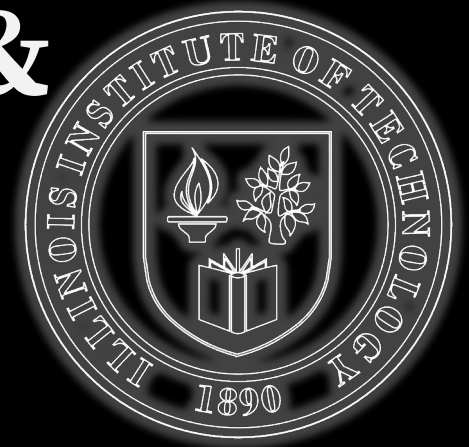
ILLINOIS TECH | College of Computing

ITMD 536 Software Testing & Maintenance

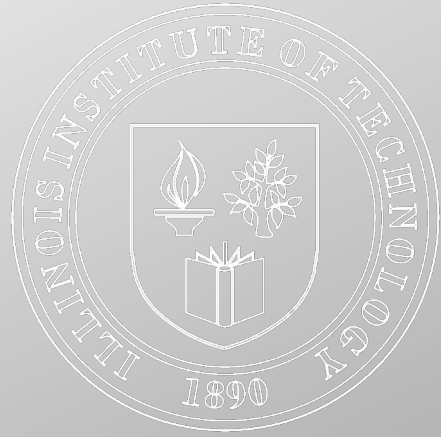
Chapter 9 and 10

A Focus on Regression Testing & Content Based Annual Release



Objectives

- What is regression test and test baseline?
- What is revalidation and qualification?
- What is field testing and releases?
- What is field support and repairs?
- What are adaptive, corrective and perfective changes?
- What changes needs to be included when and why?
- Why do we focus on quality?
- What are the distribution controls?

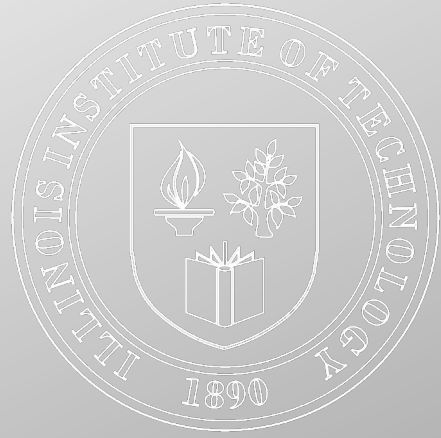


9. A Focus on Regression Testing

- **Regression Testing:** Refers to the testing of software releases to verify that modifications made to them have not caused unintended effects and that the software system and its components still satisfy its specified requirements and perform as intended.
- **Regression Testing:** Common methods of regression include rerunning previously executed tests in a specified sequence to check if the system functions the same, performance has degraded, or fixed faults reemerge either as themselves or in other instances.

Regression Testing

- What is REGRESSION TESTING? What does REGRESSION TESTING mean?
- REGRESSION TESTING meaning
- https://www.youtube.com/watch?v=YwwfipBxE4g

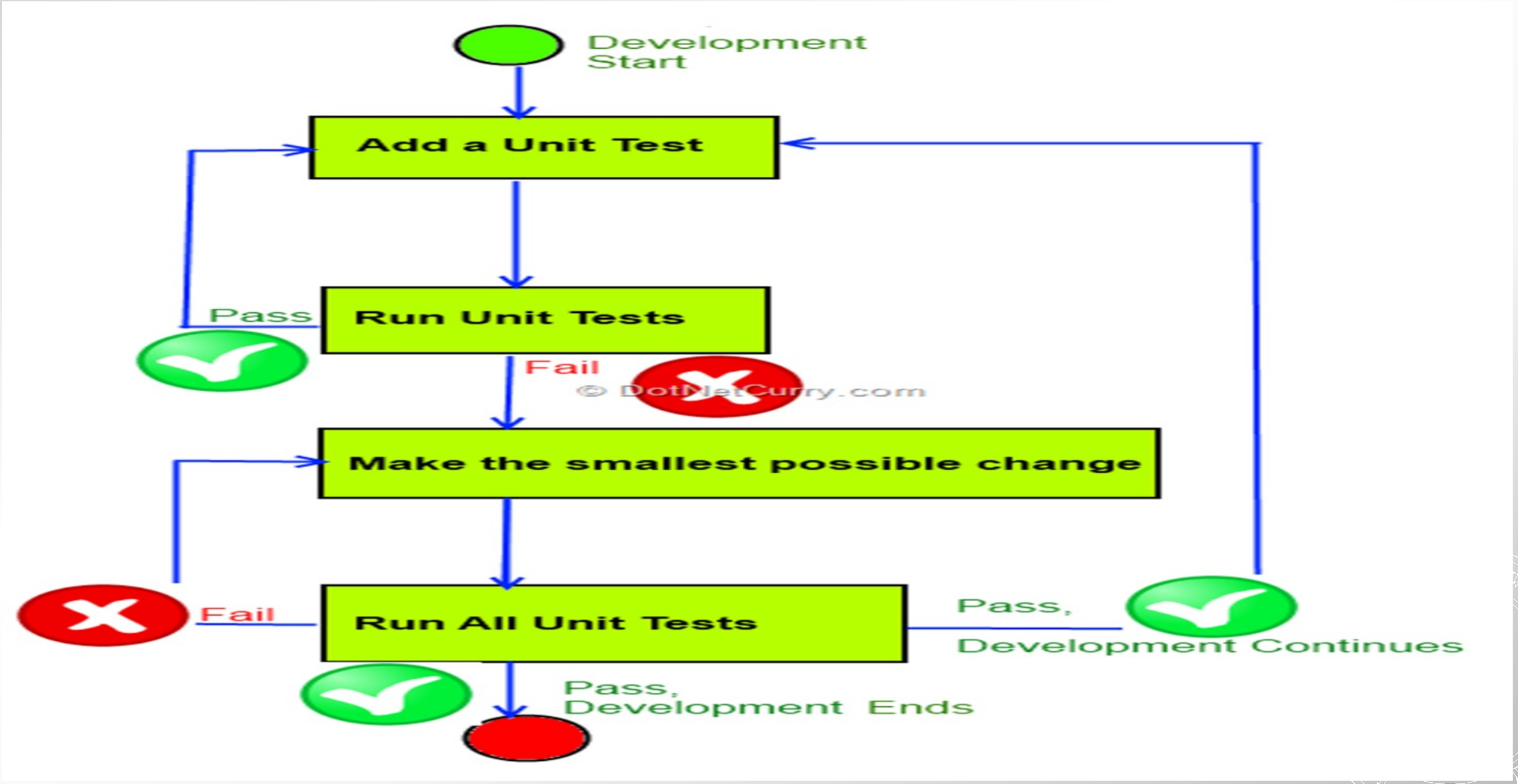


9.1 Regression Tests and Test Baselines

- **Baseline:** A specification or product that has been reviewed and agreed upon, and thereafter serves as the basis for further development, and that can be changed only through formal change control procedures.
- Testing is where the action is in software maintenance.
- IEEE 829 – 1998 specifies a set of documents for use in at least following eight stages of the test process, which are done in total as endorsed by this professional society:

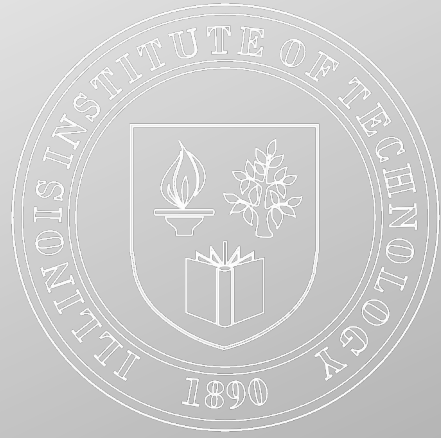
9.1 Regression Tests and Test Baselines

- **Unit Testing:** refers to test run to verify the functionality and correctness of a code module, building block, or class level component of a software build, increment, or program typically performed using white-box methods. Here is where debugging takes place. Where errors are found and fixed.


Development Start
Add a Unit Test
Run Unit Tests
Pass
Fail
© DotNetCurry.com
Make the smallest possible change
Run All Unit Tests
Fail
Pass,
Development Continues
Pass,
Development Ends

9.1 Regression Tests & Test Baselines

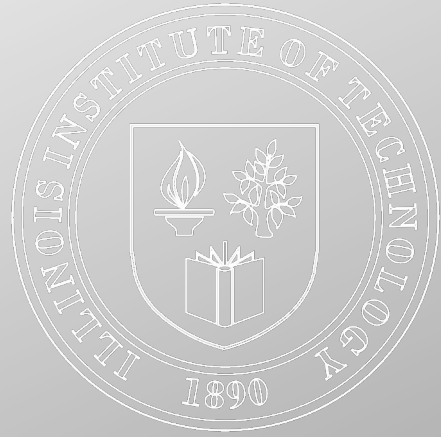
- **Integration Testing:** refers to tests conducted to verify the interfaces and interactions between software components as they are integrated together with each other and legacy, library, COTS, and open-source modules in successively larger combinations defined by the software requirements and interface specification, (collections, builds, increments& programs.

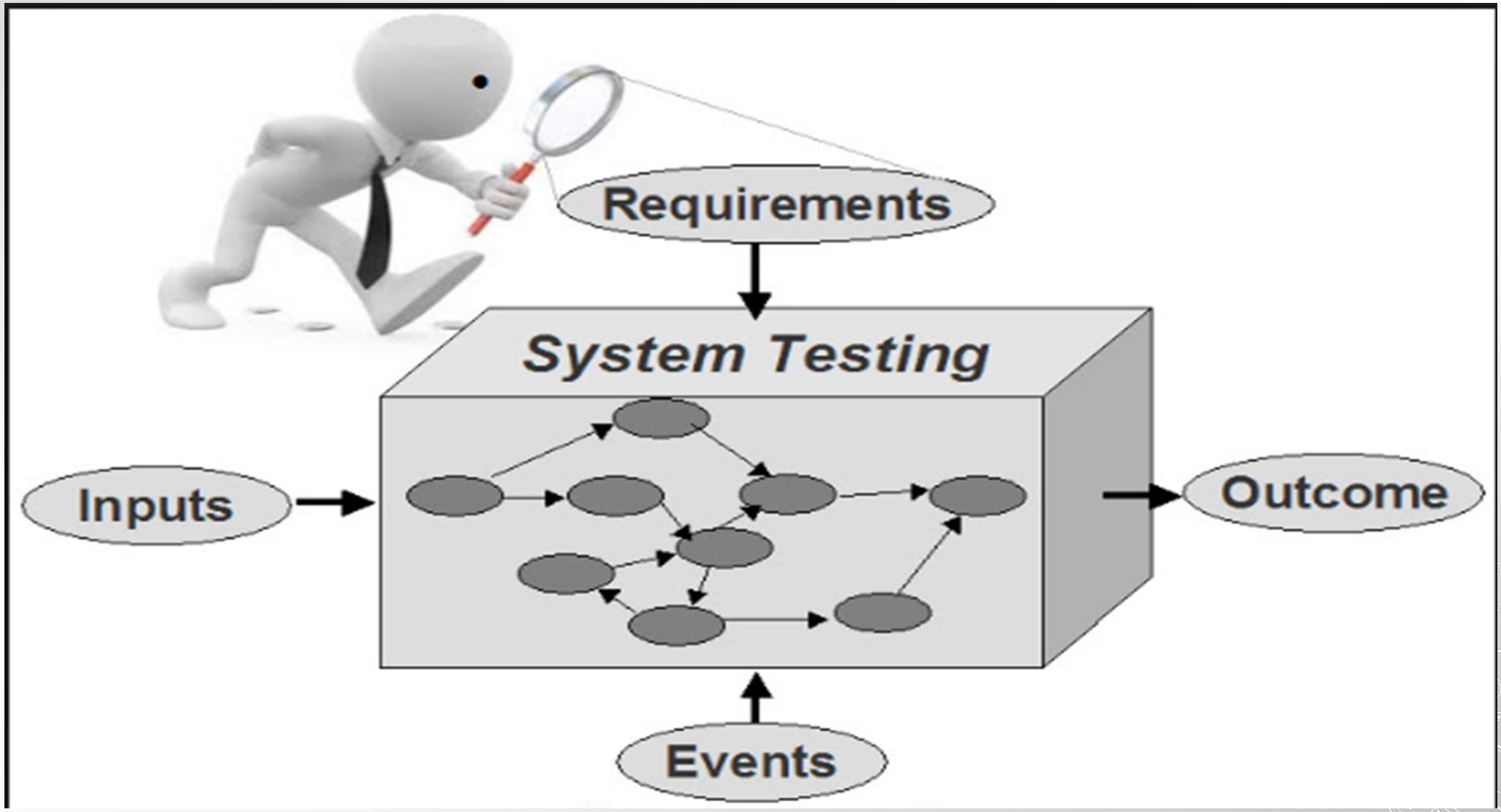


Integration Testing

9.1 Regression Tests and Test Baselines

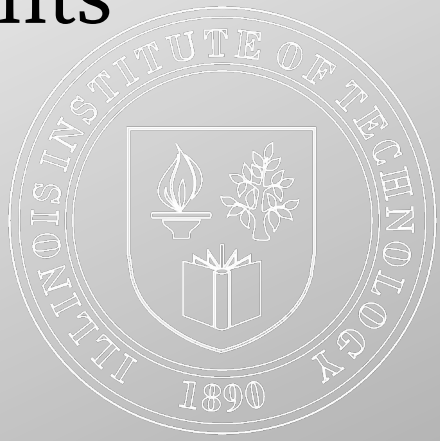
- **System Testing:** Refers to testing the completely integrated system to verify that it satisfies functional, performance, interface, and nonfunctional (availability, reliability, safety, security, etc.) requirements.

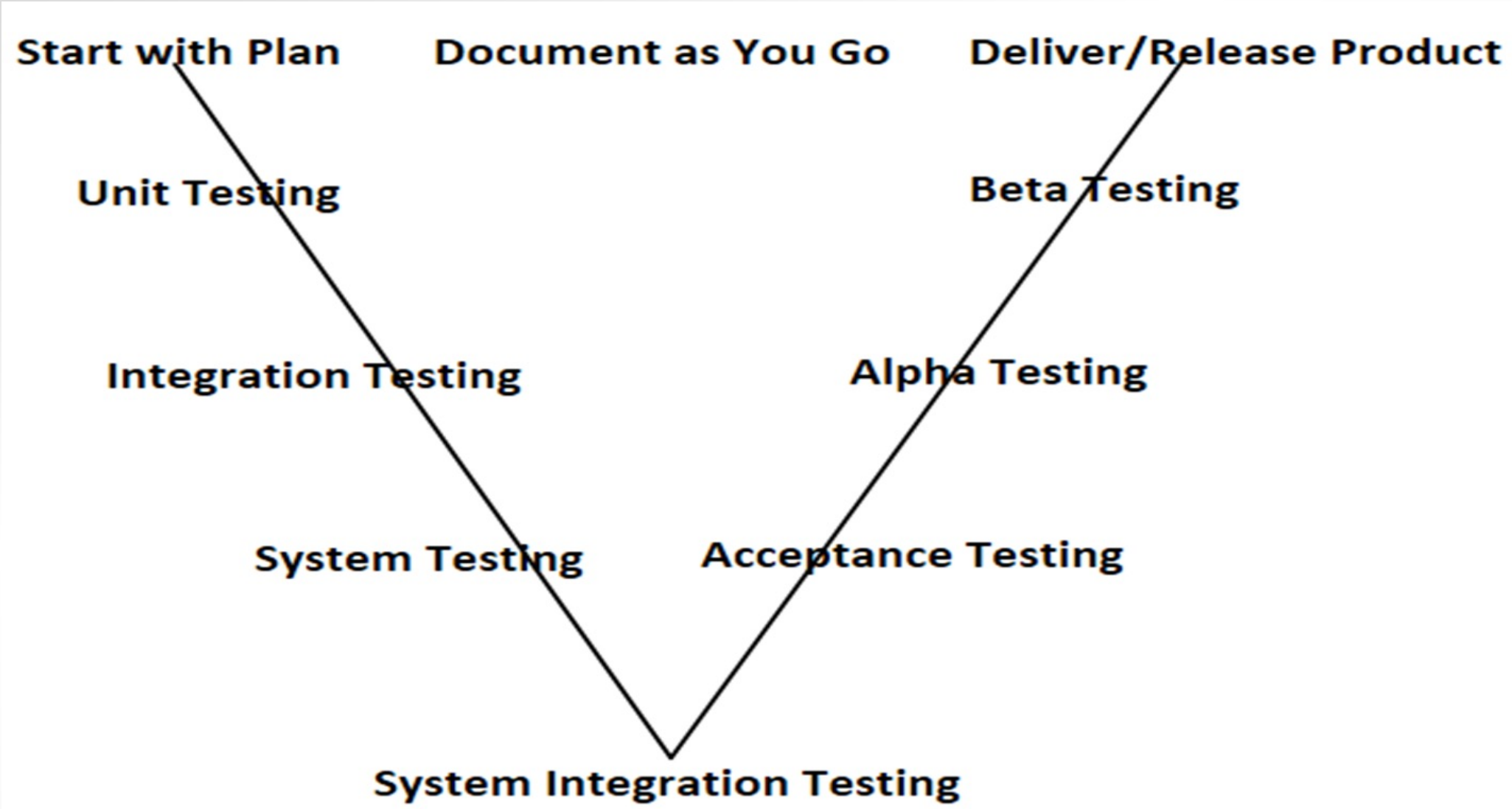



Requirements
System Testing
Inputs
Outcome
Events

9.1 Regression Tests and Test Baselines

- **System Integration Testing:** refers to tests conducted to verify the interfaces and interactions between components as hardware and software are integrated together with each other and any external or third-party systems defined by the systems requirements into successively larger combinations such as subsystems.



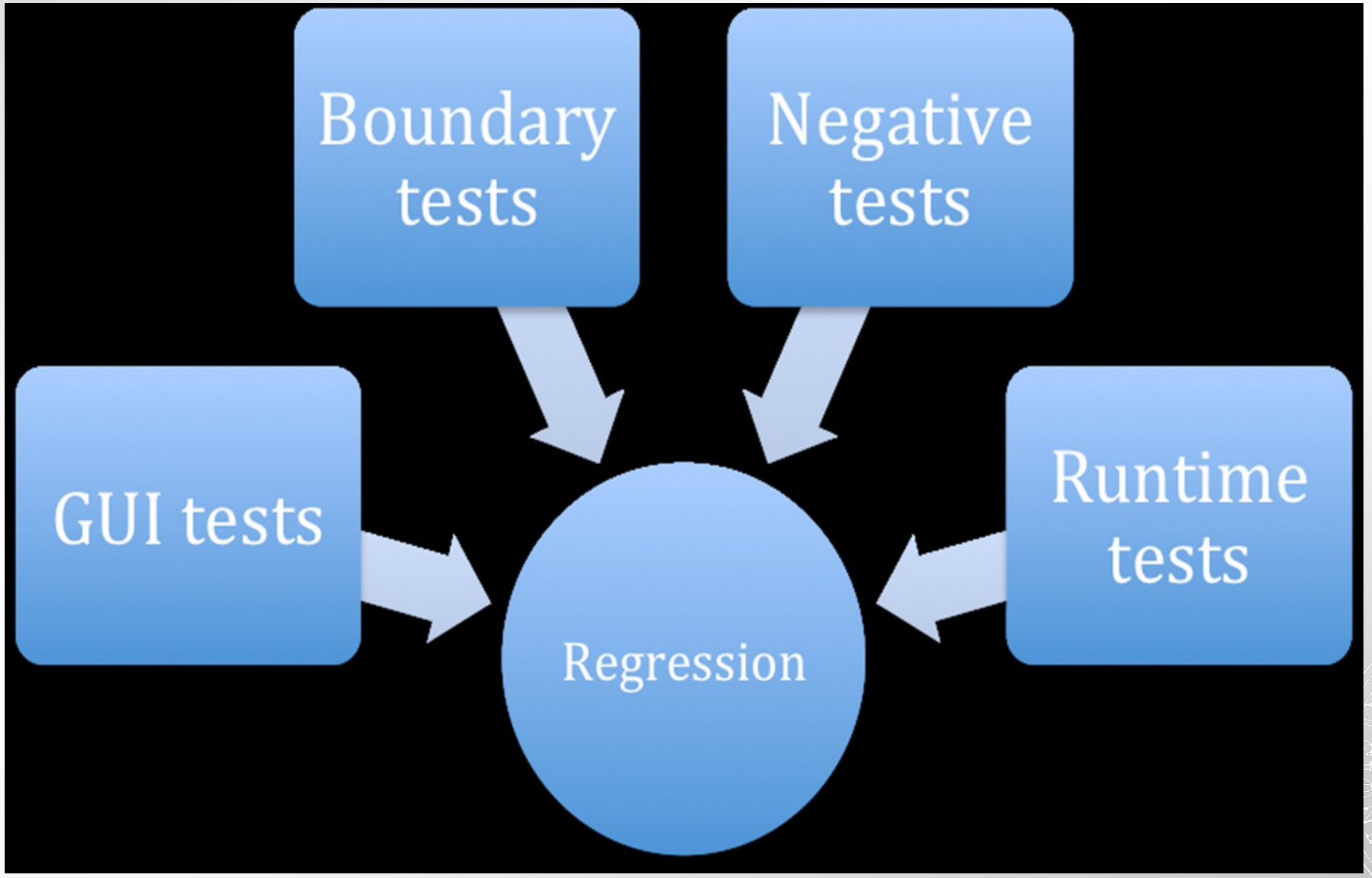

Start with Plan
Document as You Go
Deliver/Release Product
Unit Testing
Beta Testing
Integration Testing
Alpha Testing
System Testing
Acceptance Testing
System Integration Testing


System Integration Testing

9.1 Regression Tests & Test Baselines

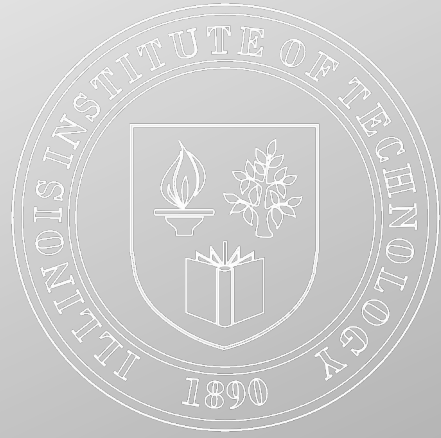
- **Regression Testing:** Refers to test software releases to verify that modifications made to them have not caused any unintended effects. The software system and its components still satisfy it's specified requirements and performs as intended. Run previously executed tests in sequence to check the system functions the same.


Regression
Testing


Boundary tests
Negative tests
GUI tests
Runtime tests
Regression

9.1 Regression Tests and Test Baselines

- **Acceptance Testing:** Refers to black-box testing conducted by the customer on a software system aimed at confirming that it satisfied its specifications and performs as expected on operational hardware prior to accepting transfer of ownership.

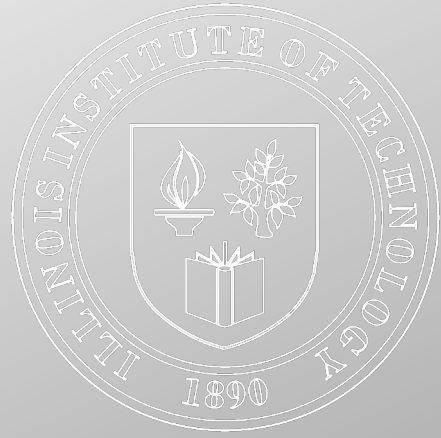


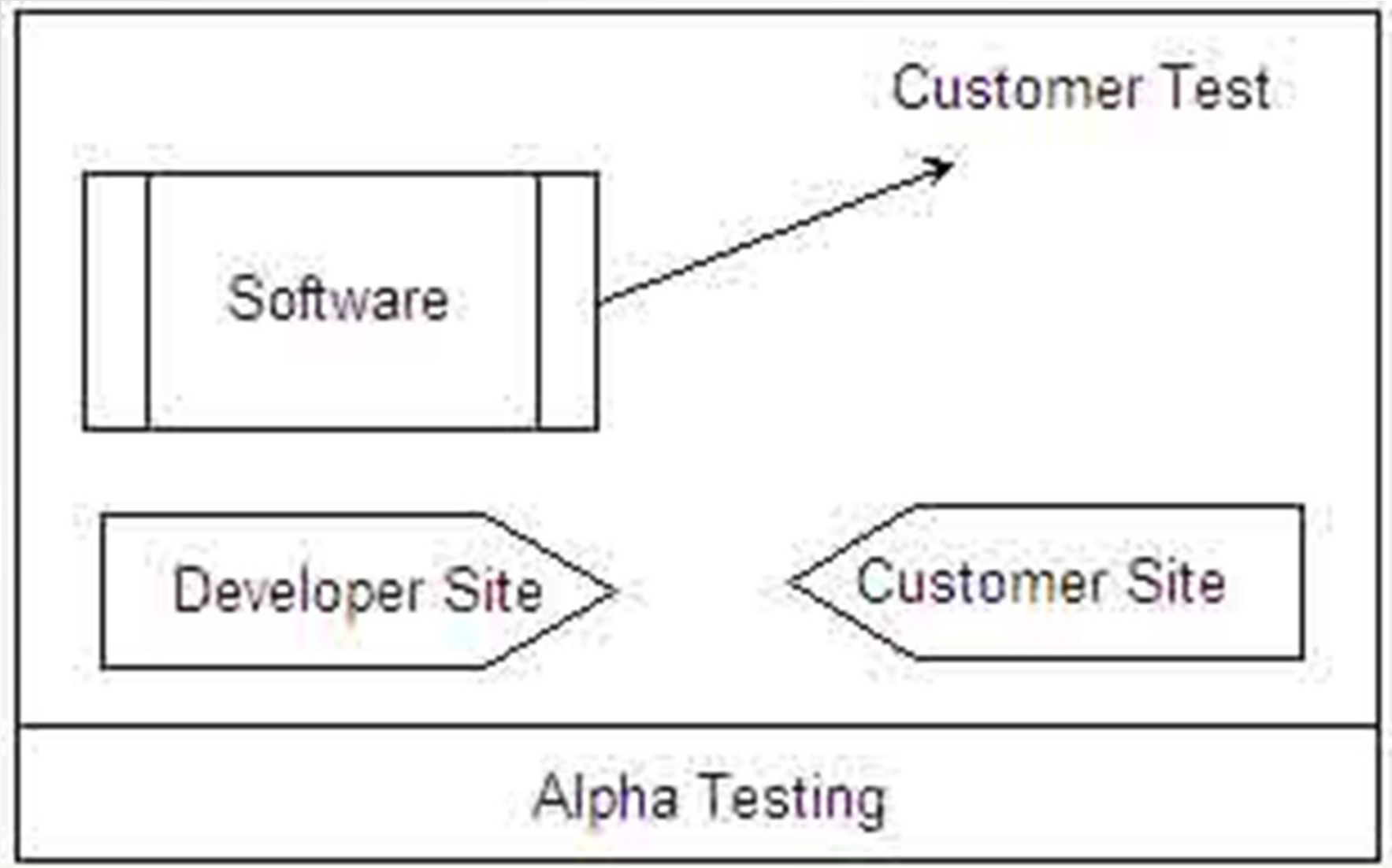

Acceptance Testing
needs
requirements
business demands
www.qatestlab.com


Acceptance Tests
NO
YES

9.1 Regression Tests and Test Baselines

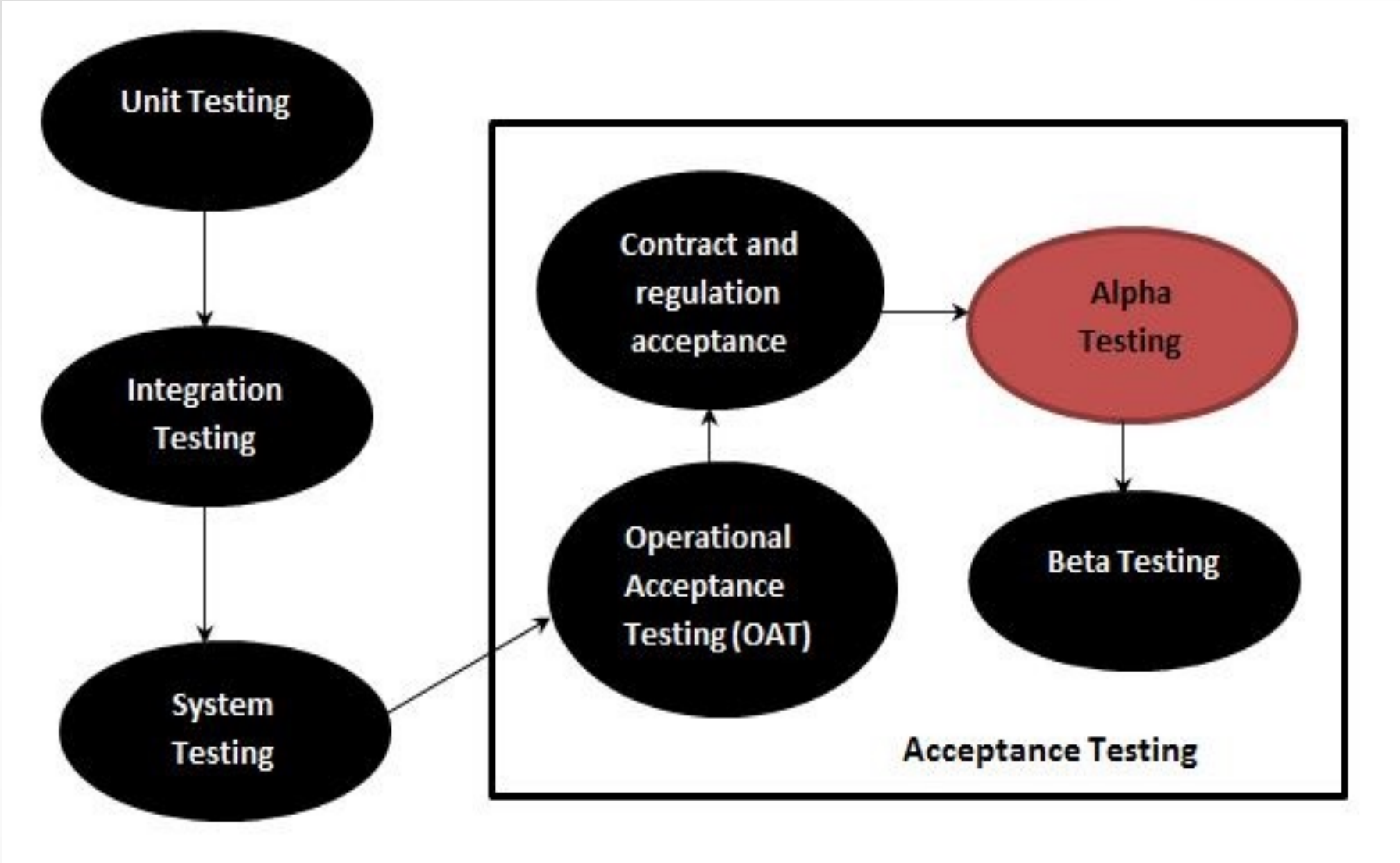
- **Alpha Testing:** Refers to testing conducted by an independent team to ensure that the software functions as expected and can be implemented with the same characteristics in its operational environment.




Customer Test
Software
Developer Site
Customer Site
Alpha Testing

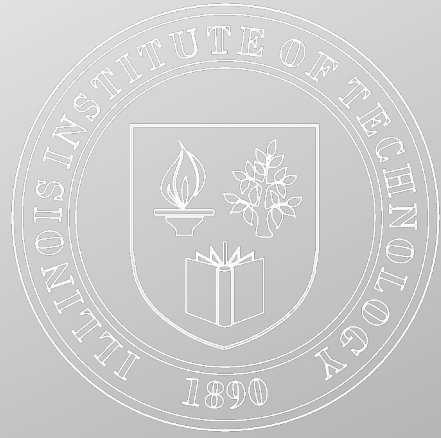
9.1 Regression Tests and Test Baselines

- **Beta Testing:** Refers to testing performed by external potential users aimed at ensuring that their needs are met. Typically, an independent group coordinates the tests conducted by outsiders and ensure that recommendations made by them are considered and potentially implemented.


Unit Testing
Integration Testing
System Testing
Contract and regulation acceptance
Alpha Testing
Operational Acceptance Testing (OAT)
Beta Testing
Acceptance Testing

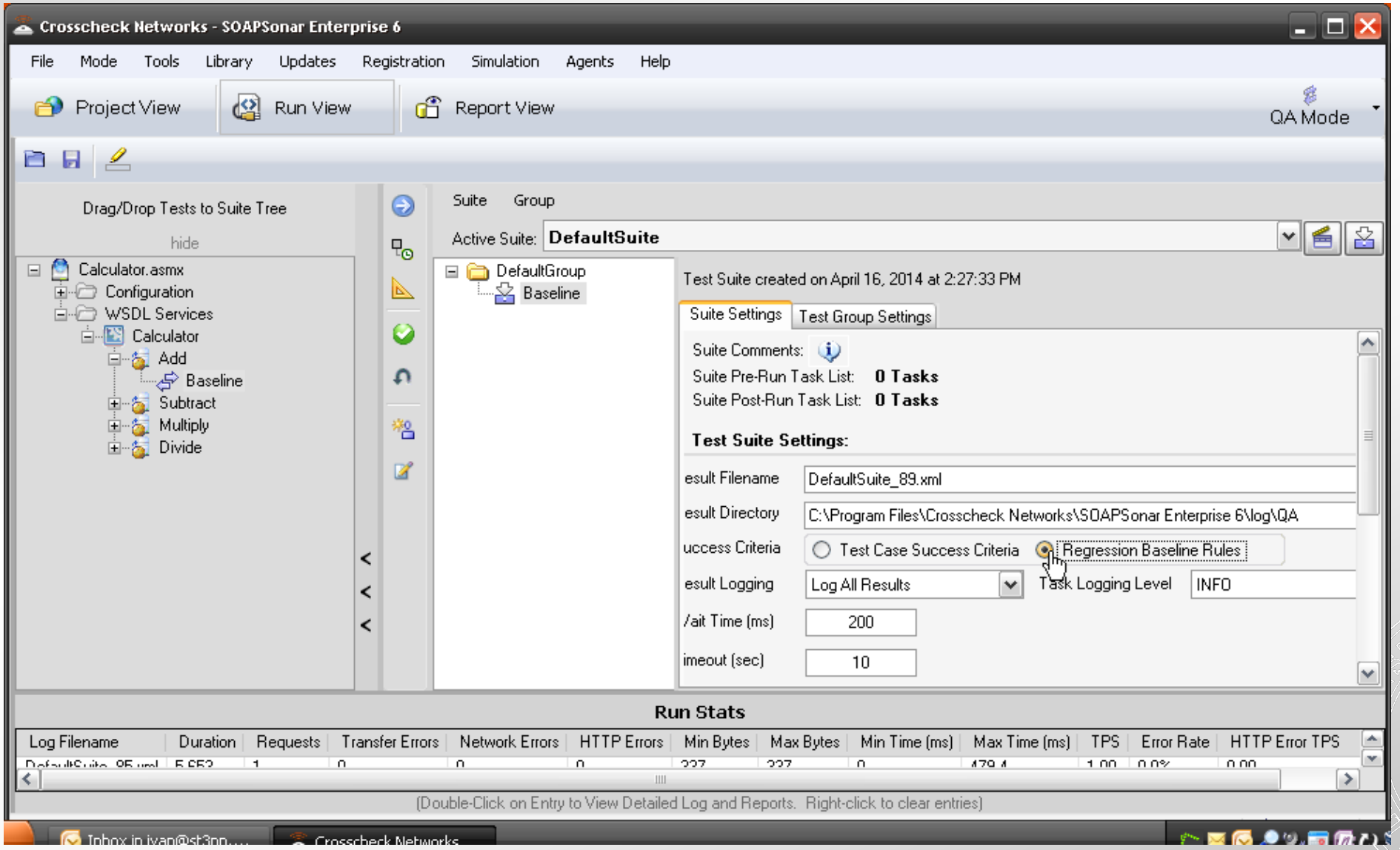
9.1 Regression Tests and Test Baselines

- Regression tests are run to ensure that the release executes as the users expect on their operational platforms. During these runs, you will need to verify that side effects are not present and operations will not be disturbed by the changes.



9.2 Revalidation and Qualification

- Regression test fulfills a dual purpose. It revalidates the release:
  - 1. will satisfy its requirements including those for external interfaces and any changes included and
  - 2. will perform as intended after repairs have been made as configured/tailored for the user's operation without any side effects.


Crosscheck Networks - SOAPSonar Enterprise 6
File Mode Tools Library Updates Registration Simulation Agents Help
Project View
Run View
Report View
QA Mode
Drag/Drop Tests to Suite Tree
hide
Calculator.asmx
Configuration
WSDL Services
Calculator
Add
Baseline
Subtract
Multiply
Divide
Suite Group
Active Suite: DefaultSuite
DefaultGroup
Baseline
Test Suite created on April 16, 2014 at 2:27:33 PM
Suite Settings
Test Group Settings
Suite Comments:
Suite Pre-Run Task List: 0 Tasks
Suite Post-Run Task List: 0 Tasks
Test Suite Settings:
esult Filename
DefaultSuite_89.xml
esult Directory
C:\Program Files\Crosscheck Networks\SOAPSonar Enterprise 6\log\QA
uccess Criteria
Test Case Success Criteria
Regression Baseline Rules
esult Logging
Log All Results
Task Logging Level
INFO
/ait Time (ms)
200
imeout (sec)
10
Run Stats
Log Filename
Duration
Requests
Transfer Errors
Network Errors
HTTP Errors
Min Bytes
Max Bytes
Min Time (ms)
Max Time (ms)
TPS
Error Rate
HTTP Error TPS
(Double-Click on Entry to View Detailed Log and Reports. Right-click to clear entries)

9.2 Revalidation and Qualification

- It is highly recommended that regression tests be automated using scripts developed specifically for that purpose. Such scripts should also be designed to automatically compare results to expectations and highlight any differences found. This will simplify the testing process considerably fast, reusable and repeatable.

9.2 Revalidation and Qualification

Time to market	95%	earlier on production
Productivity	14	times more effective
Savings	76%	on head count
Savings on investment	83%	equipments and room space
Savings on cost of money	83%	on periphals
Enviroment protection	1	more committed to nature

9.3 Field Testing and Releases

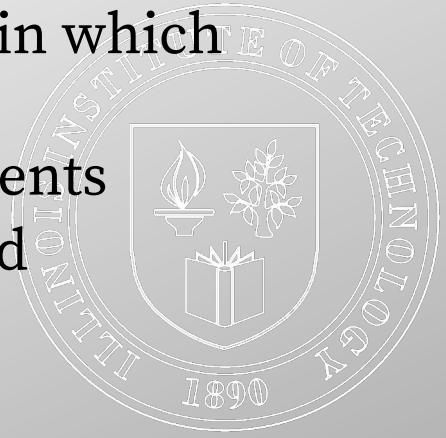
- Releases to the field are, by design, configured, adapted, and tailored to the needs of the operational facility. Field testing of releases is by its very nature intended to check out operational considerations like setup parameters and power up, boot and shutdown procedures.

9.3 Field Testing and Releases

- Speed and performance of the application (response time, CUPU and memory utilization, etc.)
- Data population ease (time to populate and verify application databases)
- Ease of use (measures include time to launch and complete an application or the steps involved in exercising a feature or function.
- Ease of learning (measures include time to learn to use features and functionality)

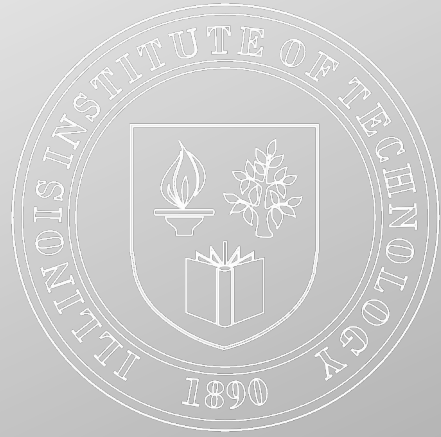
9.4 Field Support and Repairs

- Field support functions that need to be performed by the software maintenance shop besides scheduling and dispatching technical personnel include following:
  - Establish a work order system that defines, tracks, and loses out trouble tickets
  - Creating a Web-based system to provide information to users/customers on field support issues and their resolution (including a frequently asked questions list)
  - Creating a customer database that records the history for each site in which the release is installed, including a patch history
  - Establishing a purchase order system and the means to track payments
  - Creation of a patch management system to track patches in the field



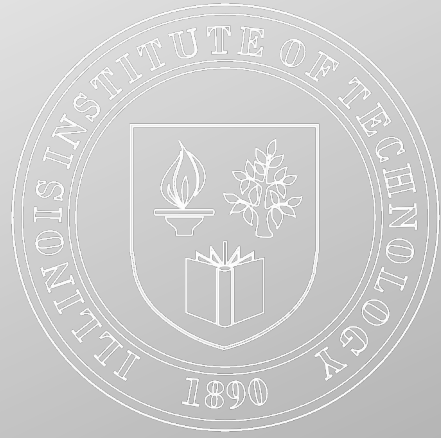
9.4 Field Support and Repairs

- Patches must be approved by management.
- Must used approved procedures and adequately documented and tested
- Categorized as priority 1 defect first



SLA and Supplier Agreements Management

- 4.2.12 The SLA indicators are used for billing purposes
- 4.2.13 Raw data describing costs are available for some maintenance resources (personnel, systems, and contracts/licenses). Maintenance billing captures, presents, and explains the most important cost elements

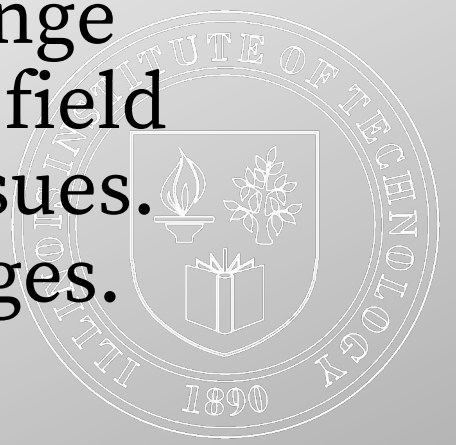


10 Content-Based Annual Releases

- **10.1 Adaptive, Corrective, and Perfective Changes**
- Change to existing software releases is precipitated by actions taken to make adaptive (add new functions, address new platform, etc.) updates to the previous software release.
- Stakeholders require the maintenance team to provide risk assessment, priorities, cost estimates especially when the changes involves potential commercial off-the-shelf (COTS) hardware and software updates and replacements.

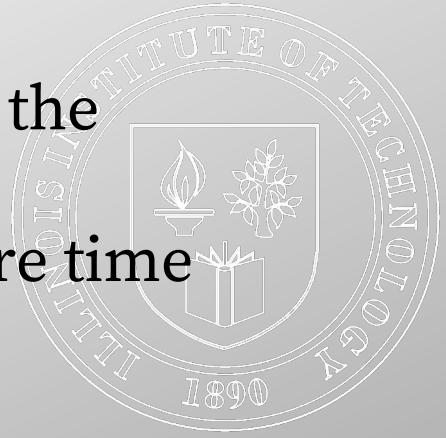
10 Content-Based Annual Releases

- They cannot include everything in the release because of resources limitations (time, money, staff, facility hours etc.)
- The change control board assumes the stakeholders responsibilities in making content decisions.
- *Record/Classify*- Stakeholders initiate a software change request (SCR) for changes or repairs. Defects in the field use the software trouble reports which identifies issues. The change control board (CCB) approves the changes.



10 Content-Based Annual Releases

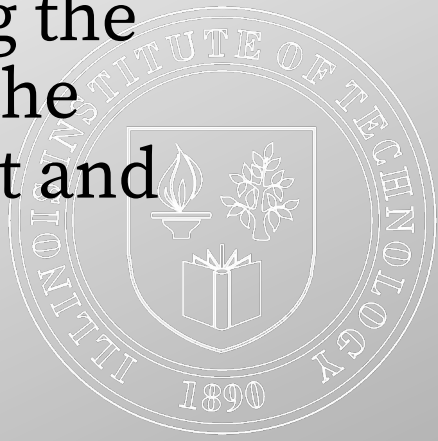
- *Assess* – The CCB tasks a technical team to assess the changes. Request are prioritized based on cost, impact, and implementation risk using the following similar scheme:
  - *Priority 1 (Urgent)* – must make a change in order to continue operations. Such as emergency repairs.
  - *Priority 2 (Critical)* – The change should be made without delay as it may be associated with a known defect that is seriously degrading system functionality or performance.
  - *Priority 3 (Major)* – The change should be made, but delays in the repair are tolerable.
  - *Priority 4 (Minor)* – The change should be made when there are time and resources to do it.

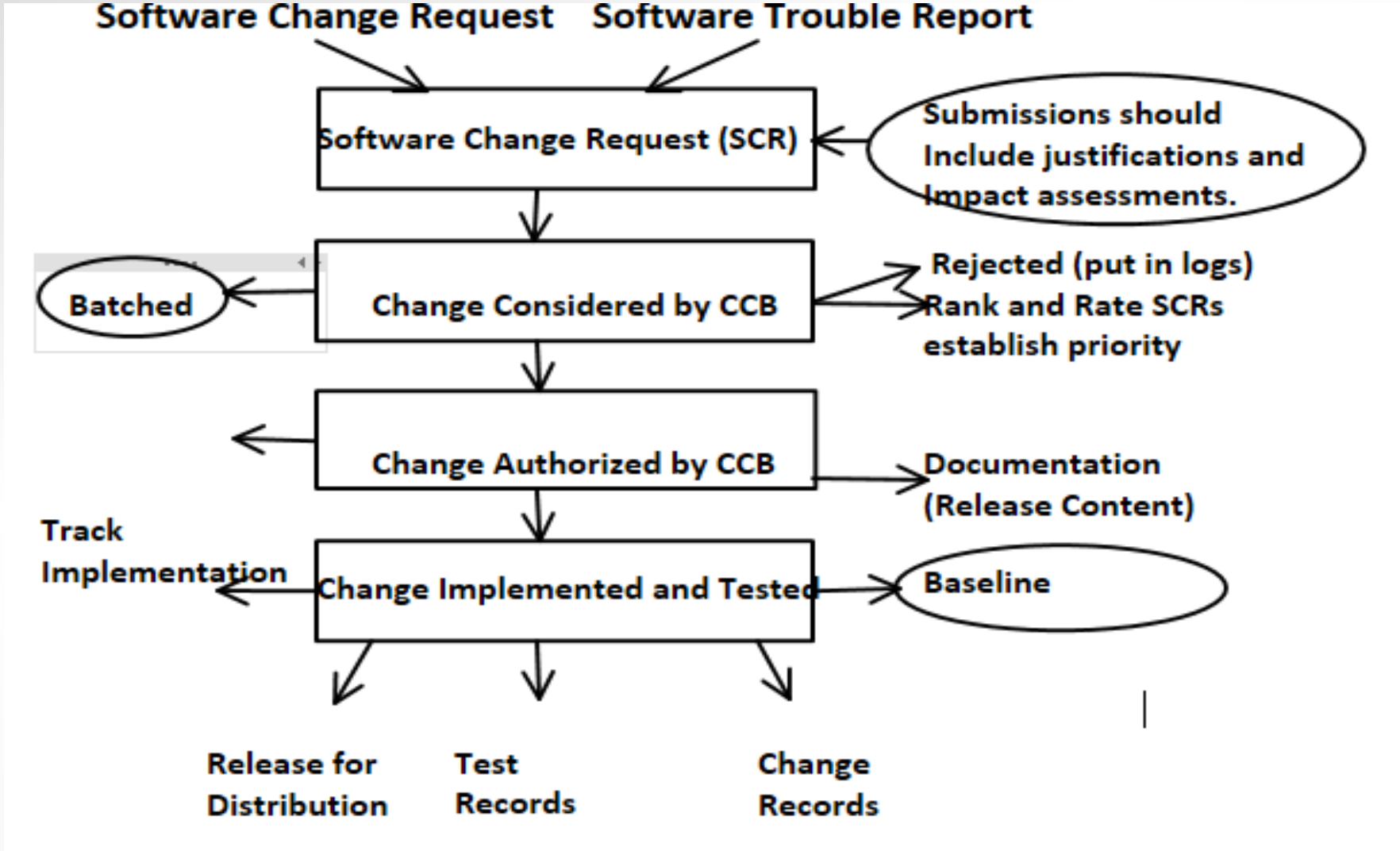



3
High Severity,
Low Priority
1
High Severity,
High Priority
4
Low Severity,
Low Priority
2
Low Severity,
High Priority
Severity
Priority

10 Content-Based Annual Releases

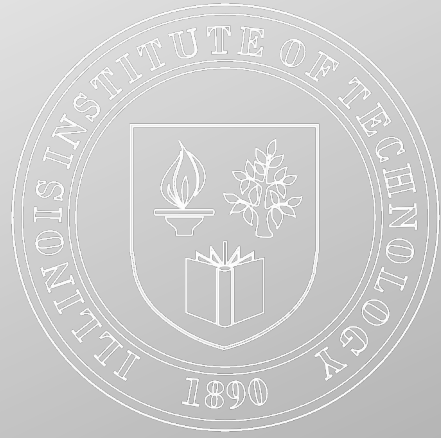
- *Plan* – Stakeholders or CCB agrees on the priority of the issue for changes.
- *Implement* – Stakeholders or CCB agree with the release plan and selected release schedules.
- *Close/Accept* – Changes implemented should be tested and accepted as part of the release update cycle.
- The normal configuration management process following the steps in Change Control Board (CCB) and process to rate the proposed changes based on an assessment of their impact and assignment priorities.

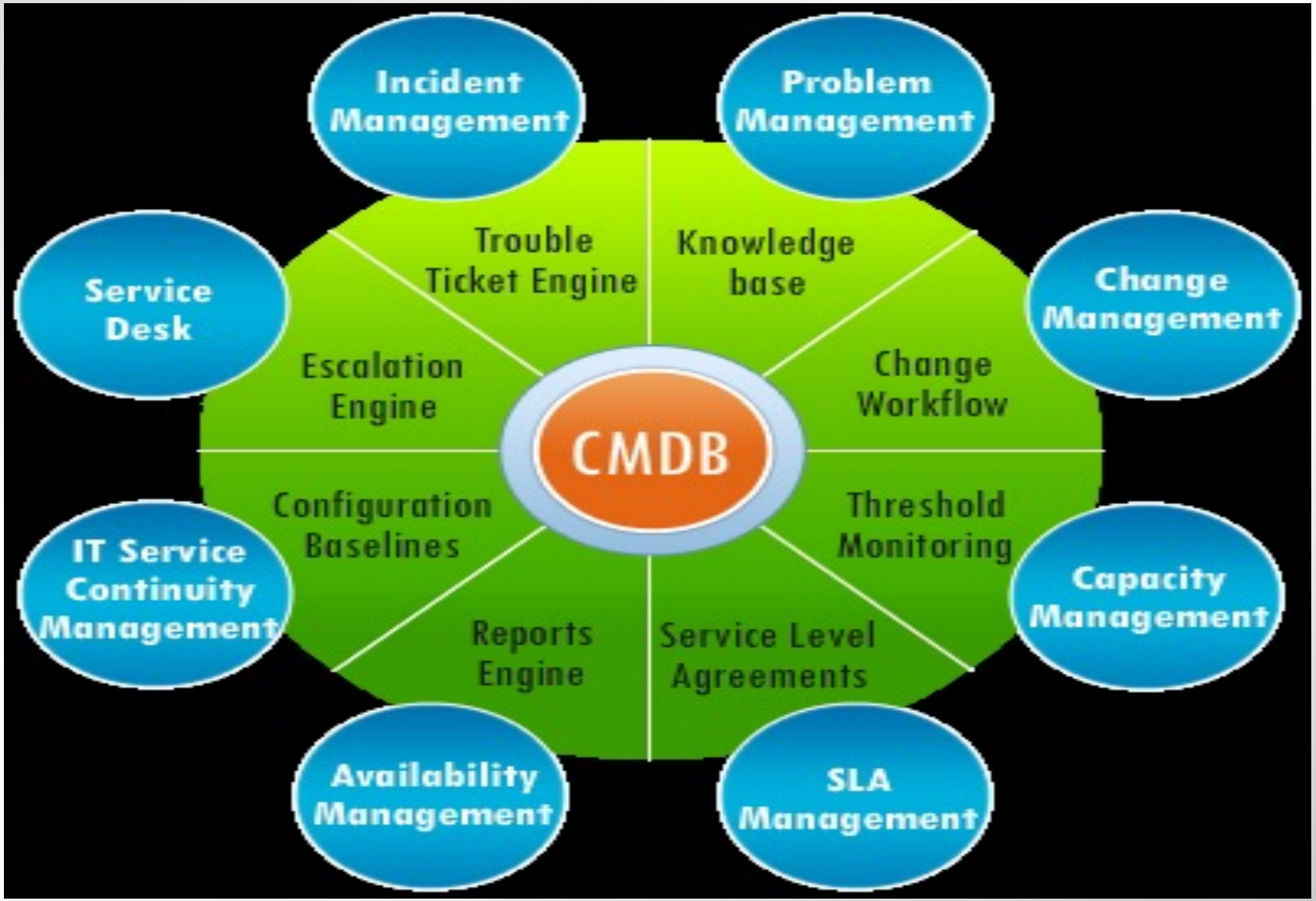



Software Change Request
Software Trouble Report
Software Change Request (SCR)
Submissions should Include justifications and Impact assessments.
Batched
Change Considered by CCB
Rejected (put in logs)
Rank and Rate SCRs establish priority
Change Authorized by CCB
Documentation (Release Content)
Track Implementation
Change Implemented and Tested
Baseline
Release for Distribution
Test Records
Change Records

10 Content-Based Annual Releases

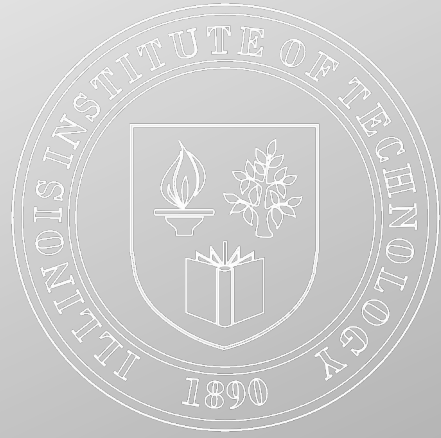
- Change control board membership:
  - 1. CCB Chair – Chair of the board
  - 2. CCB – Stakeholders
  - 3. Originator – Software Change Request
  - 4. Evaluator – person or team
  - 5. Implementation team – Project Lead
  - 6. Verifier – Test team representative
  - 7. Recorder – Person who publish minutes




Incident Management
Problem Management
Service Desk
Trouble Ticket Engine
Knowledge base
Change Management
Escalation Engine
CMDB
Change Workflow
Configuration Baselines
Threshold Monitoring
IT Service Continuity Management
Capacity Management
Reports Engine
Service Level Agreements
Availability Management
SLA Management

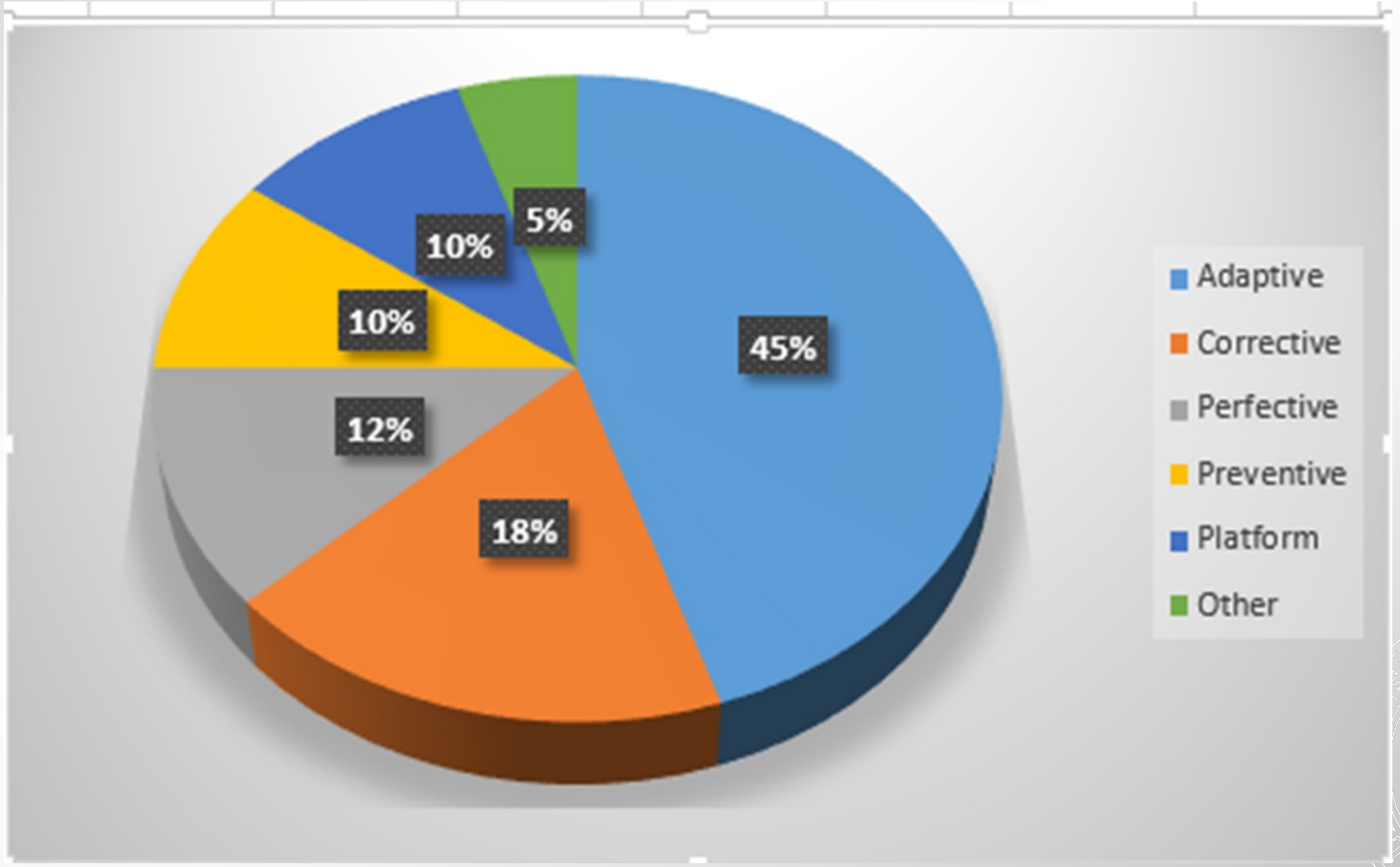
10 Content-Based Annual Releases

- *Adaptive maintenance:* Modification of a software product performed after delivery to keep computer program usable in a changed or changing environment
- *Corrective maintenance:* Reactive modification of a software performed after delivery to correct discovered faults.
- *Perfective maintenance:* Modification of a software product performed after delivery to improve either its performance or maintainability.
- *Preventive maintenance:* Modification of a software product after delivery to correct latent defects before they become problem. This often includes redesign, restructuring, or upgrade of the software to make it easier to maintain.



10 Content-Based Annual Releases

- *Platform maintenance:* Modification of a software product after delivery to ensure that it runs with platform software (operating systems, database managers, utilities, drivers, etc.) that has been updated to incorporate manufacturer recommended changes.


45%
18%
12%
10%
10%
5%
Adaptive
Corrective
Perfective
Preventive
Platform
Other

10 Content-Based Annual Releases

- **10.2 What Changes to Include, When, and Why**
- *Starts with the basics* – The basic ingredients revolve around the schedule and budget established for your release the number of SCRs that you have to process, metrics on your past performance and your backlog.
- *Add the essential stock* – You need to start prioritizing the work that needs to be done assuming that you have estimated the number of SCRs that you can incorporate into the release.

10 Content-Based Annual Releases

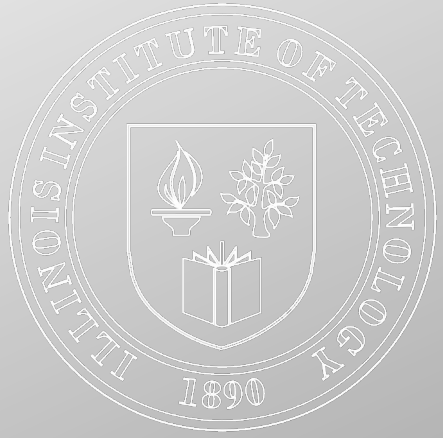
- *Fill the pot* – If you still have resources available in your plan at this point in time, you can add the remaining Priority 2,3 and 4 SCRs.
- *Stir as you cook* – Before you start updating the software generate a map that identifies dependencies between modules.
- *Sample the results* – The unexpected will occur as the release is being generated. Content will have to be added, deleted, and modified based on events, issues, and user/customer preferences. This approach allows you to set expectations so you can minimize surprises.

10 Content-Based Annual Releases

- **10.3 Focus on Quality**
- In commercial world, quality is king.
- Software releases from a historical context, you see what many call the rolling wave model.
- The number of SCRs lessening over time until the next big upgrade occurs.

10 Content-Based Annual Releases

- There are many practices that can be used during software maintenance to continually improve software quality.
- Those who work during development like peer reviews and code reading can be applied with minimal modification during maintenance.

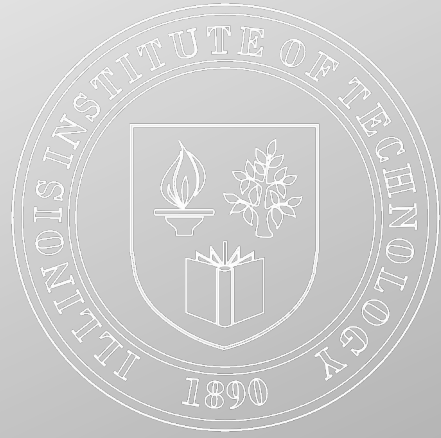


10 Content-Based Annual Releases

- **10.4 Distribution Controls**
- Releases have to be configured, customized, and tailored for distribution to more than one site or geographic region.
- For example, financial packages sold worldwide need to be customized to handle different tax laws and restrictions.
- The practice of distribution control assume that the release being distributed has been baselined, and a master copy of the release and its associated regression tests and documentation have been placed in a physical repository under configuration control.

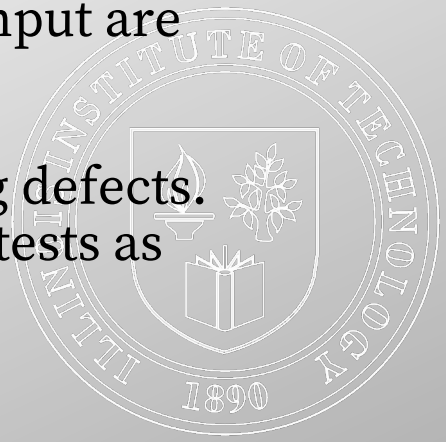
10 Content-Based Annual Releases

- Many variations to these distribution practices occur.
- Specialized install programs may be needed to comply with operating system vendor requirements that call for the established of specialized directories.



Regression Testing

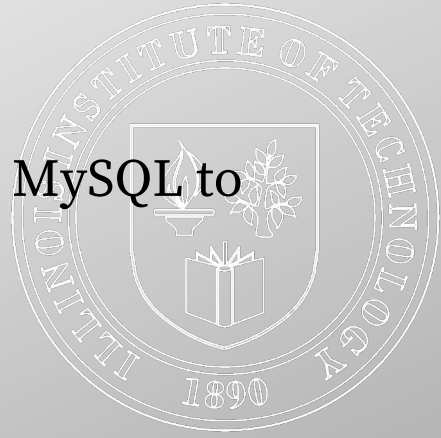
1. What is Regression Testing?
   a. Testing to find if unwanted defects have been created in the changed system
2. When should we do regression testing?
   a. At all levels – unit testing, integration testing and system testing
3. Which test cases do you execute in regression testing?
   a. First, find out the impact of changes to the system. Select only test cases that cover the impacted components of the system.
4. How frequently should you run the regression test?
   a. At least one complete regression test before system deployment to production.
5. Which part of the regression test should be automated?
   a. Test which are stable, repeated frequently, simple and require no tester input are good candidates for automation.
6. How do you ensure that your regression test are effective?
   a. The regression tests should be wide and detailed enough to allow catching defects. You can also eliminate duplicate test cases, merge test cases ad automate tests as feasible.



Regression Testing

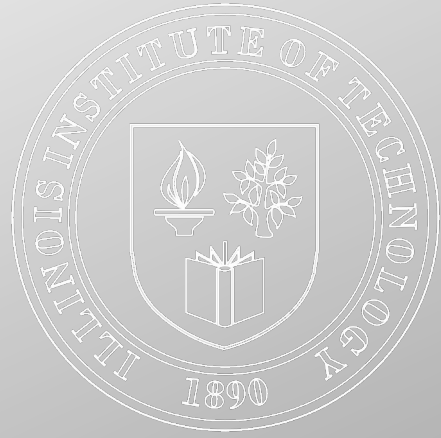
- Repeated testing of an already tested program, after modification, to discover any defects introduced or uncovered as a result of the changes in the software being tested or in another related or unrelated software components.
- We do regression testing by re-executing the tests against the modified application to evaluate whether the modified code breaks anything which was working earlier.

1. When new functionality is added
2. When there is a change requirement
3. When there is a defect fix
4. When there is a Performance Issue Fix
5. When there is an Environment change (example Updating the Database from MySQL to Oracle)



Business and Quality Analyst Question

1. Within a project, the project manager is the navigator and the business analyst is the captain
   - True
   - False
2. The first role of a business analyst with a project is to _____organization _____.
   - Design, peripherals
   - Create, obstacles
   - Validate, objectives
   - Analyze, strategies



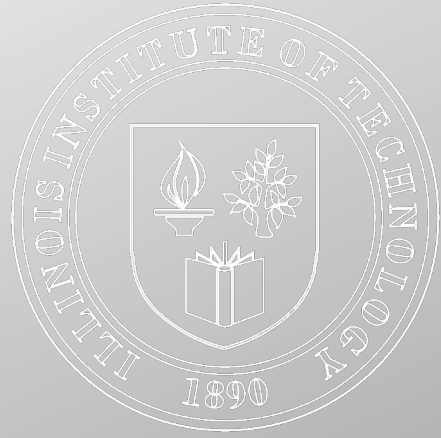
Business and Quality Analyst Question

3. What is the overall outcome of a project?
   - Projects create outdated products to devalue the organization.
   - Projects produce nothing for an organization.
   - Projects create temporary solutions to big issues.
   - Projects create products that are applied to improve the position of the organization.

Business and Quality Analyst Question

4. What are some skills that a business analyst must have for sustained growth?

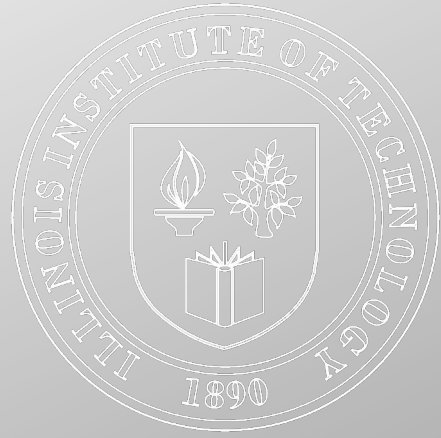
- Patience, communication, diplomacy, sustained enthusiasm, logical thinking
- Dedication, accuracy, perfection, focus
- Summative, literal, bold, patient
- Analysis, collection, verification, erratic thinking



Business and Quality Analyst Question

5. Understanding the _____will assist the business analyst on how the need for change can be justified.

- Nuance
- Context
- Worth
- Climate



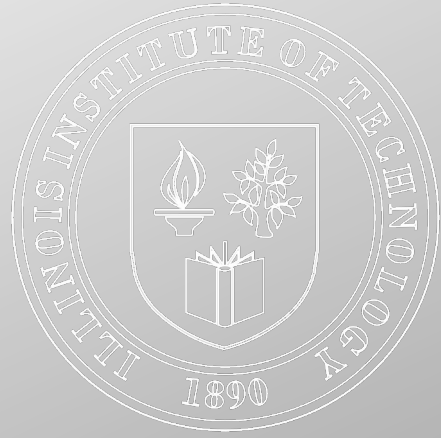
Business and Quality Analyst Question

6. The scope statement identifies _____.
   - The project objective, the testing phase and the delivery phase.
   - The stakeholders, the program mangers and the application.
   - What will be accomplished, areas that will be involved and the areas that will not be involved.
   - The business objectives, the stakeholders and the trainers.

Business and Quality Analyst Question

7. A business analyst should check for conflicts or inconsistencies in process execution.

- Ture
- False



Business and Quality Analyst Question

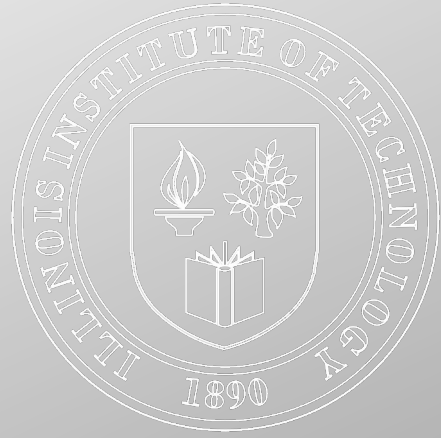
8. What are the common business perspectives used in creating objectives?

- Collect data from clients, create an assessment, ask a manager
- Determine approach, use logical thinking, analyze the application
- Ask colleagues, use the gap-fit analysis, use a questionnaire
- Use common structures, understand and share the starting point, have measurable target

Business and Quality Analyst Question

9. What is the root cause of an organization proposing unrealistic solutions?

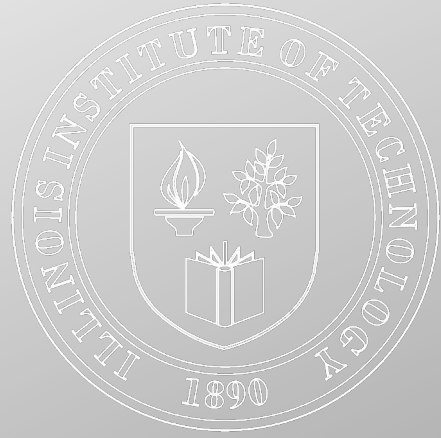
- Unrealistic approach
- Lack of investigation and analysis
- Lack of purpose and analysis
- Bad planning



Business and Quality Analyst Question

10. _____is commonly cited as the number one reason for project success.

- Project scope
- Best approach
- User involvement
- Planning analysis



Business and Quality Analyst Question

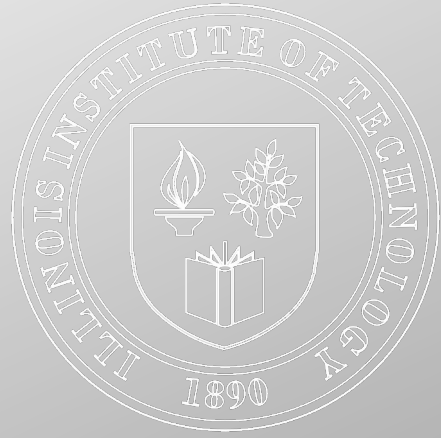
11. What are the techniques for gathering requirements from stakeholders?

- Interview, brainstorming, sessions, process observation, surveying, joint requirement session
- Lewis and Clark approach objective, implementation
- Design scope, define objective, implementation
- Gap fit analysis, ADDIE model, project plans

Business and Quality Analyst Question

12. What are the four layers of the requirement pyramid?

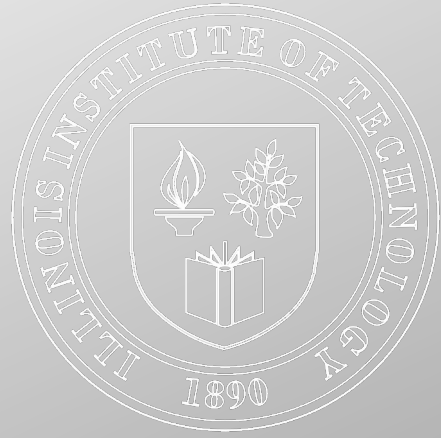
- Project need, requirements, specifications and designs, execution
- Project need, training analysis, approach, execution
- Application, stakeholders, training, surveys
- Logical thinking, stakeholders, designs, surveys



Business and Quality Analyst Question

13. Business requirements are commonly expressed in terms of measurable _____and _____

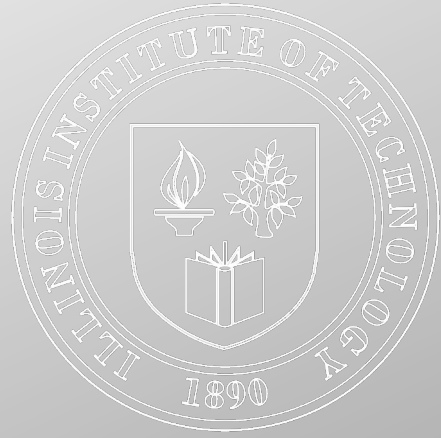
- Questionnaires, specifications
- Surveys, assessments
- Training, choices
- Objectives, outcomes



Business and Quality Analyst Question

14. While building the requirement plan, business analysts should define terms and acronym meanings.

- Fales
- True



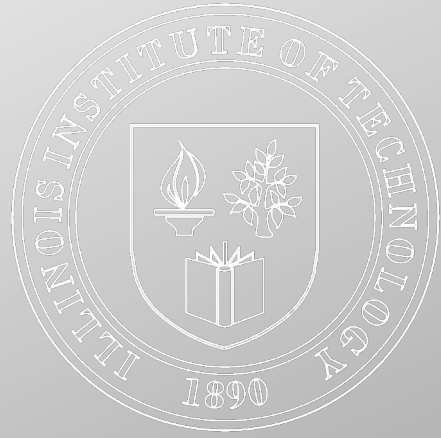
Business and Quality Analyst Question

15. What are ways to source requirements?
    - Interviewing stakeholders only
    - Analyzing processes and use cases, inspecting forms and reports, understanding exiting features
    - Using the library, going to the company website
    - Asking questions to end users, having end users build the training

Business and Quality Analyst Question

16. Structuring the interview process is important in building _____, understanding and instilling _____ with the user.

- Respect, tension
- Rapport, trust
- Questions, loyalty
- Confidence, trust



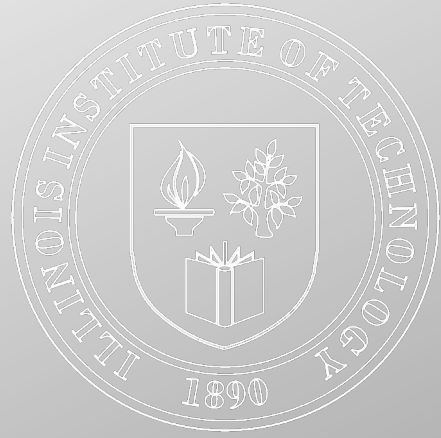
Business and Quality Analyst Question

17. What are the rules to brainstorming?
    - Capture off topic ideas, keep the energy low no debating
    - Let everyone speak, call end users into the meeting low volume is the goal
    - Set a time limit, schedule a room, order lunch
    - Clearly state objectives and deliverables, one person speaks at a time, high volume is the goal, piggybacking encouraged

Business and Quality Analyst Question

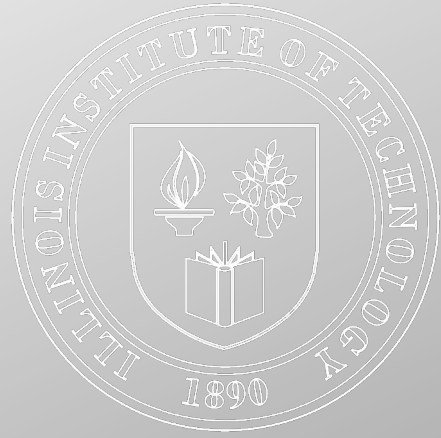
18. Observing processes can be performed passively by _____.

- Job profiling
- Internet surfing
- Job shadowing
- Cold calling



Business and Quality Analyst Question

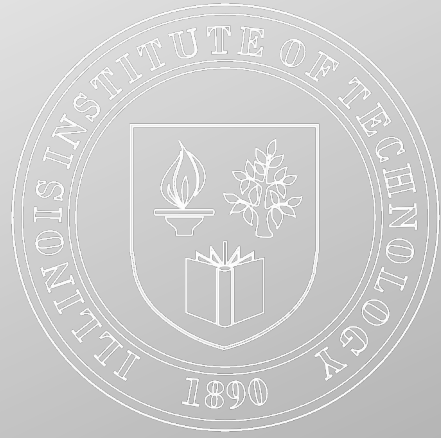
19. What are the two types of questions used in a survey?
    - Smart questions, multiple choice questions
    - Grouped questions, coded questions
    - Open-ended questions, closed questions
    - Elicit questions, backbone questions



Business and Quality Analyst Question

20. Which traceable matrix requirement is used to ensure you do not over or under deliver?

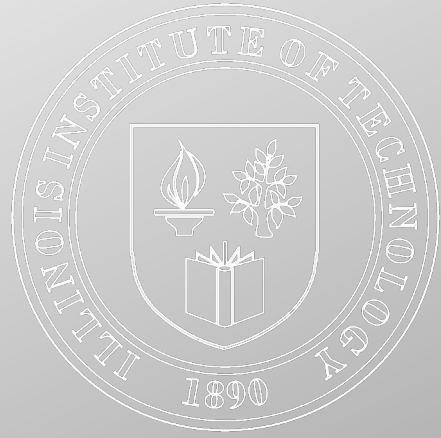
- Credit statistics
- Boundary conditions
- Source documentation
- Scope/objective alignment



Business and Quality Analyst Question

21. The _____activity and _____review of status should be significant events that are reflected in your plans.

- Statistical, periodic
- United, aligned
- Logical, systematic
- Mapped, periodic



Business and Quality Analyst Question

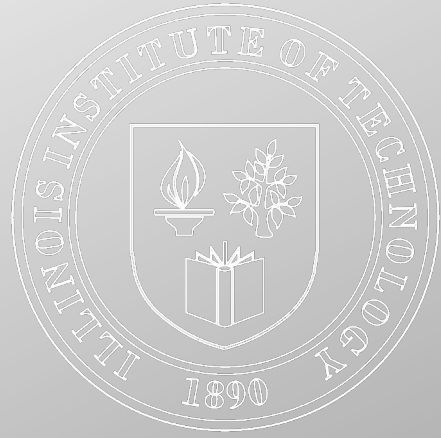
22. What are ways to insure that you have collected complete and universally understood requirements?

- Insure your work with the company intranet site
- Insure your work with the project plan
- Insure your work with the training team
- Insure your work with each department or business are affected by the project

Business and Quality Analyst Question

23. The requirements package must fire a crisp introduction of the intended business improvements.

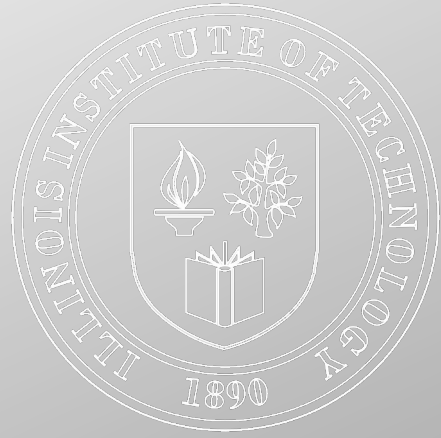
- False
- Ture



Business and Quality Analyst Question

24. The verification process may include multiple _____and require _____.

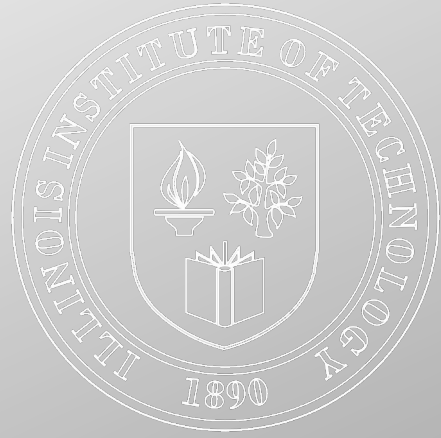
- People, meetings
- Questions, briefings
- Businesses, training
- Sessions, input



Business and Quality Analyst Question

25. What are two techniques in approaching documentation inspection?

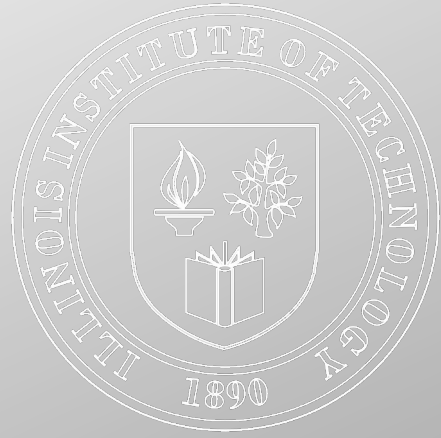
- Quality review, informal inspection
- Questionnaires, evaluation sessions
- No review, training sessions
- Peer review, formal inspection



Business and Quality Analyst Question

26. A _____ manual explains how a process is indented to function.

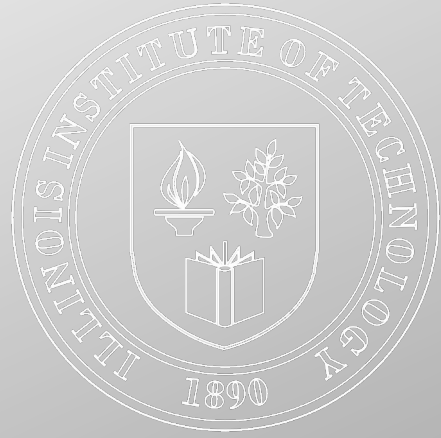
- Procedure
- Legacy
- Training
- Instructor



Business and Quality Analyst Question

27. What is the metric rule of thumb for manager-worker alignment while executing processes?

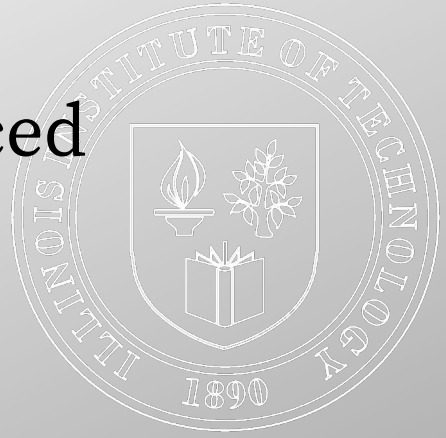
- The metric rule is 90%
- The metric rule is defined by processes
- The metric rule is 75%
- There is no metric rule for this area



Business and Quality Analyst Question

28. What are some characteristics of acceptance criteria?

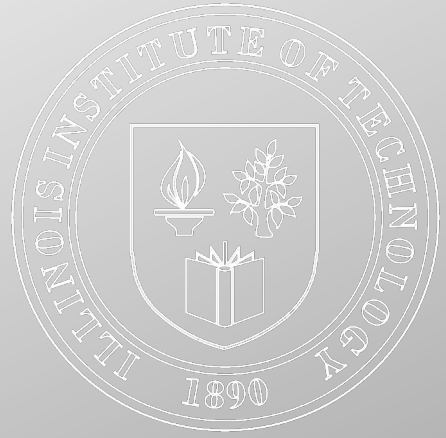
- Training implementation, training delivery, training evaluation
- Gap fit analysis, project accounting, project scope
- Reflect specific business outcomes, expectations of stakeholders are reflected, project priorities reinforced
- Marketing goals, business plans, metric rules



Business and Quality Analyst Question

29. _____are based on the measurable elements of the signed off requirements found in the requirements packages.

- Test scripts
- Information maps
- Test cases
- Training manuals



Business and Quality Analyst Question

30. What is the focus of the test plan document?

- To describe the training plan
- To describe what to test and how to test
- To describe the project objectives
- To derive the training curriculum