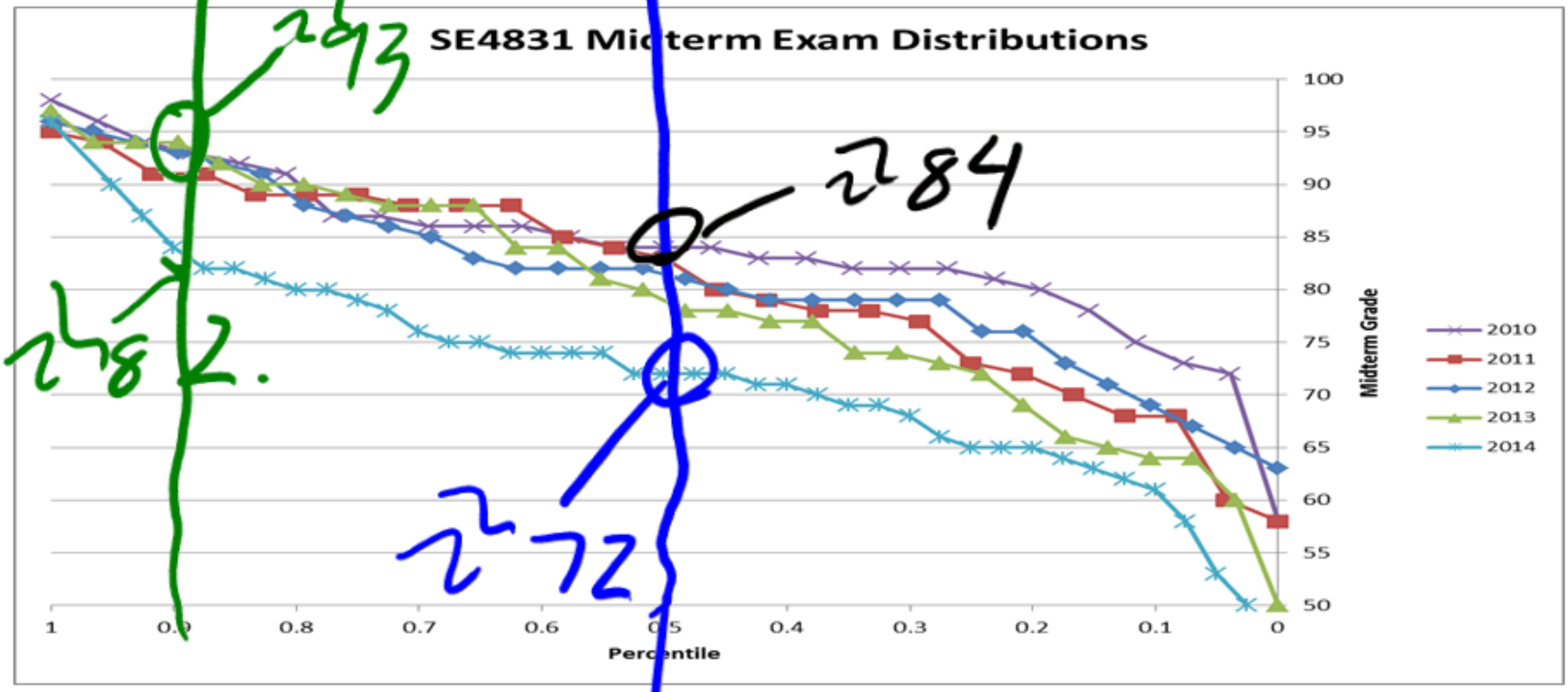

SE4831 Midterm Exam Distributions
100
95
90
85
80
75
70
65
60
55
50
Midterm Grade
2010
2011
2012
2013
2014
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Percentile

Year	Overall	Metric	MC	ZBR	Capture-Recapture	Fagan Inspection Flow	Column	Column	Column	Column	Column
2014	72%	Average	71%	77%	55%	74%	94%	89%			
	72%	Median	70%	75%	50%	75%	100%	100%			
	10%	Stdev	13%	23%	27%	18%	17%	20%			
2013	80%	Average	82%	89%	66%	87%	92%	93%	60%		
	80%	Median	84%	96%	65%	94%	100%	100%	100%		
	12%	STD	11%	14%	28%	21%	14%	20%	48%		
2012	80%	Average	72%		76%	81%	93%	90%	74%	89%	85%
	82%	Median	73%		80%	100%	100%	100%	80%	93%	90%
	8%	STD	10%		25%	25%	15%	31%	31%	16%	20%
2011	81%	Average	76%	94%	58%	85%	91%	93%	91%		
	83%	Median	80%	100%	68%	93%	100%	100%	100%		
	10%	STD	13%	11%	24%	22%	28%	12%	28%		

SE4831 : Software Quality Assurance

Configuration Management

Dr. Walter W. Schilling, Jr.
Instructor

Objectives

- Explain what configuration management is
- Compare and contrast SCM with Version Control Systems
- Explain how change is managed on large software projects
- Compare and contrast releases, versions, and variants
- Explain the models of configuration management
- Explain document control

Software Configuration Management Definition

What is software configuration management?

- SQA Component assigned to manage changes
- Deals with all issues related to
  - Control of software changes
  - Proper documentation of changes
  - Registering of software versions
  - Storage of software Versions
- Much more than the usage of a Version Control System (VCS)
  - Though usage of VCS is an important part!

Definitions

- Software Configuration Item (SCI)

- SCI Version

- Software Configuration Version

Definitions

- Software Configuration Item (SCI)
  - An approved unit of source code, a document, or a piece of hardware that is designed for configuration management and treated as a distinct entity in the software configuration management process
  - Can also be referred to as a configuration item (CI)
- SCI Version
  - The approved state of an SCI at any given point in time during the development or maintenance process
- Software Configuration Version
  - An approved selected set of documented SCI versions that constitute a software system or a document at any given point in time, where the activities performed are controlled by software configuration management procedures. The software configuration versions are released according to the cited procedures.

Common SCI's

- Design Documents
  - Software Development Plan (SDP)
  - System Requirements Document
  - Software Requirements Document (SRD)
  - Interface Design Specifications
  - Preliminary Design Document (PDD)
  - Critical Design Document (CDD)
  - Database Description
  - Software Test Plans (STP)
  - Software Test Procedure (STPR)
  - Software Test Report (STR)
  - Software User Manuals
  - Software Maintenance Manuals
  - Software Installation Plan (SIP)
  - Software Maintenance Requests (including problem reports)
- Design Documents (Cont)
  - Software Change Requests (SCR)
  - Software Change Orders (SCO's)
  - Version description Documents (VDD)
- Software Code
  - Source Code
  - Object Code
  - Prototype Software
  - Software Models (UML, etc.)
- Data Files
  - Test Cases and Test Scripts
  - Parameters, codes, etc.
- Software Development Tools
  - Compilers and debuggers
  - Application Generators
  - CASE Tools
  - Testing Tools
  - Analysis Tools

Software Configuration Management Tasks

- Control of Software Change
  - Approve SCR's
  - Document Changes
  - Coordinate Changes amongst development teams
- Release of SCI and Software Configuration Versions
  - Approve new versions
  - Document Configurations
  - Document installation sites
  - Secure version source and documentation from changes, deletions, or other damages
- Provision of SCM information services
  - Information on the status of changes
  - Information about installed versions
  - Version history list
  - Accurate copies of given versions
  - Documentation copies
- Verification of compliance to SCM practices
  - Audit compliance to SCM practices
  - Initiate update and change of SCM practices

How do we manage change?

How do we manage change?

- Software Change Control Authority (SCCA) / Change Control Board (CCB)
  - Exact acronym or name varies with organization
  - Committee set up to manage software change
  - Tasked with assessment of submitted change requests
    - May also deal with bug reports / defect reports
  - Should be independent of project responsible for system.
  - Made up of representatives from all stakeholders
    - Management
    - Customer / customer representative
    - Developers / Engineers

Factors SCCB Must consider with CR

Factors SCCB Must consider with CR

Expected contribution of the proposed change
Urgency of the change
Effect of the proposed change on project timetables, level of service, etc.
Efforts required in making the change operational
Required software quality assurance efforts
Estimated required professional resources
Cost of performing the change

Definitions

- Release – A version of a product given to a customer or non-development entity.
- Version – Independently constructible product from the repository.
- Variant – Set of parallel releases of a product.

Types of Releases

- Baseline Version
- Intermediate Version
- Revision

Types of Releases

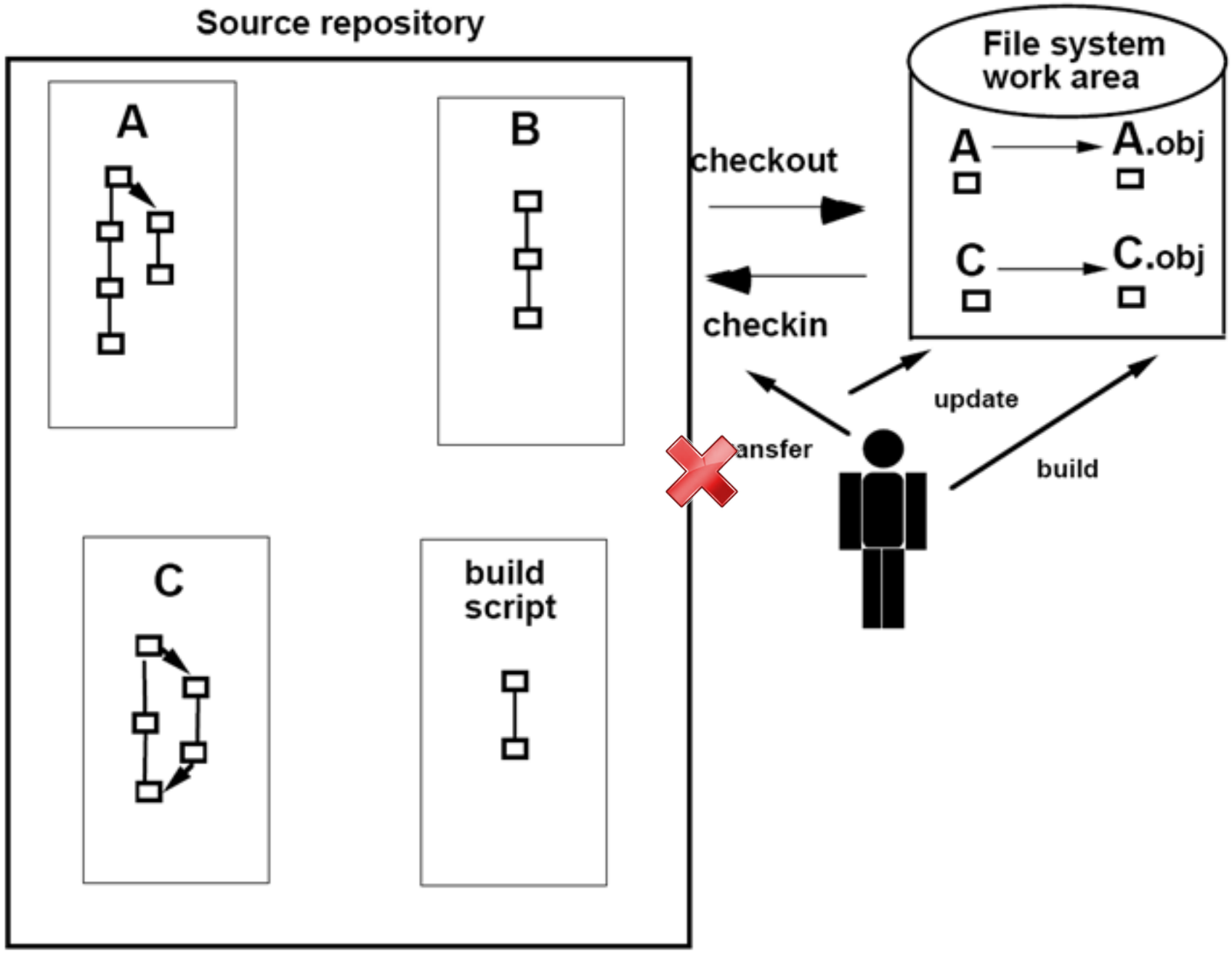
- Baseline Version
  - Planned early during system development stage
  - Major milestones in the system development
- Intermediate Version
  - Typically caused by field defects
  - Typically used for a limited time
  - Does not necessarily receive the same level of review or SQA as a Baseline version
- Revision
  - Released to make minor changes to a given software configuration version
  - Typically used for corrective actions

Software Configuration Management Plans

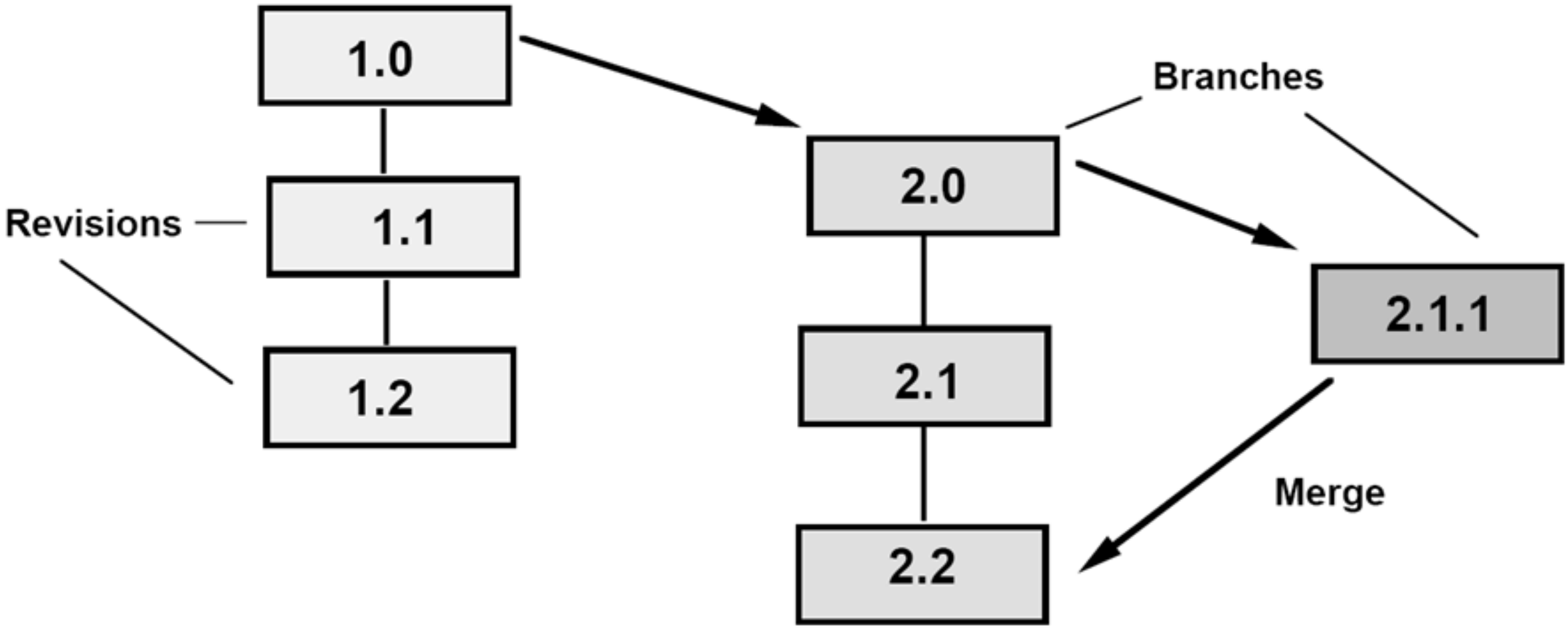
- Main objective
  - Plan ahead with the schedule of baseline release versions and required resources
- Typically Includes
  - List of scheduled baseline version releases.
  - List of SCIs (documents, code, etc.) to be included in each version.
  - Table identifying the relationship of software development project plans and maintenance plans to scheduled releases of new SCIs or SCI versions.
  - List of assumptions about the resources required to perform the SCMP.
  - Estimates of the human resources and budget needed to perform the SCMP.

Did not go beyond the previous slide. STopped here in all classes.

Checkout/Checkin Model

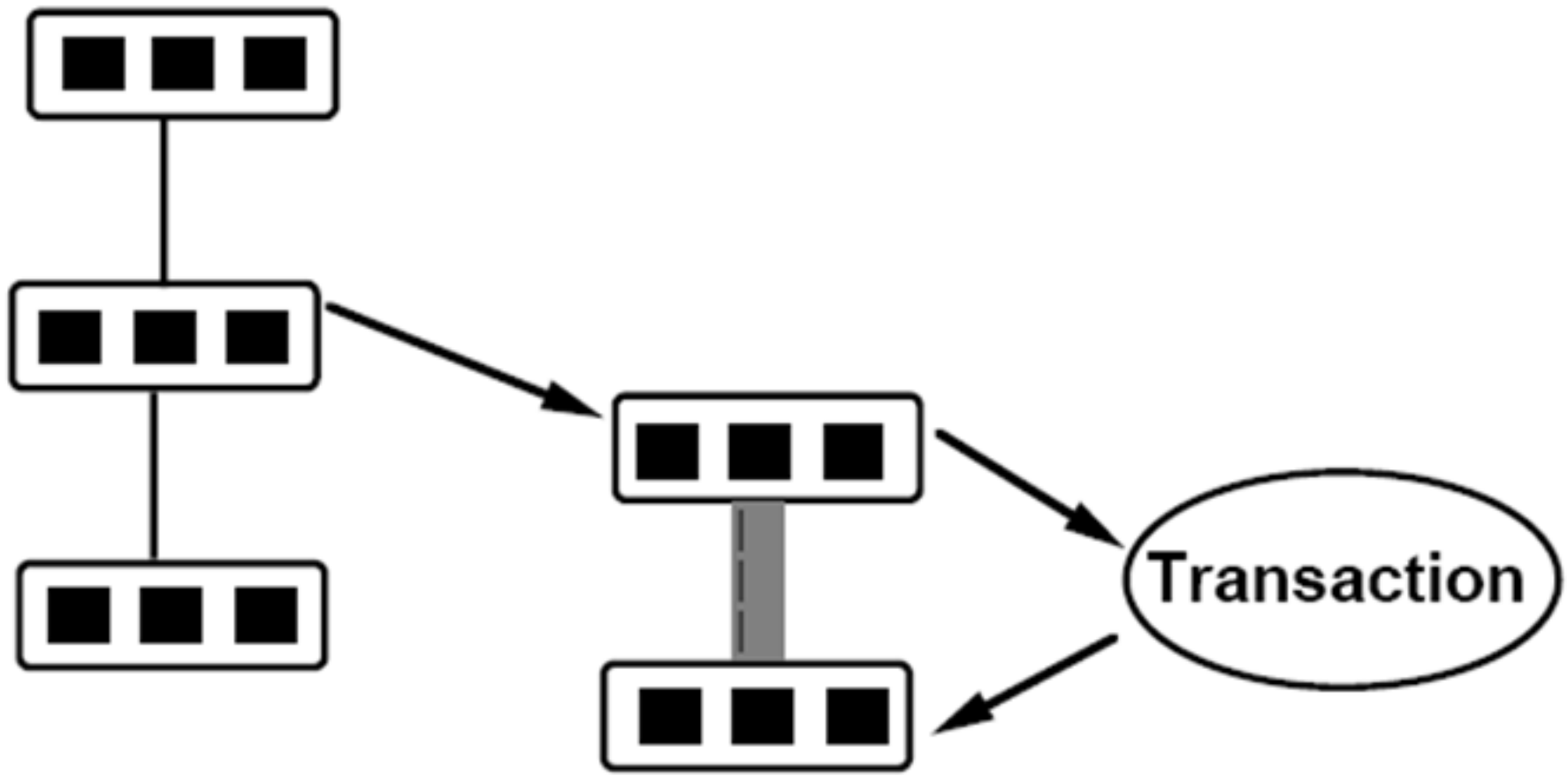


Versioning / Branching

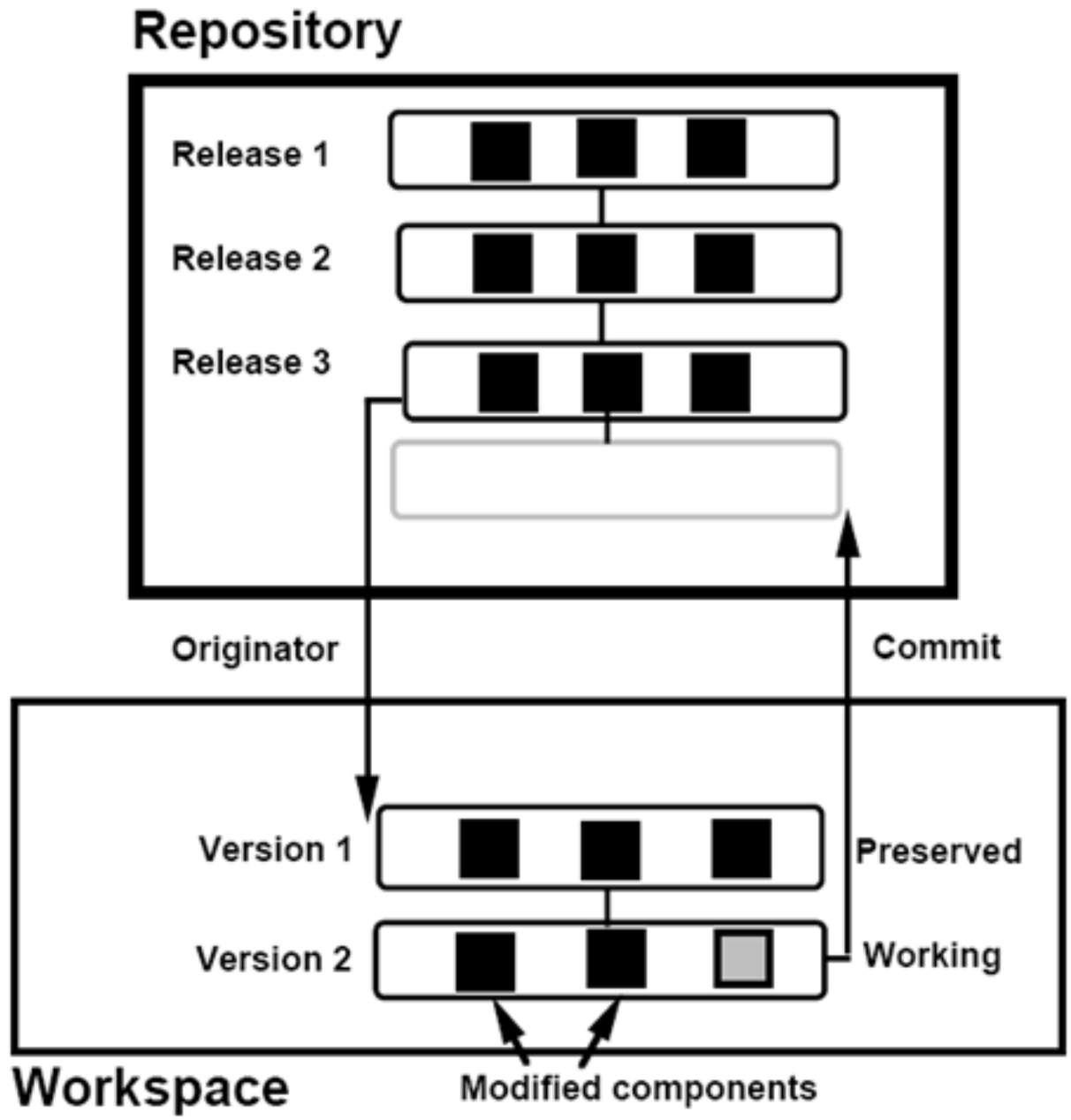


Long Transaction Model

Development path



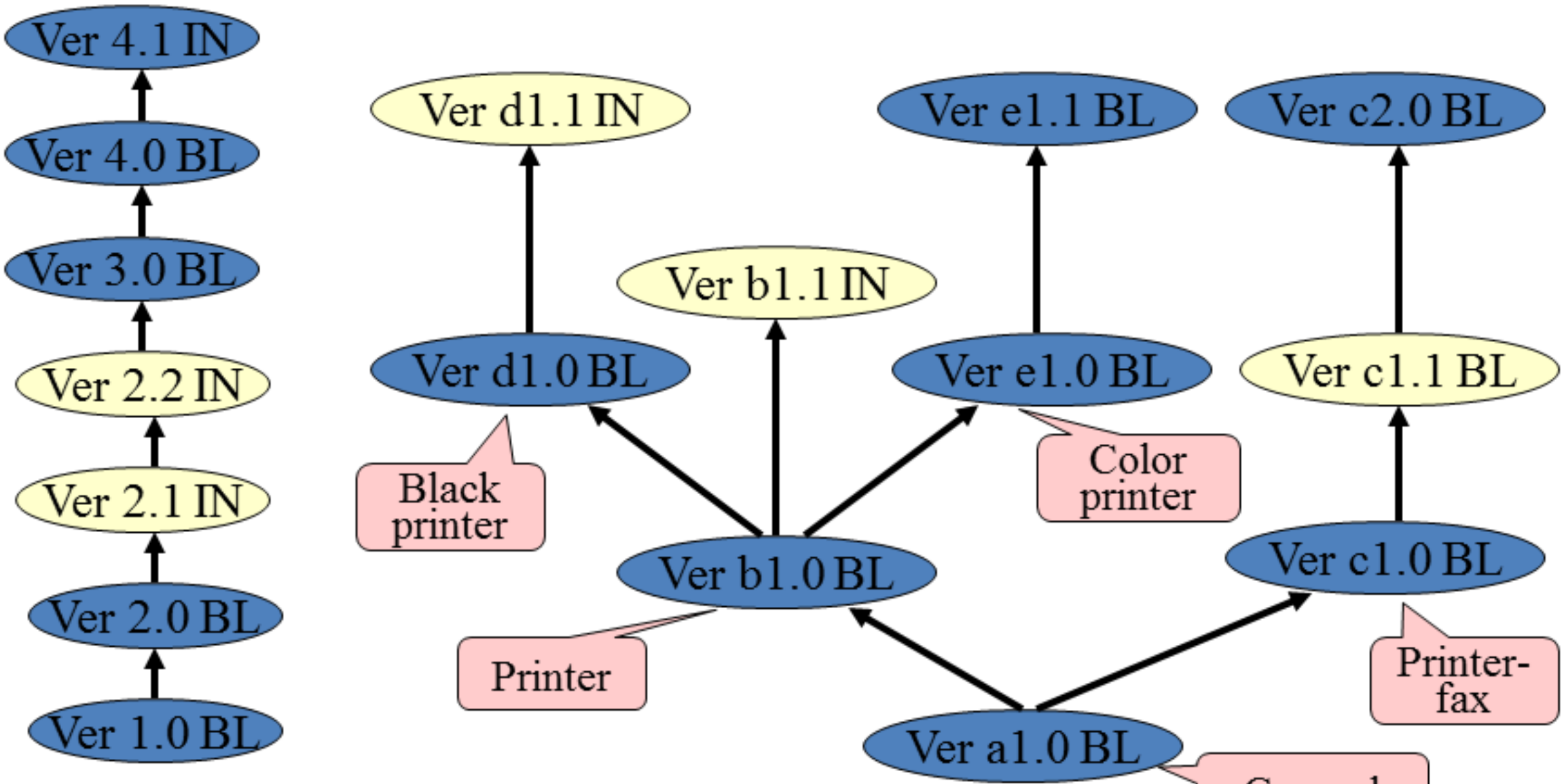
Workspace with Local History



Evolution Models

- Linear Evolution Model
  - Only one unique software system configuration version serves all customers at any given time
- Tree Evolution Model
  - Several Parallel version of the software are developed to meet the needs of different customers

Software Configuration Evolution Models



Linear evolution model

Tree evolution model

Document Control

- Where are documents stored?
  - Locally or at a remote site
  - Other options
- Who has access to given documents?
  - Engineers?
  - Contractors?
  - Customers?
  - Other persons who have signed an NDA?
- What is the record retention policy for documents?
  - How long must a document be held onto before it can be disposed of?

Documentation Control Definitions

- Controlled document

- Quality record

Documentation Control Definitions

- Controlled document
  - A document that is currently vital or may become vital for the development and maintenance of software systems as well as for the management of current and future relationships with the customer. Hence, its preparation, storage, retrieval and disposal are controlled by documentation procedures.
- Quality record
  - A quality record is a special type of controlled document. It is a customer-targeted document that may be required to demonstrate full compliance with customer requirements and effective operation of the software quality assurance system throughout the development and maintenance processes.

Components of document control procedure

- Definition of the list of the document types and updates to be controlled (some classified as quality records).
- Document preparation requirements.
- Document approval requirements.
- Document storage and retrieval requirements, including controlled storage of document versions, revisions and disposal, document security.

SCM Standards

- BS 6488-84 Code Practice for Configuration Management of Computer Based Systems
  - British standard for CM
- DOD MIL STD 483A-1985 Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs (1985)
- DOD MIL-STD 973 Configuration Management (1990)
- IEEE 828-1990 Standard for Software Configuration Management Plans
- IEEE 1042-1987 Guide to Software Configuration Management
- IEEE 1448a-1996 Supplement to ISO/IEC 12207 Software Lifecycle Processes
- NIST S.P. 500-161 Software Configuration Management: An Overview
- ISO 9000:2000
  - Includes chapter on SCM