Three Process Models

Prof. Dr. Dirk Riehle

Friedrich-Alexander University Erlangen-Nürnberg

AMOS C02

Software Process Model [DR]

- A **software process**
  - Is a **process** perfomed with goal of creating and evolving software
- A **software process model**
  - Is a **model** of a **software process**
- Software process **model elements**
  - Comprises **roles, practices, and artifacts**
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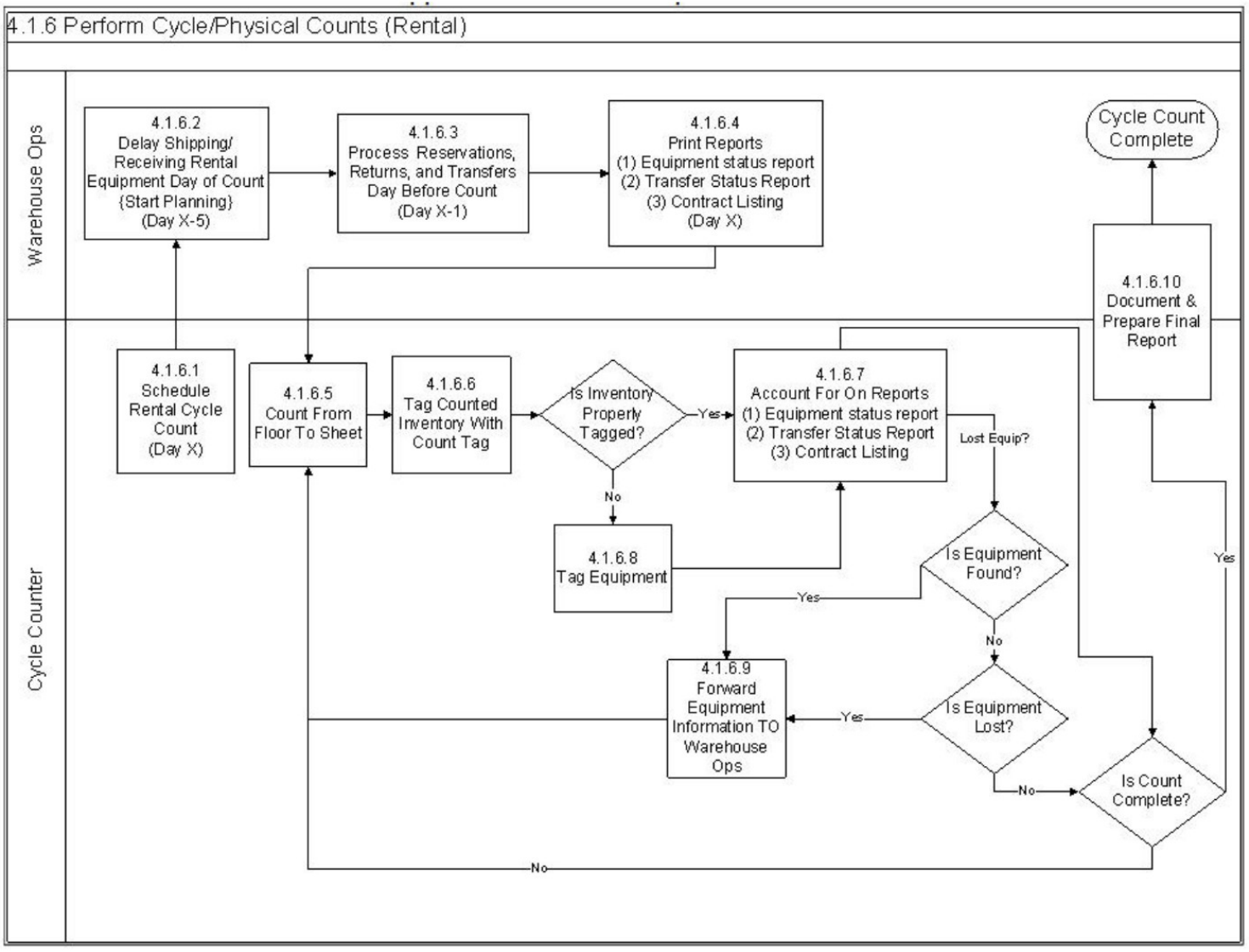
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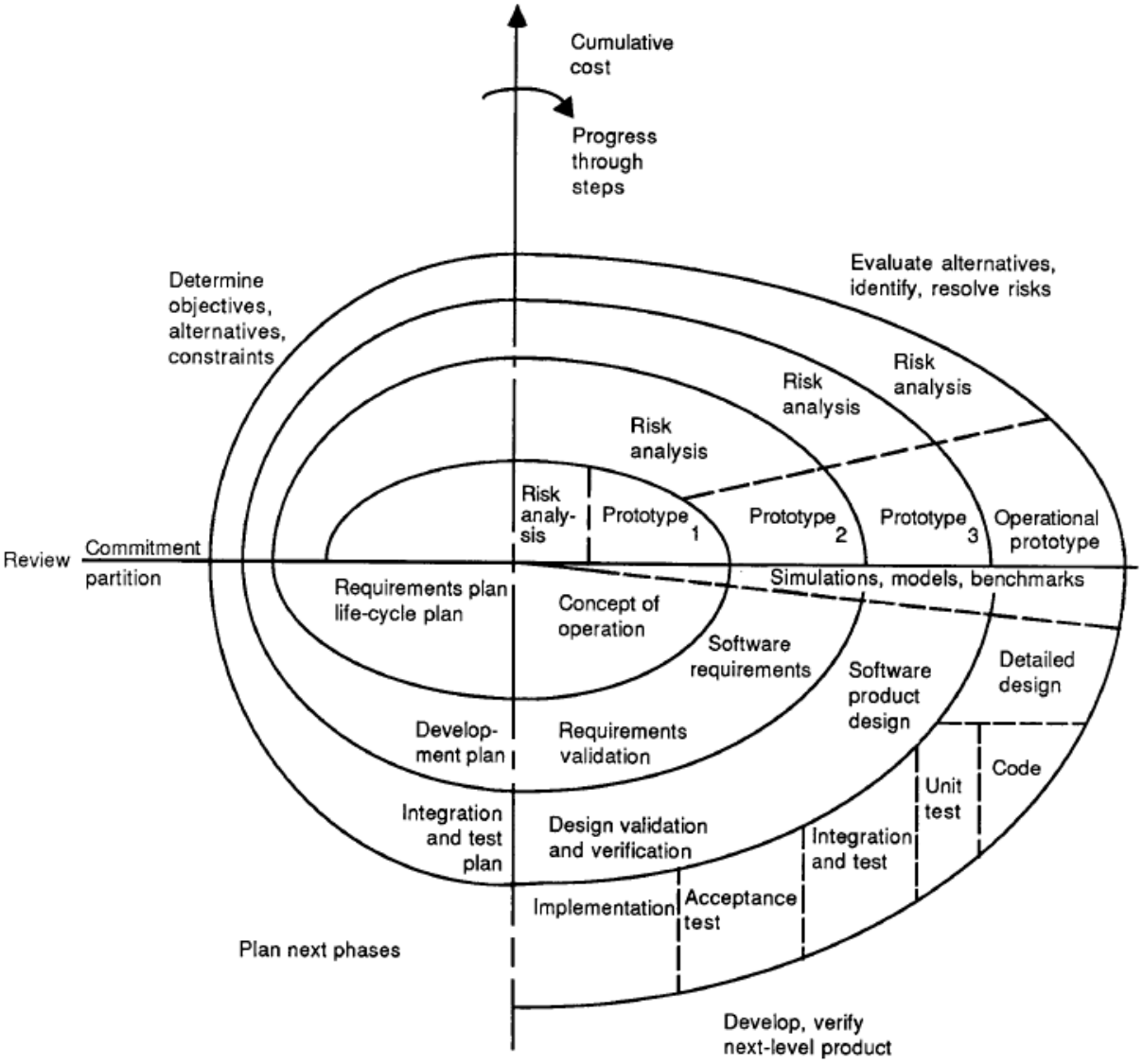
[B88]

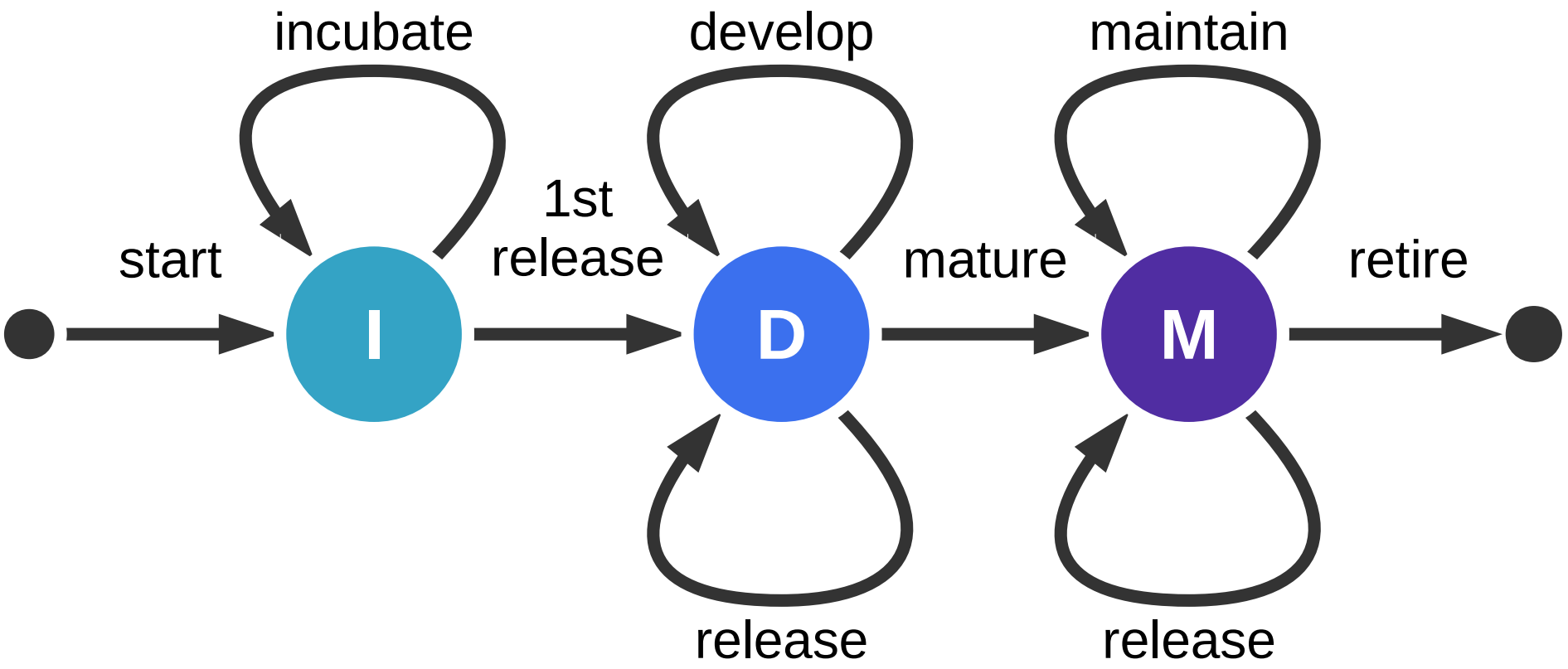

Cumulative cost
Progress through steps
Determine objectives, alternatives, constraints
Evaluate alternatives, identify, resolve risks
Risk analysis
Risk analysis
Risk analysis
Risk analy-sis
Prototype 1
Prototype 2
Prototype 3
Operational prototype
Review
Commitment partition
Simulations, models, benchmarks
Requirements plan life-cycle plan
Concept of operation
Software requirements
Software product design
Detailed design
Develop-ment plan
Requirements validation
Code
Unit test
Integration and test plan
Design validation and verification
Integration and test
Implementation
Acceptance test
Plan next phases
Develop, verify next-level product

Project Management Frameworks

Key Activities in Software Engineering

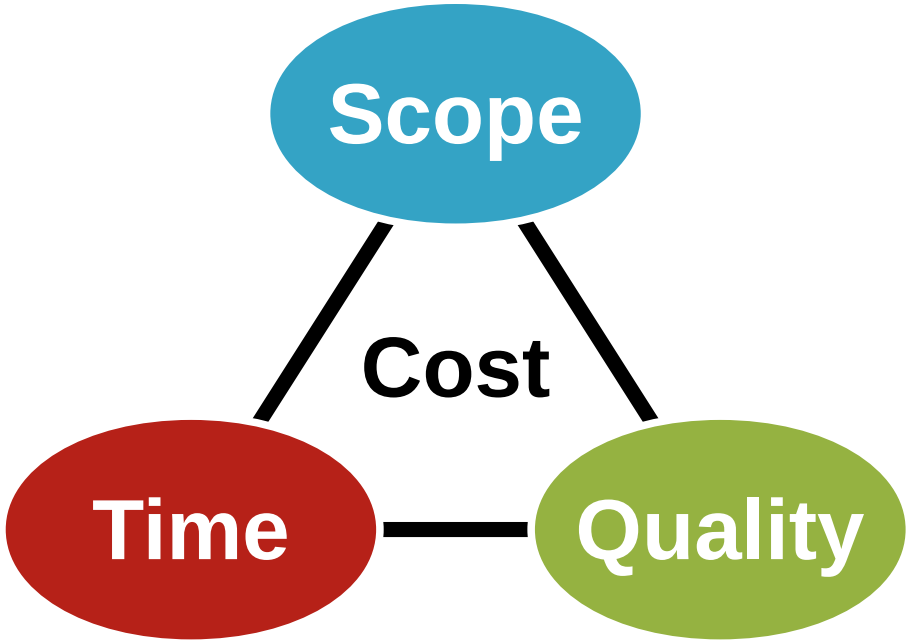
1. Planning
2. Execution
3. Review
4. Release

Example of a Software Product Life-Cycle



I: Incubation
D: Development
M: Maintenance

(One Version of) The Magic Triangle



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Because “adding manpower to a late project makes it later.” [B75]

Three Process Models

1. Plan-Driven
2. Agile Methods
3. Open Source

Plan-Driven Development

- Linear, phase-oriented, software process models
  - Intend to minimize risk through up-front planning
  - Expect only one iteration, start to finish, not many
  - Equate phases with activities
- Examples: Waterfall, V-Modell, RUP

The Waterfall Model [R04]

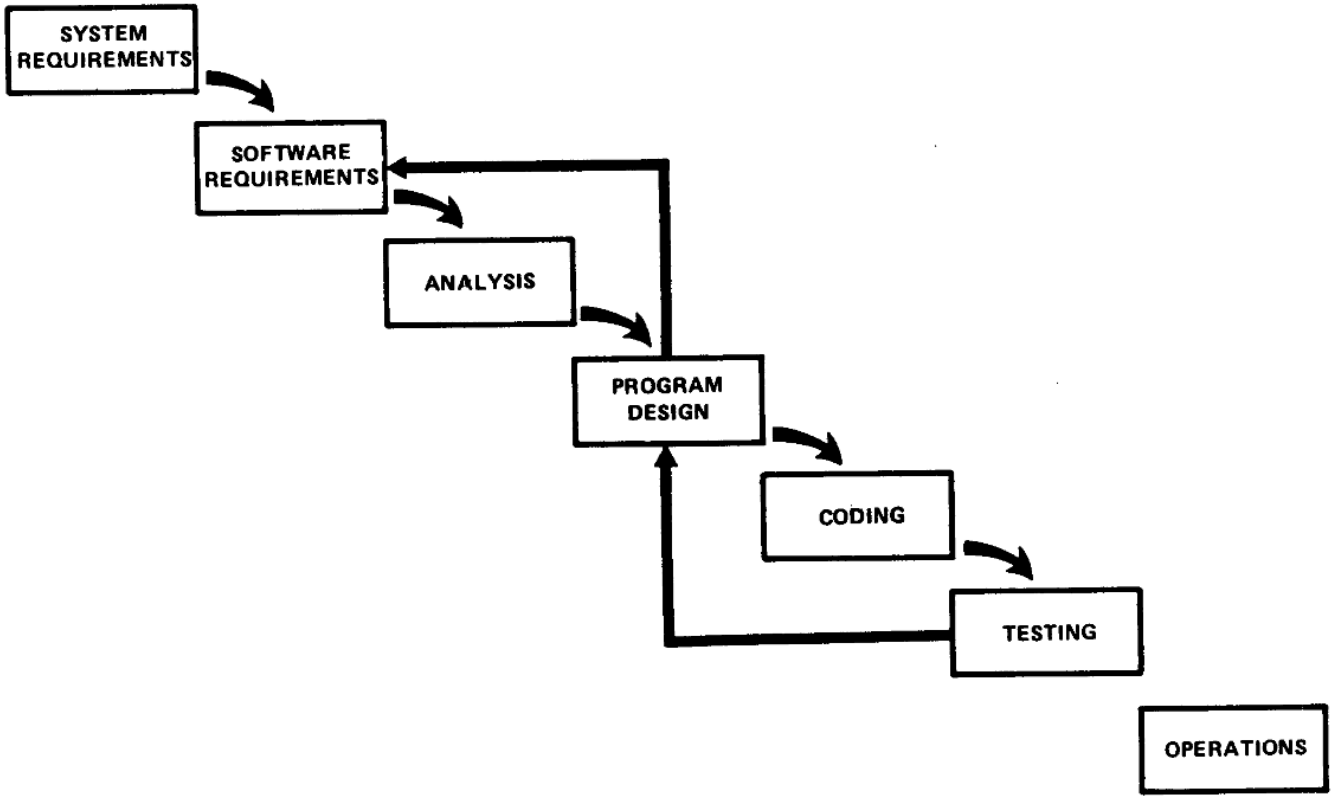

Figure 4. Unfortunately, for the process illustrated, the design iterations are never confined to the successive steps.

Planning in Plan-Driven Development

- Project definition
- Requirements analysis
- System analysis
- Contract negotiation
- ...

Execution in Plan-Driven Development

- Architecture definition
- System design
- User interface design
- Implementation
- Integration
- ...

Review in Plan-Driven Development

- System test
- Acceptance test
- Contract validation
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Release in Plan-Driven Development

- Hand-over
- Deployment
- ...

About The Conference

Date: April 1, 2006

Location: Niagara Falls, NY

Register Now

Interview with Scott Ambler

Keynotes

Put Testing Where It Belongs--At the End by Brian Marick

Dead Fish Can't Swim But They Can Float Down a Waterfall by Tim Lister

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- **“Plans are worthless, but planning is everything.”**
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Lesson from Plan-Driven Development

Phases ≠ Activities

(Activity = performing a practice)

Video on Predictability of Processes

Video Lesson

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  - Little bumps on the way have big consequences
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  - Driven by consultants as a significant business opportunity
- Repeated iteration over short linear process models
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Examples of Agile Methods

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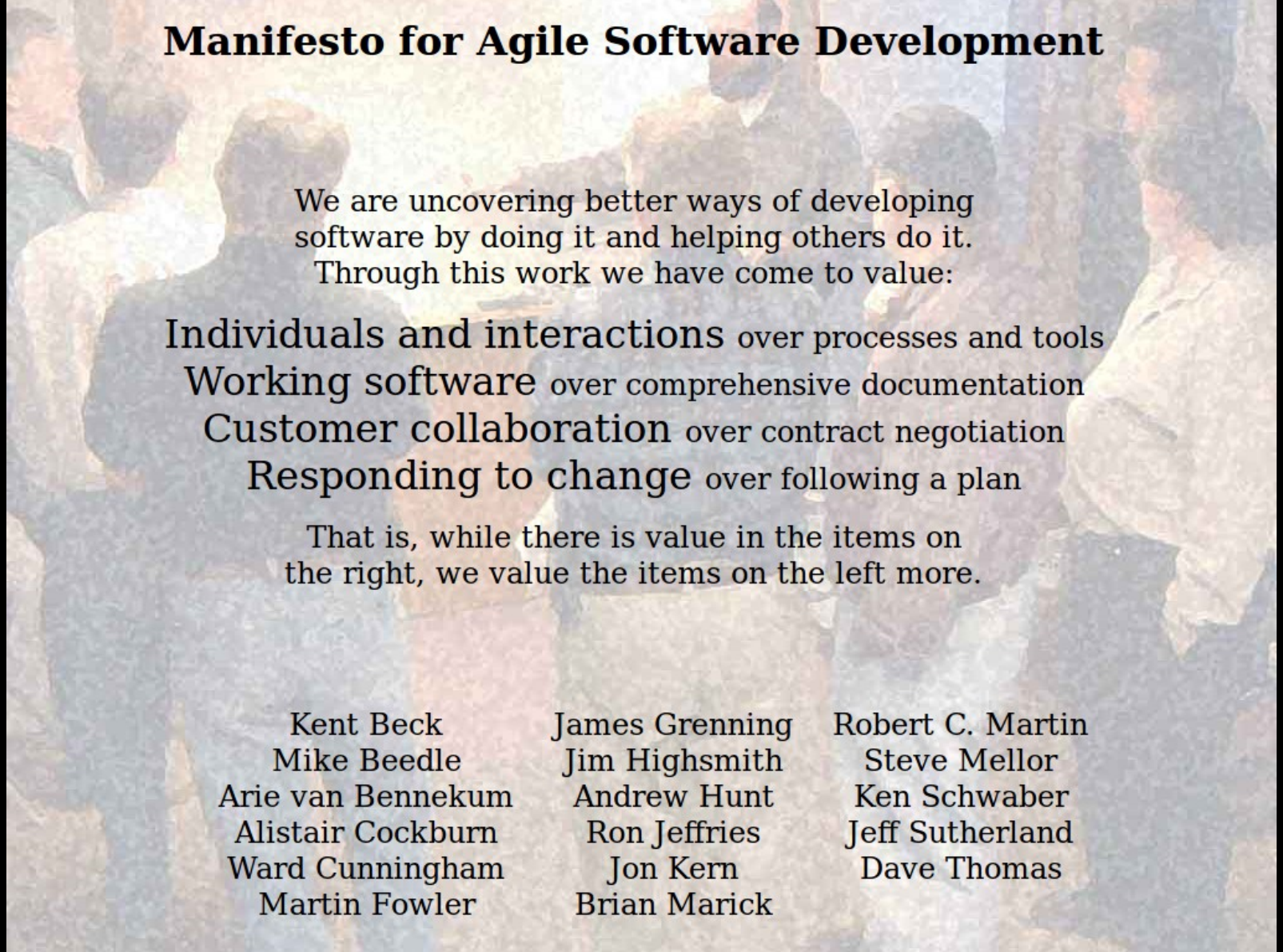
- XP (eXtreme Programming)
- Adaptive Software Development
- The (set of) Crystal Methods
- Feature-Driven Development
- Pragmatic Programming



Manifesto for Agile Software Development

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
the right, we value the items on the left more.

Kent Beck
Mike Beedle
Arie van Bennekum
Alistair Cockburn
Ward Cunningham
Martin Fowler
James Grenning
Jim Highsmith
Andrew Hunt
Ron Jeffries
Jon Kern
Brian Marick
Robert C. Martin
Steve Mellor
Ken Schwaber
Jeff Sutherland
Dave Thomas

Principles of the Agile Manifesto [A01]

1. **Individuals and Interactions**
   (over Processes and Tools)
2. **Working Software**
   (over Comprehensive Documentation)
3. **Customer Collaboration**
   (over Contract Negotiation)
4. **Responding to Change**
   (over Following a Plan)

Individuals and Interactions over ...

- **Individuals**
  - Trust people
  - Allow for self-organization
  - Adjust process to people
- **Interactions**
  - Get results from collaboration
  - Get innovation from people
- **Processes**
  - Control people
  - Enforce a rigid process
  - Adjust people to process
- **Tools**
  - Get results from using tools
  - Keep people aligned with tools

Working Software over ...

- **Working Software**
  - Get feedback quickly
  - Learn from working software
  - Steer project from feedback
  - Create incremental progress
- **Comprehensive Docs**
  - Wait until the end
  - Don't learn at all along the way
  - Follow plan until the end
  - Delay results until the end

Customer Collaboration over ...

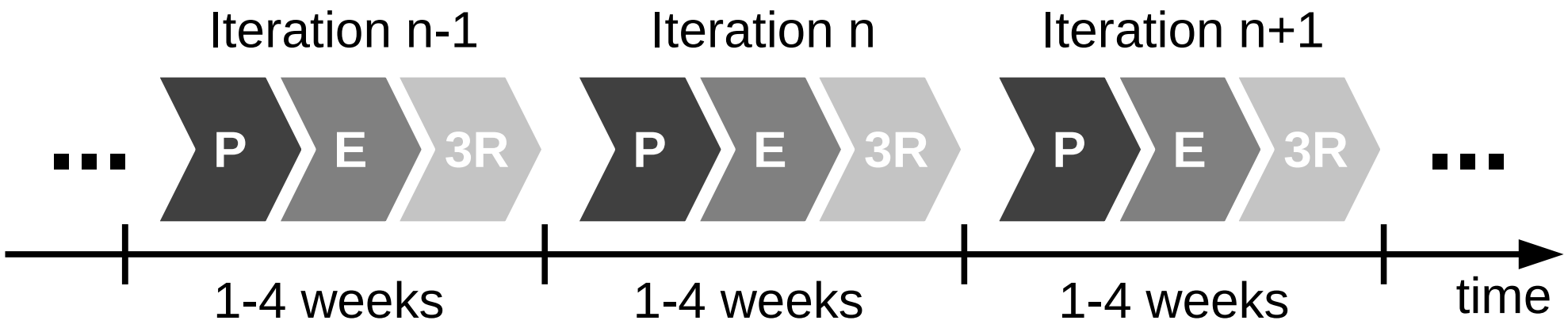
- **Customer Collaboration**
  - Collaborate with customers
  - Steer using customer feedback
  - Create feedback rhythm
  - Allow for change
- **Contract Negotiation**
  - Minimize customer contact
  - Follow contract-based plan
  - Avoid customer feedback
  - Stick to agreement

Responding to Change over ...

- **Responding to Change**
  - Adjust to changing reality
  - Deliver what customer needs
- **Following a Plan**
  - Stick to outdated reality
  - Deliver what was negotiated

Agile Development Process

- Succession of **equal-length** **iterations** (“time-boxes”)
- Intervention points are during planning and review
- User feedback only available during review

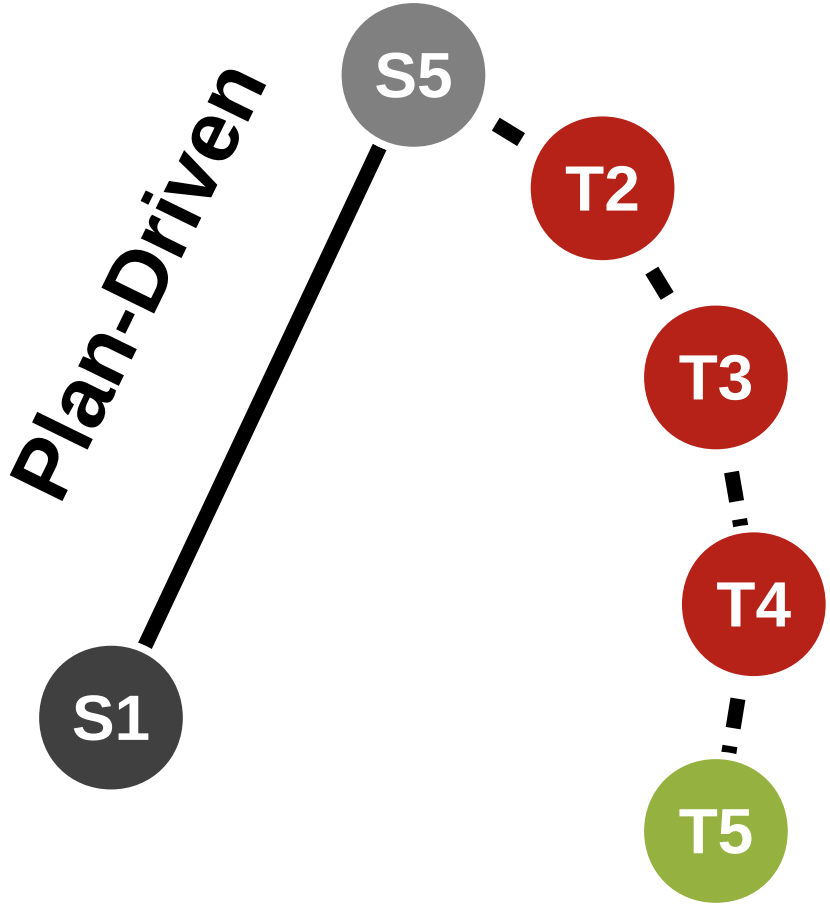


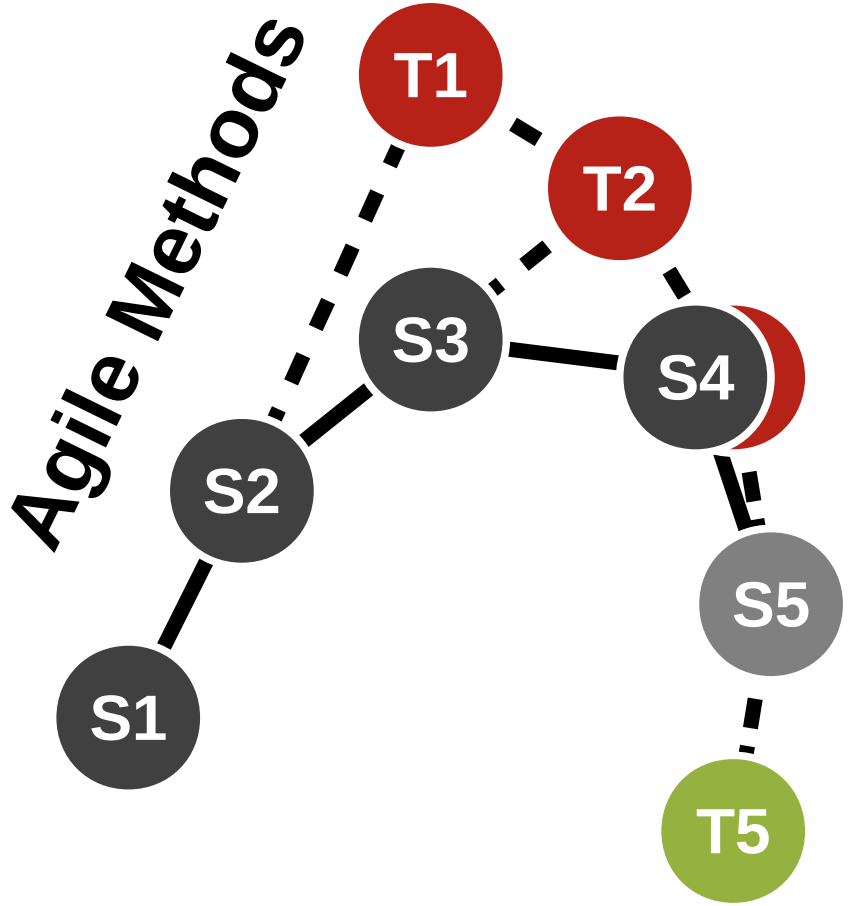
P: Planning
E: Execution
3R: Review, release, and retrospective

Short Iterations and User Feedback

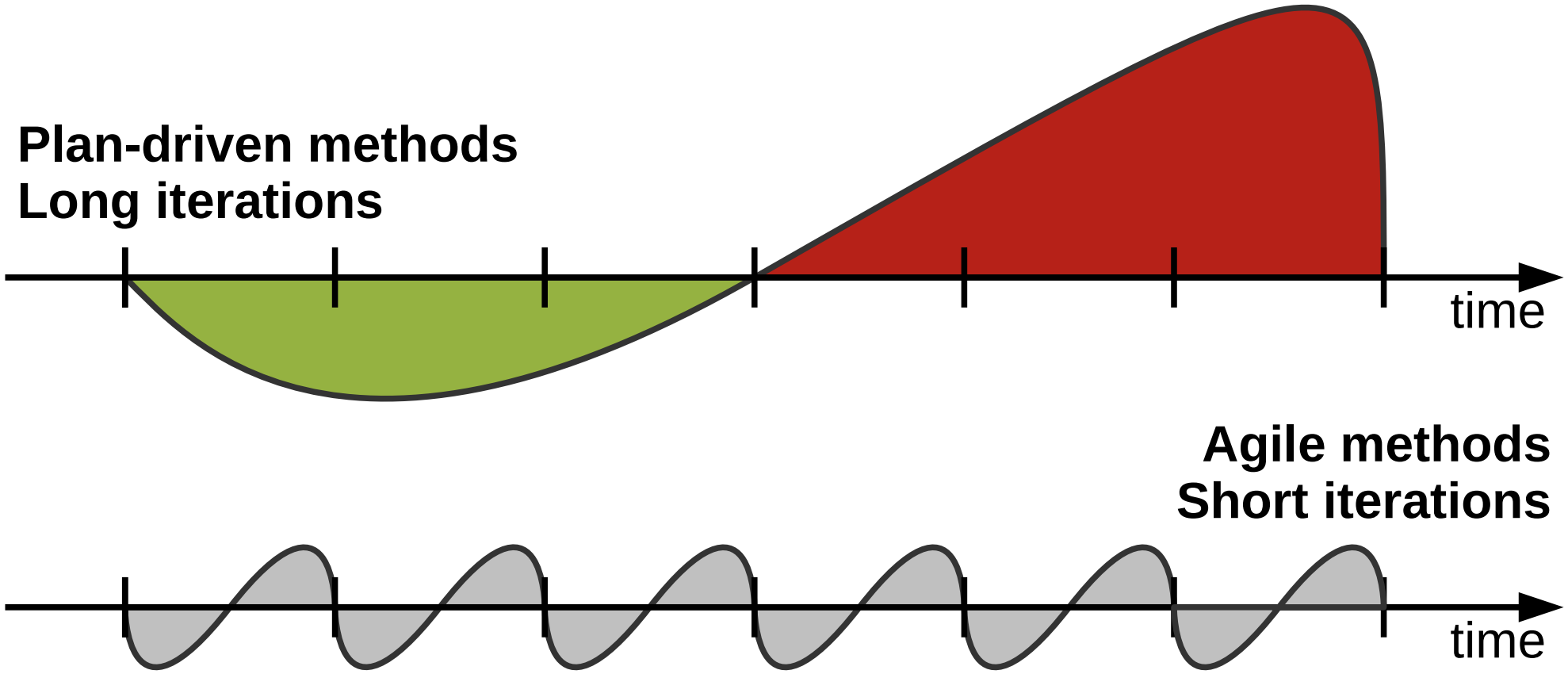
- Short iterations
  - Short iterations lead to focus on high-value features first
  - Established well-worn rhythm is sustainable, avoids burnout
  - Partial functionality is better than none
- User feedback
  - User feedback helps team steer product to meeting needs right
  - Feedback loop ensures that problems surface early
  - Feedback helps recognize and realize new innovative features

Plan-Driven vs. Agile Processes





Plan-Driven vs. Agile Work Rhythms

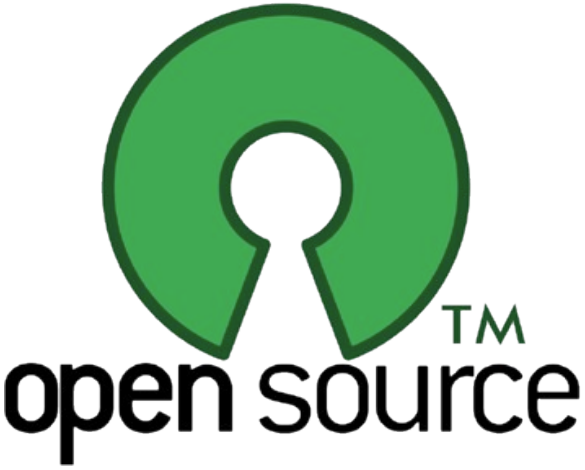


Agile methods are high-discipline

(more so than plan-driven methods)

Legal Definition of Open Source

- Definition of open source software
  - Software that is provided under an OSI-approved license
  - OSI = Open Source Initiative, http://opensource.org
  - Tried (but failed) to register the “open source” trademark
- Characteristics of an OSI-approved license
  - Source code is available and accessible
  - Modifications of code are allowed
  - Distribution of source and binary code is unrestricted
- Free software is (mostly) a subset of open source software
  - Historically, free software predates open source software
  - Invented “copyleft” (reciprocal) licensing



Open Source (Process)

"**Open source** is a **development method** for software that harnesses the power of **distributed peer review** and **transparency of process**. The promise of open source is **better quality, higher reliability, more flexibility, lower cost**, and an **end to predatory vendor lock-in**." [O12]

Principles of Open Collaboration [R+09]

1. **Egalitarian**
2. **Meritocratic**
3. **Self-organizing**

Traditional Work vs. Open Collaboration

- **Traditional work**
  - Hierarchical
    - Closed and hidden silos
    - Assigned to project
  - Status-oriented
    - Public + private discussions
    - Hierarchical status decides
  - Assigned tasks
    - Prescribed process
    - Prescribed jobs

- **Open collaboration**
  - Egalitarian
    - Open for contribution
    - Everyone can contribute
  - Meritocratic
    - Public discussion process
    - Decisions based on merit
  - Self-organizing
    - People find their project
    - People create their process

Comparison of Process Model Types

		Need to Change: No	Need to Change: Yes
Need to Scale: No		Plan-Driven Agile Methods Open Source	Plan-Driven **Agile Methods** Open Source
Need to Scale: Yes		Agile Methods **Plan-Driven** Open Source	**Open Source**

Quiz on Types of Projects

1. Which process model fits Fixed-Price-Projects?
    1. Plan-driven process
    2. Agile methods process
    3. Open source process
2. Which process model fits Time-and-Materials-Projects?
    1. Plan-driven process
    2. Agile methods process
    3. Open source process
3. Which process model fits Inter-Firm-Collaboration-Projects?
    1. Plan-driven process
    2. Agile methods process
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Review / Summary of Session

- Key activities in software engineering
- Main categories of process models
  - Plan-driven methods
  - Agile methods
  - Open source
- Plan-driven vs. agile methods
  - Predictability of the future
  - The agile manifesto

Thank you! Questions?

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dirk@riehle.org – http://dirkriehle.com – @dirkriehle

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  - Licensed under Creative Commons Attribution 4.0 International License
- Contributions
  - ...

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It is Friedrich-Alexander University Erlangen-Nürnberg – FAU, in short.

Corporate identity wants us to say “Friedrich-Alexander University”.

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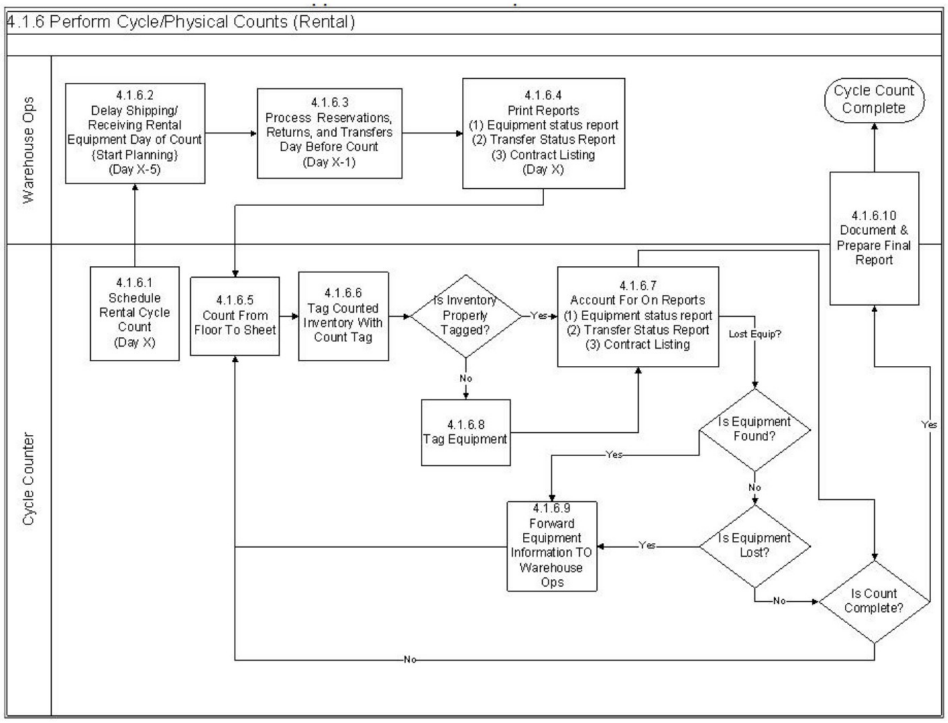
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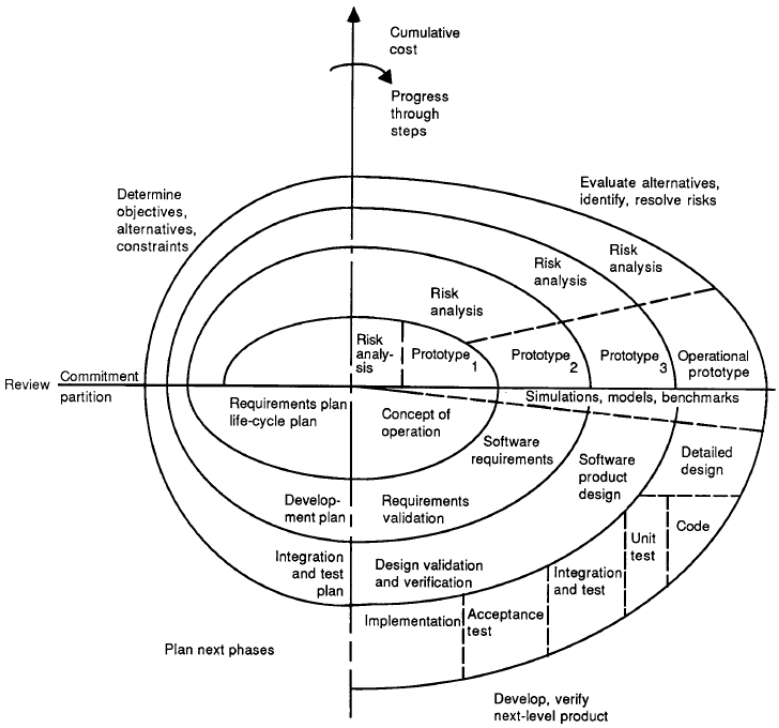
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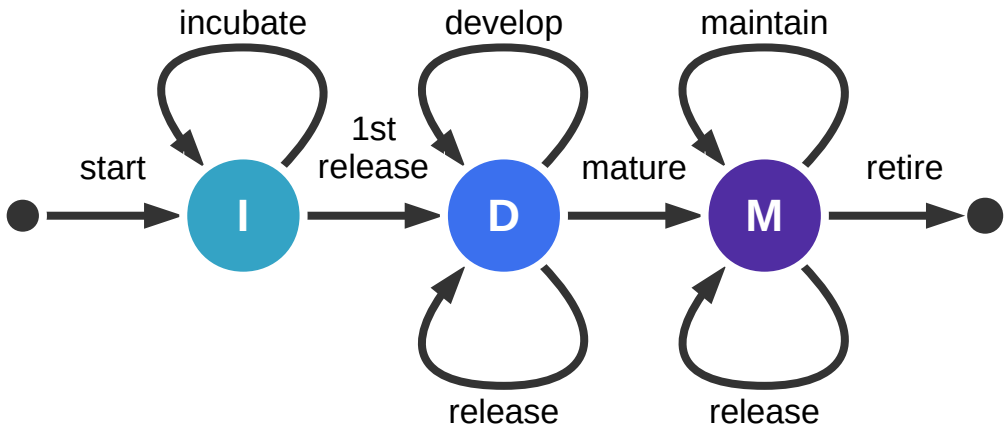
Example of a Software Product Life-Cycle



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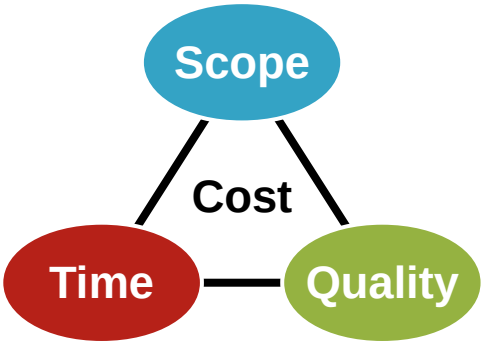

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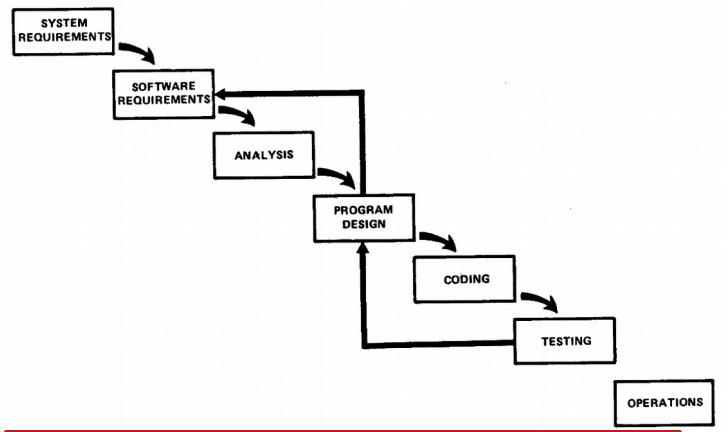

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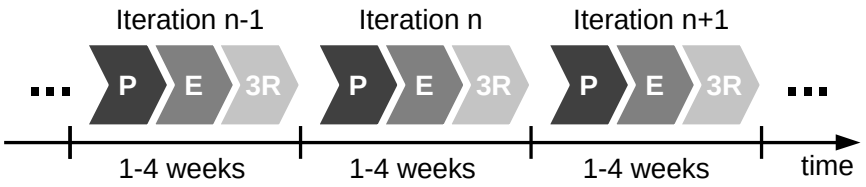
- **Customer Collaboration**
  - Collaborate with customers
  - Steer using customer feedback
  - Create feedback rhythm
  - Allow for change
- **Contract Negotiation**
  - Minimize customer contact
  - Follow contract-based plan
  - Avoid customer feedback
  - Stick to agreement

Responding to Change over ...

- **Responding to Change**
  - Adjust to changing reality
  - Deliver what customer needs
- **Following a Plan**
  - Stick to outdated reality
  - Deliver what was negotiated

Agile Development Process

- Succession of **equal-length** **iterations** (“time-boxes”)
- Intervention points are during planning and review
- User feedback only available during review



P: Planning
E: Execution
3R: Review, release, and retrospective

Short Iterations and User Feedback

- Short iterations
  - Short iterations lead to focus on high-value features first
  - Established well-worn rhythm is sustainable, avoids burnout
  - Partial functionality is better than none
- User feedback
  - User feedback helps team steer product to meeting needs right
  - Feedback loop ensures that problems surface early
  - Feedback helps recognize and realize new innovative features

Comparison of Process Model Types

Need to Scale	Need to Change: No	Need to Change: Yes
No	Plan-Driven Agile Methods Open Source	Plan-Driven **Agile Methods** Open Source
Yes	Agile Methods **Plan-Driven** Open Source	**Open Source**

Quiz on Types of Projects

1. Which process model fits Fixed-Price-Projects?
    1. Plan-driven process
    2. Agile methods process
    3. Open source process
2. Which process model fits Time-and-Materials-Projects?
    1. Plan-driven process
    2. Agile methods process
    3. Open source process
3. Which process model fits Inter-Firm-Collaboration-Projects?
    1. Plan-driven process
    2. Agile methods process
    3. Open source process

Review / Summary of Session

- Key activities in software engineering
- Main categories of process models
  - Plan-driven methods
  - Agile methods
  - Open source
- Plan-driven vs. agile methods
  - Predictability of the future
  - The agile manifesto

Thank you! Questions?

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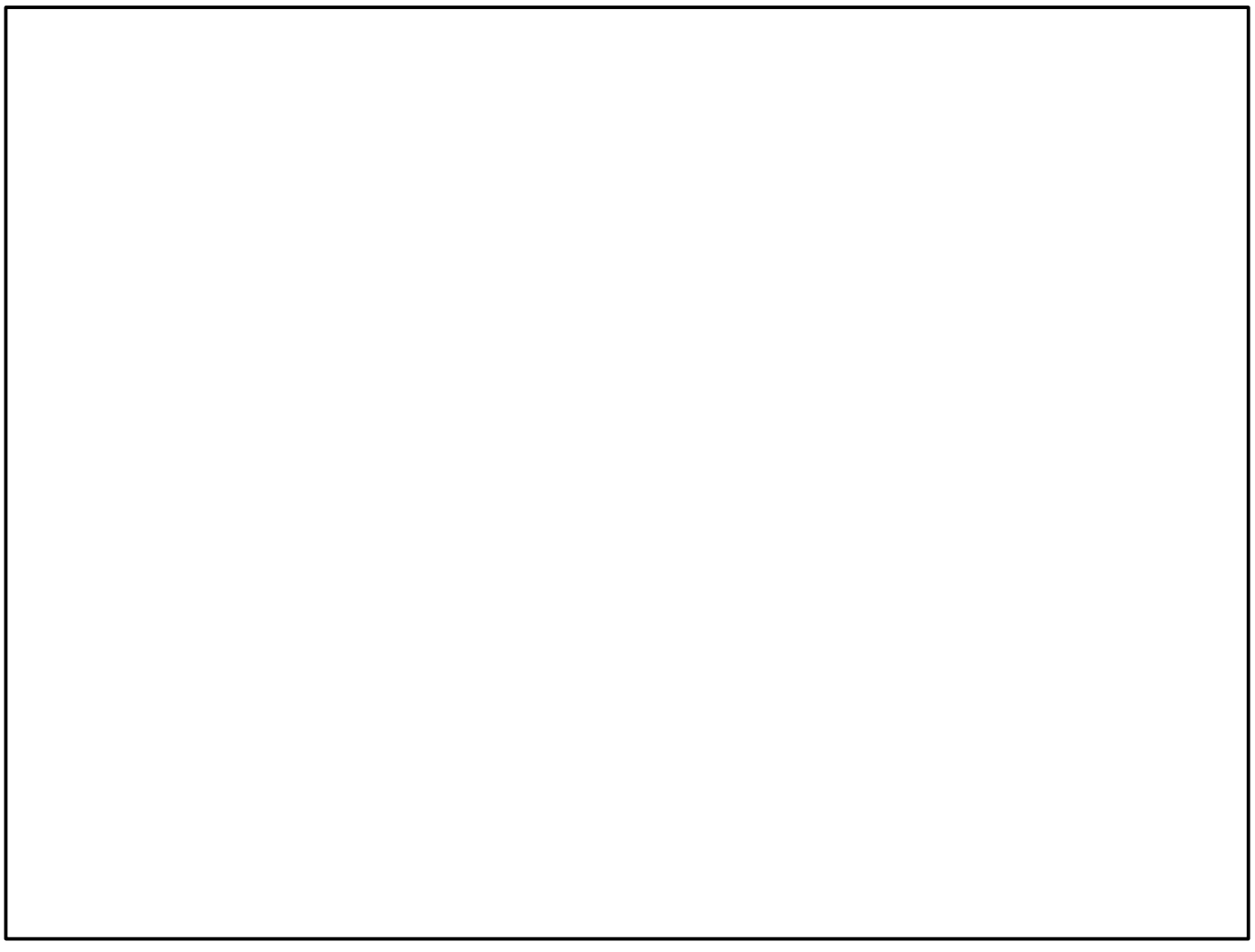
DR



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