### Cisco Systems Reusable Information Object Strategy

Definition, Creation Overview, and Guidelines

> Version 3.0 June 25 1999

Table of Contents	Forward	1
	What is the Reusable Information Object Strategy?	2
	Why Are RIOs Important to Cisco?	3
	What is the RLO-RIO Structure?	4
	RIO Creation Process	6
	Phase I: Design	7
	Phase II: Development	9
	Phase III: Delivery	11
	Phase IV: Evaluation	12
	Guidelines for Building the RLO	13
	1. Overview	14
	2. Summary	16
	3. Assessment	17
	Guidelines for Building RIOs	19
	Practice Items	21
	Assessment Items	23
	Cognitive Level	25
	1. Concept	27
	2. Fact	30
	3. Procedure	32
	4. Process	35
	5. Principle	38
	RLO-RIO Structure Summary	41

#### Forward

Abstract	Cisco Systems recognizes a need to move from creating and delivering large inflexible training courses, to database driven objects that can be reused, searched, and modified independent of their delivery media. This effort is called the Reusable Information Object Strategy.
_	This strategy defines the standards and process for designing and developing Reusable Information Objects (RIOs) at Cisco Systems.
Audience for this Document	This document assumes the reader has experience in course development, training or instructional design; or, the reader is responsible for creating content and information that will be used to build Reusable Information Objects.
_	However the RIO Strategy itself is designed to be used by ANY content providers, be it third party developers, Cisco Sales Engineers, or other content experts from the Cisco line of businesses.
Authors	<ul> <li>Chuck Barritt</li> <li>Deborah Lewis</li> <li>Wayne Wieseler</li> </ul>
Contributors and RIO Team	<ul> <li>Chris Berriman</li> <li>Rick Crowley</li> <li>Joell Chapman</li> <li>Michael King</li> <li>John Knopp</li> <li>Peg Maddocks</li> <li>Ned McDaniels</li> <li>George Ward</li> <li>Mike Wenstrom</li> </ul>

### What is the Reusable Information Object Strategy?

Introduction	Training offerings need to move from large, inflexible "courses" to reusable, granular objects that can be written independent of a delivery media and accessed dynamically through a database. The Reusable Information Object (RIO) Strategy describes how this is being done at Cisco Systems.
Reusable Information Object	The RIO Strategy is built upon the Reusable Information Object (RIO). An RIO is granular, reusable chunk of information that is media independent. An RIO can be developed once, and delivered in multiple delivery mediums.
	Each RIO can stand alone as a collection of content items, practice items and assessment items that are combined based on a single learning objective.
	Individual RIOs are then combined to form a larger structure called a Reusable Learning Object (RLO).
	See "What is the RLO-RIO Structure?" for more detail about these objects.
Other Ways of Saying It	Reusable objects are popular in the fields of human performance technology and knowledge information management.
	Other terms used in the industry include:
	Educational objects
	<ul> <li>Learning objects</li> <li>Content objects</li> </ul>
	Training components
	• Nuggets
	• Chunks
Based on Experts	The RIO Strategy represents a synthesis of modified information mapping and the work of Dr. Ruth Clark fitted Cisco System's requirements.
	In defining a methodology to design and develop training, Dr. Clark combines a modification of information mapping with Dr. Merrill's component display theory. The result is a structured approach for creating and categorizing content based on five information types: concept, fact, process, procedure, and principle.
	Cisco System has adopted Dr. Clark's methodology, and added unique elements that make our database driven, Reusable Information Object Strategy possible.
	See " <i>References</i> ," in lieu of footnoting, for a listing of major sources that have been used, either directly or indirectly.

### Why Are RIOs Important to Cisco?

Introduction	If you attend any conference on human performance technology, online learning, or traditional training, you'll find presentations on reusable, database-driven learning objects. Very few organizations have actually developed a methodology to design, develop and implement Reusable Information Objects.
Paradigm Shift	Traditional training "courses" are built as large, monolithic structures that are difficult to repurpose into searchable self-paced objects. For example, the average instructor-led training (ILT) is a five-day event, built around 60-minute lectures followed by 30- minutes of Learner activities. The ILT experience is fixed in length, sequence and scope.
	This instructor-led model does not addressed the need for similar knowledge and skills to be taught on self-paced, media driven platforms such as the Web. The RIO Strategy addresses this problem. However, the strategy requires a shift in how content is designed, developed and "published."
Benefits for Authors	<ul> <li>RIO specific templates ensure that design and development is consistent across the organization.</li> <li>Authors write effective and efficient job/task based training.</li> <li>Authors can reuse any an RIO in future development.</li> <li>Authors can combine old and new RIOs to form larger structures called Reusable Learning Objectives (RLOs.)</li> <li>The same database of RIOs can be used to create leader-led training, self-paced web based training or performance support tools.</li> </ul>
Benefits for Learners	<ul> <li>Presentation and structure of information is consistent across RIOs.</li> <li>RIOs act as a job aid or performance support tool, giving the Learners just-in-time access to training and information.</li> <li>Delivery modes are customized to best match the individual learning style of the Learner.</li> <li>Custom learning paths are tailored to the knowledge and skills the individual Learner needs to acquire.</li> </ul>

#### What is the RLO-RIO Structure?

#### Introduction

Individual RIOs can be combined to form a larger structure called a Reusable Learning Object. As you view the illustration below showing the relationship between the RLO and RIOs, keep in mind that the primary focus of this document is to describe what it takes to build this structure.

Inside the RLO

A Reusable Learning Object is created by combining an Overview, Summary, Assessment and five to nine  $(7 \pm 2)$  RIOs.



An RLO is based on a single objective, derived from a specific job task. Each RIO is built upon an objective that supports the RLO's objective.

The Overview, Summary and Assessment are defined in detail in the "Building a RLO" section of this document.

Inside the RIO Combining content items, practice items and assessment items creates a Reusable Information Object.



Each RIO is built upon a single objective. As defined by Information Mapping, each RIO is classified as either being a Concept, Fact, Process, Principle or Procedure.

Content items and Practices (learning activities) are presented to the Learner to support that objective.

### What is the RLO-RIO Structure? (continued)

	Assessment items are used by the RLO Assessment in order to prescribe individual RIOs or to measure mastery.
	The classifications, content items, practice items and assessment items are defined in detail in the "Building an RIO" section of this document.
From the Learner's Point of View	The Learner can drill into an RIO as a stand-alone performance support tool, job-aid, or just-in-time training coach. An RIO can be titled in any manner that is intuitive to the Learner given corporate style considerations. The terms "page" or "job aid" may be used generically but must fit in several delivery context.
	The Learner may choose to take the entire RLO, which could be called a "lesson." As in any traditional lesson, the RLO gives the Learner the needed learning context, the knowledge and skills they need to perform the given objective, and a method to assess mastery.
	An Administrator or Curriculum Manager may combine RIOs to form larger structures, such as "Modules," "Units" and "Courses" that are based on major topic areas (strands), job functions, time constraints (five day class), or some other business needs.
	As part of a personal portal, RLOs and RIOs can appear as offerings on a "Road Map" that is customize to each Learners wants and needs. Learners see from this "Road Map" what they need to take, what they have completed, and their learning destination.
	Regardless of how the Learner accesses an RLO or an RIO, or what label is presented to the Learner, the structure of the RLO and RIO is the same.

#### **RIO Creation Process**

Introduction Building RIOs is similar to building any instructional event or offering. For this discussion we have chosen to use a simple four-phase process for creating RLOs and RIOs.

While these phases might not directly map to your development process, each of these phases should be familiar to anyone developing content at Cisco.

The key point is that there no significant change in process, only greater flexibility in each phase due to the reusable, granular nature of the RIO Strategy.

**Four Phases** Each phase has many stages that interrelate with each other. Note that this document does *not* define every stage that needs to take place, but simply highlights some of the key stages for each phase.



#### RIO Creation Process: Phase I: Design

Introduction	The design phase lays the foundation for creating a successful learning event. Without this phase being complete and accurate, the subsequent development, delivery, and evaluation phases will fail.
	While there are many stages that actually take place during this phase, these four are key:
	<ul><li>Needs Assessment</li><li>Tasks Analysis</li></ul>
	<ul><li>Learning Objectives</li><li>RIO Types</li></ul>
Stage 1: Needs Assessment	An RLO and each RIO must be created to solve a real need in the organization. At Cisco, like most organizations, there are three main catalysts for "training" to be created:
	<ul><li>New product introduction</li><li>Product update</li></ul>
	New market strategy
	The need must be measurable and quantifiable in order for the training intervention, or RIOs in this case, to be successfully implemented.
	Needs assessment is critical for completing an evaluation. Without it, we are unable to measure if the RIO meets a performance gap, or increases the Learner's knowledge and skills.
Stage 2:	In this step the Author relates the needs to specific job tasks.
Task Analysis	At this stage the Author also separates prerequisite knowledge and "nice-to-know" information, from knowledge and skills that are critical to meet the training needs identified in Stage 1.
	With a specific job task identified, the Author adds other "need-to-know" information that helps the Learner learn the job task (such as a definition of a fact, or an explanation of a concept or process).
	The combination of these elements forms a hierarchy of RIOs, which are nested into RLOs. If the task is simple, there could be a single RIO, with no associated RLO. If the task is complex and part of a larger scope, such as training an entire job function, then many RIOs and RLOs would be formed.

#### RIO Creation Process: Phase I: Design (continued)

Stage 3: Learning	Once the job tasks have been analyzed, the Author creates learning objectives for each RLO and for each RIO.
Objectives	Objectives tell the Learner what they must do in order to achieve mastery. For the Author, they identify what type of practice and assessment should be included in the RIO in order to assure mastery.
	Each objective consists of an action statement, a performance condition and a performance criterion.
Identify the Cognitive Level	Directly tied to each learning objective, cognitive level is an important designation that identifies how the Learner will remember or use the skills and knowledge they are acquiring by taking an RIO.
	When combined with the learning objective, the cognitive level identifies what the Learner is required to remember or do in order to demonstrate mastery of a given RIO.
	There are many methods of classifying cognitive levels. The RIO Strategy combines aspects of both Dr. David Merrill's component display theory and Dr. Bloom's "Taxonomy."
	See "Guidelines for Building RIO: Cognitive Level" from more information
Stage 4: RIO Types	The Author uses the learning objective to categorize each RIO as a concept, fact process, principle, and procedure. These five types are based on modified information mapping as defined by Dr. Ruth Clark.
	See "Guidelines for Building RIOs" describes these five types in great detail.
$7\pm2$ Rule	During the Design phase, the Author may need to group like RLOs based on a job function. Similarly, RIOs are grouped to form an RLO.
	It is important to note that the entire RIO Strategy is based in the $7 \pm 2$ rule. This means that there are a minimum of five and a maximum of nine content items inside of an RIO, and that each RLO contains five to nine RIOs.
Detail Design Document	Traditionally, the deliverable at the end of this phase is a detail design document (DDD). However, with an integrated design and development tool and database, the Author could easily move from The Design phase to the Development phase without this formal deliverable.
	In fact, given the granular nature of RIOs, it is possible that each RIO could be designed and approved independent of the larger RLO structure it may ultimately form.

#### RIO Creation Process: Phase II: Development

Introduction	Now that the Design phase has been completed, the RIOs can be developed. At this phase, text, graphics, video, and other content are built. Content items, practice items and assessment items are created based on the learning objects defined in the Design phase.
	Like any development process, a number of stages take place, including the development of content, media production, milestone reviews, alpha and beta testing.
	<ul> <li>Four typical stages in an RLO-RIO development process are:</li> <li>Build the RLO</li> <li>Build the RIOs</li> <li>Conduct an Alpha Review</li> <li>Conduct an Beta Review</li> </ul>
	While we refer to building the RLO and RIO as separate stages, their development can occur in any order, or simultaneously. Different Authors could develop individual RIOs, and content items within those RIOs could be assigned to Subject Matter Experts (SMEs) to develop.
Authoring Tools	In the future, Authors will have an easy-to-use, database driven authoring tool to create RLO and RIOs. This authoring tool would ideally transfer the tasks and objectives from the Design phase into the Development phase. It would allow the Author to mine the database for of existing RLOs, RIOs, content items, practice items and assessment items in order to speed the development process.
	The CNLA team has dedicated resources to look at what tools and technologies will make this vision a reality.
	Specific requirements for this Authoring tool are defined in <i>CNLA- Knowledge</i> <i>Information Management Requirements Document</i> (contact Rick Crowley at rcrowley@cisco.com).
Stage 1: Build the RLO	Using published guidelines and templates, the Author builds an RLO to meet the design requirements specified in the Design phase.
	Each RLO is constructed out of the following:
	Overview
	• RIOs (7 ± 2)
	<ul> <li>Summary</li> <li>Assessment</li> </ul>
	See "Guidelines for Building the RLO" for details on the Overview, Summary and Assessment.

#### RIO Creation Process: Phase II: Development (continued)

Stage 2:Using published guidelines and templates for each type of RIO (concept, fact, process,<br/>principle, and procedure), the Author builds an RIO to meet the requirements specified<br/>in the Design phase.

Regardless of the type of RIO, each is built out these three elements:

- Content items
- Practice items
- Assessment items

An Author can develop these items or assign the items to a subject mater experts (SMEs). The SME is given simplified templates and guideline for each item. The Author's role is to review and edit the SME's work into the larger RLO.

Media production for each item would also begin at this stage. This includes graphics, video clips, simulations and so on. Note that while RIOs are created independent of how they are delivered, some media may not work on all delivery formats. For example, a Video on Demand clip would not be available in the print version of an RIO.

See "Building RIOs" for details and guidelines for building the five types of RIOs, and for building content, practice and assessment items.

## RIO Creation Process: **Phase III: Delivery**

Introduction	At the beginning of this phase, all the reusable objects are complete (RLO and RIOs), all media has been produced, and Alpha and Beta testing has been finished. The reusable objects are stored in a database and are ready for delivery.
	How RIOs are delivered is largely up to the Learner's preference. If an object exists in multiple delivery mediums, the Learner is free to choose the one that best matches their learning style, metacognition, and available time.
	For example, a Learner may access some time critical objects at their desk via the web, at the time of need, while they save a group of objects for a live instructor led "class" being held a week later.
	Three common types of delivery include:
	<ul><li>Dynamic Web packages</li><li>CD-ROMs</li></ul>
	Instructor-Led training materials
Dynamic Web Packages	In this case, Web pages are built as needed and delivered to the Learner through a Web browser. When the Learner wants to take a "lesson" or reference a "job aid" they simply request the raw items that make up the RLO and RIO from the database. Format and style sheets are then applied to the objects as they are packaged and delivered to the Learner's Web browser.
CD-ROMs	In cases where the Learner is separated from a network connection, due to travel, or other physical constraints, RLO-RIOs can be packaged onto a physical medium such as a CD-ROM.
	Ideally, the CD-ROM should be created like the dynamic Web package, and then simply written onto a CD-ROM just-in-time. Otherwise, a catalog of pre-packaged CD-ROMs can be made available via the Cisco Learning Store or other venue.
	Another possibility is that smaller packages of RLOs can be downloaded to the Learner's local drive and run independent of the network, eliminating the need to create a CD-ROM.
Instructor Led Training Materials	The need for live, instructor led training will not diminish because of the availability of Web based training. The RIO Strategy supports the creation of instructor-led training materials such as student workbooks, instructor guides, learning activities and presentation materials.
	Because RIOs are stored free of format and style, they can be packaged using style sheets and templates specific for instructor-led training delivery.

#### RIO Creation Process: Phase IV: Evaluation

Introduction	Evaluations can be performed at four levels. Each has its benefits in what it can tell the Author and organization about the effectiveness of a training event of intervention.
	While these levels are not specific to the RIO Strategy, it is important to acknowledge that Evaluating the success of each RLO and RIO is important to Cisco Systems, and to the organizations who use our training materials.
Dr. Donald Kirkpatrick	These four levels of evaluation are based on the research Dr. Donald Kirkpatrick started in 1959. Throughout the field of training and education, Kirkpatrick's four levels are regarded as the most complete model for assessing the success of training interventions. For complete details, refer to <i>Evaluating Training Programs: The Four Levels</i> (Kirkpatrick, 1996).
Level 1: Survey	Measures the Learner's reaction to the event (Did Learners like it?). Sometimes called "smile sheets," Level 1 measures if the Learner liked the training. It is all opinion based and does not test actual learning. However, the data collected at this level is important for business and development considerations.
Level 2: Assessment	Measures if the learning objectives have been met immediately following the event (Did Learners learn?). The Level 2 assessment should match the objective found in the RIO, and therefore must be job-task focused.
	This level is built into the RIO Strategy. Assessment items are part of each RIO, and the Assessment is part of each RLO.
	See "Building the RLO: Assessment" for more details.
Level 3: Transfer	Measures the transfer of skills back to the job (Are they using it?). This level determines if the Learners actually are using what the RIO taught them when back on the job.
	Usually, transfer is measured through some type of 360 degree peer/manager review and by observation. Simply re-testing the Learner can indicate only if they still have the knowledge and skills, not if they are actually using them on the job.
	Ideally, the same instrument used during the needs would be used to test if job transfer occurred as a result of the RIO.
Level 4: Impact	Measures the impact on the business (Did it matter?). Level 4 measures how the organization's bottom line was affected as a result of the RIO. Examples include increase in profitability, increase in customer satisfaction, increase in sales, and decrease in returns.
	Correlating business impact, productivity and return on investment (ROI) to any training intervention can be a laborious process. Most organizations only strive to calculate an ROI on 5% of their training interventions.

#### **Guidelines for Building the RLO**

#### Introduction

A Reusable Learning Object is a collection of seven plus or minus two RIOs that are grouped together to teach a common job task based on a single learning objective. In order to make the collection of RIOs into a complete *learning experience* or "lesson," an Overview, Summary and Assessment are added to the package.



Guidelines not	This section defines the components that go into the RLO and what guidelines or rules
Procedures	are applied to each of these components.

This section does *not* present the "how to build an RLO" as a step-by-step procedure. That discussion is outside the scope of this document.

RLO Level Metadata	The RLO is tagged with metadata that further describes its characteristics, function and
	associated objects.

While this document does not define all the metadata needed for the RLO, these are some of the types of metadata that will be collected by the Author and the system;

- RLO title and RLO level objective
- Strand (major topic area)
- Job function, job task
- Author name, owner name
- Creation date, published date, expiration date
- Prerequisites

A strategy for metadata is defined in *RIO Metadata Strategy* (contact Deborah Lewis at deblewis@cisco.com).

## In this Section

 1. Overview
 14

 2. Summary
 16

 3. Assessment
 17

#### Guidelines for Building the RLO **1. Overview**

Purpose	The Overview is used Learner by listing the	to introduce the RLO and act as an advanced organizer for the objective, outline, and job-based scenario for this "lesson."
Sequence	For a web based train up to the Learner. Th Overview, or they ma	ing experience, the order of objects within the RLO will largely be e Learner may have gone through the Assessment prior to the y skip the Overview and begin taking RIOs.
Structure	The RLO Overview ha Introduction Importance Objectives (system Prerequisites Job-Based Scenari Topology Illustrat Outline Note that the Overvie	as seven content items: n generated) o (optional) tion (optional) w does not contain any Practice or Assessment Items.
Content Item Guidelines	Authors use the follow	ving guidelines when writing an Overview:
	Item	Guideline

Item	Guideline
Introduction	<ul> <li>Required.</li> <li>One or two paragraphs that explains the purpose of this RLO.</li> <li>Do NOT repeat information found in other blocks.</li> </ul>
Importance	<ul> <li>Required—use in all cases.</li> <li>One or two paragraphs that create interest in this RLO for the Learner</li> <li>Let the Learner know why they should be interested in this RLO by relating the RLO's goals to their job function.</li> <li>Do NOT repeat information found in other blocks.</li> </ul>

# Guidelines for Building the RLO **1. Overview** (continued)

Objectives	<ul> <li>Required.</li> <li>One objective per RIO in this RLO</li> <li>System will generated by taking the RIO-level "objective" and displaying it for the Learner.</li> </ul>
Prerequisites	<ul> <li>Required.</li> <li>List the knowledge and skills needed to complete this RLO.</li> <li>Identify other RLOs that the Learner may need to complete ("system" should be able to automatically display prerequisite RLOs and show which have been completed).</li> <li>Focus on the primary or target audience for this RLO.</li> </ul>
Scenario	<ul> <li>Optional.</li> <li>Relate to a job function. You can use a fictitious company to help explain the purpose of the RLO.</li> <li>Individual RIOs may use this scenario when listing Examples, or explaining Processes or Procedures. Keep in mind, however, the RIOs will stand alone, and may be reused by other RLOs. As an RIO Author, don't assume the Scenario will be the same in the wrapper as it is in the RIOs.</li> <li>Ideally, this scenario is specific to the primary audience for this RLO.</li> <li>Tie scenario into summary to bring closure to this RLO.</li> </ul>
Topology	<ul> <li>Optional illustration element.</li> <li>Is tied to the Job-Based Scenario (see above).</li> <li>Illustrate the scenario.</li> <li>Topology may be used by other RIOs. Keep in mind, however, the RIOs will stand alone, and may be reused by other RLOs. As an RIO Author, don't assume the Topology will be the same in the wrapper as it is in the RIOs.</li> <li>Ideally, this illustration is specific to the primary audience for this RLO.</li> </ul>
Outline	<ul> <li>Required.</li> <li>List the title of each RIOs contained in this RLO.</li> <li>List the Summary and Case Study.</li> <li>Ideally, this information will be generated automatically by the "system".</li> </ul>

## Guidelines for Building the RLO:

### 2. Summary

Purpose	The Summary is used to conclude the RLO and tie the scenario and objectives covered in each RIO together. It also offers a suggest course of action for the Learner to broaden their knowledge and skills in this area. Finally, the Summary is a transition between the RIOs and the final Assessment.
Sequence	Assuming the Learner is taking the RLO is its suggested order, the Summary will immediately follows the last RIO.
Structure	<ul> <li>The RLO Summary has three content items:</li> <li>Review</li> <li>Next Steps</li> <li>Additional Resources</li> </ul>
Guidalinas	And service the full service of the lines and an emitting a function of

Guidelines	
------------	--

Authors use the following guidelines when writing a Summary:

Item	Guideline
Review	<ul> <li>Required.</li> <li>One or two paragraphs that recap what the Learner just learned in the RLO (touch on all the RIOs in this RLO).</li> <li>Restate objectives and importance of this RLO.</li> <li>Conclude the scenario established in the Overview.</li> </ul>
Next Steps	<ul> <li>Required.</li> <li>Suggest other RLOs that are related to this RLO.</li> <li>Recommend other areas of study.</li> <li>System may build a dynamic list of RLOs that have been assigned to the Learner.</li> </ul>
Additional Resources	<ul> <li>Optional.</li> <li>List URLs, PDFs, documents and other resources that will help the Learner learn more about the knowledge and skills covered in this RLO.</li> <li>Provide one sentence to describe each resource so the Learner knows what they will get when they access the link/file.</li> </ul>

## Guidelines for Building the RLO:

#### 3. Assessment

Purpose	The Assessment serves two functions:
	<ol> <li>Prescribe RIOs the Learner needs to take. Determine gaps in knowledge and skills prior to taking the "lesson" and indicate which RIOs fill those gaps.</li> <li>Ensure the Learner has achieved mattery on all chiesting for a given "leasen".</li> </ol>
	<ol> <li>Ensure the Learner has achieved mastery on all objectives for a given lesson. Determine gaps in knowledge and skills after taking the "lesson" and indicate which RIOs they should review.</li> </ol>
Sequence	The Assessment can be taken at any time. For this discussion, an Assessment can occur before the "lesson" (pre-RLO), or upon completing the entire "lesson" (post-RLO).
Inside the Assessment	The Assessment is simply a collection of the assessment items that are written to match the objective of each RIO found in this RLO. For each RIO, there is at least two assessment items to form a pool of items.
	From the Learner's point of view, assessment items appear as the Assessment for the entire RLO or "lesson."
	From the Authors point of view, assessment items are created for each RIO. This is important because if the RIO is reused by another RLO, then its assessment item must be available to the new RLO.
	Assessment items are covered in more detail in the Guidelines for Building RIOs section of this document.
Pre-RLO Assessment	When the Assessment is taken prior to starting the "lesson" it functions as a prescriptive tool. The Assessment evaluates if the Student meets the objective of each RIO found in the RLO.
	If the Learner passes the Assessment, the system tells the Learner that they do not need to take the RLO, and have earned credit for all the knowledge and skills covered by this "lesson."
	If the Student fails any item in the Assessment, the system "prescribes" individual RIOs for the Student to take. This is possible because each assessment item is mapped to a specific RIO.
Post-RLO	When the Assessment is taken after the "lesson" it functions as mastery assessment.
Assessment	If the Learner passes the Assessment, the system indicates they have successfully completed the entire RLO, and have earned credit for all the knowledge and skills covered by the RLO.
	If the Student fails part of the post-assessment, then the system "prescribes" individual RIOs for the Student to review. This function is similar to the <i>pre-RLO</i> function described above.
	Continues on next page

#### Guidelines for Building the RLO:

#### **3. Assessment** (continued)

# GuidelinesBecause assessment items are written for each RIO, the guidelines for writing<br/>assessment items are discussed in the "Guidelines for Building RIOs" section of this<br/>document.

Even so, there are a few RLO level parameters the Author may be required to set;

Item	Guidelines
Pass or Fail Threshold	Does the Learner need to "pass" every objective, every RIO, in order to receive full credit for completing the RLO? Or is there some number of assessment items that the Learner can miss, and still "pass.".
Number of Re- Takes	How many times can a Learner repeat the Assessment? This could be important give the limited size of the assessment item pool.
Weighted Assessment Items	When an RLO is constructed, not all of the RIOs will hold equal importance to the Job Task being taught. Therefore the assessment items associated with those RIOs have varying levels of importance. When the RLO Assessment is created the Author will indicate which RIOs are the most important to "passing" this lesson.

Introduction	Reusable Information Objects are self-contained chunks of information built around a single learning objective. Groups of RIOs are combined to form a RLO.
	Each RIO is built out of three components;
	Content items
	Practice items
	Assessment items
	This section defines these three components in detail.
RIO Types	RIOs are classified into five types based on a modified information mapping;
	Concept
	• Fact
	Procedure
	Principle
	• Process
	Not only does this classification scheme make RIOs reusable, it also provides authoring templates and guidelines to speed the creation of new RIOs.
	Any learning objective, and therefore any RIO, can be classified into one of these types. The definition of each type and the guidelines for writing each of type of RIO and are described in detail in the following pages.
RIO Level Metadata	As RLOs, each RIO is tagged with metadata that describes its characteristics, purpose and relationships with other objects.
	While this document does not define all the metadata needed for the RIO, these are some of the types of metadata that will be collected by the Author and the system;
	RIO title and RIO level objective
	RIO type
	Job function, job task
	<ul> <li>Author hame, owner hame</li> <li>Creation date, published date, expiration date</li> </ul>
	<ul> <li>Prerequisites</li> </ul>
Practice and Assessment Items	While there are specific guidelines for writing content items for each type of RIO, practice items and assessment items share guidelines common to all five types of RIOs and are therefore discussed separately in this document.
	Notes are made when there is something unique about practice or assessment items in regard to one of the five types of RIOs.
	Even though practice and assessment items share common guidelines, they are still tagged as one of the five RIO types.

### Guidelines for Building RIOs (continued)

In this Section	Practice Items 21
	Assessment Items 23
	Cognitive Level 25
	1. Concept 27
	2. Fact 30
	3. Procedure 32
	4. Process
	5. Principle 38

*Note*: When building an RLO, the five RIO types can be sequenced in any order by the Author, not just in the order presented in this document.

#### Guidelines for Building RIOs: Practice Items

Introduction	Practice items are one of the three components that form an RIO. Regardless of the type of RIO being built (concept, fact, process, procedure, principle) there are common characteristics and guidelines the Author must follow when building Practice items.
Definition	A practice item is any reinforcement activity that gives the Learner the opportunity to apply their skills and knowledge. Often the system provides mentoring and feedback. Performance may or may not affect the Learner's overall assessment.
	Practice activities can take on many forms including case study, learning activity, practice quizzes, practice test, testing quiz and practice labs.
Importance	Practice items are those elements that make RIOs more than simple "information."
	Practices are tied directly to the learning objective for the RIO. They provide the Learner with a way to self-assess their learning prior to attempting a scored assessment (See <i>Assessment Items</i> ).
	Without practice items, an RIO is incomplete, and it becomes merely a transfer-of- information instead of a learning event.
Objective and Cognitive Level	During the Design phase, a learning objective was written for each RIO, and a cognitive level was assigned to the RIO based on that learning objective.
	It is important that the practice item matches the objective and cognitive level. For example, if the RIO objective has the Learner "List the five commands used to configure an Access-List," with a "Remember: Knowledge" cognitive level, then the practice item should help the Learner memorize the five commands.
	Likewise, if the RIO objective has the Learner "Correctly configure an Access-List using no more than five commands" with a "Use: Application" cognitive level, then the practice items should give the Learner a hands-on activity so they can practice that skill of entering the correct configuration.
Media Independence	While RIOs are ideally created to be delivery media independent, some practice items may not work in all delivery formats.
	For example, in an instructor-led course, a valid practice is to have group of Learners form small groups to work on an assignment. For a self paced, Web experience, a similar practice may not be possible, and therefore an alternative practice would be created for this RIO.

### Guidelines for Building RIOs: **Practice Items** (continued)

Types of Practices	There are hundreds of possible practice items, or learning activities that an Author may want to use. However, there are reasons to limit the number that an Author is allowed to use. These may include delivery media, time to develop, time to administer and so on.
	With these limitations in mind, here are the practice items that will be supported;
	<ul> <li>True and false tests</li> <li>Single answer multiple choice</li> <li>Multiple answer multiple choice</li> <li>Matching</li> <li>Drag and drop (not for ILT versions)</li> <li>Hot Spot</li> <li>Fill in the blank</li> <li>Single answer entry</li> <li>Group activity (not for self-paced/Web versions)</li> </ul>
	This list does not include all the learning activities that may be included in a Practice (i.e. flash cards, chalk talks, small group activity, mentor session, etc) and will therefor be added to over time as Cisco development and delivery systems mature.
Practice Vs Assessment	The purpose and function of Practices are very different than Assessment Items, even though the authoring tools and engine that deliver them may be the same.
	Practices:
	<ul> <li>Are completed by the Learner during the RIO, while assessment items are completed during the Assessment</li> <li>Teach, while assessment items test</li> </ul>
	Function as a learning activity, not as an assessment
	<ul> <li>Are for the Learner's benefit. The results of practices are not reported in the Learner performance record, instead instructional feedback is given</li> <li>Offer remediation coaching and guidance</li> </ul>
	<ul> <li>May include activities that are not found in the Assessment types list: small group activity, chalk talks, flash cards, observation, exploration, mentor session, and so on.</li> </ul>
Guidelines	Here are the preliminary guidelines for creating practice items for an RIO:
	At least one per RIO
	Must match the RIO learning objective and cognitive level
	Must work in all delivery media, or more than one is required
	<ul> <li>Must prepare the Learner for the Assessment</li> <li>Practice must have some form of remediation, coaching or guidance for the Learner</li> </ul>

## Guidelines for Building RIOs: **Assessment Items**

Introduction	Assessment items are one of the three components that form an RIO. Regardless of the type of RIO being built (concept, fact, process, procedure, principle) there are common characteristics and guidelines the Author must follow when building assessment items.	
Definition	An assessment item is a question or measurable activity used to determine if the Learner has mastered the learning objective for a given RIO.	
	Each RIO contains a pool of assessment items that are used by the RLO Assessment in order to prescribe RIOs and to determine mastery of the RIOs.	
	Assessment items are associated with each RIO, and not the RLO, to ensure they are associated with the RIO when it is reused or referenced by other RLOs.	
Importance	Assessment items are a required in order to generate the RLO Assessment. Without assessment items, an RIO is incomplete, and the RIO moves into the realm of information and away from the realm of learning.	
How they are used	The Author writes a pool of assessment items for each RIO. This pool is used by the RLO Assessment to prescribe RIOs and to determine mastery of the RIOs.	



In the illustration above, RIO #5 has three assessment items. These assessment items used by the RLO Assessment Delivery Engine to generate an Assessment for the Learner. The engine records the Learner's score and reports that data to the management system.

A pool of assessment items is needed to allow the Learner to take the Assessment more than once without repeating the same question.

#### Guidelines for Building RIOs: Assessment Items (continued)

Objective and Cognitive Level	Like the practice items, each assessment item must match the objective and cognitive level for the RIO.		
For example if the RIO objective has the Learner "List the five commands us configure an Access-List," with a "Remember: Knowledge" cognitive level, assessment items should test the Learner on their recall of those the five co			
	Likewise, if the RIO objective has the Learner "Correctly configure an Access-List using no more than five commands" with a "Use: Application" cognitive level, then the assessment items should test the Learner through a hands-on exercise that measures their skill in configuration the Access-List.		
Media Independence	While RIOs are ideally created to be delivery media independent, some assessment items may not work in all delivery formats. In some cases, especially when it comes to certification, a proctored assessment may be required. In other cases, direct observation may be needed to assess a Learner's performance of a skill on the job. In either case the results of that assessment will be entered into the training management system.		
Types of Assessment Items	<ul> <li>These are the assessment items that should be supported by the on-line assessment engine. Those assessments requiring direct observation are not defined in this document.</li> <li>True and false tests</li> <li>Single answer multiple choice</li> <li>Multiple answer multiple choice</li> <li>Matching</li> <li>Drag and drop</li> <li>Hot Spot</li> <li>Fill in the blank</li> <li>Single answer entry</li> <li>How to write each of these assessment items and the specific guidelines for each type is not covered in this document.</li> </ul>		
Guidelines	<ul> <li>General guidelines for creating Assessment Items;</li> <li>Each RIO must have a pool of at least two assessment items (one for pre- and one for post-assessment)</li> <li>Use more than two assessment items if the Learning Objective is complex (higher cognitive level)</li> <li>The wording of assessment items must be different than the Practices (i.e. can't be the same exact question used in practice item)</li> <li>They must match the learning objective and the cognitive level of the RIO</li> <li>Assessment items are only presented to the Learner while they taking RLO Assessment.</li> </ul>		

# Guidelines for Building RIOs: Cognitive Level

Introduction	Cognitive Level is an important designation that identifies how the Learner will remember or use the skills and knowledge they are acquiring by taking an RIO.			
	When combined with the learning objective, the cognitive level identifies what the Learner is required to remember or do in order to demonstrate mastery of a given RIO.			
	There are many m combined aspects Bloom's "Taxonor	ethods of classifying of both Dr. David Me ny."	cognitive levels. The RIO Strategy has errill's component display theory and Dr.	
The combined Taxonomy	The table below co column).	ompares with Merrill'	s taxonomy (left) with Bloom's taxonomy (right	
	Merrill	Bloom		
	Remember	Knowledge	Simple to teach & assess	
	Use	Comprehension		
		Application		
		Analysis		
		Synthesis	Difficult to tooch	
		Evaluation	& assess	
	Notice that Merril identifies six level The RIO Strategy "Use" to the other	l identifies two levels s, ranging from Knov has matched Merrill's 5 levels from Bloom's	of cognition: Remember and Use, where Bloom vledge to Evaluation. Remember to Bloom's Knowledge, and Merrill's taxonomy.	
Importance	The Author uses the cognitive level when they are writing Practice and Assessment Items for an RIO.			
	For example, if the task analysis tells the Author that the Learner will need to "Use" the knowledge and skills they are being taught in the RIO back on the job, then the Author will create a Practice that has them "Use" that knowledge and skill. Likewise, the assessment items will test their knowledge and skill by having them actually do that something just like they where on the job.			
	If the Learner will simply need to recall knowledge, but not actually do anything with that knowledge, then the Practice will have the Learner "Remember" that knowledge. Likewise the assessment items will simply need to test the Learner's recall of information and not the demonstration of higher cognitive functions.			

## Guidelines for Building RIOs: **Cognitive Level** (continued)

Use Vs Remember	Based on the table above, an Author will tag each RIO, or more specifically, each learning objective as either "Remember" or "Use."
	If the Author tags a learning objective as "Use," then they will add a descriptive tag based on Bloom's taxonomy.
	For example, if the RIO objective has the Learner "List the five commands used to configure an Access-List," the Author will simply tag the objective with a "Remember" cognitive level. The second tag for "Knowledge" is implied, as it is the only parallel choice to remember.
	If however the RIO objective has the Learner "Correctly configure an Access-List using no more than five commands," the Author will first select "Use." Then the Author would select "Application" to further identify this objective.
Verb Identifies the Level	Correctly applying the cognitive level may seem difficult to those new to Bloom's Taxonomy. However, the verb contained in the learning objective phrase often gives the Author a valuable clue they can use to determine the cognitive level.
	For example, the verb "List" has the Learner recalling information so the RIO is tagged "Remember" and "Knowledge." While the verb "Configure" has the Learning doing something, so the RIO is tagged "Use" and "Application."
-	An extensive verb list will be made available to the Author and application wizards will guide the Author to correctly tag each RIO.

### Guidelines for Building RIOs: **1. Concept**

When to Use	A Concept RIO is used when you need to teach a group of objects, symbols, ideas, or events which:		
	• Are designated by a single word or term		
	• Share a common feature		
	Vary on irrelevant features		
Sequence	When sequencing the RIOs with the RLO, keep in mind that typically concepts are taught before a major topic, as knowledge needed to do x.		
	For example, if you are creating an RLO to teach the configuration of a standard access list, then you may need a concept RIO entitled "What Is an Access-List?"		
Structure	A Concept RIO is made of the following elements;		
	Content items		
	— Introduction		
	— Definition		
	— Facts		
	— Examples		
	— Analogy		
	<ul> <li>Instructor Notes (can be placed at the beginning or ending of content)</li> </ul>		
	<ul> <li>Practice items</li> </ul>		
	Assessment items		
Examples	Here are some examples of things you would teach using a Concept RIO:		
	• Cat		
	• Horse		
	• Computer		
	• Hub		
	• Router		
	• Switch		
Identifying a	Generally you use a Concept RIO when the job-task can be written as:		
Concept RIO	• What is a <technology, object,="" species="">?</technology,>		
	<ul> <li>What are the types of <technology, object,="" species="">?</technology,></li> </ul>		
	<i>Note:</i> This structure is also used as the title for this RIO. It gives the Learner a clue as to the learning outcome and purpose of the RIO.		
	Continues on next page		

#### 1. Concept (continued)

Content Item Guidelines Authors follow these guidelines when building the content items for a Concept RIO.

Note that these guidelines will become more descriptive over time. Some guidelines will become rules. Ideally our future authoring system will verify that these guidelines are being followed. These guidelines will also be used to validate the quality of RIOs as they are being built.

Item	Guideline
1. Introduction	<ul> <li>Required—use in all cases.</li> <li>Establish the purpose of this RIO and orient the Learner to what they are expected to learn.</li> <li>Written short and to the point.</li> <li>Do NOT tie to other RIOs, or assume the Learner has visited other RIOs within this RLO.</li> </ul>
2. Definition	<ul> <li>Required—use in all cases.</li> <li>Can be an illustration.</li> <li>Identify related characteristics clearly.</li> <li>Keep short and concise.</li> <li>Use bullets to list characteristics.</li> <li>Define the concept.</li> <li>Emphasizes the term being defined.</li> </ul>
3. Facts	<ul> <li>Used only when needed to explain a Concept.</li> <li>Follows the guidelines for Fact blocks defined in the Fact RIO guidelines.</li> <li>If there are many facts to communicate, or a Fact requires a number of blocks to describe, then escalate to a Fact RIO.</li> </ul>
4. Examples	<ul> <li>At least two are required.</li> <li>Sequence examples from simple to more complex.</li> <li>Use examples from different context.</li> <li>Present using text or illustrations.</li> </ul>
5. Non-Example	<ul> <li>Optional.</li> <li>Illustrate easily confused examples of related concepts.</li> <li>Is a sequence from simple to complex.</li> <li>Present using text or illustrations.</li> <li>State why it is not a member (not an example).</li> </ul>

#### 1. Concept (continued)

6. Analogy	<ul><li> Optional.</li><li> Is instructionally powerful.</li><li> Relate the to audience's background.</li></ul>
7. Instructor Notes	<ul> <li>Optional.</li> <li>Include if there is anything special or unique about teaching this Concept to a live classroom.</li> <li>This field does NOT appear to the Learner, but to the Instructor in either print or on-line instructor guide.</li> </ul>

#### Practice Item Guidelines

Here are specific guidelines for using Practices with a Concept RIO. See the practice item portion of this document for generic Practice guidelines.

Practice Level	Guideline
Use	<ul> <li>Include if the Learner needs to USE this concept on the job.</li> <li>Have Learners discriminate between examples and non-examples.</li> <li>Can be a quiz question or some other activity.</li> </ul>
Remember	<ul> <li>Include if the Learner needs to REMEMBER this concept on the job.</li> <li>Examples: <ul> <li>Write the definition of a concept</li> <li>Select the definition of a concept</li> </ul> </li> <li>Can be a quiz question or some other activity.</li> </ul>

## Guidelines for Building RIOs: **2. Fact**

When to Use	A Fact RIO is used when you need teach unique, specific, one-of-a-kind pieces of information.	
	Facts are presented as statements, data, or pictures of specific objects.	
Sequence	A Fact RIO is unique in that it can be taught as both a standalone RIO or as a link from another RIO.	
	If you need to teach a fact, then ideally it would have a link to the concept, procedure, process, or principle that it is referencing (or vice versa).	
	Sequence the facts so they logically flow within the RLO, or better yet, link to the other RIOs that reference that fact.	
Structure	A Fact RIO is made of the following elements:	
	Content items	
	— Introduction	
	— Illustration	
	— Fact List	
	<ul> <li>Table</li> <li>Instructor Notes (can be pleased at the beginning or ending of content)</li> </ul>	
	— instructor votes (can be placed at the beginning of ending of content)	
	<ul> <li>Practice items (only at "Remember" cognitive level)</li> </ul>	
	Assessment items	
Examples	Here are some examples of factual information you may teach using a Fact RIO:	
	• This router has four ports.	
	• That device is a Catalyst 8510.	
	• That laptop is a Toshiba Tecra 550CDT.	
	• That beaker holds 500 ml.	
Identifying a Concept RIO	You should use a Fact RIO when you have a job task that requires the Learner to remember specific facts. See the examples above.	
Guidelines	Authors follow these guidelines when building the content items for a Fact RIO.	

#### 2. Fact (continued)

Block	Guidelines
1. Introduction	<ul> <li>Use in all cases.</li> <li>Establish the purpose of this RIO and orient the Learner to what they are expected to learn.</li> <li>Keep short and to the point.</li> <li>Do NOT tie to other RIOs, or assume the Learner has visited other RIOs within this RLO.</li> </ul>
2. Illustration	<ul> <li>Precede the illustration with a sentence telling what it is.</li> <li>Identify the key parts.</li> <li>Follow by a table detailing the key parts.</li> <li>Label with a few descriptive words.</li> <li>Use illustrations, fact lists, and tables as needed in any combination or order.</li> </ul>
3. Fact List	<ul> <li>Precede by a sentence telling what it is.</li> <li>Categorize further using sub-labels as needed.</li> <li>Label to indicate what it includes.</li> <li>Use illustrations, fact lists, and tables as needed in any combination or order.</li> </ul>
4. Table	<ul> <li>Precede by a sentence telling what it is.</li> <li>List the parts with their function.</li> <li>Use appropriate column headings.</li> <li>Label to indicate with it includes.</li> <li>Use illustrations, fact lists, and tables as needed in any combination or order.</li> </ul>
5. Instructor Notes	<ul> <li>Optional.</li> <li>Included if there is anything special or unique about teaching this Fact to a live classroom.</li> <li>This field does NOT appear to the Learner, but to the Instructor in either print or on-line instructor guide.</li> </ul>

#### Practice Item Guidelines

Here are specific guidelines for using practices with a Fact RIO. See the Practice Item portion of this document for generic practice guidelines.

Practice Level	Guideline	
Use	<ul> <li>NONE! Integrate facts with other RIO types and create practice for that content.</li> </ul>	
Remember	<ul><li>Have Learners recall features or specifications.</li><li>Have Learners identify pictures or actual objects.</li></ul>	

## Guidelines for Building RIOs: **3. Procedure**

#### When to Use A Procedure RIO is used when you need to teach a performance use on the job. In order to be successful, the procedures must be clear and the RIO must provide jobbased practices in order for learning to transfer to the job. Specifically: • A procedure is a sequential set of steps to be followed by one individual to accomplish a task or make decisions. A procedure lists directions for procedural tasks. • Actions within a procedure must be done the same way each time (within a given situation). Sequence Typically a Procedure RIO will come after a Concept or Process RIO. For example, if you are creating an RLO to teach the configuration of a standard accesslist, then you may need a Concept RIO entitled "What Is an Access List?" Structure A Procedure RIO is made of the following elements; Content items Introduction — Facts — Procedure Table Decision Table Combined Table Demonstration — Instructor Notes (can be placed at the beginning or ending of content) Practice items Assessment items Examples Here are some examples of things you would teach using a Procedure RIO: • How to fill out a time sheet How to configure Fast EtherChannel on the 8510 • How to troubleshoot network congestion • • How to configure an access list on interface Ethernet 0

• How to verify that your access list is correctly configured

#### 3. Procedure (continued)

Identifying a Generally you use a Procedure RIO when the job task can be written as: Procedure RIO

- How to . . .
- Configuring . . . .
- Verifying ... •
- Operating the . . . •

Note This structure is also used as the title for this RIO. It gives the Learner a clue about the learning outcome and purpose of the RIO.

**Content Item** 

Authors follow these guidelines when building the content items for a Procedure RIO.

Guidelines	

Item	Guidelines
1. Introduction	<ul> <li>Required—use in all cases.</li> <li>Establish the purpose of this RIO and orient the Learner to what they are expected to learn.</li> <li>Keep short and to the point.</li> <li>Do NOT tie to other RIOs, or assume the Learner has visited other RIOs within this RLO.</li> </ul>
2. Facts	<ul> <li>Optional—use only when needed to explain the Procedure.</li> <li>Facts could appear as a column in a Procedure table. For example; IOS command definitions.</li> <li>Follow the Fact block guidelines defined in the Fact RIO guidelines.</li> <li>If there are many facts to communicate, or a Fact requires a number of blocks to describe, then escalate to a Fact RIO.</li> </ul>
3. Procedure Table	<ul> <li>Choose either Procedure, Decision or Combined table.</li> <li>Use an introductory sentence.</li> <li>Label columns "STEP ACTION".</li> <li>Begin each step with an action verb.</li> <li>Limit each step to one action.</li> </ul>
4. Decision Table	<ul> <li>Choose either Procedure, Decision or Combined table.</li> <li>Use an introductory sentence.</li> <li>Label columns "IF THEN".</li> <li>Write condition (if) and action (then) so it forms a complete sentence.</li> <li>Move repeated words into the column header.</li> </ul>

#### 3. Procedure (continued)

5. Combined Table	<ul> <li>Choose either Procedure, Decision or Combined table.</li> <li>Follow guidelines for both procedure and decision tables.</li> <li>Usually begin as a procedure table, with a decision table as one of the Steps.</li> <li>Looks like a table within a table.</li> </ul>
6. Demonstration	<ul> <li>Required.</li> <li>Use to illustrate a presentation.</li> <li>Performed by the instructor or media.</li> <li>As instructor clue, text block says "Your instructor will now demonstrate the procedure for you".</li> </ul>
7. Instructor Notes	<ul> <li>Optional.</li> <li>Included if there is anything special or unique about teaching this Fact to a live classroom.</li> <li>This field does <i>NOT</i> appear to the Learner, but to the Instructor in either print or on-line "instructor guide."</li> </ul>

#### Practice Item Guidelines

Here are specific guidelines for using practices with a Procedure RIO. See the Practice Item portion of this document for generic practice guidelines.

Practice Level	Guideline
Use	<ul><li>Hands-on practice.</li><li>Actually perform the procedure.</li></ul>
Remember	<ul> <li>List the steps in the procedure.</li> <li>Always use with Use-level practice unless the job task only requires memorization of the procedure (steps to fly a plane, but not actually flying the plane).</li> </ul>

## Guidelines for Building RIOs: **4. Process**

When to Use	A Process RIO is used when you need to teach how a system works. This is helpful in supporting underlying job tasks, providing motivation, and ensuring overall quality of job performance.
	A process can be defined as:
	<ul> <li>A flow of events that describes how something works</li> <li>Not a task to be done by one person</li> <li>Many persons or organizations are involved</li> <li>Mechanical, business, or scientific</li> </ul>
Sequence	A Process RIO can be placed at any point within an RLO. If the goal of the RLO is to teach the process, then multiple Process RIOs may be with Concept RIOs.
	If a Process RIO is being presented to establish the context of a procedure, then it should come before the Procedure RIO within the RLO.
Structure	A Process RIO is made of the following elements;
	<ul> <li>Content items <ul> <li>Introduction</li> <li>Facts</li> <li>Staged Table</li> <li>Block Diagrams</li> <li>Cycle Charts</li> <li>Instructor Notes (can be placed at the beginning or ending of content)</li> </ul> </li> <li>Practice items <ul> <li>Assessment items</li> </ul> </li> </ul>
Examples	<ul> <li>Here are some examples of things you would teach using a Process RIO:</li> <li>How a transmission works</li> <li>How now employees are bined</li> </ul>
	<ul> <li>How hew employees are filled</li> <li>How the Internet works</li> <li>How a computer system responds to commands</li> </ul>
Identifying a Process RIO	<ul> <li>Generally you use a Process RIO when the job-task can be written as:</li> <li>Stages of</li> <li>How the Works</li> </ul>

#### 4. Process (continued)

Concept ItemAuthors need to follow these guidelines when building the content items for a ProcessGuidelinesRIO.

Item	Guidelines
1. Introduction	<ul> <li>Use in all cases.</li> <li>Establish the purpose of this RIO and orient the Learner to what they are expected to learn.</li> <li>Keep short and to the point.</li> <li>Do NOT tie to other RIOs, or assume the Learner has visited other RIOs within this RLO.</li> </ul>
2. Facts	<ul> <li>Use only when needed to explain a Process.</li> <li>Follow the Fact block guidelines defined in the Fact RIO guidelines.</li> <li>If there are many facts to communicate, or a Fact requires a number of blocks to describe, then escalate to a Fact RIO.</li> </ul>
3. Staged Table	<ul> <li>Select either Table, Diagram, or Chart block.</li> <li>Use an introductory sentence.</li> <li>Label columns with "STAGE WHAT HAPPENS".</li> <li>Begin with who or what is responsible for the action in that stage.</li> <li>Write in the third person, active voice.</li> <li>Limit each stage to one time period.</li> </ul>
4. Block Diagrams	<ul> <li>Select either Table, Diagram, or Chart block.</li> <li>Use an introductory sentence.</li> <li>Use a block diagram (flow chart).</li> <li>Begin with who or what is responsible for the action in that stage.</li> <li>Write in the third person, active voice.</li> <li>Limit each stage to one time period.</li> </ul>
5. Cycle Charts	<ul> <li>Select either Table, Diagram, or Chart block.</li> <li>Use an introductory sentence.</li> <li>Begin with who or what is responsible for the action in that stage.</li> <li>Write in the third person, active voice.</li> <li>Label chart as a "process".</li> <li>Learner arrows to show direction.</li> </ul>

#### 4. Process (continued)

<ul> <li>6. Instructor Notes</li> <li>Optional.</li> <li>Included if there is anything special of this Fact to a live classroom.</li> <li>This field does NOT appear to the Le in either print or on-line instructor guilt</li> </ul>	or unique about teaching earner, but to the Instructor ide.
---	---

#### Practice Item Guidelines

Here are specific guidelines for using practices with a Procedure RIO. See the Practice Item portion of this document for generic practice guidelines.

Practice Level	Guideline
Use	<ul> <li>Problem-solving exercises.</li> <li>Case Studies.</li> <li>Solve a real-life problem that mirrors what the Learner will do on the job.</li> <li>Examples:</li> <li>Explain what would happen if</li> <li>Evaluate the symptoms where might the problem be located.</li> <li>Look at the display indicate where there may be problems with the system.</li> </ul>
Remember	List the stages in the process.

# Guidelines for Building RIOs: **5. Principle**

When to Use	A Principle RIO is used when you need to create a job task that requires judgement, or when guidelines must be applied to a job situation.
Sequence	Typically a Principle RIO will come after a Concept or Process RIO.
	For example, if you are creating an RLO to teach the guidelines for handling employee conflicts, the Concept RIO titled "What is a Conflict" may be taught first.
Structure	A Principle RIO is made of the following elements;
	Content items
	— Introduction
	— Facts
	Principle Statement     Cuidelines
	— Guidelines — Fxamples
	— Non-Example
	— Analogy
	<ul> <li>Instructor Notes (can be placed at the beginning or ending of content)</li> </ul>
	Practice items
	Assessment items
Examples	Here are some examples of things you would teach using a Principle RIO:
	Guidelines for handling employees with personal problems
	Guidelines for designing effective visual aids
	Responding appropriately to an angry customer
	Designing Learner-centered training
Identifying a	Generally you use a Principle RIO when the job task can be written as:
Principle RIO	• How to
	Guidelines for
	Notice that the Principle and Procedure RIO start with "how to." The distinction is that the Principle RIO focuses on what the Learner will do with the guideline.

#### 5. Principle (continued)

Concept Item<br/>GuidelinesAuthors follow these guidelines when building the content items for a Principle RIO.

Item	Guidelines
1. Introduction	<ul> <li>Required.</li> <li>Establish the purpose of this RIO and orient the Learner to what they are expected to learn.</li> <li>Keep short and to the point.</li> <li>Do NOT tie to other RIOs, or assume the Learner has visited other RIOs within this RLO.</li> </ul>
2. Facts	<ul> <li>Optional—use only when needed to explain the Principle.</li> <li>Follow the Fact block guidelines defined in the Fact RIO guidelines.</li> <li>If there are many facts to communicate, or a Fact requires a number of blocks to describe, then escalate to a Fact RIO.</li> </ul>
3. Principle Statement	<ul><li>Required.</li><li>Give a statement describing the accepted standard of behavior.</li></ul>
4. Guidelines	<ul> <li>Required.</li> <li>Derive guidelines from your analysis of expert performance.</li> <li>List the guidelines.</li> </ul>
5. Examples	<ul> <li>Required. Must have at least two.</li> <li>Vary the context of each example.</li> <li>Use different settings and situations.</li> </ul>
6. Non-Example	<ul> <li>Optional.</li> <li>Draw attention to how guidelines are violated.</li> <li>Violate one guideline at a time.</li> <li>State which guideline was not followed and why.</li> </ul>
7. Analogy	<ul> <li>Optional.</li> <li>Powerful instructionally.</li> <li>Must be easily identifiable.</li> </ul>

#### 5. Principle (continued)

8. Instructor Notes	<ul> <li>Optional.</li> <li>Included if there is anything special or unique about teaching this Fact to a live classroom.</li> <li>This field does <i>NOT</i> appear to the Learner, but to the Instructor in either print or on-line "instructor guide."</li> </ul>
	<ul> <li>This Fact to a live classroom.</li> <li>This field does <i>NOT</i> appear to the Learner, but to the Instructor in either print or on-line "instructor guide."</li> </ul>

#### Practice Item Guidelines

Here are specific guidelines for using practices with a Principle RIO. See the Practice Item portion of this document for generic practice guidelines.

Practice Level	Guideline
Use	<ul> <li>Apply guidelines to solve a real-life problem or case study.</li> <li>Example: Watch the video scenarios of angry customers and write down what you would say to each one. Role-play your responses with the class.</li> </ul>
Remember	List the guidelines.

### **RLO-RIO Structure Summary**

Introduction	The following is a list the content items, practice items and assessment items used in the RIO Strategy. Because the RLO Assessment is a collection of RIO assessment items, it is not listed in
	this summary.
RLO Overview	<ul> <li>Content items         <ul> <li>Introduction</li> <li>Importance</li> <li>Objectives</li> <li>Prerequisites</li> <li>Scenario (optional)</li> <li>- Topology Illustration (optional)</li> <li>Outline</li> </ul> </li> <li>No practice or assessment items</li> </ul>
RLO Summary	<ul> <li>Content items <ul> <li>Review</li> <li>Next Steps</li> <li>Additional Resources</li> </ul> </li> <li>No practice or assessment items</li> </ul>
Concept RIO	<ul> <li>Content items <ul> <li>Introduction</li> <li>Definition</li> <li>Facts</li> <li>Examples</li> <li>Non-Examples</li> <li>Analogy</li> <li>Instructor Notes (can be placed at the beginning or ending of content)</li> </ul> </li> <li>Practice items <ul> <li>Assessment items</li> </ul> </li> </ul>
Fact RIO	<ul> <li>Content items <ul> <li>Introduction</li> <li>Illustration</li> <li>Fact List</li> <li>Table</li> <li>Instructor Notes (can be placed at the beginning or ending of content)</li> </ul> </li> <li>Practice items (only at "Remember" cognitive level)</li> <li>Assessment items</li> </ul>

#### Content Item Summary (continued)

•

•

•

Procedure RIO

- Content items — Introduction
  - Facts
  - Procedure Table
- Decision Table
- Combined Table
- Demonstration
- Instructor Notes (can be placed at the beginning or ending of content)
- Practice items
- Assessment items

Process RIO

- Content items
- Introduction
- Facts
- Staged Table
- Block Diagrams
- Cycle Charts
- Instructor Notes (can be placed at the beginning or ending of content)
- Practice items
- Assessment items

**Principle RIO** 

- Content items
  - Introduction
  - Facts
  - Principle Statement
  - Guidelines
  - Examples
  - Non-Example
  - Analogy
  - Instructor Notes (can be placed at the beginning or ending of content)
- Practice items
- Assessment items

#### References

**Major References** The following works have been used as major sources, either directly or indirectly, to create this document:

Bloom, Benjamin S. & Krathwohl, David R., *Taxonomy of Educational Objectives, Handbook* 1 : Cognitive Domain, Addison-Wesley Pub Co., 1994.

Clark, R., Developing Technical Training: A Structured Approach for the Development of Classroom and Computer-Based Instructional Materials, Performance Technology Press, 1989.

Horn, R.E., Structured Writing and Text Design, in D.H. Jonassen, ed., *The Technology of Text*, Englewood Cliffs, NJ, 1982.

Kirkpatrick, D.L., *Evaluating Training Programs: The Four Levels*, Berrett-Koehler Publishers, San Francisco, 1994-1996.

Mager, B.F., *Measuring Instructional Results, or Got a Match*, Second Edition David S. Lake Publishers, Belmont CA, 1984, 1973.

Mager, B.F., *Preparing Instructional Objectives*, Second Edition, David S. Lake Publishers, Belmont CA, 1975.

Merrill, M.D. & Twitchell, D.G. (Editor), *Instructional Design Theory*, Educational Technology Publication, 1994.

Merrill, M.D., Component Display Theory, In Reighluth, CM, ed., Instructional Design Theories and Models, Hillsdale, NJ, 1983.

Phillips, J.J., *Return on investment in training and performance improvement programs*, Gulf Publishing Co., Houston, TX, 1997.