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## THE DISCIPLINE OF ORGANIZING

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## Outline

- Project Motivation
- We Organize Things, Documents, Information...
- The Concept of "Organizing System"
- Project Collaboration, Customization, Curation



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## Project Motivation

- Since 2005 I have taught the required course for entering professional students at Berkeley's "Information School"
- The ISchools span the range from traditional library schools to informatics and computer science programs
- They are all "interested in the relationship between information, people and technology" but what do they have in common?

→ THE DISCIPLINE OF ORGANIZING

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## We Organize...

- Things
- Information
- Information about Things
- Information about Information  
about {Things, Information}
- ...

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## We Organize...

- Most people have a notion of LIBRARY, MUSEUM, BUSINESS INFORMATION SYSTEM, and a few other common institutions that organize collections of various kinds

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## Library



*Bancroft Library, UC Berkeley*



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## Museum



*Louvre, Paris – with Mona*



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## Archive



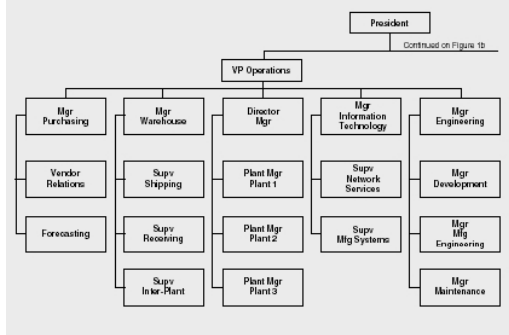
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### Human Resource Organization

Figure 1a  
Organizational Structure

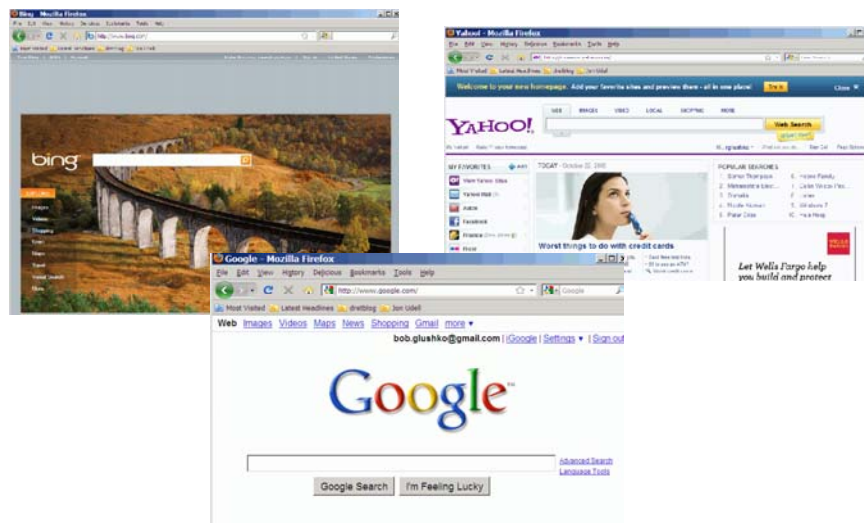


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### The Web & Digital Libraries

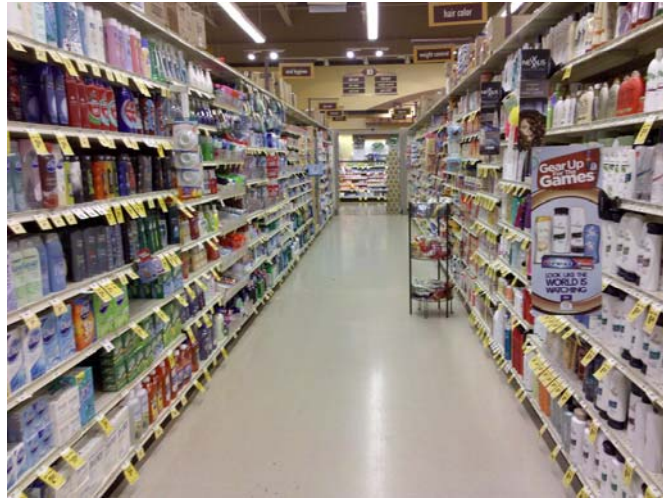


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## Retail Store



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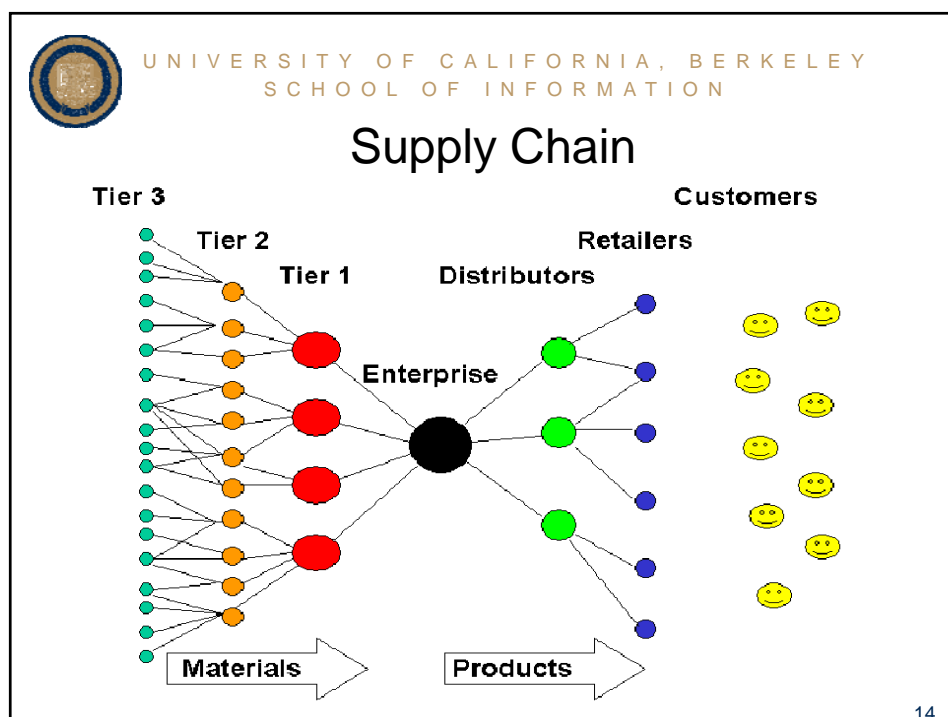
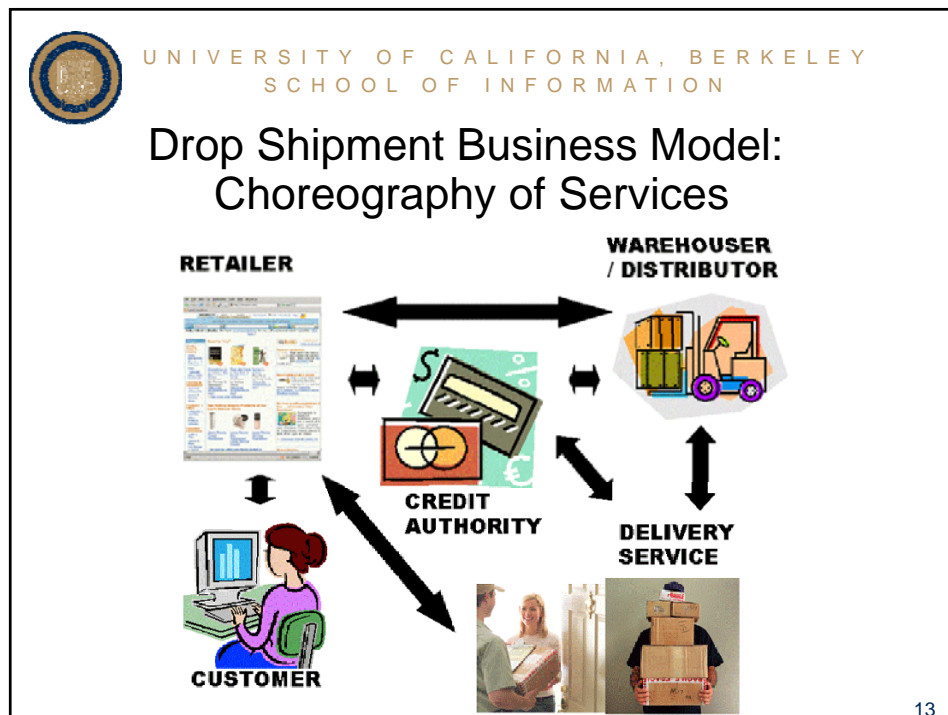


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## Web Retail Store



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## Real-Time Information About Supply Chains



Tracking Detail

1Z2007940367428014 Updated: 11/16/11

**Delivered** ✓

**Delivered On:** Tuesday, 11/15/2011 at 3:21 P.M. [Request Status Updates](#)

**Left At:** Porch [Proof of Delivery](#)

**Additional Information**

**Shipment Progress** [What's This?](#)

Location	Date	Local Time	Activity
San Pablo, CA, United States	11/15/2011	3:21 P.M.	Delivered
	11/15/2011	5:12 A.M.	Out For Delivery
San Pablo, CA, United States	11/14/2011	11:27 A.M.	Arrival Scan
Roanoke, VA, United States	11/10/2011	3:27 A.M.	Departure Scan
Roanoke, VA, United States	11/08/2011	5:32 P.M.	Origin Scan
United States	11/08/2011	11:54 P.M.	Order Processed: Ready for UPS

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## Real-Time Information About Information

Market Data Center >

MY MARKETS U.S. EUROPE ASIA CURRENCY/RATES

DJIA*	12096.16	17.18 ↑	0.14%	2096
Nasdaq*	2886.20	28.98 ↑	1.09%	2086
S&P 500*	1257.81	6.03 ↑	0.48%	2057
Global Dow	1834.94	12.44 ↓	0.67%	2644
FTSE 100*	6517.44	1.60 ↓	0.03%	
Nikkei Average*	8541.93	61.77 ↓	0.72%	

\* at close Source: Dow Jones, SIX Telekurs, ICAP plc 4:05 P.M. 11/15/11

MARKET NEWS <> H-P and Intel Pull the Blue Chips Up



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## We Organize...

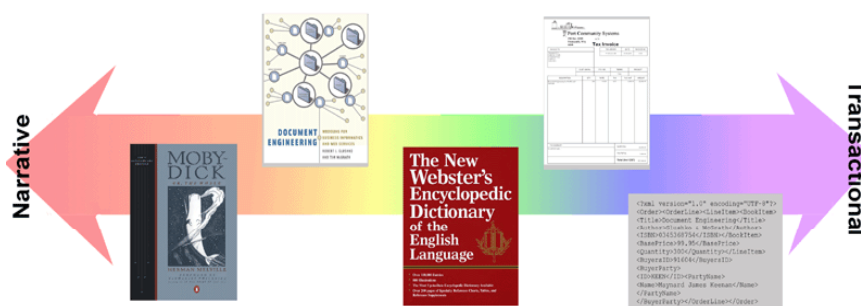
- Most people also have a notion of different types of documents that have characteristic content, structures, and presentations

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## The “Document Type Spectrum”



from “Document Engineering,”  
R. Glushko & T. McGrath, MIT Press 2005

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## A Novel

CALL me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen, and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean with me.

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## Product Catalog

### Industrial Or Light Weight Bags On A Roll

Bags are perforated allowing easy tear off for in-store or assembly line use. Choose industrial 2-mil or extra heavy 4-mil for parts fittings and hardware. Lightweight bags are .5 mil and ideal for produce and lighter weight items. Table or wall mount dispenser available below.



#### Industrial Bags On A Roll

Size (In.)	Bags Per Roll	Part No.	Price 2 Mil	Part No.	Price 4 Mil
4 x 6	1000	88400LU	25.55	88430LU	45.55
6 x 9	1000	88403LU	39.15	88433LU	59.90
8 x 10	1000	88406LU	47.15	88436LU	65.65
10 x 12	1000	88409LU	66.25	88439LU	125.30

Discount per part no.: Less 5% 12-23 rolls; 15% 24 rolls or more.

#### Lightweight Bags On A Roll

Size (In.)	Bags Per Roll	Part No.	Price Per Carton of 2 Rolls
10 x 15	2000	88080LU	52.80
10 x 20	1500	88085LU	52.80
Dispenser		88090LU	17.80 each

### Lay-Flat Poly Tubing Rolls

Simply cut tubing to your exact length and seal with the Consolidated Impulse Heat Sealer found on page 80. Choose 2 mil or 4 mil tubing stock. Ideal for a variety of different size parts. FDA approved.



#### 2 Mil

Part No.	W x L (In. x Ft.)	Price/Roll	Part No.	W x L (In. x Ft.)	Price/Roll
89965LU	2 x 2100	33.66	89972LU	12 x 2100	101.18
89967LU	3 x 2100	39.40	89973LU	14 x 2100	119.86
89968LU	4 x 2100	55.90	89974LU	16 x 2100	138.60
89969LU	5 x 2100	63.85	89975LU	18 x 2100	147.72
89971LU	6 x 2100	62.68	89976LU	20 x 2100	180.05
89978LU	8 x 2100	78.64	89940LU	24 x 1700	188.43
89981LU	10 x 2100	94.40	89941LU	36 x 1100	163.49

#### 4 Mil

Part No.	W x L (In. x Ft.)	Price/Roll	Part No.	W x L (In. x Ft.)	Price/Roll
89980LU	2 x 1050	33.66	89983LU	12 x 1050	101.18
89982LU	3 x 1050	39.40	89984LU	14 x 1050	119.86
89983LU	4 x 1050	55.90	89986LU	16 x 1050	138.60
89984LU	5 x 1050	63.85	89987LU	18 x 1050	147.72
89985LU	6 x 1050	62.68	89988LU	20 x 1050	180.05
89986LU	8 x 1050	78.64	89942LU	24 x 850	168.43
89982LU	10 x 1050	94.40	89943LU	36 x 550	163.49

Discount per part no.: Less 5% 5-11 rolls; 10% 12-23 rolls; 15% 24 rolls or more.

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## We Organize...

- Most people also have PERSONAL COLLECTIONS of things or information

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## Closet



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## Stamp Collection



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## Document Collection



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## Motivating the Concept of “Organizing System”

- We can emphasize how all of these examples differ... or we can emphasize what they have in common
- They are all “Organizing Systems”
  - *A collection of resources*
  - *Intentionally arranged*
  - *To enable some set of interactions*

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## The Organizing System [2]

- RESOURCES are “anything of value that can support goal-oriented activity”
- A COLLECTION is a group of resources that have been selected for some purpose
  - A collection is also a resource but because collections are an important and frequently used type of resource we distinguish them as a separate concept

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## The Organizing System [2]

- INTENTIONAL ARRANGEMENT captures the idea that the system requires explicit or implicit acts of organization by AGENTS – human or computational ones
- These arrangements follow or embody one or more ORGANIZING PRINCIPLES, “directives for design” that are expressed in an abstract or logical way that does not constrain their implementation

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## Intentionality in Organizing Systems

- The Grand Canyon contains information in its organization but is not an organizing system
- Organizing systems exist because of some intentional acts to enable interactions ... where we can identify the agent(s)



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## The Organizing System [3]

- INTERACTIONS include any activity, function, or service supported by or enabled with respect to the resources in a collection or with respect the collection as a whole
- Interactions can include access, reuse, copying, transforming, translating, comparing, combining... anything that a person or process can do with the resources... but we should focus on those that are designed into or directly supported by the organizing system

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## The Activities of Organizing Systems

- We can identify four activities in the lifecycle of every organizing system:
  - Selecting resources
  - Organizing resources
  - Supporting resource-based interactions and services
  - Maintaining resources

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## For Your Closet Organizing System...

- **Selecting:** *Should I hang up my sweaters in the closet or put them in a drawer?*
- **Organizing:** *Should I sort my shirts by color, sleeve type, or season?*
- **Supporting Interactions:** *Do I need separate places for laundry or dry cleaning?*
- **Maintaining:** *Should I toss out my clothes based only on stains and tears, based on how long I've owned them, or based on whether I'm tired of them?*

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## Stop and Reflect...

- Does the definition of “Organizing System” apply to all of the types of collections, documents, and information services we’ve seen?
- Is it OK to use more abstract terms like “resource,” “interaction,” and “maintenance” instead of more specific and domain-specific terms?
  - Collection development, Appraisal vs. Selecting
  - Cataloguing, Indexing vs. Organizing
  - Curation, governance vs. Maintenance ...

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## Resources...

### In the Library?



### In the Zoo?



### On the Web:

### Universal Resource Identifiers (URIs)

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## Organizing Organizing Systems [1]

- We can classify organizing systems by:
  - resource type
  - dominant purpose
  - creator
  - size of intended user community
  - or many other ways
  
- But these classifications overlap and don't have clear boundaries

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## Organizing Organizing Systems [2]

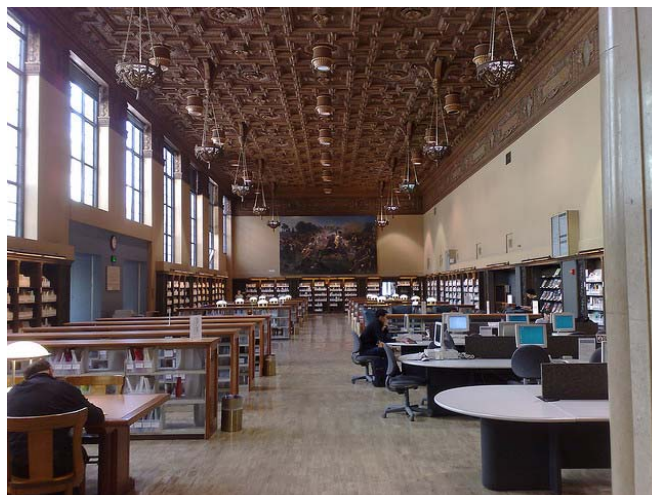
- "Memory institutions" - libraries, archives, and museums
- Enterprise collections - business content, business data and knowledge management, web-based services
- Collections of structured information
- Collections of unstructured or semi-structured information
- Personal collections vs. institutional collections
- ...

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## A Library

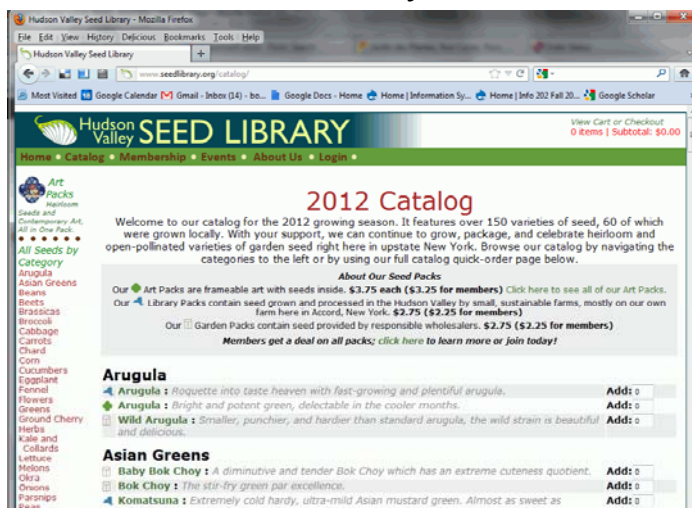


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## A Library?



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## A Library?

**WIKIPEDIA**

<p><b>English</b> <i>The Free Encyclopedia</i> 3 861 000+ articles</p>	<p><b>日本語</b> フリー百科事典 790 000+ 記事</p>
<p><b>Deutsch</b> <i>Die freie Enzyklopädie</i> 1 355 000+ Artikel</p>	<p><b>Español</b> <i>La enciclopedia libre</i> 864 000+ artículos</p>
<p><b>Русский</b> <i>Свободная энциклопедия</i> 817 000+ статей</p>	<p><b>Français</b> <i>L'encyclopédie libre</i> 1 208 000+ articles</p>
<p><b>Italiano</b> <i>L'enciclopedia libera</i> 886 000+ voci</p>	<p><b>Polski</b> <i>Wolna encyklopedia</i> 874 000+ haseł</p>
<p><b>Português</b> <i>A enciclopédia livre</i> 712 000+ artigos</p>	<p><b>中文</b> 自由的百科全书 398 000+ 條目</p>

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## Natural History Museum



*Museum national d'histoire naturelle, Paris*

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## Is a Zoo an Animal Museum?



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## Is an Animal Theme Park a Museum? Is it A Zoo?



*Sea World, San Diego - with "Shamu" [ARKS]*

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## "Design Space" or "Dimensional" Perspective

- Instead of thinking in terms of categories like Library or Museum or Business Information System, consider a specific organizing system as a point in a multidimensional design space and these categories as regions in that space...

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## The 5 Dimensions of an Organizing System

- What Is Being Organized?
- Why Is It Being Organized?
- How Much Is It Being Organized?
- When Is It Being Organized?
- Who (or What) is Organizing It?

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## What Is Being Organized?

- Identifying the unit of analysis is a central problem in every intellectual or scientific discipline - and in every organizing system
- Resources that are aggregates or composites of other resources, or that have internal structure, pose questions about the granularity of their "thingness"
- We might need to organize and manage the granular resources, the composite resources, and the relationships between them - all at the same time

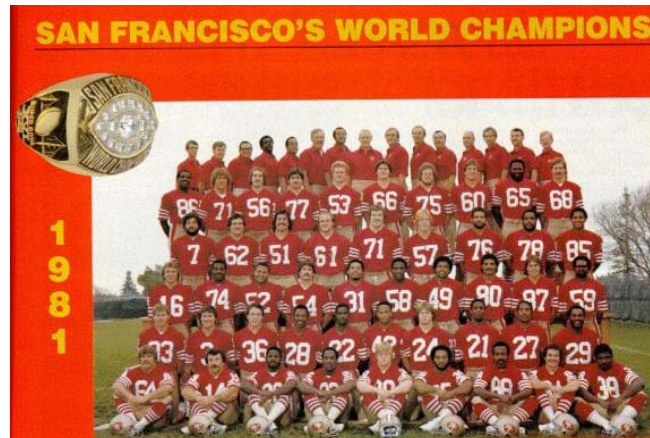
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## How Many Things?



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## How Many Things?

### THE CARPET-BAG

II

I STUFFED a shirt or two into my old carpet-bag, tucked it under my arm, and started for Cape Horn and the Pacific. Quitting the good city of old Manhatto, I duly arrived in New Bedford. It was on a Saturday night in December. Much

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## How Many Things?

### THE CARPET-BAG

II

I STUFFED a shirt or two into my old carpet-bag, tucked it under my arm, and started for Cape Horn and the Pacific. Quitting the good city of old Manhatto, I duly arrived in New Bedford. It was on a Saturday night in December. Much

<Section title="The Carpet- Bag">  
<Para>I stuffed a shirt or two into my old carpet-bag, tucked it under my arm, and started for <Location>Cape Horn</Location> and the </Location>Pacific</Location>. Quitting the good city of old <City>Manhatto</City>, I duly arrived in <City>New Bedford</City>, It was on a <Day>Saturday</Day> night in <Month>December</Month>...

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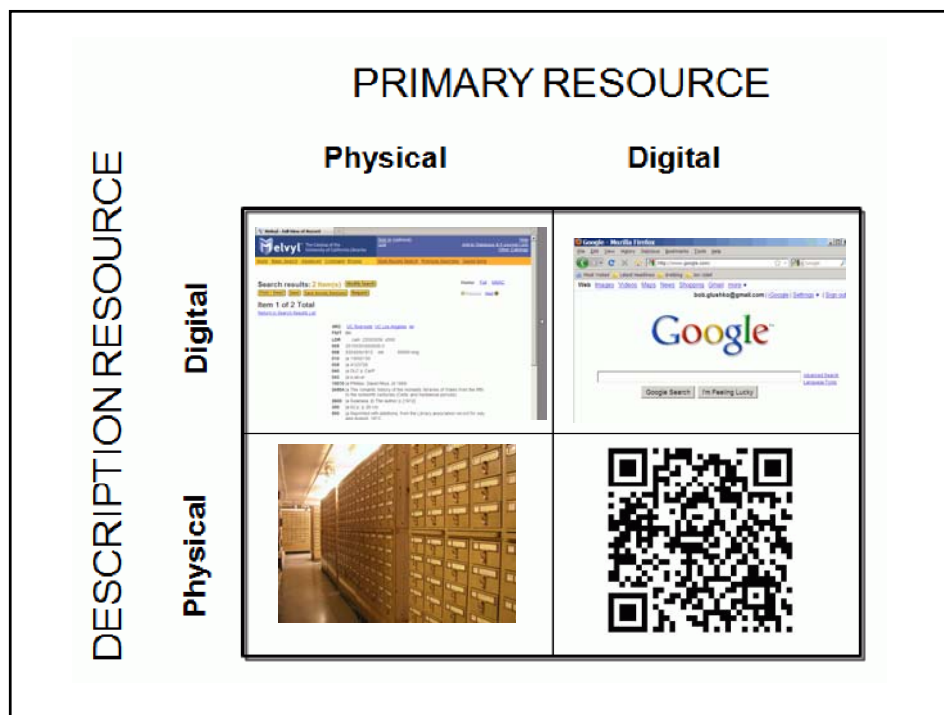


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## Primary Resources and Description Resources

- We often designate some resource as primary because it is the focus of our attention
- We often create other resources that are descriptions of or otherwise associated with the primary resource
- We call these "Description resources" (a more general term than "metadata")
- Primary and description resources can be either physical or digital.... So there are 4 combinations

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## A Collection of Physical Description Resources of Physical Resources





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## A Card from a Card Catalog

Z671      Phillips, David Rhys, 1868-  
L6      The monastic libraries of Wales, fifth to  
v.14      sixteenth centuries (Celtic and mediaeval  
periods).  
  
(In: Library association record. London.  
v. 14 (1912), p. 288-316, 374-398)

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## A Digital "Catalog Card"

The screenshot shows the Melvyl digital catalog interface. At the top, there's a navigation bar with links like Home, Basic Search, Advanced, Command, Browse, Most Recent Search, Previous Searches, and Saved Items. Below this, the search results for '2 Item(s)' are displayed. The first item is 'The monastic libraries of Wales, fifth to sixteenth centuries (Celtic and mediaeval periods)' by David Rhys. The interface includes various search filters and options like 'Display: Full MARC', 'Print / Email', 'Save', 'Save Across Sessions', and 'Request'.

**Search results: 2 Item(s)** [Modify Search](#)

[Print / Email](#) [Save](#) [Save Across Sessions](#) [Request](#)

**Item 1 of 2 Total**  
[Return to Search Results List](#)

**SRC** [UC Riverside](#) [UC Los Angeles](#) [All](#)

**FMAT** BK

**LDR** cam 22002659 4500

**005** 20100303000000 0

**008** 830420v1912 wk 00000 eng

**010** ja 13002130

**035** ja 4123728

**040** ja DLC j: CalP

**042** ja e-uk-ef

**10010** ja Phillips, David Rhys, [d 1868-

**24504** ja The romantic history of the monastic libraries of Wales from the fifth to the sixteenth centuries (Celtic and mediaeval periods)

**2600** ja Swansea, [b The author [c 1912]

**300** ja 62 p. j: 26 cm

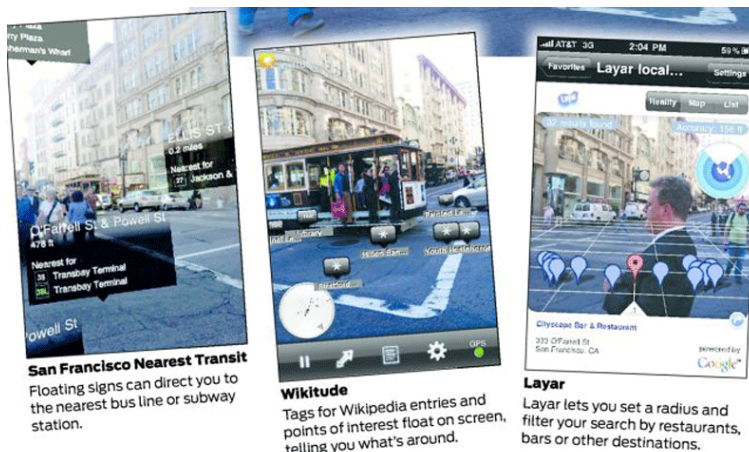
**500** ja Reprinted with additions, from the Library association record for July and August, 1912

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## “Augmented Reality” – Digital Descriptions for Physical Resources



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## Search Results are Digital Description Resources for Digital Resources



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## Printed QR “Quick Response” Codes are Physical Descriptions of Digital Resources



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## Why Is It Being Organized?

- The essential purpose of an Organizing System is to "bring like things together and differentiating among them"
- But there are always more precise requirements and constraints to satisfy and more specific kinds of interactions to support

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## Interactions – The Why of Organizing Systems

- Some interactions can be enabled with any type of resource, while others are tied to resource types
- Interaction can be direct, mediated or indirect, or limited to interactions with resource copies or descriptions

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## Some Interactions with Resources

**Search** (Boolean, Keyword, Structure)  
**Browse** (Faceted, Social)  
**Display** (Listen, Read, Watch, Perform)  
**Derivative** (Edit, Annotate, Augment, Mash Up, Transform)  
**Copy** (Share, Reproduce)  
**Sell** (Exchange, Transact, Resell)  
**Protect** (Preserve, Encrypt, Secure)  
**Destroy**  
**Organize** (Bookmark, Tag, Categorize, Move, Label)

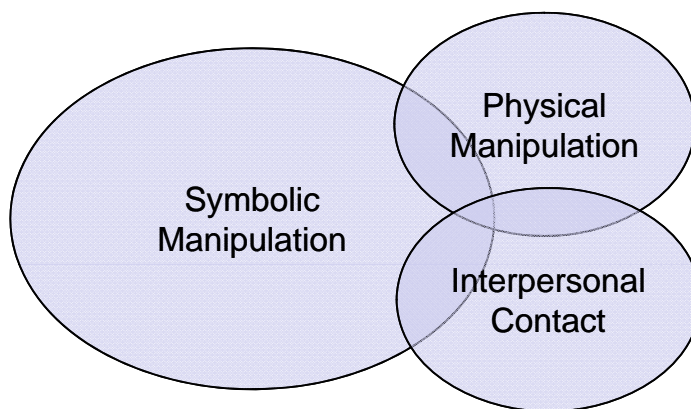
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## Understanding Interactions



Apte, U. and Mason, R. (1995). *Global Disaggregation of Information-Intensive Services*.

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## Understanding Interactions

- Physical manipulation is an intrinsic interaction with collections of physical resources
- Physical manipulation and interpersonal contact might be required to interact with information resources in physical form like the printed books in libraries
- With digital resources, neither physical manipulation nor interpersonal contact is required for interactions, and the essence of the interaction is information exchange or symbolic manipulation of the information contained in the resource
- So we often interact with physical resources through associated digital resources

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## Principles of Organization

- The organization of physical resources is strongly influenced by their material manifestation, and this organization often persists when digitized resources are organized
- The simplest organizing principle is co-location
- Almost any property of a resource might be used as a basis for its arrangement, and multiple properties are often used simultaneously
- Properties of the collection as a whole can also be used in organizing principles

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## Principles of Organization



### Single Resource Properties

Time

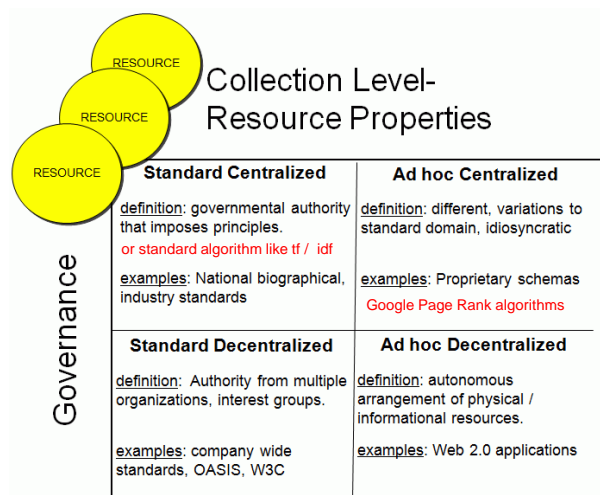
Intrinsic Static	Extrinsic Static
<u>definition</u> : directly experienced, subject matter, implicit, inherent properties	<u>definition</u> : assigned to resource, name, identifier.
<u>examples</u> : size, color, shape, author, date of creation <small>Text content</small>	<u>examples</u> : Dewey Decimal
Intrinsic Dynamic	Extrinsic Dynamic
<u>definition</u> : inherent properties; change over time.	<u>definition</u> : behavior based properties.
<u>examples</u> : skills, experience	<u>examples</u> : current owner, location, best seller lists

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## Principles of Organization



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## Organizing System: Home Kitchen



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## Principles of Kitchen Organization

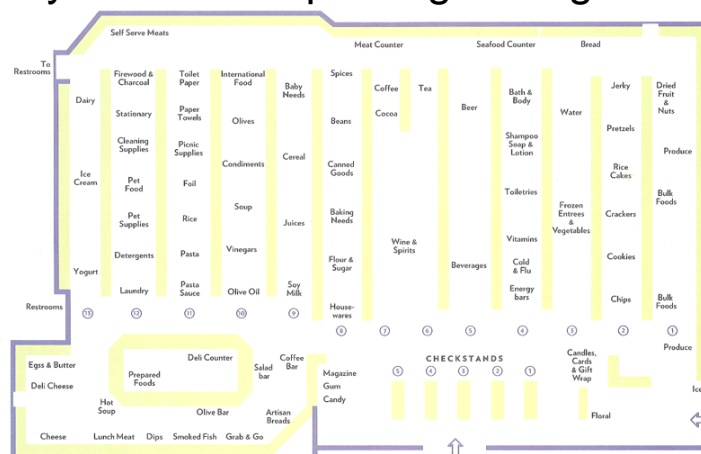
- **Intrinsic static properties:** If you store your pots, frying pans, and baking pans in different cabinets and nest each set by size
- **Extrinsic static properties:** A spice rack with the spices arranged in alphabetical order
- **Intrinsic dynamic properties** if you arrange your milk and other perishable goods by expiration date, a “useful life remaining” property that decreases to zero as the expiration date approaches
- **Extrinsic dynamic properties** if you put the most frequently used condiments or spices in the front of a refrigerator or pantry shelf.

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## Grocery Store: Multiple Organizing Principles



**Andronico's**  
COMMUNITY MARKETS

TELEGRAPH AVE.  
2855 Telegraph Ave. phone: 510-845-1052  
Berkeley, CA 94704 fax: 510-644-2574  
Hours: 10am-10pm Daily

Map of Store

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## Closet



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## An Individual's Book Classification System

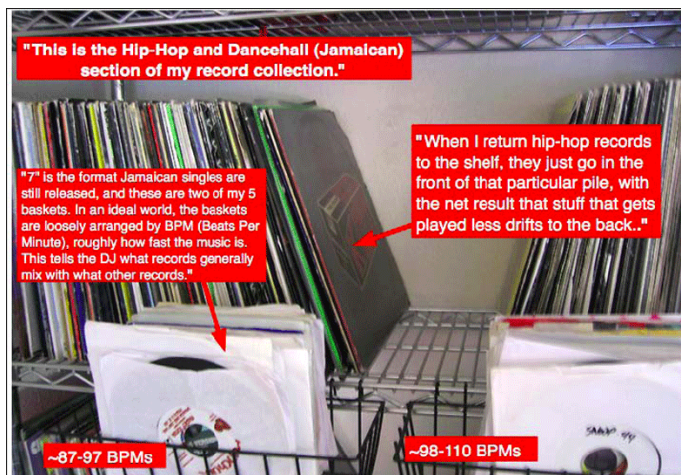


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## A DJ Organizes His Record Collection



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## Be Careful About “Objective” Principles

- Alphabetical - Arrange resources according to the spelling of their names or identifiers
- Chronological - Arrange resources according to some time-related property or descriptor
- Geographical - Arrange resources according to location information

*Rosenfeld & Morville, Information Architecture for the World Wide Web (the “Polar Bear” book)*

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## How Much Is It Being Organized?

- Not every resource needs the same amount of organization
- Not everything is equally describable
- A controlled vocabulary can yield more consistent organization
- The scope and size of a collection shapes how much it needs to be organized
- Are you organizing the resources you have, or do you need to create an organizing system that can apply to resources that you have not yet collected?

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## When Is It Being Organized?

- When the resource is created
- When it is added to some collection
- Just in time
- Never
- All the time - continuous or incremental

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## "Just in Case" Organization

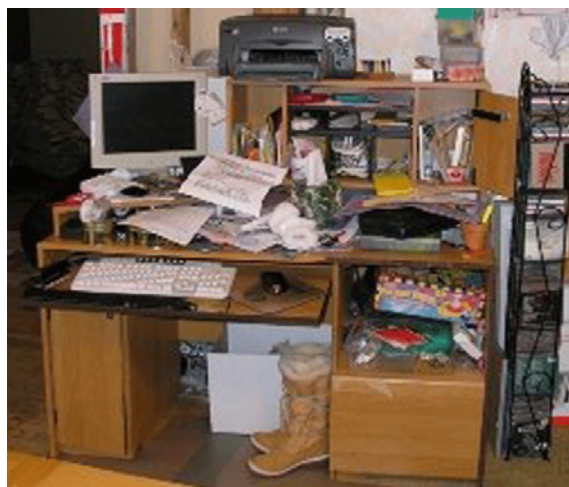


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## Postponing Organization

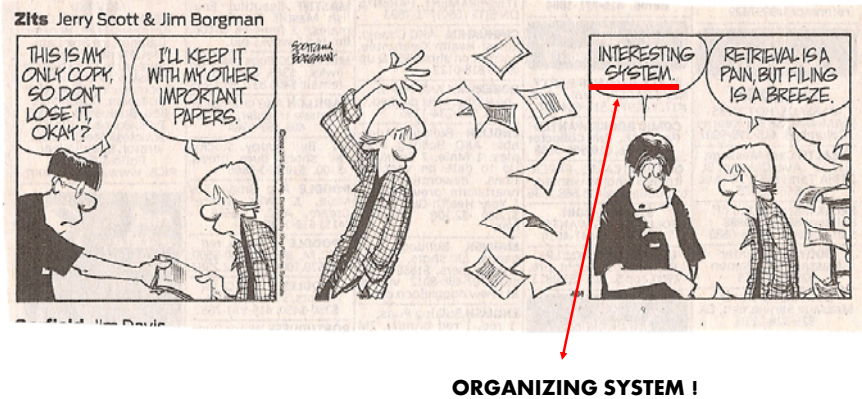


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## The Tradeoff



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## Who or What Is Organizing?

- Authors or creators
- Professional organizers
- Users “in the wild”
- Users “in institutional contexts”
- Automated or computerized processes

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## Summary

- The concept of Organizing System unifies a vast body of design and analysis practice from many disciplines
- Thinking in terms of design dimensions overcomes the limitations and inertia of the traditional categories
- It is a generative, forward-looking approach that encourages and accommodates innovation while preserving conventional theory and practice as design patterns
- It enables intelligent conversations between people who didn't have much common language before

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## Project Collaboration

- This book began as the lecture notes from my Berkeley course, but I soon realized that it was more ambitious than I could do on my own
- So I enlisted numerous collaborators, and the book is now the product of countless discussions with students and faculty colleagues at Berkeley and other schools
- Manuscript has been used at Berkeley (2x), UNC, and Humboldt, and other schools will soon try it

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## What We Are Publishing

- “The Discipline of Organizing” will be published by MIT Press in early 2013 (R. Glushko, editor) simultaneously in several different formats:
  - As a traditional printed book
  - As pdf files, freely available for anyone to use (starting Fall 2012)
  - In one or more ebook formats, integrated into an content repository to enable continued collaboration among the ISchools, who will collectively maintain and evolve the content and who can generate customized ebooks on demand

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## Customization

- We have devised an approach that lets the book focus on core ideas while enabling it to satisfy different topical emphases
- Solution: “Lean text” + tagged “endnotes”
  - [LIS], [Technology], [Business], [Healthcare Informatics], [Berkeley], [2012], etc.
  - Ebook “dials” can adjust the number and categories of endnotes that are seamlessly incorporated into the text

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## Example of Tagged Notes: Main Text

The Organizing System for a small collection can sometimes use only the minimal or default organizing principle of “co-location” – putting all the resources in the same container, on the same shelf, or in the same email inbox. If you don’t cook much and have only a small number of spices in your kitchen, you don’t need to alphabetize them because it is easy to find the one you want.

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## The Associated [Technology] Note

- For collections of non-trivial size the choice of searching or sorting algorithm is a critical design decision because they differ greatly in the time they take to complete and the storage space they require. For example, if the collection is arranged in an unorganized or random manner (as a “pile”) and every resource must be examined, the time to find a particular item increases linearly with the collection size. If the collection is maintained in an ordered manner, a binary search algorithm can locate any item in a time proportional to the logarithm of the number of items. Analysis of algorithms is a fundamental topic in computer science; a popular textbook is “Introduction to Algorithms” by Thomas Cormen et al (2009).

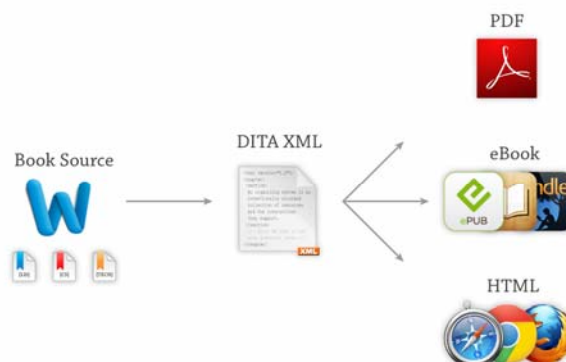
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## TDO Publishing System

### From Word to Pdf, ebooks, HTML



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## Curation

- The repository of book content and shared course materials (lecture notes, assignments, etc.) will be hosted at Berkeley as DisciplineOfOrganizing.org
- I will serve as curator for at least two years
- We will also provide technical guidance and support for authoring and customization
- Most of the publishing system will be available through ***dita4publishers.sourceforge.net/***

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**Comments, questions?**

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