Iterative and Incremental Development

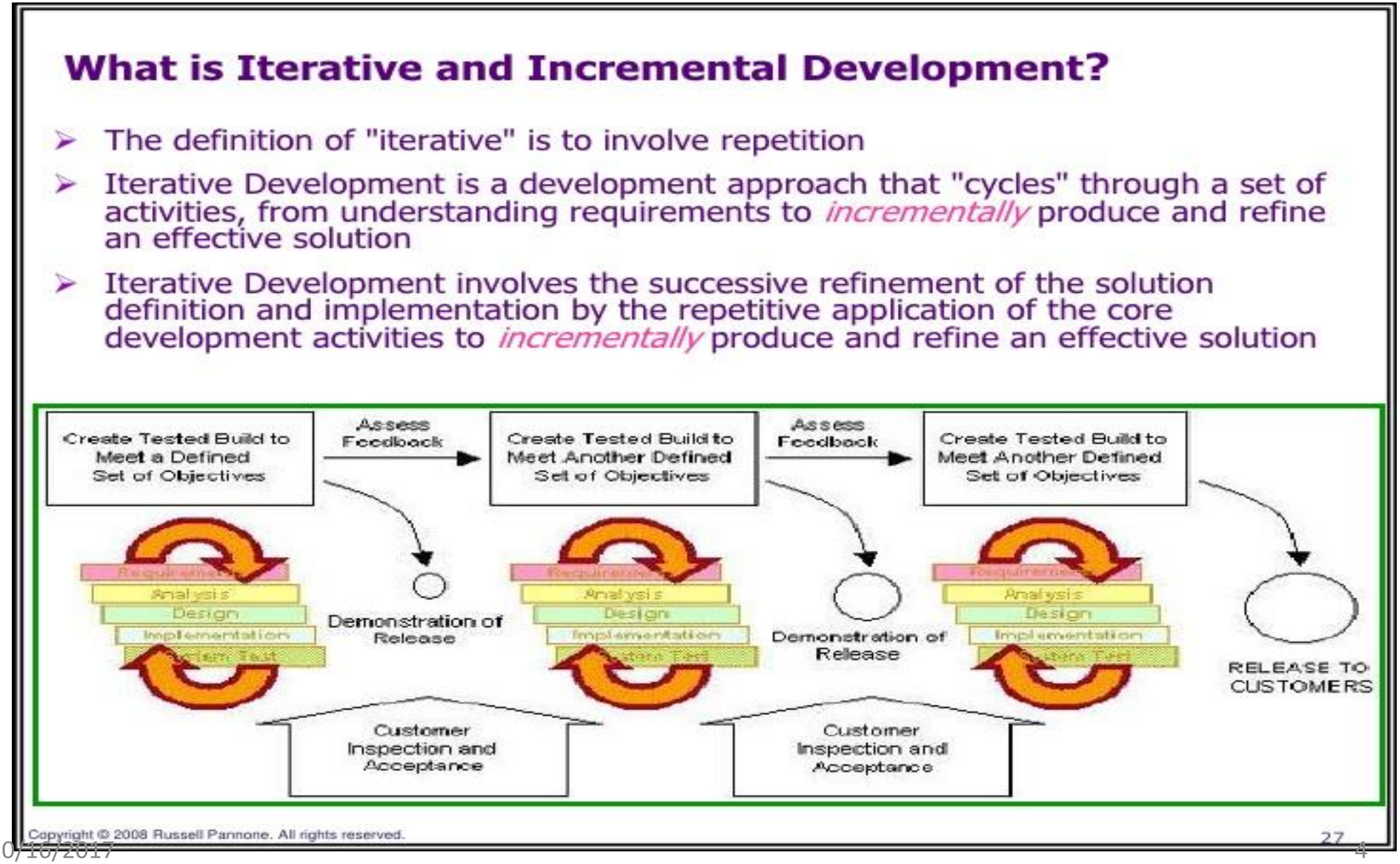
Introduction

- Iterative and incremental software development is a method of software development that is modeled around a gradual increase in feature additions and a cyclical release and upgrade pattern.
- Iterative and incremental software development begins with planning and continues through iterative development cycles involving continuous user feedback and the incremental addition of features concluding with the deployment of completed software at the end of each cycle.
- It is one of the methodologies of Agile software development, rational unified process and extreme programming.

Introduction

- Iterative and incremental development is a discipline for developing systems based on producing deliverables.
- In incremental development, different parts of the system are developed at various times or rates and are integrated based on their completion.
- In iterative development, teams plan to revisit parts of the system in order to revise and improve them. User feedback is consulted to modify the targets for successive deliverables.
- Iterative and incremental software development came about in response to flaws in the waterfall model, a sequential design process in which progress flows steadily downwards.
- It differs from the waterfall model because it is cyclical rather than unidirectional, offering a greater ability to incorporate changes into the application during the development cycle.

Introduction



What is Iterative and Incremental Development?

- The definition of "iterative" is to involve repetition
- Iterative Development is a development approach that "cycles" through a set of activities, from understanding requirements to *incrementally* produce and refine an effective solution
- Iterative Development involves the successive refinement of the solution definition and implementation by the repetitive application of the core development activities to *incrementally* produce and refine an effective solution

Create Tested Build to Meet a Defined Set of Objectives
Assess Feedback
Create Tested Build to Meet Another Defined Set of Objectives
Assess Feedback
Create Tested Build to Meet Another Defined Set of Objectives
Requirements
Analysis
Design
Implementation
System Test
Demonstration of Release
Demonstration of Release
RELEASE TO CUSTOMERS
Customer Inspection and Acceptance
Customer Inspection and Acceptance

Phases

- Inception Phase:
  - Deals with the scope of the project, requirements and risks at higher levels
- Elaboration Phase:
  - Delivers working architecture that moderates risks identified in the inception phase and satisfies nonfunctional requirements
- Construction Phase:
  - Fills in architecture components incrementally with production-ready code, which is produced through the analysis, implementation, design and testing of functional requirements
- Transition Phase:
  - Delivers the system to the production operating environment

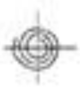
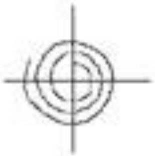
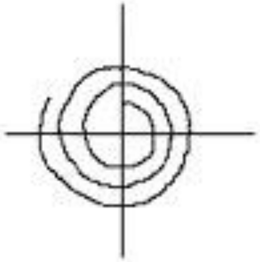
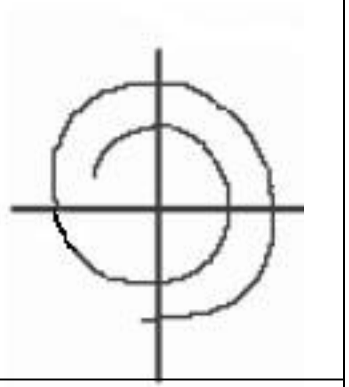
Life Cycle Phase

1. ***The engineering stage –***

   driven by smaller teams doing design and synthesis activities.

2. ***The production stage –***

   driven by larger teams doing construction, test, and deployment activities

Engineering Stage		**Production Stage**	
Inception	**Elaboration**	**Construction**	**Transition**
			
Idea	**Architecture**	**Beta Releases**	**Products**

Inception Phase

- Overriding goal – to achieve concurrence among stakeholders on the life-cycle objectives

- Essential activities :
  - *Formulating the scope of the project* (capturing the requirements and operational concept in an information repository)
  - *Synthesizing the architecture* (design trade-offs, problem space ambiguities, and available solution-space assets are evaluated)
  - *Planning and preparing a business case* (alternatives for risk management, iteration planes, and cost/schedule/profitability trade-offs are evaluated)

Elaboration Phase

- During the elaboration phase, an executable architecture prototype is built

- Essential activities :
  - *Elaborating the vision* (establishing a high-fidelity understanding of the critical use cases that drive architectural or planning decisions)
  - *Elaborating the process and infrastructure* (establishing the construction process, the tools and process automation support)
  - *Elaborating the architecture and selecting components* (lessons learned from these activities may result in redesign of the architecture)

Construction Phase

- During the construction phase :

  All remaining components and application features are integrated into the application

  All features are thoroughly tested

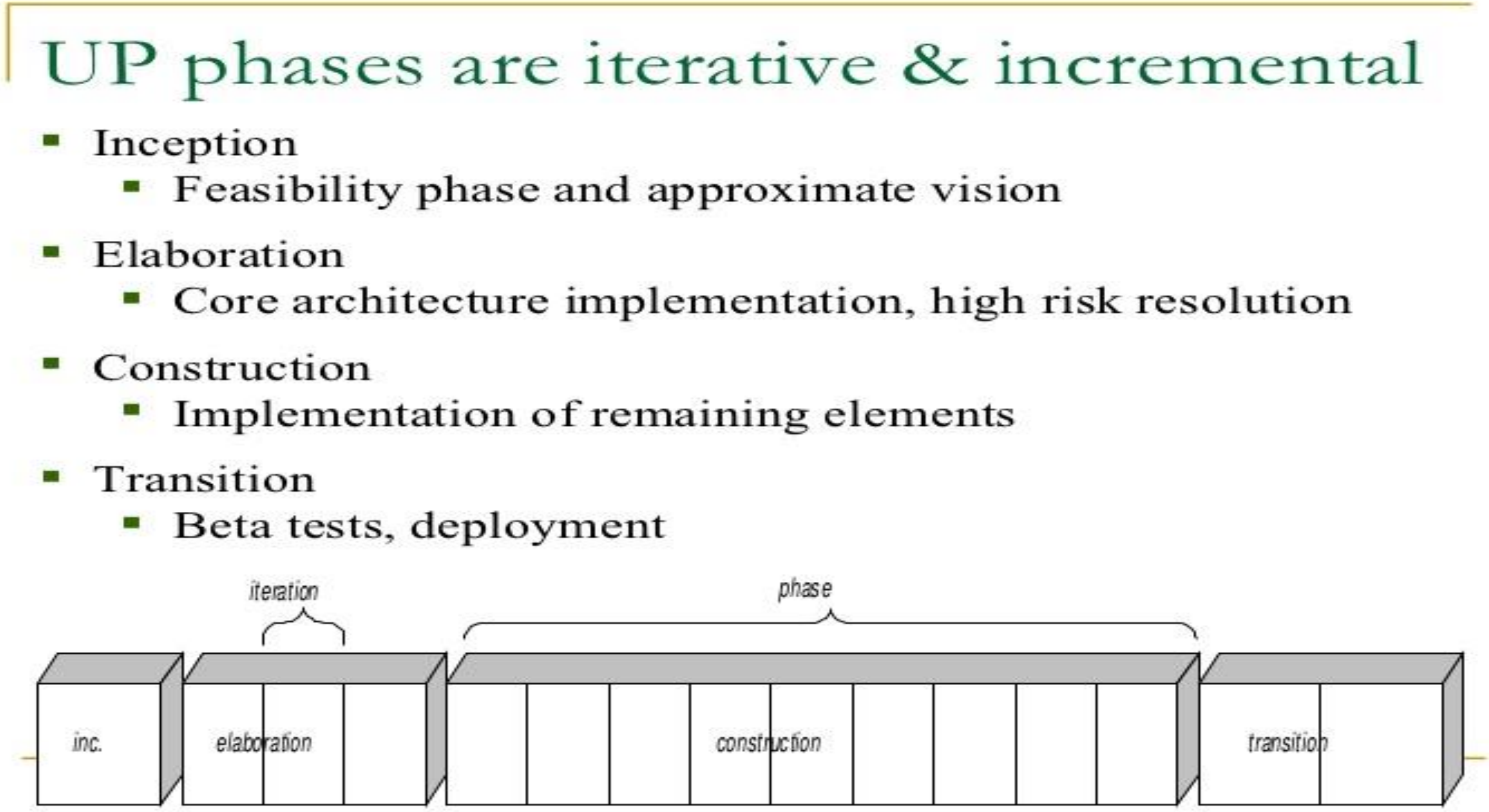
- Essential activities :
  - *Resource management, control, and process optimization*
  - *Complete component development and testing against evaluation criteria*
  - *Assessment of the product releases against acceptance criteria of the vision*

Transition Phase

- The transition phase is entered when baseline is mature enough to be deployed in the end-user domain
- This phase could include beta testing, conversion of operational databases, and training of users and maintainers

- Essential activities :
  - *Synchronization and integration of concurrent construction into consistent deployment baselines*
  - *Deployment-specific engineering* (commercial packaging and production, field personnel training)
  - *Assessment of deployment baselines against the complete vision and acceptance criteria in the requirements set*

Phases



UP phases are iterative & incremental

- Inception
  - Feasibility phase and approximate vision
- Elaboration
  - Core architecture implementation, high risk resolution
- Construction
  - Implementation of remaining elements
- Transition
  - Beta tests, deployment

iteration
phase
inc.
elaboration
construction
transition

- Evaluation Criteria :
  - Is the user satisfied?
  - Are actual resource expenditures versus planned expenditures acceptable?

❑ Each of the four phases consists of one or more iterations in which some technical capability is produced in demonstrable form and assessed against a set of the criteria

❑ The transition from one phase to the next maps more to a significant business decision than to the completion of specific software activity.