Software Engineering

Chapter 4 Agile Development

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The 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 et al (Agile Alliance) , 2001.

What is “Agility”? Changes!

- Effective (rapid and adaptive) response to change
- Effective communication among all stakeholders
- Drawing the customer onto the team
- Organizing a team so that it is in control of the work performed

Yielding …

- Rapid, incremental delivery of software

12 Principles for Agile Process

1. Highest priority: satisfaction of the customer through early & continuous delivery of valuable SW.
2. Welcome changing requirements, even late in development.
3. Deliver working SW frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people & developers must work together daily throughout the project.
5. Build project around motivated people.
6. The most efficient & effective methods of conveying information to and within a development team is face-to-face conversation.
7. Working SW is the primary measure of progress.
8. Agile process promote sustainable development.
9. Continuous attention to technical excellence and good design enhance.
10. Simplicity-the art of maximizing the amount of work not done-is essential.
11. The best architecture, requirements, and design emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Assumptions

- It is difficult to predict in advance which SW requirements will persist and which will change.
- For many types of SW, design & construction are interleaved.
- Analysis, design, construction, and testing are not as predictable (from a planning point of view) as we might like.

An Agile Process

- Is driven by customer descriptions of what is required (scenarios)
- Recognizes that plans are short-lived
- Develops software iteratively with a heavy emphasis on construction activities
- Delivers multiple ‘software increments’
- Adapts as changes occur

Human Factors

- Competence
- Common focus
- Collaboration
- Decision-making ability
- Fuzzy problem-solving ability
- Mutual trust & respect
- Self-organization

Extreme Programming (XP)

- The most widely used agile process, originally proposed by Kent Beck
- XP Planning
  - Begins with the creation of "user stories"
  - Agile team assesses each story and assigns a cost
  - Stories are grouped to for a deliverable increment
  - A commitment is made on delivery date
  - After the first increment, "project velocity" is used to help define subsequent delivery dates for other increments

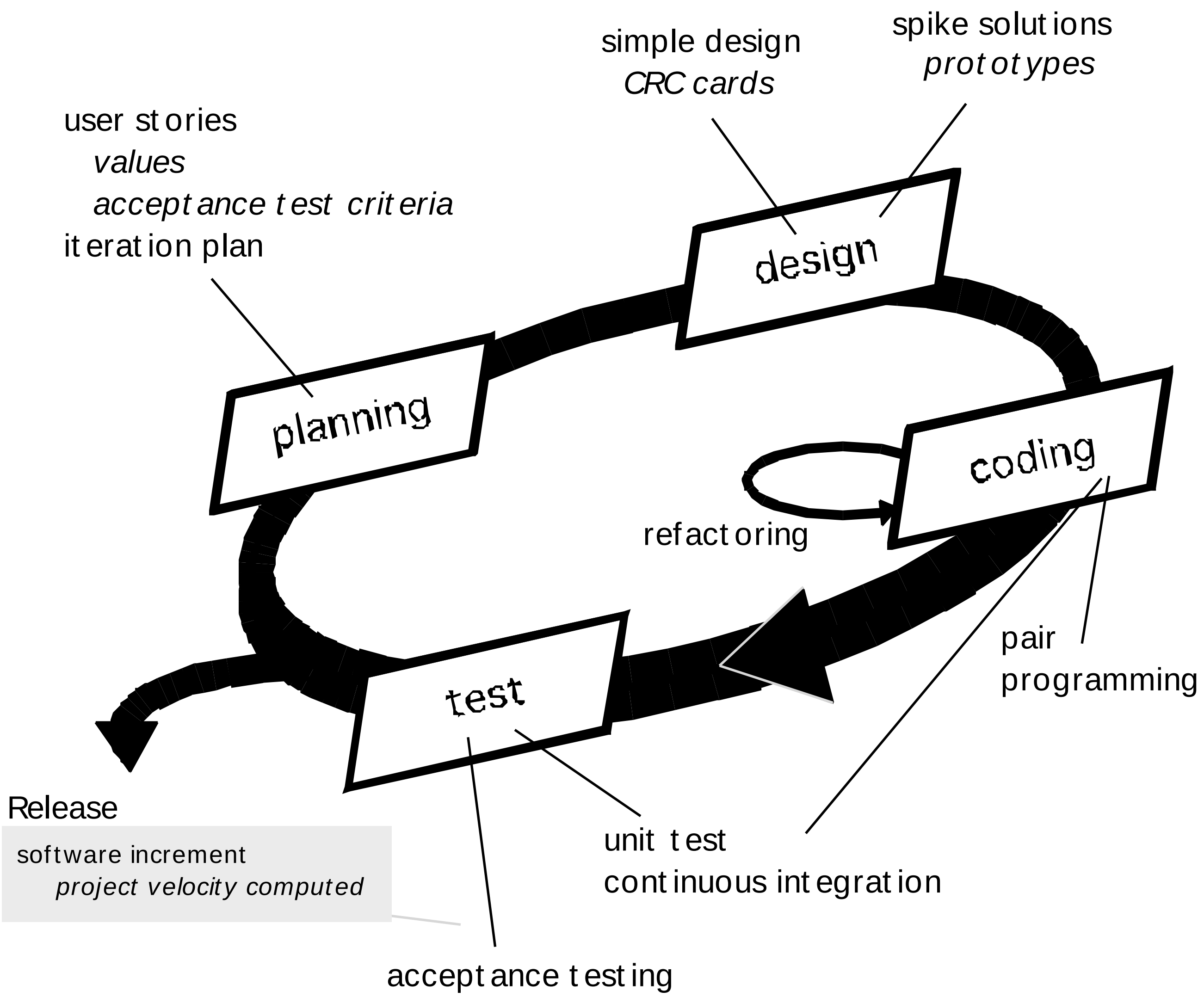
    - User story: story that describes required features & functionalities to be built.
    - Project velocity: the number of stories implemented during the first release.
    - Cost: period for an increment to be completed in weeks.

Extreme Programming (XP)

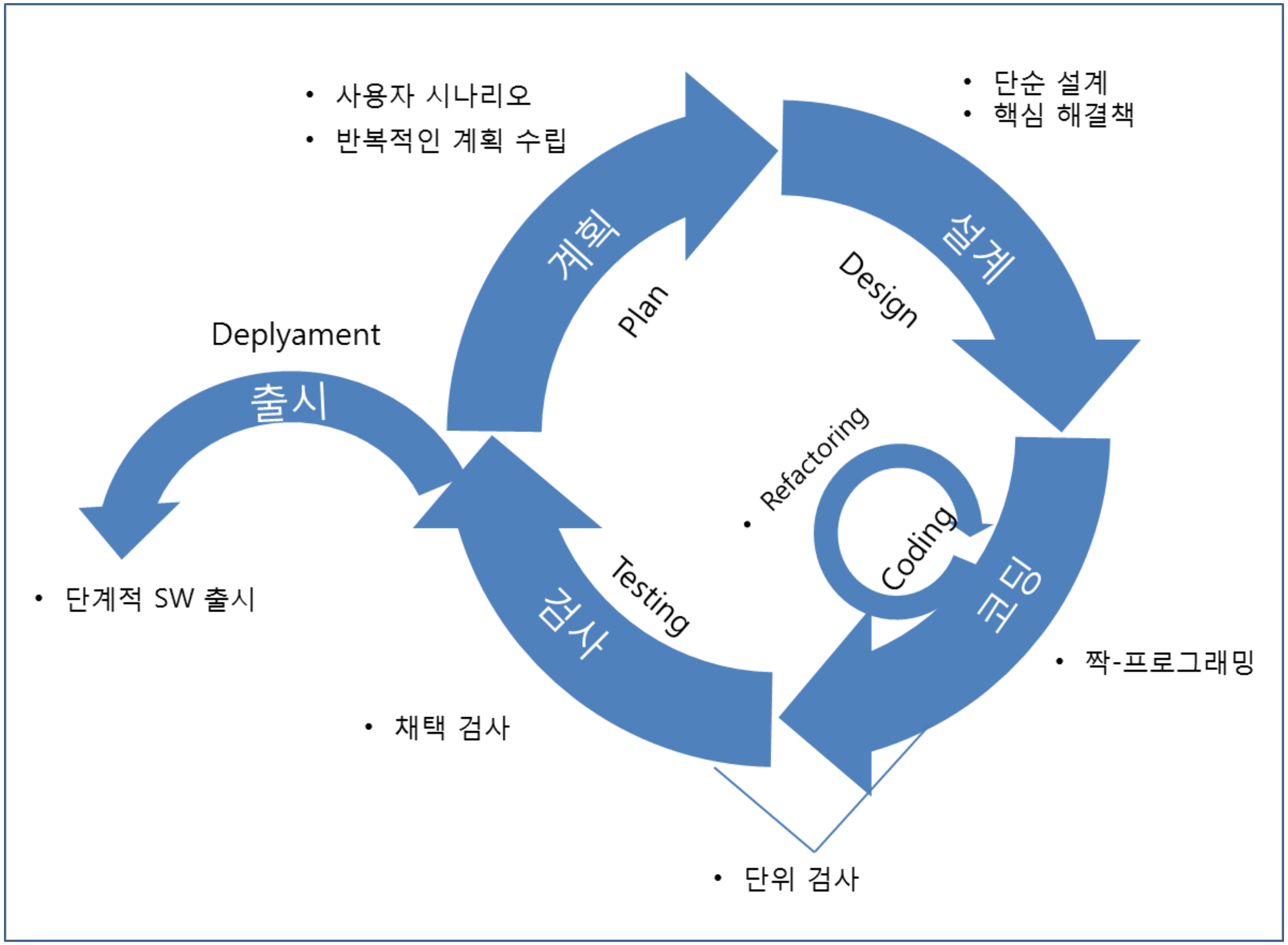
- XP Design
  - Follows the KIS (keep it simple) principle
  - Encourage the use of CRC cards (see Chapter 8)
  - For difficult design problems, suggests the creation of "spike solutions"—a design prototype
  - Encourages "refactoring"—an iterative refinement of the internal program design
- XP Coding
  - Recommends the construction of a unit test for a story *before* coding commences
  - Encourages "pair programming"
  - Continuous integration
- XP Testing
  - All unit tests are executed daily
  - "Acceptance tests" are defined by the customer and executed to assess customer visible functionality

Class Responsibility Collaboration

Extreme Programming (XP)



Extreme Programming (XP) Model



Adaptive Software Development (ASD)

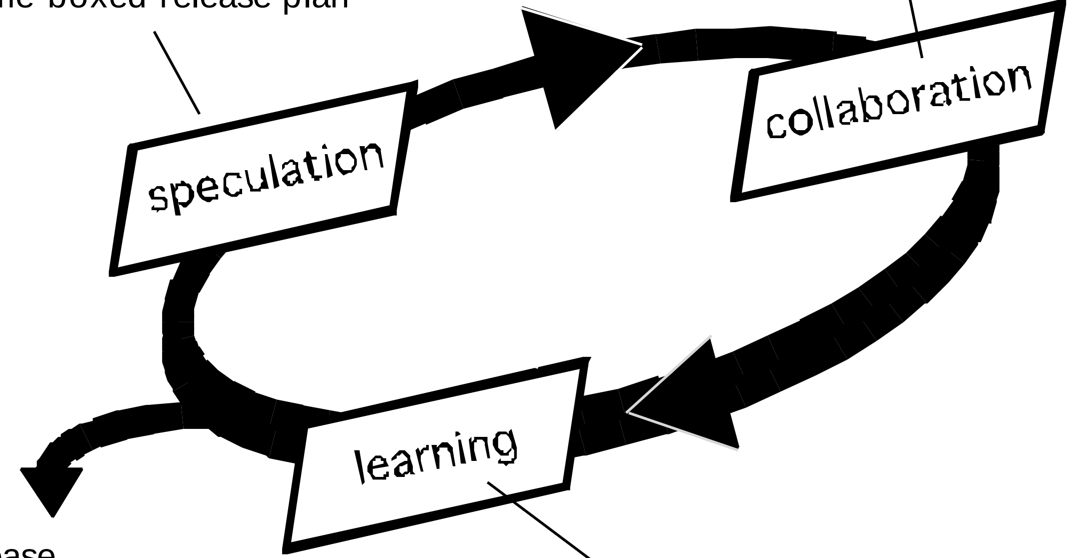
- Originally proposed by Jim Highsmith
  - A technique for building complex SW & systems
  - Philosophy: human collaboration & team self-organization
- ASD — distinguishing features
  - Mission-driven planning
  - Component-based focus
  - Uses "time-boxing" (See Chapter 24)
  - Explicit consideration of risks
  - Emphasizes collaboration for requirements gathering
  - Emphasizes "learning" throughout the process

Adaptive Software Development

Joint
Application
Design

adaptive cycle planning
uses mission statement
project constraints
basic requirements
time-boxed release plan

Requirements gathering
JAD
mini-specs

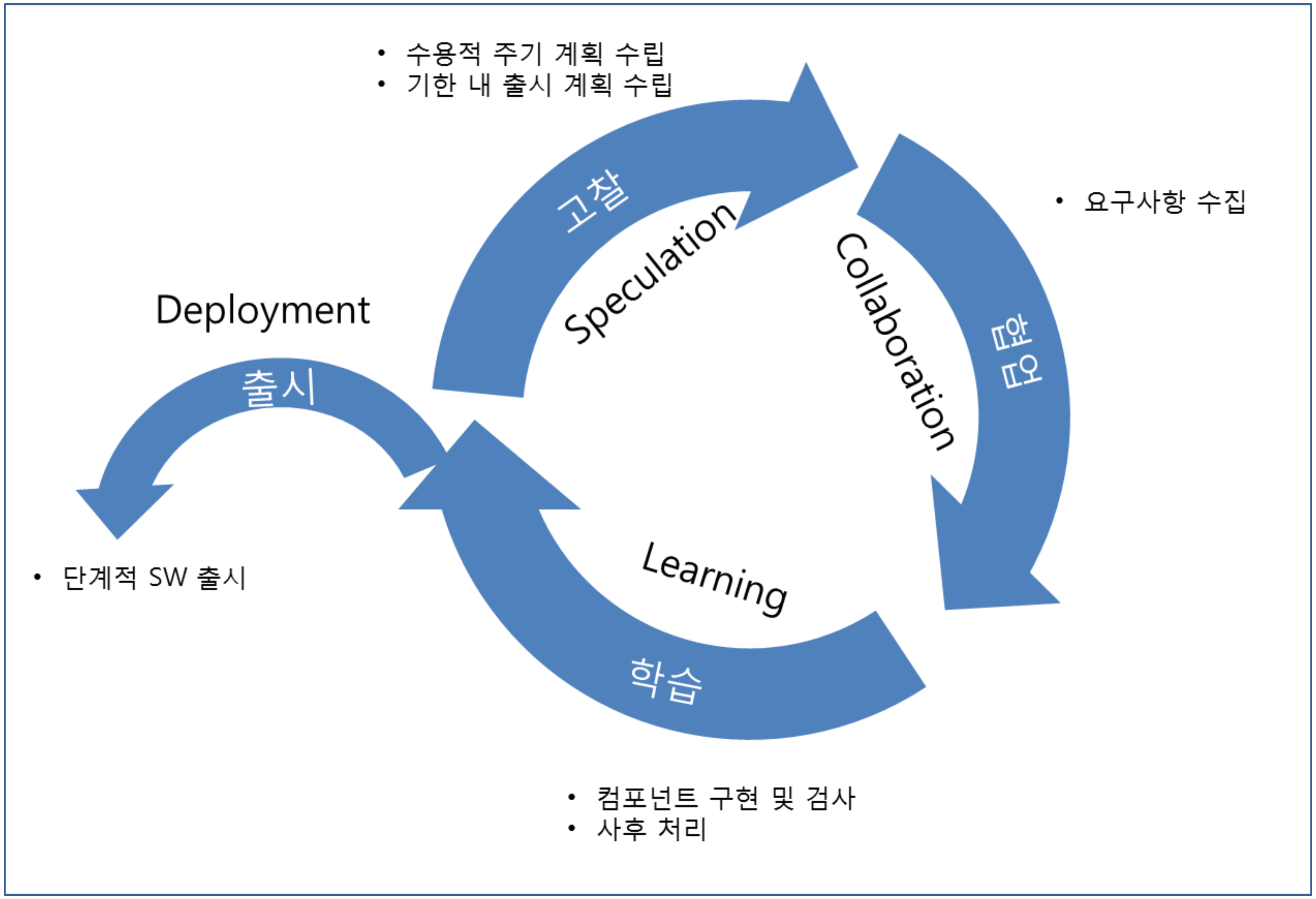


Release

software increment
adjustments for subsequent cycles

components implemented/tested
focus groups for feedback
formal technical reviews
postmortems

Adaptive Software Development (ASD) Model



Dynamic Systems Development Method(DSSM)

- Promoted by the DSDM Consortium (www.dsdm.org)
- DSDM—distinguishing features
  - Similar in most respects to XP and/or ASD
  - Tight time constraints
  - Nine guiding principles
    - Active user involvement is imperative.
    - DSDM teams must be empowered to make decisions.
    - The focus is on frequent delivery of products.
    - Fitness for business purpose is the essential criterion for acceptance of deliverables.
    - Iterative and incremental development is necessary to converge on an accurate business solution.
    - All changes during development are reversible.
    - Requirements are baselined at a high level
    - Testing is integrated throughout the life-cycle.

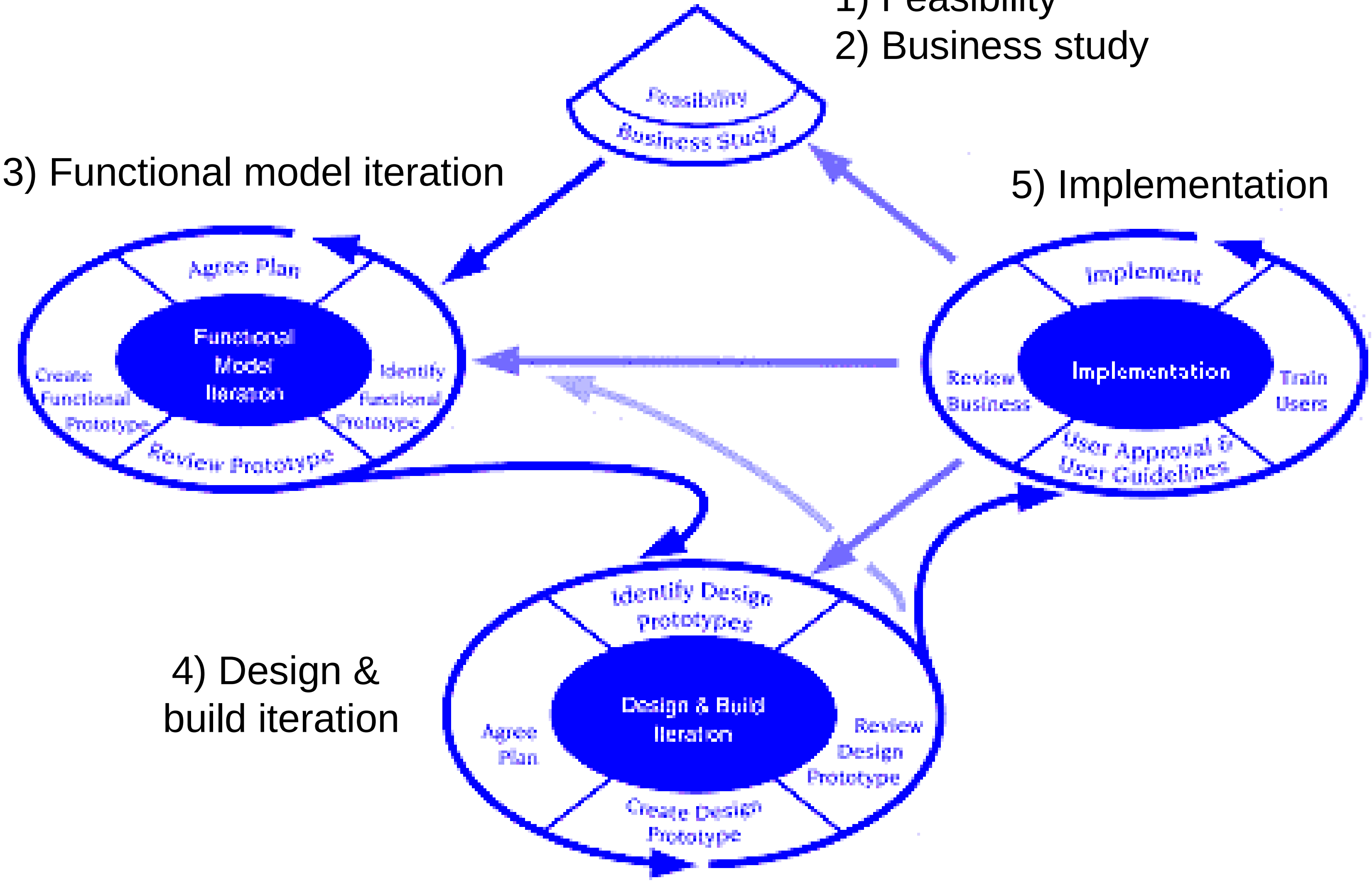
Dynamic Systems Development Method

1) Feasibility
2) Business study

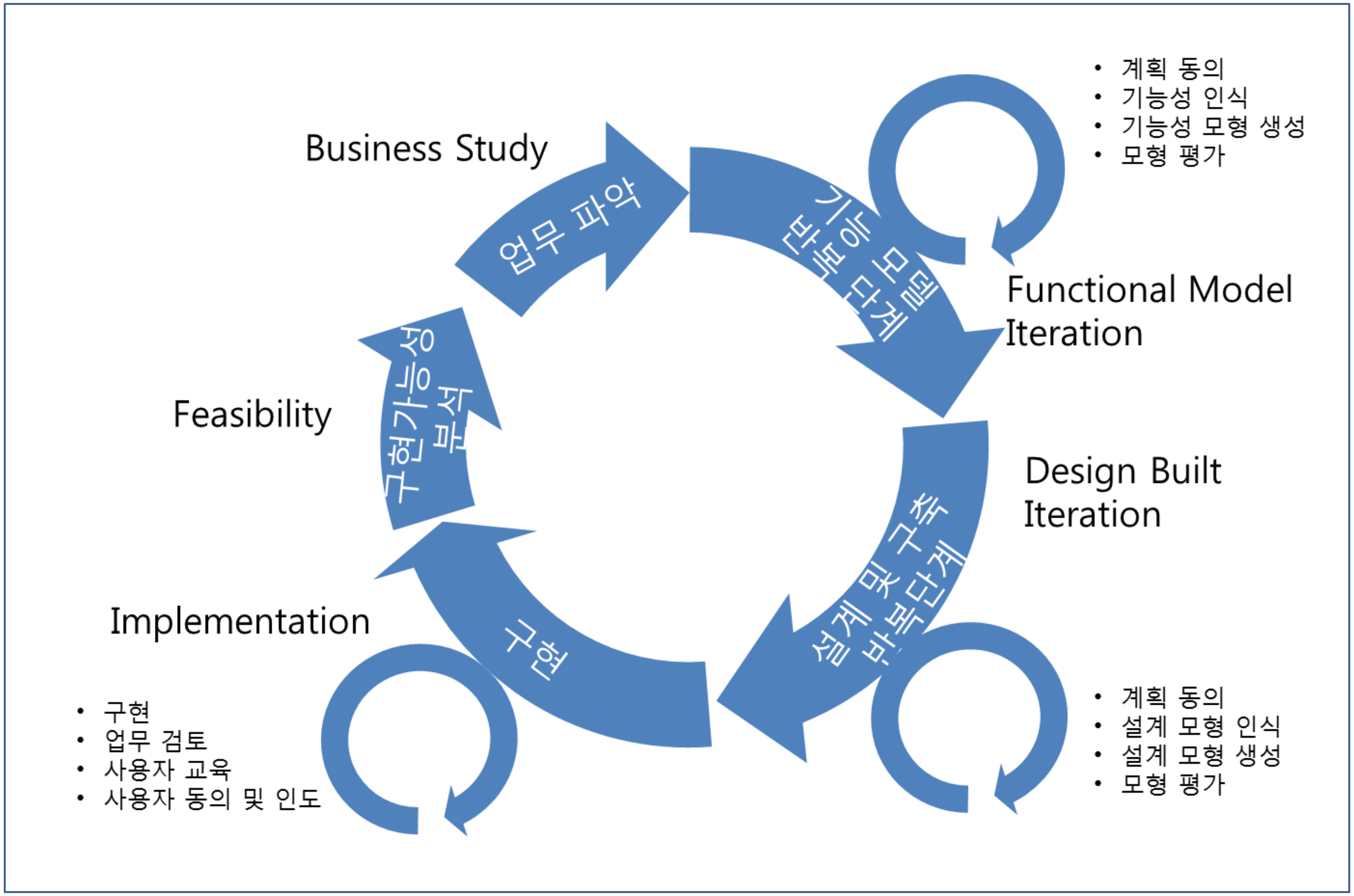
3) Functional model iteration

5) Implementation

4) Design &
build iteration



Dynamic Systems Development Method (DSDM)



Scrum

- Originally proposed by Schwaber and Beedle
- Scrum—distinguishing features
  - Development work is partitioned into “packets”
  - Testing and documentation are on-going as the product is constructed
  - Work occurs in “sprints” and is derived from a “backlog” of existing requirements
  - Meetings are very short and sometimes conducted without chairs
  - “demos” are delivered to the customer with the time-box allocated

Scrum

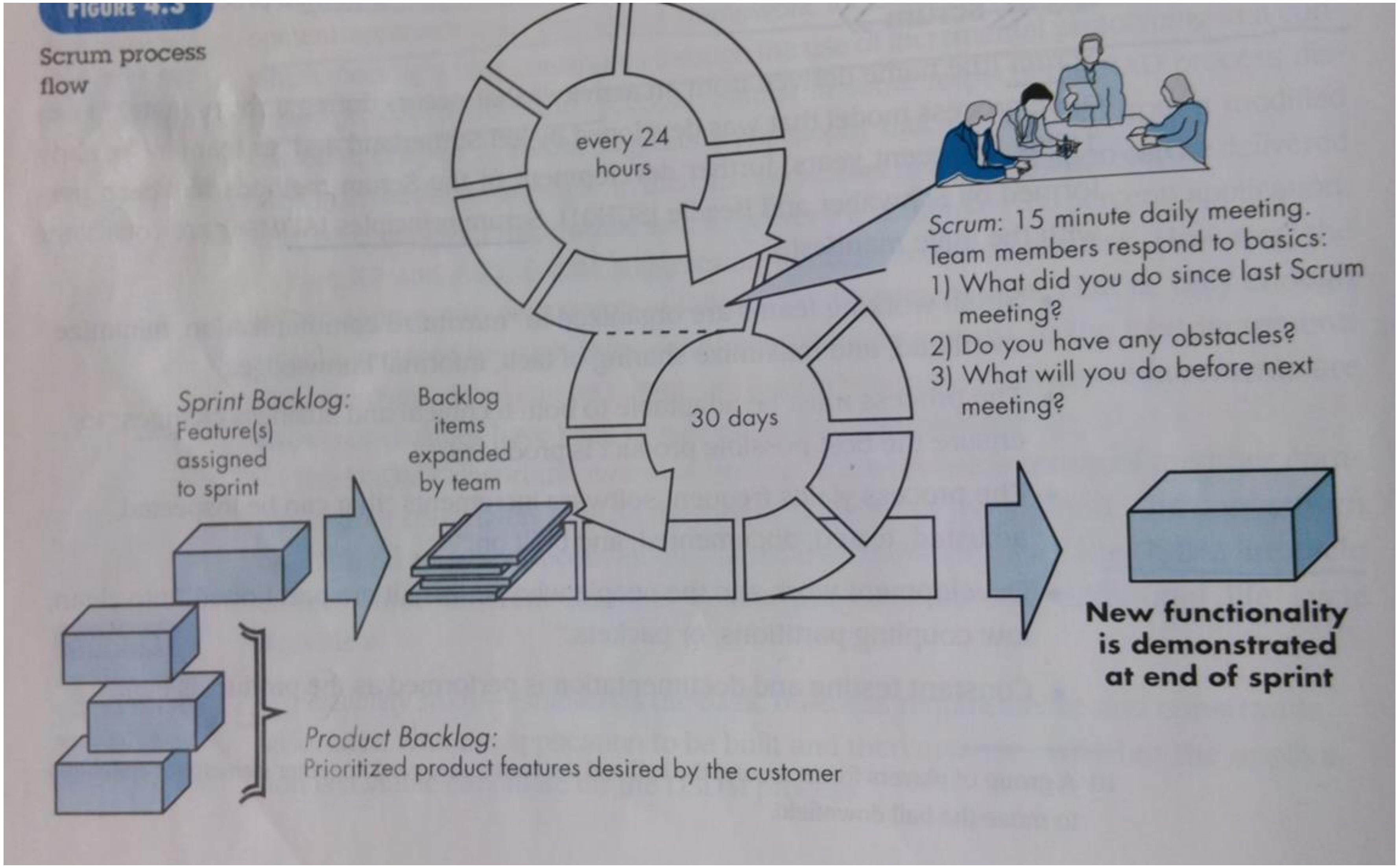
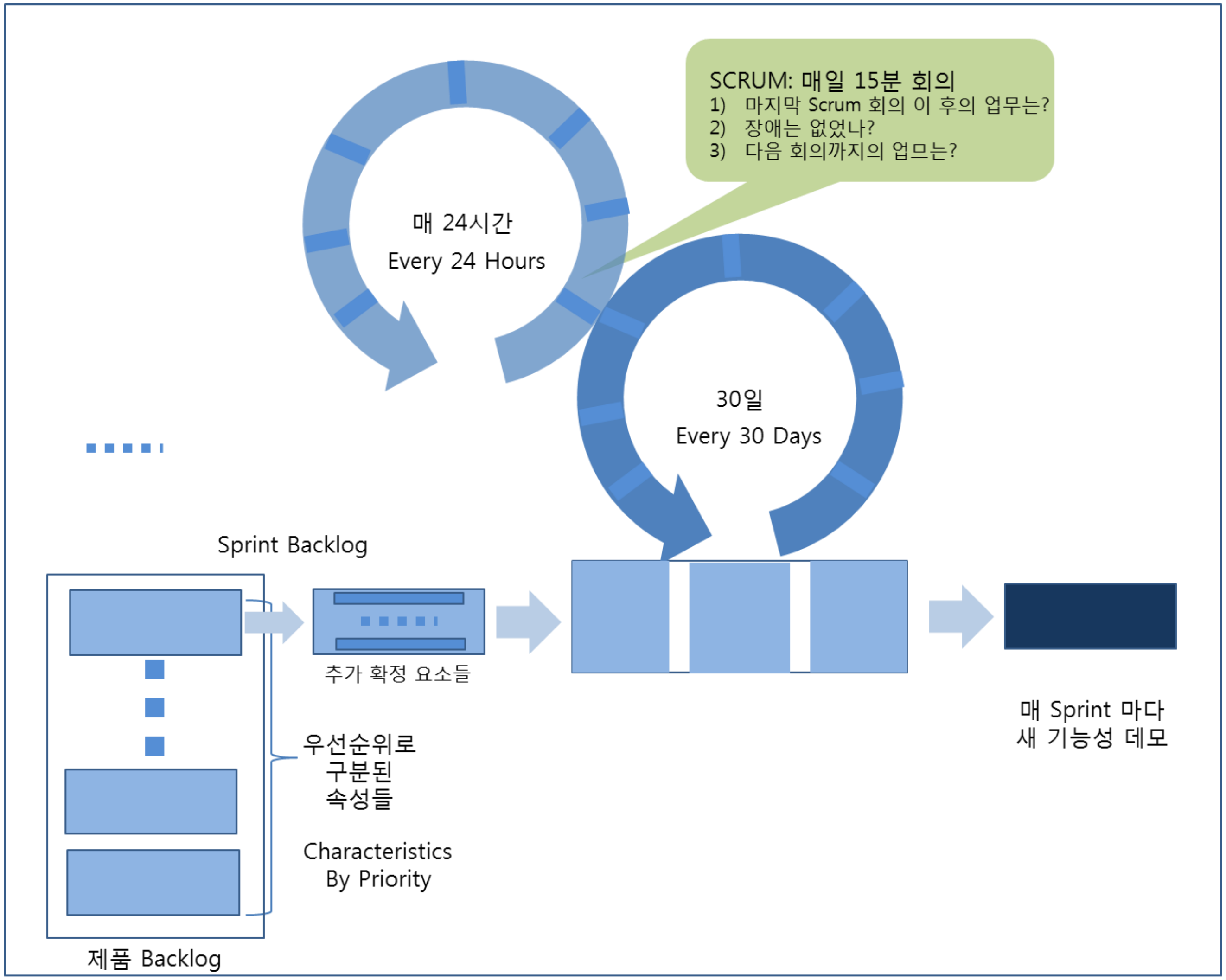


FIGURE 4.3
Scrum process flow
every 24 hours
30 days
Scrum: 15 minute daily meeting.
Team members respond to basics:
1) What did you do since last Scrum meeting?
2) Do you have any obstacles?
3) What will you do before next meeting?
Sprint Backlog: Feature(s) assigned to sprint
Backlog items expanded by team
New functionality is demonstrated at end of sprint
Product Backlog: Prioritized product features desired by the customer

SCRUM Model


SCRUM: 매일 15분 회의
1) 마지막 Scrum 회의 이 후의 업무는?
2) 장애는 없었나?
3) 다음 회의까지의 업므는?
매 24시간
Every 24 Hours
30일
Every 30 Days
Sprint Backlog
추가 확정 요소들
우선순위로 구분된 속성들
Characteristics By Priority
제품 Backlog
매 Sprint 마다 새 기능성 데모

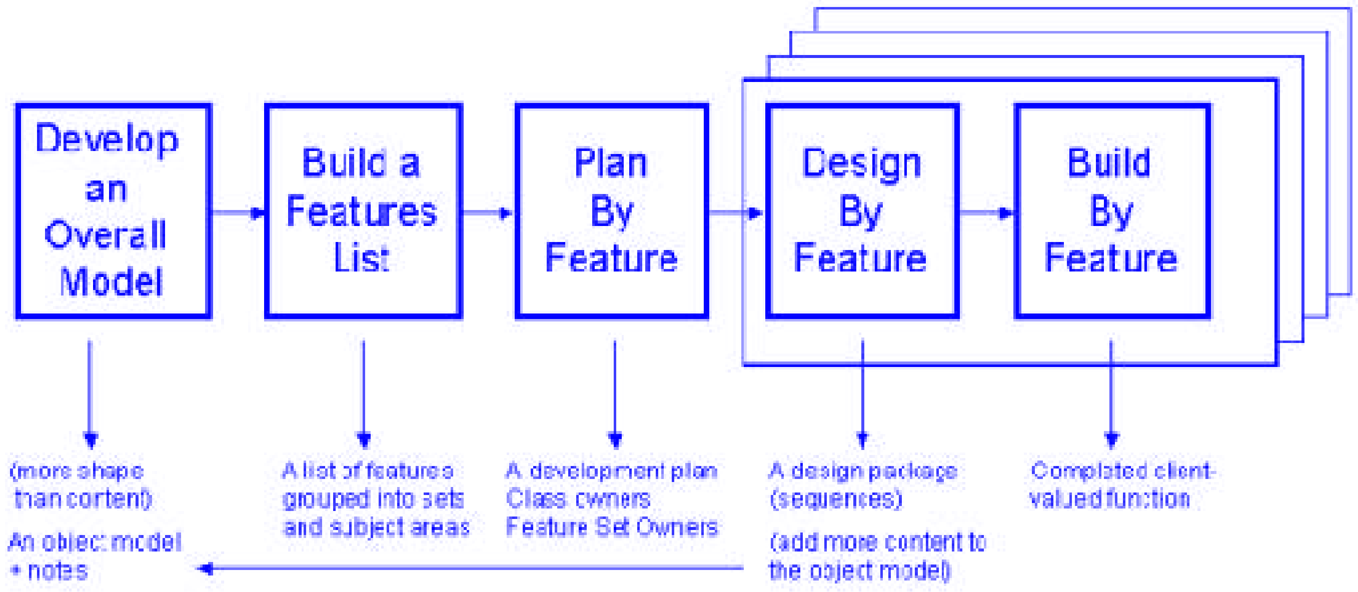
Crystal

- Proposed by Cockburn and Highsmith
- Crystal—distinguishing features
  - Actually a family of process models that allow "maneuverability" based on problem characteristics
    - A resource-limited, collaborative game of invention and communication, with a primary goal of delivering useful, working SW and a secondary goal of setting up for the next game.
  - Face-to-face communication is emphasized
  - Suggests the use of "reflection workshops" to review the work habits of the team

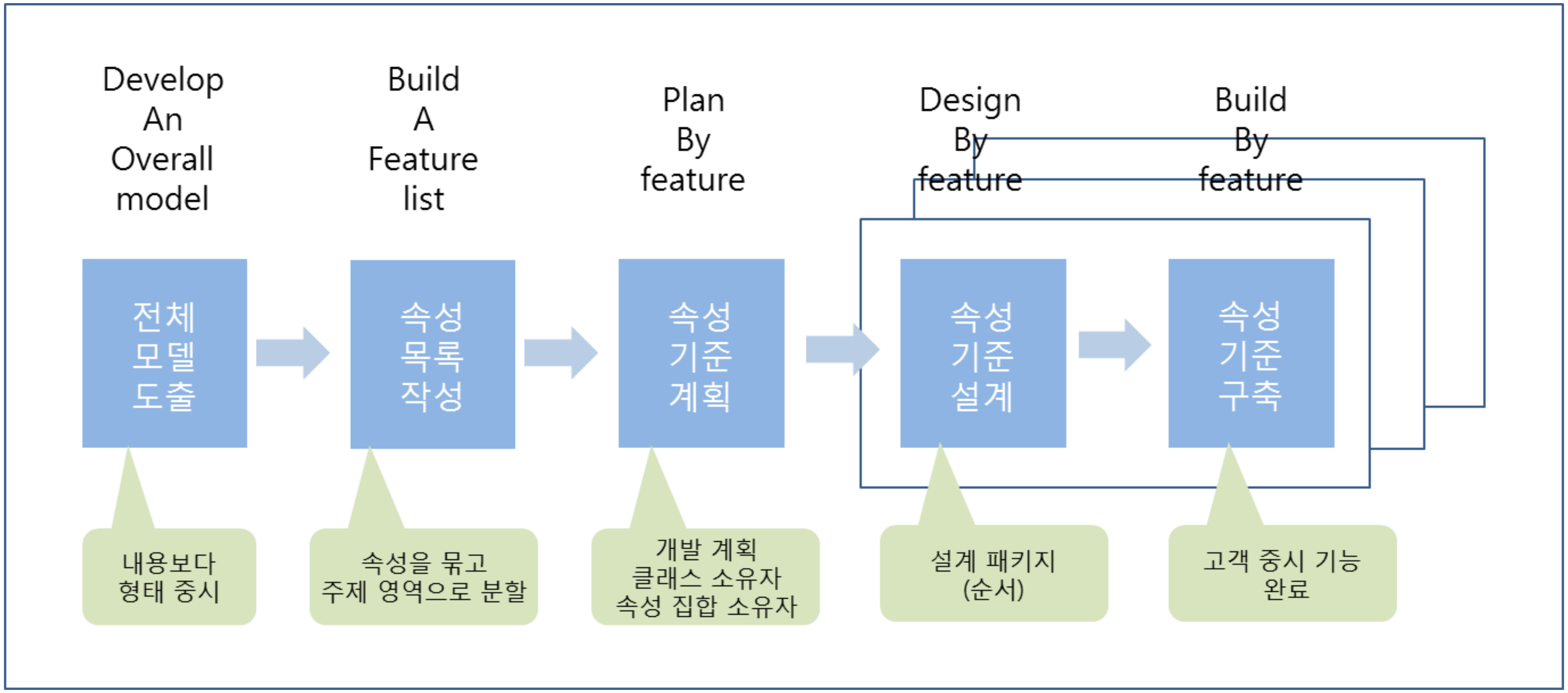
Feature Driven Development

- Originally proposed by Peter Coad et al
- FDD—distinguishing features
  - Emphasis is on defining “features”
    - a *feature* “is a client-valued function that can be implemented in two weeks or less.”
  - Uses a feature template
    - <action> the <result> <by | for | of | to> a(n) <object>
  - A features list is created and “plan by feature” is conducted
  - Design and construction merge in FDD

Feature Driven Development


Develop an Overall Model
Build a Features List
Plan By Feature
Design By Feature
Build By Feature
(more shape than content)
An object model + notes
A list of features grouped into sets and subject areas
A development plan Class owners Feature Set Owners
A design package (sequences)
(add more content to the object model)
Completed client-valued function

Feature Driven Development (FAA) Model



Agile Modeling

- Originally proposed by Scott Ambler
- Suggests a set of agile modeling principles
  - Model with a purpose
  - Use multiple models
  - Travel light
  - Content is more important than representation
  - Know the models and the tools you use to create them
  - Adapt locally