



# Software Development Methodologies

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## Lecture 15

### 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”.



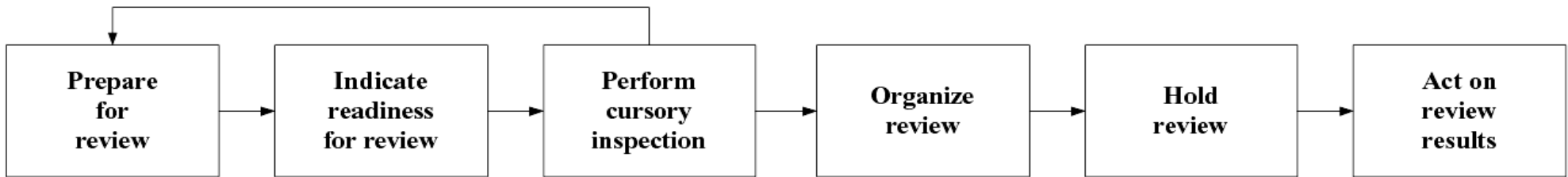
# Ambler's Process Patterns: Types

- 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

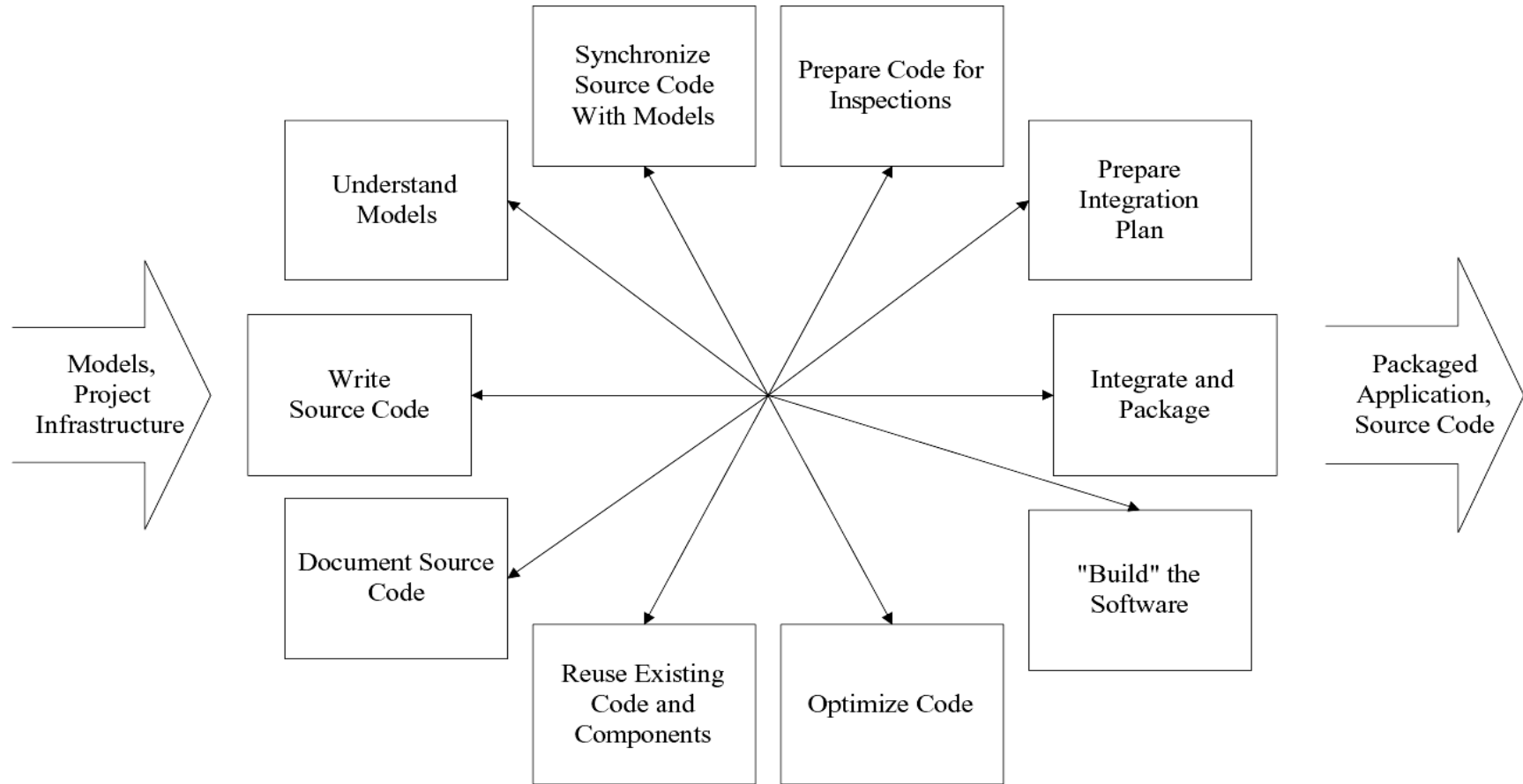


[Ambler 1998]



# Ambler's Process Patterns: Stage – Example

## Program

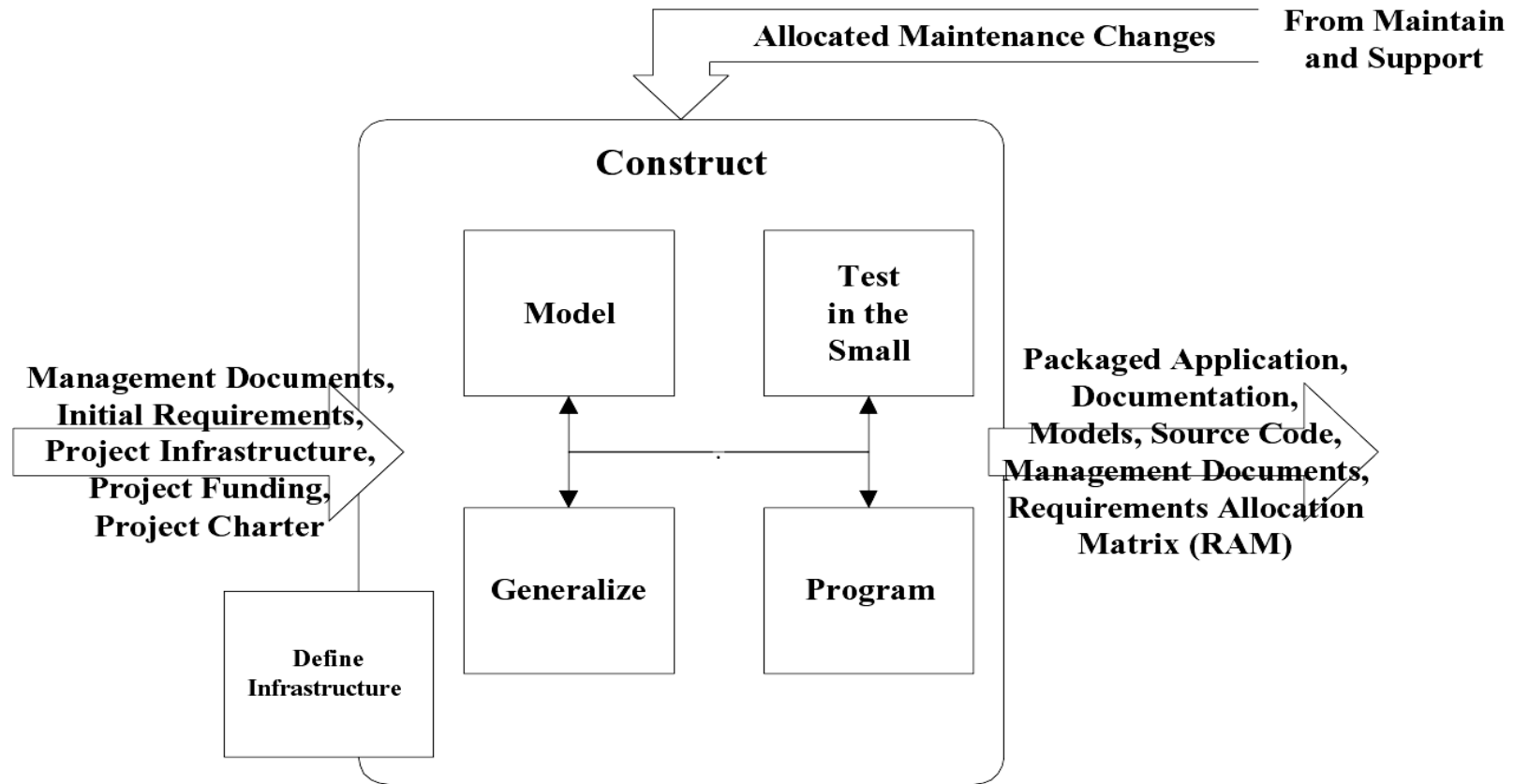


[Ambler 1998]



# Ambler's Process Patterns: Phase – Example

## Construct

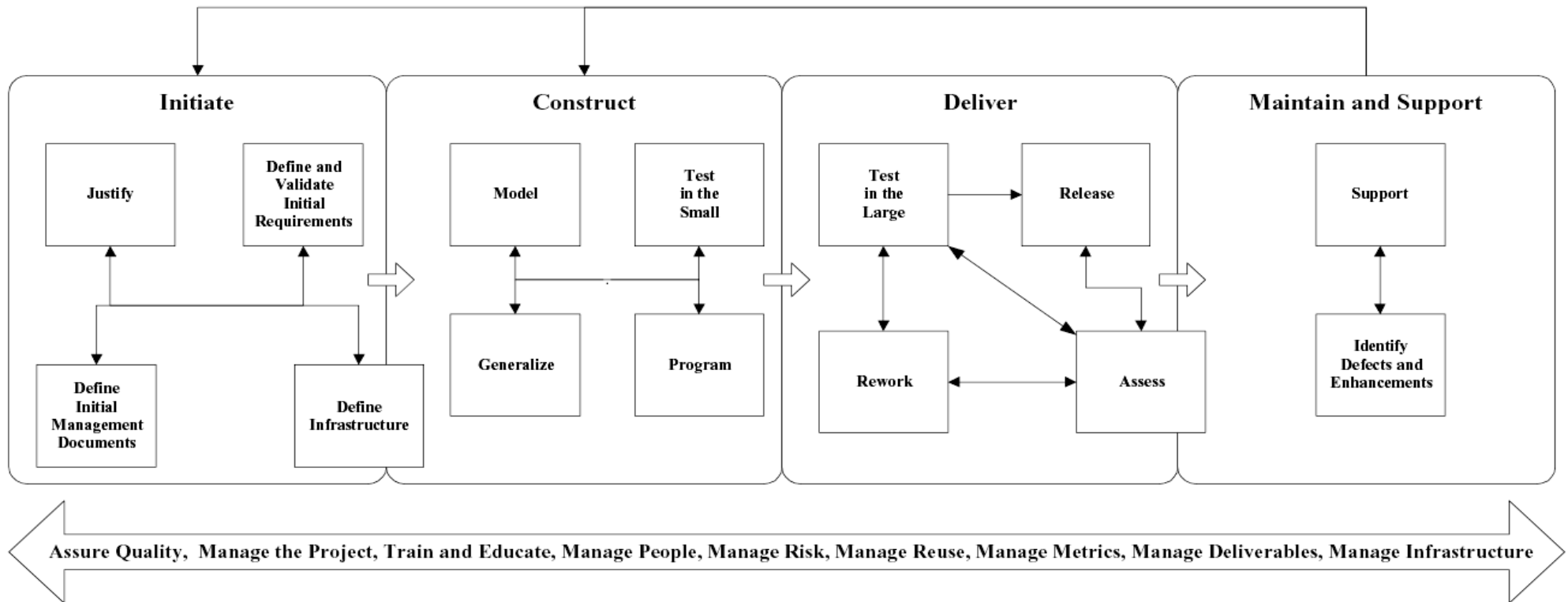


[Ambler 1998]





# 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.