

NEW AND EMERGING PROCESS METHODOLOGIES

Software Engineering
CS 130

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Content adapted from Essentials of Software
Engineering 3rd edition by Tsui, Karam, Bernal
Jones and Bartlett Learning

REVIEW

KEY SOFTWARE PROCESS FAMILIES

- Individual
- Waterfall
- Iterative Waterfall
- Spiral
- Rational Unified Process
- Agile



EMERGING PROCESS METHODOLOGIES

PROBLEMS WITH TRADITIONAL PROCESSES

1. Focused on and oriented towards “large projects” and lengthy development time (years)
2. Inability to cope with changes in requirements and technology fast enough --- “**formal**” **change mgmt**
3. Assumes requirements are completely understood at beginning of project --- **stable requirements**
4. Starting to rely on “non-sustainable” heroic and lengthy development effort by the developers --- **hard to maintain “constantly high” productivity**
5. Complex set of activities --- **needed process experts**
6. Waste or duplication of effort, especially in documentation --- **formal documentation needed for long and large project communications**



EMERGING PROCESS METHODOLOGIES

MORE RECENT PROCESSES: AGILE METHODS

- Family of software development methodologies:
 - “Short” releases and multiple iterations
 - Incremental design/development
 - User involvement (especially for in-house)
 - Minimal documentation
 - Informal communications
 - Assumes changes



EMERGING PROCESS METHODOLOGIES

THE AGILE MANIFESTO

“We are uncovering better ways of developing software by doing it and helping others do it.
That is, while there is value in the items on the “right,” we value the items on the “left” more. “

“left”

1. **Individuals and interactions**
2. **Working software**
3. **Customer collaboration**
4. **Responding to change**

“right”

- - over processes and tools
- - over comprehensive documentation
- - over contract negotiation
- - over following a plan ---”dogmatically

EMERGING PROCESS METHODOLOGIES

AGILE METHODS INCLUDE:

- **Extreme Programming (XP)** --- the first by Beck (1990's)
- **Crystal Clear/Orange** – by Alister Cockburn
- **SCRUM** ---- currently popular
- **Open Source**
- Partially Agile
 - RUP (rational unified process)
 - Microsoft Solutions Framework (tool/process)



EMERGING PROCESS METHODOLOGIES

XP FUNDAMENTAL PRINCIPLES:

- Rapid feedback (also core value)
- Simplicity (also core value)
- Incremental change
- Embrace change
- Quality work



EMERGING PROCESS METHODOLOGIES

XP SECONDARY PRINCIPLES:

- Ongoing learning
- Small initial investment
- Playing to win
- Concrete experiments
- Open, honest communications
- Working with people's instincts
- Accepting responsibility
- Local adaptation
- Traveling light
- Honest measurement



EMERGING PROCESS METHODOLOGIES

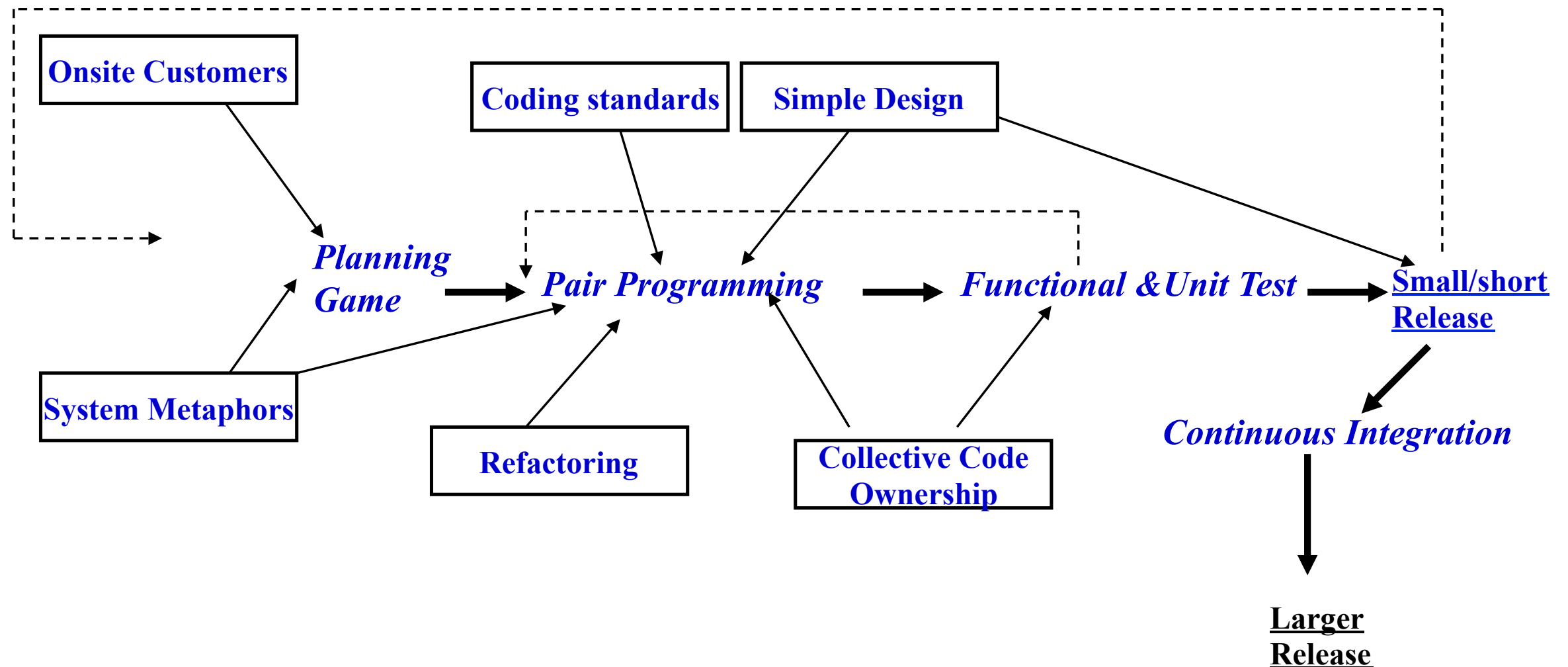
XP 12 KEY PRACTICES:

- Based on the concept of quick and constant “*feedback mechanism*” involving:
 - Planning Game (Small Units of Requirements)
 - Onsite Customer (Immediate and better feedback)
 - Metaphor (Use one set of metaphor for design/architecture)
 - Simple Design (Just enough to cover what’s needed)
 - Coding Standard (Facilitates better communication)
 - Collective Code Ownership (Peer pressure to improve code)
 - Pair Programming (Feedback and shared improvements)
 - Refactoring (Continuous examination for duplicative design/code)
 - Continuous Functional and Unit Testing (100% completion)
 - Small/short releases
 - Continuous Integration (integrating of small releases)
 - 40 hour work (high morale and energy level)



EMERGING PROCESS METHODOLOGIES

XP PROGRAMMING:



Adhere to 40 hour work week as much as possible ! -- sustainable pace

PAIR PROGRAMMING

- Have you ever done it?
 - How did it work?
- What do you think are the challenges, advantages, costs?



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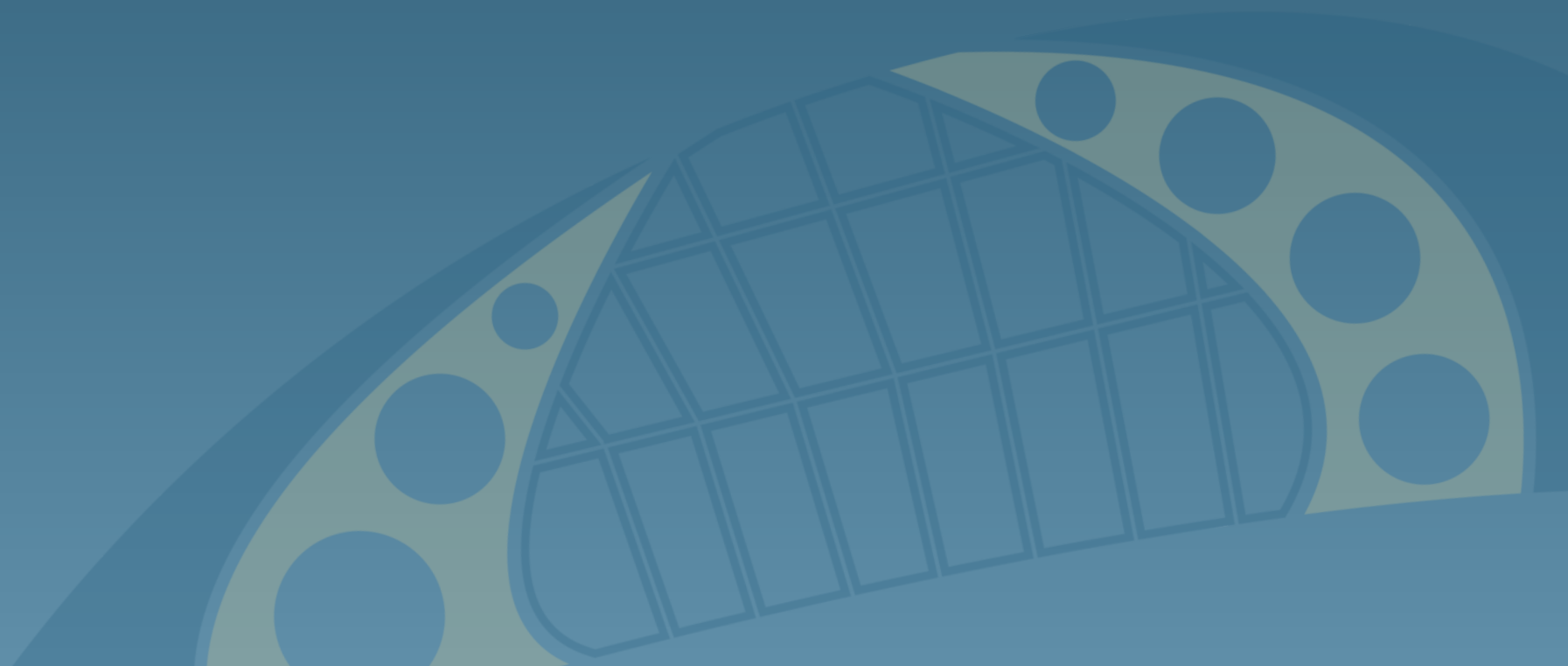
CRYSTAL FAMILY OF METHODOLOGIES

- Cockburn classified projects via:
 - Size (by number of developers involved)
 - Criticality (by losses a malfunction or defect will cause - “quality”)
 - Priority (time pressure on the project)
- Alistair Cockburn introduced a family of 3 methodologies
 - **Crystal Clear** ---- for “non-critical” projects (6-8 people)
 - **Crystal Orange** ---- for “critical” projects (up to 40 people)
 - **Crystal Orange Web** – for web development

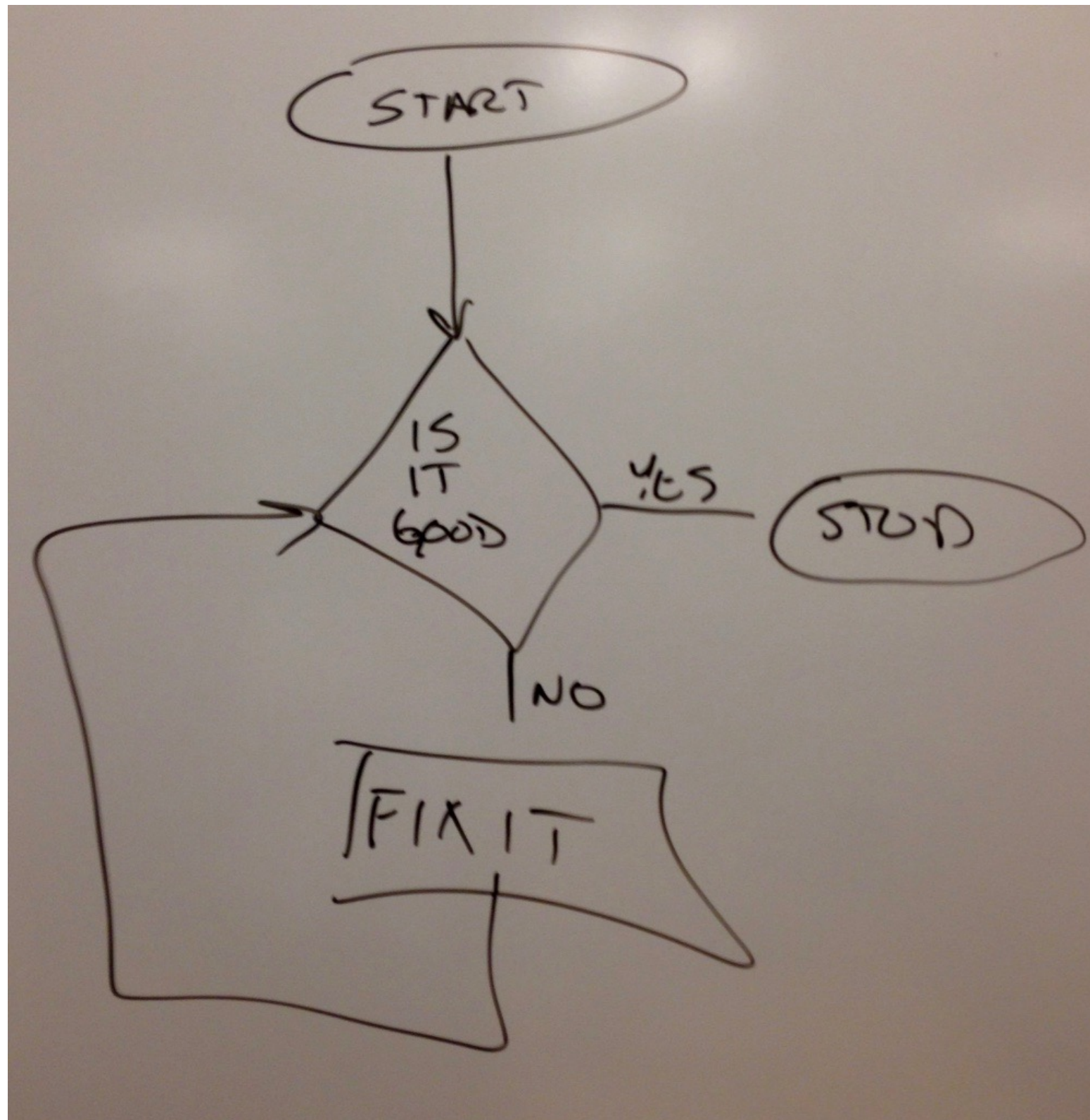


PROJECT COMPLEXITY

- Crystal Methods are known for adaptability
- What attributes of a project require heavier weight methodologies?



- Space Shuttle



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SCRUM DEVELOPMENT PROCESS

- First introduced by Takeuchi and Nonaka (Japan) in 1986 modeled after the way rugby game is played.
- Ken Schwaber and Mike Beedle published a book, “**Agile Software Development with Scrum**,” in 2001.
- It is an incremental and iterative development approach:
 - Develops small “**sprints**,” or increments (of features) in a short cycle of about 2-3 weeks.
 - There are 3 main roles
 - Product Owner who talks to & decide with users about the content of each sprint
 - Scrum Master who runs the sprints
 - Scrum Team of about 7-8 members who develop the sprint



EMERGING PROCESS METHODOLOGIES

SCRUM DEVELOPMENT PROCESS

- Sprint planning meeting
- Daily Scrum
 - Stand up meetings (15-min)
- Sprint Review
- Sprint Retrospective



SCRUM FOR RESEARCH

- Scrum works really well for research groups
 - Why?



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EMERGING PROCESS METHODOLOGIES

OPEN SOURCE DEVELOPMENT PROCESS

- Highly variable
- Develop by consensus
 - Strong Leader
- “Committers”
- Heavy use of online collaboration tools
- Asynchronous communications
 - International Teams



OPEN SOURCE EXPERIENCE

- Has anyone ever used open-source software?
 - Has anyone ever contributed to open-source software?
 - Why not?
 - Would you consider it?
- 



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— COMPUTING LAB —