CREATING A REUSABLE LEARNING OBJECTS STRATEGY

Leveraging Information and Learning in a Knowledge Economy

Chuck Barritt
F. Lee Alderman Jr.
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About This Book

Why is this topic important?
There is a great deal of confusion over the definition and utility of reusable learning objects (RLOs). Although the RLO concept is becoming more and more familiar to those of us in the training and human performance technology fields, the use of the term is fluid. You have likely noticed that vendors define RLOs to suit their current products and tools, adding the term learning object to a list of existing features and functions. Likewise, content vendors may replace common terms like module and lesson with the sexier moniker reusable learning object, and each company may get on the RLO bandwagon to fulfill an ill-defined business goal. Add to the morass of definitions and uses of RLOs the concept of knowledge management and the need for a clear definition, process, and implementation framework becomes self-evident. This book provides that definition, process, and framework. It helps you document and create a reusable learning objects strategy.

What can you achieve with this book?
This book first provides a foundation for creating reusable learning objects in your organization. This book will help you lay out an RLO strategy that covers design, implementation, delivery, costs, benefits, and pitfalls. You will learn how RLOs can fit into your training design, development, and delivery process, and which areas in your process will need to be modified. We will also touch on the need for evaluation and ongoing support of each RLO database, whether it is stand-alone or it is reused or shared by multiple authors.

How is this book organized?
The basic structure of the book follows the process for establishing a reusable learning object system, from designing the original strategy to evaluating the results. Each chapter will take a portion of that process and break it down while building on the previous chapter. A number of examples are included and build on each other as the book progresses. Worksheets are provided at the end of several chapters to allow you the opportunity to capture your own thoughts and needs and lay the groundwork for your own RLO strategy.

At the end of the book, we take out our crystal balls and try to predict future trends for RLOs, e-learning, and knowledge management, and how the three may be merging into one field.
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Creating a Reusable Learning Objects Strategy
Creating a Reusable Learning Objects Strategy

Leveraging Information and Learning in a Knowledge Economy

Chuck Barritt and F. Lee Alderman Jr.
To my mother for her unconditional support; she is missed.

—Chuck

To my wife Sherry for her constant love and support.

—Lee
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Foreword

Organizational training is an expensive endeavor, with over $50 billion invested by business and industry annually. And $50 billion is a conservative estimate because it does not include the most expensive element of any training event—the salaries, time, and lost opportunity costs of the learners! To realize a return on this investment, training to improve organizational performance must use a structured process—commonly called the instructional design process—to identify best practices and the knowledge and skills that underpin those best practices. Implementing the instructional design process adds a lot of time to the production of training events. Common estimates range anywhere from forty to two hundred hours of design and development time for every one hour of instructional time.

If you work in a large organization you have no doubt encountered redundant efforts by professionals who, unknown to each other, develop training programs from scratch that use similar content for different, or sometimes even the same, learners. You may also have experienced situations where individual learners did not need the entire course. For these people some very specific skills or knowledge included in the course would have sufficed. Reusable learning objects offer great
promise here: for a reduction in development time, because you can “mine” the work of others, and for a tailored learning experience that gives learners only the training they need to perform their jobs. The not-so-obvious potential of reusable learning objects is improved quality and consistency in instructional programs.

Technology now makes reusable learning objects possible. The challenge, however, falls to the training profession to adopt an entirely new way of working—an evolution from an artisanal approach characterized by great flexibility to a more standardized, assembly-line approach. Although you may have a gut reaction against the assembly-line idea, do not forget that, from automobiles to computers, the Industrial Revolution and its underlying processes allowed mass access to modern consumer goods and a higher standard of living.

As the authors point out in this book, there are many factors to consider as you define your learning objects strategy. No one solution will fit all organizations. Much planning and coordination will be required to make reusability work. As the days of the solo practitioner and small design team independently developing lessons and courses wane, a professional practice is emerging that requires greater discipline and coordination to adhere to standards and to implement policies in ways that will ensure reusability.

However, no matter how learning objects are defined, granulated, or stored, the end product must serve fundamental processes of learning. Although we can develop new technology and new business processes relatively quickly, the evolutionary process that has shaped human cognitive learning moves much more slowly. As humans we all share memory architectures that are simultaneously very powerful and quite limited. Any instructional strategy, reusable or not, must take into consideration the requirements of this architecture, including the need to focus learner attention, activate prior knowledge, manage cognitive load in working memory, and prompt processing of new content in ways that lead to transferable knowledge in long-term memory. Thus, although there will be organizational challenges in new technology, new processes, and new policies to implement reusability, no less important will be solutions that keep the focus on human learning and the instructional strategies that support that learning. No amount of reusability will compensate for an end result that defeats human psychological learning processes.
Recent research has taught us much about the best instructional methods. Implementing reusable learning object strategies offers us the opportunity to make instructional products not only more efficient but more effective as well. Success will depend on the collaboration of a diverse team of experts, including technology, knowledge management, domain-content, and instructional psychology personnel.

This book, one of the first on reusable learning objects, is a great road map for training professionals setting out on this new journey.

*Ruth Colvin Clark*
*Cortez, Colorado*
Acknowledgments

This project got its start many years ago, when we began to discuss and refine exactly what reusable learning objects are, how they are created, and what their benefits are. Over the years, many people have helped us along the way. From those who participated in our earliest discussions to those gracious enough to review our first draft, we learned from them all. We learned from the critics of RLOs as well. Their wisdom forced us to reevaluate, rethink, and make changes to our ideas. The end result is better for their suggestions.

Although the list is long, we would specifically like to thank Ruth Clark, Wayne Hodgins, Wayne Weiseler, Steven Elliot, Wayne Seamans, Le-Anne Sousa, Chris Sliz, and the members of the RLO and OutStart user groups.

Chuck Barritt would like to acknowledge the RLO team at Cisco Systems, who actually worked through many of the key implementation issues over the past four years: Rick Crowley, Matt Tabor, Peg Maddocks, Barbara Termaat, Corliss Lee, Bob McGough, Christine Yoshida, and Samantha Edwards, to name but a few.
Introduction
Getting the Most from This Resource

Creating a Reusable Learning Objects Strategy: Leveraging Information and Learning in a Knowledge Economy will answer your questions about what it takes to create and implement a reusable learning objects strategy for your individual needs or throughout a global organization. Specifically, you will learn how to:

• Synthesize the various definitions of reusable learning objects (RLOs) to fit your needs.
• Recognize the current state of reusable learning object utility and how your usage may differ.
• Create reusable learning objects based on your needs.
• Identify the benefits and challenges of employing reusable learning objects.
• Compare your current development process with one based on reusable learning objects and the changes you will need to make during the transition.
• Document and capture all the elements that go into a strategy before moving forward with implementation.
• Create learning objects in a way that maximizes their reuse while maintaining their instructional effectiveness.

• Ensure that learning objects are designed for use in multiple learning approaches with the context needed to enable learning.

This book also addresses three important points that seem to be missing from much of today’s discussion about reusable learning objects: designing a strategy for implementing RLOs in an organization, correlating with existing training design philosophies and their architectures, and using reusable learning objects beyond directive, page-turning types of computer-based training (CBT) or electronic learning.

As you read, you may ultimately decide that reusable learning objects are not right for your organization at this time. This may be because of their cost, the needed changes in tools and processes, or the overall benefits for your specific training and knowledge management needs. This book is intended to help you make an informed decision—whether to go with reusable learning objects or pass on them.

AUDIENCE
Training, instructional design, and human performance technology professionals are the primary audience for this book. It is helpful to have a background in basic instructional systems design (ISD) principles, including the role of learning objectives, needs assessments, and evaluations in the ISD process. This book contains implementation-level suggestions geared to those in the training development function as well as suggestions for more strategic-level issues that managers and directors face in training, human resources, and knowledge management areas of their organizations.

Technical writers, or anyone involved with creating manuals and publications (either on paper or on-line), are an important secondary audience for this book. Those working in the information technology field who must implement and integrate RLO-based tools and solutions will also find this book helpful. Finally,
anyone whose job function is the breakdown and dissemination of information to end users, or employees, will find this text useful.

**HOW THIS BOOK IS ORGANIZED**

The book is designed as a how-to guide to documenting your own RLO strategy. We have included worksheets and checklists throughout the book so you can write down pointers, tips, and thoughts and make note of any signs of trouble along the way. In fact, by the time you have completed this book, the worksheets, and the checklists, you should have most of what you need to form a strategy document for your stakeholders, vendors, developers, and others.

We provide a number of examples taken from our personal experience in consulting with many companies, vendors, and standards boards on the subject of RLOs. Sample strategies include those used at a large global company, Cisco Systems, Inc., and those employed by a small regional firm, Redwood Credit Union. You will also find that examples and case studies continue from chapter to chapter to help you see how an RLO strategy may be developed and implemented, taking you from designing a strategy all the way to evaluating the results.

Because the book assumes that readers have some ISD knowledge, it does not discuss in depth the basic principles and processes of needs assessments, training design, development tools, valid assessments, or evaluation methodologies. However, we make numerous references to other books that we believe will be useful. A complete bibliography and a glossary are included at the end of the book.

**THE RLO-SPECIFIC ISD MODEL**

A large portion of the book is built around an ISD model geared specifically to reusable learning objects. The model, shown in Figure I.1, is a modification of the generic, traditional ISD model. The book explains how these stages are different and what you should keep in mind when you devise your own strategy based on this model. You will quickly discover that the type and magnitude of the changes depend largely on your tools, processes, and audience demands.
Figure I.1. The RLO-Specific ISD Model

- Analyze
- Design and mine
- Develop, repurpose, and reuse
- Deliver and access
- Evaluate
- Maintain and retire
Introducing Reusable Learning Objects

This chapter will help you get to know reusable learning objects (RLOs). To get you started, this chapter introduces many of the concepts involved: standards, reusability, applications, and so on. These elements form a foundation of knowledge that we will build on throughout this book as you create your own plan for developing and delivering training solutions based on RLOs.

Here are the specific areas we will cover in this chapter:

- What are learning objects and reusable learning objects?
- Why do I need a strategy?
- Why focus on reuse?
- What are the myths?
- What are the benefits?
- What are the delivery options?
- Are there industry standards?
WHAT ARE LEARNING OBJECTS AND REUSABLE LEARNING OBJECTS?

The term *learning object* means many things to many people. Definitions range from something as small as a paragraph of text to something as large as a complete training course. Some people focus on any grouping of like content with an associated performance objective or learning objective. Others shy away from the concept of learning and instead focus on content or knowledge objects. Still others exclude any small granular objects, media elements, or interactive assets as mere building blocks that can be pulled together to form a learning object. In fact, the more people you ask about what they believe a learning object is, the more answers you will get. As for the learners, they see a variety of terms for what they experience as a class, module, unit, lesson, chapter, page, section, and so on. In fact, each is simply a collection of learning objects.

Notice the use of the term *granular*. In the context of learning objects the concept of granularity refers to the smallest item that is found inside a “course” or other deliverable created from learning objects. An individual grain can be called an asset, or element, and is similar to grains of sand that form a beach, or building blocks that are combined to form a structure. However, the size of these granules is open to definition, just as the size of each learning object can be uniquely defined. You could choose to define a letter, word, sentence, or paragraph as the smallest granule, element, or asset.

There is one industry-accepted definition of the term that we can refer to, although it is very broad and does not clearly address issues of learning objectives, performance outcomes, measurement, and other elements you would expect. According to the IEEE Learning Technology Standards Committee (LTSC) IEEE P1484.12.1-2002 Learning Object Metadata Working Group (http://ltsc.ieee.org/wg12/s_p.html), learning objects are “any entity, digital or nondigital, which can be used, reused, or referenced during technology-supported learning.” The phrase “any entity” opens a Pandora’s box of various-size objects with different functions and target audiences. As for “technology-supported learning,” according to the IEEE specification, this includes “computer-based training systems, interactive learning environments, intelligent computer-aided instruction systems, distance learning systems, and collaborative learning environments.”

In its white paper titled “Reusable Learning Object Strategy,” Cisco Systems, Inc., defined a two-level hierarchy of objects in which five types of reusable
information objects—concept, fact, principle, process, and procedure—were used to build a larger structure based on a single terminal objective called the reusable learning object. Cisco simplified the terminology over time to avoid any confusion between levels of the hierarchy. This resulted in the company’s use of the student-familiar terms lessons and sections to represent the RLOs and RIOs, respectively.

Cisco’s follow-up white paper, titled “Enhancing the Learner Experience,” defined the ideal learning object as containing “a single learning or performance objective that is built from a collection of assets that provide static or interactive content and instructional practice activities. Any learning object can be ‘tested’ through assessments that measure the learning or performance objective and are either positioned with the learning object or collected as an assessment object.”

Others in the training and performance-support industry have created similar definitions for learning objects. Most training vendors, and organizations with a large set of existing content in their curriculum, look at their current hierarchies and pick out the smallest logical group that they may want to leverage and reuse in another context or have students access as a discrete learning experience and call that the learning object. Most would agree that, from a utility point of view, the learning object should have some context and meaning for the learner. Thus, a graphic on its own would likely not be considered a learning object. However, the graphic next to a procedure table and a simulator for practice can be combined to form a meaningful learning experience, and so this would likely be called a learning object.

Missing from many definitions is the idea of context and the impact that context has on being able to find, modify, and reuse existing learning objects from a database of courses, lessons, or modules. Many argue that context is what enables a piece of information to move from simple reference material to active training experience, something that encourages learning-to-job transfer. Depending on the size and scope of the learning object the context can result in collections and packages with labels that you and the learner are familiar with, such as courses, lessons, labs, case studies, role-plays, and so on. Regardless of the label, it is important to keep in mind that context is a key component in a learning object definition, and it will be discussed in more detail throughout the book.

Put very simply, a working definition of a learning object is as follows: a learning object is an independent collection of content and media elements, a learning approach
(interactivity, learning architecture, context), and metadata (used for storage and searching). Metadata is part of the definition. As you will learn in Chapter Five, the term metadata refers to a collection of keywords, attributes, and descriptive information that tells authors, learners, and systems about a learning object. This rich set of data is critical when using applications and databases throughout the learning object creation and delivery process.

Learning objects are authored in small pieces, assembled into a database, and then delivered to the learner through a variety of delivery media (see Figure 1.1). The learning object definition needs to encompass delivery and format issues as well as elements and context. Context and learning objectives should fit with accepted instructional design approaches and methodologies. Storage and retrieval of learning objects and their elements from a database should be allowed. To be reusable, learning objects must also contain search data so that users can find these objects and reuse them. Ideally, learning objects should include the following features:

- They should be objective-based. They should accomplish a single learning objective by combining a series of elements including content, media, and interactivity. (The process of creating these elements is presented in Chapter Four.)
- They should be context-free. Content, media, and interactivity are combined to form a meaningful structure so that the learning object can stand alone from the rest of its associated hierarchy, making it portable, reusable, and relevant as an independent learning experience. (How to build this structure is covered in Chapter Four.)
• *They should be interactive.* Although this is not always required, engaging learners, making them active participants in the learning experience, is key to having them meet the learning objective.

• *They should be self-descriptive.* Search data (or metadata) associate with each element and learning object to be used by the system, authors, and learners. (Metadata will be covered in Chapter Five.)

• *They should be self-contained.* Each learning object is capable of either standing alone or standing in unison with other learning objects to create any number of training programs or technical manuals.

• *They should be single-sourced.* A learning object is written so that multiple authors, in multiple learning environments, and in multiple delivery formats ranging from print to e-learning, can use it. This requires writing and reuse guidelines and processes that will be discussed later in this book.

• *They should be format-free.* To be reused in multiple delivery media, learning objects should be created free of look-and-feel formatting. The formatting happens during the delivery of the learning objects to the learner. (Delivery is covered in Chapter Three.)

In this book we most frequently use the term *reusable learning object* (RLO) because our focus is on learning objects that are accessed, reused, or reformatted throughout a database system. The idea of reuse has implications for both authoring and delivering learning objects; therefore, it is important to include in your strategy. Throughout this book we also acknowledge that learning objects have benefits besides reuse, and supporting reuse may result in some difficulties. More on the subject of reuse follows in a later section of this chapter.

**WHY DO I NEED A STRATEGY?**

The purpose of any strategy is to document a plan of action, goals, and deliverables for a project or undertaking. In this case, the strategy you are developing is the implementation of reusable learning objects in your department or organization. Your strategy may be narrow, focusing on a small group of internal authors creating RLOs for a modest-sized internal audience, or it may be global, relying on every employee as an author, leveraging the help of external vendors and partners, and establishing a commerce model for external learners.
Obviously, the ambitiousness of your goals, the size of your organization, its willingness to change, and your time lines will all have an impact on the size and scope of your RLO strategy. This strategy should contain an assessment of the risks, challenges, and benefits for authors, the organization, and learners. It should specify deliverables, milestones, and projected costs. It should identify partners and vendors who will help roll out your RLO-based authoring, delivery, and management tools. It should highlight possible integration issues with your existing systems and integration with your “legacy” or existing knowledge and training infrastructures. As you can guess, changing your existing process and content to an RLO-based system will require additional resources.

An RLO strategy will be necessary in order for you to document all these points. If you do not have such a strategy, you will have difficulty communicating your plan. This is especially critical when the strategy is global or its implementation requires a great deal of change management to deal with possible resistance. This book will help you answer questions that you should consider in developing your strategy, including these:

• Will all training and information be developed to the RLO strategy?
• What resistance will you face in implementing the RLO strategy?
• Will the RLOs be authored and delivered internally or externally?
• Will the RLOs be delivered on-line, as part of a performance support tool, in a classroom, in print, or through some combination of all of these?

By the time you finish this book, your strategy should be complete. It will become your project plan, best practice guide, business justification, and integration map for implementing RLOs at your organization. Without this document, your ability to implement RLOs successfully will be greatly reduced.

WHY FOCUS ON REUSE?

As you can see, the concept of reuse is only one element in learning objects. It is in the title of our strategy because many authors and implementations of learning objects have found the potential of reusing existing learning objects and elements to be a key business driver for adopting such a strategy. Figure 1.2 illustrates the goal of looking for existing materials from multiple sources and bringing them together in a new course, unit, lesson, or other performance solution. This level of
reuse is ideal. It assumes that pieces or elements from other learning objects can be found to fit into a new learning object. It also assumes that you will be able to find those elements and learning objects from all the other possible sources throughout your learning object database or existing course curriculum. Reuse, as you will quickly guess, is not as clean and easy as we would like. Therefore, it is important to think beyond reuse when adopting an RLO strategy.

Remember, the promise of learning objects is that they can be leveraged, linked, or copied by multiple authors, placed into any number of training and performance programs, and then delivered in a range of delivery media. Of course, there are other \textit{r} words that could equally speak to the advantages of learning objects. We could focus on modifying these objects through \textit{repurposing} while avoiding redundant information. We could focus on \textit{returnable} learning objects that can be checked in and checked out by authors. Likewise, we could talk about \textit{restrictive} learning objects that force you to author based on a specific instructional design approach. These “\textit{r}” words are covered in more detail in Chapters Two and Three.
For now, let us keep in mind that pure reuse is an ideal scenario; in practice, many authors adopt a repurposing approach. This is the process of finding existing learning objects and changing them in some way to fit the author’s specific needs. Although this does allow for custom solutions that fit the new context, repurposing content can have some negative consequences. To begin with, each modified object becomes a copy in the database, and therefore adds more and more objects to a learning object repository that may be difficult to distinguish. This provides a larger number of objects for potential reuse in the future, but it can also significantly limit your ability to find them. Other issues such as version control, ownership, and updating the original also need consideration.

All the issues around the $r$ in front of learning objects, including reuse, repurpose, redundant, return, and restrictive, are addressed in later chapters.

WHAT ARE THE MYTHS?

Just as there are many definitions for learning objects, there are many myths about their benefits, costs, and limitations. In the previous section we listed the possible benefits of learning objects, including reuse, distributed authoring, single-source delivery, and customized learning experiences. These may not be of equal difficulty or cost to implement. In fact, some critics of learning objects have focused on the restrictive nature of granular, single-source content, asserting that it lacks context and relevance. Others have focused on the costs of integration, conversion of existing content, finding learning object–authoring tools, changing authoring habits, and engaging the learner in meaningful, rich, problem-solution-based learning experiences. Others think that only step-by-step, procedural, technical training can be built from RLOs.

So how do you determine what is a myth and what is a possible reality? There is no simple answer to this question. It will depend on the size and scope of your learning object strategy, the tools you have to support that strategy, the size of your authoring community, and the demands of both your business and your learners. One way to separate myth from reality is to look at your RLO strategy and everything you would like to accomplish through learning objects. Assume that everything can be done given enough time, resources, and intellectual capital. Then do a reality check. Look at the tools, partners, and resources available to help you complete your implementation. Those items that prove too costly, out of
scope, or limiting for the learning experience should be highlighted and either modified or removed from the strategy. Likewise, you may find that some items you thought would be difficult to fulfill are in fact possible. So instead of perceiving those impossible features and functions as limitations, or myths, realize that they are simply out of scope for your current implementation.

That said, we will address four myths about RLOs here: they only work with technical content; they result in directive learning; single-sourced content is impossible with them; and they solve any training problem.

**They Only Work with Technical Content**

One of the frequent criticisms of RLOs is that they only work with technical content. Because many organizations look at RLOs to support e-learning initiatives, and there is a great deal of procedural technical training on the market today, the impression is that RLOs only support technical-based e-learning.

Of course, this is not accurate. Many companies have used learning objects to build soft skills, such as sales skills, management skills, or other nontechnical training. As you will see in the case studies in this book, both Cisco Systems and Redwood Credit Union have implemented soft-skills training using RLO strategies. Cisco Systems has successfully applied RLOs to sales and client relationship training as well as to technical training. Redwood Credit Union is creating a strategy that will use RLOs for customer service, management, and operations training.

**They Result in Directive Learning**

Another common myth is that RLOs can only be strung together to form step-by-step directive learning architectures. This is where the learner cannot explore, apply problem-solving skills, or achieve higher cognitive learning objectives such as synthesis and evaluation. The reason why many people focus on directive learning is because of the tie to traditional computer-based training, where lessons are connected through a forward and backward button, following a page-turning metaphor. In addition, many of the database-oriented authoring tools of today present learning objects in a fixed hierarchy that is based on that same page-turning metaphor.

In her book *Building Expertise*, Ruth Clark (1998) identified four distinct architectures for the design of training programs: receptive, directive, guided-discovery,
and exploratory. Table 1.1 presents a brief description of each. (More discussion can be found in Chapter Three.) Looking at the content that goes into each of these architectures, we can see a place for learning objects. Exploratory environments allow the learner to jump from area to area—or learning object to learning object—with little or no system control. Guided discovery allows learners to solve problems and perform complex tasks just as they do on the job. Learning objects in

<table>
<thead>
<tr>
<th>Architecture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive</td>
<td>Training and presentations based on a receptive architecture put learners in the inactive role of observer. They may be in the form of a long lecture (with no questions) or a series of e-learning screens with no interactivity. In these cases the learner is passive and has little or no control over the speed or flow of events.</td>
</tr>
<tr>
<td>Directive</td>
<td>The directive architecture places learners in a more active role. The training provides small sections of material followed immediately by an opportunity to apply the learning through practice or interactions. Although learners are more active, they still may not be in charge of the speed and flow of learning.</td>
</tr>
<tr>
<td>Guided discovery</td>
<td>The guided-discovery architecture is based primarily on problem solving. Ideally, the problems presented to learners are replicas of the types of problems they will solve in the workplace. Learners also receive a variety of instructional support techniques to use when solving the problems being presented.</td>
</tr>
<tr>
<td>Exploratory</td>
<td>The exploratory architecture provides learners with a large and complex set of materials that can be used to learn new things. This architecture does not try to guide the learning in any way. Learners are free to choose from any number of experiences to master a new topic or task.</td>
</tr>
</tbody>
</table>
that architecture include all the tools, resources, and supporting context that build the guided-discovery learning experience.

It is not hard to imagine, or require, that those small granular objects can be leveraged in a guided-discovery environment, in a hands-on lab activity, or in a feature-rich simulation (see Figure 1.3). The myth is based on the limitations of today’s tools and the general cost of building any course in terms of instructional design and programming. In other words, since it is not very easy to create a guided-discovery architecture even with existing tools, it must be impossible with RLOs. The myth is that learning objects cause directive architectures, when in fact that approach is often driven by the costs of developing alternative learning architectures.

**Single-Sourced Content Is Impossible**

Although it is not impossible to do, creating one learning object that can be used in any delivery medium is challenging. Some media-rich content developed for e-learning obviously will not exist in print. However, you should be able to produce equivalent elements that can detect if the output is going to be e-learning or print. In this case, you could argue that the learning object itself, its target audience, learning objective, search data, static content, and instructional approach are

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**Figure 1.3. Leveraging RLOs in All Learning Architectures**

---

Introducing Reusable Learning Objects
all single-sourced. Only the media that is dependent on the delivery environment is unique (see Figure 1.4).

When it comes to e-learning and instructor-led training, the instructor could use the same media elements in the class as are used in the e-learning version. For example, a video clip would play well in both settings. If the classroom is set up with computers, the instructor could also have small groups work through simulations and case studies that are reused from the self-paced e-learning. A more difficult transition is from the classroom, where a learning objective calls for small group activities among the learners, to the e-learning environment, where an on-line community may not be available.

In sum, making RLOs work in many delivery media is not impossible. Alternative delivery types, instructional design approaches, and equivalent objects are covered in more detail in Chapters Two and Three. For now, let us just make it clear that single source is possible with some work and planning.

They Solve Any Training Problem

Obviously, this is a myth, but it is one that often gets lost in the marketing hype and the lure of trying out the “next big thing” in training. We have seen the rush to adopt all things new in the training and human performance world in the past. Starting with every form of new instructional media—from audio, film, computer-based training, laser discs, e-learning, and so on—our industry has a fixation with trying the latest technology before research is in place. Each of these new technologies has been sold as a cure-all, something that will help solve any training problem. Admittedly, technology has helped solve many problems: limiting the cost of travel,

Figure 1.4. Media-Dependent Elements May Be Needed

<table>
<thead>
<tr>
<th>Storage → Delivery → Learner</th>
</tr>
</thead>
</table>

- E-learning
- Print
- Help systems
- Instructor led
- Virtual class
- Blended
- PDAs
- Other

Creating a Reusable Learning Objects Strategy
simulating dangerous work environments, creating economies of scale, accommodating multiple learning styles, and so on. However, the problem drove the solution when these technologies were used effectively. The solution should never try to find a problem to fill. As you read this book, keep in mind your performance problem, your goals, your needs, and what elements of an RLO strategy, if any, will help you address them. Plan time to research your needs and your results once RLOs are in place.

Be cautious of any sales pitch portraying RLOs as the greatest training innovation since the Web, film, textbooks, and so on. Realize that very little, if any, quantitative research has been published on the effectiveness of RLOs for a given performance problem. This book is based on solid human performance technologies, processes, and best practices. Some research on instructional design can be leveraged in defining an RLO strategy, but areas such as context, granularity, learner preferences, effectiveness, and so on need further research. Keep this and the other RLO hype in mind. To help you do this, throughout this book we will mention specific concerns to watch out for in implementing RLOs in your environment.

**WHAT ARE THE BENEFITS?**

No matter how well you plan, the transition to RLOs can still be rocky. At some point you (or others) may ask: *What is the advantage to RLOs? Why are we doing this again?* Fortunately, you can enumerate numerous benefits to help answer those questions. Depending on the tools and process you follow, converting to an RLO approach for the design, development, and delivery of training and performance-support materials should result in benefits for authors, learners, and eventually, the organization sponsoring this implementation. Although this section lists some of the most important benefits, you will likely pick up on others as you read through this book. We suggest that you make notes of any benefits that seem applicable to your RLO strategy, and disregard those that do not apply.

**Benefits to Authors**

Did you ever write a page or two of training material only to discover that someone else had provided the exact same information in a different course? If the answer is no, then consider yourself lucky. It is also possible that your existing curriculum is so broad, and has so many authors from different training entities, that you
simply cannot track every learning objective that has been developed into a course. In contrast, if you have been able to reuse existing content, then you already understand that one of the benefits of learning objects is avoiding re-creating material that already exists.

In addition to finding existing learning objects for possible reuse in new solutions, RLOs afford authors the following benefits:

- Object-specific templates for streamlining the process of creating content.
- A consistent design and development process that allows more time to focus on actual content.
- Searching for existing content to reuse (or repurpose) to reduce the possibility of multiple authors creating the same content.
- The ability to create one object for use in a classroom handout, a Web page, a personal digital assistant (PDA), and an on-line technical manual. (See the earlier section on single-sourcing.)
- The ability to reconstruct training into new and novel configurations with little or no retyping.
- The ability to share the exact same information easily across various departments or divisions.

Benefits to Learners

Perhaps the greatest benefit to learners is consistency. This does not mean that every training program will be a carbon copy of the last, but it is important for training across the organization to maintain the same general look and feel. Learners will also see these benefits:

- RLOs can be used for just-in-time training or information, giving learners what they need just when they need it.
- Training can be easily individualized, eventually reaching the point of being prescriptive, where the delivery system will suggest RLOs for a particular learner.
- Learners may be able to get the same information in multiple formats, allowing them to choose their preferred method.
- Learners can “test out” of certain RLOs, allowing them to focus on areas where they need improvement.
Benefits to the Organization
Of course, if reusable learning objects provide benefits to authors and learners, that should translate into benefits for the organization. However, there is an important caveat here: reusable learning objects are not a cure-all for an organization’s training problems.

If an organization is not following a sound instructional design (ISD) process, then the resulting training may be mediocre at best. If you fail to apply sound ISD to a reusable learning object strategy, then you will still get poor results. In other words, a reusable learning object strategy is not a replacement for following good instructional design principles when training programs are created.

WHAT ARE THE DELIVERY OPTIONS?
In the previous section we talked about the benefits of learning objects for the learner. We have also mentioned that they can be used in multiple delivery modes—from e-learning to instructor-led training—and that they can be used with any of the four learning architectures. The limitations to delivering a meaningful, effective, and motivating learning experience derive largely from the limitations of tools, resources, or instructional design skills. If learning objects are used properly, learners should have an experience that closely resembles that afforded by the e-learning, virtual classroom, instructor-led training, support systems, and print documentation that they use today.

E-Learning
In today’s high-tech world, e-learning may still be the front-runner for applying the RLO strategy. This is especially true if the RLO strategy is planned around the just-in-time concept of training. Training courses are easily placed on the corporate intranet, on the Internet, or on a CD. The e-learning environment also gives learners the flexibility to test out certain RLOs and only complete the ones that they need.

Instructor-Led Training
Reusable learning objects are equally at home supporting instructor-led training. Objects can be created that are then used to print student handouts, instructor guides, and practice and assessments. One solution is to print class slides via HTML files that will mimic a Microsoft PowerPoint presentation.
Blended Solutions

Blended solution is the term applied to training programs that include elements of classroom training, e-learning, and possibly on-the-job performance. It goes without saying that if RLOs support both e-learning and instructor-led training they will support blended solutions as well.

Blended solutions can cover literally hundreds of scenarios. The following are just some of the possibilities: reading print-based manuals and completing on-line practices or assessments; completing an on-line module followed by classroom discussions; combining classroom discussions, on-line practices, and an on-the-job performance-based assessment.

Technical Manuals

By now you have seen that RLOs are not just applicable to training. The same content blocks used in a training program may be reused in a technical manual or a policy and procedure guide. The underlying principles and concepts are the same for technical documentation and for training. And it does not matter if the technical document will be delivered in a printed manual, through an on-line system, or in some form of help file.

More Flexible Options

In addition, you may find RLOs being delivered in personal digital assistants, help systems, job aids, mp3 players, and other nontraditional training delivery media. RLOs may also be used to consolidate both training and knowledge inside an organization, encompassing everything from technical documents and product specifications to e-mail lists, on-line communities, and communication tools. RLOs may be leveraged and delivered to both internal and external applications. RLOs may be adopted by marketing groups, human resources, sales, manufacturing, and others who are normally not in alignment with traditional training materials.

ARE THERE INDUSTRY STANDARDS?

The answer to this question is complex; this is because there is a difference between standards groups and specifications groups. The IEEE is a standards group, whereas organizations like Advanced Distributed Learning (ADL), IMS Global Learning
Consortium, and Aviation Industry CBT Committee (AICC) are specifications
groups. Just as a bill in the U.S. government gets passed from committee to com-
mittee and is then voted on by both the House and the Senate to become a law,
specifications groups supply the standards groups with requests to create a new
standard based on a specification that they created.

To date, there is only one official standard that deals specifically with learning
objects. The IEEE voted to approve a metadata framework, simply called learn-
ing object metadata (LOM). In Chapter Five, we talk more about metadata and the
LOM. For now, just think of the LOM as a common set of metadata that can be used
by anyone implementing learning objects. It includes ways to extend that metadata
to fit specific implementation.

As you begin storing and searching for reusable learning objects you quickly
understand why a metadata standard is important. If two authors use different
metadata, then they may miss each other’s objects when conducting searches for
existing RLOs to reuse in their solutions. Likewise, learners are unable to find RLOs
to meet their needs without a rich set of metadata that they can either directly
search on or leverage in creating profiles and preferences. Without metadata, one
of the main benefits of reusable learning objects would be lost.

A specification that is quickly becoming a de facto standard is the Shareable Con-
tent Object Reference Model (SCORM) from the ADL project (see www.adlnet.org).
This project has created a stir among training-tool vendors and providers of large cur-
ricula of off-the-shelf courseware because it attempts to unify a number of specifica-
tions in order to ensure that learning management systems can exchange learning
objects between systems. We cannot explain all of the possibilities of SCORM here,
but you should be aware of its existence. Many of the vendors, training partners, and
content providers you research will claim SCORM compliance. You will have to
determine if SCORM compliance is in the best interests of your organization.

To learn more about using SCORM, we suggest you review the SCORM Best
Practice Guide for Content Developers (Rehak, 2003), published by the Learning Sys-
tems Architecture Lab at Carnegie-Mellon (see www.lsal.cmu.edu/lsl/ expertise/
projects/developersguide). This document is designed for content developers,
instructional designers, writers, programmers, and subject matter experts who are
creating new content that is SCORM-conformant or converting existing content
into SCORM-conformant content.
CHAPTER REVIEW

By now you should have gained a firm definition of reusable learning objects and understood what a reusable learning object strategy is. This chapter has discussed a number of preliminary questions to help you begin defining your own RLO strategy. We have debunked some myths, talked about benefits of learning objects, and noted what learners will experience. Specifically, this chapter answered the following questions:

- What are learning objects and reusable learning objects?
- Why do I need a strategy?
- Why focus on reuse?
- What are the myths?
- What are the benefits?
- What are the delivery options?
- Are there industry standards?

As you move forward in your RLO strategy, keep in mind that although we offer advice, provide examples, and describe best practices for RLO design, development, and delivery, you will need to choose those elements and features that best fit your organization’s needs. The remaining chapters in this book help you focus on the day when your learners will be using RLOs.

RLOs in Action: How One Company Got Started

Each chapter in this book concludes with a section called RLOs in Action. This section captures how a sample medium-size company applies the topics covered in the chapter to develop an RLO strategy that addresses its needs. Each RLOs in Action section is presented as a case study and a way to summarize what you just read. It is difficult, however, to create a believable case study that covers every possible aspect of the RLO strategy that you may want. For example, you may be planning a turnkey solution for your organization, whereas our RLOs in Action company is planning a phased approach. You may find it helpful while reading each RLOs in Action section to review your own...
developing RLO strategy and determine what lessons or best practices you will apply.

To get started, here is some background information on NoWaste Goods, Inc., the company that we will track as it moves forward with its strategy. You may want to note the learning environment and what the organization sees as the possible benefits and opportunities for RLOs to meet its employee and customer needs.

**Size and Location**

NoWaste Goods, Inc., has twenty-seven hundred employees and has been in business for twelve years. It has one hundred retail stores located in fifteen western U.S. states, including Alaska and Hawaii. Each retail store has between fifteen and thirty employees. Locations in some cities have a small staff of consultants. There are two regional warehouses, each with twenty employees. Finally, the corporate offices, in Portland, Oregon, have about 250 employees. There are plans to expand the retail and consulting services into the eastern United States within two years. Currently there are a total of twenty-seven hundred employees, with future growth pushing that number to near four thousand.

**Business Plan**

NoWaste earns income from in-store and on-line retail sales and consulting services. The retail locations and on-line catalogue sell household and office supplies made from recycled and renewable materials. They include a large selection of non-perishable organic and vegetarian food items. No fresh produce is being sold currently. Minimal waste and packaging are emphasized. Each retail location runs off solar power; the company is considered “earth-friendly” by environmental groups.

NoWaste also offers consulting services to local companies, schools, and government agencies, focusing on how each group can meet the low-waste and zero-waste regulations in each state through education, purchasing choices, manufacturing changes, automation, and employee action. Consultants help reduce energy consumption and set up solar-based power systems. In addition, the consulting groups offer free or discounted educational and training events to the local community. These are conducted in the retail locations or in local schools and businesses. The company leverages these engagements to draw business into its retail locations to promote its branded products.
Learning Environment

Four primary groups in the company traditionally have their own unique learning environments: the corporate headquarters, warehousing and distribution, retail sales, and consulting services. NoWaste also has a marketing department that is focused on customer education through product information materials available in the retail locations, through consulting services, and on the NoWaste Web site.

There are three training groups in the company, as well as a documentation group, which maintains print-based materials and the Web site. The documentation group is housed in the marketing department. Currently, there is very little sharing of training resources or product information between these groups.

Opportunity for RLOs

There are many areas of duplication at NoWaste. Each training group recognizes that its content, training materials, and delivery needs are similar to those of other groups. However, project schedules, development processes, authoring tools, and distribution channels have largely kept the groups separate. This is about to change for the better as the team has just learned about RLOs and is pulling resources together to begin exploring the solution in more detail.

This process started when the vice president of HR and the vice president of retail training began discussing ways to provide better access and updates to employees about their 401k and stock purchase benefits. These two areas seem to be obvious possibilities for RLOs because they have common elements for each state in which NoWaste does business. If employees are new to the program or simply looking for more information about the current plan, they want quick access to the most updated information. Likewise, when employees sell stock options, or leave the company, they need additional training and information.

In other areas of NoWaste, management noticed that the consulting group could use the product-marketing information created for external customers instead of creating its own separate materials. The consulting training programs are also customized for each state, because local recycling and waste reduction regulations vary. Key areas of each course in each state remain the same, but often the training becomes out of sync because updates and revisions are not passed around to each state’s version of the course. Finally, many of the skills and knowledge needed by the consulting staff are also useful to the staff at the
retail locations. The retail staff often answers tough questions on local policies and products before suggesting that customers talk to a consultant.

The VP of documentation and some developers in the training departments are aware of the need for standards and have heard of SCORM and the IMS Global Consortium, but they are not sure why they should care. Their exposure to RLOs and standards has largely been limited to vendors, journal articles, and those claiming compliance with “industry specifications.” The entire documentation department is currently using Information Mapping to “chunk” content into concepts, fact, processes, principles, and procedures. They are also using XML (a method for creating Web sites) and some established document management guidelines and tools.

**RLO Strategy Task Force**

Based on hallway conversations, the inefficiencies of duplicating training and product materials, and exposure to RLO standards, the CEO and management decided to begin an RLO strategy effort. Because of her background in standards, templates, and Information Mapping, the management team tasked the VP of documentation to lead the effort to build the strategy and implementation plan. She was given access to key company personnel to create a task force, including team members from the retail, warehouse, HR, consulting, customers, and product areas. Information technology team members were also included to assist with development and delivery issues. All team members agreed that the overall RLO strategy made sense, but the consulting group expressed some trepidation. The VP of consulting services voiced concerns about sharing the information his department used with the retail sales staff and on the public Web site; he feared that consulting needs might be reduced. These concerns will be addressed in the strategy as the task force moves forward.

As you will see in the upcoming chapters, the team developed three RLO-based pilot projects to address the specific needs of HR and retail and consulting sales, as well as those of documentation. They felt that if their RLO strategy could meet the needs of these three groups, then it could accommodate all training and knowledge areas in NoWaste.
Although it may be tempting to look at the instructional design process first, we will save that topic for Chapter Three, when we will talk about how building RLOs to meet your strategy follows the traditional design process in many ways. In this chapter we will focus instead on what you need to consider as you create your RLO plan, or strategy. We will challenge you to document your goals for using RLOs as training and performance-support solutions. We will help you create a road map that identifies the ideal implementation and how you will get there and lists the costs, possible pitfalls, and advantages of using RLOs. We will help you examine how you will design your RLOs to fit the needs of learners and the organization. These are the types of issues that you will need to address in developing an RLO strategy.

To that end, in this chapter we will examine the following questions:

• How will authors and learners use the system?
• How will you break down content to build RLOs?
• Who will create and own the RLOs?
• How will the RLOs be delivered?
• Will the RLOs be static or dynamic?
• Will the RLOs be customized for learners?
• Will you use format-free objects?
• Will you use templates?
• What business rules will you need?
• How much metadata will you need?
• How will you evaluate your success?
• What are your RLO tool options?
• What system architecture will you need?

Of course, you may have other questions that need answering as you define your RLO strategy. This list is of the thirteen questions that are the most common. As you read this chapter, document any other questions that come to mind. To help you answer these additional questions and capture your ideas, we have included a worksheet at the end of the chapter. However, do not feel that you have to have all the answers now, because your questions will likely be addressed in the next few chapters.

Let us start building your RLO strategy by looking at the authors and learners who will be affected.

HOW WILL AUTHORS AND LEARNERS USE THE SYSTEM?
The first step in creating your RLO strategy is to identify how your authors and learners will access RLOs in their jobs and what quality of service they will expect. Perhaps you have an ideal authoring and delivery environment in mind. Maybe your strategy will start with a single database of learning objects that are delivered dynamically to learners as e-learning or performance support. These same objects will then be reused to fit instructor-led training and repackaged again to fit the needs of a new audience. Your vision may include many groups inside your organization contributing to the RLO database, each having the right to update and modify one another’s learning objects. Perhaps your business requires you to leverage external training partners, vendors, and contractors, who will also be contributing to the RLO database. To make all this a reality, you will need to
document how authors will use the system, their locations, access rights, authoring guidelines, and how RLOs will flow from design to delivery.

When documenting how authors will use the system, first determine if they are internal, external, or both. Communicate with your IT group to determine how a single database may be shared across these locations, or if multiple databases with data replication are needed. This can be further complicated depending on how dispersed the various authoring groups are, the type of security each requires, the need for reusing objects across authoring groups, and the overall IT infrastructure you set up for your internal and external authors.

Likewise, your students may be centralized in your corporate network or distributed around the world. Just as with your authors, the students may require minimum quality service, round-the-clock support, dynamic and up-to-date content, and integration with the tools and systems they use daily on the job. In defining your RLO strategy, it is important to map out the authoring process and the delivery process. Identify how everyone will use RLOs and their expectations, because this will help you find the tools, network infrastructure, and business rules you will need to implement your strategy.

**Internal Authoring and Delivery Processes**

Let us look first at a simple process for internal authoring and delivery. In this case your authors are creating RLO-based content that will only be used inside your organization. All the authors are centrally located and all have access to the corporate network. In this scenario, you will likely set up a single RLO database, establish a few rules for checking in and checking out objects from the database, and provide minimum security. Learners will access the RLOs as they are finalized directly from that same RLO database. (See Figure 2.1.)

As you add authors from around your company, these new authors will have an impact on your strategy when it comes to the tools and business rules you put in place. If you have more authors, it will require you to establish more rules and guidelines on sharing objects from group to group, ownership rights, security, and cross-charges for used objects. In the first scenario—with only a single group of authors—the issue of who owns the content and who is allowed to reuse the RLOs is usually not as critical as when two or more groups are involved. Depending on the size of the authoring groups, your IT infrastructure may also need to be increased to support a minimum level of service, with more RLO database
servers, application help desks, data replication, and backup. As your RLO database grows and more learners access the completed RLOs, new servers may be needed to maintain delivery quality and speed.

Another issue is how content is broken into “chunks” and placed into a content outline or some other logical hierarchy. It is possible that one group defines its hierarchy using a three-layer approach while another uses four. In order to exchange and share objects with each group, you will either need to work out a common hierarchy or acknowledge that a lesson authored by one group may be a different size and cover a different level of job tasks than that of another. Again, this illustrates how the level of complexity increases as more groups are added to the RLO authoring process, especially if they are out of your locus of control. (We use the familiar terms lesson and course throughout this book to refer to groups of RLOs that have been combined to meet specific learning objectives.)

Adding External Authors and Learners
Your RLO strategy may also require you to make your authoring and delivery environments available to external authors and learners. You may find the need to use consulting companies and vendors to help develop training. Perhaps you have a lot of existing training materials that will be converted to RLOs by an external vendor, but you want that vendor to use the same tools and database you access inside your organization. The multitude of issues that grow out of adding external authors to your environment include ownership of the RLOs, how the RLOs can be reused, when they can be modified, and how updates can be communicated quickly. Although integrating tools and systems with external authors will help,
you should define clear business practices and guidelines as well—for example, the legal issues involved in access to authoring tools and the guidelines for intellectual property and reuse. Documenting these requirements at the start will prevent project delays as you expand your author population.

Likewise, when you open your delivery environment to external learners or customers, you must address new systems, tools, security, business rules, and expectations. The demands increase when your business charges external customers to access the training. Unlike simply delivering RLOs at no cost to internal employees, you will likely charge external customers for training. In addition, external customers may have higher expectations for quality of service, requiring twenty-four-hour support, speedy delivery, high production-value media, and customized learning experiences. You may have this same goal for internal groups, but the focus may change from one based on delivering RLOs quickly—when the learners need it—to a business that markets training to external customers. Of course, if your internal training is run like a business, there may be no difference between the groups aside from the registration and commerce systems that support the learners.

As Figure 2.2 shows, the complexity of your RLO strategy grows exponentially as you add authors and learners. Likewise, the systems and processes that support

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**Figure 2.2. Internal and External Authors and Learners**

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>SYSTEM</th>
<th>LEARNER</th>
</tr>
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<td>SMEs and employee</td>
<td>RLO authoring tools and database</td>
<td>Employee</td>
</tr>
<tr>
<td>Remote author</td>
<td>Training vendors</td>
<td>Global customers and remote workers</td>
</tr>
</tbody>
</table>

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the RLO strategy, such as authoring tools, database replication, delivery media, registration, assessment tools, communities, and evaluations, are also affected. In defining your process, interview authors and learners to determine their ideal work flow and access needs. Interview business owners and sponsors to find out their expectations for today and the future. Work with your internal IT and tool vendors to ensure that you can support your authors and learners, that tools can be used externally, and that the work flow demands of authors and learners can be met. You may find you will need to integrate internal and external RLO tools, align different learning object strategies from across your organization, and integrate with e-commerce and learning management systems. Doing all of this will help you prepare to roll out a successful RLO strategy.

**HOW WILL YOU BREAK DOWN CONTENT TO BUILD RLOs?**

Breaking down content into a logical sequence, sections, or topics is actually a very common process. You do this each time you write a report, document a procedure, or create a training course. Often you start with a series of objectives, goals, or tasks, and then draft an outline listing what you need to communicate to meet those objectives. There are many ways to break a task into an outline, but most of them focus on the job being performed. Making the switch to RLOs does not change the need to break content down into a logical flow to meet your needs. RLOs will, however, have you look at the use of those chunks, how “legacy” or existing content and training may fit in, and what levels of granularity you will want to store as reusable learning objects in your database.

Figure 2.3 shows a generic process for breaking down a job task, taking the project from the design phase into development. In this example, the job task is to verify that a personal check being deposited at a bank is valid. Just as in traditional training development, the author would research the job task being performed, looking for concepts, facts, processes, principles, and procedures that employees follow during the validation of a personal check. Once the author has collected all the needed background on that task, he can organize it into a design plan that includes the learning objectives, necessary context, job-based scenarios, and content type (concept, fact, process, principle, or procedure).

The design plan is commonly a document using a hierarchy that starts from a broad job function and moves toward a specific job task. These levels are easily
**Figure 2.3. Breaking Down Content Through a Job-Task Analysis**

1. **Identify task to solve a performance need**
2. **Capture tasks: look for procedures, concepts, processes, principles, facts**
3. **Organize tasks into design plan: include objectives and structure for learning objects**
4. **Begin developing RLOs**

Job task = Verify a check

- Interviews and observation
- Existing documentation
- Design plan
- RLO authoring tool and database
transferred into a lesson or course hierarchy that is used during a traditional
directive training delivery approach. Each level of that course and lesson hierarchy
would also have a learning objective that moves from the very broad to the very
specific.

Although you may find it limiting to constrain any RLO to a single hierarchy
(as they can be reused in other organizational structures), it is helpful document
a hierarchy for your design phase. A proposed course hierarchy serves as a good
“table of contents” for your stakeholders and as an outline to help capture content
during the development phase. When you specify a hierarchy for a set of job tasks,
keep in mind that other organizational structures or guided-discovery learning
approaches are still possible and are not limited by listing job tasks in this way. A
hierarchy is simply a way to communicate a logical flow and progression of content
to those reviewing and using the design documents.

Although this process is probably very familiar to you, the level of granularity,
the division of content, and the idea of being able to reuse specific steps in the job
task may all be new. This section will focus on two areas that may be very differ-
ent for you: methods for breaking down content (that is, job-task performance
matrix) and dealing with legacy knowledge.

**Methods for Breaking Down Content**

There are numerous approaches to breaking content down into a logical flow, out-
line, or job-task structure. Many books have been published on cognitive task
analysis, documenting procedures and work flows, creating knowledge maps, and
capturing expert knowledge. You may choose to use a job task methodology or
perhaps a process that focuses on behaviors and general competencies. As you
define your RLO strategy, be sure that you account for the content breakdown that
you have adopted. In other words, if you want to remain job-focused, just make
sure your strategy supports that approach. It is very likely that the method you cur-
rently use to break down content will fit right into your RLO strategy, because it
is difficult to imagine a case where chunks of content could not be defined as part
of an RLO or as an entire RLO. In other words, you should have an easy time mak-
ing the transition from a traditional job-task analysis to one that applies RLOs.

Let us say you are using the job-task analysis that is included in most traditional
ISD models. The basic premise here is that you simply start with the job being
performed and then break it down into smaller and smaller chunks until you feel
that it should not be broken down any further. If your job is to land an airplane, then the smallest chunk might be how to read a specific gauge on a control panel. Or if you decide this is prerequisite information, you may instead focus on the procedure for solving a warning light. In either case, that small chunk would fit into your RLO strategy as a possible reusable, searchable learning object that other authors and training programs could use.

Any level of the job task hierarchy can be tagged as a learning object. As you probably know, there are many different ways to take various chunks of content and configure and reconfigure them into training programs or other forms of performance improvement interventions. You will ultimately need to look at the level of reuse you expect, the number of delivery formats you want to support, and your expected return on investment for adopting RLOs.

One method for dividing content into small chunks is with the content-performance matrix. Ruth Clark proposed this model in her book *Developing Technical Training* (1999). In this text she suggested that content should be divided based on a job task hierarchy. Each lesson should include a single terminal objective that is supported by a number of enabling objectives. Furthermore, each objective should be classified as a concept, fact, process, principle, or procedure: the CFP3 model. Within those five information types, Clark also suggested what needs to be communicated to teach each of those objectives adequately. For example, a concept needs to include a brief introduction, a definition, an example, a non-example, and an analogy supported by a practice activity to support its performance objective.

Cisco Systems applied the CFP3 model to its original RLO strategy as a way to divide job tasks into related chunks. Each of the five types of information had its own design template, based on which each author knew precisely what elements were needed to build an RLO to teach a concept or a procedure, for example. By agreeing to this methodology, Cisco could search for any one of the five types for possible reuse by authors, or as part of a customized RLO for a specific learner. Before it began using the content-performance matrix, lessons were built from content that did not have a common structure; therefore, they were difficult to update, locate, and reuse. Legacy knowledge was slowly converted to Cisco’s RLO strategy as it was updated and revised to ensure that all training materials followed a common structure.

Redwood Credit Union follows the same CFP3 model for breaking down its content. Because each content type has its own structure for presenting content on the delivery end, it will work extremely well with any RLO strategy. The
structure of a concept RLO, for example, recommends that an author build an introduction, definition, example, non-example, analogy, and some type of interaction or practice at the highest possible cognitive level based on the learning objective. The procedure RLO structure recommends that the author build an introduction, procedure table listing the step, action, and results, followed by a demonstration, working example, or simulation, and the opportunity for the learner to practice that procedure with various levels of coaching and feedback. These items are simply recommended, based on business rules and instructional design best practices. Although the tools could enforce the rules for structuring CFP3s, RCU has elected to allow its authors to make the best choice to fit the needs of the learners and the learning objective for that RLO.

To see more specific examples of CFP3 structures, refer to Cisco’s RLO strategy white paper (Cisco, 2003b), which outlines the required and optional elements found in a concept, fact, process, principle, and procedure. Again, you can also reference the Clark (1999) text to learn about the instructional justification for these structures.

Dealing with Legacy Knowledge
In some cases you may have content that has simply been captured as a stream of thought, or with very little structure and organization. This is often true of presentations that are put together to fill a specific, timely need. These are rarely based on a thorough job-task analysis and they usually lack formal learning objectives. Existing or legacy content and knowledge could encompass everything in your current training catalogue—training programs, manuals, on-line help systems, and so on. Each of these can be thought of as stand-alone learning events that vary in size and organizational structure.

As you define and create your RLO strategy, this legacy knowledge must be accounted for if you want to leverage content from one training offering or program to the next. So if your new RLO structure is based on a content-performance matrix, as in the Cisco Systems example, any legacy content will either need to be converted to that structure or be accepted as larger chunks that will not directly “fit” into the ideal structure. We advise you to account for legacy knowledge and how you will align it with your RLO strategy. (See Figure 2.4.)

Cisco Systems built its authoring and delivery tools to support both legacy content, which comes in any size and shape, and content specifically designed for its
RLO strategy based on the content-performance matrix and the five information types. (See Cisco’s white paper “Reusable Learning Object Strategy: Designing and Developing Learning Objects for Multiple Learning Approaches.”) It was necessary to support all types of content—from well-defined RLOs to larger RLOs that did not fit into the matrix—in order to support the business goal of tracking all learning materials (that is, all RLOs) and enabling learner search. Cisco made the business decision that only the RLOs classified as concepts, facts, processes, principles, and procedures would leverage the full advantages of learning object authoring and delivery, including reuse, repurposing, prescriptive learning, and dynamic content. (These functions will be covered in detail later.) This allowed the company to include important legacy content, yet avoid having to reformat those items before having them stored in a database where they would be searchable by learners.

This strategy proved to be a compromise between the desire to have everything properly chunked and formatted as RLOs and the necessity of a return on investment for conversion. This choice was further justified by the maturity of the delivery tools, authoring tools, and authoring guidelines. It was felt that the cost of waiting until everything was in place, well defined, and accessible to both authors and learners would not meet immediate training needs. Under these conditions, Cisco made the best decision: to leverage existing content today and convert it to the ideal RLO structure during future revision cycles.
When it comes to legacy content, Redwood Credit Union has a distinct advantage. Because it is a small organization, formal training is still relatively new. Since it is dealing with small amounts of existing training materials, its RLO strategy calls for converting all legacy content into the RLO format.

**WHO WILL CREATE AND OWN THE RLOs?**

As you define your strategy, the questions of who should create the RLOs and who should own those objects become critical. In traditional training design and development the training team usually creates all content for the training: handouts, instructor guides, Web sites, and other instructional media. Although your company may have always distributed the creation of content, with an RLO database and remote authoring tools you can easily have multiple authors working on multiple RLOs throughout the organization. Part of your strategy may be to capture knowledge early, using subject matter experts (SMEs) or technical experts who are not even aware they are building what you ultimately will call an RLO. Perhaps these SMEs will contribute only one or two reusable pieces of information (a definition, facts, product specifications, a procedure) that will support your training needs. If your goal is distributed authoring, then you should review this section carefully.

**RLO Creation**

When defining your RLO strategy you must determine who can author content and create learning objects. This may seem easy to do, but in fact the implications can be significant. You should consider your authoring environment today and what you would like it to be in the future.

Let us begin by looking at who can author content. In other words, who will have the capabilities and access to create or add learning objects to the database? There are some obvious and not-so-obvious issues involved. To begin with, it makes sense that the department or group that is initiating the RLO strategy will have the right to create content. Which people are these in your organization? You may find that the training, publications, knowledge management, or IT departments are initiating the RLO strategy, and therefore they will be authors.

In addition to the group initiating the RLO strategy, you will likely want to include other authors (recall Figure 2.2, showing internal and external authors). The more contributors adding to the pool of RLOs, the better economies of scale and reuse. But who else should have access to the database, authoring tools, and
existing objects? Here is a list of some groups of people who are likely to create learning objects:

• Trainers and instructional designers (including both classroom and Web-based designers)
• Technical writers (for both print-based and on-line viewing)
• Graphic artists
• Media specialists
• Vendors and consultants
• Subject matter experts

Allowing trainers, instructional designers, and technical writers to create learning objects makes perfect sense. However, you may also need graphic artists and other media specialists (video, animators, and so on) to place media elements in the database and associate them with RLOs under construction. It is also possible that your partners and training vendors will need access to the database and authoring tools to create RLOs. Then, there are all the other possible contributors in your organization, including SMEs, marketing department personnel, and others; they may need to access the same database of RLOs as your core instructional designers. Alternatively, you may decide to limit the scope of authors, having sources of content like SMEs work through instructional designers who ultimately author the RLOs, for example.

In the final analysis, your business needs and the locus of control for both the database and authoring tools will dictate who will be able to create RLOs. Be sure to keep in mind your needs for both today and tomorrow. If you are not letting SMEs author directly due to limitations in today’s tools, do you have a plan to allow them to contribute directly when better tools are available? It is important to have an RLO strategy that is flexible and robust enough to handle all of the authoring scenarios you will face.

Ownership and Reuse
Besides determining who can create RLOs, you will need to determine who will own the RLOs and who will be able to reuse them. Ownership and reuse are intertwined. You may experience limitations in the willingness of RLO owners to allow for the free exchange of RLOs that cost their organization development time
and resources. Perhaps, however, your RLO strategy specifies that everyone can reuse everything, and that ownership rights do not exist. You may decide that every RLO belongs to the entire business, to the overall knowledge base of the company. But no matter how you handle this policy of reuse and ownership, it is important to capture those rules in your RLO strategy early to prevent future conflicts.

Here are two scenarios. The first scenario is based on a free trade of RLOs. In this case each and every learning object can be reused by anyone in the organization without restrictions. The overall purpose of the RLO strategy is to encourage the exchange of information to maximize reusability and minimize development time.

In contrast, in the second scenario control of content, ownership, and reuse are all restricted. As control of content becomes more critical, things get a little more complicated. In some cases the owner of the content cannot allow that content to be reused. There are numerous valid reasons for this, such as classified information in a government setting, advances in R&D that a company does not want to share, or even federal requirements that actually prevent some organizations from sharing information internally. How do you deal with these special circumstances? One answer is to provide this group of authors with a dedicated database server; this will allow them to share information with each other but not allow access to the rest of the organization.

Of course, ownership may be more complicated when using vendors to create learning objects. In a perfect world any author would be able to reuse each and every object in your database. Unfortunately, many of us do not work in a perfect world. You will want to ensure that the ownership of learning objects is addressed in any vendor contracts. There is also the question of how much a vendor can reuse. Some organizations may have philosophical difficulty with the idea of paying a vendor to develop content only to have that vendor reuse existing content in the database. Although this issue is easily addressed in a contract, it may change the fees you pay vendors along with the type of access they have to the database.

Ownership and reuse rights are most salient when an RLO that is reused by other authors is updated. For example, an author may reuse an RLO for a training program that your organization is developing. However, a recent policy change requires updating that RLO. Can that author make the update, or will the original author need to do it? If the original author does not allow anyone else to update the RLO, then the new author may be forced to create a new RLO to support the
change. Obviously, it would not make sense to have two contradictory RLOs. Yet if each author controls who can reuse and update his or her RLOs, then each update will require some type of approval from those original authors.

Here is a more detailed example of reuse and repurposing RLOs. Figure 2.5 illustrates three RLOs on verifying checks at a bank. The first RLO is called “Verify a Personal Check, Version 1” and is created by Author A, who is now the owner of that RLO. As owner, she can update and modify that RLO as needed. Over time, Author A updates the “Verify a Personal Check, Version 2.” Because Author B reused Version 1 in his course, the changes made to create Version 2 will automatically be reflected. Finally, a third author, Author C, needs to make a new RLO on verifying a business check. Because the flow and structure of the RLO is similar to the original Version 1 RLO, Author C decides to simply repurpose Version 1 by physically making a copy of it. This results in a new RLO, called “Verify a Personal Check, Copy.” Now Author C can change the title of the RLO and modify the

**Figure 2.5. Impact of Reuse and Repurposing of an RLO**

<table>
<thead>
<tr>
<th>Author A = Owner of RLO</th>
<th>Version 1</th>
<th>Version 2</th>
<th>New RLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Created Version 1.</td>
<td>Pay to:</td>
<td>Pay to:</td>
<td>Pay to:</td>
</tr>
<tr>
<td>Updated to Version 2.</td>
<td>Amount</td>
<td>Amount</td>
<td>Amount</td>
</tr>
<tr>
<td>Affects Author B and all others who reuse.</td>
<td>5551212555</td>
<td>0002223333</td>
<td>4449922222</td>
</tr>
</tbody>
</table>

**Author B = Reused**
- Linked to RLO Version 1.
- Cannot change Version 1.
- Change to Version 2 automatically accepted.

**Author C = Repurposed**
- Copied RLO Version 1.
- Made new RLO in database.
- Link to Version 1 severed.
- Became owner of this RLO.
content, practice activities, graphics, metadata, or any other element found in that RLO. In effect, it is a new RLO, simply based on the original Version 1. As you have likely guessed, this creates a new RLO in the database, and severs the link or dependency on Version 1. Therefore when Version 1 is updated in the future, those updates will not be reflected in Author C’s copy. It is possible, however, that only parts of the verify-a-business-check RLO are copied by Author C, such as the routing information, while the remainder of the RLO remains exactly the same.

When to copy or repurpose an RLO is a serious concern for anyone trying to establish an RLO strategy. For example, missing from the check-cashing scenario described here are the business rules and policies on automatically updated RLOs that are reused without permission from all authors who rely on the contents of those RLOs for other courses. The concept of ownership thus goes beyond the technical question of how authors are notified of change requests by other authors. Ownership and reuse may be a politically sensitive issue. In other words, the training department may be allowed to update an RLO created by the technical writers who will reject the change because it was not done through their group. These kinds of issues are covered in the following section.

**Best Practices**

The question of who can author RLOs and the rules on ownership and reuse all point to the need to document your own use cases, work flow processes, and other best practices. Look at your authoring needs. Decide which parts of the authoring process will be controlled through the application of software tools (passwords and work groups) and which parts will simply be ruled by accepted usage (when to build a new object rather than reuse an object). You may already have established a number of guidelines for authors in your current development process. For your RLO strategy, consider having a guideline or best practice documented for each of the following questions: Who can create an RLO? What rights and access privileges do authors need? Do RLOs belong to the individual, work group, solution, or entire organization? When should authors reuse objects instead of creating a new object? How should authors notify other authors of changes they have made? Can any author update an RLO that he or she does not own?

You must answer each of these questions for yourself. Although we could suggest a best practice for each, the ultimate answer and resulting guideline needs to be uniquely suited to your organization. As you answer each question, be sure to take
a realistic view of your current authoring environment, how content is created, and your vision for the ideal RLO creation and delivery process. It is also helpful to involve representatives from each possible authoring group when creating your guidelines. Give each group the opportunity to help document the RLO creation process, discuss work flows, and suggest answers to the questions raised. This collaboration will help ensure wider adoption of any guidelines you impose for authoring rights, ownership, and reuse.

HOW WILL THE RLOs BE DELIVERED?
In traditional training design you selected your delivery method—classroom, CD, Web, and so on—fairly early in the process. You then based all decisions on that single delivery decision. If you planned for two different options, such as classroom and Web, you created two distinct training courses. They had the same general content but were modified to fit the delivery method. With the proper RLO designed to be delivery-neutral, a variety of delivery templates can be used to take RLOs and deliver them in more than one medium. Your RLO strategy should recognize all possible delivery media for your RLOs and the changes to each that will be necessary to support those delivery options. (See Figure 2.6.)

Your RLO strategy should establish a policy for multiple delivery formats. The way authors create and reuse RLOs will be different if they know that their RLOs can be delivered in multiple formats. Think about how the media, content, learning approaches, and metadata will be affected by a single RLO being used in each

![Figure 2.6. Single-Source Authoring for Delivery in Multiple Media](image)
of the following delivery solutions: e-learning programs, instructor-led training courses, on-line help systems, on-line performance-support systems, printed reference materials such as technical manuals and user guides, on-line either through an intranet or the Internet, programs that run locally, and portable digital assistants (PDAs).

Although some graphics, sounds, and learner interactions can be applied to each delivery solution listed, some will be unique or simply will not work in a given medium. In that case, your plan to author once and deliver in many environments will need an exceptions clause. This introduces the idea of equivalent objects. That is, if an interaction, animation, sound, or other multimedia element is used in one RLO, then a similar element should be built for access to that experience in other delivery modes.

The simplest example of equivalent objects for delivery comes with graphics. Often a high-resolution graphic is created for print, a low-resolution graphic is created for low-bandwidth e-learning, and an interactive animation is created for high-bandwidth e-learning. There may also be a need to have equivalent objects for multiple languages. The limiting factor to supporting all equivalent objects and other delivery types is resources.

You will likely discover that supporting each delivery medium through the creation of equivalent objects is costly, and therefore you may attempt to push authors to create RLOs that play in all delivery formats, recognizing the limitations that doing so may impose on their ability to customize the learning experience for a specific delivery mode.

Remember, your goal in creating an overall RLO strategy is to determine the types of delivery you want to support both today and in the future. In this case, you may want to think big. Even if you currently do not envision ever using PDAs as a delivery option, you may want to make sure that the delivery aspect of your strategy (and tool) supports them. This ensures that your strategy is flexible and expandable in the future.

WILL THE RLOs BE STATIC OR DYNAMIC?

You may decide that you need to provide your learners, students, and on-the-job performers with the most current training, information, and support tools possible. In this case you will likely set up your RLO strategy to support dynamic RLOs. Dynamic implies that the RLOs are “built” at the time of need. In other words, the
contents on the page, or in the support tool, are pulled from the RLO database and presented when needed. Of course, this is only possible with electronic delivery media such as the Web and on-line help tools. If you are using paper-based delivery, such as workbooks or instructor-led training, then you may wind up with a mix of both static and dynamic content. The term *static* refers to any RLO output that cannot be updated without reproducing those materials and delivering that update to the learner.

Looking at Figure 2.7 you can see the issues that may arise here. You could simply author content directly into a database, and then let learners access those RLOs directly. This way, every time an RLO is updated, the changed RLO is available to learners. You may also add a delivery management system to keep track of registration for RLOs, capture assessment and evaluations, provide mentors and communities, and notify learners of RLO updates. The downside of this method is that any changes that are made bypass an important quality control step. This is where a validation and production database may ensure that changed RLOs are approved before being made available to learners. The use of this final check, or some type of validation or quality-control database, is especially key if your learners are paying for this course and expect flawless content and delivery.

**Figure 2.7. Dynamic or Static Delivery of RLOs Is Based on Your Business Rules**

![Diagram of RLO delivery system](image-url)
If you are using static RLOs, your revision and update problems remain the same as with your traditional system. For example, how will learners know they are looking at the most current version? How will they receive or learn about updates? Although authors may go into your RLO database and update those RLOs, it will take time and effort to get those changes communicated to learners, to get new media produced, and to ensure that everyone has met the updated learning objective.

This is not to say that dynamic delivery will make all content, information, and training flow seamlessly from your authors to your learners. It is likely that you will build some type of RLO flow management and editing guidelines into your development process. These can range from hardware solutions, like the validation and production database already mentioned, to guidelines that you enforce among your authors based on the honor system. This, of course, assumes that each author applies these guidelines correctly to ensure quality control. Your guidelines, databases, and production process need to support your decision to have your editing staff look at each RLO before it is made public or simply allow the authors to make them public based on their own approval. In any case, you will obviously want some type of quality-control measures in place.

Related to dynamic delivery is notification of changes. If a change is made to a dynamic RLO, how do learners find out about it? Ideally, your delivery system will send out a notification, URL, or other message that lets learners know that an RLO that fits their performance need or job task has been updated. If the delivery system can issue these types of notifications, and always provide the learner with the most current RLOs, then dynamic delivery will prove to be a valuable addition to your RLO strategy. With static delivery, you may have the advantages of smaller revisions to the parts of the RLOs but will still need to address getting the media in learners’ hands, notifying them of the change, and ensuring that the out-of-date RLOs are removed from future access.

**WILL THE RLOs BE CUSTOMIZED FOR LEARNERS?**

Your RLO strategy may also need to address the ability to deliver RLOs that are personalized, prescriptive, and localized. Each adds an extra level of complexity to your RLO delivery tools, but they may be of high enough value to your overall strategy to justify the cost.
Personalized RLOs

We all have experienced personalized Web sites, such as My Yahoo! or My Excite or a custom store on Amazon.com. Information Web sites and retail Web sites often give users the ability to customize their view into the content. On information sites, users may have their local weather, favorite teams, horoscope, and so on. They also may get to select the colors for the Web page, the position of headline news and stock information, and other layout choices. Similarly, you may want your RLO strategy to allow for customized, personalized settings. Because learners can now access smaller pieces of training, they can easily customize a collection of RLOs to meet their individual needs.

It is also possible for learners to set up a global profile, and the Web page will be built to match that profile. For example, the RLO delivery system may look at what job function a learner does, or what department he or she works in, and suggest RLOs to fit that group’s needs. This is similar to how news and information portals give users local team scores, traffic reports, and weather updates based on the address they put in when they registered for the Web site.

Figure 2.8 shows two learners who need to take an RLO-based lesson on verifying a personal check at their bank. Both Learner A and Learner B set up a number of user preferences in the system, including delivery media, language, duration,

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**Figure 2.8. Based on Preferences, a Custom Learning Experience Is Delivered**

<table>
<thead>
<tr>
<th>Learner A</th>
<th>Learner B</th>
<th>Learner preferences</th>
<th>RLO database</th>
</tr>
</thead>
</table>
| ![Video-driven directive, French](image) | ![Problem-based guided discovery, English](image) | - Delivery media  
- Language  
- Duration  
- Location  
- Learning architecture | Payne to: $  
Amount  
5551212555 |
location, and learning architecture. When requested, the system looks at the RLO database and gathers the RLOs that match their requests. In this ideal case, Learner A receives the RLO formatted as a video-driven directive learning experience in French. Learner B, in contrast, experiences the same content and meets the same learning objective as Learner A, but does so in a problem-based guided-discovery learning experience that is presented in English.

**Prescriptive RLOs**

Your RLO strategy may also define the need to prescribe RLOs that fit a learner’s need based on a performance assessment. When RLOs are combined with an advanced assessment or testing system, the delivery tool can look at those results and deliver the RLOs that fit the performance gap. In essence, a learner can take the assessment of one or more RLOs, and based on the results, be told by the system which RLOs, or parts of RLOs, she needs to complete. Obviously, the success or failure of the delivery system to prescribe RLOs depends on the assessments, performance tests, and other measures that your authors create. If the assessment is a poorly written instrument, then the prescription will likely misdiagnose the performance gap, causing the learner to skip critical RLOs, or perhaps worse, prescribe unneeded RLOs. Again, prescription is a key benefit of dynamic RLO-based delivery systems, but it must be founded in job-task, performance-measured learning objectives. The success of prescription depends more on your authors and less on the assessment tools and systems used to support the RLO delivery environment.

**Localized RLOs**

If you are currently delivering training content to a global audience, then this is not a new issue for you. The need for global training that is specific to each local audience is an ongoing challenge for most international businesses. The most common challenge is supporting multiple languages, translating content, eliminating culture biases, or providing local examples. Content that contains U.S. slang, idioms, metaphors, and analogies may not be understood in other parts of the world.

Such issues are present in traditional ISD, but there is still a significant RLO spin. If you face these issues you need to decide how your RLOs will be created and stored in the database. For example, say you have an RLO that contains a U.S.–specific analogy. Let us also assume that this RLO will be delivered in five different countries around the world. Do you try to maintain it as a single RLO, or
do you create an RLO for each situation? If you choose the latter you are potentially creating five RLOs for the same content.

During your RLO strategy development, talk to your IT department and tool vendor about ways to track the various localizations of your RLOs. If they build the system correctly, you can be notified when one local piece of content changes inside an RLO. You can require that alerts be sent to owners of local RLOs whenever there is a change to one. Although keeping each of the localized versions in parity is a challenge, a database-oriented authoring and delivery system will give you new methods to track versions and updates around the globe.

You may also want to change your writing style to enhance reusability by avoiding slang, analogies, metaphors, and so on. This is one way to help minimize the localization challenge. (Chapter Three offers more information on writing style and guidelines for reusability.)

In an ideal RLO delivery environment RLOs would be changed based on the local needs of the learner. For example, Figure 2.9 shows how one procedure in the RLO-based course on cashing a check at a bank changes based on the regulations in Ohio and in Nevada. In this case, only the procedure for verification of the check changes between states; the remainder of the RLOs in that course can be delivered to both

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**Figure 2.9. RLO Changes Based on the Location of the Learner**

- **Learner in Nevada**
  - "Verify a personal check in Nevada branches"
  - Pay to: __________ $________
  - Amount: 5551212555

- **Learner in Ohio**
  - "Verify a personal check in Ohio branches"
  - Pay to: __________ $________
  - Amount: 0002223333

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learners as normal. The system detects that the learner requires the correct state procedure through the metadata about the check-cashing course. It then presents either the Nevada or Ohio procedure to the learner.

As you think about personalization, prescription, and localization issues, keep the learner’s needs and work process in mind. Issues such as geographic location, work style, learning preferences, and access to technology should all play an important role in your RLO strategy. When combined with a learning management system (LMS), an RLO strategy can allow for static content as well as dynamic, prescriptive, personalized, and localized content that is always up-to-date and directly relevant to the learner’s job task.

**WILL YOU USE FORMAT-FREE OBJECTS?**

Having format-free objects in the database will significantly affect your authoring and delivery tool requirements, and you may have to sell this idea to your authors and graphic artists. The concept here is that everything stored in your database contains no layout, font color, background color, font, or style information. This means no bold or italic font, no setting the left and right margins, no table borders, or any of the other formatting decisions that are typically made. Ideally, all “look and feel” issues are resolved on delivery; the formatting is handled by filters or templates as part of the process of moving RLOs from objects in the database to content seen by the learner or end user. The goal is maximum reuse and database efficiency.

The following example shows how this works and why it is important. Using an RLO strategy, you decide to create a training program on customer service that will have both a classroom and an on-line option. The content for both delivery options will come from the same set of RLOs. Say that your on-line design calls for a light green font on a dark green background, whereas your print-based classroom materials will use a dark green font on white paper. What color should the font be in the RLO while resting in the database: light green or dark green? We suggest *neither*. The object simply resides in the database. Then, during the delivery process, it goes through a filter that applies the necessary formatting.

Here is another example. Figure 2.10 shows two RLOs on verifying a personal check. Although the content in both delivery media are the same, the look and feel change because one is used in an instructor-led training class, while the other is
accessed on-line as a self-paced e-learning experience. In fact, the e-learning version could take on a new interface at any time as the delivery style sheets are updated. Likewise, the classroom materials, such as slides and workbooks, could have a different look and feel without affecting the RLO’s content.

Cisco uses a similar methodology to support both its instructor-led training and its e-learning courses given by the Internet Learning Solutions Group (ILSG), which is the corporate group responsible for certification training programs offered through training partners to Cisco’s end customers. Because all the RLOs are created with both delivery formats in mind, the time and effort to create the second learning environment is greatly reduced. In some cases, Cisco is able to have training partners take the instructor-led training materials and reformat them to their e-learning delivery needs, adding interactions and practices that are best suited for a single learner working on-line. This may not be as clean as having everything pass through an automated style and delivery templates, but Cisco has still realized the benefits of supporting two delivery formats through a common RLO structure, or more directly, a common hierarchy of learning objectives and job tasks that are related to RLO-based content and practices. In other words, just as in the earlier check example, Cisco can use a single source of RLOs for both media.

It is worth mentioning again here that you will likely make some changes to support multiple delivery media when it comes to practices and your instructional
approach. Some are obvious—like switching from live role-plays in the classroom to case-based scenarios in e-learning. Even so, the raw content, graphics, hierarchy, learning objectives, metadata, and other elements should be leveraged in both cases. How seamless the application of style and format templates are will depend on the sophistication of your authoring and delivery tools.

When evaluating authoring and delivery tools, you will want to make sure they are flexible enough to generate the look and feel you want. Do not accept a system that forces you to change how you present content to accommodate its limited filters and templates. Likewise, your authors and graphic artists need to be aware of the requirement to avoid defining look and feel during authoring. If the tool enforces this, then you have little to worry about. However, if the tool allows authors to place their own HTML tags, for example, then those format choices could override the global templates you set up on the delivery side.

WILL YOU USE TEMPLATES?

One way to ensure that the RLOs in your database are of consistent size and shape is to enforce the use of authoring templates. By templates here we are not referring to the RLOs’ look and feel but rather to their instructional structure, cognitive approach, or learning methodology. These templates may be based on the content-performance matrix defined by Clark (1999) as concepts, facts, process, principles, and procedure. Each type indicates an instructional structure that the author uses to build an RLO to meet a specific learning objective. You may choose to employ any type of template but should keep the instructional and content elements separate from the presentation style. In other words, do not get trapped in deciding where to put buttons on a Web page; instead, focus your templates on what content and practices are needed to ensure learning.

Your RLO strategy should acknowledge the use of instructional templates, if not define the types you are going to implement. The advantage of using templates is consistency, in that all of your training materials are created in a similar fashion. You may decide to implement this level of consistency as part of your RLO strategy.

As you look for authoring tools, you should make sure that templates can indeed be applied. Check to make sure that your ideal learning methodology can in fact be authored and delivered. Never compromise on your methodology; instead, work with tool vendors who can allow you to implement your template. We will
talk more about tools at the end of this chapter. For now, simply put down templates as another feature you will need from your tools.

Choosing templates may seem like a simple decision, but your authors may not like the idea of writing guidelines based on small, independent RLOs. Remember, your RLO strategy is based on the creation of small chunks rather than large files. If your authors are used to, and more comfortable with, a less structured approach, getting them to make the switch may be a hard sell. Authors who are used to the structure of templates may take the change in stride. For example, both Microsoft Word and Adobe FrameMaker can take advantage of macros and style sheets to create templates. In these instances authors are usually required to follow a straightforward structure when populating the templates with content. Such an author, making the switch from using structured templates in Word, will likely see a similar structure when creating RLOs. In contrast, authors who are used to a more free-form approach to writing training materials may find the structure of RLOs oppressive.

The two final issues with templates are maintenance and enforcement. All templates, whether you create them or they come as part of an authoring tool, must be maintained. Your RLO strategy should account for maintenance and enforcement. When templates are updated, you will need to determine if they retroactively affect existing RLOs. You will also need to establish rules about when authors must follow the templates and when they can bypass them. If your tools do not automatically enforce templates, then you will need to find a way to ensure that they are followed. Likewise, you will need a policy covering what happens if authors do not follow the templates.

If your RLO strategy is being implemented in phases, then you may want to implement templates before implementing the authoring and delivery tools. In this way, you may be able to convince your authors of their value without the tools issues getting in the way. This will also allow you to perfect the instructional aspects of your templates without the constraints of tools, which may limit your options.

Redwood Credit Union, for example, decided to start with instructional templates before implementing an RLO authoring tool. When the company looked at its RLO strategy, the team determined that they were a long way from selecting the authoring tool they would use. However, their delivery environment, number of authors, and audience size allowed them to wait on the database tool side of the RLO strategy. They started to get buy-in from authors by developing and maintaining instructional templates as a lead-in to the RLO process.
RCU’s strategy took into account the update cycle of its training materials, and the number and location of authors and learners. Because the company had a manageable update cycle with a limited number of training courses, few authors centrally situated, and only a few hundred learners in ten branch offices, the need for a database of RLOs and a dynamic delivery system was not primary. Instead, RCU made sure that all the templates were well defined for each concept, fact, process, principle, and procedure found in its training solutions—job aids, simulations, role-plays, reference manuals, and so on. In other words, the company focused on ensuring that every solution could be generated from a single source of RLOs, even if they were not stored in a database at the time.

WHAT BUSINESS RULES WILL YOU NEED?
Making the switch to an RLO strategy is bound to change some of the business rules you currently have on authoring templates, editing guidelines, work flow management, pricing, evaluation, release schedules, and life-cycle management, to name just a few. It is beyond the scope of this chapter to cover each of these in detail. Throughout the book, however, we will return to business rules and best practices for you to keep in mind as you develop an RLO strategy.

At this point, simply think about what business rules you have in place today. Which ones are controlled through authoring and delivery tools and which are simply agreed to by authors as part of your business rules and best practices? As you build requirements for your RLO strategy, you may choose to move some of those rules and best practices to the RLO-based tool. You will quickly realize that, just as with traditional tools and processes, trade-offs will always be made between automated enforcement of rules and “guidelines” that are followed by the authoring community.

Let us look at a few business rules that you should include in your RLO strategy at this point: linking content, chargebacks and pricing, release schedule, and change notification.

Linking Content
You will need to define the rules for linking content to existing RLOs outside of your department where you do not have ownership. Although we discussed ownership and reuse earlier in the chapter, we need to reiterate this point again. In some organizations business rules or even government regulations on sharing information
across departments will affect your desire to leverage existing RLOs. As the database of job-task-oriented RLOs increases, your desire and ability to share information across departments should also increase. But you may want or need to establish rules covering who can link to those objects and how credit will be given when they are used. You need to know who can and cannot link to RLOs created by other departments. Establishing these rights in advance is the only way to ensure your RLO strategy will promote reusability where allowed and limit linking where needed.

**Chargebacks and Pricing**

How will your learners pay for RLOs: based on development time, delivery time, media used, importance, age of RLO? In many organizations the training department charges for the training it provides to employees. This is often done through internal chargebacks to an employee’s department when he takes the training. If this is part of your business structure now, or will be in the future, you may want to redefine the rules for a chargeback. You could base the charge on the development cost for each RLO, or the amount of time it is used, or the overhead cost of supporting its delivery. You may not change a thing if your training department charges back the actual development expenses, plus the cost of delivering the training in a classroom (instructor’s time, facility rental, printed support materials, refreshment). However, if you are currently charging a flat rate for the length of training, then RLOs may require a change. If your delivery allows for RLOs to be referenced at any time, and they are a mix of linked RLOs from other groups, then the true measure of the cost for delivery is not as simple as $100 per hour, for example. Reuse, linking, delivery size, and delivery resources all should go into determining what you charge for training.

Ask yourself what you currently charge for training and how that price is determined. Then consider how that pricing will be affected by your RLO strategy. The answer will range from drastically to not at all. The situation for RLOs is similar to chargebacks for internal training. For example, if you are currently charging a flat rate for your three-day classroom-based training program, what is the impact if learners can now complete an on-line version in five to eight hours? How will you handle requests for customization, since theoretically any number of RLOs can be combined quickly to meet a particular organization’s needs? If you are not charging either externally or internally for your training, then these will not be issues for you. If you are charging, then this is another set of questions you will need to answer while creating your RLO strategy.
Release Schedule
You will have to determine if you want to release an entire set of RLOs together as a course or individually as they become ready. You are probably very familiar with the rules for releasing your training solution. You may have alpha and beta classes that lead up to your final course release. Perhaps you market the course through e-mail a month before its release. Maybe you even make up T-shirts to announce the release of a big solution, such as a corporate training curriculum. Your RLO strategy may change these formal release events and the business rules you have in place. For example, say you are developing a training program that will consist of a series of twenty-five RLOs (identified during analysis and design). It is likely that some of them will be finished and ready for delivery before others. Will you allow learners to complete these RLOs or will you keep everything back until all twenty-five are ready? Likewise, if one of those RLOs is updated, will you release the updated RLO or wait for a quarterly or yearly revision cycle when the entire course will be rereleased to employees?

Change Notification
One last business rule you will need to consider in your RLO strategy is when to let authors and learners know that an RLO has been changed or modified. Authors need to know if a linked RLO in their solution has been changed or modified by its owner. Likewise, if an author changes an RLO that she owns, everyone who linked to it needs to know about the change, unless you create the rule that any change by the RLO’s owner will automatically cascade through the database. Ideally, authors should know in advance that an RLO they are reusing is about to change. Of course, this means that the original authors and those who are reusing each RLO in the database must be known. In some cases the authoring tool may track this; if not, you will have to have rules in place to enforce change notification. It is our advice to include some type of change notification rule in your RLO strategy if reuse is your goal. Without a notification system, your authors will be reluctant ever to “link” to an existing object and reuse it.

For learners, it would be beneficial to know that an RLO has changed since they last accessed it. For example, if a learner went through a series of RLOs on how to do his job and one of those RLOs has been updated to reflect a change in policy, then the delivery system should let that individual know about that change. Although ideal, this can become overwhelming if a series of RLOs, or a course, has a slight
change on every RLO that amounts to fixing grammar and typos. The learner in this case might not care about such changes, and in fact may not want to waste his time trying to figure out if the grammatical change affects her knowledge and skills.

Instead, your RLO strategy should identify rules for scope of change. If the change is deemed significant, then authors and learners should be notified. If the change is editorial, grammatical, or otherwise trivial, then that RLO could be updated without the others being notified. As you can tell, this is a case where you will need to create a business rule or best practice for your authors to issue change notices. Keep in mind that authoring and delivery tools will not be able to distinguish if a change is trivial or actually affects the skills and knowledge being covered by that RLO.

**HOW MUCH METADATA WILL YOU NEED?**

The concept of metadata was introduced in Chapter One. As you may recall, metadata include all the search data that you may want to include with an RLO, along with its instructional objective, intended audience, costs, expiration date, ownership rights, cognitive domain, instructional strategy, and so on. In fact, you may need an entire strategy for metadata alone. The question for your RLO strategy is how much metadata you will need to have to achieve your authoring and delivery goals. Do you want be able to reuse any RLO, and any size and shape, regardless whether it is a media file, a block of text, or an entire course? The more the reuse and the higher your desired granularity, the more detailed metadata you will need. Likewise, if you want to use a dynamic delivery environment that contains prescriptions and learner preferences, then metadata for each RLO are critical.

All this comes down to a cost-benefits question. More metadata will add to the amount of time the authors spend creating RLOs. Metadata guidelines, templates, and an editing process will be needed to facilitate its proper use.

In addition to the business rules on metadata, your decisions about implementing metadata may be dictated by the authoring and delivery tools you select. If the tools do not support metadata, then obviously you will not require your authors to capture metadata. However, you may want to plan for the future, when your tools will support metadata. In this case you will probably want to find a way to have authors capture some basic metadata now in preparation for the future tools.

The purpose of metadata is to make it easy to find the RLOs your authors and learners need (see Figure 2.11). As you define your metadata needs, interview
both learners and authors to find out what they will require for searching. Do not give them more than they will use. In other words, do not waste your authors’ time in entering metadata that will never be used. You will also need to examine the capabilities of your search tools to ensure that what you capture as metadata can in fact be used to retrieve RLOs.

Although you may find the topic of metadata overwhelming at this point, it is important not to lose sight of its purpose and value. We will come back to the topic of metadata throughout the book. For now, when you think about RLOs, keep in mind that attached to each is some amount of metadata that describe it to your authors and learners.

**HOW WILL YOU EVALUATE YOUR SUCCESS?**

Evaluation is a key aspect of any training solution. As the next chapter details, there are a number of places where you may want to evaluate your RLO strategy and your training solutions built out of RLOs. You may measure the impact of an RLO on learners, if learners use what they learned on the job, or if there is a return on the investment. You may evaluate a small element inside an RLO, such as a media type, or wait until the entire course is completed before you conduct an evaluation. From a business point of view, you will likely want to collect evaluation data to evaluate the success of your entire RLO strategy.
As you create your RLO strategy, keep in mind what each feature, function, business rule, template, and tool costs to implement. Is there a way to translate that feature—such as change notification, for example—into a dollar figure, cost savings, or performance impact that shows a return on your investment? Although it would be nice to have a blank check to design and implement your ideal RLO strategy, someone is likely going to ask you to prove its value to the organization.

Having a well-thought-out evaluation plan can help sell your RLO strategy to the organization. You will actually be able to let your sponsors and stakeholders know that you thought about measuring the satisfaction of the learner, the transfer of skills and knowledge to the workplace, the benefits to the organization, and the return on investment. Although the exact details of what you will capture may change as your strategy matures, you will at least have tied evaluation into every aspect of it. Again, the next chapter talks about evaluation as part of your RLO development process and provides examples of types of evaluation data you may want to capture, when to capture them, and how they may be reported back to authors, learners, and stakeholders.

**WHAT ARE YOUR RLO TOOL OPTIONS?**

Tools. We saved this subject for the end for a good reason: it should be one of the last decisions you make. Selecting a tool too early in the process can force you to adapt your strategy to fit a tool rather than the other way around. As with any great shift, we encourage you to make decisions up front, establish your strategy, and then go shopping for the right tool to meet your needs.

One way to research the features and functions you will need in your RLO tools is to look at the tools you are using today. Some of today’s more common tools for developing training include Microsoft Word, Microsoft PowerPoint, Adobe FrameMaker, Microsoft FrontPage, Macromedia Dreamweaver, and Macromedia Flash. If you have a background in developing traditional computer-based training (CBT), then perhaps you already are using such tools as ToolBook, Authorware, Director, and C++. You selected each of these based on the features and functions it gave you in creating training materials. You can assume that the types of solutions you will be building with RLOs will be similar to those you built in the past. Your organization’s performance needs should not have changed. Therefore you can use your prior tool requirements as a starting point for a new RLO-based authoring and delivery tool.
Depending on your RLO strategy, you still may use your traditional authoring tools. You may find that some of them will be useful in authoring RLOs, whereas others will be useful during delivery. For example, if you are supporting the creation of instructor-led training, then the tools for delivery really will not change that much. You will still likely produce documents for students and slides for the instructors. Keep in mind that some RLO tools try to use RLOs to create PowerPoint-like presentations from a database without actually using PowerPoint. Likewise, if you have authored a number of interactive Flash elements for your Web-based training, then those too will still be valid in an RLO authoring tool.

What you will notice in your tool search is that most are data assembly tools, not true authoring tools. You will still create Flash elements in that tool, graphics in a tool like Adobe Photoshop, and interactive simulations in tools like ToolBook, Director, or Authorware. All of those elements are then imported into the authoring tool. In this example, it is likely that only text and metadata are actually written in the RLO authoring tool. Your RLO strategy should include an expectation about where content is authored, how it is assembled into RLOs, and what your delivery needs will be as a result.

You could search externally for authoring tool vendors, or decide to bypass the vendor option altogether and develop an RLO authoring system in-house. This is a perfectly workable solution provided that two conditions are met. First, your information systems department must have the time and skills to create and maintain such a system. Second, you truly need a sound, detailed RLO strategy for this staff to work from. No matter whether you decide to go with a vendor or develop your system in-house, you will want something that can grow. Future changes in audience, technology, and your organization will most definitely generate changes to your RLO process and therefore your tools. Your RLO strategy should account for this reality.

It is always a challenge to match your requirements with the features and functions found in existing tools. Selecting a tool vendor becomes an exercise in separating marketing hype and the promise of future releases from today’s reality. Some vendors may have no plans to meet your long-term needs on some features and functions. In this case you will either need to pay for that feature to be added, work around that feature, or shop for another vendor. Finally, your vendor should be able to work with your internal information technology group to ensure integration with your existing tools, processes, systems, and network. Although we cannot help
you find the names of tool vendors, we can suggest that you work closely with your internal IT and have a well-documented, prioritized RLO strategy in place before you start your search.

WHAT SYSTEM ARCHITECTURE WILL YOU NEED?

Your system architecture is the blueprint, or map, that documents how all the disparate parts of your authoring, delivery, and management systems work together to enable your RLO strategy and integrate with your existing applications and systems. Although this subject can quickly get technical, it does have some real impact on your RLO strategy. Your strategy should actually define your requirements for a system architecture, or enlist your tool vendor and internal IT department to determine what architecture will need to be put into place.

For example, your RLO strategy will define how RLOs are authored, how they are accessed, if external authors can contribute to the internal databases, how RLOs are authored and delivered globally, the performance expectations, and so on. Each requirement should help the IT department and tool vendors draw a design of the RLO authoring network, including server locations, authoring locations, and learner locations. The final plan for the RLO system architecture should include backup, quality, uptime, and performance requirements.

Look back on Figure 2.2, showing both internal and external authors and learners. In that scenario, some authors may directly link to your RLO database and tools, whereas others will want you to integrate with their proprietary RLO authoring systems. You may also have global learners and external customers who access the RLOs. This will require an entire delivery management system, and depending on your delivery media, global load-balanced servers to ensure high availability and quality of service.

List any details you feel should be part of a system architecture plan in your RLO strategy. Ideally, your IT department will partner with you to write this section of the strategy. If so, encourage them to review your strategy so far and to interview stakeholders, authors, and learners to define their needs and expectations.

CHAPTER REVIEW

This chapter identified the key questions that any RLO strategy should answer. Some of these questions may not have been applicable to your specific RLO strategy, or maybe you feel you need more answers. We hope we have answered more
questions than we raised, and that you took notes on what you will include in your RLO strategy. By now you should have been able to answer these questions:

- How will authors and learners use the system?
- How will you break down content to build RLOs?
- Who will create and own the RLOs?
- How will the RLOs be delivered?
- Will the RLOs be static or dynamic?
- Will the RLOs be customized for learners?
- Will you use format-free objects?
- Will you use templates?
- What business rules will you need?
- How much metadata will you need?
- How will you evaluate your success?
- What are your RLO tool options?
- What system architecture will you need?

As we said at the start of this chapter, you may have other questions that still need to be answered as you define your RLO strategy. Keep them in mind as you read the following chapters, which address the RLO development process, delivery needs, content structures, RLO standards, and ultimately your overall readiness to adopt an RLO strategy. The next chapter tries to answer your questions about how RLOs affect a traditional approach to training development and delivery. We will give you a model for development and delivery that is specific to reusable learning objects, explain how it differs from your current process, and discuss how it may affect your RLO strategy.

**RLOs in Action: Kicking Off the RLO Strategy Project**

At the end of Chapter One we introduced NoWaste Goods, a company with twenty-seven hundred employees divided among the corporate headquarters, a hundred retail stores, and consulting groups. The company is focused on environmentally friendly products and business solutions for compliance with
state regulations for waste reduction and lower energy usage. The management team recognizes they have many training functions that overlap and duplicate. To address this issue, an RLO task force was created. The task force is defining an RLO strategy and building three pilot projects. The first uses the training materials from the 401k benefits program, the second focuses on product training used by the sales consultants. Third, the documentation group is producing both customer marketing documents and product informational Web pages using a single source of information.

NoWaste has three training departments and a separate documentation department. The existing training groups are responsible for all retail, consulting, and human resource curricula. The documentation function is under corporate marketing and is primarily focused on information in the stores and on the company’s Web site about products used by customers. Each of these groups already follows an established process for developing training and documents. Each group also uses its own distinctive learning hierarchy and set of tools, even though they are often creating similar content.

To start moving toward RLOs, the VP of documentation was tasked with bringing each department together, along with the internal information technology department, to identify ways to leverage content, tools, and resources across the groups. The ultimate purpose was to reduce duplication of efforts, meet growing customer needs for education, and ensure that all employees had access to valid and up-to-date knowledge and skills specific to their job function.

During the RLO task force meeting, each manager was asked to describe and answer the questions covered in this chapter. A senior-level director and facilitator ensured that participants effectively communicated their needs, shared ideas, and compromised on solutions. The results were recorded during the meeting in order to form the foundation of the company’s RLO strategy. Special attention was given to what the ideal goal of the RLO strategy should be, what level of change would be required to reach that goal, and what tools, templates, content structure, and business rules needed to be created.

The following table lists some of the high-level notes taken during the RLO task force meetings at NoWaste. Each question was discussed, with corporate IT helping on some technical questions. Authors and other content contributors from each group talked about their ideal development and delivery system. The purpose and possible benefits of RLOs were also discussed.
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<th><strong>RLO Need</strong></th>
<th><strong>RLO Strategy</strong></th>
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<tr>
<td>Using the system</td>
<td>Authors include employees and contractors located inside the corporate firewall. Locations include corporate and retail locations as well as some remote users with VPN connections. Most are located at the corporate office. Future growth may demand the use of external contractors. Some suppliers offer training that should be integrated with content from NoWaste. It would be ideal if external training courses fit into our RLO system. Learners include both employees and customers. Employees are found at corporate and retail locations and include the consultants, who are often on the road. Customers gather information at computer kiosks at retail locations, through informational pamphlets and direct mail, and through Internet connections to NoWaste’s public Web site.</td>
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<tr>
<td>Content breakdown</td>
<td>Documentation and retail training groups both use Information Mapping to break content into concept, fact, principle, process, and procedure “chunks.” This breakdown will easily adapt into an RLO strategy. Training for the consulting group uses situational learning and case studies that emphasize role-play, guided discovery practices, and cross-selling skills. There has been little consistency in content size or scope across courses. Human resources uses a mix of all approaches. Its e-learning and instructor-led training (ILT) are built as two separate content structures. Whereas the ILT contains text-rich workbooks, the e-learning text is brief. Even the hierarchies are different. Most of the e-learning design is based on screen layout and not on content types.</td>
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Creating a Reusable Learning Objects Strategy
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<th><strong>RLO Need</strong></th>
<th><strong>RLO Strategy</strong></th>
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<td>All groups agreed that an Information Mapping approach would be ideal, but they will need to determine how existing courses can be moved to new structure of concept, fact, process, principle, and procedure. Sales and consulting training is largely principle-based, but the size of the current role-plays and guided-discovery learning environments is very large and would encompass multiple principles.</td>
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<tr>
<td>Ownership</td>
<td>Each department generates content and lessons independent of other groups and has traditionally been protective of its content. However, if proper “owner” acknowledgments are maintained, and a system of internal chargebacks is created, the groups are willing to share content and RLOs. Each RLO will require an owner and cost metadata value.</td>
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<tr>
<td>Delivery types</td>
<td>Print, Web, and instructor-led training will continue to be needed. In addition, the documentation group is responsible for producing marketing and product specification sheets used in the retail stores, which are then repurposed on the customer Web site.</td>
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<tr>
<td>Static or dynamic</td>
<td>A mix of static and dynamic RLOs will be delivered to employees and customers. Dynamic content is critical for sales and consulting service RLOs. These dynamic needs are expected to focus on changes in product specifications and changes in environmental regulations that consultants need to be aware of during sales meetings. Products are often added or deleted from retail outlets, so dynamic updates to RLOs are critical.</td>
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<tr>
<td>Customization for the learner</td>
<td>Customization is a long-term goal but a low priority at the start of the project. A larger need is to get all training groups to agree to content breakdown and ownership. Personalized RLOs for employees and customers need to be defined and documented in the future. Currently, the commerce engine for the customers does allow some custom features around purchasing options.</td>
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<th><strong>RLO Need</strong></th>
<th><strong>RLO Strategy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Format-free</td>
<td>In order to support multiple delivery media from a single source, all formatting information is to be applied when the RLOs are packaged for delivery. This requires all authors to develop RLOs without concern for the final delivery look and feel. Although this is ideal, more research is needed to determine what compromises will be needed to accomplish this goal. Impact may include changing the current look and feel of each medium to align with each training department’s requirements and possible limitations on development and delivery tools.</td>
</tr>
<tr>
<td>Templates</td>
<td>Two departments are using templates and two are not. All groups agreed that templates are needed and will follow those resulting from the Information Mapping types modified to be used for soft skills (sales and consulting) as well as documentation. A common set of templates will be created during the prototyping phase of the RLO strategy implementation.</td>
</tr>
<tr>
<td>Business rules</td>
<td>Many rules are needed to ensure that ownership rules are followed. Because of the dynamic delivery goal, rules about updating and changing RLOs need to be defined. All agree that some change process needs to be in place prior to the dynamic system being put into place.</td>
</tr>
<tr>
<td>Metadata</td>
<td>Very little metadata, if any, are currently captured by the training and documentation groups. Metadata have been limited to the product fact sheets and Web pages. A metadata subteam is to be established to work parallel with the RLO task force and is tasked with defining the metadata needed for all authors, learners, and external customers based on the IEEE learning object metadata specification. This subteam will document how the IEEE metadata values map to the common content breakdown, search function, ownership rights, and other business rules. Results from this team are needed before the system can go live because costs of adding metadata at a later date would be too great.</td>
</tr>
</tbody>
</table>
### RLO Need | RLO Strategy
--- | ---
**Evaluating success** | Each department has evaluation measures to determine the success of its programs, courses, and marketing materials. Consulting services uses sales data and customer satisfaction surveys to evaluate its engagements. All of these evaluation methods need to be aligned as the departments implement the RLO strategy. A subteam is needed to define the evaluation criteria used, collect baseline data, and define reports to be used with upper management.

**RLO tool options** | Currently, no RLO tools are used at NoWaste. Traditional tools are used for development based on ease of use, corporate standards, and delivery medium. All groups are using the same word processing application. For Web site creation, different groups use up to four different applications. Documentation is done using a page layout application. Each of these tools is effective for the groups using them.

No group is willing to change its current tool set without knowing the impact of implementing new tools on the production schedule. Authors are reluctant to learn new tools without time and training to become fluent.

All have agreed, however, that a single database-oriented tool for authoring and delivery would be ideal. More research on tool needs will be based on final specifications laid out by the RLO strategy. The information technology group has been tasked with researching RLO tool vendors that meet NoWaste’s needs.

**System architecture** | Depends on tool and system adopted. Information technology is responsible for architecture issues. They are going to estimate the cost of changing the current architectures to one that supports the tools, business rules, authoring locations, and delivery needs.
Although the table presents many of the key points from the task force meeting, follow-up meetings are used to help clarify and address open issues before moving forward. During this process, potential challenges were identified and documented.

Some team members still were skeptical about reaching the ideal RLO state, because they did not see an easy transition to new tools to support it. The skeptics felt that too many compromises in the way training was structured might be needed. The RLO strategy also had to address the concern of program managers, who feared that the new tools, guidelines, and business rules would grind the current development process to a halt.

The changes to the development process will be explored as this case study continues in Chapter Three, where we describe what changes are needed to adopt an RLO strategy.

RLO Strategy Worksheet

1. Write a mission statement that encompasses your overall RLO strategy.

2. List three to five goals you would like your RLO strategy to accomplish.
3. Do your combined mission and goals allow for future growth?

4. Create a working diagram showing how you envision the RLO process working in your organization, including authors, learners, SMEs, and vendors as necessary.

5. Who will create learning objects both today and in the future (for example, authors, SMEs, vendors)?

Creating a Reusable Learning Objects Strategy. Copyright © 2004 by John Wiley & Sons, Inc. Reproduced by permission of Pfeiffer, an imprint of Wiley. www.pfeiffer.com
6. Create a diagram showing the hierarchical structure and granularity of the content as you break down and rebuild content into RLOs. Once complete, indicate the lowest level of reusability in your RLO strategy.

7. Does your legacy content fit into this hierarchy? If not, how will you address the legacy content (for example, re-create it using RLO process, leave it as it is, revise it during next update)?

8. Will there be any organizational restrictions on who can reuse learning objects stored in the database?
9. Do you need to deal with ownership issues (with regards to updating content) as you begin to populate the database?

10. How will RLOs be delivered?
   - Print-based
   - On-line either through an intranet or the Internet
   - CDs with programs that are accessed through Web browsers or other programs
   - Portable devices (PDAs)
   - Other

11. What types of media will you support as part of the RLO strategy?
   - Graphics, charts, and tables
   - Video
   - Animations
   - Presentation slides
   - Work simulations
   - Printed manuals
   - On-line references
   - Other

12. Do your current or future plans call for the dynamic delivery of content?
13. Identify the changes, if any, to these business processes.

- Rights to link to existing content outside of your department
- Internal chargebacks to other groups for linked objects
- Pricing structures, both internal and external, for training delivery
- Defining when training becomes available
- Notifying other authors of upcoming changes
- Other

14. How will you collect, apply, and monitor metadata?

15. Do you need to show success or ROI for the RLO strategy? If yes, what will you measure?
Numerous instructional designers are, like you, considering reusable learning objects to support their training. As you think about making the switch, some significant questions come to mind. How does an RLO strategy affect the design, development, delivery, and evaluation of your training? How do you adopt RLOs without rearchitecting the ISD process? What changes, and what remains the same?

This chapter will take you through the minor and not-so-minor changes that occur when making the switch from traditional ISD-based design to RLOs. We will compare a traditional ISD model with one that is RLO-specific. You may find that you are closer to adopting RLOs than you think. Specifically, we will answer the following questions:

• What is the traditional ISD model?
• What is the impact of linking and reuse?
• How will RLOs affect evaluation?
• How will RLOs affect analysis?
• How will RLOs affect design?
• How will RLOs affect development?
• How will RLOs affect delivery?
• What is the maintain and retire stage?
• How will RLOs affect learning activities?

As you read this chapter there is one more thing to keep in mind. The depth and complexity of the changes that will occur in the ISD process are direct consequences of your overall RLO strategy. Some of you may plan to use RLOs to support your current instructor-led training. Others may take the opportunity of switching to RLOs to convert your training to a self-paced, Web-delivered environment. And others still will want to support both classroom and Web-delivered programs. As you can see, the overall mission of your RLO strategy will affect what changes you need to make to your ISD process. As a result, you may discover the need to adjust or rethink certain parts of your RLO strategy.

To help you answer the questions presented in this chapter, we provide a worksheet at the end for you to document what will remain the same and what will change in your own process. As you review each section, use the worksheet to document the changes from analysis through delivery. Pay close attention to those things that are unique to RLOs, such as reuse and repurposing. Note any tools, systems, and guidelines that need to be implemented to support the change from traditional ISD to a process that supports RLOs. Completing this worksheet will help you define your RLO strategy and determine your implementation strategy and action plan later in this book.

WHAT IS THE TRADITIONAL ISD MODEL?

We begin by looking at a traditional ISD model. Although there are many models to choose from, we will use the basic model presented by Gagné and Medsker in *The Conditions of Learning* (1996). After reviewing the traditional model we can look at how each stage differs from a model that is RLO-specific.

The basic ISD model traditionally consists of five stages, starting with analysis and continuing through to evaluation. These five stages are outlined in Figure 3.1.
It is beyond the scope of this chapter to go into the traditional model in great detail. (See the Bibliography for additional resources on the traditional model.) However, Table 3.1 summarizes each stage.

As you can see from Figure 3.2, the RLO-specific ISD model appears to have only minor changes. Yet these changes can have a significant impact on your training design process.

**WHAT IS THE IMPACT OF LINKING AND REUSE?**

One important thing to keep in mind throughout the process is your strategy for linking to existing RLOs and your policy on changes to linked, or reused, RLOs. This point will come up in this chapter’s discussion of several different stages of the changeover process. If you are an experienced instructional designer, remembering to keep this idea in mind may be a significant change for you. You are probably used to thinking about the design of a single training program or performance solution. You have completed your training analysis, design, and delivery based on the idea that they formed a single training program whose evaluation and updating was under your ownership (either directly or indirectly). You have made choices about how big each section will be, what practices to select, and how the content flows from topic to topic based on a single training course.
Table 3.1. Stages of the ISD Model

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>The analysis stage primarily answers two critical questions: How can we improve performance? And is training part of the solution? Unfortunately, this stage is skipped in many organizations where training is mandated as a solution to any performance issue.</td>
</tr>
<tr>
<td>Design</td>
<td>Once training is selected as part of the solution the course may be designed. During design, you create your learning objects, practices, and assessments. In doing so, you break down and structure the content. Ultimately you end up with a training outline or design document that explains the content and how the course will flow.</td>
</tr>
<tr>
<td>Development</td>
<td>Once the course is designed you get to start creating. You build the training materials and practices. You write your assessment scenarios, shoot video clips, create graphics and tables, and so on. Basically, you create all of the RLOs that were identified as necessary during the design stage.</td>
</tr>
<tr>
<td>Delivery (implementation)</td>
<td>At this stage you make the training solution available to learners in the proper medium and learning architecture. Most organizations will test their solutions through an alpha or beta pilot, or some type of limited rollout. After this trial period you make revisions to the training, and then you are ready to deliver the training solution “for real.” This may be through an on-line system or an instructor-led class, depending on your learners' needs.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Your job does not end with delivery. In fact, you should be completing formative evaluations throughout the process to ensure that your analysis, design, development, and delivery all meet the learning objects and solve your performance needs. Once the training is delivered to the learners, you will also be able to collect evaluation data about its utility and impact from them. This summative evaluation data can be used to adjust any stage of ISD from analysis to delivery.</td>
</tr>
</tbody>
</table>
With RLOs you have to think beyond a single training program. At least you do if you want to maximize their reusability. You need to think about others who will reuse the content in the future. What type of solutions will they try to support? The question becomes: How do you make reuse happen?

To begin, review your overall strategy. One of the primary decisions you made involved chunk size. In essence, smaller objects create a greater chance of reusability. For example, say we created an RLO based on the ISD concept. In this RLO we created a definition of ISD and provided two examples of ISD in practice. One example was from a bank and the other was from the high-tech industry. If this is stored as a single object in your database, then all three items must be appropriate before the object can be reused. But say another author does not want to use those examples. This author wants to create her own examples based on different industries. The only option is to repurpose this RLO—that is, create a new version of it based on an existing RLO—and change the examples. This is similar to doing a “save as” in any traditional program, where you would be forced to change the file’s name to save it in the same location. However, if the original content had
consisted of three different objects—one for the definition and one for each example—then the new author could reuse the definition object and simply create new example objects to fit her needs. This way of repurposing the original RLO actually includes some reuse, while still allowing the new author to meet a specific need. This approach leaves an RLO that has a single definition and four examples (two originals, two new) for future authors to choose from.

Another strategy that will dramatically increase reuse is creating objects that stand alone. If a series of objects is connected (for example, the content of one object refers to content of another), each is harder to reuse. Designing objects that stand alone means you can “drop” any related object into a training program without creating a disconnect.

In this chapter we assume that you already have a database of RLOs, or at a minimum, have started to develop your training materials and other solutions in a chunked, RLO-based model that you will move over to a database-driven system in future. Of course, there is always a starting point. This is when you do not have any RLOs, either in content format and structure or in the ideal authoring and delivery tools. As you read this chapter, remember that what changes and what stays the same also depend on where you are in your overall implementation. The more invested you are in new tools, processes, guidelines, and templates, the greater the changes you will see at all stages of the process. Likewise, the closer you are to your ideal RLO strategy, the more likely you are to be able to leverage some of the advantages of these changes. Not all change is bad; some changes will result in the benefits you are pursuing through the RLO strategy in the first place.

**HOW WILL RLOs AFFECT EVALUATION?**

In both the traditional and the RLO-based ISD processes, evaluation should be carried out at every stage, as highlighted in Figure 3.3.

Evaluation data are important to the developer, author, content owner, and business. Such data can be used to show the success of the program as well as to provide important information on what needs modification.

Perhaps the most widely known evaluation model is based on Kirkpatrick’s four levels (1998). A description of each level is provided in Table 3.2.

We will use Kirkpatrick’s evaluation levels as a useful framework for presenting the changes and the similarities between traditional and RLO-specific ISD processes.
What Stays the Same

Your organization’s goals in conducting evaluations will probably remain the same in both processes. The challenges you face today in creating valid and effective evaluations at all levels will still exist in the RLO-specific process. In particular, these parts of your overall evaluation plan will not be affected:

- Create a plan at project kickoff. (For more on this, see Kirkpatrick, 1998.)
- Identify format and discuss collection methods.
- Follow the evaluation plan in determining success.
- Predict requests from stakeholders.
- Identify metrics that are important to your stakeholders.

What Changes

There are some significant changes in converting to an RLO-based process. These changes will create challenges as well as benefits. The scope of challenges you face...
will depend on your current evaluation model. For example, an organization that is evaluating training only at Levels 1 and 2 will face different challenges than organizations that conduct Level 3 and 4 evaluations as well. Another factor that will affect evaluation is your delivery strategy. If you intend to use RLOs to generate only instructor-led training classes, then your evaluation process will not change as significantly.

### When to Conduct Level 1 Evaluations

Many of today’s traditional training programs finish by asking learners to complete a Level 1 evaluation. This allows for measurement of the overall satisfaction with the learning experience. However, if the learning experience is created with RLOs, or is part of a performance-support system, there may not be a formal completion to trigger the Level 1 evaluation. Even if learners take a collection of learning objects that may be termed a *course*, there is still no guarantee that they

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**Table 3.2. Applying Kirkpatrick’s Levels of Evaluation**

<table>
<thead>
<tr>
<th>Evaluation Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1: Reaction</td>
<td>At this level, evaluation is simply gauging the participants' reaction or opinion about the training. Level 1 evaluation data are usually collected using end-of-course critiques.</td>
</tr>
<tr>
<td>Level 2: Learning</td>
<td>Level 2 evaluation is looking to see if learning has occurred. The most effective ways to collect Level 2 data are practices and assessments (tests).</td>
</tr>
<tr>
<td>Level 3: Transfer</td>
<td>Level 3 looks for changes in the workplace. These data let you know that the skills and knowledge acquired during training are now being applied on the job.</td>
</tr>
<tr>
<td>Level 4: Results</td>
<td>The bottom line. Are the changes on the job (Level 3) producing positive results on the bottom line? In other words, do you see less waste, greater efficiencies, more satisfied customers, and so on?</td>
</tr>
</tbody>
</table>

*Source*: Based on Kirkpatrick, 1998.
will complete every object in that course or proceed in a predetermined order. This changes how you look at Level 1 evaluation.

When to issue the evaluation is also a challenge, because a learner may access ten small objects in a fifteen-minute period. Should each object end with an evaluation, or should the evaluation wait until the end of the entire fifteen-minute period? Being asked to complete an evaluation at the end of every RLO will become very annoying for learners. Maybe you decide to evaluate every RLO when it first rolls out, but then drop back to something less frequent. Ultimately, deciding when and where to conduct Level 1 evaluations will be your decision based on how you intend to use your evaluation data.

As you have probably noticed, the question of when to evaluate is only a challenge for RLOs used in e-learning, performance-support, or other computer-based on-demand delivery methods. If your RLOs are used to build traditional instructor-based classroom training programs, the issues you face today when conducting a Level 1 evaluation will not change.

New Sources of Data
Having a database of RLOs that are dynamically accessed by learners opens many possibilities for tracking usage trends, media selection, and profile information. You could run reports giving the number of times an RLO was accessed and which people accessed the RLO, their job function, and other background data. These data will be useful in many ways, but in particular for deciding when to “retire” an RLO.

Direct Learner Feedback
An effective RLO strategy makes it possible for the learner to give immediate feedback on each RLO through a comments field. Comments are saved so they can be accessed by other learners looking for best practices, or by the developer who is updating the RLO. You may even decide to use this more open-ended approach as part of your Level 1 evaluation strategy.

Scope of Data
One powerful aspect of RLOs for your learners is the ability to receive the same content through different media. If you take advantage of this opportunity, it will affect your Level 1 data. Your current Level 1 data probably tell you how learners felt about a particular training program but not individual preferences in the
program. A well-developed RLO strategy will allow you to monitor Level 1 data down to the media level. For example, say that you embed an RLO with a link to another RLO in the database that happens to be a video clip. You can now monitor how many times the video is selected. This type of information will be helpful in deciding priorities for future updates. If no one is accessing the video, perhaps you will decide to drop it and no longer keep it updated.

One final note on this topic before we move ahead: statistical analysis down to a detailed level is easier with an RLO approach. However, these statistics should not be used alone. Returning to the video example, we can see how these data work with other information to help us make sound instructional decisions. In the video example, we would correlate the fact that no one is accessing the video with Level 2 results. In other words, if learners can “pass” the RLO without seeing the video, then we might decide to drop it and no longer invest time and resources to its upkeep.

Feedback to Owners of Linked Objects
In a traditional training system feedback comes from students, colleagues, and perhaps SMEs. The RLO environment also allows authors to receive feedback from other authors who either link to or repurpose their original RLO. Although this might not lead to changes in existing RLOs, such communication can lead to writing at a higher level of reusability throughout the organization.

Metadata Evaluation
The last difference may be the most significant. A big component of your overall evaluation strategy will be evaluating your metadata. Consistent use of metadata will be critical both in your reuse strategy and for allowing learners to search for the RLOs they need. As you can imagine, if different authors use different metadata for the same type of information it will negatively affect your overall strategy. (We provide more detailed information on metadata and how they are applied in Chapter Five.)

HOW WILL RLOs AFFECT ANALYSIS?
Unfortunately, it is beyond the scope of this book to explain how to conduct a needs or task analysis. As you can imagine from looking at the RLO-specific ISD model, the analysis stage is critical to starting the project down the right path. (See Figure 3.4.)
We can quickly say that during analysis you explore all of the factors that affect the performance gap of your target audience, identify the desired performance, and use that information to select the best solution. Basically, you are trying to answer these questions: How can we improve performance, and is training part of that solution? There are numerous books and articles available on this topic, but we recommend Allison Rossett’s *First Things Fast: A Handbook for Performance Analysis* (1999) as a starting point for those new to the topic.

**What Stays the Same**

Besides the traditional standbys—lack of time and no organizational support—numerous aspects of both traditional and RLO-based analysis are the same. The following steps remain the same:

- Identify other solutions to improve performance (such as reengineering jobs and processes, performance aids, on-line support systems, motivation incentives, and so on).
• Define the job tasks, competencies, skill maps, and performance objectives of the performance you are trying to improve.
• Break content down into smaller chunks based on a hierarchy (course, module, lesson, page) or object classification approach such as facts, concepts, principles, procedures, and processes. (See again Chapter Two.)
• Identify solutions that go beyond, or at least provide support for, training.
• Research the performance through data analysis and subject-matter expert interviews.
• Select deliverables and get a final sign-off on your plan.
• Align with competencies and organizational performance goals.

What Changes
The changes in the analysis stage are relatively straightforward. This does not imply that they are simple or unimportant. It means only that they are the types of changes you might expect when converting to a more technology-based system. As with all aspects of RLOs, what changes depends on the tools you have employed in implementing your strategy. More robust tools will allow you to leverage RLOs earlier in the design process. Likewise, the more RLOs you have stored in a central database, and the more these objects are tied to the core competencies of your learners, the more helpful RLOs will be at the design stage. Again, we are assuming that you have existing RLOs in place on which to draw from during analysis.

Accounting for RLOs Early in the Process
Even before you have selected the performance solution, you can start thinking in terms of learning objects. They may influence the types of questions you ask, how you research tasks, and the context for the solution. The specific changes will depend on how your current process is affected by the RLO process.

New Access Methods
The analysis could indicate a solution that is simply another method of accessing an existing learning object. It is possible, for example, that an existing training course contains an RLO that can be used as part of a performance-support tool. This reuse will be easier if the course was built and stored as RLOs in a database than if it was built with traditional tools.
More Data for Analysis
Depending on the authoring tool you choose, you may be able to collect data and reports from the learning object delivery environment. A report, for example, could compare job performance with access to RLOs. If people who are accessing the RLO are not performing well, this might indicate that the RLO is incorrect or that the access method is hindering transfer of knowledge and skills to the job.

Skipping the Analysis
Just as analysis is often skipped or shortened in traditional training programs, you may be pressured to do the same with an RLO-based training solution. The difference here stems from how quickly RLOs can be reused and new solutions from an RLO database can be assembled. The ability to find and reconfigure RLOs quickly and easily into new training programs is one of the benefits of using them. However, this same process allows authors to skip analysis entirely. They have the ability to create new training programs easily before deciding if training is really necessary. Although RLOs will make designing training and other performance solutions easier, that should only happen after you select training as part of the appropriate performance solution. In other words, take the time to analyze the cause of the performance gap your RLOs are being designed to solve.

RLO Usage and Profile Statistics
Depending on your delivery tools, you may find a database full of data that will help your analysis. It is possible that your learning management system (LMS) and RLO delivery system track all learners, what they viewed, what media choices they made, what preferences they set, and their related job tasks. Although these data may be more valuable to you during the actual RLO design, you may find some data to support your performance analysis. For example, if you find that all the learners in your study already have RLOs to support their job task, and have “passed” their associated assessments, you may need a different type of performance solution. In other words, maybe training was not the solution to the problem in the first place. Maybe there are organizational or motivational factors that are preventing learning-to-performance transfer. You may also find a performance gap between those learners who went through an e-learning RLO and those who went to a live instructor-led training event, or maybe between learners
who looked at media clips and those who did not. Keep in mind, however, that this
type of data will not answer all of your analysis questions. Instead, usage data give
you the opportunity to account for past usage and profiles in your final recom-
mendation for a performance solution.

**HOW WILL RLOs AFFECT DESIGN?**
The RLO-specific model adds “mining” for existing learning objects (see Figure 3.5)
to the traditional design stage. An important function of an RLO database is to
allow you to find out what has already been created, gather evaluation data and
usage statistics, or add media elements to existing objects. Many instructional
designers already do this in traditional training development by building new
courses from existing ones. Many of us start new training courses by looking for
what is already available and determining if it meets our needs. If you have done
something similar, then you already understand the mining concept.

**Figure 3.5. RLO-Specific Model Focusing on the Design Stage**
The result of the design stage is a design document, or some kind of manifest, that tells others on your team what will be developed in the next phase. This document serves a number of functions that you should already be familiar with: outlining the project’s scope from learning architectures to resource planning, and providing you with a manifest of the RLOs that you will either build or reuse in the next stage.

One important point: as you design your RLO-based training and performance solutions, remember that you should not let the system or tools control your training design. Of course, this means selecting a system and a tool that are robust enough to handle a wide variety of design scenarios. With that in mind, let us take a look at what stays the same and what changes during the design stage of the process.

**What Stays the Same**

Even with the addition of mining, many steps in the process stay the same when shifting from traditional ISD to an RLO strategy:

- Define the practices and assessments needed to solve the performance gap (to match the performance objectives).
- Determine the instructional strategies and media options, language needs, and accessibility issues.
- Sign off on the design of your solution through a design plan.
- Align objectives, practices, and assessments.
- Conduct research and SME interviews.
- Create budget and resource allocation.
- Do a cost-benefit analysis for the solution.
- Decide on media elements.
- Decide on modes of learning (guided discovery, directive, exploratory).
- Determine what content and courses exist.
- Determine appropriate size and scope of the solution.

**What Changes**

The changes in your design will depend in part on the system used to implement learning objects. As you might imagine, a system that is feature-rich, links RLOs...
to job competencies, or enables multiple delivery options or prescriptive learning will create a greater number of changes.

**Accounting for a Variety of Training Architectures**

Numerous architectures are available as a basis for designing training programs. In Chapter One we introduced the four architectures shown in Figure 3.6. We also dispelled the myth that RLOs will support only a predominantly directive training architecture.

In this section we look more closely at how RLOs affect these four architectures.

**Receptive** As author-designer you can place a number of RLOs on a fixed path by combining a series of related ones. The possible combinations are limited only by the number that fit together without the need for branching while still meeting the learner’s needs. (*Branching* offers learners multiple paths during an RLO-based course, either through their response to interactions or based on menu selections.) For example, you can assemble a series of RLOs on installing memory into a computer without branching. All those RLOs are presented to the learner without any navigation controls aside from an “exit” in an e-learning environment. In this

![Figure 3.6. Leveraging RLOs in All Learning Architectures](image)
situation, you prevent the learner from controlling the speed and pace of the learning experience.

Many might argue that in this case you are only creating an “electronic page-turner.” We would probably agree with you. Debating whether this is a good application of RLOs is not the point, though; we are simply stating that RLOs do support receptive architectures if that is what your situation requires.

**Directive** The directive architecture is perhaps the most common one used in training programs today. This is especially true for e-learning delivered via the Web. Converting to RLOs from a more traditional training design will not necessarily change this, because RLOs can fully support a directive architecture. Usually, a series of related RLOs are connected so that learners follow a logical progression through the training materials. This progression may move from simple to more complex skills, or from a beginning to an end point in teaching a process or procedure. Learning objects are combined to form larger groups, such as a lesson, unit, module, or course. If the training is conducted in a classroom, the instructor simply follows the progression, checking the students’ progress as they go along. In an e-learning environment, you may provide a hierarchical menu with basic navigation such as forward and backward buttons. Although branching and exploration by the learner are possible, the course designer assumes that the structure, visual cues, and other devices all suggest how the learner should progress through the series.

The challenge in designing RLOs to support this architecture is ensuring that each one can stand alone, removed from its current hierarchy. This is necessary so that both the author and the learner can use that RLO as part of other training programs that use different architectures.

**Guided Discovery** In general, the guided-discovery architecture is more complex to design and deliver than the others. Here, RLOs are looked upon as resources accessed by the learner during the guided-discovery experience. The overall learning experience is built to encourage learners to find the skills and knowledge they need to complete their job task or learning goal successfully.

A common e-learning application of the guided-discovery approach is a job simulation, where a learner may find a simulated desk, computer system, filing cabinet, customers, job-related tasks, and real-life distractions. RLOs can be used as resources to support each component of the simulation. For example, if the learner is given a
task during the simulation, that task would be an RLO. Likewise, the resources the learner accesses in completing that task—such as the computer system, telephone, a customer, peer, or manager—would all be RLOs stored in the database.

Guided-discovery environments are usually constructed using authoring tools or programming languages such as ToolBook, Authorware, Director, and C++. These tools connect the referenced RLOs from a common database, making them available during the guided-discovery experience. As you probably know, the more joblike these work environment simulations are, the greater the cost of both their design and their programming. The savings, however, is in accessing existing RLOs and creating new RLOs that are stored in the common database for other architectures to employ.

Ideally, all the RLOs needed for your guided-discovery architecture already exist in the database and are being used in the other architectures. You could search, or mine, the database and then reuse or repurpose those others to build the guided-discovery learning experience. Once designed, a programmer could build the training program with links to those RLOs. The benefit of this approach is that the RLOs can be updated once, and the changes will appear in all the architectures that use them.

**Exploratory** Finally, RLOs can easily be used to support an exploratory architecture. Because RLOs are stored in a database and are created with rich search data (that is, metadata), tools can be built to allow people easy access to any of them. Your search engine should allow for exploration based on any number of criteria, including content type, job task, interests, media, language, or related RLOs. In fact, access to existing RLOs is limited only by the search data attached to each one and the search tools the learner has available during delivery.

An important assumption here is that each RLO used in the exploratory architecture has already been created and stored in a common database. Your role as course designer is to determine what types of content, information, and skills learners might need to access. You would then mine the database to ensure that all of the RLOs already exist. If an RLO you thought necessary turned out to be missing from the database (and therefore not used in other architectures) you could build it, apply search data, and deposit it into the database. You might also receive feedback from learners about RLOs they want to see included. These too could be designed, built, and stored in the common database for future learners to access.
Mining for Related Content
We need to make a critical point up front here: before mining for existing content you need to establish learning objectives. Then, when you find RLOs through the mining process, you need to compare them with those learning objectives. This is what should drive your decision to reuse or repurpose an existing RLO rather than create a new one. Once again, our concern is that the ease of finding existing RLOs will lead some designers to create training courses that are unnecessary.

Imagine this scenario. A focus group on improving sales comes to the conclusion that more training is needed on overall customer service, so a request is made for training. The instructional designer assigned to the project does some quick mining and discovers numerous RLOs that already exist and combines them into a new course. What is the danger here? No one took the time to find out if the training was truly necessary. A training solution was created when in fact the situation might have been better solved by changing incentives. Ultimately, when customer service does not improve it might be seen as training’s fault. This scenario is all too frequent in organizations today, and RLOs can accelerate the ability to create unnecessary training.

This concern notwithstanding, RLOs can be a true benefit to any performance solution once the proper analysis is completed. During the design phase you can identify RLOs that exactly match your needs without modification as well as those that can be repurposed. The speed with which you can find existing RLOs should increase once the tools and systems are in place to support their storage and retrieval. Ideally, you would document and promote the percentage of reuse and repurposing along with any associated cost savings in order to evaluate the success of the program.

A key to successful mining is valid and consistent metadata. A lack of valid metadata makes the mining process nearly impossible because any search will not result in RLOs that meet your needs. To that end, we fully recommended that the creation and updating of metadata be built into the entire RLO process. (As noted earlier, we cover metadata in depth in Chapter Five.)

Multiple Delivery Options
It may help sell your solution if the stakeholders understand that a single RLO can be used to support multiple delivery types. As with any significant change, the more diverse the new strategy, the more likely it will be embraced. Simply put, an RLO
strategy that supports e-learning, on-line references, print-based manuals, and instructor-led training will be more readily received than one focused on Web-based training alone. The various delivery possibilities were already covered in Chapter Two and will be examined in greater detail when we cover the delivery stage later in this chapter.

Longevity of RLOs

RLOs that are leveraged in multiple performance solutions or delivery venues may “live” beyond those in a traditional onetime event such as a course. Once created, an object can be reused by other authors in a variety of training solutions, and likewise can be reused for specific audiences. Your learners may also bookmark and reference an RLO again and again when they are back on the job. As you can see, any solution you create today may live past its original purpose. In traditional ISD, you would simply quit printing the training materials and perhaps archive the computer files. But in the world of RLOs, the objects you create might be connected through links to other programs. If you delete or retire these objects you may dramatically affect other authors throughout the organization. As we have already stated, you will thus need an authoring system or business practices to avoid problems.

The RLOs’ ability to be reused in multiple situations can be a valuable feature when justifying to your stakeholders the inclusion of high-budget items such as simulations. Many other courses or performance solutions may use those simulations, and those simulations may be relevant beyond the update of any single course. For example, you could build a very rich case-based simulation to teach the principles of designing a computer network, marketing a product, or managing employee performance. Those RLOs would all be part of larger courses that would likely have very specific procedure RLOs on the systems and tools needed to design the network, market the product, or document the employee’s performance. But because principles change less often than procedures, you could justify spending more (time, money, personnel) on robust case-based simulations on principles and less on the procedural simulations. Likewise, because the principles may exist in multiple courses, they will likely be leveraged by other groups needing to reference the topics of network design, product marketing, or employee management.

Here is a more detailed example of how the longevity of RLOs may affect other authors and courses. Think about traditional classroom training programs. Once the program has run its course it is frequently canceled. This may mean removing
it from the training catalogue and no longer offering it to learners. At this point the course is no longer updated. In many cases the handouts and materials are kept as computer files or simply deleted. The information is lost to the organization.

In contrast, if the class was created with RLOs, these objects would still reside in the database for future reuse or repurposing. Figure 3.7 shows how Author 2 is reusing an RLO created by Author 1. If Author 1 decides to retire or change the RLO, then that same object will be changed or retired in the training created by Author 2. Author 3 is not affected because the RLO was repurposed, not reused. (We will discuss the impact of editing in more detail in the maintain and retire stage of the RLO process.)

When to Reuse and When to Repurpose

The impact of linking to existing RLOs, the size of your RLOs, and your organization’s policies on reusing RLOs all come into play here. It is vital that you create

**Figure 3.7. RLOs “Living” Beyond Their Intended Purpose**

<table>
<thead>
<tr>
<th>Version 1</th>
<th>Author 1 = Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay to:</td>
<td>Created Version 1.</td>
</tr>
<tr>
<td>Amount</td>
<td>Updated to Version 2.</td>
</tr>
<tr>
<td>5551212555</td>
<td>Affects Author 2 and all others who reuse.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version 2</th>
<th>Author 2 = Reused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay to:</td>
<td>Linked to RLO Version 1.</td>
</tr>
<tr>
<td>Amount</td>
<td>Changes automatically accepted.</td>
</tr>
<tr>
<td>0002223333</td>
<td>Disappears if Author 1 retires original RLO.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New RLO</th>
<th>Author 3 = Repurposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay to:</td>
<td>Copied RLO Version 1.</td>
</tr>
<tr>
<td>Amount</td>
<td>Made new RLO in database.</td>
</tr>
<tr>
<td>4449922222</td>
<td>Link to Version 1 severed.</td>
</tr>
<tr>
<td></td>
<td>Became owner of this RLO.</td>
</tr>
<tr>
<td></td>
<td>Affected by Author 1 no longer.</td>
</tr>
</tbody>
</table>
guidelines for authors when it comes to making new copies of existing RLOs (that is, repurposing them), and determining under what conditions they should simply reuse an RLO without changing a single word, graphic, or metadata field. Define those issues involving ownership of RLOs, who has the authority to make a change, and what notification should be sent to other authors who link or reuse those RLOs.

These choices can have a significant impact, especially if you have a well-established editing and SME process in place. Although there may be other implications as well, the main implications of these decisions are demonstrating a high level of reuse, influencing the editing process, and influencing the SME review process.

**Demonstrating a High Level of Reuse** Many of you will find it necessary to prove that your new strategy is successful by reaching a certain level of reuse. If this is the case, then any decision to repurpose or create new objects will negatively affect that percentage. But by the same token you do not want to lock authors into reusing content that does not fit their learning objectives. Worse yet, you may lock authors into reaching an arbitrary “magic” number of reused RLOs.

From a design point of view, your authors should be aware of your RLO strategy so that they can make the appropriate choices about building new RLOs or simply reusing something that is in the existing database. For example, perhaps your policy on reuse states that 20 percent of an RLO needs to change based on an analysis before authors may create a new RLO. Or more likely, authors may add new examples and practices for specific scenarios while maintaining all existing facts, definitions, and procedures. Again, you will need to look back at your levels of granularity and your hierarchy of objects to determine which parts can be modified and which parts should stay the same. This will then tell your authors what they need to design into their new learning solutions.

**Influencing the Editing Process** The design of any training or performance solution will require editing. If your organization already has an edit-review process, that is great. The question is how that process will be affected by this decision. If an object is being reused, it does not need a spelling and grammar edit. Those items were fixed during the editing process when the object was originally created. However, it still needs a content edit. The editing process can focus on how this object fits into the greater solution. Every time you decide to repurpose an RLO, the new RLO will need to go through quality checks, such as editing and SME review, prior to being released to learners.
Influencing the SME Review Process  As unlikely as it seems, reusing objects may mean that the subject matter expert will have to spend more time reviewing the course materials. The object (and therefore the course) was not created specifically for the current RLO-based solution being developed, and the SMEs on your team could be more skeptical of directly reusing someone else’s content. They may question if the writing style, examples, and learning objects can really be transplanted from one course to another. In fact, authors often share this level of skepticism, especially those who have not accepted your RLO strategy or see flaws in the ability of the guidelines to ensure clean reuse by multiple authors. Again, the secret here will be creating a solid design plan so that you can show how reusing objects fits into multiple courses and that learning is not affected by piecing these RLOs together.

Searching Multiple Databases on Multiple Forms of Metadata
Traditionally, you could reuse any training materials, manuals, references, job aids, and so on, if only you knew they existed. If your entire organization has adopted the RLO strategy, then you will be able to find resources and other RLOs that other groups have created. With the proper search tools and metadata associated with all possible forms of knowledge (that is, the RLOs), you will find RLOs that already exist to support your new training solution. To reiterate this important point yet again: the level and consistency of your metadata will directly affect your search capabilities.

Leveraging Multiple Performance Solutions from a Single Object
RLOs are not just for training solutions, even though the word learning is in the term RLO. Recall from Chapter One that an RLO can be simply called an object. Its size, shape, and purpose are up to you to define. Any RLO can in turn be used to create printed manuals, on-line help systems, on-line reference systems, and any other performance-improvement solution that involves providing information to the end user. This type of flexibility can greatly shorten the time it takes to get a performance solution—any solution—up and running. It also increases the return on investment of your RLO strategy.

Updates and the RLO’s Purpose
Finally, as we have mentioned several times, RLOs reusing or linking to other RLOs in the database creates a unique situation. If you are creating a training program
and find numerous RLOs that you intend to reuse because they fit your purpose, what happens six months from now when the original author changes the objects, thereby changing their purpose? Will they still fit your needs, or will you need to create your own RLOs? Does the original author receive notification that the RLOs he is updating are currently being reused? Do you get a notification saying that an RLO you are reusing was updated? Again, these issues must be worked out through the authoring system or through your business practices. We cover reuse and repurposing in greater depth in the following section on development.

**HOW WILL RLOs AFFECT DEVELOPMENT?**

As in the design stage, an RLO strategy adds steps to the development stage. Specifically, the RLO-specific model adds reuse and repurposing (see Figure 3.8).

At this stage, content, practices, assessments, learning activities, and all the supporting media are created in a variety of tools. Your process may engage
the services of a large team of specialists or rely on a single person to author all the RLOs. During this stage you see your RLOs taking shape, growing into courses or performance-support tools. RLOs can speed up this phase if you are able to find and reuse the smaller elements that go into them. In order to be successful here you will need to establish guidelines for when to reuse an RLO and who has permission to change objects, metadata, and levels of granularity for reuse.

**What Stays the Same**

Regardless of your tools and systems to support RLOs, at some point you or your development team will need to create content. You may use subject matter experts and editors, a video production team, animators, simulation programmers, and a team of course developers to build your solution. In creating these training solutions you are likely to perform the following tasks in both traditional and RLO-based development:

- Validate new and existing content to be included in your solution.
- Research the content to be included through SME interviews and a review of existing materials.
- Create content, practices, and assessment.
- Create graphics, audio file, and video clips.
- Write media scripts and create storyboards and flowcharts.
- Carry out reviews and alpha and beta testing, and copyedit the RLOs.
- Maintain project schedule and manage the development team.

**What Changes**

What changes in your development process will vary greatly depending on what tools you have in place for developing and delivering RLOs. For example, you may not change a thing if the first phase of your RLO strategy simply requires authors to break content down into RLOs, using their traditional tools for your traditional delivery mechanism. In contrast, if you are rolling out a new Web-based authoring tool that connects to a database you will populate with content, practices, assessments, media, and metadata about each element, you will have the opportunity to leverage the full potential of the new RLO-oriented tool set. In this case, the following are the areas where you may notice the most change.
Research
Ideally, all the content mining is completed during the design phase. However, more content mining may be justified if you feel more reuse is possible or believe that some RLOs were missed in the design phase. Even in traditional ISD it is not uncommon to discover “holes” in your design once you start creating content. You may have to walk a fine line here. You should not be afraid to add RLOs that you feel support the training, but you also do not want to start adding content just because it happens to exist already in the database.

Tools for Authoring or Assembling RLOs
RLO tools will let you either create content directly into the database or assemble a collection of existing content and media elements into the database. Assembly tools have you upload completed content, practices, and assessments into the database in order to build the structures (such as “training course” or “help system”) of your solution. Other tools, however, give you more authoring features, such as creating text, bulleted lists, tables, practice questions, and assessments. Here is the catch: no one tool does everything, so the use of traditional media tools for creating sound, graphics, simulations, or video is still necessary. The RLO tool you ultimately use will likely combine some aspects of authoring and assembly into the database. Of course, this will require your development team to acquire new skills in using the tool set, establishing new baselines for development time and effort and possibly new methods to update the team on progress toward project milestones.

Tools for Reviewing and Editing
The introduction of RLO-based authoring tools may affect how you review and edit your RLOs during each milestone in their development. For example, some Web-based authoring tools will allow your review team to preview an RLO in its delivery format (that is, Web-based delivery), followed by a comments field or comments button. You could establish a standard for your review team to enter comments if the RLO needs to be updated. All the comments from all the reviewers could be stored in a common database where your project management team can run a report to see them. You may find this a great improvement over your current method for capturing and reporting on SME and editorial commands.
Of course, you may find that your editing groups do not find the new authoring tools as feature-rich as their current tools. For example, many word-processing applications allow the user to compare versions of a document and allow the reviewer to track changes directly in the document. The RLO-based review tool may only allow users to enter comments next to the RLO, but not change the text. This was the case at Cisco Systems, where its first authoring tool gave the Web interface for commenting on RLOs but lacked the ability through the Web interface to change actual content. The editors were forced to look at the SME comment and then open the authoring tool and make the changes. This proved less efficient than the traditional process of accepting editing and SME review comments.

Reusing and Repurposing RLOs
Our discussion of reusing and repurposing RLOs during the design phase was largely a question of when to reuse. At this point, you will be facing the issue of how actually to change existing RLOs to form a new course hierarchy for a specific audience. As you can imagine, the levels of reuse, from the course and module level down to the text and graphics, all play important parts in helping you decide on your overall development resources and processes.

RLO-based authoring tools allow you to find and reuse existing RLOs at any level of granularity, from the large container you may call a course down to the smallest parts that form the RLO (media, text, interactivity). During the development phase, you will be able to go into your RLO-based authoring and assembly tool, find those “parts,” and combine them into new RLOs as needed. As we saw in Figure 3.7, pure reuse of existing RLOs maintains a connection to the original RLO. This allows the owner of that RLO to make changes that automatically cascade through the database and into your new RLO-based solution.

For example, say an author decides to reuse an RLO called “What is a mechanical pencil?” through a database connection. The new author decides that the definition must have a reference to adding more lead to the pencil, even though the original author included disposable, or nonrefillable, pencils in the definition. Because of the database connection with the original, that new definition will appear in all the courses that have RLOs with the mechanical pencil definition. If the original author does not agree with the change, or if the system forces the new author to create a new RLO—in effect, repurposing the old one—then more than
one definition of mechanical pencil will exist. This requires two editing cycles, two sets of metadata, and two choices for all future authors who may need the definition in their courses.

Here is where your development team will need to make a policy decision. By creating a copy of an existing RLO—that is, repurposing it—you break the connection and owner dependency with the original one, freeing yourself to make any changes you need to make. However, this method could lead to many copies of similar RLOs on the database. If every author repurposed a small percentage of the “What are mechanical pencils?” RLOs, the database would be littered with multiple RLOs that were so similar that authors and learners would find it difficult to distinguish between them. Your level of reuse might drop as authors find too many close matches for their needs or become overwhelmed with the amount of “junk” in your RLO development database. Compromises help, but as this example illustrates, agreement on the critical elements of any definition are needed to prevent the proliferation of similar RLOs in a database.

Writing Style and Guidelines
To ensure maximum reuse, granularity, and delivery options, it is critical to have writing style and editorial guidelines. For example, your RLO strategy may dictate that each RLO should stand alone to maximize possible reuse at the smallest level of granularity. The writing guideline would instruct authors to write in such a way that they never reference RLOs that came before or after. This allows any RLO to be placed into a new training solution or lesson while possibly limiting the use of common examples, scenarios, and context between the objects.

At Cisco Systems, for example, each concept, fact, process, procedure, and principle RLO is written so that it does not reference another. Each is a stand-alone RLO with its own learning objective, content, interactivity, practice, and assessment. The introduction to each RLO does not assume that the learner has viewed the prior RLO. Cisco’s guideline on this states that the introduction to each RLO will not use such terminology as “in the prior section,” “on the prior page,” “as you know,” and so on.

In addition to covering reuse of RLOs in lessons or courses, you may want to extend your guidelines to account for differences between delivery media. If your RLOs may be used in instructor-led training, e-learning, and performance-support tools, for example, your guidelines would need to instruct authors to change
the wording to make sure that it is delivery-neutral. Say, for example, that you have a practice activity that you want to reuse in both instructor-led training and e-learning. The workbook asks learners to “draw a line between two points,” whereas the e-learning text asks them to “drag and drop the correct item to its target.” Both of these are specific to the type of delivery used. The action can become completely independent of delivery if the text says to “match the two columns.” These are the kinds of small adjustments that can be made to the writing style to increase reusability.

As you may have guessed, consistency in the writing style of the RLOs and a good editing process to ensure that consistency are key to creating a smooth flow when building new structures. This is where small development groups implementing RLOs for specific job tasks have an advantage over a corporate-wide RLO initiative, where everyone in the organization is contributing to the database. You should answer these questions when establishing your writing styles and guidelines:

- Will all the authors follow the guidelines?
- How will you verify and enforce the guidelines?
- Will the learning experience be consistent enough to be effective with these guidelines?

In answering the third question, let us agree that the consistency of the learning experience may or may not affect your learners’ ability to gain the skills and knowledge they need. Many elements come into play when you talk about learning transfer back to the job. Writing styles that increase reuse of RLOs may simply be one of many factors you will want to think about to maximize learning and performance results.

Valid Metadata
For every RLO you want to track, reuse, repurpose, and store in your database you will need some level of metadata. Based on your RLO strategy, this could range from the smallest text and graphic element up through the hierarchy to the largest module, lesson, or curriculum. If your strategy is not to use a database of RLOs, then your need to ensure valid metadata diminishes greatly. But assuming that you are authoring for a database, keep in mind that someone during the development phase will need to create metadata tags and ensure that they are current before the
RLO is delivered. Some tags are maintained by the system (author, date, media type, hierarchy, size, and so on), whereas others are the responsibility of the authors (description, objective, title, owner, keywords, competency, and so on). Without valid metadata most of the benefits of having RLOs stored in a database are lost.

Plan on budgeting resources for authoring, reviewing, and editing metadata. The amount of time and the number of resources should be based on your RLO strategy and tools. In any case, creating search terms and other metadata will add to your development effort. Be prepared for some authors to balk at doing this extra work. As with all the development changes, remind them of the benefits of your RLO strategy for both learners and the authors.

Once you have established your guidelines for metadata and the impact of metadata on your overall development process, you will want to add these measures to the design phase. This is key, because your design phase contains your request for budget and resources, and likely spells out the project timeline. Adjusting for new and modified metadata may also affect your guidelines for reuse. After all, if a single change to a metadata value forces a new RLO onto your overall process, your authors will need to justify that return on investment. Again, these impacts are felt during the development phase, but they should be accounted for during the design phase. (For more detailed information on implementing metadata, and what specific values you may use in creating metadata, see Chapter Five.)

Granularity

The consistency of the size of RLOs is another area that requires close attention. We are not recommending a cookie-cutter approach where every RLO is the exact same size, with the same number of practices. Instead, this is where your writing guidelines will come into play. In addition to the overall RLO hierarchy, your guidelines should provide examples of the right size for each media element that goes into an RLO. It is debatable how much consistency between elements and RLOs the learner will need to avoid cognitive dissonance. Likewise, the more control you have over the overall RLO implementation, the easier it will be for you to maintain a consistent size and shape of your RLOs.

Number of Deliverables and Milestones

Because you are building a number of small, stand-alone RLOs, it is possible to increase the number of deliverables and milestones during the overall RLO
development process. Just as in a traditional development process, you have likely based your deliverables and milestones on your project scope, time line, production schedule, and human resources. Now, you may choose to review a collection of RLOs in its e-learning delivery mode, then as a performance support tool, and finally as an instructor-led training experience. Staggering sign-offs based on delivery type may help identify early gaps in content and let you save the costly instructor-led training pilots for the future, when your content will be more stable. Other questions you should answer before defining your project deliverables include these:

• Will you show the stakeholders one or two RLOs and tell them that the remaining RLOs will have a similar look and feel?
• Will you wait until all the RLOs are completed and then sign off on the entire bunch at once?
• Will you need to sign off on any RLOs you intend to reuse or repurpose versus those created from scratch?

Keep in mind that, although we are addressing these issues and questions during the development phase of the process, you will have sign-off and deliverables at each stage from analysis through delivery. At your project kickoff, we recommend establishing RLO-based deliverables and milestones, including any traditional project planning that you are performing today.

**HOW WILL RLOs AFFECT DELIVERY?**

During the delivery stage, the training or performance solution is made available to learners. Depending on how your RLO strategy defined your delivery needs, you may roll out your RLOs in an instructor-led class, as a series of Web pages for self-paced learning, or through a blended approach, using on-line mentors, communities of practice, and live workshops back in a traditional classroom. Notice that for this phase, we have added the concept that RLOs are “accessed” as part of their delivery (see Figure 3.9). This is intended to acknowledge that learners can access training when they need it as part of a performance-support system and that they may do so today or at any time interval based on their need. Access means that your RLO strategy could be used beyond traditional events to include other performance solutions, such as help systems and performance support.
What Stays the Same

If your RLO strategy states that your future delivery will be the same as your current delivery, then you should not expect much to change during this phase. If you are using RLOs to help design your training but still need to support only instructor-led training, or only Web-based training, then you may have little reason to read through this section. In contrast, if you are adopting new delivery systems or methods, then any number of things can change. Before we look at those changes, let us simply acknowledge some steps you will take in this phase that should remain the same regardless of how your RLOs will be accessed and delivered:

- Create a release plan and schedule.
- Obtain management support.
- Promote the solution to stakeholders.
- Ensure that learners use the solutions.
What Changes
As we continue to state throughout this chapter, what changes at this stage will be largely tied to your RLO strategy, business goals, and tools. The level of change will vary if you are moving from old tools to new tools, from classrooms to performance-support tools, from static Web pages to interactive on-line mentoring. Keeping in mind that we cannot account for every possibility, here are some differences that you should be aware of as you move forward with your RLO strategy.

New Ways to Access the Solution
Learners may access RLOs as bookmarks, as just-in-time training, or as job aids. They may download RLOs to personal digital devices or laptops for reference off-line. They may also log into the system and get personalized delivery of RLOs based on language, media choices, and learning preferences.

No Longer a Scheduled Event
We addressed this issue earlier, but it is important enough to repeat. A traditional instructor-led training event meets at scheduled times, whereas a sophisticated RLO delivery system opens the possibility that the same RLO may support on-demand training and performance support. Of course, if you are already supporting Web-based training and instructor-led training, then this is not anything new to you. However, RLOs should make supporting both of these delivery and access methods more cost-effective.

Size of Deliverables Seen by Learners
As learners complete training, either in a classroom or on-line, how big will each section be? Will they start with topics that are then combined into lessons? Or will you limit access to a course, module, or unit? This decision is ultimately determined by your overall strategy. For example, if you intend to use RLOs to support classroom training only, then learners will continue to see courses. However, if you intend to support a Web-based learning environment where learners can test out some topics, then the size of each deliverable should be much smaller.

Tracking Usage
As we have noted already, one of the many possible benefits of RLOs is the ability to track their use. The challenge, however, is in tracking the use of job aids, downloads, bookmarks, or access to embedded help systems. Often learning management
systems (LMS) are set up to track events in time, such as a class, limiting the reporting and tracking of the other possible access options for RLOs.

Capturing a Knowledge Base
This may not be applicable to your RLO strategy or it may not be a feature of your tools. However, you may want learners to be able to submit reviews about each RLO, share that information with other learners, and build a community around each RLO. Amazon.com offers a good illustration of this kind of knowledge base capture. In most cases, any book you locate on Amazon.com will have one or more customer reviews attached to it; people who have read the book offer their opinions. In fact, you also have the opportunity to write your own review for future prospective buyers. An RLO strategy can employ this same technique. Learners will have the ability to write reviews at any level (individual content object, complete RLO, entire lessons, and so on). This allows future learners greater access to information when they want to decide if they will take a particular RLO. The same system works for the media embedded in your database as well.

Access Based on Learner Preferences
With RLOs, each learner in your organization may have a unique profile that states how he or she likes to see training and information delivered. Again, this can be a significant change if your delivery tool is sophisticated enough to support it. For example, the delivery tool may let the learner “see” RLOs based on language, media type, schedule, peer review, job task, or any other criteria that you establish. Often these types of features are included in your LMS. In this case, you may want to work with your IT group and LMS vendor to ensure that the metadata about each RLO can be used to achieve these goals.

Communicating Updates
Letting learners know that an RLO has been changed may also be different for you. Communicating updates has always been a challenge, whether you are delivering instructor-led training or Web-based solutions. So how can RLOs help? If you reuse the same RLOs to prepare training materials, printed manuals, and on-line references, then the information is always current in all three delivery sources. When an update occurs you can simply use your current methods to notify people of changes. This is a far cry from the days when you had to update all three sources individually. And depending on your delivery tools, the communication to the
learner about the change could be automated—letting learners know that there is a new RLO and providing them with a specific, direct link to only the changed RLO. If your delivery medium is instructor-led, an e-mail message might alert the learner of a special update workshop. The possibilities here are great, but again they are tied to your RLO strategy, tools, and integration with your LMS.

**WHAT IS THE MAINTAIN AND RETIRE STAGE?**

In the traditional ISD process, the assumption is made that you will continue to keep your training materials up-to-date until some future time when they are no longer needed by your learners. In some cases, the training could simply be a one-time event, such as a workshop; in other cases it might be an ongoing training program about management skills. Most training falls someplace in between a short-term need and an ongoing class. For the RLO process we have added a stage called maintain and retire (see Figure 3.10) to call your attention to the fact that a

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**Figure 3.10. RLO-Specific Model Focusing on the Maintain and Retire Stage**

- Analyze
- Design and mine
- Develop, repurpose, and reuse
- Deliver and access
- Evaluate
- Maintain and retire
database full of RLOs that can be reused, linked, and accessed as performance-support or training events presents some challenges compared with the traditional IDS model.

As we have already suggested, a database full of RLOs used by multiple authors and learners, and offering various training courses and delivery solutions, makes simply updating a part of an RLO or deciding to remove the RLO (that is, retire it) from the learner’s view a bit more complex than in the traditional process.

**What Stays the Same**

Even though this stage appears unique to the RLO process, it really is not. Designers are continually faced with the issue of retiring a training program or keeping it going. So, to that extent this stage is not new. In particular, in your current process you probably take the following steps:

- Keep all content and solutions relevant to the learner or performer.
- Keep the training courses or performance solution up-to-date.
- Use evaluation data to help determine maintenance choices.
- Ensure that the job tasks in the solution align with those on the job over time.
- Compare costs of updating with the value of the training.

**What Changes**

When you create a training course or any performance-improvement solution, you include a time component. You likely ask how long that training course will be needed before it becomes obsolete. You decide to continue maintaining the solution or retire it from use. Because traditional training courses are not reused in the direct way they are in an RLO database, your traditional courses can be changed and retired without much concern for dependencies on other solutions or authors. But this is something that you will need to take into consideration when you look at the maintenance and removal of RLOs. Again, how automated this process is and the impact on your RLOs will depend on the tools and database you have in place. The tools drive some aspects of this phase, whereas for others you will want to create guidelines and best practices. With those general ideas in mind, let us
spend some time looking at specific areas you will need to address at this stage of the RLO process.

**Ability to Update Parts Rather Than the Whole**

In the past you may have updated a course by sending out physical pages of a workbook or building a new Web page on what’s new in a course. Then you would notify everyone who had taken the course and incorporate those changes into future rollouts of the course. All this updating will still need to be done. But sophisticated authoring and delivery tools can improve this cycle. The tools may allow your authoring community to send out alerts to other authors who have linked to that RLO. Likewise, the LMS may alert learners that an update has been made to a specific RLO. The learner may then access only the part of the RLO that has changed. This is true in e-learning; instructor-led training still will require an event in time for the update (workshop, virtual meeting, new class).

Your decision about what parts of an RLO to update could be generated by learner feedback and other evaluation data. These data could indicate that additional media options, additional languages, new practice types, or other learning strategies need to be added. For example, you may have a single learning object that consists of a static graphic and simple multiple-choice practice. Although this may have been fine for the initial release of the solution, you now can go back and add a dynamic animated graphic and more robust practice or simulation. And again, ideally the system would automatically alert learners that this update has been made to an RLO they had already accessed.

**Retiring a Learning Object**

It is likely that some of the solutions you are building out of RLOs will become obsolete. At that point you will want to remove the object or make it inaccessible to learners so that they do not access obsolete information, training, or support. If your RLO delivery included e-learning and on-line performance support, the ability to remove the RLO is more complex. A learner may have bookmarked the learning object, used it as a job aid, or downloaded a local version to her computer or personal digital assistant. You goal here should be to make it as easy as possible for learners to have current and relevant information, training, and support. As you shop for RLO tools, keep in mind how alerts of changes will be funneled to learners. This may require you to work with your internal IT group, the RLO tool vendor, and your existing LMS.
An obsolete object will affect any other author who has linked to it for reuse in his or her solution. Your tool and reuse guidelines will need to support notification of the removal of RLOs and their impact on linked RLOs. Will all authors be notified of the object’s retirement? If so, at this point they can accept the change or choose to make a copy of the RLO and maintain it in their course, thereby preventing that RLO from being marked as obsolete in their RLO-based training program. As you can see, there is no simple answer here. Your RLO strategy and authoring tools will come into play as you choose between accepting all retired objects or automatically creating copies of obsolete RLOs in those other solutions. You should also note that the issue is the same for updating or changing linked RLOs and for retiring them.

Cost of Learning Objects
It is possible that some of the learning objects in your solution have internal or external charges for their use. It is also possible that charges for reused objects may change over time, and this may affect how you resell those objects to the learner. Some charges may also be applied to the performer. For example, a static HTML course may be free for the learner to access, but the live hands-on lab using remote equipment might have a fee for its scheduled use. Although this may seem a trivial change compared with others that occur at this stage, the cost of any updates should be included when your project begins. If you find a great number of ongoing costs, include that information in your RLO metadata so that other authors who want to reuse the RLO will be able to budget and plan for those costs in their new solutions.

Reviewing Learner Profiles and Preferences
The decision about which RLOs need updating and which have outlived their utility could be based on reports generated from your RLO delivery system and LMS. If each learner has indicated a media preference, or signs up for one type of RLO over another, then you may have some valuable data to help you make your maintenance decision. You can use these profiles to determine which objects to update, which media elements to add, and where to focus new RLOs and solutions. For example, if you find that no one has a preference for simulations you built into your RLOs, or no one has set French as their language of choice, then you may
want to readjust your future expenditures on simulations and translation, or at least research the gap more fully.

Ideally, user profile information is stored as metadata by the LMS. However, if you need to create requirements for a new LMS, or want to modify your existing LMS to support user profile information, then document this in your RLO strategy. When in doubt, do not assume that this feature will be in your LMS. As with all your system and tool requirements, document them and share them with your internal information technology group and external tool vendors so you will not be surprised during the RLO implementation.

Reports and Utilization Data
Your decision to maintain existing RLOs or retire them may be based in part on usage data that you gathered from your RLO authoring and delivery tools. In other words, the reports you can generate from the ideal RLO delivery system should be valuable decision-making tools. Of course, if you are not using a database of RLOs or do not have the ability to generate reports, then this is a nonissue for you at this stage.

However, you may find it valuable to gather usage reports about RLO access history, media choices, language preferences, or assessment results. Perhaps you can even tie these results back to actual changes in learner job performance. At a minimum, you will want to see if learners are at least viewing an RLO. Maybe it is time to retire one that has not been used in the last six months. As part of your RLO strategy, identify the types of data you want to collect at this stage. Then ensure that your authoring and delivery tools allow you to create those reports.

HOW WILL RLOs AFFECT LEARNING ACTIVITIES?
Few would argue that engaging learners and having them apply skills and knowledge are critical to learning and job transfer. One key method of engaging learners is to create learning activities such as practices, assessments, simulations, roll-plays, or games, to name a few. As you may recall, practices and assessments are part of Level 2 evaluations, which we covered earlier in the chapter. We are returning to this topic here because of the impact of RLOs on the way you determine if learning was successful. Note that what we discuss here should be applied
when you are designing your RLOs. We are covering the subject here to stress its importance in respect to the entire RLO development process.

A word on terminology before we move forward. Many people freely use the terms practice and assessment to mean slightly different things. You may see other terms used to talk about learning activities, such as quiz, simulation, rolle-play, games, activity, and test. To simplify, we use learning activity to refer to any engaging learner activity that checks for knowledge, requires a performance, or is the basis for certification.

What Stays the Same
The goal of including learning activities in your training is the same in traditional ISD and when you build RLOs. In both cases the goal is to ensure that the learner has acquired the knowledge and skills identified in the learning objectives. Therefore, you will notice that many steps stay the same when you switch to RLOs:

• Match practices and assessments to your performance objectives.
• Create practices and assessments that are job-based.
• Provide practices and assessments that are completed in the real world rather than in the training environment.
• Provide learning activities that build on each other in order to ensure mastery.
• Use remediation and feedback to build knowledge and skills.
• Validate the learning activities to ensure they are unbiased, well written, and correctly measure learning.

What Changes
Although you may find a number of tool-specific or business process changes when you switch to RLOs, we would like to highlight three significant areas of change: supporting both classroom and Web-based training, reusing all or parts of learning activities, and offering prescribed solutions. Again, these subjects may not apply to your overall RLO strategy depending on the tools you have in place or your need to support multiple delivery media.
Supporting Classroom and Web-Based Training

Using the same learning activity to support both instructor-led training and Web-based training can be a challenge. Perhaps you are already supporting two delivery environments and have a policy in place on how to engage the learner and build learning activities that work well in both. If this dualism is new to your RLO strategy, then you may find it quite challenging to create learning activities that work effectively.

You will likely need to create a number of authoring guidelines to help your authors craft learning activities that support two delivery media. Or you may decide that you will build separate learning activities for each medium, and share only learning objectives and content across media.

If you do want to share learning activities, then here are some guidelines and tips you may find useful:

- Avoid overusing multiple-choice or multiple-select questions. There is a tendency to overuse these question types because they work well in both environments.
- If you create media-based learning activities for on-line delivery, have your instructors use them in the classroom as well. This can be very effective in computer training environments where each student has a computer in the class. This also leverages costly learning activities such as simulations, spreading the costs of development over multiple delivery media.
- Have the RLO focus on the content, or the knowledge needed to perform a task, and use real-world job activities to support the learning activity. For example, if you are teaching a manufacturing process, perhaps you can teach the process, concepts, and principles either on-line or in a classroom. Then you can have learners go out on the assembly-line floor to gain hands-on practice.
- Measure the learning activity through peer or management review.
- Build learning activities from job-based scenarios. The scenario may be divided into text and a learning activity that builds on the “story” of the scenario. For example, you may create a job-based scenario on handling employee conflicts. The story would start with the conflict, and each question could be part of the resolution. The scenario, because of its structure, could easily be
used by an instructor in the classroom to lead a discussion or small group
activity and be an effective, self-paced learning activity for the on-line learner
as well.

Designing for Reusability
When compared with the content portion of your RLOs, learning activities may
have limited reusability. This is due primarily to the specific nature of learning
activities and the way they are directly tied to the course objectives. But with a lit-
tle thought and planning you can still achieve some level of reuse.

Achieving reusability will require storing the activities in small chunks in the
database. For example, say you are creating training for your salesforce that sells
networking solutions. You create a scenario explaining the computer network
requirements of a potential customer and ask learners to create a sales proposal
based on those requirements. If the scenario and instructions for completing the
proposal are a single object in the database, the reuse potential is very low. So
instead create two objects in the database—one for the scenario and one for the
instructions to create a proposal. Now the scenario can be reused in a training pro-
gram to help engineers design networks based on customer needs.

Offering Prescribed Solutions
Using learning activities to generate prescribed solutions is a powerful feature of
RLOs delivered through an e-learning medium such as the Web. As always, the
power of this feature depends on the systems you have in place for delivery and ac-
cess. With the right system, however, learners will be able to access the learning ac-
tivities before they “see” any of the content or information contained in the
RLO-based lessons. Because each learning activity has associated content (inside
the RLO), the delivery system can keep track of which learning activities were suc-
cessfully completed and which ones the learners failed to complete. Along with feed-
back on how well they did on the individual activities, the system could recommend
RLOs they should look at in order to learn how to succeed at the learning objective.

In other words, the system compares the learning objectives that learners have
mastered with the objectives that they need to review and then prescribes an
e-learning solution to fit their individual needs. In this case, the learning activity
can be loosely compared to an intelligent pretest, where the questions are chosen
based on the responses made by the learner. Ideally, the system will present only the
RLOs that learners must complete, in effect “rearranging” or “restructuring” the default organization that they would see if they skipped the “pretest.”

To make this prescriptive system work, there are two requirements. First, you will need a delivery system that is sophisticated enough to accomplish the task of prescribing RLOs based on learning activity results. As you define your requirements for this feature, work with your internal IT department to help you analyze this aspect of any tool you are considering in order to ensure that any possible dependencies between your LSM, delivery, and authoring tools are addressed. The second requirement is that your RLOs be designed in such a way as to support prescription. Thus, you may have to define rules such as sequence and structure between RLOs, and under which conditions the system can prescribe new structures for learners. For example, if they cannot skip to a new RLO until they master a prior RLO, then the prescription will need to lock out those later RLOs until mastery is achieved.

**CHAPTER REVIEW**

As this chapter made clear, the traditional ISD process changes in numerous ways when you make the switch to RLOs. Fortunately, many aspects of training design remain the same. Specifically, we tried to answer the following questions:

- What is the traditional ISD model?
- What is the impact of linking and reuse?
- How will RLOs affect evaluation?
- How will RLOs affect analysis?
- How will RLOs affect design?
- How will RLOs affect development?
- How will RLOs affect delivery?
- What is the maintain and retire stage?
- How will RLOs affect learning activities?

So what comes next? Well, at this point you are beginning to establish your RLO strategy and you know how RLOs will affect your overall training design process. This means that it is finally time to begin creating, maintaining, and updating RLOs. That is what the next chapter is all about.
RLOs in Action: What Changes Are Needed?

In Chapter Two, NoWaste Goods held a number of meetings to identify the scope and goals of its ideal RLO strategy. It gained general acceptance from each training group and the documentation group. Although there was some concern about the impact of RLOs on the process and tools, the team members agreed that sharing RLOs to meet employee and customer training and information needs would be ideal. As a next step in creating the RLO strategy, each department head and production manager was tasked with looking at the changes needed in his or her current process to use RLOs.

To begin, three pilot projects based on the ideal RLO process were launched using the documentation group’s current Information Mapping templates to format the content. Each pilot team worked with the assumption that full implementation of the ideal RLO strategy was its goal. The project teams used the guidelines and questions presented in this chapter as they completed their pilot projects and documented their findings.

The HR pilot project focused on changes that would be made to the current process when developing the 401k benefits course. This team decided that each part of the course was to be developed as a stand-alone RLO that could be reused and dynamically updated. These RLOs would include 401k enrollment, 401k loans, matching funds, contribution limits, risks, advantages, managing funds, and rollovers. The consulting and retail sales groups’ pilot project focused on changes in the current process, business rules, and development tools when product knowledge and training are leveraged among the customer, retail, and consultant audiences. Finally, the documentation group’s pilot project explored methods of producing both customer marketing documents and product informational Web pages using a single source of information. In addition, the group was looking at the impact dynamic delivery would have on the current version control guidelines.

Through these pilot project efforts, each team reported back to the RLO task force on the impact of the development and delivery process. This report included time lines, deliverables, tools, templates, business rules, guidelines, and so on. The specific areas in the report and some of the notes from it are listed in the following table.
## Process Area Level of Affected Impact Notes and Actions

<table>
<thead>
<tr>
<th>Process Area Affected</th>
<th>Level of Impact</th>
<th>Notes and Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reuse and ownership</td>
<td>High</td>
<td>No process exists for sharing between different authors at this time. Currently two or three RLOs are created for each given product, based on the audience: consulting, retail, or customer. Linking and reusing will help keep versions current and avoid duplication. Moving forward, there are many other places where sharing between groups can occur.</td>
</tr>
</tbody>
</table>
| Evaluation            | Medium          | More data on cost-benefits of RLO strategy are required. Focus of future evaluations needs to be on both the internal and the external audiences (employees and customers).
For customers, evaluate their ease of access to RLOs on the public Web site and their satisfaction with the knowledge and skills of the consultants and the products and solutions they are given.
For employees, evaluate increase in skills, knowledge, and fluency; cross-selling of similar products in retail location; and product development duration.
Other measures will be added as the RLO strategy and implementation plan mature. |
| Analysis              | Medium          | Impact is in the form of communicating with other training groups and the documentation team, then asking those groups for assistance in collecting common needs. In the past, this communication was not done. The need to improve communications between departments will still exist even if the RLO strategy is not implemented. Each group should be asked to contribute to the overall needs analysis for these solutions to ensure that the design will meet the largest needs and is not duplicating analysis and designs under development with other groups. Internal and external audience needs should also be included in the analysis. |

(Continued)
RLO design needs to be authorized by a cross-functional committee to ensure the design is effective in meeting the needs of all training and document audiences. NoWaste’s RLO strategy calls for the possible reuse of all RLOs by other audiences and in multiple delivery media.

RLOs must be designed free of delivery “style” or constraints. To ensure maximum reuse, writing guidelines need to ensure delivery- and audience-neutral language. Transitions between RLOs should be used sparingly as part of critical context elements. Delivery systems must be able to strip these context RLOs from the stand-alone RLOs so they are still usable by multiple audiences.

The greatest impact on development is in the area of RLO-based tools. Training on new tools and what can be achieved using those tools could not be tested during the three pilot projects.

Current tools are geared toward a specific delivery type (documents, Web pages, instructor-led training, print-based job aids, and so on). RLO tools should be able to author all of these into one common database of RLOs. The RLO authoring tool must manage images, multimedia elements, and metadata. Users and groups need to be given levels of access and permission. The tool must enforce business rules and templates between authors. Authors can be located inside or outside the firewall.

These tool requirements will affect development significantly because new skills are required to use the tool. Also, the information technology group will have to configure the tool for NoWaste’s network structure and allow for the templates and guidelines to be created and tested.

The exact impact on time lines is unknown and must be researched along with tool vendors in more detail. A phased implementation and more pilot projects using new tools are advisable.
<table>
<thead>
<tr>
<th>Process Area Affected</th>
<th>Level of Impact</th>
<th>Notes and Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery</td>
<td>Low</td>
<td>Minor impact on actual media options, but systems used to develop and deliver may feel greater impact. NoWaste currently delivers content and training in the form of e-learning, documentation, product information sheets (retail), instructor-led training, and on-the-job coaching. However, some changes to the look and feel of each of these may be required based on tool limitations. More research needs to be done to determine if print documents can be produced from new delivery tools, or if some manual process is needed to go from development to delivery (RLO database into FrameMaker file, for example).</td>
</tr>
<tr>
<td>Maintain and retire</td>
<td>Medium</td>
<td>This stage of the process is expected to be easier once the RLO tools are in place. This assumes the RLO tools are capable of sending change notifications to authors, internal learners, and customers, allowing for dynamic changes or removal of RLOs from the delivery system. Business rules need to be in place to prevent changes without OK from owners of each audience. When NoWaste’s products are removed from inventory or are no longer carried, sales and consulting staffs need to know why that has occurred and be able to suggest replacement products. The original RLOs about the NoWaste product will remain available for internal audiences as an archive of removed products. External customers should not be able to find RLOs for items they can no longer purchase. Instead, the delivery and search systems should point customers to the new products that fit a similar customer need.</td>
</tr>
<tr>
<td>Learning Activities</td>
<td>High</td>
<td>Currently, custom learning activities are created by each training group for each delivery type. Future RLOs should try to be delivery- and audience-neutral. This challenge must be explored in greater detail.</td>
</tr>
</tbody>
</table>

(Continued)
The HR pilot project on 401k benefits did uncover some difficulties in making an engaging e-learning and ILT course using the same exact learning activity. Likewise, consultants, retail staff, and external customers will need different learning activities. Consultants need to be able to compare products with others, match features to customer needs, and propose implementation methods. Customers may get only the product information and not the activities designed for consultants. Some “fun” activities may be placed on the external Web sites to “entertain” customers, but these would not be explicitly designed to teach customers in the way that a sales simulation for consultants would.

As a result of the analysis meetings and pilot projects, NoWaste was able to compare its existing training and documentation process with one based on the emerging RLO strategy. NoWaste can now begin to refine its templates, guidelines, and business rules in order to complete RLOs for both employees and customers. You will read about how NoWaste does this in the next chapter.
Changing Your Design Process Worksheet

Identify how you feel each phase of your current training process will remain the same and what will change when converting to RLOs.

**ANALYSIS**

What stays the same?

What changes?

**DESIGN AND MINE**

What stays the same?

What changes?
DEVELOP, REUSE, AND REPURPOSE

What stays the same?

What changes?

DELIVERY AND ACCESS

What stays the same?

What changes?

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LEARNING ACTIVITIES
What stays the same?

What changes?

EVALUATION
What stays the same?

What changes?

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(Continued)
MAINTAIN AND RETIRE

What stays the same?

What changes?
I
n the last chapter you learned how RLOs may affect your current ISD model for training design, development, and delivery. In this chapter, those same stages are highlighted as we cover creating RLOs to fit multiple training and performance-support objectives. As you read both of these chapters, be sure to continue to refine the RLO strategy you began developing in Chapter Two. You should already know what changes you will need to make to your traditional ISD process, and after completing this chapter, you should have a fair idea of what it takes to build an RLO-based solution.

This chapter focuses on the analysis through delivery stages; these stages are broken down into smaller steps for you to follow. We do not spend as much time on the evaluation or the maintain and retire stages because the actual development of evaluation tools and your course update tasks are similar to a traditional approach. Also, the subject of incorporating metadata into the RLOs at each stage is not covered here but it will be covered in the next chapter.

In brief, this chapter examines the following questions:

• How flexible is your RLO strategy?
• How do you analyze RLO solutions?
• How do you design RLO solutions?
• How do you develop RLO solutions?
• How do you deliver RLOs?
• How do you evaluate RLOs?
• How do you maintain and retire RLOs?

Note that the steps and checklists for each stage are based on the assumption that you have implemented database-oriented RLO tools that support each stage from analysis through delivery. Often we focus on what a tool and supporting network system should allow you to do in the creation of your RLOs. In reality, a blending of these ideal tools and traditional tools are used in any development project. With that in mind, if you are using more traditional tools—such as MS Word without a database—then some of the suggested steps in this chapter may not be applicable.

One more word of caution before diving into the topic of RLO creation: as we stated in Chapter One, RLOs are not a cure-all. They cannot rescue your current training programs if they were not designed based on sound instructional design and performance improvement processes. This is similar to when computer-based training (CBT) first broke onto the scene. Too many people expected the medium to revolutionize their training. It became painfully obvious that poorly designed instructor-led training programs were just as ineffective when they were converted to CBT. So remember, if you have existing ILT materials, simply converting them to RLOs will not ensure effective training if they were not well designed in the first place.

HOW FLEXIBLE IS YOUR RLO STRATEGY?

One of the more important questions to consider as you begin to create RLOs is this: How flexible is your strategy? This is especially important if you are currently developing your RLO strategy and putting it into use for the first time. Parts of your strategy may sound just fine when you are creating them but may look less appealing, applicable, or enforceable when placed into action.

Situations that may cause you to change your RLO strategy are numerous. For example, your original strategy may have focused on instructor-led training, but the first project you attempt will be delivered on-line. Or perhaps you decided not to include PDAs in your delivery strategy because they were not used in your
organization, and then a simple policy shift came along and required all salespeople to use PDAs in planning on-site visits. Or your RLO strategy may be focused on training, but the first project needs to blend training, print-based manuals, and on-line references together. Because all three of these solutions can be built using RLOs, you decide to adapt your strategy.

The hard part is walking the fine line between a flexible yet consistent RLO strategy. At Cisco Systems, for example, flexibility has been key to an RLO strategy that has grown with the needs of the company’s employees and customers. Although Cisco defined templates for lessons and topics that are constructed out of RLOs, it also acknowledged other RLO structures by building tools and systems to support other delivery types and instructional models. Cisco is adding new elements to its RLO strategy to support problem-based learning, guided discovery, and transfer of information via networked video, to name but a few add-ons. If you keep this type of flexibility in mind at each stage of the ISD process described here, it will help you develop a viable strategy rather than one that is doomed to the same problems that occur with large, monolithic course design and development.

HOW DO YOU ANALYZE RLO SOLUTIONS?

During analysis you explore all the factors that affect the performance gap of your target audience, you identify the desired performance, and you use that information to select the best solution. In Chapter Three we asked the question: How can we improve performance, and is training part of that solution? Now we modify the scope of the question to match the scope of the RLO strategy. If you plan to use RLOs to create nontraining performance solutions as well, the question becomes: How can we improve performance, and are RLOs part of that solution?

By expanding the analysis stage we can see the detailed steps as shown in Figure 4.1. These are obviously not all of the steps involved in analysis but instead a synopsis of those specific to RLOs. After reviewing each of these steps, this section ends with a checklist that you can use to determine if you are ready to move from the analysis stage to the design and mine stage.

Determine If RLOs Are Part of the Solution

Under a more traditional ISD model, trainers are primarily interested in whether the analysis phase indicated training as part of the performance solution. Other
performance improvement solutions are left up to other groups in the organization. RLOs change that outlook because they can be applied to such a variety of solutions. Now the group or groups conducting the analysis must look at a much broader picture. Now being examined are all the aspects of performance improvement—including training—that will be supported by RLOs. We will discuss the impact in more detail a little later in this chapter.

Once again we address the flexibility of your RLO strategy. If your strategy calls for using RLOs strictly for training, you may not care that the overall solution also requires an on-line reference. However, by adjusting your strategy you may be able to reuse some of the RLOs for both the training and on-line reference portions of the overall solution.

**Complete the Target Audience Analysis**

As you know, the ideal method of audience analysis is to look at who will use your performance solution—who needs the training, coaching, incentive, or performance-support tool. Once you determine that RLOs are going to solve
the performance need, you can start looking at audience needs, such as location, size, demographics, media requirements, learning skills, barriers, motivation, and perceptions.

However, remember that more than one audience may use the RLOs after they are completed. If possible, anticipate those future audiences, or secondary audiences, and determine if they too have needs that can be met through the RLOs aimed at the primary audience.

For example, perhaps your audience needs video-based RLOs delivered to the desktop with English narration. But then you discover that a secondary audience may use the RLOs if they are easy to translate into that native language, indicating a possible cost savings for the business (and requiring flexibility in your RLO strategy). In another example, an employee who works at a desk may require a performance-support tool to help him learn to apply employee-conflict skills while answering phone calls, but that same employee-conflict RLO also needs to be a job aid posted on the manufacturing floor for the assembly workers. In both of these examples, your primary and secondary and even future audiences should be considered as much as possible during the target audience analysis.

**Complete the Job-Task Analysis**

You can probably continue to use the same job-task analysis process that you use today, as long as it is performance-based. The change occurs in the scope and level of detail needed. You now need to complete a job-task analysis on every job (and audience) that will use the resulting collection of RLOs.

Recall the example of the employee-conflict RLOs that can support both the employee working in the call center (primary audience) and the assembly worker (secondary audience). In this case, you should analyze what job tasks both groups are performing. If you do not, the RLOs delivered may succeed with the call center audience but fail with the assembly worker audience, or vice versa. Completing a job-task analysis for each not only will increase the chances for success but, as you will see in the next section, will increase the opportunities for reusing and repurposing RLOs.

The level of detail in your job-task analysis will be driven partially by your overall RLO strategy. In an attempt to make solutions consistent you may include information in your strategy on how job tasks should be broken down and
to what level. In order to create as many reusable learning objects as possible, everyone in the organization must be consistent in the level of detail of their job-task analysis.

As you can imagine, this is another area where flexibility is needed. It is not as important for everyone to follow the exact same process for completing a job-task analysis as it is for everyone to agree on the amount of detail they will collect on primary and secondary audiences when building RLO solutions.

**Choose the Task-Level Content for Each RLO Solution**

Once you complete the job-task analysis you are ready to select the content, at task level, that will be included with each RLO-based solution. As you decide what tasks to include in the various RLO solutions you should also complete the following actions. (*Note: These actions are different from mining for existing RLOs, which we will address later in this chapter.*)

- **Identify any content that is the same for all solutions, audiences, and delivery modes.** This content is an ideal candidate for reuse. As with reuse generally, if you find content in your job-task analysis that will work for multiple audiences, multiple delivery types, or other solutions, it will minimize design and development time, from authoring through editing.

- **Identify any content that is similar, but not quite identical, for all solutions.** This content is a good candidate for repurposing. The trick here is to determine that what is going to change is enough to justify creating an entirely new RLO rather than simply reusing it. Keep in mind that, with each repurposed RLO, you will end up with two very similar results in the database. Depending on the level of your repurposing, however, you should see a reduction in design and development time.

- **Identify any content that is repeated in creating a structured learning environment, such as a directive architecture.** Although it may seem strange to repeat content in the same course or solution, you may find that structural elements such as summaries, overviews, processes, definitions, or diagrams are repeated in a very directive learning environment. For e-learning you may have more of these reused objects to ensure that all learners will “run into them” during the self-guided learning process and will not get lost in a directive training hierarchy.
Here is an example of how Redwood Credit Union (RCU) chose its task-level content for each RLO. The overall goal of the needs assessment at this company was to improve the efficiency of its credit union tellers. The RLO-based portions of the overall solution include ILT, print-based manuals, and an on-line reference system. Figure 4.2 displays some of the tasks selected for these various solutions. Notice how RCU began looking at reuse and repurposing during the job-task analysis process. At this point, however, RCU only found potential for reuse. (You will see later in the chapter that RCU also found potential for repurposing.)

The RCU example shows how there is reuse across the same job-task analysis for two separate delivery types or delivery solutions. It is logical that this level of reuse should occur when you realize that basic information about checks is likely to have widespread salience in a banking environment. Other content at Redwood Credit Union may not enjoy that level of reuse—policies and procedures that are designed for branch managers, for example.

The level of reuse and repurposing for each RLO you design will vary, in most cases from project to project. But this does not mean you can skip this step. Mapping out potential RLOs for reuse and repurposing during a job-task analysis is a good way to maximize your time by minimizing the number of RLOs you need to build.

**Figure 4.2. Sample Job-Task Analysis Showing Reuse**

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cashing checks ——— Reuse ——— Cashing checks</td>
<td>Checks from other institutions</td>
</tr>
<tr>
<td>Checks from other institutions</td>
<td>“On us” checks for members</td>
</tr>
<tr>
<td>“On us” checks for members</td>
<td>“On us” checks for members</td>
</tr>
<tr>
<td>Third-party checks</td>
<td>Third-party checks</td>
</tr>
<tr>
<td>“On us” checks for nonmembers</td>
<td>“On us” checks for nonmembers</td>
</tr>
<tr>
<td>Processing deposits ——— Reuse ——— Processing deposits</td>
<td>Check deposits</td>
</tr>
<tr>
<td>Check deposits</td>
<td>Check deposits</td>
</tr>
<tr>
<td>Cash deposits</td>
<td>Cash deposits</td>
</tr>
</tbody>
</table>
Break Down the Content of Each RLO

Once you identify the required task for each RLO in the solution, you will have to break down each task to identify the supporting content. One of the easiest ways to do this is by following content templates such as those used at Cisco Systems and Redwood Credit Union. In sum, they classified content into one of five categories: concept, fact, principle, procedure, or process (CFP3). The CFP3 model also provides guidelines for building practices and assessments for each classification, or more specifically, for the concept, fact, principle, process, or procedure that makes up the RLO.

The CFP3 model not only works well in creating training and other performance solutions (it is being used very effectively with traditional training courses, print-based manuals, and on-line references by organizations around the world) but also fits nicely into the RLO structure. In fact, some organizations are converting their current free-form designs to the structure of the CFP3 model as an introductory step to having the full range of database-driven RLO-based authoring tools.

Looking again at the Redwood Credit Union example on checks, you can see how CFP3 is applied. Figure 4.3 shows how the original RCU job tasks are applied to the model. Redwood Credit Union can now identify areas of reuse and repurposing down to the component level for each task. CFP3 indicates to authors later in the development process what elements they will need to include to teach learning objectives that are concepts, facts, processes, principles, or procedures. In the RCU example, identifying the CFP3s at this point helps to scope the project, ensure that the course is not concept-heavy, and ensure that each lesson requires the learner to do something back on the job, usually employ a principle or a procedure. For more information on CFP3 and the content-performance matrix, see again Chapter Two and the book *Developing Technical Training* (Clark, 1999).

Ready to Move On?

Now that you have examined the specific RLO steps inside the analysis stage, look back at your RLO strategy and determine if you have accounted for them. When you begin producing your RLO-based training and performance solutions, be sure that you have indeed taken these steps, along with any of your current best practices for analysis, before moving on to the design stage. Specifically, you should be able to answer yes to the items shown on the checklist in Table 4.1.
Figure 4.3. Sample Job-Task Analysis Showing Reuse and Repurposing

Table 4.1. Analysis Checklist

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>RLOs are part of the solution, and therefore the RLO-based ISD process should continue.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>Target audience analysis is completed, and any secondary audience analysis has been included.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The task for each RLO is identified using a formal job-task analysis.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Each RLO is classified with task-level content, such as concept, fact, principle, process, and procedure.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The content for each RLO in the job-task hierarchy is broken down based on the prior steps in this stage.</td>
</tr>
</tbody>
</table>
HOW DO YOU DESIGN RLO SOLUTIONS?

By now you have determined that RLOs can be created to solve your needs. You have completed your analysis checklist and are ready to proceed with the design of your RLO-based solution. As you learned in Chapter Three, designing RLOs includes mining, or leveraging, existing RLOs that you have in your database. Although mining is an important addition to this stage of the process, it is not the only new step added to the design checklist. Figure 4.4 identifies each of the steps that are covered here as we lead you through the design of your RLOs.

Determine the Learning Architecture

Although RLOs can be reformatted or repurposed to support any learning architecture, it is helpful to identify the primary approach you plan to use in your final deliverable. As we have already seen, Clark has defined four learning architectures: receptive, directive, guided-discovery, and exploratory (Clark,
1999). If your architecture is going to be directive, then perhaps your practice types, media selection, and delivery choices will reflect the limitations of that architecture. In contrast, if you feel a guided-discovery architecture is more suited to the needs of your RLO-based solution, then you will need to design practices and content resources that are appropriate. Again, you may choose to do both, in which case your final design document should reflect that decision and how it affects your authoring tools, delivery requirements, media, performance, and delivery needs.

Create Learning Objectives
You can use any of the classic models for actually writing your learning objectives (see, for example, Mager, 1997, and Gagné, Briggs, and Wagner, 1992). However, there are some RLO implications. Specifically, we will discuss these two issues: level of learning objectives, and classifying learning objectives.

Level of Learning Objectives
As you may recall from our working definition, RLOs are designed to accomplish a single learning objective by combining a series of elements that include content, media, and interactivity. So RLOs are based on a single learning objective. But at what level is that objective written? The answer is the task level (sometimes referred to as a terminal objective).

An example from Redwood Credit union shows how this can be done. Figure 4.5 illustrates how job tasks, learning objectives, and RLOs are connected. As you can see, the job task in this example, “Cashing checks from other institutions,” is used to build the RLO called “How to cash non-RCU checks.” This is tied to the learning objective for that RLO: “Given numerous checks written from other financial institutions, cash each check with no errors.”

**Figure 4.5. Job Tasks, Learning Objectives, and RLOs**

<table>
<thead>
<tr>
<th>Job task</th>
<th>RLO lesson</th>
<th>Learning objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cashing checks from other</td>
<td>How to cash</td>
<td>Given numerous checks written from other financial institutions, cash each check with no errors.</td>
</tr>
<tr>
<td>institutions</td>
<td>non-RCU checks</td>
<td></td>
</tr>
</tbody>
</table>

Creating Your Learning Objects
Classifying Objectives

Although you may choose to skip this step, it can be helpful to classify your learning objectives. By classifying your learning objectives you have a controlled vocabulary of metadata for authors and learners to use in locating RLOs to meet their needs. If you decide to apply the CFP3 model, then this model comes with a “ready-made” classification of use-level objectives, or recall-level objectives for each concept, fact, process, principle, and procedure in your RLO-based solution. A recall-level objective simply asks your learners to recall or recognize content, but not actually do anything with that information back on the job. Objectives developed at use level include activities that range from application through evaluation. These require learners to do something, from completing a procedure to evaluating a problem and proposing a solution.

In applying Ruth Clark’s performance matrix, two levels of learning objectives are used: use and recall. This is similar to Bloom’s taxonomy, which calls for six levels of classification for each learning objective, from the lowest level of simple knowledge to the higher cognitive skill of evaluation. Table 4.2 compares the two classification schemes and shows where they align.

You could decide to use more learner-centered classification schemes and terminology such as background, how to, what is it? and so on. Likewise, you could combine CFP3 and Bloom’s taxonomy with a verb list, so that you spell out each learning objective as a string, such as [CFP3] + [Bloom] + [action verbs]. It is

<table>
<thead>
<tr>
<th>Table 4.2. Comparison of Classification Schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Matrix</strong></td>
</tr>
<tr>
<td>Recall</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Use</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
beyond the scope of this chapter to debate which classification is more robust and results in more focused learning objectives, and more importantly, learning outcomes. Identifying the level of an objective helps the author aim the content, practices, and assessments at the proper cognitive level, but it can also help learners find what they need when the RLOs are stored as metadata.

Looking again at our banking example, we find a learner looking for RLOs, or lessons, that list the steps he needs to follow in order to process a check. In other words, he is looking for a procedure RLO at the use level. He wants to learn how to do the procedure, not simply remember the steps. If that learner goes to the delivery system and completes a search for RLOs with content on checks, he would likely get a long list of RLOs that contain that keyword. But by applying the CFP3 classification as metadata, the learner can now search for procedural RLOs (based on the metadata tag *procedure*). Furthermore, he could search for procedural RLOs that have use-level practices, implying that there is a hands-on practice in the training or that the RLO is based on a higher cognitive learning objective than a procedure with a simple remember-level objective and practice.

The search tool could support a multilayer search that allows entering the subject of “checks” combined with a “how to do it” (procedure) together with the criteria of “use.” The term “use” could be replaced for the learner with phrases like “do it . . .” or “let me try . . .” Or, you may have all your procedures built to the use level and therefore not need this extra layer of search. More detailed searching obviously helps learners locate the best possible RLOs to fit their content and performance needs.

Design Learning Activities

There are endless methods to engage learners through learning activities. It is beyond the scope of this chapter to address all the types of learning activities available when building RLOs. In Chapter Three we discussed the various learning activity issues and how implementing RLOs affects training. One point to reiterate here concerns multiple outputs. In traditional training design you are frequently concerned only with a single delivery source, such as instructor-led training or e-learning. With RLOs the same source materials (audio, text, graphics, video, interactions, and so on) can be used in either medium. Your challenge
in designing learning activities is making one activity work well in multiple media or seeing if you need to create separate learning activities.

Unfortunately, there is no rule for creating mult-delivery learning activities. For example, multiple-choice activities work equally well in many delivery environments. Computer simulations do too, assuming the ILT classroom is computer-enabled. In contrast, activities like discussions, role-plays, and actual job performance do not work on-line in e-learning as they would in an ILT classroom.

This is not an invitation to limit your learning activities to those you can easily leverage in different delivery environments. Recall that in earlier chapters we mentioned that learning activities might be one of your least reusable items. As a result, you may need to create specific learning activities for each medium used to deliver the training.

Again, flexibility in your RLO strategy is important. You do not want a strategy that limits authors’ and designers’ ability to create the best type of learning activities. Make it a goal never to sacrifice learning in the interest of improved reusability.

**Determine Delivery Options**

When you created your overall RLO strategy, it was focused on the types of delivery needed to meet the needs of your audience. Although an RLO strategy may allow for every type of delivery media, this does not mean that every training solution needs to be delivered in all those possible media types. Instead, make sure your RLO strategy has the flexibility to allow designers to make that call for each RLO they develop.

The same holds true for static versus dynamic delivery (discussed in Chapter Two). Just because your RLO strategy allows dynamic delivery, that does not mean that you will choose it every time. There may be legitimate reasons why learners need to complete training at a given moment, such as in a live ILT classroom where the same message, the same role-play, is critical for getting the learning objective across.

The process of media selection is no different with RLOs than with more traditionally built training programs. You must look at each RLO and content element inside it to determine the best media to convey that content, to meet that learning objective. You need to continue to identify the text, graphics, video, and so on, necessary to build the RLO based on the needs of your learner, delivery medium choice, and project constraints (such as budget and time).
So how do the media elements come together during delivery? This question should be answered in your RLO strategy. If your strategy calls for storing each media element in the database, then they can all be automatically included in the output for delivery. If media elements other than text—such as video, graphics, animations, and so on—will not reside in the database, then you will need a plan for dropping them into the output prior to the final delivery. We believe the more successful approach is maintaining all media in the same database. This is easily accomplished with many of the database-oriented RLO authoring tools, or by using a specialized media repository that is linked to the RLO authoring tool. The better the integration between systems, the more benefits you will find in both authoring and delivery.

Again, do not forget metadata. If your media elements will be stored in the database, then they have the potential for reuse and therefore need to be catalogued with some type of metadata to facilitate searching and perhaps automatic media selection (high versus low resolution, for example). Enabling these capabilities requires consistent, valid, and meaningful metadata. (Again, Chapter Five provides details on metadata.)

With the flexibility of delivery options in mind, and the need to focus your RLOs on the best media for the target audience, here are three delivery media that may require some additional decisions on your part as you design your RLOs and create your strategy.

Printed Manuals
The primary structure for printed manuals remains the chapter format. Each printed manual is broken down into a series of chapters. You can easily continue to use this structure with RLOs. You can also apply other techniques, like grouping chapters into sections and dividing chapters into topics. You may use different terminology, but we hope you get the point. Your RLO strategy should allow you to structure your printed manuals any way you want.

Once again, flexibility enters the scene. Your overall RLO structure should be flexible enough to allow different entities in the organization to apply different structures if necessary. Agreeing on what the smallest chunk size will be and building everything up from that point will provide that flexibility.

On-Line References
On-line references provide many more structural options than printed manuals. You may choose to structure these RLOs as on-line manuals, on-line help, frequently
asked questions (FAQs), or any combination. As with printed manuals, if everyone follows the RLO strategy and agrees on the smallest chunk size, all of these structures are possible with RLOs.

**Blended Solutions**

This section of the chapter would not be complete without a few words on blended solutions. In Chapter One we introduced the idea of blended solutions: programs that combine multiple elements, such as classroom training, on-line reading, and on-the-job performance for practice and assessment. By their very nature (format-free, small chunks, and so on) RLOs are ideal for supporting blended solutions.

The trick to building blended solutions is effectively using RLOs in combination with non-RLO-based delivery methods. You may need to accept that, in some cases, an RLO in your database does not support all assigned reading tasks (such as textbooks), virtual classroom presentations, and on-the-job training. In other cases, RLOs may be a perfect match. The challenge of designing effective blended learning is the same with or without RLOs. As with any training or performance solution, start with your analysis and objectives before jumping into delivery options.

**Create a Design Document**

Every training course should have a high-level design document. One of the primary purposes of such a document is to record the various decisions made during the design process. It also provides a blueprint for the next stage, when you begin to develop the RLOs. The design document can serve as a communication tool for all designers, media creation specialists, subject matter experts, and management. Finally, the design document allows stakeholders to sign off on each deliverable and ensures that everyone on the project is on the same page before the project moves on to the development stage, when resources are finalized.

The size of your organization and the number of people involved in the project drive the amount of detail contained in the design document. At a minimum, however, consider covering the following categories:

- Its overall purpose
- A list of authors
- Date and version number of each revision
- A list of reviewers
At Cisco, there is a very formal method for capturing the information and metadata contained in its design documents. This makes it possible to move easily from design to development, and to have multiple groups work on design and development as needed. Redwood Credit Union also uses a detailed design document that contains similar categories to those outlined here, although it is not as formal as the Cisco model because the organization is smaller, with only a few authors. Both companies, however, include enough information about the proposed RLO-based training solution to gain project approval and move on to the development phase.

**Mine the Database**

You are now ready to start looking for existing content. For many of you this is the ultimate goal: mining for existing content (RLOs) so that you do not have to create all new content from scratch. At this point in the design process you have already identified some reuse and repurposing possibilities. It is likely that your job-task analysis pointed out some possible areas for reuse. Now it is time to search the database to see if there are existing RLOs that support your learning objectives and can either be exactly reused or copied and repurposed.
Recall the Redwood Credit Union check-cashing example from earlier in this chapter. At this point, RCU has completed its design document, which lists all RLOs that need to be included in its training solution. Based on this RLO outline—or menu, if you prefer—the designers can search through the database to find a match. Figure 4.6 shows that RCU found elements of existing RLOs that could be reused or repurposed. It was able to reuse two elements of an existing e-learning course dealing with check fraud, and it was also able to repurpose an RLO element on IDs from an existing print-based manual on new accounts.

The RLO elements on types of checks, what are negotiable checks, and what is an acceptable ID were already slated for significant reuse and repurposing from the job-task analysis. Note the time savings that RCU has realized from doing this mining up front during the design phase. Based on just the short section shown in Figure 4.6, RCU reduced the time for development of new content by as much as a third.

Your ability to find existing content will rely on two significant factors. The first is how well you addressed the areas of reuse and repurposing in your strategy. If you did not establish these as primary goals, then you may discover your systems do not easily support them.

The second factor is how well authors are applying metadata. Your strategy could be full of wonderful guidelines for applying consistent metadata to reach the ultimate

![Figure 4.6. Mining for Existing Objects](image-url)
goal of maximum reuse. But if authors are not following the strategy and appropriately tagging RLOs with metadata, this portion of your strategy may fall apart quickly.

Before you finalize the mining stage, be sure to document your findings in the design document. In fact, you may want to wait until you have completed your RLO mining process before getting sign-off from stakeholders on the proposed design. After all, they are likely to have a vested interest in the amount of reuse you find, and the amount of new or repurposed RLOs you will need to create. As we noted in Chapter Three, a high level of reuse can result in the funding of more costly simulations or guided discovery. The bottom line is that reuse should be part of your design document because it is important to have captured this research as you move forward into development.

**Ready to Move On?**

Now that you have completed the specific RLO steps inside the design and mine stage, look back once again at your own RLO strategy and determine if you have accounted for each of the steps that we have identified. Specifically, you should be able to answer yes to the statements in the checklist shown in Table 4.3.

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>The design includes a description of the primary learning approach best suited for this RLO (receptive, directive, guided-discovery, or exploratory).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>The learning objectives are associated with the RLOs at the proper level of the hierarchy.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The learning activities are designed and documented in a way that makes their development requirements clear.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Any needed media have been identified and described for each RLO.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The database of existing RLOs has been mined for possible reuse or modification (repurposing).</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The design document is complete, with enough delivery, content, audience, and metadata information to make development of each RLO possible.</td>
</tr>
</tbody>
</table>
HOW DO YOU DEVELOP RLO SOLUTIONS?

At this point, the content, learning activities, and all the supporting media are designed and waiting to be created. The creation process may involve the services of a large team of specialists or rely on a single person. Likewise, the creation of RLOs may employ a unified RLO authoring tool or a group of traditional tools that produce elements that are collected and assembled using the RLO authoring tools. Figure 4.7 lists the steps that you will likely need to take when developing RLO-based training or performance-support solutions. Keep in mind that there may be other steps that you will take depending on the size of your development staff, your tool choices, and your delivery media needs. It is beyond the scope of this chapter to create a cookbook for developing training; we are simply highlighting RLO-specific steps.

**Reuse, Repurpose, and Create RLOs**

It is finally time to start combining, editing, and creating the series of RLOs that will result in a deliverable solution for your learner: a course, a lesson, a simulation,

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**Figure 4.7. Expanded Development Stage**

```
<table>
<thead>
<tr>
<th>Analyze</th>
<th>Reuse, repurpose, and create RLOs as necessary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and mine</td>
<td>Create learning activities.</td>
</tr>
<tr>
<td>Develop, repurpose, and reuse</td>
<td>Create media.</td>
</tr>
<tr>
<td>Deliver and access</td>
<td>Build support for learning architectures.</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Add context as necessary.</td>
</tr>
<tr>
<td>Maintain and retire</td>
<td>Update or add metadata.</td>
</tr>
</tbody>
</table>
```
case study, ILT, virtual class, document, job aid, performance support tool, and so on. The actions you take to develop RLOs are limited in two ways. The first is your overall RLO strategy, which defines what RLOs in your database are available for reuse or repurposing. Your RLO strategy should have documented the business rules on ownership, change notification, and tools needed to support the development stage.

The second constraint is the blueprint that you created with the design document. As you recall, the design document contains information on the learning architecture, learning objectives, media types, delivery types, and target audience, to name but a few. During development you should rely on your design document, and if needed, update or modify your design.

The specific steps you take to move from the design document to developed RLOs are presented here. Of course, the complexity of each depends on the size and scope of your project, the RLO authoring tools you have in place, and the business rules you have established.

- **Establish links to the RLOs and other elements you want to reuse.** This could be down to the media level, depending on your RLO strategy. You identified these links during the job-task analysis and mining stages.

- **Copy and edit any RLOs you intend to repurpose.** The RLOs and content elements for repurposing were also identified during your job-task analysis and mining stages.

- **Create any RLOs or other media elements that were not available for reuse or repurposing.** In other words, create all of the remaining content that was not reused or repurposed.

There is one more topic to consider before moving on. In some cases you may consider editing an original RLO and then reusing it instead of repurposing the existing RLO. For example, say you created an RLO for the Redwood Credit Union check example. Months later on a different project you decide to repurpose that RLO on check cashing. At this point it may be worth considering editing the original RLO you created if that allows you to reuse it in your current project. Of course, you must ensure that editing the original check-cashing RLO does not interfere with others who also reuse it. An explanation of when you can and cannot modify an RLO should have been captured in your RLO strategy. Reuse is an ideal...
situation, and the issues of changes, ownership, and number of similar RLOs all affect the development of your RLOs.

Create Learning Activities
As you develop the training portion of your RLO solutions you will also create the learning activities that were selected during the design stage. Depending on your RLO strategy these activities can be generated and stored in the database using your selected authoring system. Or in the case of media-based activities, such as video, graphics, or animation, activities will be created using the most appropriate tool and the result can be stored in the database.

As you create your learning activities do not forget about reusing and repurposing existing elements. You may find that a video clip created to present material in one course works perfectly as a case study in another. All you need to do is add the questions or activity instructions.

Create Media
The rich media elements that you include in your training programs today will likely be created in the same way for RLOs. For example, if you have graphics in your RLOs, then your graphic artist may use Adobe Photoshop to create the images and then export those as JPEG or GIF images for you to use in the RLO. The graphic artist may also develop multiple resolutions of that image to support the various output media you specified in your design document. You may need a high-resolution image for print and a low-bandwidth option for Web-based training. Again, which media tools to use and the various delivery requirements were captured in your design document, so they should not come as a surprise here.

One tip: you may want to store both the source media and the deliverable media in the RLO database. For example, the source Adobe Photoshop image may be stored in the RLO database so that it can be updated or repurposed in the future. If media are stored in a separate media repository, then you may want a metadata link to that source file. This is especially true with scripted audio clips that you may put in your RLOs. The actual script is likely to be written in a document and stored elsewhere. However, that script could be useful for translation or used to display a textual version of the audio for the hearing-impaired or nonnative speakers, or in various delivery media.
The important point is that your RLO authoring tool, media databases, and IT infrastructures should support the impact of equivalent objects and source files. Again, this all should be captured in your RLO strategy—not discovered during the development of your first RLO.

**Build Support for Learning Architectures**

During the design phase you identified a learning architecture that would support your learning objectives. We are focusing on the four architectures defined by Ruth Clark—receptive, directive, guided discovery, and exploratory—in this book, although other architectures or a blend of architectures may be used in your RLO development. What is important is that the architecture you proposed in your design be developed here. The amount of effort required to develop an RLO for a given architecture depends on your authoring tools and the complexity of your learning objectives. It is possible, however, that a given RLO can be leveraged across all four learning architectures, either as a referenced RLO inside a simulation (guided discovery) or as a primary lesson in a more traditional course (directive), for example.

**Create Context**

As you may recall, part of our working definition of RLOs is that they are self-contained, allowing each RLO and each element inside the RLO to stand alone. This is an ideal state, and it may seem to ignore a key tenet of good instructional design and learning architecture: that learners need context in order to apply new knowledge and skills to their work environment. Creating stand-alone RLOs does increase the ability to reuse them in multiple learning architectures and multiple delivery media. However, stand-alone RLOs can result in training, manuals, or on-line references that appear “choppy” to learners when they are strung together by multiple authors creating them over time. To solve this problem, your RLO strategy should support RLOs that are context-specific.

In most directive learning architectures, whether they are instructor-led or on-line, numerous introductions and summaries are embedded in the course hierarchy. You may have an overall course introduction and final summary. Typically, introductions and summaries are created for each lesson, module, or chapter. These elements provide context. You can still use these contextual elements in your RLO-based solutions. Although those context RLOs are helpful, they
become the least reusable objects in your RLO database. However, those smaller RLOs that make up the lessons—such as an example, definition, procedure, or illustration—can be reused more easily once you have allowed for the context-specific RLOs that wrap around them.

The RLO strategy at Redwood Credit Union calls for an introduction and summary for the entire course as well as for each lesson. Individual topics may also include an introduction if it is necessary to help the flow of the course content. These introductions and summaries are stored in the database and combined with all other elements when the course is generated for delivery.

Figure 4.8 shows the addition of context to our Redwood Credit Union check-cashing example. The concept, fact, and procedure each has a short introduction. Because they are specific to this lesson, the introductions make each RLO less reusable. But looking specifically at the concept—What are negotiable checks?—everything after that introduction is still great for reuse. This includes the definition, example, non-example, and learning activities. Since they are lesson-neutral and can be reused in any lesson (RLO).

Although the Redwood Credit Union example is based on a directive architecture, it could also be used in a guided-discovery architecture. In this case, the small reusable parts of the lesson, such as the procedure and guidelines, could be built into a job-based simulation or a live role-play carried out at the local branch. The

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**Figure 4.8. RLO Outline Showing Context**

<table>
<thead>
<tr>
<th>RLO Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cashing checks</td>
</tr>
<tr>
<td>How to cash non-RCU checks</td>
</tr>
<tr>
<td><strong>Lesson Introduction</strong></td>
</tr>
<tr>
<td>What are negotiable checks?—Concept</td>
</tr>
<tr>
<td>Teller limits for cashing checks—Facts <em>with introduction</em></td>
</tr>
<tr>
<td>Types of checks—Facts <em>with introduction</em></td>
</tr>
<tr>
<td>What is acceptable ID?—Concept</td>
</tr>
<tr>
<td>How to cash checks?—Procedure <em>with introduction</em></td>
</tr>
<tr>
<td><strong>Lesson Review</strong></td>
</tr>
</tbody>
</table>
context is established through the scenario and job environment built into the simulation. Context at the actual branch may include a student acting as a customer, walking up to a teller to cash a check. In either case, the RLO that is the same contains the procedure and the principles applied by the teller when cashing the check. The larger container that provides context would be the guided-discovery learning architecture being used in the training.

**Update or Add Metadata**

In every step of the development process, some type of information about the RLO could have been captured. This includes changes made to repurposed learning objects, review comments from alpha and beta tests, media types, primary audience, and learning objective, to name but a few. Again, the specific metadata you may include in development, and its overall impact on your RLO strategy, will be discussed in Chapter Five. At this point, simply recognize that development is not complete until every RLO has correct, valid, and meaningful metadata.

**Ready to Move On?**

Look at your RLO strategy and determine if you have accounted for each of the steps that were identified in the development stage of the ISD process. Before moving on to delivery, you should be able to answer yes to the statements in Table 4.4.

**HOW DO YOU DELIVER RLOs?**

Once you have completed your development, you can make the training or performance solution available to learners. Depending on how you defined your delivery options in your RLO strategy you may roll out the RLOs as an instructor-led class, a series of Web pages for self-paced learning, or in a blended approach using on-line mentors, communities of practice, and live workshops back at a traditional classroom. Again, this is all based on your RLO strategy.

When compared with the traditional delivery stage, the RLO-specific delivery stage combines the idea that RLOs are accessed as part of their delivery (see Figure 4.9). Although access is part of delivery it is called out as a separate item because learners can find and use RLOs in far more creative ways than they can with traditional training events. They may access them as part of a performance-support system, and they may do that today or at any sporadic time interval based
<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Consistent, granular-accurate, and meaningful content that supports the learning objective for each RLO has been created.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>RLOs that can be reused have been leveraged. Any notification that the RLO is being reused has been made in the system so that changes made to the original RLO are sent to the author.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>RLOs that can be repurposed or modified have been leveraged by applying guidelines that state the amount of change that justifies the cost of creating a similar RLO in the database.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Engaging learning activities have been created for each learning objective. The activities are connected to the RLOs they support, and they are at the proper cognitive level (that is, use or recall or Bloom's taxonomy).</td>
</tr>
<tr>
<td>Yes/No</td>
<td>All the media have been created in their source tools and imported or connected to the RLOs stored in the authoring and assembly database.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Equivalent RLOs, including learning activities and media, have been developed for delivery-dependent constraints (that is, print, classroom, e-learning).</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Support for learning architectures is built into either the RLO or the application that will deliver the RLOs as receptive, directive, guided-discovery, or exploratory solutions. (This may require simulators or other authoring tools that reference RLOs stored on the database.)</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The proper mix of context versus reuse has been applied to ensure that the RLOs are meaningful. When used, context ties RLOs together in a learning architecture by providing a wrapper in the form of lesson hierarchy, job-based scenario, importance statement, theme, examples, simulation, and so on.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Metadata have been added to each RLO, learning activity, and media element that has been created, repurposed, or reused.</td>
</tr>
</tbody>
</table>

on their needs. Access reflects that your RLO strategy may be used beyond traditional events, to include other performance solutions such as help systems and performance support.
With the other stages in the RLO development process we outlined many steps for you to follow, but our assumption here is that most of the delivery steps are either accounted for in your RLO strategy or remain the same as in your current rollout and delivery plans. For example, if you are currently delivering ILT and printed student workbooks, then you will still have those deliverables when they are created from a database of RLOs. You will still have train-the-trainer needs, classroom setup, and printing and duplication dependencies. Likewise, if you are currently delivering Web-based training or using a learning management system, you will still need to make your RLO-based lessons and courses available to learners by publishing them in the LMS as an offering that learners can sign up to complete. Of course, some of these steps can be automated depending on the integration between RLO authoring tools, and your existing delivery systems. Two areas that we will discuss in the context of delivery and access are piloting and revising your solutions, and adapting your rollout plan.

Figure 4.9. Expanded Delivery Stage
Pilot and Revise

Most ISD models suggest a pilot and revision phase, and the RLO-specific model is no different. The difference lies in the scale. When you apply RLOs to multiple solutions you need to pilot and revise each solution independently to make sure all work as designed. This means that if your analysis indicates the need for training, printed manuals, and on-line references that are accessed through a computer and PDA, then each of these solutions needs to go through the pilot and revision stage.

RLOs can be helpful if you refine the instructor-led environment first, and then roll out the e-learning version that is built on the same RLOs. Because many organizations pilot their training before making it available to the larger audience, they can leverage that feedback and content evaluation to update the RLOs in the database. During the pilot class, questions may be answered and content modified until the design team members are confident they have the content and flow of the training just right. At this point, the RLOs in the database may be updated to reflect the changes suggested in the live class. The RLOs may then be ready for widespread release as both ILT and e-learning. If your organization uses this approach, RLOs can significantly speed up the conversion because both outputs can be generated from the same set of RLOs.

Of course, you could choose to use any staggered release and delivery schedule, where you try one delivery medium before moving on to the next. This blurs the line between when development ends and delivery begins, because it depends on which delivery medium has been released and which is still being modified for future delivery. The key concept here is parallel development and delivery with pilot and revision checks that improve the quality of all deliverables that are generated from a common pool of RLOs.

Adapt Your Rollout Plan

As you begin to build your individual RLOs, do not be afraid to adapt or change the delivery plan. One good example is of RLOs designed to support e-learning or on-line references. Your original plan, or even your overall RLO strategy, may call for waiting until the entire project is complete before releasing the RLOs to learners and end users. However, as the project progresses, for any number of reasons it can fall behind its deadlines. At this point you may decide to change your delivery strategy and release each on-line training or reference section as it is completed.
After all, each section should have been designed and developed as RLOs that can stand alone, without the need for context. In some cases, context will be more important than rolling out smaller portions over time. If context is key, then you may simply release everything to the learner at the same time. Again, the rollout plan is always a trade-off between speed and quality, context and granularity. Some context-rich learning approaches (guided discovery, for example) will also take longer and cost more to develop, resulting in delayed release schedules. One way to advance the release schedule is to release a directive version of the lesson or course, and then add a guided-discovery version that is context-rich, such as a problem-based simulation built from RLOs. You may find this phased rollout necessary if the guided discovery version is more time-consuming to produce.

**Ready to Move On?**

Look at your RLO strategy and determine if you have taken each of the steps that were identified in the delivery stage of the ISD process. Some of the questions in the checklist shown in Table 4.5 may not be applicable to your delivery needs,

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>The RLOs have been taken from the authoring environment and moved to their delivery media through integrated tools or through a manual copy-paste process. Delivery media range from print documentation to PowerPoint slides, hands-on labs, and static HTML pages.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>The needed link between registration systems and the RLO database is complete, allowing learners to register for the RLO-based course.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Phased rollout between media has been used to ensure that the RLOs are accurate but that the rollout is also as timely as possible.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>All the delivery requirements identified in the design document have been fulfilled and the RLOs are available to all target learners in all the required media.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The rollout plan is open and flexible enough to allow you to deliver parts of the RLO solution as they become available.</td>
</tr>
</tbody>
</table>
but we still strongly suggest that you at least review them before moving on to the evaluation stage.

**HOW DO YOU EVALUATE RLOs?**

In reality, the evaluation stage does not change substantially with RLO projects. Most of the key issues that you addressed when creating your RLO strategy are already resolved at this point. In fact, as Figure 4.10 shows, we did not expand the evaluation stage into smaller steps as we did in all the other stages examined in this chapter. Still, two key points here are to create and use your evaluation plan, and as with all aspects of RLO implementation, remain flexible.

**Use Your Evaluation Plan**

Ideally, you created your evaluation plan during the analysis stage, and that was captured in the design document. Therefore, you should know from the start how

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**Figure 4.10. Evaluation Stage**

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[Diagram of the evaluation stage with steps: Analyze, Design and mine, Develop, repurpose, and reuse, Deliver and access, Evaluate, Maintain and retire]
you are going to measure the success of each deliverable built from your database of RLOs. This evaluation plan should also be reflected in your RLO strategy, which likely talks about how, in general, you will prove the value of the entire strategy to your learners, authors, and sponsors.

However, even though your RLO strategy addresses evaluation, you should still create a specific plan for each new RLO project and include that in the design document. The plan should call for the evaluation of all aspects of the RLO solutions and not just a single-delivery medium or single event such as an ILT course. Think back to the Redwood Credit Union check-cashing example, where RLOs were used to create instructor-led training and on-line manuals. The evaluation plan would describe how both the ILT and the on-line manuals should be evaluated.

**Remain Flexible**

We have emphasized flexibility throughout this chapter, so it is not surprising that it is important in the evaluation stage as well. If your RLO strategy does not allow enough flexibility, you may create a situation where the evaluation data you gather are suspect. For example, your overall RLO strategy may call for conducting Level 1 evaluations at the end of every RLO. However, if the current project consists of hundreds of RLOs that are part of a larger lesson or course hierarchy, then you may need to define when to conduct the evaluation and at which level of the hierarchy.

Perhaps your initial strategy for evaluation called for every RLO that is tied to a terminal or enabling objective to result in a Level 1 survey being sent to the learner. This results in learners getting hundreds of small evaluation forms for every RLO that they complete. They may become so overwhelmed that they stop responding, or worse, provide false data simply to get the survey out of the way. The flexibility in this case may be to decide that a single course-level survey is enough.

**Ready to Move On?**

Evaluation can be thought of as the last stage of the RLO development process or simply as a formative part of ensuring that your goals for design, meeting audience needs, and evaluating business impact have been achieved. Although evaluation is always optional, the key questions to answer are listed in the checklist shown in Table 4.6.
HOW DO YOU MAINTAIN AND RETIRE RLOs?

In the traditional ISD process, the assumption is that you will continue to keep your training materials up-to-date until your learners no longer need them. With RLOs, your course, lesson, or job aid can theoretically stay in the database forever. Your ongoing challenge is to ensure that the RLOs that build those solutions are maintained or removed from the database. Although Figure 4.11 shows the maintain and retire stage as the last in the process, like evaluation it can affect the other stages depending on which objects are being retired and which are being linked or reused during a maintenance cycle.

A Few Points of Note

This chapter does not go into detail on this stage of the process because most of the issues should have been successfully handled during the development of your overall RLO strategy. In essence, the addition of this stage to the RLO-specific model has more impact on your business processes than on the actual building of RLOs. However, there is a time issue involved. When you create RLOs for various projects you will not reach the maintain and retire stage for them for perhaps years. So this portion of the RLO-specific ISD model may not happen for some time.

Table 4.6. Evaluation Checklist

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>The evaluation method as defined in your RLO strategy and design document has been followed for each delivery medium.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>The evaluation plan allows for evaluations to be scaled based on the number of RLOs or the levels of hierarchy found in any one RLO-based solution.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Evaluation results are reported in such a way that they are meaningful to authors, learners, and sponsors.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Your delivery and authoring tools allow you to capture and report on evaluation data during all phases of the development project.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>You have accounted for evaluation data in your metadata strategy.</td>
</tr>
</tbody>
</table>
Another issue here involves the reuse of existing objects. Whereas the RLOs you create may not expire for months or years to come, any RLO you link to (reuse) can theoretically expire tomorrow. Again, issues around how to maintain and retire RLOs should be included in your overall RLO strategy. In order to be effective, RLOs should be current and relevant or they simply will not be used by learners, or worse, they will provide them with erroneous information.

Ready to Move On?
Now that you have accounted for everything from analysis through evaluation, you can look back at your RLO strategy and determine if you have accounted for the ongoing update and decommissioning of RLOs. You should be able to answer yes to the items shown in Table 4.7.

CHAPTER REVIEW
This chapter explained the process of taking an RLO-based training solution from design through delivery. You learned about the enabling steps and the RLO-specific
points to address at each stage of the RLO-specific ISD process: reusing and repurposing content, doing concurrent development, supporting multiple delivery media and multiple target audiences. As you saw, throughout this process, many actions are driven by your RLO strategy. Now is the time to look back once again at the strategy you have created to ensure that it is flexible enough to deal with those issues from design through to delivery. Although we did not cover them in great depth, both the evaluation and the maintain and retire stages are part of the RLO creation process. We provided a checklist of key questions to answer at each stage in the process before moving on to the next stage. Specifically, this chapter should have prepared you to answer these questions:

- How flexible is your RLO strategy?
- How do you analyze RLO solutions?
- How do you design RLO solutions?
- How do you develop RLO solutions?
- How do you deliver RLOs?
- How do you evaluate RLOs?
- How do you maintain and retire RLOs?

In Chapter Five, the topic of metadata will finally be addressed in depth and tied in to the RLO-based ISD process. This important subject affects not only the

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>The design document lists when the RLOs will need to be updated or retired.</th>
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</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>The RLO strategy describes the business rules and methods for communicating changes to linked or reused RLOs when they are modified or retired.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>The metadata strategy allows life cycle, history, and revision information to be captured.</td>
</tr>
<tr>
<td>Yes/No</td>
<td>Authoring and delivery tools allow for notifications to be sent to authors and learners affected by changed or retired RLOs.</td>
</tr>
</tbody>
</table>
design, development, and delivery discussed in this chapter but the RLO strategy you began developing in Chapter Two. Although we have covered development and strategy separately, remember that your goal is to update your RLO strategy continually as we move closer to the end of this book. Your end deliverable should be a complete, flexible, and all-inclusive RLO strategy that communicates the process, scope, and benefits of adopting RLOs in your organization.

**RLOs in Action: Building RLO Prototypes**

The RLO strategy task force at NoWaste has determined that the best way to test the emerging RLO strategy is to build prototypes for each audience and each delivery medium. Emphasis is placed on how flexible the RLO strategy is in creating variant learning approaches, writing styles, and learning activities. The lessons already learned from the RLO pilot projects (see Chapter Three) are used in this phase, where the focus is more on using the RLO process and less on changes to current processes. NoWaste has chosen, however, not to test RLO authoring and delivery tools, nor the ability to maintain and retire RLOs, because the RLO tools and systems do not exist. The lack of RLO development and delivery tools needs to be noted in the summary of this effort.

The HR department continued with the 401k benefits prototype used in the process impact phase of the project. The 401k RLOs demonstrate how one topic area may fit different needs as employees advance through their tenure at NoWaste. New hires needed to see enrollment information. Existing employees need training on changing their deductions, taking loans out against their 401k, and reallocating funds. Employees leaving the company need to see the rollover options. Employees who are not enrolled may only be interested in the benefits, risks, and enrollment policy. At any point an employee may choose to learn more about any of these items by accessing individual RLOs. In addition, human resource employees and most managers need to be aware of more details of the 401k program than the average employee. Finally, the 401k RLOs make ideal RLOs, because they are updated each year, sometimes more, depending on the changes to the funds in the program.

During the development of the 401k-based RLO solutions, metadata were captured for each RLO. All of the changes noted previously to the development process (Chapter Three) were validated, including communication with other
groups about the analysis and design of the RLOs. The development tools used to create the prototype were those historically used. To get around this limitation, the pilot team created e-learning, instructor-led training, and print-based versions of the RLOs. This let them test look-and-feel issues, page layout, the amount of text on each screen or page, and how learning activities would differ for each medium.

This pilot project turned out to be a major undertaking, requiring a full development team and several months to complete. However, the results of this project clarified many of the questions that were raised during the earlier RLO strategy meetings. NoWaste could include guidelines in its RLO strategy, templates, business rules, and tool requirements with greater confidence. This pilot project also allowed NoWaste to judge the ease with which RLOs could be written without context to ensure maximum reuse between courses and delivery media.

With the prototype phase completed, NoWaste felt it could move forward in documenting its RLO strategy and implementation plan. One final element, however, was to look at the metadata needs. In the next chapter, the metadata that NoWaste can capture and use today with traditional tools will be compared with what will be used as RLO-based tools are adopted.
Applying Metadata

One of the advantages of RLOs is that they allow both authors and learners to search for existing objects to meet their needs. Authors will search for objects they can leverage in building new training programs and performance solutions. Learners will search out content, training, and performance support tools that fit their current or future needs. There are two bases for this search-and-reuse capability: tools and metadata. Tools are needed to provide both the author and the learner with an interface to the RLOs. The metadata—that is, the data about each RLO—are what the tools leverage to enable the authoring and delivery system functions.

This chapter provides an overview of metadata and discusses the impact on your RLO strategy and ISD process, the benefits, the costs, and industry standards. Specifically, we will answer these questions:

• What are metadata?
• How are they used?
• What are the standards?
• How do you use the standards?
• Where are metadata used?
• What tools will be needed to use metadata?
• What will the impact be on your process?
• Is it worth the cost?

WHAT ARE METADATA?
Metadata are simply data about data. More specifically, they are data about each RLO in your database, from the smallest media asset up through each layer of the hierarchy that makes up your courses, modules, or lessons. Metadata can be thought of as any information that tells you about the RLO. The information can be as basic as the author’s name or the RLO’s title, subject, and objective. It can also be complex, including job competencies, completion criteria, access rights, and costs. (As you will learn later in this chapter, adding detailed metadata may actually result in diminishing returns.)

For example, a book’s metadata would include the author, book title, ISBN number, table of contents, references, bibliography, publisher, number of pages, list of graphs and tables, and index. Likewise, a can of food may have metadata with such information as manufacturer, serving size, nutritional value, ingredients, expiration date, quality statements, and preparation tips. In the case of a book or a can of food, some of the data you may find useful, other data you may choose to ignore. All told, the metadata help you make the decision to read the book or to purchase the food.

The ultimate usefulness of your metadata depends on two things: first, creating valid metadata for every learning object, and second, having the search tools in place to use that metadata. Both learners and authors can use metadata when searching for learning objects. During the mining process, authors can find specific courses, lessons, media, or any other sized learning object that is tagged with metadata in their database. Likewise, students can search for training courses, individual lessons, support tools, or any other object that has been defined as a searchable, accessible object in the delivery environment. It is also possible that your delivery system will automatically provide a custom delivery experience based on a combination of metadata, including learner profile, job competencies, job roles, and learning objectives, to suggest learning objects that best fit a student’s needs.
HOW ARE THEY USED?

A challenge for your RLO strategy is defining the metadata that meet your goals for your authors and learners. The metadata should be rich enough to meet your needs, but not overly burdensome for your authors to input. Achieving this balance can be tricky, because some of the tools you use in your RLO strategy may not accept all the metadata you would like to include. Likewise, many organizations have created their own systems and lexicon for metadata for each RLO. This makes interoperability between vendors and organizations more of a challenge. Fortunately, there is an industry standard that most organizations and tool vendors are using as a starting point for the definition of their metadata schemes: the IEEE’s learning object metadata specification, which we will talk about later in the chapter.

As we have already stated, metadata help authors and learners make decisions about the utility and function of an RLO. That may sound simple, but the possibilities are greatly affected by the systems and tools that are in place. With that in mind, let us look at two examples, one an on-line retailer with a database of products, the other a corporate training portal with a database of courses that are saved as RLOs.

Example 1: On-Line Retailer

Most of us have had the experience of finding and purchasing books, music, videos, electronics, and clothing through an on-line retailer. The list of these retailers is long, with each trying to offer a personalized shopping experience by suggesting products and aiming messages at individual consumers based on their purchasing habits. On-line retailers like Amazon.com, Barnes & Noble, Target, Wal-Mart, Macy’s, Office Depot, Best Buy, and Circuit City all have large inventories of goods and services that you can search on and add to a shopping cart or wish list. All these retailers use metadata about their products to make it possible to find these goods and services. Products are organized in a logical scheme by function, manufacturer, publisher, relationships, popularity, or special interest, to name a few categories. The wish list function allows consumers to “save” items that they may want to purchase in the future. Some sites suggest products that consumers may be interested in purchasing based on their prior product searches and purchases. Some will also suggest products based on what other customers with similar interests have searched for or purchased.
A customer’s ability to find a product that matches her expressed and expected needs successfully depends on four functions of the retailer’s metadata and systems: product metadata, customer profile metadata, interface metadata, and tools and systems.

**Product Metadata**
On-line retailers can include a range of metadata about their products. At a minimum, the product metadata include an inventory number, price, product name, and simple description. Other product metadata may include references to photos, product reviews, customer ratings, product accessories, or related products. It is up to the retailers to decide what metadata to include based on their on-line business model and their customer needs.

**Customer Profile Metadata**
The first time a customer purchases a product from an on-line retailer, a number of metadata values are captured. At minimum, the customer’s payment method, shipping address, and contact information are captured. Retailers may also ask for more detailed demographic information, such as age, gender, income, interests, and so on. The customer may also be able to sign up for interest groups and e-mail mailing lists for special offers or product updates. The customer’s choice of categories and the other demographic information in his profile inform the retailer about his interests and potential buying trends.

It is important to note here that most discussions about metadata focus on the product, not on the customer. As you plan your RLO strategy, focus on defining your RLO metadata, keeping in mind that there is a learner who you may want to know more about. In this case your RLO strategy may also define what metadata you need your learning management system (LMS) and delivery portals to capture from your learners.

**Web Portal Use of Metadata**
The Web portal in this case goes beyond the look and feel of the user interface. Instead we are talking about all the features and functions that are found on the Web pages that make up the entire user interface and lead to a successful shopping experience. Assuming that the interface (portal) allows the customer quick and easy access to all of the retailer’s products, the role of the metadata is invisible to the customer. Aside from the tiresome account setup during the first on-line
purchase, the other metadata are specific to products and communities of interest. Metadata in this case are simply what makes the on-line shopping experience more effective and efficient. With the right set of tools and metadata, the customer interface becomes prescriptive, offering products and services that match the customer’s needs and predicted wants. The interface can offer categories of products or even provide links to communities of customers with like interests.

In order to build a successful shopping experience, the Web portal’s features and functions are dependent on the strategy, tools, and metadata used. The past few years have been littered with the debris of poor on-line retail commerce sites with confusing user interfaces, illogical product catalogues, or limited search tools. Most of those retailers have either improved their customer interface (and underlying tools and metadata) or have gone out of business.

Systems and Tools
As you can imagine, a number of systems and tools must operate together in order for the product, customer, and interface metadata to form an effective shopping experience. The systems must capture and store both product and customer information. Some of the systems will automatically capture metadata about the product, such as the date it was entered into the system. Other details about the product—its description, photos of it, its size, function, and so on—are manually entered by the retailer or sent to the retailer by the manufacturer or distributor. In addition, the retailer must provide tools to allow customers to enter and manage their own profile information, such as shipping address, areas of interest, and billing information.

Example 2: My E-Learning
Keeping the on-line retail experience in mind, now let us look at an on-line learning experience. For learning, those products are now collections of RLOs that are presented as courses, units, or lessons that learners can purchase or access depending on the business model in place. Each RLO will require metadata about its function, purpose, author, date, category, and intended audience. This e-learning system will also likely capture information about learners, such as their demographics, training history, job function, and learning style preference. It may even allow them to sign up for special interest groups, communities of practice, announcements, and possible promotions.
When looking at metadata implementation here, ask yourself these questions:

- What will your delivery environment look like to learners?
- Are you creating a “My Learning” portal where learners can find training and performance tools?
- Will you simply allow searching?
- Will you want the learning objects to be self-selecting based on learners’ prior search histories?

With the right set of metadata and author and delivery tools, your learners can search for objects that match keywords, subject, job task, related topics, peer evaluation, peer review, delivery media, language, or learning style, to name a few. Of course, each area to be used in conducting searches needs to be captured as metadata about the RLO or about the learner. Some metadata are built with the learning object during the development process. Other metadata will be associated with learning objects after the training has been delivered.

It may be helpful to compare the four areas highlighted in the previous section on on-line retailers with that presented here. The e-learning experience has similar needs for tools, systems, and metadata:

- Product metadata become RLO metadata that can be accessed by both authors and learners.
- Data about the customer become data on the learner (learner profile).
- The customer portal becomes the learning portal.
- Tools and systems remain largely unchanged.

Although there are many subtle differences between on-line retail systems and e-learning systems, the most important may be who is accessing the RLO metadata. Whereas the retailer is focused on the customer, the RLO metadata are captured for both authors and learners. As we will discuss later in this chapter, an author’s needs when it comes to metadata may be more detailed than those of a learner who is searching for learning objects.

To craft a feature-rich RLO implementation, you may want to combine the best aspects of on-line retail systems with the needs of your learners. Document those items and note which will need to be created and saved by authors as metadata,
and which can be captured and tracked by your learning and content management system on delivery to the learner.

**WHAT ARE THE STANDARDS?**

As we explained earlier in this book, official standards for most aspects of the size, shape, and function of reusable learning objects do not exist at this time. Many specifications and standards groups—such as the AICC, IMS, and ADL—are building consensus and defining specifications, reference implementations, and best practices for RLOs. To date, only one specification has become an officially recognized standard: the IEEE learning object metadata (LOM) P1484.12.1-2002 (see http://ltsc.ieee.org/wg12/). This standard defines a number of metadata fields and values that you can use in your RLO strategy.

Many of the metadata fields listed in LOM P1484.12.1-2002 are optional, so you do not have to require your authors to enter every piece of metadata available. The LOM also allows you to add extensions to the metadata to cover your own needs. Keep in mind that the value of metadata is in how you use it. Because the LOM has so many optional fields, your implementation may look different from that of another organization.

What metadata elements make up the LOM? This section of the chapter will give you some insights into what you will find in the LOM. It is beyond the scope of this chapter to teach you the functionality of all seventy-plus elements that the LOM defines. Indeed, your own RLO strategy will be unlikely to use all of these elements. For now, let us review the LOM’s nine main categories and recognize the types of elements that are found in those categories.

Table 5.1 lists the categories along with some of the elements found in each one. Notice that each element is numbered, with the general category starting at 1, life cycle at 2, metadata at 3, and so on. Because some elements are left out of this sampling, some element numbers are missing. We believe that those that we have included are the most relevant to most training needs. But you will likely want to review the complete list to see if any other elements meet your specific implementation needs.

Although some of the learning object metadata elements, like title and language, are self-explanatory, others such as learning resource type or Taxon path may require some explanation. Taxon is used to categorize the learning object, and like
<table>
<thead>
<tr>
<th>Category</th>
<th>Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>1.2 Title</td>
</tr>
<tr>
<td></td>
<td>1.3 Language</td>
</tr>
<tr>
<td></td>
<td>1.4 Description</td>
</tr>
<tr>
<td></td>
<td>1.5 Keyword</td>
</tr>
<tr>
<td>Life Cycle</td>
<td>2.1 Version</td>
</tr>
<tr>
<td></td>
<td>2.2 Status</td>
</tr>
<tr>
<td>Meta-Metadata</td>
<td>3.3 Metadata scheme</td>
</tr>
<tr>
<td></td>
<td>3.4 Language</td>
</tr>
<tr>
<td>Technical</td>
<td>4.1 Format</td>
</tr>
<tr>
<td></td>
<td>4.2 Size</td>
</tr>
<tr>
<td></td>
<td>4.3 Location</td>
</tr>
<tr>
<td></td>
<td>4.7 Duration</td>
</tr>
<tr>
<td>Educational</td>
<td>5.1 Interactivity type</td>
</tr>
<tr>
<td></td>
<td>5.2 Learning Resource Type</td>
</tr>
<tr>
<td></td>
<td>5.3 Interactivity Level</td>
</tr>
<tr>
<td></td>
<td>5.8 Difficulty</td>
</tr>
<tr>
<td>Rights</td>
<td>6.1 Cost</td>
</tr>
<tr>
<td></td>
<td>6.2 Copyright</td>
</tr>
<tr>
<td>Relation</td>
<td>7.1 Kind</td>
</tr>
<tr>
<td></td>
<td>7.2 Resource</td>
</tr>
<tr>
<td>Annotation</td>
<td>8.1 Entity</td>
</tr>
<tr>
<td></td>
<td>8.2 Date</td>
</tr>
<tr>
<td></td>
<td>8.3 Description</td>
</tr>
<tr>
<td>Classification</td>
<td>9.1 Purpose</td>
</tr>
<tr>
<td></td>
<td>9.2 Taxon Path</td>
</tr>
<tr>
<td></td>
<td>9.3 Description</td>
</tr>
<tr>
<td></td>
<td>9.4 Keyword</td>
</tr>
</tbody>
</table>
many other values, it is optional. Likewise, many of the seventy-plus LOM elements are optional. You could choose to implement all, some, or none of those elements. If you are fortunate, your authoring tools and systems may automatically capture some elements—like owner or structure—while others you will need to create and maintain—such as description and learning objective. You may also find that extensions are needed to fill in product, organizational, and utility metadata specific to your needs. Cisco Systems, for example, did all of this by paring down the LOM metadata to a handful of required tags, selecting from both the LOM and their own product-specific extensions.

There is a great deal to consider when adopting the LOM. Prior to its approval by the IEEE, there was no standard method for vendors to ensure that their objects’ title or target audience was documented in a shareable location. The LOM standard ensures that when applied correctly, metadata about any organization's RLOs can be read and used by any other IEEE LOM–compliant authoring and delivery system.

**HOW DO YOU USE THE STANDARDS?**

An example of how the LOM metadata are used would be helpful here. We will present a few of the key educational values, and look at places where the LOM was extended through the efforts of Customized Learning Experiences Online (CLEO; http://www.cleolab.org/). CLEO was a collaboration between a number of companies, including Cisco Systems, IBM, Microsoft, and Thomson–NETg, which conducted focused, applied research on technical and pedagogical issues related to ADL’s Shareable Content Reference Model (SCORM), in order to extend the LOM to meet their goal of sharing RLOs. (For more on ADL and SCORM, see Chapter One and http://www.adlnet.org/).

Table 5.2 shows how metadata are defined for four learning objects (simply labeled A, B, C, and D). These objects are all the same size, but they have different objectives and therefore slightly different metadata values. Those elements that were either added or expanded on through the CLEO group are indicated by an asterisk and include aggregation level, interactivity type, learning resource type, and interactivity level.

Notice that not all the LOM metadata are included in the CLEO example shown in the table. Why? First of all, CLEO’s focus was on those elements that needed to
<table>
<thead>
<tr>
<th>Learning Object A</th>
<th>Learning Object B</th>
<th>Learning Object C</th>
<th>Learning Object D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>What is a router?</td>
<td>Performance</td>
<td>Cross-selling a</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>statistics</td>
<td>default gateway</td>
</tr>
<tr>
<td><strong>Aggregation level</strong></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Interactivity type</strong></td>
<td>Active</td>
<td>Expositive</td>
<td>Mixed</td>
</tr>
<tr>
<td><strong>Cognitive domain</strong></td>
<td>Analysis</td>
<td>Remember</td>
<td>Use</td>
</tr>
<tr>
<td><strong>Cognitive strategy</strong></td>
<td>Concept</td>
<td>Procedure</td>
<td>Principle</td>
</tr>
<tr>
<td><strong>Learning resource type</strong></td>
<td>1. Practice</td>
<td>1. Demonstration</td>
<td>1. Principle_statement</td>
</tr>
<tr>
<td></td>
<td>2. Definition</td>
<td>2. Step</td>
<td>2. Guidelines</td>
</tr>
<tr>
<td></td>
<td>4. Non-example</td>
<td>4. Reference</td>
<td></td>
</tr>
<tr>
<td><strong>Interactivity level</strong></td>
<td>Low</td>
<td>High</td>
<td>Very high</td>
</tr>
<tr>
<td><strong>5.3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table 5.2. (Continued)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
<td>Learning Object A</td>
<td>Learning Object B</td>
<td>Learning Object C</td>
</tr>
<tr>
<td>5.4 Semantic density</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>5.6 Context</td>
<td>Training</td>
<td>Training</td>
<td>Training</td>
</tr>
<tr>
<td>9.1 Classification</td>
<td>Educational objective</td>
<td>Educational objective</td>
<td>Educational objective</td>
</tr>
<tr>
<td>9.3 Description</td>
<td>Describe the unique characteristics of a router that allow it to operate at Level 3 of the TCP/IP stack.</td>
<td>List the performance statistics of the P1930.</td>
<td>Configure the default gateway on the 8500 series router using Ethernet.</td>
</tr>
</tbody>
</table>
be refined or added to the existing LOM. Second, many fields are basic and would simply clutter this example if they had been included. Instead, the key metadata for defining a learning experience are included. Although the entire LOM is geared for learning objects, the CLEO group did not adjust, modify, or recommend using all the fields. As we noted, this was possible because the LOM itself does not require them all to be used. Again, this gives you the flexibility to adopt only those metadata elements that meet the needs of your RLO strategy.

Let us look at the CLEO example in more detail, starting with the column for Learning Object A. Notice that Learning Object A has the educational objective (LOM 9.1), indicates a concept cognitive strategy (LOM 5.13), and is being applied at the analysis level (LOM 5.12). As we stated in our earlier discussion of the Clark performance matrix, the CFP3 model is useful to classify and structure an RLO in its creation and to validate that the practice activity is at the proper cognitive level for the learning objective (in this case, analysis). Likewise, this type of metadata information can be used by the learner to find an RLO, although it is likely that user-friendly terminology or some type of automation would be used to hide the author-oriented labels.

Notice that the primary learning resource type (LOM 5.2) is a practice, which is supported by a definition, example, non-example, and analogy. Because this learning objective is at aggregation level number 3 (LOM 1.8), those elements in LOM 5.2 are all the parts that are used to build a concept RLO. In other words, they are the smaller RLOs or “children” of this concept RLO. A key agreement between the CLEO members had to do with this mapping of aggregation level between parent and child RLOs. Each company was free to use its own instructional model and learning hierarchies. In order to exchange RLOs among them, each had to place its RLOs in an aggregation table that assigned a value from 0 to 10 for levels of a hierarchy that began at raw media (0) and ascended through courses (9) and curriculum (10). See the CLEO white paper for a detailed explanation of this mapping, how the parent-child relationships function, and how the CLEO members mapped their hierarchies using these elements (Customized Learning Experiences Online, 2003).

The last few fields shown in Table 5.2 are from the original LOM, but they present some interesting values that you may or may not find useful to your metadata needs. We simply include them here as food for thought, and we do not take a
position on whether you should or should not use them. That said, notice that the
interactivity type (LOM 5.1) is set to “active,” but the author decided that com-
pared with other types of interaction, its interactivity level (LOM 5.3) is “medium.”
Likewise, the semantic density (LOM 5.4) is set to medium, because the concept
is primarily active in nature, but it requires expository material through a narra-
tion. Finally, the context (LOM 5.6) is set to “training.” Together, all the LOM and
CLEO metadata found under Learning Object A give authors and learners a clear
picture of what this learning object is about from an instructional, cognitive point
of view. Again, it is largely up to your systems and tools if these values can be used
as effectively as possible.

You may also want to take time here to notice key differences between the other
three examples in the table: Learning Objects B, C, and D. Notice what the learning
objective for each one requires of the learner, and what type of RLO you would
expect to build to support that learning objective. Now peruse the remaining rows
in that column. You will likely agree that the cognitive strategy listed for each learn-
ing object is the best value of that element. However, the other values in the column
may be more subjective, because they are often based on the author’s goal. For
example, a principle-based object could have a different interactivity level, semantic
density, or learning resource type than those listed. Again, this is where authoring
guidelines and internal metadata auditing would help ensure consistent applica-
tion of metadata across your RLOs.

WHERE ARE METADATA USED?

When to apply metadata and how much to apply are interesting challenges. The
impact on your development process can be overwhelming if everything that could
be tagged is tagged. Your RLO strategy may require you to be able to search and
reuse any RLO in your object hierarchy, including graphics and rich media ele-
ments. You may also want authors to be able to search for specific types of RLOs,
such as a procedure, example, demonstration, guideline, or fact. As you go through
your list of possible metadata tags, look at each level of your RLO hierarchy, from
the smallest element or building block up through the highest course level. Your
authors’ and learners’ search needs at each level will dictate the amount and scope
of metadata you need.
Ask the following questions as you define required and optional metadata at each level of your RLO hierarchy:

- What is the benefit of this tag for the learner?
- What is the benefit of this tag for the author?
- How often will the author and learner use this tag?
- How will this tag improve the learning experience?
- How will this tag reduce development costs?

Once you have gone through this process, you should have a table with the following headings: Metadata Name, Value, Definition, Hierarchy Level, and Required or Optional. Table 5.3 lists five of the LOM elements and values adopted at Cisco.

<table>
<thead>
<tr>
<th>Name</th>
<th>Example Value</th>
<th>Definition</th>
<th>Hierarchy Level (Aggregations)</th>
<th>Required or Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title (1.2)</td>
<td>What is a router?</td>
<td>Name of content supplied by author</td>
<td>All levels</td>
<td>Required for search</td>
</tr>
<tr>
<td>Description (1.4)</td>
<td>The learner will be able to describe the characteristics of a router.</td>
<td>Level of object in hierarchy.</td>
<td>3 and above (all with learning objectives)</td>
<td>Recommended for search</td>
</tr>
<tr>
<td>Cisco Products (Cisco extension to LOM)</td>
<td>[Product name and model from controlled vocabulary list]</td>
<td>Subject matter keywords of Cisco products.</td>
<td>3 and above (all with learning objectives)</td>
<td>Recommended for search</td>
</tr>
<tr>
<td>Aggregation level (1.8)</td>
<td>1, 2, 3, 4</td>
<td>Level of object in hierarchy.</td>
<td>All levels</td>
<td>Required (ideally the system would create based on child object)</td>
</tr>
<tr>
<td>Name</td>
<td>Example Value</td>
<td>Definition</td>
<td>Hierarchy (Aggregations) Level</td>
<td>Required or Optional</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Cognitive domain (5.12)</td>
<td>Analysis, synthesis, use, knowledge</td>
<td>What level of cognition this RLO is achieving; describes “kind” of topic addressed by learning object.</td>
<td>3 and above (all with learning objectives)</td>
<td>Required</td>
</tr>
<tr>
<td>Cognitive strategy (5.13)</td>
<td>Concept, fact, procedure, principle, process</td>
<td>Indicates the cognitive strategy for this object.</td>
<td>3 (based on Cisco CFP3)</td>
<td>Optional</td>
</tr>
<tr>
<td>Learning resource type (5.2)</td>
<td>1. Practice 2. Definition 3. Example 4. Non-example 5. Analogy</td>
<td>Identifies where learning objects fit in context of common learning content strategies or instructional methodologies.</td>
<td>All levels</td>
<td>Optional (ideally the system would create based on child object)</td>
</tr>
<tr>
<td>Classification purpose (9.1)</td>
<td>Educational purpose</td>
<td>The purpose of classifying this learning object.</td>
<td>3 and above (all with learning objectives)</td>
<td>Required</td>
</tr>
<tr>
<td>Description (9.3)</td>
<td>Describe the unique characteristics of a router that allow it to operate at Level 3 of the TCP/IP stack.</td>
<td>Describes the learning object relative to the stated classification.</td>
<td>3 and above (all with learning objectives)</td>
<td>Required</td>
</tr>
</tbody>
</table>
Systems based on the CLEO extensions to the LOM. Out of the complete set of metadata, Cisco only requires six metadata values; another thirteen are recommended. Keep in mind, however, that every time something is recommended it often is left blank. Cisco, like many others who have implemented RLOs, struggled with this balance between required, optional, and recommended. This becomes even more of an issue when you consider that of the nineteen metadata elements in the Cisco example, some are required at all levels of the RLO hierarchy, whereas others are specific to a level, compounding the number of values entered by the author and increasing the time it takes to build a given RLO. Some groups may choose to apply metadata only at one level of an RLO hierarchy, so that they can save costs in tagging and validation while sacrificing reuse and search capabilities.

WHAT TOOLS WILL BE NEEDED TO USE METADATA?
As you have probably understood by now, the type and amount of metadata you capture are up to you to define. Each organization may start with the IEEE standards and apply its own extensions and controlled vocabularies, like those used by the CLEO group. As a result, there is no one perfect way to define metadata, nor is there one unified tool for capturing the metadata. It is true that most database-oriented authoring tools will allow you to create metadata for each learning object. Now that the LOM P1484.12 standard has been approved by the IEEE, look for tool vendors to become LOM-compliant. Make sure that your tool also allows you to add extensions to the LOM and allows you to define your own controlled vocabulary.

If you are using internal LOM extensions that are referencing a preexisting controlled vocabulary, then you may want to require the authoring tool to access that vocabulary so you do not have to keep track of changes inside the authoring tool. For example, Cisco Systems added a product extension to the LOM. This extension contains hundreds of values, each representing a product that Cisco produces. To keep the list up-to-date, the RLO authoring tool simply looks at a common corporate product database to generate the controlled vocabulary list that authors choose from when building RLOs.

It is possible that your authoring tools do not support all the features and functions you need to implement metadata fully. What should you do? Perhaps
you can find other, creative methods to capture metadata so they can be moved to a database tool in the future. Using a table for metadata in an MS Word document or an MS Excel spreadsheet may give you enough metadata to avoid a costly retrofit in the future. We will explore in more detail the tools and systems you may use in the next section of this chapter, when we discuss the changes you may make in your RLO development process when implementing metadata.

WHAT WILL THE IMPACT BE ON YOUR PROCESS?

Many of the benefits that both authors and learners realize with an RLO strategy are based on the proper implementation of metadata. But many of the costs associated with building RLOs are incurred because of it as well. In addition, your ISD process, tools, and systems will need to work together to apply and leverage metadata efficiently. Let us look more closely at what you are likely to have to do during your ISD process when you adopt an RLO strategy:

• Decide on the amount of metadata to be captured (required, recommended, optional).

• Decide where to tag each RLO with metadata (at the course, unit, module, lesson, or page level, and so on).

• Create processes to validate metadata and ensure they are up-to-date.

• Provide authoring guidelines and job aids to help authors and editors create and maintain the metadata.

• Ensure that the tools and systems are in place to capture, maintain, and employ metadata.

• Decide on the number of people who will create the learning objects (this can increase the rollout challenges).

• Calculate the benefits for both learners and authors to justify the cost of capturing metadata.

• Work with external vendors to ensure they are building RLOs using your metadata standards.

• Purchase new tools that support your metadata needs for tagging and searching.
As you can tell, your ISD process may have to adjust to accommodate these demands. As with any conversation about processes, you will need to examine your current ISD process, metadata needs, and RLO strategy to create your overall development process. Now let us explore the specific changes that will occur at each stage of an RLO-specific ISD process when you adopt metadata.

**Analysis Stage**

During the analysis phase of the RLO development process, you collect data about the audience, performance gap, learning style, support tools, and so on. Some of these data may be specific to the research on the performance gap and will not result in the creation of RLOs. Other data may lead you to building RLOs to solve that gap. In that case, the metadata you capture during the analysis phase can be saved, and possibly leveraged during the design phase. For example, if you are currently using interview questions or some formal process to analyze performance gaps, then those results can feed the metadata at the next phase. Keep in mind that even if some of the metadata captured during analysis are not relevant in the next stage of the ISD process, they may be useful if you need to go back to analyze similar performance gaps.

Unfortunately, there is no off-the-shelf tool that will allow you to move metadata seamlessly from the analysis stage to the design stage. You may be forced to use traditional tools such as MS Word and document your findings at this phase, then manually transfer that data to the design phase.

Regardless of your tool choices, first look at your reuse and search needs for learners and authors. Identify how much of the required metadata were actually available during the analysis phase. Metadata that are created this early in the ISD process should be captured and then used by each following stage to build the final RLOs. Any other metadata that you collect during the analysis phase is subject to this question: “If it’s not being used, why are we collecting it?”

To summarize the impact of metadata on the analysis phase, Table 5.4 reviews the amount of metadata, where to apply the metadata, and the tools and human resources that may be involved at this stage of the process.

**Design and Mine Stage**

The design and mine phase can begin once you have completed your analysis of the performance gap and determined that RLOs are the solution to fill the gap.
The outcome of this phase is a proposal, or a blueprint of your solution, often broken down by learning objective, listing the individual RLOs, practice types, and assessment types used to build this performance solution. As the design takes shape, metadata such as learning objectives, performance outcomes, instructional strategies, learner preferences, and delivery requirements, among others, should be captured. You should also look back at the metadata you captured during the analysis phase to determine what can be carried over into this phase.

An advantage of adopting an RLO strategy is to have a resource pool or database of existing RLOs to draw from for possible reuse or repurposing. An important assumption is that those existing RLOs have been tagged with relevant, valid, trusted metadata. Another assumption is that your authors know how to use the tools to search the metadata and can find matching RLOs quickly. Although these factors need to be addressed in your strategy, being able to present a design document that accurately states how many RLOs are new versus repurposed, or directly reused, can be calculated as a cost savings for your organization.

Ideally, you have a database-driven authoring tool with which you can both design new RLOs and mine for existing RLOs. If you are using traditional tools at this stage, you should still plan on capturing some metadata. This can be done using a word processing program like MS Word. As you create a design document,

### Table 5.4. Impact of Metadata on Analysis

<table>
<thead>
<tr>
<th>Amount and type</th>
<th>As with your current analysis process, capture enough information to describe the audience and performance gaps, and recommend a solution.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where to apply</td>
<td>A course, or learning object hierarchy, usually does not exist at this point. Metadata captured would be at the “need” and “solution” levels.</td>
</tr>
<tr>
<td>Tools used</td>
<td>Because metadata here are captured through many types of performance, tasks, and gap analyses, your current, traditional documents, forms, and techniques will likely be used.</td>
</tr>
<tr>
<td>Human resources</td>
<td>The number of people you will need to implement metadata at this stage will depend on the tools you have to capture metadata and the scale of your overall needs analysis.</td>
</tr>
</tbody>
</table>
present your course hierarchy in a table, where each row is a separate RLO and each column contains metadata such as the learning objective, target audience, cognitive level, content type, instructional methodology, and whether it is a new or existing RLO. This detailed table will be a valuable tool in getting sign-off on the scope of the RLOs before you jump into the development stage of the process and will give you a structure for collecting metadata.

Table 5.5 reviews the amount of metadata, where to apply the metadata, and the tools and resources that may be involved at this stage of the process.

<table>
<thead>
<tr>
<th>Table 5.5. Impact of Metadata on the Design and Mine Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amount and type</strong></td>
</tr>
<tr>
<td><strong>Where to apply</strong></td>
</tr>
<tr>
<td><strong>Tools used</strong></td>
</tr>
<tr>
<td><strong>Human resources</strong></td>
</tr>
</tbody>
</table>
Development Stage

Of all the stages presented here, applying metadata at the development stage will have the greatest impact on your current process and resources. Aside from the general RLO development issues involving tools, reuse, and granularity, authors now may be asked to add more information—more metadata—to their training programs than they have in the past. As an author creates or links to RLOs and hierarchies made from content, interactions, practices, assessments, and media, each requires its own metadata. As noted, metadata can range from the smallest media or text element up to the larger course. If such metadata were not included in the past, doing this will require your authors to budget extra time and resources to complete the RLOs.

Depending on your tools, you may save some time during this stage if all the prior metadata you captured about the RLOs in your solution have been automatically imported or carried forward from the first two stages (analyze, design and mine). This is the ideal situation, where your tools are integrated and allow for a smooth transition between stages. If you captured metadata in a traditional tool, like an MS Word table, as we suggested in the preceding section, then your authors will likely find themselves copying and pasting that metadata into the RLO authoring tool.

Your process may allow authors to off-load the metadata effort to a secondary author or expert who will be responsible for creating and validating metadata. Regardless of who enters the metadata, you should consider your RLOs incomplete if they are missing valid metadata.

In planning project development, resources, and external development contracts, you will need to accept an additional cost for the entry and editing of metadata. Although your costs may differ, you should budget a 10 percent to 20 percent increase in time and costs over your historical development costs. (As already noted, automated tools may help you save time.) As with any new process, you will want to capture baseline data on the impact of metadata. Once you have the baseline data, examine your metadata strategy, tools, and processes to determine the cost-benefit of metadata for both your authors and learners. Unfortunately, there is no best-practice guideline to help you gauge the costs of applying metadata during development.

Table 5.6 reviews the amount of metadata, where to apply the metadata, and the tools and resources that may be involved at this stage of the process.
Delivery and Access Stage

From the author’s point of view, metadata will not change the delivery and access stage. The author may simply change a tag on each object from “under development” to “deliver” to alert the delivery system that the RLOs are ready for learners. At this point, the delivery system can assume that all the metadata required have been included with the RLO, that the metadata are valid, and that the RLO-based course, lesson, or performance-support tools are ready for the learners.

From the learner’s point of view, metadata are an invisible feature of the training or performance solution. How successfully the delivery and search systems can

<table>
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<th>Table 5.6. Impact of Metadata on the Development Stage</th>
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<tr>
<td><strong>Amount and type</strong></td>
</tr>
<tr>
<td><strong>Where to apply</strong></td>
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<tr>
<td><strong>Tools used</strong></td>
</tr>
<tr>
<td><strong>Human resources</strong></td>
</tr>
</tbody>
</table>
use metadata depends on the sophistication of the tools and how robust the metadata were in the earlier stages of the ISD process. Once again, ideally the tools automatically use the metadata to aid learners through custom learning paths, suggesting related RLOs or displaying RLOs that others have viewed.

Integration between your authoring tool and delivery tool is key in saving time and resources when moving from authoring to delivery. Your delivery solution may be more complex if you have a learning management system (LMS) to track learner registration, progress, and access to RLOs. The LMS requires some metadata about each RLO it is going to manage. For example, the LMS may require a title, duration, expiration date, learning objective cost, and description before it can be made available for the learner. These data were already captured in the authoring stage, and should be moved automatically from the authoring tool to the LMS and then through to delivery with little or no manual intervention.

Furthermore, if your RLO strategy requires that you capture metadata about the learner—so that you can establish a “My Learning” type portal with features and functions like those of an on-line retail store—then you will have to create a learner metadata repository. This type of metadata is usually captured by the delivery systems or the LMS. The links between the metadata for the learner and the metadata for the RLOs will need be established through your LMS vendor, internal IT department, and RLO strategy team.

Table 5.7 reviews the amount of metadata, where to apply the metadata, and the tools and resources that may be involved at this stage of the process.

**Maintain and Retire Stage**

The process of maintaining and retiring learning objects can be improved over the traditional ISD process used to build monolithic courses. Because each RLO has metadata, an author can find the RLOs that need to be updated by a number of criteria, including expiration date, learning objective, subject, task, or audience, to name a few. During an update cycle, an author may change part of the RLO, in effect returning it to the design or development stage of the ISD process. By focusing only on changed RLOs, it is possible for an author to save time and resources in updating smaller pieces of a course than in the past.

Learners may be alerted to only those items that are revised through the metadata associated with the RLO (version or history) and the metadata about the learner (RLOs completed, change notification preferences). For example,
A learner may take a series of RLOs that are tracked by the LMS. The author then updates only one or two of them during a revision cycle. If the integration between authoring, the LMS, and delivery is set up correctly, the learner should be notified of the change and provided a link to only the new or updated RLO.

<table>
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<tr>
<th>Table 5.7. Impact of Metadata on Delivery and Access</th>
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<tbody>
<tr>
<td><strong>Amount and type</strong></td>
</tr>
<tr>
<td><strong>Where to apply</strong></td>
</tr>
<tr>
<td><strong>Tools used</strong></td>
</tr>
<tr>
<td><strong>Human resources</strong></td>
</tr>
</tbody>
</table>
When updating an existing RLO, authors must be aware of reflecting changes in the metadata values for that object. A simple example is to include a revision history note as metadata and update the expiration date. If the changes to the RLO are significant, then the author may change other values, such as the description and learning objective.

Finally, you may need to retire an RLO and remove it from the system. The authoring tool could use the expiration date to alert an author automatically when a course is about to be retired. The author could then go into the authoring tool to extend the life of the object, update its contents, or allow it to be retired. The only new piece of metadata you may require in this case is a note that explains why the object was retired, and what if any other RLOs fill the gap created when the old one was removed from the system. Of course, the concept of retiring an RLO assumes that any links to that RLO are also alerted to its removal as an active RLO.

Table 5.8 reviews the amount of metadata, where to apply the metadata, and the tools and resources that may be involved at this stage of the process.

**Evaluation Stage**

As mentioned in the previous section, evaluation data may be captured by your delivery system and used by authors as they update those RLOs. Another approach is for the delivery system to track all the evaluation comments that were made on an RLO and simply store the URL to the evaluation report with each RLO. That way, authors will be able to access the evaluation data, but will not have to find a way to integrate every single learner’s evaluation report back into a metadata field for the RLO. If there are thousands of evaluations for an RLO, the size of the database alone will likely prevent you from including that information directly in the RLO’s metadata.

It is also possible to collect evaluation metadata at each stage in the RLO-specific ISD process as the RLOs are reviewed by stakeholders, SMEs, and learners (during pilot rollouts). Any comments made during these reviews could be linked either directly or indirectly to the RLOs. This way, the review metadata and sign-off metadata are always available as the RLOs move from one stage to the next in the ISD process. Although this type of metadata has little value to the learner, it is critical for your authors to be able to find, review, and acknowledge review comments easily on each RLO.
### Table 5.8. Impact of Metadata on the Maintain and Retire Stage

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amount and type</strong></td>
<td>Depend on level and number of RLOs being updated. If RLOs are changed, authors will need to go through the development process again, validating the metadata along with the updates to their content. At a minimum, metadata should track history and version information.</td>
</tr>
<tr>
<td><strong>Where to apply</strong></td>
<td>Any level of the RLO hierarchy could be updated depending on your update and revision policies and procedures. For example, if a typo in a definition RLO is updated, you need to decide if that version of the metadata will be applied to only that RLO or to each RLO that contains that definition (the RLO’s parents).</td>
</tr>
<tr>
<td><strong>Tools used</strong></td>
<td>The same tools you used in creating the original RLO will likely be used as you circle back into development. Other tools may be used if you are reviewing separate learner evaluation comments about the RLO. Again, integration between the LMS, evaluation system, and RLO authoring tools is key for a smooth process.</td>
</tr>
<tr>
<td><strong>Human resources</strong></td>
<td>As with any update cycle, the resources you need will depend on the number of RLOs you are updating. Because the bulk of the metadata for each RLO will remain the same, and only fields like history and version will likely change, you should realize a savings in time dedicated to metadata creation and editing during this phase.</td>
</tr>
</tbody>
</table>

Table 5.9 reviews the amount of metadata, where to apply the metadata, and the tools and resources that may be involved at this stage of the process.

**IS IT WORTH THE COST?**

It could be argued that the advantages of using metadata outweigh the costs. Just as you would not open an on-line retail store without a way for customers to find your products, you would not implement a database of reusable learning objects without an organized and well-documented set of search criteria (metadata) for...
both authors and learners to employ. Metadata plus the correct tools enable the benefits of RLOs. If you are sold on those benefits, then you simply need to place an acceptable dollar figure on capturing metadata.

Be warned, however, that collecting metadata may result in diminishing returns. Figure 5.1 illustrates how costs continue while the benefits start to diminish.

### Table 5.9. Impact of Metadata on Evaluation

<table>
<thead>
<tr>
<th>Amount and type</th>
<th>If you currently have learner and review evaluation forms, they likely contain the same type of questions you will include in your RLO-based evaluations. The number will depend on what you feel is important in ensuring the quality of the RLOs as they move from design to delivery.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where to apply</td>
<td>You will need to determine at what level of the hierarchy you want to conduct the RLO evaluation. Traditional evaluations have focused on the course or lesson; with a database-delivered RLO course it is possible for even the smallest media object to have its own evaluation.</td>
</tr>
<tr>
<td>Tools used</td>
<td>This is tied to the capabilities of your authoring and delivery systems. Some have built-in review and evaluation features. If you are delivering ILT from the RLO database, then you will likely use your traditional evaluation collection methods (such as paper forms or scanning technologies).</td>
</tr>
<tr>
<td>Human resources</td>
<td>Learners will complete evaluations. However, to use that data, the evaluation, authoring, and delivery systems must be integrated. Your authors may need to summarize the evaluation data manually and then enter that summary data into the RLO metadata fields during the revision stage of the ISD process. The amount of work required by authors depends on how you want them to summarize the evaluation results collected by the delivery system. If there are hundreds of responses, then the author may have a formidable task in synthesizing that data for a single metadata entry.</td>
</tr>
</tbody>
</table>
If you decide that every word on a page needs hundreds of metadata values and that every RLO in your hierarchy needs hundreds of metadata values, then your overall learning object strategy will likely fail based on the sheer cost of metadata tagging. Furthermore, you may include so much metadata that searching and finding RLOs will become more of a burden for authors and learners than it would be with only a few simple, very powerful metadata values.

Even with a small metadata requirement for your RLOs you will face some change management issues, because your authoring community may be reluctant to spend the time required to tag the RLOs with enough metadata to realize the full benefits of your strategy. To convince your authoring community that the process is of value, start by promoting the advantages of the overall RLO strategy.

Your first priority may be to get authors to design and develop RLOs without metadata, or with very little metadata. This could offset the cost of implementing metadata at the start of your transition to RLOs; instead, you might build it during your maintenance cycle or when your metadata tools are fully in place. Ease into metadata with a few basic tags like objective, author, and audience. Also, focus on a specific size RLO to tag, and consider which levels of your object hierarchy you really need to tag. By starting with a few simple, well-placed metadata tags, you may get your authors and editors comfortable with the change in their processes and let them start accepting the benefits of metadata.

Phasing in new metadata requirements over time will also save you money. You can simply add more metadata to each version of the RLO, or as new RLOs are added to the system. However, this method will only save you money if you do not have to retrofit hundreds of legacy objects that are never updated or retired. If this
is the case, then you will need to budget the addition of new metadata tags into your revision cycles. The cost of retrofitting RLOs could easily outpace that of applying all the metadata tags when they were first created.

Another way to gain acceptance in your organization is to sell the benefits of metadata for learners. The value learners gain from searching, prescriptive learning, competency maps, professional development, multiple delivery formats, user preferences, and so on, all accrue from metadata. Again, these advantages will vary greatly depending on the power of your delivery tools and systems. At minimum, the fact that learners will be able to search out a specific learning object to meet their performance needs should help your sale of the idea of metadata.

Of course, if you are simply adopting RLOs in the design phase and either are still delivering instructor-led training or do not have the tools in place that utilize the ideal e-learning delivery environment, then it will be difficult to convince authors and your organization to spend resources tagging objects with metadata. If you cannot use the metadata, then you need to ask, “Why include it?”

IMPLEMENTATION CASE STUDY

To ensure that all of Cisco’s metadata needs would be met, fit all of the full system requirements, work across departments, and align with emerging metadata standards such as the IEEE, Cisco formed a metadata framework (MDF) committee. Team members from the RLO strategy team worked in parallel with the MDF committee to ensure that the metadata they had been using with their new RLOs fit within the larger Cisco Systems metadata scheme. During this period, the RLO strategy matured, the MDF completed its companywide standards, and the IEEE completed the LOM P1484.12 standard. The result is that while an RLO may not use every possible metadata tag, the values between internal and external standards are documented and the authors understand what values are required to meet their business goals.

In order to accomplish this convergence, the RLO strategy team determined which values would be required and which would be optional. The group then identified three Cisco-specific extensions: product description, technology, and job task. Along with the IEEE metadata, these three extensions had a predefined set of vocabulary terms that authors would need to use to describe an RLO’s relationship to Cisco products and technology and the job task that the RLO was focused on.
However, RLOs had been created during this same period of time using a system that did not support metadata. Even so, Cisco moved forward with its RLO strategy, planning on retooling those RLOs with metadata once the MDF was finalized and the tools supported metadata. The first step was to begin capturing metadata in the design document. Using an MS Word document, with a detailed outline for each RLO type, five to ten metadata values were required as part of the design document sign-off. Along with the design document, these metadata were updated during the RLO development, so that they were always correct. Although this method did not allow for search and reuse (because the RLOs were stored in simple MS Word documents), it did make it possible to retrofit each RLO into the RLO database when it was in the development phase.

ILSG assigned one full-time employee to support metadata, train authors, and validate that the internal and external standards were being followed. This person provides job aids on how to enter the information into the tool and makes the business case for why this is of value to both the author and the learner. Likewise, all program managers and review teams are aware of the metadata requirements.

As Cisco moves forward with its RLO strategy and application of metadata, it is keeping abreast of industry standards and participating in groups like CLEO (described earlier) to optimize its metadata implementation. As we already mentioned, CLEO added a few extensions to the LOM that Cisco had not addressed in its original metadata implementation. By leveraging the work of CLEO and the LOM P1484.12 standard, Cisco has supported its vision for RLOs to be developed, delivered, and updated on either internal or external systems, and also moved back and forth, without the loss of metadata.

**CHAPTER REVIEW**

At this point you should understand the trade-off between having rich, fully descriptive metadata about every learning object at every possible level of the hierarchy and having no metadata at all. For example, if you are simply chunking your training using traditional tools, not using a database to store your objects and not planning on supporting e-learning, then metadata will have little impact on your strategy. In contrast, if you plan on migrating your traditional tools to a database and moving your learning objects from the classroom to the Web, then
defining your metadata standards is critical. Recognize the amount of metadata you can use today and tomorrow.

In this chapter you learned just how important metadata are to the success of your overall RLO strategy. Unless authors and learners can search your ever-growing database, the system will ultimately fail. You will end up with a huge database of RLOs but no easy way to reuse them during the authoring process or access them during delivery.

This chapter answered the following:

- What are metadata?
- How are they used?
- What about the standards?
- How do you use the standards?
- Where are metadata used?
- What tools will be needed to use metadata?
- What will the impact be on your process?
- Is it worth the cost?

In Chapter Six we will help you begin building your transition plan. You will follow this plan as you begin to transform your current training and performance improvement programs from a more traditional development process to one that is RLO-focused.

**RLOs in Action: Setting Up Metadata**

NoWaste has decided to comply with the metadata values listed in the IEEE learning object metadata standard. However, the company is concerned about requiring authors to capture a great deal of metadata before having an RLO-based authoring and delivery system in place that can make use of the metadata. The managers recognize that metadata is important, and the cost of going back to add metadata once the tools are in place could be excessive. However, the RLO strategy is already facing some adoption challenges in meeting time lines and getting authors comfortable with new guidelines, templates, and RLO-based writing styles.
The RLO task force recommended that a smaller, select set of metadata be used in conjunction with traditional tools during the analysis, design, and development phases. This might require creating a separate file to document and house metadata, using hidden text in word documents or table cells that list metadata for each RLO in a given course. NoWaste’s information technology group suggested a simple database program that might be used with Web-based templates to house metadata. This would require manual updates by authors as each RLO moves from analysis through delivery. The documentation group, in contrast, suggested creating a place for metadata in all the templates created as a result of the 401k benefits pilot, because that was done using current, non-RLO tools. NoWaste decided that this proposal seemed best for the short term.

The following metadata fields will be included in the first phase of the RLO implementation. Note that these metadata are required at each level of the hierarchy used in the RLO-based course or solutions. Again, the more levels in the hierarchy, the more metadata will be needed. Because this is all being collected through traditional tools, no automated inheritance between levels is possible.

**Phase 1 Metadata**

- Title
- Description
- Author
- Expiration date
- Objective
- Content type
- Hierarchy level
- Target audience
- Primary delivery media
- Product type
- UPC
- Supplier
Moving forward, NoWaste is requiring that logic metadata, such as hierarchies, parent-child relationships, owners, groups, and reuse links, be tracked and stored by the RLO-based development tools automatically. In addition, the RLO-based development tools must be able to draw metadata from the product information database and retail point-of-sale terminals. The information technology group at NoWaste has been tasked with solving the future automation of the existing product metadata, point-of-sale terminals, logic metadata, and learning object metadata.

Everyone on the RLO strategy task force agrees that the benefits of metadata are worth their cost. The complete vision of metadata in NoWaste’s strategy includes a rich search engine for authors, learners, and customers. In addition, the delivery engine will be able to use a combination of personal preferences and RLO metadata to deliver personalized and prescriptive learning environments. Again, adjustments to the metadata requirements are likely to be made based on the capabilities of the development and delivery tools and the integration with current sources of product metadata. Future budgets should account for these adjustments to existing RLOs.
Applying Metadata Worksheet

1. How will you use metadata?
   - Author search
   - Learner search
   - SME search
   - Vendor search
   - Other:

2. Working with the diagram you created in Chapter Two (Item 6 on the Chapter Two worksheet) showing the levels of content hierarchy, identify all levels in your hierarchy that will include metadata. (At a minimum you need metadata for each level above the “reusability” line you added.)
3. What forms of assistance will you provide authors to ensure that metadata are created and added consistently throughout the organization? Will you provide the same assistance to vendors (if applicable)?

4. What types of specific metadata will you collect for each phase of the training process?
   Analysis stage:
   Design and mine stage:
   Development stage:
   Delivery and access stage:
   Maintain and retire stage:
   Evaluation stage:

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5. What standards will you apply to metadata?

6. How will you “police” metadata to ensure accuracy and consistency?

7. Do you need a plan to “sell” the creation of metadata to authors? If so, draft an outline of the plan.
In the previous chapters you defined your RLO strategy, analyzed the impact of RLOs on your development process, and identified the tools and templates you will need to implement RLO authoring and delivery. What is left? It would be great if you could simply flip the “on switch” and have your entire organization produce RLOs, giving your learners all the benefits of granular, personalized, just-in-time training and performance-support materials. However, as you know, there is no such magic switch, and nothing about organizational change is as simple as one would hope. Besides defining your strategy, tools, templates, and resources, you will need to address the changes that will occur in your organization as a result of implementing an RLO strategy. All these processes, tools, and standards will be new, and you will have to convince your organization of the return on investment, the authoring benefits, the learner benefits, and the overall value of making the transition to reusable learning objects.
With that in mind, here are the key questions we will address in this chapter on transition planning:

- Have you defined your hierarchy and granularity?
- Do you have management support?
- Will your organization embrace change?
- Do you currently use templates?
- Have you updated your development process?
- Have you identified your authoring tools?
- Have you identified your delivery tools?
- What is the expected return on investment?
- Are you ready to implement your strategy?

The chapter concludes with a readiness decision table that will help you answer the last question and build a project schedule. You will be able to rate your ability and confidence in moving forward with a learning object strategy today rather than at some time in the future. The results will allow you to determine if you are ready you to “turn on” your strategy today or should wait to phase in your transition plan over a longer period. Each option has advantages and disadvantages that you will need to evaluate before going forward.

**HAVE YOU DEFINED YOUR HIERARCHY AND GRANULARITY?**

Earlier in the book, you defined your learning object structure. Ideally, you identified the type of objects you will need in your solutions, be they training or performance-support solutions. By using a job-task analysis you also determined the level of possible reuse for each level of granularity in the resulting hierarchy of learning objectives (and corresponding RLOs). Finally, you now have a plan on how these RLOs will be accessed by learners—for example, as part of a directive course hierarchy or a guided discovery learning environment, or inside a performance-support system.

One group at Cisco Systems has structured their lessons based on concepts, facts, principles, processes, and procedures. Each of those objects is further divided into blocks, which contain text, interactions, or raw media. From a database point
of view, each of these objects, from the largest course down to the media elements, is available to authors. However, the first reuse application came at the lesson level, because those smaller objects were not as valuable to the authors or learners out of their original context.

From the learner’s point of view, accessing all levels of the hierarchy is limited by the learning management system (LMS) that is “registering” the hierarchy. Currently, authors publish their lessons or courses in Cisco’s LMS. Learners then sign up for them. Because of the labor involved in telling the LMS about the RLO hierarchy, learners are not able to drill into smaller elements such as concepts, facts, principles, processes, or procedures, without going first into the course. However, Cisco is planning to allow learners to access smaller elements directly, bypassing the larger course structure.

This Cisco example highlights the need to have a well-defined RLO hierarchy. Recognize that you may have a phased implementation, applying tools, guidelines, and metadata to support more granular access to objects over time. Our advice is to document clearly your learning object hierarchy and identify the levels of reuse for authors and learners. Think about how these objects will be tagged with metadata, tracked, updated, and searched. Then determine your implementation schedule for this hierarchy.

Redwood Credit Union will basically follow Cisco System’s model on hierarchy and granularity with one notable exception. Initially, RCU’s delivery channels will be instructor-led courses or complete manuals. This makes its delivery system much simpler, because learners will only be able to access training at the course or manual level. RCU is not concerned at this time with accessing smaller chunks. However, the company is still establishing a hierarchy and building objects that will allow the same type of learner access mentioned in the Cisco Systems example.

DO YOU HAVE MANAGEMENT SUPPORT?
The support of upper management is key to implementing anything as large as a learning object strategy. As you know by now, a full-featured RLO strategy will require a number of changes in tools and processes—not to mention the challenge of integration with existing systems and the associated labor costs. Maybe you are lucky enough to have a mandate from the CEO level down to your managers to “do e-learning” or to “solve the performance gaps at any cost.” Or maybe the CEO
has heard of these things called “learning objects,” thinks they are a good idea, but is not aware of all the costs and integration efforts they will require for implementation in your organization. At worst, you have a management structure that resists change, has tight budgets, and needs solid return on investment figures (especially those coming from the training group).

As you can imagine, you can quickly be forced into the role of salesperson. As the spokesperson for the RLO strategy, you may need to take numerous actions to gather the support you need. You will need to perfect your five-minute elevator sales pitch as well as provide detailed reports on the value of learning objects. Perhaps you will need to create a list of examples from other companies that have implemented the strategy and highlight the benefits for authors and learners. You can explain the phases in your approach, including milestones and ROI figures along the way. Each manager has a different hot button—that point where he or she opens the checkbook and sees the RLO strategy as a solution rather than needless overhead. Finally, do not forget to sell the partnerships that you will forge with external vendors and your internal IT group.

In reality, you will likely face a wide spectrum of management support—from a mandate to create RLOs to a “prove it to me” attitude. No one will get a blank check or an unlimited budget for an RLO strategy, but having management support will make it possible for you to acquire the resources, vendors, and tools you will need. In addition, management support will help answer the next question: how your organization will accept the change to learning objects.

Redwood Credit Union’s situation is unique. Because the training function is relatively new, management is allowing the program to be developed with learning objects as a foundation from the beginning. The only concern in the future will be the cost of purchasing an RLO-based authoring tool.

**WILL YOUR ORGANIZATION EMBRACE CHANGE?**

Once you have management support, getting the rest of your organization to embrace or accept the change should be easy, right? Well, as you have probably noticed by now, implementing RLOs can mean a lot of changes, pitfalls, and growing pains. The changes can be especially acute if you are introducing all aspects of your RLO strategy at once—for example, having all the authors use a structured writing format like Information Mapping, or CFP3, with new writing guidelines,
new database authoring tools, and the application of metadata. Any one of these changes alone will require a great deal of effort to roll out successfully; trying to do it all at once can be overwhelming and result in failure. Again, a mandate from management will help, but if your authors, editors, SMEs, and learners all push back on these changes, your strategy will never live up to its full potential or even make it out of the starting gate.

When Cisco Systems rolled out its first-generation RLO authoring tool and strategy it met some resistance. Even though management supported e-learning, and the CEO mandated that Cisco would be an e-learning leader, individual authors had to accept the changes. The first round of RLO training attempted to combine new writing guidelines, metadata requirements, structured writing templates, and a new database authoring tool all at once. To make matters worse, Cisco’s first-generation authoring tool often failed during the early RLO training workshops. This created an environment of doubt, not just about the authoring tool but about the overall RLO strategy, and these doubts quickly spread among authors and SMEs.

As it turns out, each change should have been handled separately. Authors needed to know about the benefits of the RLO strategy. They needed proof about writing for granularity and reuse. They needed to see examples from their knowledge domain using the concept, fact, process, principle, and procedure templates. They needed to know about changes in development times, tools, and incentives. To solve this acceptance problem, Cisco changed its tactic and phased in the strategy, rolling out each change separately, addressing authors’ concerns, providing examples, and providing tools that mirrored their traditional authoring tool set. It also provided specific training on RLOs and partnered with content developers and authoring tool vendors who shared its RLO vision.

So how do you handle change, prepare for it, and have methods to answer the challenges you may face? One idea is to hire a change management firm or consultant to work with you during your RLO implementation. If this is not an option for you, then there are many Web sites, books, and other resources that cover organizational change. For example, www.change-management.org lists a number of books, articles, and case studies on the topic of change management. We also suggest this simple yet powerful change management model, found on the Business Process Reengineering (BPR) Web site (available at http://www.prosci.com/adkar-overview.htm). BPR is a “comprehensive directory and
resource guide” for reengineering and change management in organizations. The group offers on-line tutorials, benchmarking results, and other resources. One is the following ADKAR change management model:

- **Awareness** of the need for change
- **Desire** to make the change happen
- **Knowledge** about how to change
- **Ability** to implement new skills and behaviors
- **Reinforcement** to retain the change once it has been made

Each phase of the ADKAR model suggests the actions you should take in managing a big change, such as implementing an RLO strategy (see Hiatt and Creasey, 2003). According to the ADKAR overview Web page, this model “can help you plan effectively for a new change or diagnose why a current change is failing.” Let us explore how you may apply the ADKAR model.

You can start building **awareness** of your RLO strategy through your internal Web sites, e-mail, and brown-bag workshops. **Desire, knowledge, and ability** require a bit more effort, so you may want to enlist the support of a team of authors, editors, learners, and managers who accept the benefits of your RLO strategy. You can then provide that team with the tools they need to roll out the strategy in their functional areas. This team could help build the desire, share the knowledge, and help train their groups (that is, give them the ability) to adopt the RLO strategy. If management and peers support the RLO strategy, ongoing **reinforcement** will be much simpler. At each stage, remember to go back to your list of benefits and make as many of those as you can as tangible and relevant for the team as possible. Provide team members with tools they can pass along to others. You may also want to ensure that everyone feels that the RLO strategy is shared, not owned by or mandate by the training group.

No matter how you handle the changes imposed by the RLO strategy, you need to be ready for roadblocks and challenges along the way. Managing these changes will take time and extra resources on your part. You should plan for this, and try to anticipate where you may have difficulties. This will help ensure that you achieve critical mass for your RLO implementation, that it will be embraced and used, and that it will ultimately fulfill its promise.
Once again, Redwood Credit Union has an advantage in this area. Since the company began building the training function with RLOs in mind there is no “change” for the organization to embrace. It recognizes this as a true benefit that many others may not enjoy.

DO YOU CURRENTLY USE TEMPLATES?

Most training groups use models and templates to build their solutions. Templates can be used to produce a wide range of deliverables, including your design document, instructor-led training materials, e-learning screen layout, lesson hierarchy, and writing style, to name a few. If your current development process uses these types of templates, you may be able to modify them to fit your learning object strategy. Although your current templates may not match your strategy, they may be a good place to start the transition to learning objects. Furthermore, if your authors are used to using templates and are open to the idea of updates and changes to the templates, then you may have a better chance that the new learning object templates will be used.

As you review your current templates, assess how they may be used in your RLO strategy, what elements are missing, and the level of changes you will need to make. For example, if you have a lesson template, it is likely missing the metadata you want to capture at each level of the hierarchy. Likewise, if your current lesson template is written in a tool like Microsoft Word, then you will likely want to add tables that list the key metadata you want the authors to capture. You may also want the authors to classify the types of information in the lesson, breaking pages down as concepts or principles that contain definitions, analogies, examples, and so on. Your modified template may also reference the media objects in the lesson, such as graphics, audio, and video.

One point we need to discuss about changing templates is your authority to do so. Some templates may deal with corporate identity, trademarks, and “look and feel”—items that you will not be able to change without involving other groups in your organization. Luckily, the RLO strategy promotes the idea of separating style from function. Each object focuses on the instructional content, interaction, and assessment and is free of look-and-feel constraints.

However, your organization may use design and development templates that you do not own and therefore cannot change. For example, perhaps your
instructor-led training is built using a template that structures the lesson to end with a lab, and optional practices are placed at the end of a module. You may also find that all print materials must start with a slide and that only four paragraphs can follow each slide. Slides must be on the left-facing pages, and only one level of headings can be used. These existing templates may encompass both instructional and content structure to graph and print layout. Your challenge is to work with your instructors to modify their delivery or to identify those elements in the existing ILT templates that may be good “objects” as a starting point in the conversion to your RLO-based templates.

Again, you are working with existing templates that you cannot directly change, so the best you can do is consult on how what they are using today may work with the RLO strategy of the future. Getting them to see the possible overlap between templates, and ideally, adopt the future vision become change management issues. You will need to negotiate the changes to the existing template and determine the cost of the changes. You may decide to roll out your RLO templates in phases, waiting until you gain buy-in from your current template owners and those who use them.

Templates are another hot change management topic that can become less so in a smaller organization. Cisco Systems has literally hundreds of authors, SMEs, and outside vendors who will ultimately use the templates it establishes. In contrast, at Redwood Credit Union three people need to agree. These kinds of advantages allow smaller organizations to benefit from an RLO strategy without going through the turmoil that larger organizations face.

**HAVE YOU UPDATED YOUR DEVELOPMENT PROCESS?**

In Chapter Three we described the differences between traditional instructional system design (ISD) and RLO-based design. You may recall that your changes can be extensive, depending on the new tools, templates, and writing styles you implement. In Chapter Three you identified the areas in your current development process that may change when you adopt an RLO process. Of course, you cannot anticipate all the changes you will face until you get the chance to implement your templates, authoring tools, and delivery tools and get your authors and vendors up to speed on creating and reusing learning objects.

Keep in mind that if you already have a firm, reliable, repeatable process, then modifying it for RLOs may be a relatively simple thing to do. In contrast, if you
have not established a formal process or are skipping steps in your current training development process, then you may find it more challenging to change to any new or formal process, let alone an RLO-specific one.

So have you identified all the changes in your process? Probably not, but at least you are starting to document those areas where you may face some challenges. Look back at your notes on the changes you will need to make to implement RLOs. Did you list those that will occur at each phase? What percentage of the process will change: 10 percent, 30 percent, 50 percent, or unknown? Try to quantify the amount of change and the potential risks you may face in completing your training solutions. This will help you determine if you are ready to change your process to one that is specific to RLOs.

**HAVE YOU IDENTIFIED YOUR AUTHORING TOOLS?**

You will likely use a number of authoring tools in your RLO strategy. At each stage of the RLO development process, you may leverage existing tools along with new RLO-specific tools. As we mentioned in Chapter Three, there is no single authoring tool to handle all the possible functions that you will want to perform as you move from analysis to development. That is why it is best to plan on using a mixture of tools, including some you have today and others that are specifically designed to support a shared database of RLOs.

For example, during the analysis phase your strategy may call on the database to research existing solutions. During the design and mine phase you will—ideally—call on a rich database of existing objects, matching some to your performance gaps in creating new training and performance solutions. Then, when you enter the development stage, the tool set will allow you both to author new content and to assemble media-rich elements in the RLO database. Perhaps your new authoring tools will allow you to repurpose and reuse existing RLOs, regardless of their level of granularity. The tools may also support the creation of simulations, media elements, learner interactions, and so on. Or you may find that a number of tools are needed to build these elements, and you will simply use the authoring tool to assemble those objects into a database.

You could also use existing tools, such as Microsoft Word to document your analysis and design. Perhaps you already use a spreadsheet to collect and tabulate your evaluation results. During development, maybe you are building interactive
practices or simulations with tools like Macromedia Flash. Each of these tools could be used to support your learning object development. What new tools you will want to adopt at each phase of the RLO development process will depend on the objectives you stated in your RLO strategy, and the time line you established for its implementation.

Your strategy may simply be to teach authors how to chunk data into reusable objects using traditional tools to support your current instructor-led training. In this case, you could phase in the database tools for authoring and assembly in order to support e-learning or performance-support tools. This may help you begin your transition to RLOs today, as you implement new RLO-specific tools.

Obviously, the question of authoring tools can be a slippery slope. The more bells and whistles, features and functions, and process automation you demand, the more challenging your hunt for tools will become. If your RLO strategy is grandiose, you will likely find numerous gaps in your current tool set, thus reducing your ability to make the switch. Once again, you may discover that a phased approach is the best way to get started with RLOs.

**HAVE YOU IDENTIFIED YOUR DELIVERY TOOLS?**

Delivering your learning solution is arguably the most important element in your RLO strategy. Providing learners with the solution that meets their job performance needs is critical to your success. Your strategy should list how your learners will access the learning objects that will define the required delivery tools. As you know, delivery options can range from an instructor in a classroom to a Web page that is personalized for the individual learner, providing job tasks, performance-support tools, and related training resources. All of these could be objects in your dynamic database.

Chapter Three talked about the gaps between your current delivery tools and those specified in your RLO strategy. It is possible that you will decide simply to change your writing style to be more object driven, requiring no changes in your current delivery tool set. Perhaps you are going to focus your delivery on e-learning structures through static HTML pages. Although the content on those HTML pages was designed using RLO templates and principles, the actual authoring and delivery tools are the same ones you are using today. In future phases you may move that HTML content to an RLO-based database for dynamic delivery, supporting directive and guided-discovery learning architectures.
Just as with the authoring tools, your delivery needs will likely be met by multiple tools from multiple vendors. The important thing to do is to identify the functions you need from the delivery tools to meet your ideal state, and then determine how much time you will need to get there. This will form a delivery requirements document that you can use to find vendors and partners to help make your RLO vision a reality.

Having a clear vision of your delivery needs will trickle back through your design and development tool decisions. Obviously, you need tools to design and build the delivery solutions spelled out in your RLO strategy. For example, if your delivery demands include group collaboration, then your authors will need a tool set to communicate that solution as part of the RLO along with any supporting content or instructions the learner will need to succeed in that collaborative environment.

Delivery requirements need to be fully defined more than any other aspect of your RLO strategy because of the impact on your learners. Your strategy should document how learners will access your performance solutions and training courses, including instructor-led training, e-learning, on-line mentors, remote collaboration, virtual classrooms, live chat rooms, learning profiling, dynamic content, or prescriptive learning, to name a few. Each of these is an area that should be covered in your strategy and can therefore be pulled out and placed in a formal tools requirement document as you search for vendors.

**WHAT IS THE EXPECTED RETURN ON INVESTMENT?**

Defining your expected return on investment for an RLO strategy can be very complex, perhaps the most difficult question to answer when determining your readiness to implement the strategy. You may be in a fortunate position where your organization has tracked existing development costs, has correlated learning outcomes and training to the bottom line of the company, and has data that list the ways in which your existing training initiatives affect the business. For many training groups, this type of baseline data do not exist. You may simply be developing training and performance solutions, and conducting Level 3 evaluations. (Did students use what they learned on the job?) In contrast, you may want to conduct a Level 4 evaluation to calculate the return on investment and the impact on the business. Although Level 4 may be more difficult and costly to gather, it does provide you with the bottom-line results that you will need, especially when you
are justifying the costs of a new global initiative like an RLO strategy. Regardless if you are using Level 3 or Level 4 evaluations, you will need to establish success criteria for the implementation of RLOs. If baseline data do not exist, or if you cannot afford to conduct a Level 4 evaluation, then you could be in trouble if management comes back a year from now asking for proof that the strategy has been worth the costs. Agree up front to what you will measure, how you will measure it, and what changes you will need to see in those measures in order to call the project a success.

Throughout each chapter in this book, we have addressed the benefits and costs of moving to RLOs. We hope you have made detailed notes in your learning object strategy on the benefits and costs. Again, the benefits extend to the authors, the learners, and the organization. When you write down each of these benefits, also suggest how you will “prove” each. Then place a dollar figure next to them all.

On the cost side, look at each challenge. Find out what each challenge may cost your organization. Finally, look at other resources you will need to implement and maintain the learning object strategy. Try to find items that you did not put in the benefits or challenges lists—perhaps training your authors, initial loss of productivity due to changing tools and templates, software costs, IT support, and so on.

Unfortunately, we do not have a formula to give you to answer the question about your return on investment. Most companies that have implemented a learning object strategy have done so on faith that it will in fact pay off in the long run for authors, learners, and the bottom line.

At Cisco Systems, for example, managers clearly defined the business problems the RLO strategy was intended to solve: update content quickly, reuse learning objects across courses, support both instructor-led training and Web-based training with the same objects, standardize training development tools and processes, improve the learning experience, support ongoing learning, provide just-in-time job aids, and other forms of performance support, to name but a few. Many of these objectives did have some baseline data. And there was an expectation from the team that the benefits of implementing RLOs would greatly outweigh the costs. However, the plan did not specify a time line for these returns, or the exact percentages desired as they moved forward. Once Cisco achieved critical mass of learning objects, stabilized the authoring tools and process, defined the evaluation methodologies, and ensured that all quality measures had been put in place, it was able to start exploring the return on investment.
Your strategy for calculating return on investment may be similar to Cisco’s. Perhaps you will take a leap of faith and implement the change to learning objects. Acknowledge that you may not have all the answers when you begin and that you may have to retool, suffer a false start, and achieve critical mass of learning objects before a true impact is felt. Once you reach that point on the horizon, you can collect your ROI information. Look back to the historical data (before you began the RLO strategy) and do your comparison. If this is your proposed solution, acknowledge that today in your ROI plan. State that you expect a percentage of improvement or increase in some measure. But make it a conservative estimate: maybe a 20 percent increase in author efficiency, 15 percent reuse of learning objects, 40 percent increase in the delivery modes being offered (if choice is valued by your organization). Again, predict and track those returns your organization finds important and set expectations for when these numbers should be researched.

**ARE YOU READY TO IMPLEMENT YOUR STRATEGY?**

Now look back at how you answered all the questions asked in this chapter. Be honest. Did you have a clear answer for each? If not, how important is that question to the success or failure of your RLO strategy? Your ability to roll out your strategy, to have it successfully adopted by authors and learners, and the overall risks involved can be determined by going through this exercise for each question. The readiness decision table (see Table 6.1) provides a method for you to capture that data. Once it is captured, you can determine if you need to narrow the scope of your RLO strategy or build more phases into your implementation process.

Let us say, for example, that you give yourself a readiness score of 0 on a specific question. This indicates that you have not completely answered that question. You need to spend more time or gather more data. Perhaps you need to update or narrow the scope of your RLO strategy to boost your readiness. In contrast, you may give yourself a 5 for a specific question. This indicates that you have completely answered this question and are ready to move forward per your project plan.

As you answer the questions in the table, also think about the importance of each one to the success of your strategy. If that question has low importance, then
it is not key to the success of your strategy. You do not need to answer this question fully in order to move forward. If, in contrast, you determine that this question is of high importance, then it is critical to the success of your strategy. You should not move forward without addressing the question or your strategy will fail. Obviously, the more questions you list as high, the more complete your RLO strategy should be before you can successfully implement it.

For example, perhaps you scored question number 1 “Have you defined your hierarchy and granularity?” with a readiness level of 5 and a high level of importance. This is a good combination, because it indicates you are ready to move forward and are confident in your object hierarchy as defined in your RLO strategy. But if you had a readiness level of 1 matched with high importance, then you would need to look at your RLO strategy and determine the hierarchy before moving forward with your implementation.

Let us look at how Redwood Credit Union responds to the readiness decision table. Remember, this is a small organization (some two hundred employees) that was able to create a training function centered on learning objects to deliver classroom training and complete manuals.

### Table 6.1. Readiness Decision Table

<table>
<thead>
<tr>
<th>Implementation Area</th>
<th>Readiness</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you defined your hierarchy and granularity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Do you have management support?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Will your organization embrace change?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Do you currently use templates?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Have you updated your development process?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Do you have authoring tools in place?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Do you have delivery tools in place?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. What is the expected return on investment?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Readiness: 0 to 5 (0 = not answered, not ready; 5 = completely answered, completely ready). Importance: low to high (low = answer is not required; high = answer is critical to RLO strategy’s success).*
Here is how RCU rates itself:

<table>
<thead>
<tr>
<th>Implementation Area</th>
<th>Readiness</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you defined your hierarchy and granularity?</td>
<td>5</td>
<td>High</td>
</tr>
<tr>
<td>2. Do you have management support?</td>
<td>5</td>
<td>Medium</td>
</tr>
<tr>
<td>3. Will your organization embrace change?</td>
<td>3</td>
<td>Low</td>
</tr>
<tr>
<td>4. Do you currently use templates?</td>
<td>5</td>
<td>High</td>
</tr>
<tr>
<td>5. Have you updated your development process?</td>
<td>5</td>
<td>High</td>
</tr>
<tr>
<td>6. Do you have authoring tools in place?</td>
<td>3</td>
<td>High</td>
</tr>
<tr>
<td>7. Do you have delivery tools in place?</td>
<td>5</td>
<td>High</td>
</tr>
<tr>
<td>8. What is the expected return on investment?</td>
<td>0</td>
<td>Low</td>
</tr>
</tbody>
</table>

Note: Readiness: 0 to 5 (0 = not answered, not ready; 5 = completely answered, completely ready). Importance: low to high (low = answer is not required; high = answer is critical to RLO strategy’s success).

As you can see, RCU has only one remaining area of concern: authoring tools. It will ultimately need a robust authoring tool to allow it to reach its final results. However, the company will be able to start laying the foundations of its overall RLO strategy and roll out the authoring tool in the near future.

CHAPTER REVIEW

In this chapter we talked about your schedule and the possibility of rolling out your RLO strategy in phases, over time. You evaluated your readiness and calculated your readiness score, or confidence level.

Your readiness score may indicate that you need to take a phased approach in adopting your RLO strategy. Perhaps you can begin with templates, then move to tools, authoring, and delivery. If you can afford to document processes as you go, then perhaps you will be OK building the process over time.

Whatever the outcome, it is important to document your answers to these questions. Use the readiness decision table to create a challenges and risks section in your overall RLO strategy implementation plan, because these questions represent the bulk of the tough questions about RLOs that your stakeholders, authors, and learners are likely to ask when you walk into that meeting to promote the idea.
At this point, you should have answers to each of these key questions:

- Have you defined your hierarchy and granularity?
- Do you have management support?
- Will your organization embrace change?
- Do you currently use templates?
- Have you updated your development process?
- Have you identified your authoring tools?
- Have you identified your delivery tools?
- What is the expected return on investment?
- Are you ready to implement your strategy?

You have also judged not only your own readiness to jump into an RLO strategy, but how important each specific question is to your organization and to the success or failure of your strategy. You may confidently know that you are ready to start today with RLO implementation or you may realize you need to take things at a slow pace and phase in your RLO strategy, looking for support, tools, and the return on your investment along the way. It is likely you are somewhere between the two extremes, but you have the critical answers to key questions to help you on your way.

In the next and final chapter, we will briefly talk about the future of reusable learning objects, emerging RLO standards, new tools, and other enabling technologies. These may all be “vaporware” or they may deeply influence your RLO strategy during implementation. No one has a crystal ball, and technology is quick to adopt something new, often before solid instructional methodologies, quantitative research data, or best practices are in place. As you will learn in Chapter Seven, this is also true with RLOs.

**RLOs in Action: Adopting the Strategy**

NoWaste’s RLO strategy is nearly complete. As you recall, three groups worked on validating the RLO strategy based on their training and documentation needs. One group looked at sales skills, another at the benefits package, and a third on informational documentation accessed in the retail stores and on-line.
During these pilot projects, the groups defined their authoring guidelines and templates, addressed key changes in current processes, and identified short-term and long-term implementation plans. In addition, a great deal of research was done to document NoWaste’s RLO hierarchy, instructional methodologies, location of authors, and needs of both internal learners and external customers.

The last phase for the NoWaste RLO strategy task force is to determine readiness to move forward with the implementation plan, to present its findings and recommendation to the entire training and documentation staff, and to state that, from this day forward, NoWaste will be using an RLO strategy. The task force completed a slightly modified readiness decision table, which is shown here.

<table>
<thead>
<tr>
<th>RLO Checklist</th>
<th>Status (%)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchy and granularity</td>
<td>100</td>
<td>By building prototype RLOs, each department was able to sign off on a common hierarchy and level of granularity for reuse.</td>
</tr>
<tr>
<td>Management support</td>
<td>90</td>
<td>Still waiting for final tool report from IT to determine overall project costs, including for software updates and support. Management and entire team support the structuring of content as RLOs and the sharing of RLOs between groups. Tools are a secondary issue.</td>
</tr>
<tr>
<td>Embracing change</td>
<td>90</td>
<td>Although some authors have taken a wait-and-see attitude, most have been converted to the RLO strategy based on the prototypes. Some are worried that the “compromise” made in learning activities and context may affect learning and customer satisfaction. These issues are noted and will be evaluated during each RLO release. Lessons learned will be rolled back into guidelines, templates, and the RLO strategy.</td>
</tr>
<tr>
<td>RLO Checklist</td>
<td>Status (%)</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Use of templates</td>
<td>100</td>
<td>Templates for each type of RLO have been designed and tested with the prototype RLOs. Templates may need to be adjusted based on the limitations or capabilities of RLO-database-driven development and delivery tools.</td>
</tr>
<tr>
<td>Updated development process</td>
<td>75</td>
<td>Each department used the prototype process to begin redefining its development processes. Some new steps were added to the process to ensure communications between departments and notification of changes between RLO owners. However, the process needs to be updated over time, as new tools are implemented. Managers are planning on a phased implementation so that the impact on current time lines and deliverables will be minimized.</td>
</tr>
<tr>
<td>Identified authoring and delivery tools</td>
<td>35</td>
<td>Prototypes were built using traditional tools that the development groups used prior to the RLO strategy. Tool vendors have received the requirements document and request for proposal. NoWaste’s information technology group is screening vendors and working with the development and delivery groups to ensure that each function is properly prioritized. The expectation is that no one tool will solve all the development and delivery needs. A phased conversion to new tools is preferable to a turnkey solution.</td>
</tr>
<tr>
<td>Evaluation and ROI</td>
<td>100</td>
<td>The success criteria for the RLO strategy are clearly defined by the business and upper management. This includes all the evaluation data points identified by the evaluation subteam. For customers, success will be evaluated based on ease of access to RLOs on the public Web site and increased satisfaction with the knowledge and skills of the consultants and the products and solutions they are given.</td>
</tr>
</tbody>
</table>
Based on the findings reported in the readiness checklist, the RLO task force made the decision to begin RLO implementation at NoWaste. Those areas that did not receive 100 percent were noted, and the project plan and implementation schedule will take them into account. Now the RLO task force can be transitioned into the RLO implementation team. This team will face the challenge of creating time lines for implementation, including the evaluation of tool vendors; phasing in updates to templates and guidelines; tracking dependencies; and ensuring that evaluation results indicate that the program is succeeding.

The team expects that it will take them two years to achieve the full promise of the RLO strategy. At each quarter along the way, evaluation results and implementation costs will be examined to ensure that the project is still meeting the needs of the business and that the business is on track in meeting its goals. As you will see in the next chapter, however, the RLO implantation team expects things to change over time. It is inevitable that the RLO strategy will mature and that new standards and tools will emerge.
Preparing Your RLO Strategy for the Future

As you have likely realized, you will face a number of challenges in defining and implementing an RLO strategy. The success or failure of your strategy will depend on the magnitude of the changes you are proposing to make to your existing tools and process. Likewise, the speed of change, the readiness of your organization and authors, and the overall acceptance of reusable learning objects will affect your success. The goal of the previous chapter was to help you prepare your RLO strategy so that you could implement it in the near future. Elements in your strategy address process, standards, templates, authoring, delivery, tools, and systems integration. Now, as the final step, think about the future after implementation. What elements in your strategy will change two to five years from today?

The RLO strategy you implement today needs to be malleable to internal and external factors that you may encounter over time, including what-if scenarios, a contingency plan, a list of frequently asked questions, or projects for growth. Of course, predicting the future is impossible. The best we can do in this chapter is to
look at questions and trends that you may encounter. Specifically, this chapter will explore the following areas:

- Changing business demands
- Critical mass and acceptance
- RLO research
- Merging of knowledge and learning
- Accepted industry standards
- New RLO-based tools
- New vendors and partners

You may want to think about including these areas in your own strategy under the heading “Planning for the Future.” In addition to these seven areas, you may have a few that we have missed or are specific to your RLO strategy and needs.

**CHANGING BUSINESS DEMANDS**

Perhaps you are in a very stable business environment and your business goals will continue to support your RLO strategy for the next five years. Although many businesses have a five-year plan, the reality is that such plans may not be fixed in stone. Likewise, individual projects and initiatives may be authorized or canceled along the way.

If you accept change as inevitable, what can you do to minimize the impact on your RLO strategy? Although easier said than done, the best way to minimize the impact is to ensure that your strategy aligns with your organization’s business goals, has upper-management support, has a positive influence on employee performance, and demonstrates a return on investment. Be aware of your organization’s business plan and how the RLO strategy will grow to meet that plan. Keep your RLO strategy flexible enough to meet the expectations of the stakeholders in your business. Likewise, a new or emerging industry RLO standard may affect your strategy. Or your company might form a partnership or merge with another organization that has a different RLO strategy. The bottom line is to expect change and to keep the RLO strategy nimble enough to meet these new challenges.
CRITICAL MASS AND ACCEPTANCE

Like any new technology, process, or template, your RLO strategy will need to be accepted by your organization. Once it is, you will have reached critical mass—the point at which the strategy can propel itself throughout the authoring and employee communities. Your RLO strategy should describe the point of critical mass—the tipping point, if you will—for its acceptance. You should also project how changes in the business demands, tools, technologies, and the other issues described in this chapter may delay or speed up this acceptance.

Initially, the costs for rolling out your RLO strategy may be higher than once a smooth, running strategy is in place with all the features and functions you expect. Until you reach critical mass—when more people are using the RLO strategy than are not—you will likely find higher costs for training, support, and integration with existing systems. As quickly as possible you will want to grow the RLO implementation beyond custom software installations and unstable tools, which require high levels of support and could result in “underwhelming” learning experiences. Once you get through these growing pains of a new RLO strategy, you will greatly increase your odds of making it to critical mass and wide-scale adoption of the strategy.

At Cisco Systems, for example, critical mass was achieved once program managers and authors became knowledgeable and skilled in the RLO strategy. Getting to this point required the internal sponsors of the strategy to conduct training sessions, market the advantages of RLO, discuss expected returns on investment, and support developers as they made the transition to new tools and templates. Instead of forcing the RLO strategy on the authors at once, it was phased in over time as existing courses required updating and revisions. Likewise, RLO-based tools were introduced over time and wide-scale usage was limited until the company had reached a point of maturity allowing for a self-supporting, unambiguous tool for generating RLOs.

Probably the best option here is to include a projection of when your RLO strategy will achieve critical mass and what the impact will be if that point is not reached. You may not want to project a firm date for 100 percent RLO acceptance without considering the phases required to get to that point. One strategy is to look at the number of current training courses and a projected update schedule, then assign a percentage of RLO-compliant courses you would like to introduce for each quarter. Meeting that milestone each quarter should result in you reaching...
100 percent compliance of the content; as a result, your program managers and authors should be fully versed in the RLO strategy.

RLO RESEARCH

There is a great opportunity for controlled studies to be done on how granular, reusable, media-independent, format-free, database-oriented learning objects actually affect learning, performance, and knowledge and skills transfer. There are many debates these days about granularity versus context—a too-small object creates a “ransom note” effect for the learner, leading to cognitive dissonance. You may have seen Hollywood’s version of ransom notes, where words and letters are formed from clippings from newspapers and magazines and then assembled on a piece of paper. This results in a mix of font families, font size, line positioning, and paper quality, and the note is hard to read. Still, it is a good example of reuse, because all those letters and words came from some other document or publication. Anyone surfing the Web, from Internet site to Internet site, will feel the same effect. The look and feel, navigation, and metaphors change from site to site, giving viewers the feeling that each is totally different and unrelated to the other. This feeling is one that would be avoided in a single training course or lesson.

However, this jumbling of context, images, and writing styles may not affect learning. Many argue that today’s knowledge workers build their own context, and can assemble knowledge to fit their own mental model. After all, we all make our way through the Web without getting lost, or at least are able to move from site to site, recognizing that we are in fact in control of our own navigation and where we are going. We could take the position that surfing the Web for unstructured knowledge and understanding is different from trying to achieve a learning objective that calls on a specific training event or learning experience.

Research from the authoring side may look at cost savings, methods to design complex learning environments, and problem-solving scenarios that leverage learning objects. Perhaps future research studies will highlight the best application of RLOs for specific learning goals or outcomes.

Ideally, your RLO strategy will build these types of research studies and evaluations into each phase of implementation. You will have baseline data and control groups to add validity to your results. Otherwise, you will have to dedicate some resources to keeping up with research on learning objects. In this case, the specifications and standards groups American Society for Training and
Development and the International Society for Performance Improvement, as well as other training and performance organizations, are good places to start.

Whether you create the research and share it with others or find the research outside your organization, you should be prepared for what the results will mean for your RLO strategy. Again, flexibility is key. Your authoring tools and templates need to be flexible enough to change over time. Perhaps your yearly phases will include a “research checkpoint” at which you will validate your tools, process, and standards and what the impact is on learners.

**MERGING OF KNOWLEDGE AND LEARNING**

Historically, there has been a gap between two concepts: knowledge management and learning management. *Knowledge management* is focused on providing employees with the information and tools they need to perform their jobs in the most effective manner. This could include the text of e-mail messages, instant messaging, chat sessions, remote conferences, whiteboarding, traditional documents, and other pieces of knowledge created by employees. Ideally this information is captured, classified, and stored in the background by the system, not directly by the employee. Then all of this information becomes available to other employees as part of a performance-support system or as assets that can be used in future RLOs. In fact, you could simply think of the RLOs stored in a learning management system as one part of the global knowledge management of an organization.

Think about your own RLO strategy. Is your goal to bridge the gap between training and knowledge? To branch out into tools that support performance on the job? To touch the corporate Web sites where employees go to find the tools and resources they need to do their jobs? If so, your RLO strategy could arguably be a knowledge management strategy. This should not be a problem if you have the mandate, support, and authority to implement a solution that touches so many other function groups.

From an industry point of view, tools for managing learning and knowledge seem to be moving closer together. As vendors consolidate their offerings and organizations see the need to combine learning and knowledge management, there should a unified system to support all these needs. For example, today an employee would go into a learning management system and register for a course. If that course contains fifty RLOs in a hierarchy, then the learning management system would have to treat each as a separate offering that is still managed as part of a course. Although it is desirable
to have these stored as separate RLOs, you would also want to have a way to have the course broken down automatically based on its hierarchy.

Having to enter all fifty RLOs manually so that they can be accessed as knowledge is not ideal. If the system forces the manual entry of the smaller RLOs to be used as knowledge chunks, then you can expect costs to increase, or even worse, that the RLOs will not be included as part of the knowledge management systems because of the tedious nature of this chore. In the ideal scenario, the employee would see all levels of all RLOs, and the systems would make them available, tracking their usage, and establishing links between knowledge and the structured RLOs from which they came. Although learning management systems provide critical functions—like tracking usage, collecting scores, and creating curricula—they need to be combined with those features found in knowledge management, and ultimately in your RLO strategy. We can see a point in the future where learning management and knowledge management truly converge, allowing RLOs to be treated as much more than learning resources. This will allow us to focus more on the performance needs of employees and less on building courses that may not live beyond their current training role.

**ACCEPTED INDUSTRY STANDARDS**

As we discussed earlier in this book, many groups are working on standards for RLOs and e-learning. Most of these groups, however, are not producing official standards. Instead, they are publishing specifications and best practice guidelines. These specifications are then adopted or rejected by those implementing RLO strategies and systems. If there is acceptance of these specifications, then they can be promoted to official standards bodies such as the IEEE. If these bodies approve the specification, then tool vendors and those implementing RLO strategies can be assured that they are using an accepted industry standard.

Perhaps your own RLO strategy calls on the use of the Shareable Content Object Reference Model (SCORM) specification from the Advanced Distributed Learning (ADL) project of the U.S. Department of Defense (see www.adlnet.org). This specification is actually a collection of specifications from other sources that is used as a reference library for creating what are termed shareable content objects. Today many parts in the SCORM are based on specifications that have not yet passed the IEEE. However, many companies and the U.S. government are treating SCORM as a requirement, as a standard.
Keep in mind that SCORM, like any specification, grows and changes over time. For example, when SCORM moved from Version 1.2 to Version 1.3 it was significant in that 1.3 allows for the sequencing of objects. Authors can now create “if-then” branching logic to move between objects. In contrast, in Version 1.2, if you wanted to set up any type of if-then branching, it was all locked inside the object as a package. In other words, the package was self-supporting, and did not have a way of jumping to another object based on the learner’s actions. It is beyond the scope of this section to describe Version 1.3 in detail, but there is a wonderful tutorial on the specification at the Carnegie-Mellon Learning Systems Architecture Lab (www.lsal.cmu.edu).

If your RLO strategy includes references to SCORM, or uses SCORM’s definition of learning objects, then you may be very interested in how the specifications in SCORM are adopted officially or changed through the community at large. If you are not concerned with SCORM and are working on your own independent RLO strategy, then maybe you will look at SCORM once the IEEE accepts it as a standard. In either case, your RLO strategy should reflect the fact that today’s specifications may become tomorrow’s standards. Of course, today’s specifications could also be rejected by the industry. For example, in the late 1970s consumers had a choice between Beta tape for home television viewing and recording and the alternate VHS tape. Beta, although it offered better picture quality, had limitations that prevented it from being accepted.

Therefore, your RLO strategy needs to be flexible enough to move to alternate standards as they emerge. Be ready for accepted industry standards to emerge from today’s specifications. Be equally ready for those specifications to be rejected. That said, you should expect to see more specifications become standards that can be relied on. As with any standards, this will eventually make it easier for you to find standards-based tools and systems, leverage best practice templates for RLOs, and build RLO commerce between organizations.

**NEW RLO-BASED TOOLS**

Over the years each of us has seen many promising course design and development tools come and go. Many tools have promised a simple authoring interface that even a subject-matter expert could use to build training programs. Often these tools have fallen short of this claim, requiring training and support to create the training programs. Other tools have focused on the entire authoring process,
design through evaluation. Others have blurred the lines between authoring, delivery, and learning management, handling training registration, commerce, assessment, evaluations, and reports.

Now tool vendors are adding learning object features and capabilities to their tools. Registration systems are trying to become more granular. Authoring tools are storing information in a database, using metadata, and keeping style separated from presentation. New Web-only authoring interfaces are being created, giving subject-matter experts simple forms to complete in order to contribute to the learning object database. Work flow management, change notification, learning object reuse, and tracking are also being implemented.

The challenge is to find one tool, or one set of tools, that has all the features and functions that match the goals of your RLO strategy. You also must judge if those RLO tools are indeed feature-rich, or simply marketing twists on older tools. For today, a guarded optimism about these promising learning object tools and systems is perhaps the best attitude.

Just as you need to weigh the features of learning object tools on their own merits, you will need to judge if they will work with your existing tools and technologies. Often, integrating a new tool or system in your current environment will prove more costly than simply modifying your current systems or changing the scope of your RLO strategy.

With that in mind, it is important to remember that advances are being made in tools. As more specifications become standards, tools and systems to support those standards should become readily available. As these vendors start agreeing to use specifications like those defined in SCORM, or IMS, you will be able to shop with more confidence. Always, of course, you must look at the current state of the specifications and if they align with your RLO strategy and existing tools, systems, and processes. Again, being optimistic, we think that tools and systems should emerge over the next few years that will be specification-based and will harmonize the integration between systems.

NEW VENDORS AND PARTNERS

Just as standards and tools to support the creation, delivery, and management of learning objects should become more available, the pool of skilled vendors and partners is also likely to grow. This may be a nonissue if your strategy does not
look to external content providers or external vendors to help you create learning objects. However, if you are looking outside for support in creating learning objects, having a larger pool of competent vendors to choose from will be key to developing a growing number of learning objects quickly.

Today you will meet many vendors who are using the term learning object merely as a marketing buzzword to generate business. You may find that those claiming to “get it” are implementing learning objects in a way that is incompatible with your RLO strategy. This situation could be difficult for you to rectify without costly training of the vendor or compromising your RLO strategy to fit the vendor’s capabilities. For example, Cisco Systems found the need to train many vendors and partners about the templates it used to classify RLOs as concepts, facts, principles, and processes. Even though all the vendors Cisco contracted with to create content were competent in creating customized, engaging learning environments, switching to a specific and rigid form of RLO development and classification was more of a challenge. From Cisco’s point of view, the cost of getting vendors up to speed was high because each new vendor required that information. Vendors with multiple customers would need to track multiple RLO development standards. Cisco had the greatest success with vendors who were adroit enough to modify their current design and development models to those implemented by Cisco Systems.

Just as vendors came up to speed in desktop publishing in the late 1980s, we can expect more and more vendors to gain the skills and knowledge they will need to help you create learning objects. Always keep in mind, though, that you will still need to communicate your specific RLO strategy, compare it to any industry specifications as baseline data, and document those requirements before starting the project with the vendors.

From a cost point of view, you should see parity between what you pay for traditional course development and when you develop RLOs. As you implement RLOs you can expect to pay a premium for a vendor to learn your RLO strategy, your standards, templates, tools, and processes. You will either pay this penalty directly or it will be hidden in the hours required to complete the project. However, you should expect the cost of RLO development to equalize, and in time, drop to a point where you see more savings than with traditional development. Our advice is always to demand that your vendors present you with cost justifications, and explain why following the RLO strategy is costing you more than it perhaps
should. Collect data on these costs over time, and identify if they are dropping or remaining the same. If the vendor is executing your RLO strategy correctly, and if all the tools and templates are in place, there should actually be a reduction in development costs, even from these external vendors.

**CHAPTER REVIEW**

Over time you should see a convergence of skilled content vendors, tools, systems, and standards supporting RLOs. During this period your RLO strategy should be a living document that is flexible to new instructional design methodologies based on research and best practices. In addition, the lines that separate knowledge management and learning management systems should blur, allowing you to leverage RLOs in both training and performance-support environments. Finally, you will consistently need to compare your business requirements with all of the above. The acceptance and success of your strategy relies, of course, on its support of changing business requirements. The bottom line for your RLO strategy is this: try to be as complete as possible today, implement in phases, and be open to changes in tools, standards, and requirements.

**RLOs in Action: What Comes Next?**

Luckily, NoWaste’s RLO strategy is being used by many departments and is being championed from the CEO on down through the management team. This level of involvement should allow everyone at the company to help identify changing business needs as they emerge and their impact on the RLO strategy. The greatest impact is likely to be felt as NoWaste expands its retail and consulting services in more states and looks to Canada for future expansion.

NoWaste is also approaching the tipping point—the point at which enough authors are trained in the guidelines, templates, and processes used to develop RLOs. Buy-in and acceptance will now be greater than any lingering doubts about the strategy.

New tools and additional templates or guidelines can be added with greater ease now. In the company, trends in knowledge management, product knowledge, and learning need to be aligned. New areas such as e-mail and chats may contain knowledge that feed into RLOs. For the consulting group, their best
practices and selling “tips and tricks” should be accommodated in future revisions to the RLO strategy.

NoWaste is aware that change will occur and that its RLO strategy and development team must be flexible. New tools, processes, and learning methodologies will be introduced over time. With proper planning, prototyping, and business requirements, these changes should not disrupt the overall success of the company’s RLO strategy.
Final Thoughts

With your strategy, implementation plan, and future trends in mind, you are ready to make a few key decisions about your ability and willingness to develop and deliver reusable learning objects. At this point you should be familiar with all the issues that affect the size and shape of your RLOs. Maybe your RLOs are all case-study-based simulations, applying guided-discovery learning environments, where RLOs are hidden resources that are simply part of the learning environment. Or maybe they are going to drive instructor-led training offered once a month in a classroom setting. Both are perfectly valid depending on your needs, learning objectives, and target learners.

We hope that you used the worksheets, followed the examples and case studies in this book, and took many of the suggestions in defining your instructional approaches, standards, guidelines, and authoring templates. Most important, you should have a plan for evaluating your results. Measuring the impact of RLOs on your learners and your business will be critical to your overall success.

It is unlikely that you will switch to RLOs today, or make an all-or-nothing switch to RLOs tomorrow. Although it might be nice to get the ball rolling and start the project, forcing RLOs on your organization could result in resistance, confusion, and a morass of disconnected systems. Instead, look back at Chapter Six...
and the questions you answered about where you are on the path to change. Notice how many questions you answered this way: "Yes, I’m ready, my organization is ready, and my learners are more than ready."

Move forward by doing more research on the guidelines and instructional approaches you need to apply to meet your performance needs. Talk to vendors who are marketing RLO-based systems and other organizations that have undertaken similar efforts. Keep abreast of the happenings at ADL with its SCORM work and the various specifications emerging from the IMS Global Learning Consortium. Finally, take what you need from this book and put aside anything that you find disruptive or impractical for your needs. Apply the suggestions we made in this book as they make sense to your unique business needs.

We hope that these RLO-based solutions will address your learners’ performance needs, from just-in-time knowledge support to prescribed, custom learning environments. Assume that what the knowledge worker needs on the job is measured both in time and performance, in what can be called “time to optimal performance.” The easier RLOs make it for each knowledge worker to gain new skills and knowledge quickly to succeed on the job, the better the organization should perform. The quicker workers can update their skills, reference necessary information, increase the fluency with which they perform, and be alerted to new bits of knowledge, the better. One key to meeting this performance goal is your ability to design and develop a large database of RLOs that contains the right amount of knowledge, the right types of interactions, the needed context, and learning approaches to support any delivery need. Your RLO strategy will help you focus on the goal of increasing the time to optimal performance for your employees.

Although you are sure to encounter bumps, costs, and unexpected resistance during your journey, your effort to fulfill an RLO strategy holds the promise of significant returns for your learners and for your organization.
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Accessible</strong></td>
<td>Learning experience or knowledge that is easy to obtain from multiple remote locations through the use of metadata and packaging standards. Key function of the ADL’s SCORM and any RLO strategy.</td>
</tr>
<tr>
<td><strong>Adaptable</strong></td>
<td>Learning experience or knowledge that is configured, reorganized, or personalized in some way to fit a specific situation, tailored to the individual or organizational needs. Key function of the ADL’s SCORM and any RLO strategy.</td>
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<tr>
<td><strong>Affordable</strong></td>
<td>Learning experience or knowledge that is efficient and cost-effective, often reducing times and costs associated with development and delivery. Key function of the ADL’s SCORM and any RLO strategy.</td>
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<tr>
<td><strong>Blended learning</strong></td>
<td>Combination of multiple delivery media to instruct or teach a given set of objectives. Often used to describe the combination of e-learning with more traditional instructor-led training.</td>
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<tr>
<td><strong>CFP3</strong></td>
<td>Abbreviation used by Cisco Systems, Inc., for its RLO strategy templates made up of concept, fact, principle, process, and procedure.</td>
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<tr>
<td><strong>Chunk</strong></td>
<td>Term commonly used for any piece of training or information, including learning objects and information objects, or something less formalized, such as a course.</td>
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<tr>
<td>Term</td>
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<tr>
<td>Concept</td>
<td>A group of objects or ideas that share critical features while also possessing differences. Also, one of five information types used in the content-performance matrix and CFP3 templates. Value is usually captured in the metadata for a given RLO.</td>
</tr>
<tr>
<td>Content-performance matrix</td>
<td>A combination of five information types (concept, process, principle, process, and procedure) with the cognitive levels use or recall (see Clark, 1999).</td>
</tr>
<tr>
<td>Delivery tools</td>
<td>Systems or applications that allow information and training materials to be received by the target audience. Examples range from Web servers and Web browsers to classrooms and printed student workbooks.</td>
</tr>
<tr>
<td>Development tools</td>
<td>Systems or applications that allow information and training materials to be created.</td>
</tr>
<tr>
<td>Durable</td>
<td>Learning experiences that are designed, developed, and delivered so that they remain consistent between revisions, operating systems, and platforms. Function of the ADL’s SCORM and any RLO strategy.</td>
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<tr>
<td>Dynamic delivery</td>
<td>Usually, a Web-based output of a development process that presents learning and information content to an end user (learner, employee, customer) that is instantly updated when content changes, is customized for the end user’s specific goals and needs, and is modified by actions taken by the user or by the system anticipating new needs for knowledge and training materials. Opposite of static delivery.</td>
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<tr>
<td>Element</td>
<td>Individual graphics, blocks of text, or interactions stored in the RLO database. Combined in a logical manner to form context for information objects and learning objects.</td>
</tr>
<tr>
<td>Fact</td>
<td>A unique instance of something. Examples include model number, definitions, lists of dates, names, commands, and so on. Also, one of five information types used in the content-performance matrix and CFP3 templates.</td>
</tr>
<tr>
<td>Information type</td>
<td>One of five possible structures to teach specific knowledge and skills as defined in the context of Information Mapping or the glossary.</td>
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content-performance matrix, where the five information types are defined as concept, fact, process, principle, and procedure. It is possible to create new information types to fit new methods to classify and present knowledge and skills. Information type is usually stored as a metadata value to help authors identify the instructional purpose of an RLO.

<table>
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<tr>
<th>Term</th>
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<tbody>
<tr>
<td><strong>Interoperable</strong></td>
<td>Learning experience or knowledge that is shared among systems, tools, authors, and delivery platforms. Key function of the ADL’s SCORM and any RLO strategy.</td>
</tr>
<tr>
<td><strong>Knowledge management system (KMS)</strong></td>
<td>Used to distinguish a system that is biased toward learning, such as an LMS, from one that accounts for all the knowledge, skills, and information that exists in an organization. This includes e-mail, chat windows, Web pages, white papers, job aids, and so on. Not usually tied to the LMS because the knowledge stored or referenced by the KMS is used simply to link the employee with needed information and not to take care of authentication, registration, and commerce.</td>
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<tr>
<td><strong>Learning activity</strong></td>
<td>A call to action that requires participants to use cognitive skills and knowledge that match the learning objective for the RLO. Navigation in an e-learning environment or simple page turning is not considered a learning activity.</td>
</tr>
<tr>
<td><strong>Learning content management system (LCMS)</strong></td>
<td>A tool or system used to store items directly, such as courses or RLOs, or simply contain links to where those items are stored. Usually used in combination with an LMS so that one system tracks who took the course and the other actually contains the content itself. An administration feature allows for authors or content owners to publish their completed courses or RLOs to the system so that it can be accessed by an LMS.</td>
</tr>
<tr>
<td><strong>Learning management system (LMS)</strong></td>
<td>A tool or system used for authentication, registration, and commerce and access to any learning-focused deliverable. Most include a catalogue or listing of available courses and a method for learners to enroll in those courses. The system should track enrollment for each course, and what courses each learner has taken. Includes an administration feature to</td>
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allow for courses to be added or removed from the catalogue. Some systems allow for customized learning paths or road maps for learners based on their preferences or job function.

**Learning object** See *reusable learning object*. Some definitions purposely leave off the concept of reusable and therefore only focus on the granular structure. This book uses the full term *reusable learning object*.

**Learning objective** Statement that indicates the expected results of completing a specified training event or RLO. Usually states criteria for success.

**Legacy knowledge** Legacy knowledge, or legacy content, refers to existing knowledge or content. For example, it would encompass everything in a firm’s current training catalogue—training programs, manuals, on-line help systems, and so on.

**Lesson** Container for related learning objectives and their associated content, graphics, and learning activities. Usually associated with a specific job task. Some structures are clearly defined. Generically, a lesson is simply one of many labels that may be used to discuss the hierarchy of a course (for example, curriculum, course, unit, module, lesson, section, element).

**Link** A logical or physical connection between multiple abstract or concrete objects. In the context of RLOs, this connection is referred to as reuse. An RLO is created and stored as a single object in the database and any other solution that can use that object simply points to that source. As a result, changes to the source RLO will appear in all other solutions that have connected to the source object.

**Metadata** Information about a thing, such as a person, place, object, element, graphic, and so on. Has two parts, the item (name, date, type, title) and its value (Chuck, October 4, 1967, Fact, “Chuck’s Bio.”)

**Needs assessment** Completed during the analysis phase of a project kickoff to determine what if any opportunities exist for corrective action.
**Prescriptive**  The ability of an e-learning delivery system or some manual method to issue a recommended path of action based on a learner’s performance, profile, assessment results, career goals, or organizational initiatives. Results of a prescription are often presented to learners in the form of a list of actions they should take to fulfill their learning goals or solve their knowledge gap.

**Principle**  A set of rules or guidelines followed during the completion of a task. Also, one of five information types used in the content-performance matrix and CFP3 templates. Value is usually captured in the metadata for a given RLO.

**Procedure**  A set of step-by-step instructions for completing a task. Also, one of five information types used in the content-performance matrix and CFP3 templates. Value is usually captured in the metadata for a given RLO.

**Process**  A flow of events or actions that frequently completes some form of activity or cycle. Also, one of five information types used in the content-performance matrix and CFP3 templates. Value is usually captured in the metadata for a given RLO.

**Properties**  Used in Microsoft Word as a way to capture and store metadata about each document. Help identify the document’s purpose and creator through a title, author name, subject, keywords, and statistical data about the file in order to organize files and enable searching.

**Remediation**  The act or process of correcting a fault or deficiency often associated with an e-learning delivery system suggesting RLOs based on the results of assessments or other learning activities.

**Repurposing**  Taking an original entity and converting it or modifying it to fit a new goal. In the context of RLOs, the process of finding and copying any object, making it a new independent RLO that can be modified as needed by the author.

**Reusable**  Learning experiences that are designed, managed, and delivered to be used more than once without modification by
authors, learners, or systems. Key function of the ADL’s SCORM and any RLO strategy.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Reusable information object (RIO)</td>
<td>Used to communicate content at one level below an RLO. Usually does not contain a formal learning objective or a learning activity. Distinguishes information from learning. Term coined in Cisco’s RLO strategy.</td>
</tr>
<tr>
<td>Reusable learning object (RLO)</td>
<td>Used to specify a collection of elements that contains some information, learning activity, metadata, context, and learning objective. May be nested inside of other RLOs to create a hierarchy of objects. The size in terms of number of learning objectives, related information, and learning activities is up to the organization to define. Distinguishes learning from information.</td>
</tr>
<tr>
<td>RLO strategy</td>
<td>A master plan for definition and implementation of a reusable learning objects strategy that includes human resources, authoring tools, templates, guidelines, evaluation methods, business impact, and expected outcomes. Size and scope are based on what the adopting organization feels is an acceptable level of detail with which to implement a given project.</td>
</tr>
<tr>
<td>Road map</td>
<td>A set of guidelines, instructions, or explanations. In the learning context, often lists course or call to action as the result of assessment results, prescriptions, and job title or career goals. Simple or historical terms include course catalogue or table of contents.</td>
</tr>
<tr>
<td>Sequencing</td>
<td>The ability to define if-then logic between multiple objects. Used in SCORM Version 1.3. Allows shareable content objects to communicate with the LMS on the actions taken by the learner, then move to the next action within that SCO or to another SCO based on those results. This allows authors to control which SCOs learners can access, ranging from all SCOs in the LMS to one at a time. For complete information on how this is applied, see <a href="http://www.adlproject.org">www.adlproject.org</a>.</td>
</tr>
</tbody>
</table>
**Shareable content** Any package of information, knowledge, or training materials that are designated as the unit to be used in a SCORM-based authoring or delivery system. Analogous to an RLO in that its size and shape are up to each author or organization to define. The SCORM documentation explains how authors should package SCOs in order for them to be exchanged between learning management systems. All content and learning activities inside the SCO are not defined by the documentation. Each SCO is treated as a closed package, or black box, by the LMS.

**Shareable Content Object Reference Model (SCORM)** A collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities that enable interoperability, accessibility, and reusability of Web-based learning content. It is built on the work of the AICC, IMS, IEEE, ARIADNE, and others to create one unified reference model of interrelated technical specifications and guidelines designed to meet the Department of Defense’s high-level requirements for Web-based learning content. SCORM Version 1.2 focused on the packaging of SCOs in order to pass objects between multiple learning management systems. SCORM Version 1.3 added sequencing between each SCO (see www.adlproject.org for more information).

**Specification** Defines through peer-level acceptance the materials, dimensions, and quality of work for something to be built, installed, or manufactured. In the case of the learning, this includes content structure, metadata, learning activities, learning objectives, screen layout, media requirements, and so on. Usually treated as a best practice and guideline but not enforced as a standard. Examples of specifications include internal authoring guidelines, authoring templates, or any other internal definition of requirements. See *standard*.

**Standard** Official statement that has been vetted by multiple originations, approved by formal review process, and published as public record. Defines materials, dimensions, and quality of
work for something to be built, installed, or manufactured. In the case of learning, this includes content structure, metadata, learning activities, learning objectives, screen layout, media requirements, and so on. Formal and official in contrast to a specification, which is an internal guideline. See specification.

**Static delivery**
Any type of output from a development process that is presented to an end user (learner, employee, customer) that does not change without the direct manipulation from those responsible for the original output. Examples include workbooks, simple HTML code for Web pages, video files, audio files, photographs, and so on. Opposite of dynamic delivery.

**Use**
One of two cognitive levels specified in the content-performance matrix. Indicates that the learning objective and information type require learners to do something with the knowledge and skills they are being presented as the result of that learning event.
# Web Resources

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<td>Advanced Distributed Learning (ADL) Initiative</td>
<td><a href="http://www.adlnet.org">www.adlnet.org</a></td>
<td>Sponsored by the Office of the Secretary of Defense, the ADL initiative is a collaborative effort among government, industry, and academia to establish a new distributed learning environment that permits the interoperability of learning tools and course content on a global scale. It published the Shareable Content Object Reference Model (SCORM).</td>
</tr>
<tr>
<td>Allison Rossett</td>
<td><a href="http://edweb.sdsu.edu/people/ARossett/ARossett.html">http://edweb.sdsu.edu/people/ARossett/ARossett.html</a></td>
<td>Professor of educational technology at San Diego State University, Allison Rossett is also a consultant in training and technology-based performance systems and a member of the HRD Hall of Fame, <em>Training</em> magazine’s “virtual&quot; and elite Hall of Fame.</td>
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<td>ASTD</td>
<td><a href="http://www.astd.org">www.astd.org</a></td>
<td>Professional association and leading resource on workplace learning and performance issues. ASTD provides information, research, analysis, and practical information. It hosts conferences, expositions, and seminars, provides publications, and has built coalitions and partnerships for research and policy work.</td>
</tr>
<tr>
<td>Aviation Industry CBT Committee (AICC)</td>
<td><a href="http://www.aicc.org">www.aicc.org</a></td>
<td>An international association of technology-based training professionals. The AICC develops guidelines for the aviation industry in the development, delivery, and evaluation of CBT and related training technologies.</td>
</tr>
<tr>
<td>Customized Learning Experience Online (CLEO) Lab</td>
<td><a href="http://www.cleolab.org/">http://www.cleolab.org/</a></td>
<td>CLEO produced a document that extends the metadata defined by the IEEE P1484.12.1-2002 LOM. Collaboration between academic researchers, corporations interested in e-learning, and the ADL. Founded by Cisco Systems, Click2Learn, IBM Mindspan Solutions, Microsoft, and Thomson-NETg.</td>
</tr>
<tr>
<td>IMS Global Learning Consortium, Inc. (IMS)</td>
<td><a href="http://www.imsglobal.org">www.imsglobal.org</a></td>
<td>IMS is developing and promoting open specifications for facilitating on-line distributed learning activities such as locating and using educational content, tracking learner progress, reporting learner performance, and exchanging student records between administrative systems.</td>
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<tr>
<td>Institute of Electrical and Electronics Engineers, Inc. (IEEE)</td>
<td><a href="http://www.ieee.org">www.ieee.org</a></td>
<td>Leading authority in technical areas ranging from computer engineering and biomedical technology and telecommunications to electric power, aerospace, and consumer electronics, among others.</td>
</tr>
<tr>
<td>Instructional Use of Learning Objects</td>
<td><a href="http://www.reusability.org">www.reusability.org</a></td>
<td>On-line version of <em>Instructional Use of Learning Objects</em>, a recent book that tries to go beyond the technological hype and connect learning objects to instruction and learning. You can access the full text of the book here at no charge.</td>
</tr>
<tr>
<td>International Society for Performance Improvement (ISPI)</td>
<td><a href="http://www.ispi.org">www.ispi.org</a></td>
<td>The ISPI is the association of choice for performance improvement (PI) practitioners seeking a community of practice. The premier source of performance improvement information, tools, and professional development opportunities.</td>
</tr>
<tr>
<td>Learnativity White Papers</td>
<td><a href="http://www.learnativity.com/whitepapers.html">www.learnativity.com/whitepapers.html</a></td>
<td>“Where adult learning, productivity, creativity, and activity meet on-line.” Learn-a-tivity is the notion that individual and organizational effectiveness depends on learning better, faster, smarter, and through the consistent application of learning combined with creativity, flexibility, and paying close attention to the right things.</td>
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<tr>
<td>Learning Circuits</td>
<td><a href="http://www.learningcircuits.org">www.learningcircuits.org</a></td>
<td>ASTD’s on-line magazine about e-learning. It presents feature articles, departments, columns, and peer interaction to help readers understand workplace e-learning and bring it into their organizations.</td>
</tr>
<tr>
<td>Learning Systems Architecture Lab</td>
<td><a href="http://www.lsal.cmu.edu/">http://www.lsal.cmu.edu/</a></td>
<td>This research lab funded by Carnegie-Mellon conducts research on the design and creation of Internet-based technologies for education and training. Its role includes design and content creation, with an emphasis on emerging technologies and standards for e-learning for all users (K–16, training, lifelong). The group also offers the SCORM Best Practice Guide for Content Developers, which corresponds to the public release of the IMS Simple Sequencing Specification and the draft SCORM 1.3 Application Profile.</td>
</tr>
<tr>
<td>Making Sense of Learning Specifications &amp; Standards: A Decision Maker’s Guide to Their Adoption</td>
<td><a href="http://www.masie.com/masie/default.cfm?page=standards">www.masie.com/masie/default.cfm?page=standards</a></td>
<td>The phrase learning standards is one of the most powerful and most misunderstood terms in the e-learning revolution. To lessen industry confusion about learning standards and to accelerate their adoption, the Masie Center’s e-learning consortium organized and facilitated a group of learning professionals who worked together for several months to generate a collection of information and job aids.</td>
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<tr>
<td>OutStart Evolution and RLO User Group (GUSTO)</td>
<td><a href="http://groups.yahoo.com">http://groups.yahoo.com</a></td>
<td>To subscribe, e-mail: <a href="mailto:gusto_group-subscribe@yahoogroups.com">gusto_group-subscribe@yahoogroups.com</a>. Companies using OutStart’s authoring tool Evolution meet each month to discuss issues around learning objects and the use of the Evolution tool to develop and deliver RLO-based solutions. Although the meetings are focused on Evolution, the dialogue between group members often branches into other core RLO issues. Non-Evolution users are welcome to participate.</td>
</tr>
<tr>
<td>RLO Strategy</td>
<td><a href="http://www.cisco.com">www.cisco.com</a> (Search for “RLO strategy.”)</td>
<td>Cisco’s reusable learning objects strategy provides a process and framework to create and deliver learning experiences that support the performance of its employees, partners, and customers. These learning experiences are constructed out of existing learning objects (combined with any required new learning objects) to build solutions in multiple learning approaches for a robust set of performance needs and delivery options.</td>
</tr>
<tr>
<td>RLO User Group</td>
<td><a href="http://groups.yahoo.com/group/RLO/">http://groups.yahoo.com/group/RLO/</a></td>
<td>Free public forum of self-administered members looking at the application and implementation of reusable learning objects. Offers e-mail updates, file postings, suggested best practices, and virtual meetings. You can access this group by searching for “RLO” in Yahoo Groups.</td>
</tr>
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<tr>
<td><strong>Shareable Content Object Reference Model (SCORM)</strong></td>
<td><a href="http://www.adlnet.org">www.adlnet.org</a> (Navigate to the SCORM link.)</td>
<td>The SCORM is a reference model that defines the interrelationship of course components, data models, and protocols so that learning content objects are shareable across systems that conform with the same model. Published and maintained by the ADL Initiative.</td>
</tr>
<tr>
<td><strong>Training Magazine Online</strong></td>
<td><a href="http://www.trainingmag.com">www.trainingmag.com</a></td>
<td>Professional development magazine that advocates training and workforce development as a business tool. The magazine delves into management issues such as leadership and succession planning, HR issues such as recruitment and retention, and training issues such as learning theory, on-the-job skills assessments, and aligning core workforce competencies to enhance the bottom-line impact of training and development programs.</td>
</tr>
<tr>
<td><strong>Training Software Database</strong></td>
<td><a href="http://www.capterra.com/training-software">http://www.capterra.com/training-software</a></td>
<td>Great site that lists software that supports the virtual training and education of employees. Capterra’s training hub includes a directory of software products, research, and other useful resources.</td>
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The books and articles listed here are some of the many sources of information on instructional design, performance support, and learning objects. These and similar works will provide background that is key to the success of any RLO strategy.


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About the Authors

*Chuck Barritt* is a senior instructional designer at Apple Computer, in addition to consulting with companies on reusable learning object implementation and related performance solutions. These skills were honed while he was an internal consultant and program manager responsible for the definition and implementation of the reusable learning objects strategy at Cisco Systems, Inc. This cross-functional team effort included interfaces with internal IT, learning object tool vendors, internal and external authors, and a wide variety of business owners. The RLO strategy required creation of instructional methodologies, templates, training, and support for authors and editors. Barritt led the RLO team in documenting Cisco’s “Reusable Learning Object Strategy” and “Enhancing the Learner Experience” white papers. He has presented globally on the company’s RLO strategy and represented Cisco on the IMS Global Learning Consortium and the ADL Initiative.

Previously, Barritt worked on a similar initiative at Oracle—part of the Oracle Learning Architecture marketed by that company as one of the first RLO authoring and delivery systems. He also has over ten years’ experience in identifying needs and applying performance solutions, ranging from training to knowledge delivered via the Web, stand-alone multimedia, help tools, and instructor-led training.

Barritt is active in the International Society for Performance Improvement and has presented at three ISPI international conferences. In addition to his work with ISPI, he participates in other professional groups focused on learning, performance improvement, and e-learning. He has written on the subject of the RLO
process change for *Performance Improvement Journal* and has authored many short articles for the local chapter of ISPI. He has a master’s degree in instructional technology from California State University, Chico.

F. Lee Alderman Jr. has worked as a consultant and offered seminars to help organizations create job-based training programs that lead to successful transfer to the work environment. His experience in designing job-based training spans twenty-one years, during which time he has worked with corporate, government, and nonprofit organizations. He recently helped Cisco Systems in its strategy and training for the rollout of its reusable learning objects strategy.

Currently training manager at Redwood Credit Union, Alderman is responsible for all training, learning resource, and documentation projects. He has presented numerous sessions and workshops at International Society for Performance Improvement (ISPI) international conferences on the topics of reusable learning objects and transfer of training.
This guide is designed to familiarize you with the various types of Pfeiffer publications. The formats section describes the various types of products that we publish; the methodologies section describes the many different ways that content might be provided within a product. We also provide a list of the topic areas in which we publish.

**FORMATS**

In addition to its extensive book-publishing program, Pfeiffer offers content in an array of formats, from fieldbooks for the practitioner to complete, ready-to-use training packages that support group learning.

**FIELDBOOK** Designed to provide information and guidance to practitioners in the midst of action. Most fieldbooks are companions to another, sometimes earlier, work, from which its ideas are derived; the fieldbook makes practical what was theoretical in the original text. Fieldbooks can certainly be read from cover to cover. More likely, though, you’ll find yourself bouncing around following a particular theme, or dipping in as the mood, and the situation, dictate.

**HANDBOOK** A contributed volume of work on a single topic, comprising an eclectic mix of ideas, case studies, and best practices sourced by practitioners and experts in the field.

An editor or team of editors usually is appointed to seek out contributors and to evaluate content for relevance to the topic. Think of a handbook not as a ready-to-eat meal, but as a cookbook of ingredients that enables you to create the most fitting experience for the occasion.

**RESOURCE** Materials designed to support group learning. They come in many forms: a complete, ready-to-use exercise (such as a game); a comprehensive resource on one topic (such as conflict management) containing a variety of methods and approaches; or a collection of like-minded activities (such as icebreakers) on multiple subjects and situations.

**TRAINING PACKAGE** An entire, ready-to-use learning program that focuses on a particular topic or skill. All packages comprise a guide for the facilitator/trainer and a workbook for the participants. Some packages are supported with additional media—such as video—or learning aids, instruments, or other devices to help participants understand concepts or practice and develop skills.

- *Facilitator/trainer’s guide* Contains an introduction to the program, advice on how to organize and facilitate the learning event, and step-by-step instructor notes. The guide also contains copies of presentation materials—handouts, presentations, and overhead designs, for example—used in the program.
• Participant’s workbook  Contains exercises and reading materials that support the learning goal and serves as a valuable reference and support guide for participants in the weeks and months that follow the learning event. Typically, each participant will require his or her own workbook.

ELECTRONIC  CD-ROMs and web-based products transform static Pfeiffer content into dynamic, interactive experiences. Designed to take advantage of the searchability, automation, and ease-of-use that technology provides, our e-products bring convenience and immediate accessibility to your workspace.

METHODOLOGIES

CASE STUDY  A presentation, in narrative form, of an actual event that has occurred inside an organization. Case studies are not prescriptive, nor are they used to prove a point; they are designed to develop critical analysis and decision-making skills. A case study has a specific time frame, specifies a sequence of events, is narrative in structure, and contains a plot structure—an issue (what should be/have been done?). Use case studies when the goal is to enable participants to apply previously learned theories to the circumstances in the case, decide what is pertinent, identify the real issues, decide what should have been done, and develop a plan of action.

ENERGIZER  A short activity that develops readiness for the next session or learning event. Energizers are most commonly used after a break or lunch to stimulate or refocus the group. Many involve some form of physical activity, so they are a useful way to counter post-lunch lethargy. Other uses include transitioning from one topic to another, where “mental” distancing is important.

EXPERIENTIAL LEARNING ACTIVITY (ELA)  A facilitator-led intervention that moves participants through the learning cycle from experience to application (also known as a Structured Experience). ELAs are carefully thought-out designs in which there is a definite learning purpose and intended outcome. Each step—everything that participants do during the activity—facilitates the accomplishment of the stated goal. Each ELA includes complete instructions for facilitating the intervention and a clear statement of goals, suggested group size and timing, materials required, an explanation of the process, and, where appropriate, possible variations to the activity. (For more detail on Experiential Learning Activities, see the Introduction to the Reference Guide to Handbooks and Annuals, 1999 edition, Pfeiffer, San Francisco.)
GAME  A group activity that has the purpose of fostering team spirit and togetherness in addition to the achievement of a pre-stated goal. Usually contrived—undertaking a desert expedition, for example—this type of learning method offers an engaging means for participants to demonstrate and practice business and interpersonal skills. Games are effective for team building and personal development mainly because the goal is subordinate to the process—the means through which participants reach decisions, collaborate, communicate, and generate trust and understanding. Games often engage teams in “friendly” competition.

ICEBREAKER  A (usually) short activity designed to help participants overcome initial anxiety in a training session and/or to acquaint the participants with one another. An icebreaker can be a fun activity or can be tied to specific topics or training goals. While a useful tool in itself, the icebreaker comes into its own in situations where tension or resistance exists within a group.

INSTRUMENT  A device used to assess, appraise, evaluate, describe, classify, and summarize various aspects of human behavior. The term used to describe an instrument depends primarily on its format and purpose. These terms include survey, questionnaire, inventory, diagnostic, survey, and poll. Some uses of instruments include providing instrumental feedback to group members, studying here-and-now processes or functioning within a group, manipulating group composition, and evaluating outcomes of training and other interventions.

Instruments are popular in the training and HR field because, in general, more growth can occur if an individual is provided with a method for focusing specifically on his or her own behavior. Instruments also are used to obtain information that will serve as a basis for change and to assist in workforce planning efforts.

Paper-and-pencil tests still dominate the instrument landscape with a typical package comprising a facilitator’s guide, which offers advice on administering the instrument and interpreting the collected data, and an initial set of instruments. Additional instruments are available separately. Pfeiffer, though, is investing heavily in e-instruments. Electronic instrumentation provides effortless distribution and, for larger groups particularly, offers advantages over paper-and-pencil tests in the time it takes to analyze data and provide feedback.

LECTURETTE  A short talk that provides an explanation of a principle, model, or process that is pertinent to the participants’ current learning needs. A lecturette is intended to establish a common language bond between the trainer and the participants by providing a mutual frame of reference. Use a lecturette as an introduction to a group activity or event, as an interjection during an event, or as a handout.
MODEL  A graphic depiction of a system or process and the relationship among its elements. Models provide a frame of reference and something more tangible, and more easily remembered, than a verbal explanation. They also give participants something to “go on,” enabling them to track their own progress as they experience the dynamics, processes, and relationships being depicted in the model.

ROLE PLAY  A technique in which people assume a role in a situation/scenario: a customer service rep in an angry-customer exchange, for example. The way in which the role is approached is then discussed and feedback is offered. The role play is often repeated using a different approach and/or incorporating changes made based on feedback received. In other words, role playing is a spontaneous interaction involving realistic behavior under artificial (and safe) conditions.

SIMULATION  A methodology for understanding the interrelationships among components of a system or process. Simulations differ from games in that they test or use a model that depicts or mirrors some aspect of reality in form, if not necessarily in content. Learning occurs by studying the effects of change on one or more factors of the model. Simulations are commonly used to test hypotheses about what happens in a system—often referred to as “what if?” analysis—or to examine best-case/worst-case scenarios.

THEORY  A presentation of an idea from a conjectural perspective. Theories are useful because they encourage us to examine behavior and phenomena through a different lens.

TOPICS
The twin goals of providing effective and practical solutions for workforce training and organization development and meeting the educational needs of training and human resource professionals shape Pfeiffer’s publishing program. Core topics include the following:

  - Leadership & Management
  - Communication & Presentation
  - Coaching & Mentoring
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