Software Development Methodologies

Lecturer: **Raman Ramsin**

Lecture 18

Process Patterns

Process Patterns

- Results of applying abstraction to recurring processes and process components
- Create means for developing methodologies through composition of appropriate pattern instances
- Reflect the state of the practice and are based on well-established, refined concepts

Process Patterns: Coplien

- The first recorded reference to the term “Process Pattern” was made by Coplien in his landmark paper in 1994.
- Coplien defined process patterns as “the patterns of activity within an organization (and hence within its project)”.
- Almost all his patterns are relatively fine-grained techniques for exercising better organizational and management practices.
- Do not constitute a comprehensive, coherent whole for defining a software development process.

Process Patterns: Ambler

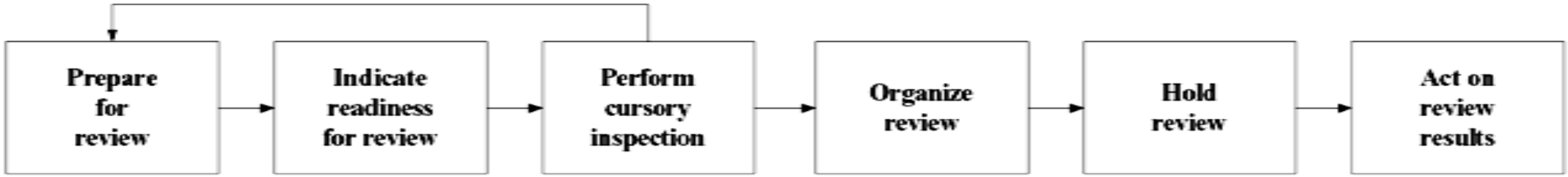
- Ambler is the author of the only books so far written on object-oriented process patterns.
- Defines a process pattern as “a pattern which describes a proven, successful approach and/or series of actions for developing software”
- Defines an object-oriented process pattern as “a collection of general techniques, actions, and/or tasks (activities) for developing object-oriented software”.

Ambler's Process Patterns: Types

- In the ascending order of abstraction level:
  1. *Task Process Pattern:* depicting the detailed steps to execute a specific *task* of the process.
  2. *Stage Process Pattern:* depicting the steps that need to be done in order to perform a *stage* of the process. A *stage* process pattern is usually made up of several *task* process patterns.
  3. *Phase Process Pattern:* depicting the interaction of two or more *stage* process patterns in order to execute the *phase* to which they belong.
- In any process, *phases* are performed in serial order, whereas the *stage* patterns inside them can be executed iteratively.
- Ambler proposes many patterns of each type, complete with detailed steps and guidelines for integrating and shaping the patterns into a comprehensive process.

Ambler's Process Patterns: Task – Example

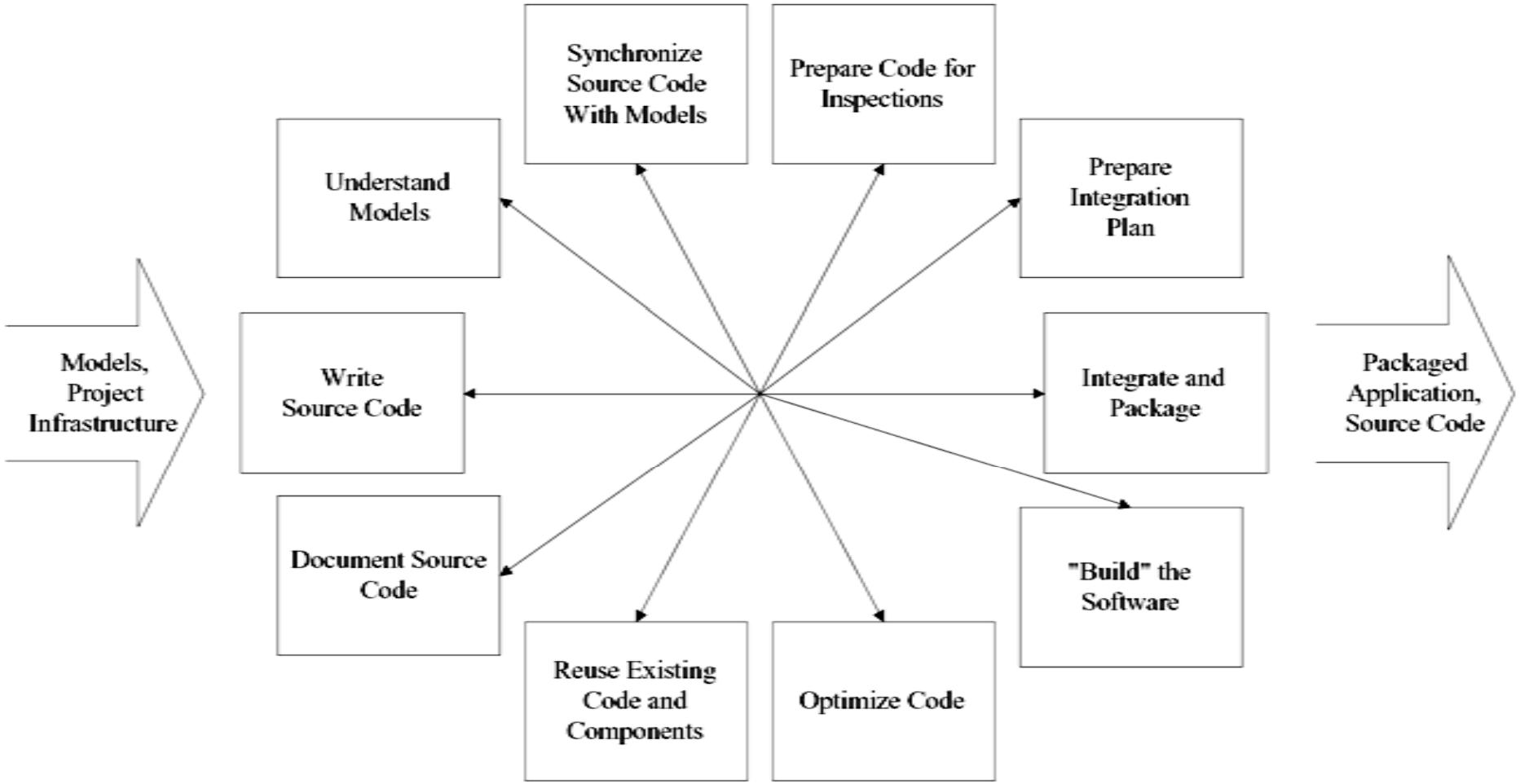
Technical Review



[Ambler 1998]

Ambler's Process Patterns: Stage – Example

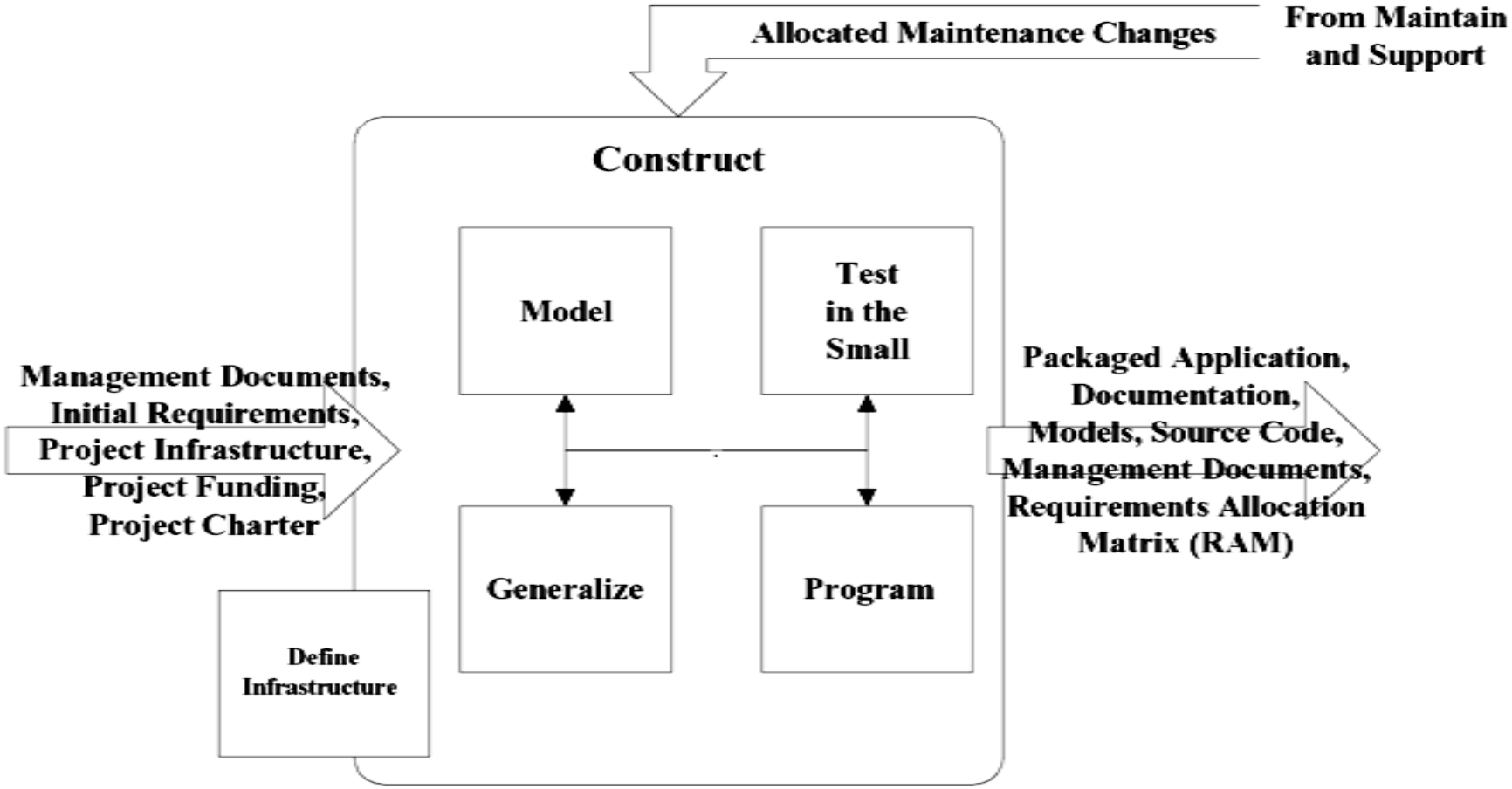
Program



[Ambler 1998]

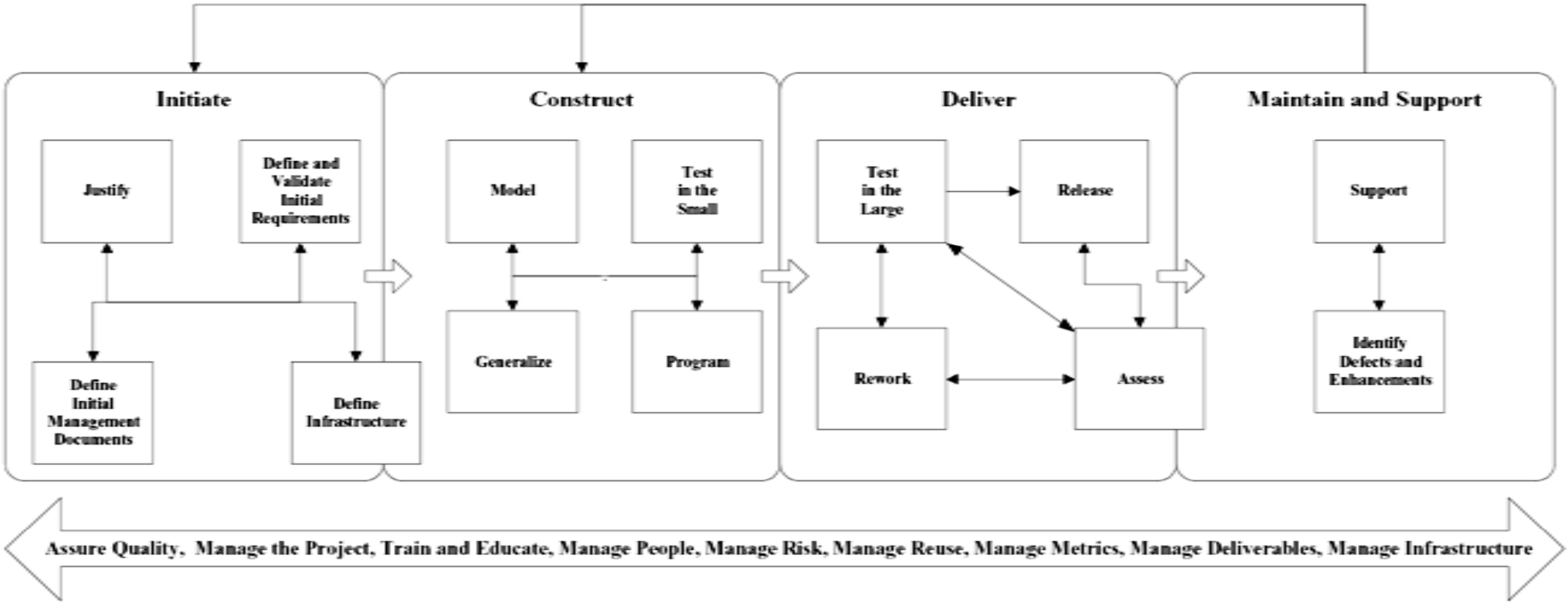
Ambler's Process Patterns: Phase – Example

Construct



[Ambler 1998]

Object Oriented Software Process (OOSP)



[Ambler 1998]

Ambler's Process Patterns: Strengths and Weaknesses

- ***Strengths***
  - Comprehensive and detailed specification document
  - Full coverage of generic development lifecycle activities
  - Iterative-incremental process
  - Full support for umbrella activities
  - Requirements-based development
  - Based on functional, behavioural, and structural modeling of the problem domain and the system.

Ambler's Process Patterns: Strengths and Weaknesses

- ***Strengths*** **(Contd.)**
  - Accommodates comprehensive modeling at all levels (enterprise to problem domain to system objects; logical to physical).
  - Rich modeling-language support (UML), especially in structural and behavioural modeling features
  - Support for formalism (through UML/OCL)
  - Traceability supported through use cases

Ambler's Process Patterns: Strengths and Weaknesses

- ***Weaknesses***
  - Process patterns are not defined as individual patterns, but as components of a specific object-oriented methodology (OOSP);
    - this enhances the tangibility of the patterns but damages their generality and applicability.
  - Very complex process (OOSP)

Ambler's Process Patterns: Strengths and Weaknesses

- ***Weaknesses*** **(Contd.)**
  - Configurability not addressed
  - Seamlessness damaged due to hitches in model mapping
  - Prohibitive number of models
  - Substantial potential for inconsistency of models

References

- Coplien, J. O., A development process generative pattern language. In *Proceedings of the First Annual Conference on Pattern Languages of Programming (PLoP)*, 1994.

- Ambler, S. W., *Process Patterns: Building Large-Scale Systems Using Object Technology*. Cambridge University Press, 1998.

- Ambler, S. W., *More Process Patterns: Delivering Large-Scale Systems Using Object Technology*. Cambridge University Press, 1999.