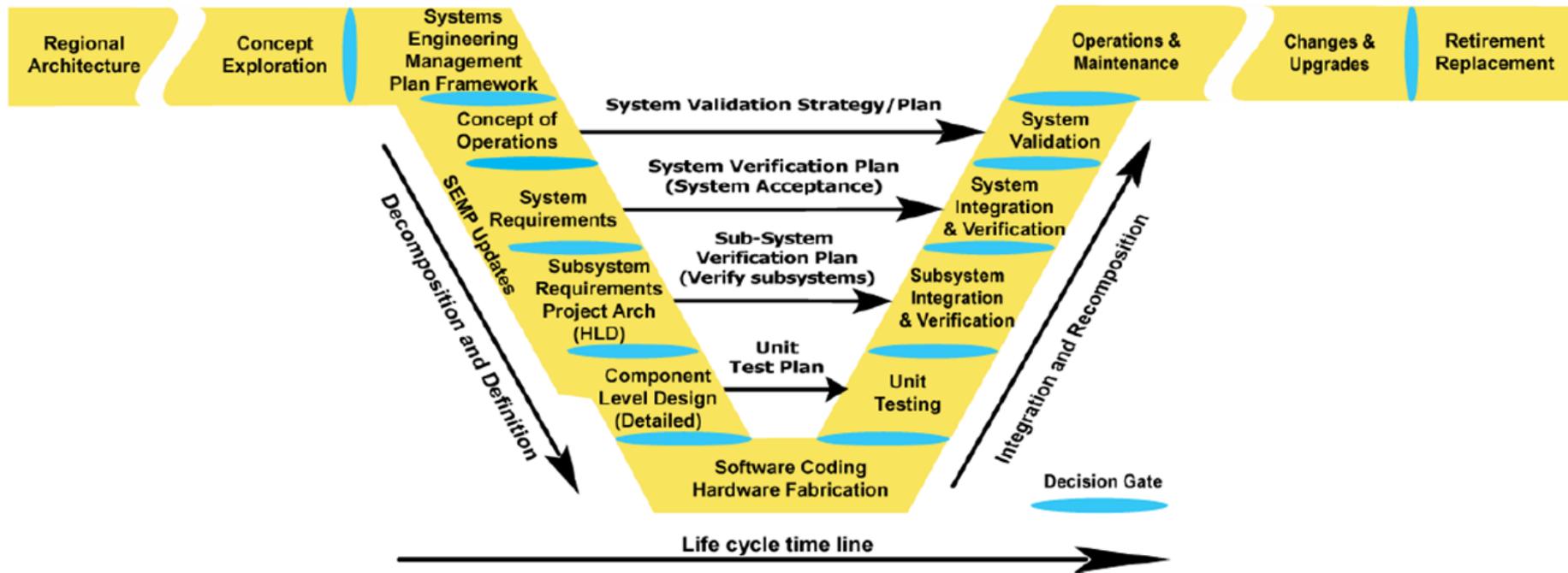


Figure 1-2 ITS Project Life cycle Phases and the Life cycle Tasks in this Guidebook

Getting Started

Concept of Operations

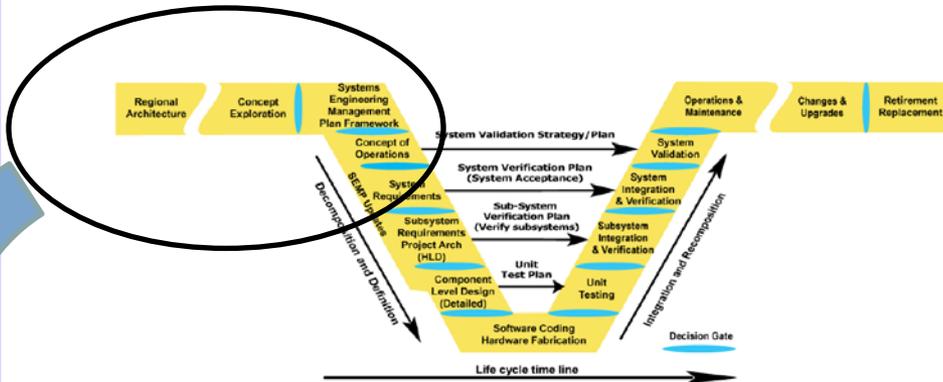
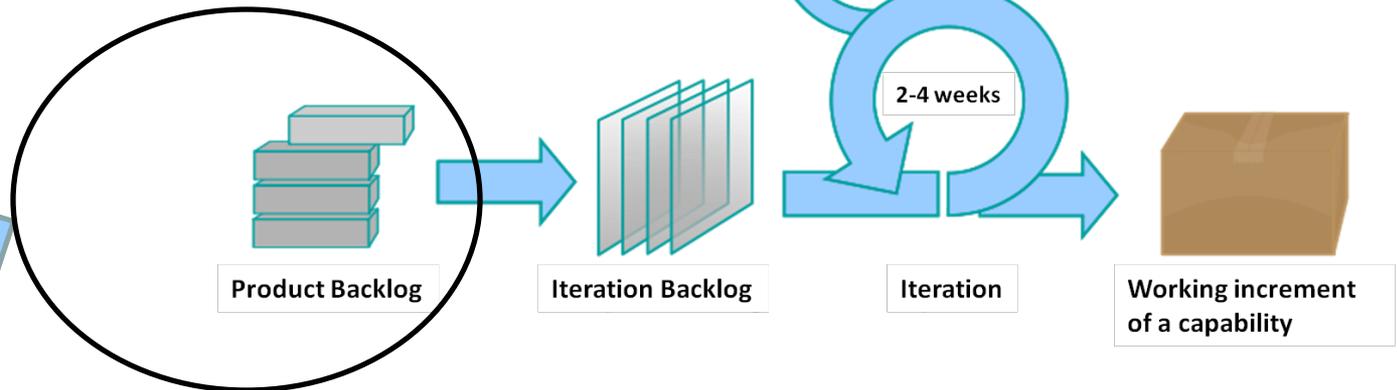


Figure 1-2 ITS Project Life cycle Phases and the Life cycle Tasks in this Guidebook

Vision, Roadmap, Modular Architecture



Development, Delivery, Maintenance, Upgrades

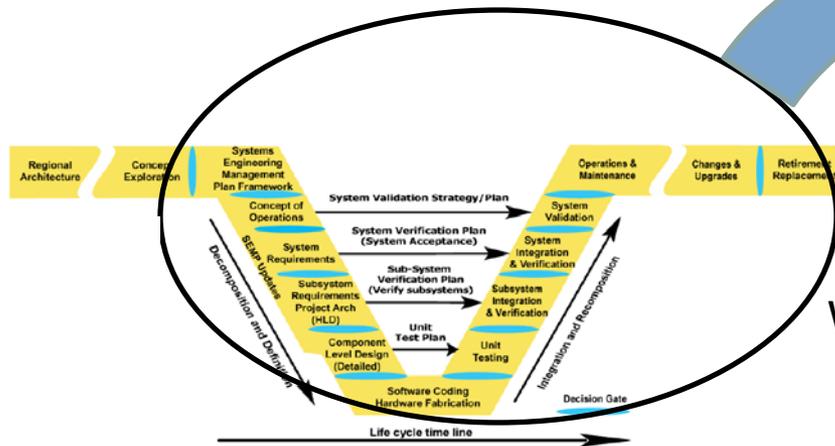
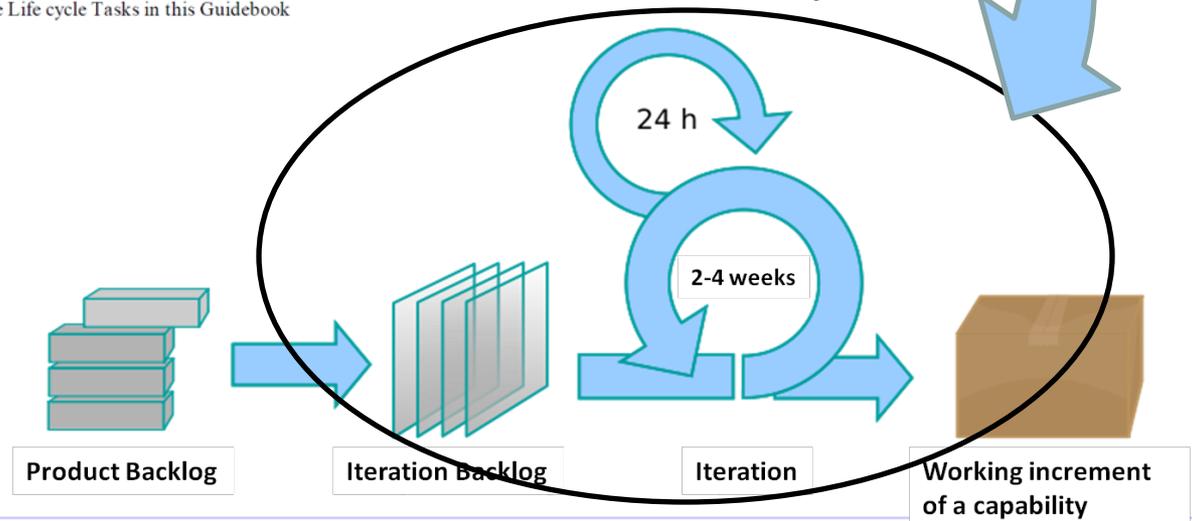


Figure 1-2 ITS Project Life cycle Phases and the Life cycle Tasks in this Guidebook

Working software, hardware and supporting documentation incrementally



Product Backlog

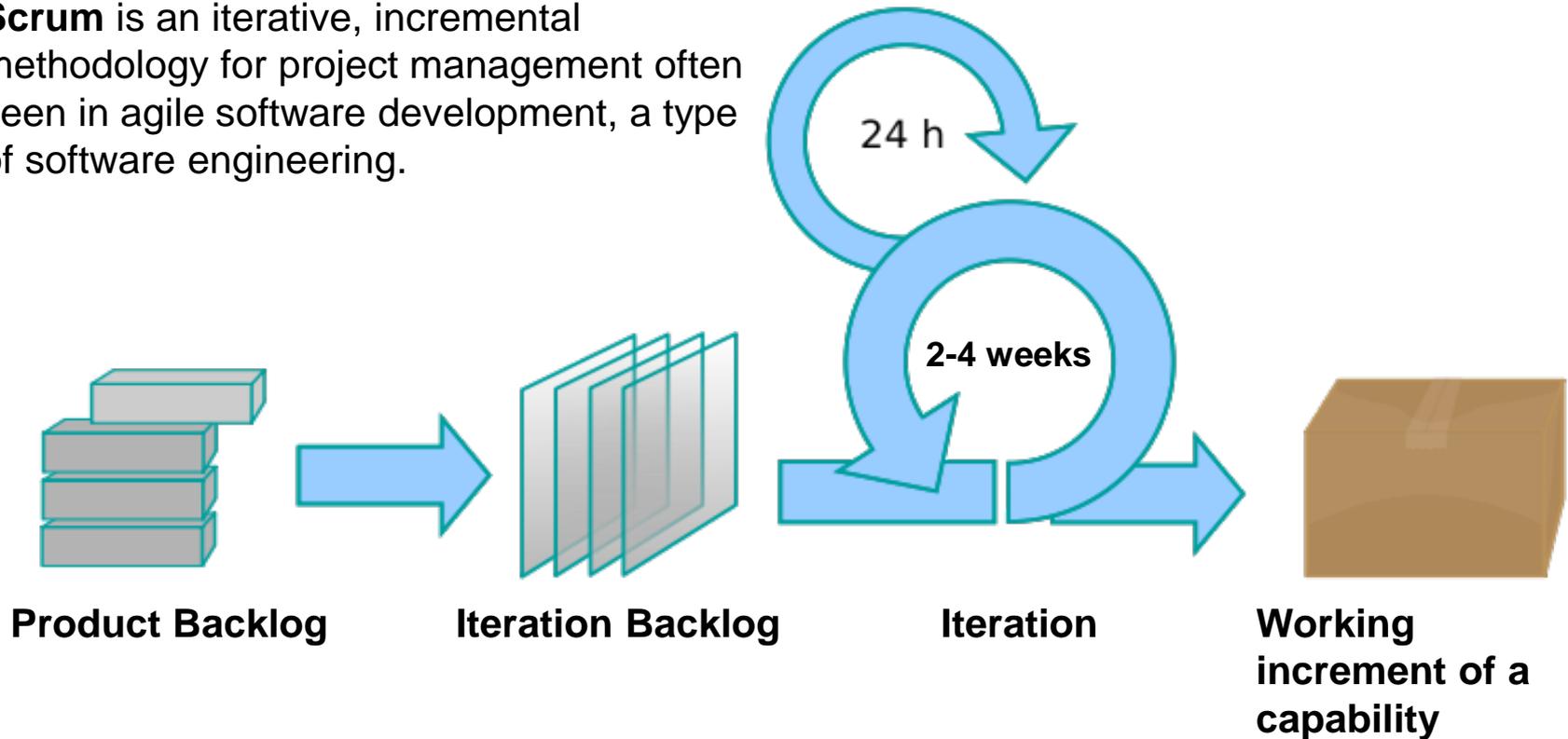
Iteration Backlog

Iteration

Working increment of a capability

Introduction to Agile (Scrum)

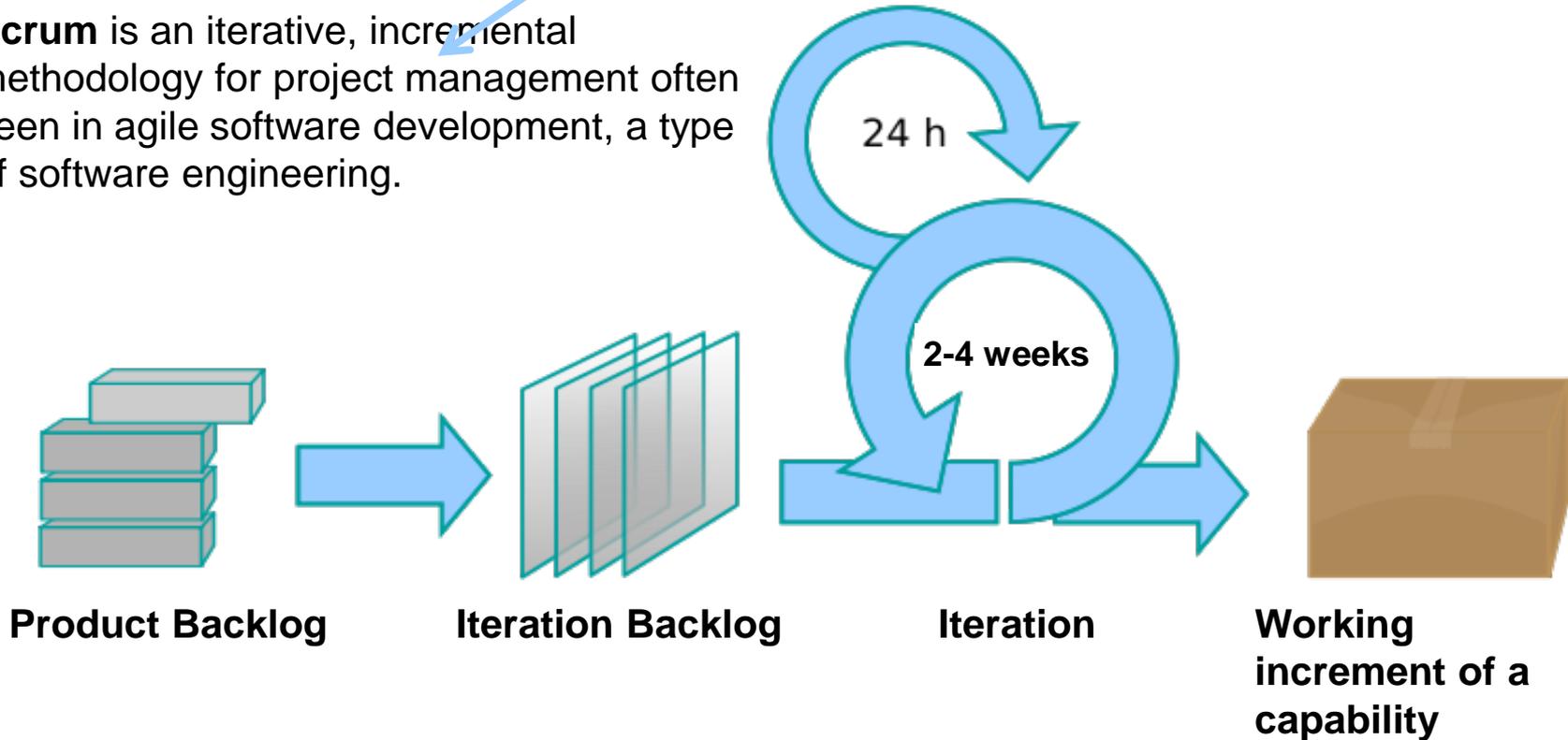
Scrum is an iterative, incremental methodology for project management often seen in agile software development, a type of software engineering.



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Project Management

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Agile Includes:

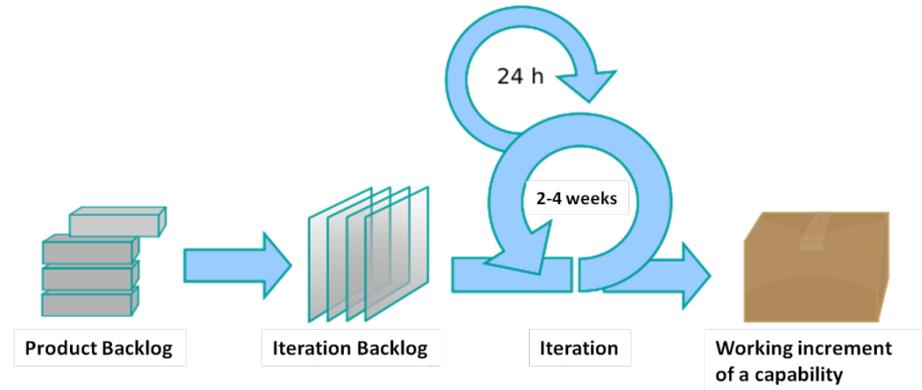
- Scrum: Iterative, incremental methodology for project management
- Lean: reduce waste, reduce Work in Process (WIP); have what you need to start; once an item is started finish it before starting the next item;
- eXtreme Programming: pair programming, continuous integration, automated testing, test first development,
- Crystal Methods: frequent delivery, reflective improvement, daily stand-up meetings, side-by-side programming, burn charts, automated tests, configuration management, frequent integration

Agile is often called Lean-Agile

Start

Project Management:

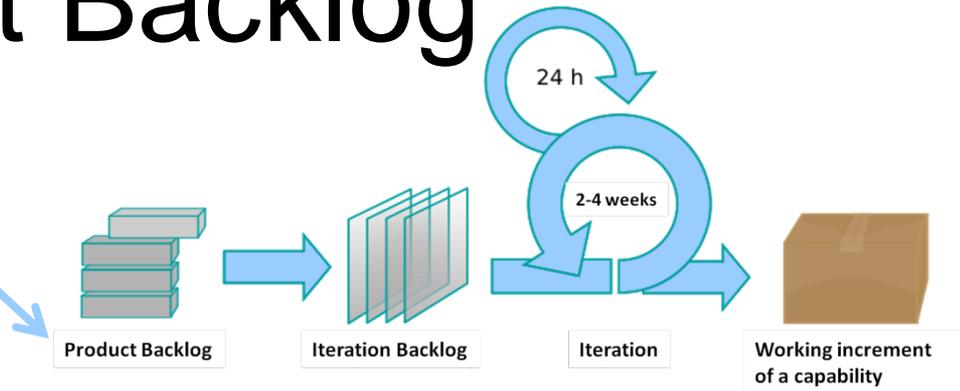
- Vision,
- Roadmap
- Budget



Example Visions:

- Create a car that will get 100 mpg, go from 0 to 60 m/hr in 5 sec; (They went on to compete in X-Prize 2010; wikispeed.org)
- Bikesharing Intelligent Transportation Systems (ITS) will monitor, evaluate, and manage bike transportation systems to enhance safety, efficiency and mobility, and to reduce negative environmental impacts.

Product Backlog



- Create a Product Backlog: list of stuff to accomplish
- Created by the Product Owner
- Prioritize the list of stuff by the highest priority at the top
- List of stuff usually comes from a group of stakeholders

Bikesharing

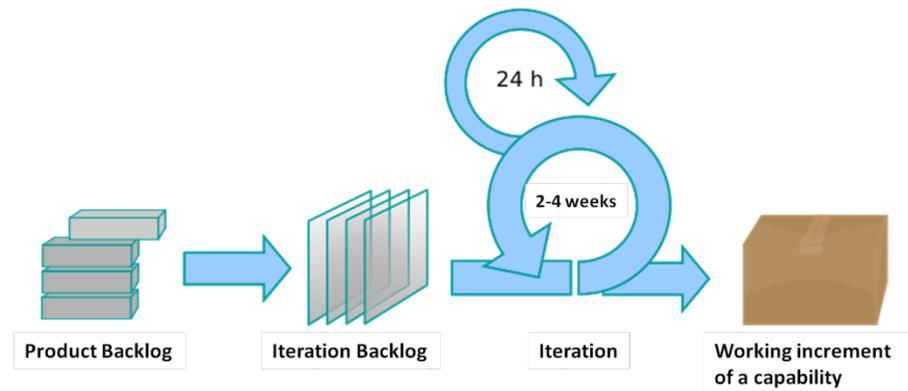
- Project: Implement Bikesharing Service in City of San Tequila
- Service: Short-term, any-to-any, bike rental to members (Bike may be picked up and dropped off anywhere in City)
- Hardware: COTS bikes are available (including GPS, cellular, RFID, solar)

Example Bikesharing Backlog

- User app
- GPS tracking/mapping
- Back-end database
- COTS hardware on the bikes

Iteration Planning

- Commit to a small set of goals – the Iteration Backlog
- Identify the smallest capability that can be created; some call this a Minimum Viable Product (MVP)



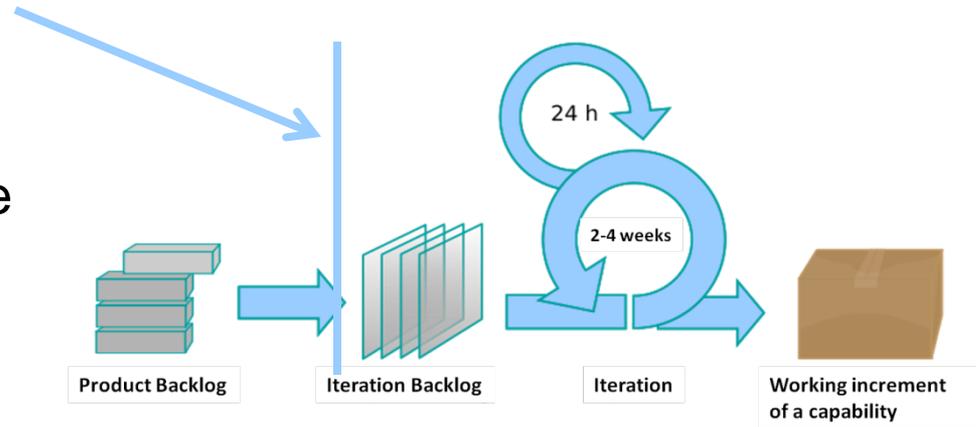
Functional Requirements

1. Provide registration & accounting via website
 - 1.1 Establish account for each participant and mail RFID card.
 - 1.2 For each use, apply charges of \$1/hour
 - 1.3 Bill credit card monthly and email statement to user
2. Track and Display Location of Bikes
 - 2.1 Track location of each bike
 - 2.2 Display each bike on map (bike ID#, street address, status)
3. Provide check-out and check-in at the bike, via bike unit RFID reader
 - 3.1 Establish communications with each bike unit.
 - 3.2 On check-out, validate account and change status to “in-use.”
 - 3.3 On check-in, calculate charges and change status to “free.”

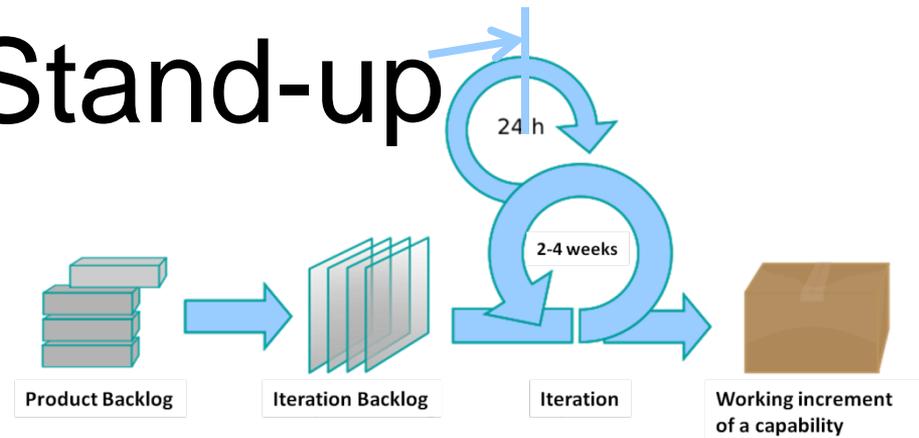
- Should one capability be developed at a time or establish a minimum framework of each during a Program Increment?
- Focusing and finishing one significant capability at a time applies Lean thinking.

Iteration Planning

- Product Owner identifies the highest priority items and the environmental constraints
- Architect or SE defines architectural requirements
- Team looks at the highest priority items on the product backlog and plans what they can do in the next 2 to 4 week iteration Team defines which of the high priority items they can do in the iteration being planned
- Team identifies any dependencies between the backlog items
- Agreement is that no stakeholders can add to or change the planned work during the iteration



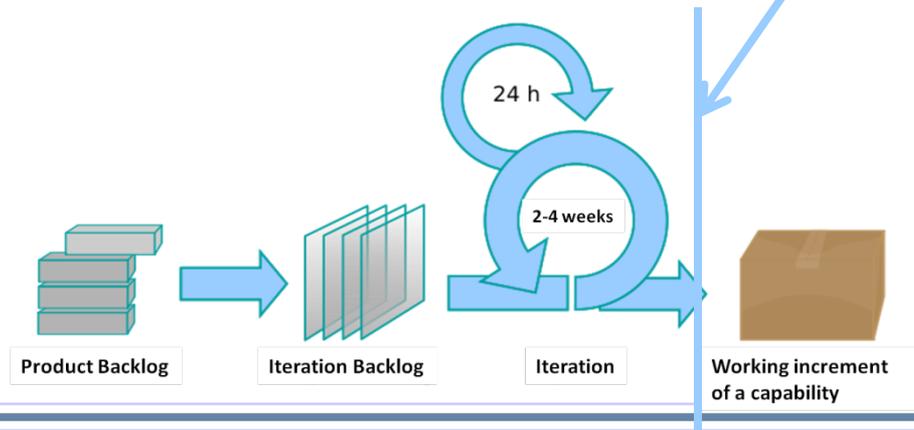
Daily Stand-up



- Each day the team gets together at a Daily Stand-Up where they report to each other:
 - This is what I just finished
 - This is what I plan to do next
 - Also report any impediments that might be slowing you down or in the way of finishing something
- Scrum Master facilitates the Daily Stand-Up Meetings and removed impediments
- Daily Stand-Up should last 15 minutes or less

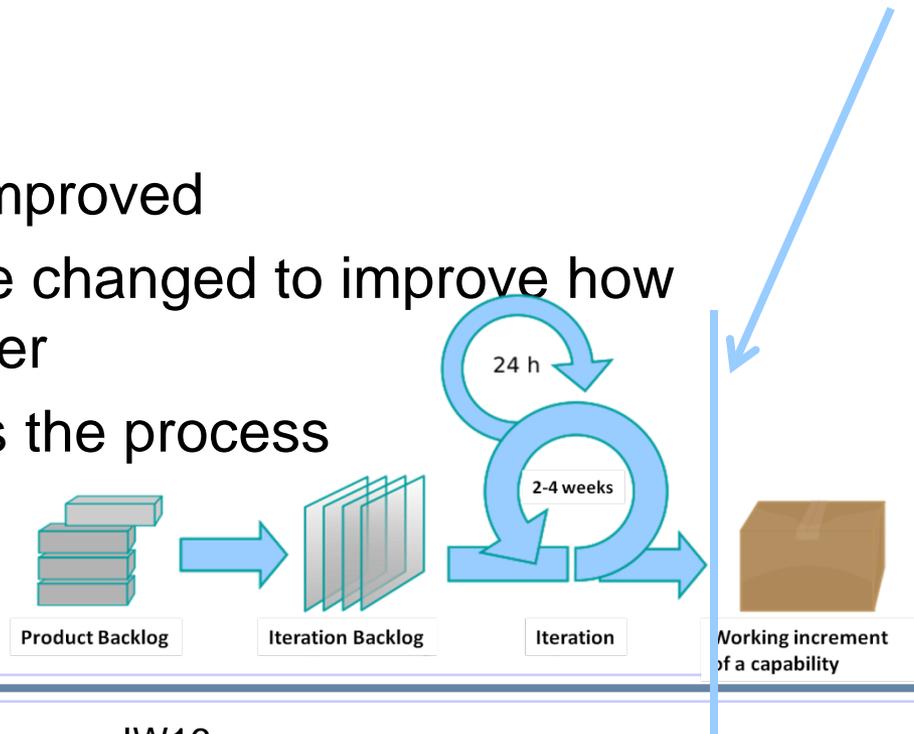
Iteration Demonstration

- Team present what has been finished during the iteration in a “Show and Tell”
- Stakeholders and Product Owner provide feedback on what is demonstrated
- This inspects and improves the product



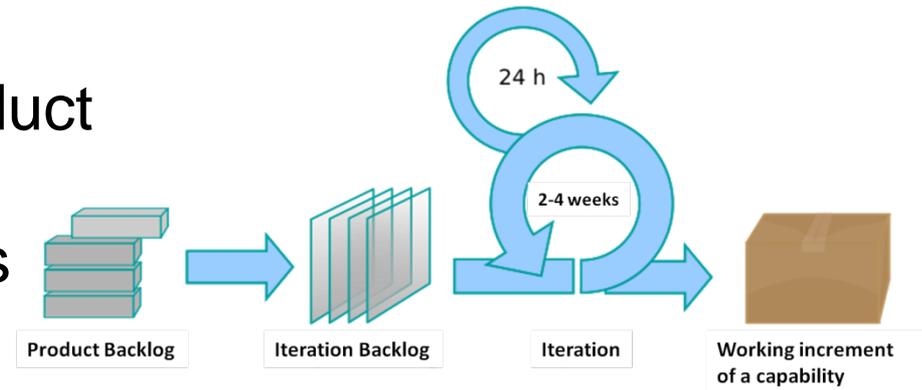
Retrospective

- Facilitated by the Scrum Master
- Usually after the demonstration, attended by team members only (not customers)
- Each team member identifies:
 - What worked well
 - What did not work well
 - What could/should be improved
- Agreements on what will be changed to improve how everyone is working together
- This inspects and improves the process



Team Roles

- **Product Owner:**
Responsible for the product backlog, removes impediments, represents the customer and works closely with the customer
- **Scrum Master:** Facilitates the team meetings, removes impediments
- **Team Members:** Plan the Iterations, estimate the amount of backlog that can be completed each iteration; demonstrate the capabilities at the end of each iteration
- Teams ideally are 5 to 9 members of developers, testers and other roles such as SE as needed



Agile in Government Example

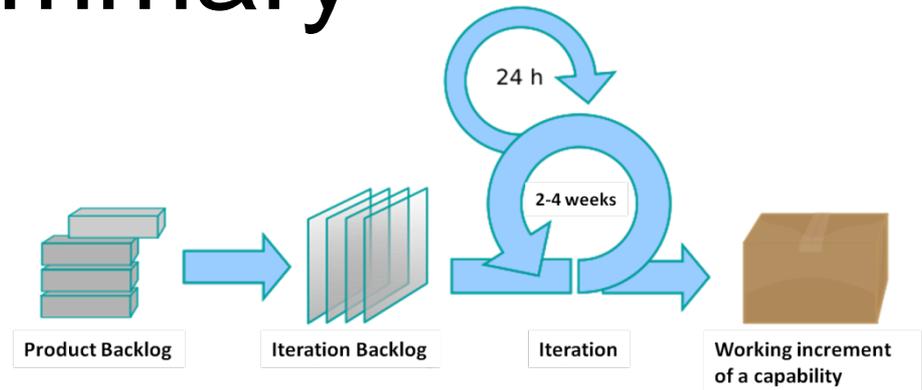
- State of Washington Office of the Chief Information Officer (CIO)
- The State of Washington has been using agile practices for IT projects for a few years.
- In 2014 they instituted Agile Fridays where agile practices were shared and recorded. Available here:
<https://ocio.wa.gov/news/agile-fridays-training-series-agile-development>
- Agile practices are changing how organizations deliver customer visible value. Around the world, Agile allows public and private enterprises to deliver value sooner in smaller increments, make customers happier by responding quickly to change, and maintain happier and more productive product teams.

Agile in Government Example

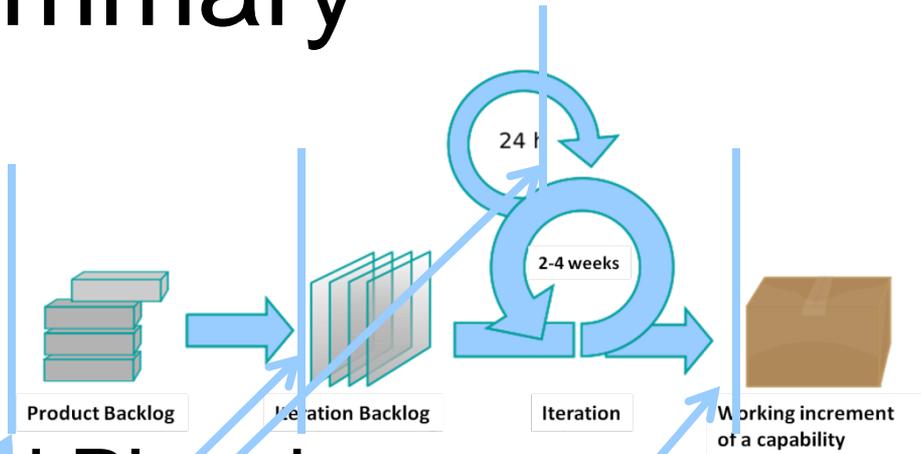
- Their contracts personnel were trained as Certified Scrum Masters, CSM. They were able to change the process an Information Technology Professional Services provider uses to register for work for the State of Washington from 18 months to 1 month using an on-line Purchase Agreement. See:
<http://des.wa.gov/services/ContractingPurchasing/ITContracts/ITMasterContract/ITPS/Pages/default.aspx>
- Recommend “Agile Contracting” by Andreas Opelt, Boris Gloger, Wolfgang Pfarl and Ralf Mittermayr, Wiley, 2013
- This book has information that could be used to modify government procurement practices for IT service providers using agile
- Items that would be useful for contracting with suppliers:
 - Guidance for writing Requests for Proposals to encourage agile practices
 - Checklists for assessing the agile practices of a proposal

Summary

- Roles:
 - Team Member
 - Scrum Master
 - Product Owner
- Artifacts:
 - Product Backlog
 - Iteration Backlog
 - Working Demonstrate-able Increment of Capability



Summary



- **Communication and Planning**
 - Vision/Roadmap
 - Iteration Planning
 - Daily Stand-Up
 - Iteration Demonstration
 - Retrospection