

Organizational Models

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Let me begin this chapter by introducing two related, but different concepts: hypertext structure and organizational model. Hypertext structure is based on the *physical* organization of all of the static HTML documents and dynamic templates in a site. Organizational model, on the other hand, is based on the *logical* relationships among the pieces of content that the static HTML, or more frequently, the dynamic templates, present to the user.

When web sites were just static collections of documents, hypertext structure and organizational model were one and the same. However, when content was finally separated from hypertext and dynamic web sites were born, the separation between the hypertext structure and organizational model also took place. On a typical eCommerce site hypertext structure shows, for example, how the home page template is related to the category page template, the search results template, the your account section, the help pages, editorials, etc. Organizational model, on the other hand, describes how similar data objects, such as the products in an online catalog, are classified and arranged for presentation. This chapter is about organizational models.

An organizational model has two components: classification and association.¹ Classification scheme determines how items are placed into categories based on the characteristics of the items. A model of association determines how those categories are arranged for presentation to the user.

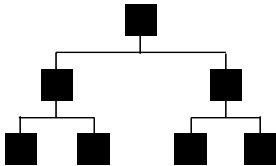
Classification

While we experience the world chronologically, we comprehend it by making connections and recognizing patterns. We relate items based on what they have in common. This is classification in its simplest form. For example, we may classify toothbrushes and toothpaste as oral hygiene items based on the fact they're both used to clean our teeth. Simple enough.

¹ Baxley, Bob. "Making the Web Work: Designing Effective Web Applications" (New Riders, 2003), p. 147. Another commonly used name for a model of association is a topology.

Most common models of association:

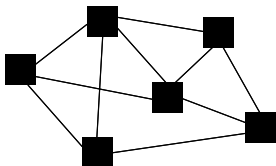
Hierarchy (or tree):



Linear (or sequence):



Web:



Association

A model of association describes how individual items or categories of items are aggregated and arranged into a navigable “information space.” To continue with our oral hygiene example, we can aggregate the oral hygiene items with other categories like shaving and bath supplies to come up with an umbrella category like personal care, thereby creating a hierarchy—the most popular model of association.

The classification criteria used to categorize items will to a large extent determine the model of association. To use Bob Baxley’s example from “Making the Web Work,” if you classify your company’s employees by position, they are best organized hierarchically because this is how positions are related to each other. However, if you use the date of hire as the basis for classification, arrange the same employees along a linear timeline instead.

Of course, classification does not *determine* the model of association. For instance, you can aggregate categories at different levels granularity to create hierarchies even if the classification criteria are not inherently hierarchical. You will see several examples of this in the classification scheme table on the next page.

Homogeneity and granularity

Homogeneity and its twin, heterogeneity, refer to how similar the items within a single group are. The more similar the items, the more homogeneous the group. For example, classifying toothbrushes as personal care items places them into a large group of fairly heterogeneous items like razors, shampoo, and soap. On the other hand, classifying them as oral hygiene products places toothbrushes into a relatively small group of homogeneous items like floss, toothpaste, and mouth wash.

Granularity, in the context of an organizational model, refers to how general or specific a category’s label is in relation to the items it can contain. The more specific the label, the more finely grained the category. For example a dining table and a set of chairs can be placed into a finely grained category like “Dining Room,” or into a coarsely grained category like “Things that go in the house.” More coarsely grained categories allow for, but do not require, more heterogeneous items to be placed into them. Because a category’s specificity often dictates its depth in a hierarchy, you can also think of granularity in terms of the category’s position within a hierarchy. The deeper the position, the finer the granularity.

Classification schemes

In classification one size does not fit all. Depending on the nature of the item you may want to use any one of its many different characteristics to classify it in different ways to suit the situation. Sometimes an item's physical property (an intrinsic characteristic) like size or weight is useful. At other times factors like the item's purpose or typical location (extrinsic characteristics) are more helpful in classifying it meaningfully. For example, toothbrushes can be classified as things that go into the bathroom, things that anyone concerned with their health would use regularly, or simply things that clean. This classification multiplicity gives rise to several classification schemes. The most common are summarized in the following table.

| Classification Scheme: | | Example: |
|------------------------|-----------------------------------|---|
| Ambiguous | <i>Topical</i> | "Drama", "Comedy", "Action", etc. (movie review site) |
| | <i>Task-oriented</i> | "Customize It", "Find financing", etc. (online car shopping) |
| | <i>Audience-specific</i> | "Home", "Business", "Education", etc. (computer store) |
| | <i>Metaphor-driven</i> | "Living Room", "Bedroom", "Kitchen", etc. (furniture store) |
| Unambiguous | <i>Continuum</i> | "4/5 stars" (product rating) |
| | <i>Special cases of continuum</i> | <i>Alphabetical</i> "S – U" > "T" > "Toe - Top" |
| | | <i>Numerical</i> "1 oz.", "under \$2" |
| | | <i>Chronological</i> "2004" > "August" > "August 12, 2004" |
| | <i>Geographical</i> | "Solar System" > "Earth" > "Australia" > "Victoria" > "Melbourne" |

Continuum ranges at different levels of granularity can be used together to create a hierarchy

A thing worth noting here is that alphabetical, numerical, and chronological are the most popular continuum schemes. While they deserve a separate mention, they all fall under the continuum umbrella. Of course, in order for a continuum scheme to be useful, it must either have a limited number of discrete points (as in the example of user ratings) or be made up of relatively homogeneous ranges like months, weeks, etc.

Ambiguity

There's sometimes more than one property, or criterion, that can be used *within a single classification scheme* to classify an item. The fact that not everyone uses the same attributes for classification gives rise to ambiguity. For example, within the metaphor-driven scheme, a toothbrush can be classified as a thing that can be found in the bathroom, a pharmacy, or your dentist's office. To use a classical example, a tomato can be considered a fruit, a vegetable, or a berry, all within a topical classification scheme.

I came across an interesting example of ambiguity at work when I was looking for “Envisioning Information” by Edward Tufte at Barnes & Noble and Borders bookstores in downtown Boston. At Barnes & Noble the book was in the section on graphic design, whereas at Borders it was in mathematics! Topical (or subject-based) classification scheme is clearly ambiguous.

Unambiguous (or objective) classification schemes are devoid of ambiguity, because these schemes:

- rely on a predefined set of units, be it letters, numbers, or dates for classification;
- use an agreed-upon attribute like an item’s measurable physical property (size, weight, length, etc.), the date of creation, etc. for classification. The only variable here is granularity. For example, you can find toothbrushes in categories labeled “S – U,” “T,” or “*Toe through Top.*” Different levels of granularity, yet no confusion about where to look.

So if ambiguous schemes are so subjective then why not simply use unambiguous classification schemes? The simple reason is that we don’t always know what we’re looking for.² This simple fact makes ambiguous schemes much more useful, especially at the top levels in a hierarchy, where users can easily start browsing with minimum knowledge about the things they will eventually find.

Cross-referencing: a solution for the consequences of ambiguity

What were the consequences of the fact that Borders and Barnes & Noble categorized “Envisioning Information” differently? I could find it at B&N, because I was looking for it in design, but not at Borders: I actually had to ask a salesperson for help. Of course, the fact that the number of departments in a physical bookstore is limited only aggravated the problem: statistics books were shelved in mathematics at Borders. Even though math and statistics are related, I didn’t think about looking in mathematics: I just didn’t make the connection. Had there been a statistics department, I probably would have looked there; it would have been less of a stretch.

Could the two bookstores fix the problem I encountered by cross-referencing? Not really. Shelving every book in all the sections where it can

² Louis Rosenfeld and Peter Morville, “Information architecture for the World Wide Web”, O’Reilly, 1998, p. 30. Rosenfeld states that “library patrons used ambiguous, subject-based schemes... much more frequently” (p. 29).

fit would be prohibitively expensive: time-consuming and wasteful of shelf space. Online, however, the same book can be cross-listed in several departments, letting customers who categorize books differently still find what they're looking for. For example, you could take nine different paths to "Envisioning Information" on Amazon.com:

- Subjects > Nonfiction > Social Sciences > Statistics
- Subjects > Reference > Words & Language > Communication
- Subjects > Arts & Photography > Graphic Design > Design > General
- Subjects > Arts & Photography > Graphic Design > Graphic Arts > General
- Subjects > Business & Investing > Business Life > Communication > General
- Subjects > Computers & Internet > Graphics & Illustration > General
- Subjects > Computers & Internet > Web Development > HTML, Graphics, & Design > Web Graphics
- Subjects > Computers & Internet > Digital Business & Culture > Project Management > Statistical Computing
- Subjects > Reference > General

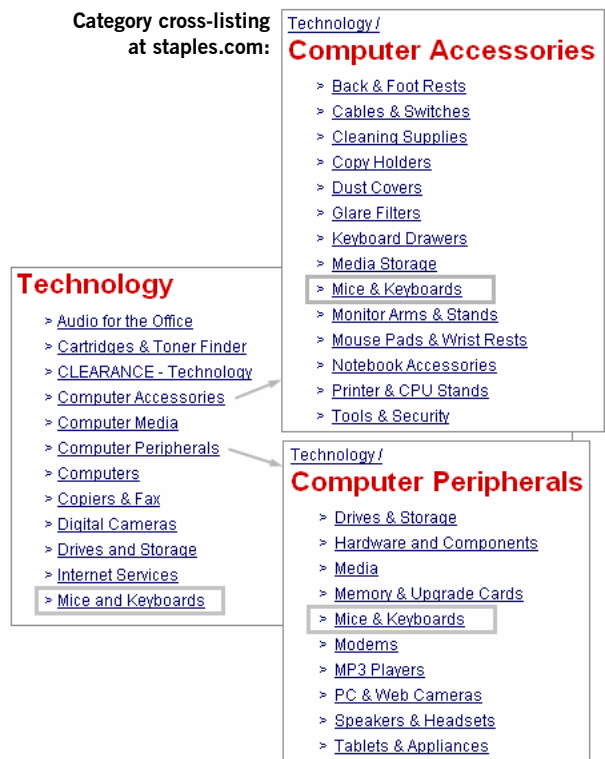
Can you cross-reference too much? Absolutely. I once tested a boot shop subsite at Nordstrom.com. Cross-referencing there was taken beyond extreme: in a single section any two categories could share as many as *half* of their boots. The users got quickly frustrated when, after clicking a different category, they saw many of the same products. The lesson here is that, while it can be extremely useful, cross-referencing should be used in moderation.

Item vs. category cross-referencing

While the amazon.com example above illustrates *item* cross-referencing (a single item listed in several categories), the following example from staples.com demonstrates *category* cross-referencing, where an entire category appears in several places in a hierarchy:

The strategy behind this approach is straightforward:

- To cross-link subcategories that can belong to more than one high-level category. This ensures that customers who start out on the wrong path can still find the category they want. In this example, a customer looking for mice can get to them by choosing "Mice and Keyboards" from Technology, Computer Accessories, or Computer Peripherals categories (see the illustration on the right).
- To make more categories "bubble up" to higher levels in the hierarchy so that the customers can get to the products in fewer clicks. According to Meena Venkateswaran, a project director with Human



Factors International, “people had to dig a little bit too deep to find the information they were after.”³

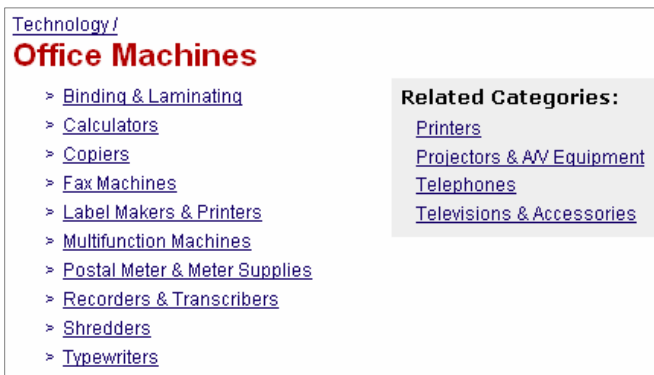
While the staples.com’s implementation of category cross-referencing gets customers to products—I am sure staples.com has stuck with this approach *because* it works—it is not the most elegant. The following minicase addresses some usability issues that arise and suggests an alternative.

Minicase: Category cross-referencing at Staples.com

There are two major approaches for displaying cross-referenced categories:

- **plug the cross-referenced categories directly into the list of the “main” categories.** This is what staples.com does. The disadvantage of this approach is that, when taken too far, it “destroys” the hierarchy: the hierarchy starts resembling a collection of alphabetized groups of disparate category links rather than a well-organized tree. When too many things are repeated in too many places it becomes difficult for the users to create a model of how the items are organized.
- **list the cross-referenced categories separately from the main categories as “see also” links.** This is the approach I propose for staples.com.

My solution for staples.com, using the “Technology” category as an example, consists of these three parts:



Cross-listing categories in the Related Categories box.

Because the cross-listed categories are confined to a special area, more of them can be included without overwhelming the user: splitting the links into two visually and logically different lists results in less cognitive load than placing them all into a single list.

- › **Create a “straight” hierarchy to serve as the basis of organization.** No category should be listed in more than one place. This will let users get a better grasp of what items “live” in what category. As an added bonus, a straight hierarchy will eliminate the need to mix coarsely and finely grained categories at the same level in the hierarchy. For example, “Computer Peripherals” is more coarsely grained compared to “Mice & Keyboards,” yet both appear together on the Technology home page. Moving “Mice & Keyboards” *under* “Computer Peripherals” creates a more logical arrangement and maintains the natural transition from coarse to fine category granularity as one progresses down a hierarchical tree.

³ Quoted in “Staples.com: The Customer-Driven Approach” by Anne Zeiger, 6/21/02, agilebrain.com (<http://www.agilebrain.com/staples.html>).

- › Display cross-referenced categories separately from the main hierarchy. List related categories in an appropriately named box/area next to the main categories. This places helpful category cross-references in plain view without compromising the integrity of the main hierarchy.
- › Redesign the Technology page using a yahoo-style directory to reveal several subcategories for each top-level category. Top-level category labels like “Computer Accessories” or “Presentation & Meeting Tools” are not very useful: they’re too broad and ambiguous—characteristics that often go hand in hand. The redesigned version places more useful categories like Batteries, Memory, and CDR/RW media in front of the customer:

The screenshot shows the Staples website's Technology category page. The layout is a directory-style list of subcategories, each with a list of related products or services. The subcategories include: Audio for the office (Desktop audio & Clock radios, Headphones, Micro systems...), Computers (Desktops, Hardware & Components, Notebooks), Computer Accessories (Cables & switches, Cleaning, Dust covers, Glare filters, Tools...), Computer Media (CDR/RW & DVD, Data cartridges & Tape backup, Floppies, Zip...), Computer Peripherals (Drives & Storage, Memory, Mice, Monitors, Networking, Printers...), Digital Cameras (Accessories, Cameras, Removable memory), Internet Services, Office Machines (Copiers & Fax, Label printers, Multifunction machines, Shredders...), Office Machine Supplies (Audio & Video tapes, Batteries, Ribbons, Toner & Cartridges...), PDAs and Handhelds (Electronic Organizers, Palm, Pocket PC & Linux, PDA Software...), Presentation & Meeting Tools (A/V Carts, Conferencing systems, Projectors & A/V equipment...), Software, Licensing & Downloads, Telephones & Communication (GPS, Telephones, Telephone accessories, Two-way radios...), and Wireless & Cellular Services.

Yahoo-style directory works well for a coarsely grained top-level category such as Technology.

While this places more links on the page, the links are split logically and visually (indentation and font size) between two hierarchical levels. This avoids confusion: the user can see how things are organized.

Appliances

- › **Accessories**
[Air Cleaner](#) • [Compactors & Disposers](#) • [Cooking](#) • [Dehumidifier](#) • [Floor Care](#) • [Heaters](#) • [Humidifier](#) • [and More Items...](#)
- › **Air Cleaners**
[Accessories](#) • [Air Cleaners](#)
- › **Compactors & Disposers**
[Accessories](#) • [Compactors](#) • [Disposers](#)

Appliance categories at Sears.com.

Linking to subcategories provides a useful shortcut. As a result, you can get to most sears.com bottom-level categories from the home page in just two clicks.

There is an additional benefit here. The more ambiguous categories clarified through examples—subcategories—placed next to the main category labels. For instance, you can now clearly see the difference between Computer Accessories and Computer Peripherals. At right, an example of yahoo-style directory on sears.com’s appliances shopping page.

Designing more robust hierarchies to reduce ambiguity

Cross-referencing is a great way to fight the consequences of ambiguity. However, a better approach is to design a hierarchy that is less ambiguous in the first place. Here are a few rules of thumb to follow:

- › **Make the items at each level in a hierarchy mutually exclusive.** This is the #1 rule for any hierarchy. Mutually exclusive categories create well-defined choices that are clearly distinguished from each other—choices that are easy to make. The only exception to this rule is a situation where the customers are so used to a certain top-level category set that organizing things differently would confuse them more than it would help. The classical “Women,” “Men,” “Kids” top-level breakdown in most department stores is an example. Most customers will look for children's items in “Kids” rather than “Men” or “Women.”
- › **Label the categories clearly.** While clear labeling is one of the most basic general usability guidelines, many sites still have labels that are clever or cute (but ultimately confusing) in a misguided belief that it enhances their brand. Keep in mind that good experience rather than flashy visuals builds brands both online and off. Clear category labels let customers get to the items they're looking for with a minimum of frustration and doubt.
- › **Keep category granularity fine.** Doing this reduces ambiguity by creating category labels that are closer to the names of the items they contain. Of course, this means that the category labels will tend to be fairly specific. Your site's users and breadth of offerings will dictate how specific the categories can become before you start alienating customers with category labels that are too specific to be useful. Doing a few card sorting exercises with your target audience will allow you to determine the perfect blend of breadth and depth. In general, however, I recommend labeling categories as close to the names of items they contain as is reasonable.
- › **Keep the items within a single category homogeneous.** This decreases the chance that items from two or more levels in the hierarchy will get “squished” into a single level and helps define the category as a more coherent unit within the hierarchy.
- › **Show sample items/subcategories alongside the category labels.** If you find yourself with coarsely grained categories, doing this will provide hints for customers who find the category labels too ambiguous. The redesigned Technology home page in the staples.com minicase shows how this technique can clarify categories that are too broad or ambiguous.

Minicase: Nordstrom.com's boot shop

This minicase is based on the results of a user test I conducted in the Fall of 2001. It shows what happens when there's too much overlap among categories at the same level in a hierarchy.⁴



The boot shop “home” at nordstrom.com.

The boot shop's navigation mechanism lets the user browse the entire selection in four different ways: by boot height, feature, price, and style. Of these, only style is a truly ambiguous classification criterion since it is so subjective. On the other hand, price is exact, a feature is either present or absent, and the boot heights—ankle, mid-calf, and knee-high—are fairly well-defined gradations on the height continuum. However, the categories in the “shop by feature” section gave users the most trouble.

The problem with the categories in the “shop by feature” section was that so many of them overlapped. That is, the categories listed here were not mutually exclusive. One user's comment summarizes the problem: “What if I want a waterproof, flat-heeled, pull-on boot? Where do I click?”

In general, there are two things that happen when categories at the same level in a hierarchy overlap:

- **either: the items in those categories get arbitrarily split up between the categories to avoid repetition.** This way no single category contains the full selection. In Nordstrom.com's case, the high-heel category might have contained all zip-up, pull-on, and lace-up high-heel boots. While this would make this category complete, the zip-up, pull-on, and lace-up categories would now be missing high-heeled boots. Doing the same for

⁴ As of May 2003, the boot shop for women was still organized at it was when I ran this test in 2001 with only minor changes: <http://store.nordstrom.com/category/boutique0.asp?category=2376778~2372808~2372895>.

the flat-heel category (in addition to the high-heel category) would leave the zip-up, pull-on, and lace-up categories empty.

- › **or: the items get cross-listed in *all* categories that mention an attribute of the item.** This is the approach that the nordstrom.com's designers took. For example, the flat-heel category listed zip-up, pull-on, and lace-up boots, which were also outdoor and waterproof:



As a result of this rampant item cross-listing, the users got really frustrated, because there was no way to narrow the complete list down to just the boots that met a particular set of criteria. For example, one user was looking for an knee-high, zip-up, flat-heel leather boot, but the site did not provide a way to narrow down the list beyond just one of these criteria. As a result the user was forced to look through pages of irrelevant products.

The underlying problem here, however, is the chosen model of association: a hierarchy is simply not well suited for organizing a set of such homogeneous items such as boots. I will delay the discussion of the proposed solution for Nordstrom's boot shop until I discuss faceted browsing as an alternative to hierarchical browsing in Chapter 6: Winnowing Tools.

Mixing classification schemes

Classification schemes owe their existence to the fact that a single thing can be classified in several different ways. This means that there is often more than one suitable way to present a the same set of items. In fact, using several schemes at once is often a better approach. It satisfies the widest target audience. Here are a few situations where mixing classification schemes can be useful on an eCommerce site:

- › **Your customers may want to browse in different ways at different times or for different products.** Their primary selection criterion—price, brand, situation of use, etc.—may change depending on their goals: “find a

designer dress shirt for under \$200,” “get a dress shirt by Gucci,” “get a nice dress shirt to wear to my gallery opening.”

- › **Your customers may be used to narrowing down their selections in a certain way—a way they consider logical.** In addition, there are sometimes established ways that certain stores organize their wares—ways which are familiar to the majority of their customers. For example, many furniture stores organize their offerings by room of the house at the topmost level in the hierarchy, and then by a type of furniture: desk, chair, table, sofa, etc.
- › **Your product catalog offerings may be tailored to a well-defined audience.** In this case, categorizing things by audience first makes the most sense. For example, most department stores are organized around the three major audiences: women, men, and kids.

The most important thing to keep in mind when mixing schemes is never to mix them at the same level in a hierarchy. The classic “Men,” “Women,” “Shoes,” and “Kids” breakdown of many online department stores is an example. I have absolutely no idea why most online department stores have a “Shoes” category at the same level as the other three. At my local Filene’s, “men’s shoes” and “women’s shoes” are sub-departments within “men” and “women,” respectively. Unfortunately so many online department stores practice this that it has become the standard.

While mixing schemes at the same level of the hierarchy creates confusion, there are two ways to mix schemes successfully:

- › **in parallel, where several hierarchical trees “live” side by side.** For example, Kbtoys.com, will let you browse its toys by the recipient’s age, as well as the toy’s price, brand, and category. Even though “Price” and “Age” are just categories (not hierarchies) this breakdown still works.
- › **in series, where the schemes change (but are never repeated) as the user narrows down the complete set of items.** Department store product catalogs are the obvious example of series, or hierarchical, organizational mixing at work: audience-oriented at the top level, topical (pants, shirts, etc.) after that.

There are many challenges to organizing your site’s offerings: balancing ambiguity and usefulness, breadth and depth; deciding whether to cross-reference categories and items, or how to mix organizational schemes. In the end, however, it all comes down to organizing things in ways your customers will find most familiar and useful.

Shop by Age:
[0-12 Months](#) [Ages 5-7](#)
[Ages 1-2](#) [Ages 8-11](#)
[Ages 3-4](#) [Ages 12+](#)

Shop by Price:
[Under \\$10](#) [\\$30 - \\$40](#)
[\\$10 - \\$20](#) [\\$40 - \\$50](#)
[\\$20 - \\$30](#) [Over \\$50](#)

Shop by Brand:
[Barbie](#) [LEGO](#)
[Fisher-Price](#) [PlayStation 2](#)
[Hot Wheels](#) [VTech](#)

Shop by Category:
[Animated Toys](#) [New Arrivals](#)
[Dolls](#) [Preschool](#)
[Electronics](#) [Riding Toys](#)

Four ways to browse for toys at Kbtoys.com. Offering several parallel classification schemes is an excellent way to handle multiple customer goals by matching the browsing options to the customer's most common primary selection criteria. KBToys' breakdown is works well until you get to the “Shop by Category” section. There, topical (Animated Toys, Riding Toys), audience-specific (Preschool) schemes are mixed at the same hierarchical level. In addition, “New Arrivals” is an attribute that can apply to any one of the categories in that list.