I 202: INFORMATION ORGANIZATION & RETRIEVAL
FALL 2025

Class 9: Information Architecture

Today's Focus

Data / Information
Collections
Categories
 - Types of categories
 - Cognitive / language aspects
       - Naming / Lexical similarity
 - Structure
       - Hierarchical / Taxonomy
       - Faceted
       - Overlapping / Clustering
       - Network / Ontology
 - **Use in Navigation & Search**
       - **Information Architecture**
       - **Faceted Navigation**

Technology Support for Info Org
       - Identifiers
       - Metadata
       - Markup
       - Schema / Databases
       - Search Ranking / Evaluation
       - Automated category creation
       - Automated similarity

Social / Ethical Aspects
       - Cultural Bias
       - Intellectual Property
       - Standards Process

Today's Outline

Thematic Categories

Information Architecture

Breadcrumbs

Content Management Systems

HOW TO DEFINE THE FACETS?

- Depends on the makeup of the collection

- Depends on the goals of the use

- Then ask the classic questions:
  - *Who, what, when, where, why, how much, under what circumstances?*

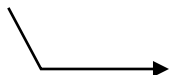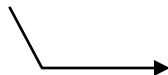# Five Hierarchical Faceted Categories

Nature
Animal
  Mammal
    Horse

Is-a

Occupations
  Cowboy

Is-a-type-of

Clothing
Hats
  Cowboy Hat

Is-a

Media
  Engraving
    Wood Eng.

Is-a-type-of

Location
  North America
    America

Is-in or is-part-of

A Bucking Bronco by Henry Wolf, https://art.famsf.org/henry-wolf/bucking-bronco-19633026024

Description: 19th c. paint horse; saddle and hackamore; spurs; bandana on rider; old time cowboy hat; underchin thong; flying off.
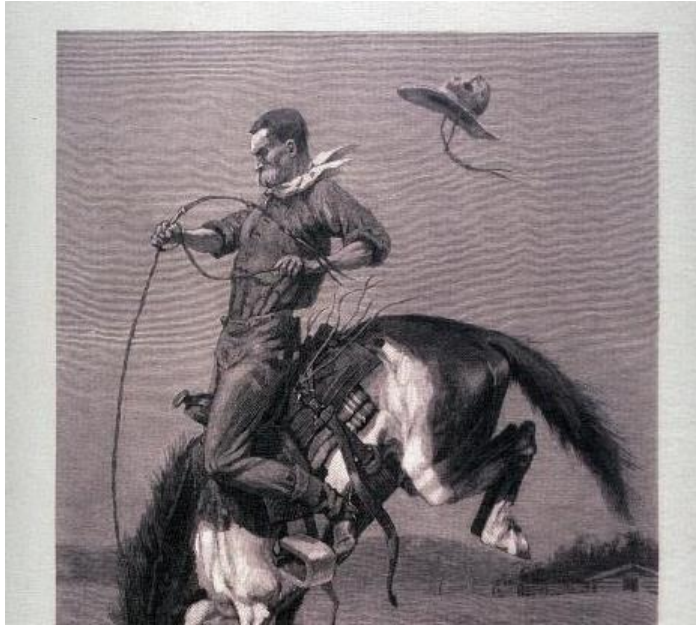
By using faceted categories, what are we not capturing?

The hat flew off;
The bandana stayed on.

The thong is part of the hat.

The bandana is on the cowboy
(not the horse).

The saddle is on the horse
(not the cowboy).

HOW TO HANDLE MISSING RELATIONS?

- Ontology is one way, but complex for users

- Alternative: **Thematic Categories**
  - *Combine key facets into groups that are meaningful for the application*
  - *These can be hierarchical if the underlying facets are*

Example:

    Facet: Objects > Weapons

    Facet: People > Military Personnel

    Facet: Even: Battle

Combine these to make a Theme

    Theme: Armed Conflict

    Composed of all three facets

Flamenco Fine Arts Search

SAVE   HISTORY AND SETTINGS   RETURN TO SEARCH   NEW SEARCH   LOGOUT

Images from the Collections of the Fine Arts Museums of San Francisco;
Legion of Honor and de Young Museums, http://www.thinker.org

Questions or Comments? Email Kevin Li (kevinli@sims.berkeley.edu)

[   ] SEARCH

☑ Show tooltip previews of subcategories

Username [default]   Password [   ]   LOGIN
Create a New Account

Media

Book *(309)*   Objects *(1689)*
Ceramic *(896)*   Painting *(115)*
Drawing *(1547)*   Photograph *(333)*
Glass *(403)*   Print *(18206)*
Metalwork *(134)*   Sculpture *(193)*

Date

1 - 1000 a.d. *(135)*   18th century *(2287)*
12th century *(3)*   19th century *(7551)*
13th century *(1)*   20th century *(1667)*
14th century *(3)*   21st century *(14)*
15th century *(76)*   B.c. *(240)*
16th century *(1225)*   more...
17th century *(3058)*

Location

Africa *(101)*   Middle east *(60)*
Asia *(945)*   North america *(3634)*
Australia *(5)*   Oceania *(72)*
Central america *(57)*   Roman empire *(4)*
Europe *(17758)*   South america *(158)*

Built Places

Bridge *(431)*   Dwelling *(1528)*
Building *(2571)*   Part of building *(3159)*
Built open space *(912)*   Road *(1204)*

Objects

Clothing *(6018)*   Musical instruments *(634)*
Containers *(2632)*   Timepieces *(73)*
Food and meals *(3580)*   Vehicles *(3457)*
Fuel *(453)*   Weapons *(1498)*
Lighting *(386)*   Writing tools *(3636)*

Themes

Military *(2600)*   Nautical *(1381)*
Mortality *(423)*   Religion *(4142)*
Music, writing, and sport *(5499)*

Shapes, Colors, and Scenes

Color *(4149)*   Scene *(6526)*
Decoration *(1680)*   Shape *(1566)*
Metal *(256)*

Flamenco Fine Arts Search

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SAVE | HISTORY AND SETTINGS | RETURN TO SEARCH | NEW SEARCH | LOGOUT

[ ] SEARCH

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Username default   Password [ ]   LOGIN
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Media — *What*

Book (309)
Ceramic (896)
Drawing (1547)
Glass (403)
Metalwork (134)
Objects (1689)
Painting (115)
Photograph (333)
Print (18206)
Sculpture (193)

Date — *When*

1 - 1000 a.d. (135)
12th century (3)
13th century (1)
14th century (3)
15th century (76)
16th century (1225)
17th century (3058)
18th century (2287)
19th century (7551)
20th century (1667)
21st century (14)
B.c. (240)
more...

Location — *Where*

Africa (101)
Asia (945)
Australia (5)
Central america (57)
Europe (17758)
Middle east (60)
North america (3634)
Oceania (72)
Roman empire (4)
South america (158)

Built Places — *What*

Bridge (431)
Building (2571)
Built open space (912)
Dwelling (1528)
Part of building (3159)
Road (1204)

Objects — *What*

Clothing (6018)
Containers (2632)
Food and meals (3580)
Fuel (453)
Lighting (386)
Musical instruments (634)
Timepieces (73)
Vehicles (3457)
Weapons (1498)
Writing tools (3636)

Themes — *Thematic What*

Military (2600)
Mortality (423)
Music, writing, and sport (5499)
Na[...]
Re[...]

Shapes, Colors, and Scenes — *Property What*

Color (4149)
Decoration (1680)
Metal (256)
Scene [...]
Shape [...]

Let's drill down into the Military Thematic Category

Flamenco Fine Arts Search

Images from the Collections of the Fine Arts Museums of San Francisco; Legion of Honor and de Young Museums, http://www.thinker.org

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○ all items ○ within current results

Refine your search further within these categeories:

Media (group results)

Book (23)	Objects (39)
Ceramic (18)	Painting (4)
Drawing (157)	Photograph (11)
Glass (5)	Print (2336)
Metalwork (12)	Sculpture (8)

Date (group results)

1 - 1000 a.d. (3)	20th century (122)
15th century (26)	B.c. (4)
16th century (219)	B.c. to a.d. (2)
17th century (528)	Date unknown (18)
18th century (203)	more...
19th century (698)	

Location (group results)

These terms define your current search. Click the ☒ to remove a term.

Themes: military ☒

2600 items (Ungroup items)

soldiers and fighters 1173

#11 from The fol...
Galle
16th - 17th cent...

#12 from: The fo...
Galle
16th - 17th cent...

#14 from: The fo...
Galle
16th - 17th cent...

#16 from The fol...
Galle
16th - 17th cent...

all 1173 items...

war 698

THEMATIC (ASSOCIATIONAL) CATEGORIES

- Combine one entity type that is strongly associated with another, but is not taxonomically related

- **Examples:**
  - Field of Study and Object of Study (Astronomy / Star)
  - Process and its Agent (Frying / Pan)
  - Concepts and their Properties (Flame / Heat)
  - Action and Product of Action (Frying / Cooked Eggs)
  - Concepts linked by Causality (Shooting / Murder)
  - Activity and its Tools (Camping / Tent; Astronomy / Telescope)

A Few Words About Netflix's Success: Vivid. Snappy. Tags.

The descriptive tags that the streaming service runs near each title — like "slick" for the show "Suits" — have proved crucial to getting people to click play.

[gift] Share full article   [share]   [bookmark]
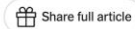
NETFLIX CATEGORIES: COMBINES CATEGORIES TO CREATE THEMES

- Netflix has been having humans tag videos since they were a DVD mail service

- >3,000 categories

- Used to create traditional genre categories (*Action*) as well as custom thematic categories (*Action with a Side of Romance*)

- Have to know the code number (Action with a Side of Romance is at http://netflix.com/browse/genre/81647318)

https://www.netflix.com/tudum/articles/netflix-secret-codes-guide

NETFLIX CATEGORIES: THEMA

- **Traditional genres**: comedy, suspense

- **Genres + modifiers**: Feel-good dramas

- **Metadata based categories: N**ew releases

- **Thematic categories**: reluctant adults, fight-the-system

Comedies

NORM MACDONALD
HITLER'S DOG, GOSSIP & TRICKERY

Reluctant Adults

New Girl

Imaginative TV Shows

AVATAR
THE LAST AIRBENDER
nickelodeon

Real Stories

TURNING POINT
9/11 AND THE WAR ON TERROR

New Releases

ATYPICAL

Suspenseful Movies

SCHWARZENEGGER

TOTAL RECALL

Ensemble TV Shows

Dawson's Creek

Feel-good Dramas

FREEDOM WRITERS

Fight-the-System TV Shows

Murder

EXERCISE: DISCUSS NETFLIX CATEGORY TYPES

Focus on the ones that are combinations of categories:

Netflix Codes 2025: All The Secret Movie & Series Category Codes on Netflix

https://www.whats-on-netflix.com/news/the-netflix-id-bible-every-category-on-netflix/

Thematic Categories

https://xkcd.com/2456/
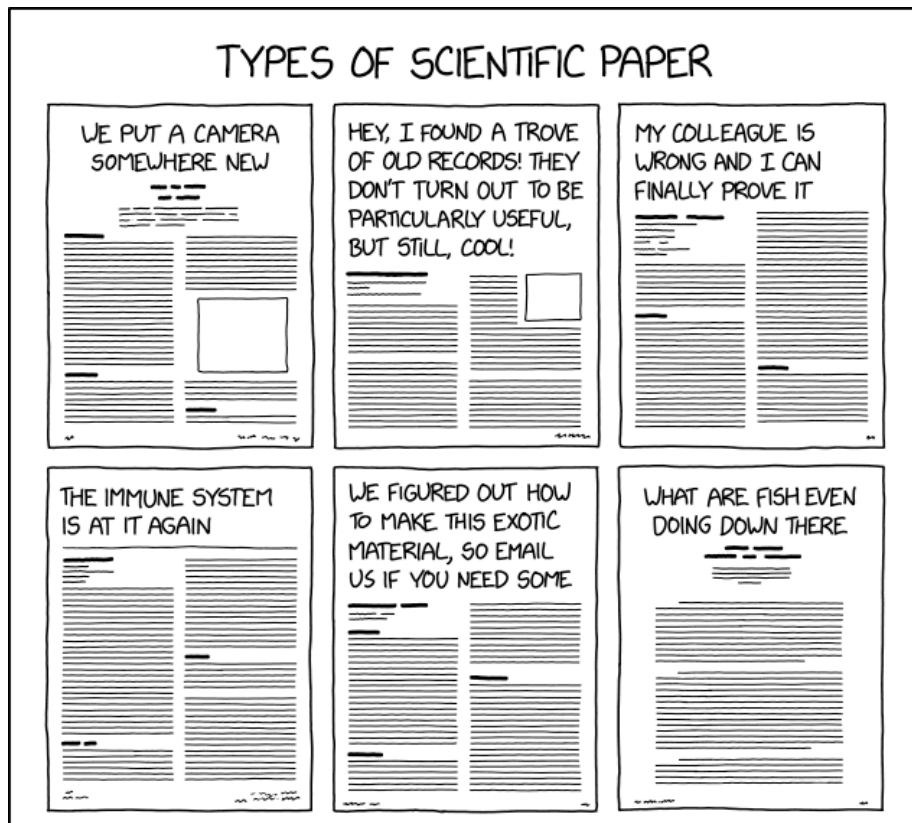
SUMMARY: THEMATIC CATEGORIES

- To capture cross-cutting concepts, it can be helpful to combine facets into themes

- These themes can take on several forms, including
  - *Combinations of related facets (weapons, soldiers, wars)*
  - *Combinations of facets that support a commonly used service (how to get a small business loan)*
  - *Combinations of facets and modifiers (feel-good dramas)*

INFORMATION ARCHITECTURE

Where the rubber (info organization) hits the road (website / mobile app design)

Information Architecture (IA)

- Asks: how to organize and structure information to aid navigation and search?

- Methods are not algorithmic; require practice and judgment

- Practitioner-driven (vs research-driven)

Newman & Landay, DIS '00
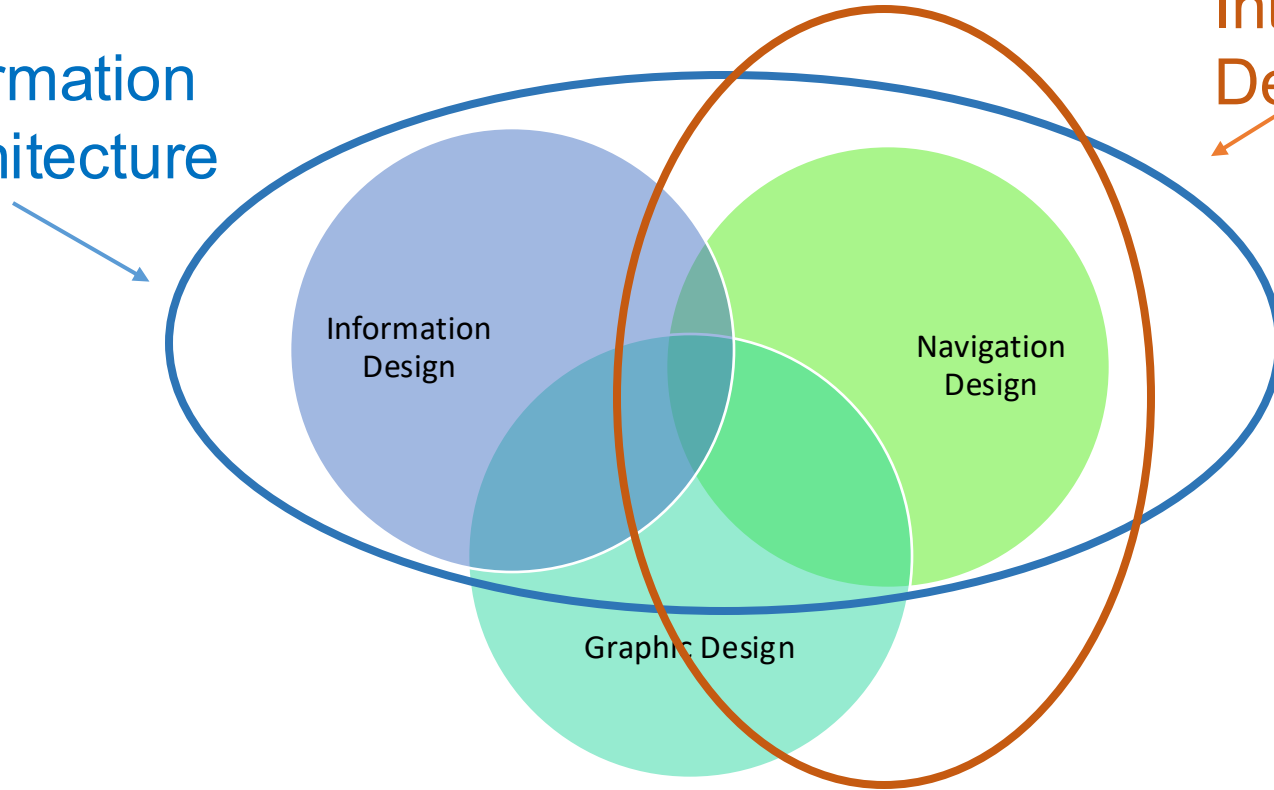
Job listing description (9/25)

Information Architect

Firnal Inc | Remote | $120,000 - $160,000 a year

You must create an Indeed account before continuing to the company website to apply

Apply on company site ⧉

Job details

💳 **Pay**

$120,000 - $160,000 a year

Full job description

JOIN OUR TEAM Where intelligence meets ambition. Join a team building the tools, systems, and strategies that power smarter decisions.

Information Architect

Design the systems that organize our world-class data. You'll work across teams to develop schemas, taxonomies, and pipelines that bring structure to everything from personas to market signals.

Salary ranges from $120k-$160k per annum

Information/Date Architect

Concept Plus ⧉ | Remote

Apply now

About the role

The Information/Data Architect will provide technical expertise and support for the data and information architecture requirements of the business. This will help maintain proper information categorizations and identify where information is used, stored, and transmitted.

What you'll do

- Develop and maintain information and data architecture strategies that align with organizational goals.
- Apply meta data models, taxonomies, and ontologies to strengthen business and IT capabilities.
- Define data classifications and zoning standards to improve governance and asset management.
- Document and categorize information across IT portfolios to ensure accuracy and compliance.
- Support enterprise information initiatives including master data management, metadata, analytics, content management, and data integration.

MAIN STEPS OF INFORMATION ARCHITECTURE DESIGN

Conduct customer research
- UX research
- User profile

Review and update content
- Content inventory
- Content audit

Apply card sorting for content classification
- Card sorting

Build user-friendly hierarchy
- Navigation and labeling
- Site mapping

Create UI prototype
- Wire framing

Test and improve
- Usability testing
- First click testing
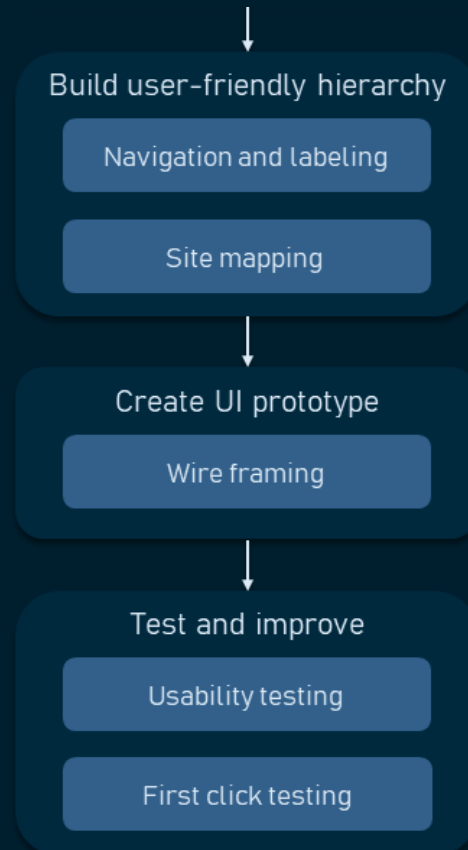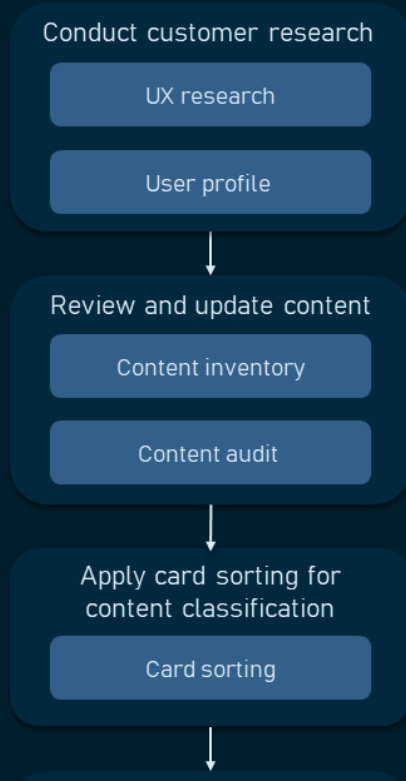
NAVIGATION BREADCRUMBS

Caroline Attwood, Unsplash

Navigation Breadcrumbs

- Remind the user of the path they have taken
  - *A combination of hyperlinks, filters, and queries*

- Modifying it can expand the set of options
  - *Click on a prior link, or remove a filter (facet or other)*

- There can be a tension between the dynamic nature of a path taken and the desire to have a stable link for a page.

NAVIGATION BREADCRUMBS

Remind the user of the path they have taken
A combination of hyperlinks, filters, and qu

All Products > **Storage & Organization** > Shelving > Bookcases

Bookcases

Storage & Organization

Home / Typo

"typo"

10 Items

Filter By: Materials ⌄ Size ⌄ Shape ⌄ Subjects ⌄ Color ⌄ Art Type ⌄ Room ⌄ Price ⌄

Medium (e.g. 18" x 24") x $25 - $75 x   Clear All

PRIZE: literature x
YEAR: 1920s x

10 results
Group by: prize, year
Sort by: usual name, year of birth, year of death, country

APPAREL & GEAR

Dresses, Skirts, Skorts
Dresses
Skirts
Skorts
Jumpsuits & Rompers

SORT BY   Top Sellers ⌄

REFINE BY

[blue color swatch] ✕

Straight ✕

CLEAR ALL

NAVIGATION BREADCRUMBS

Remind the user of the path they have taken
A combination of hyperlinks, filters, and queries

Matching search terms to the breadcrumb

Yelp.com

NAVIGATION BREADCRUMBS

Modifying it can expand the set of options

Click on a prior link, or remove a filter (facet or other)

NAVIGATION BREADCRUMBS

There can be a tension between the dynamic nature of a path taken and the desire to have a stable link for a page.

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NAVIGATION BREADCRUMBS

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Watch the Breadcrumbs from the Thematic Category "snow"

Watch the Breadcrumbs

title nine

New   **Apparel & Gear**   Swim   Sports Bras   Activity   Women-Owned

Dresses, Skirts, Skorts	**Bottoms**	**Tops**	**Jackets & Vests**
Dresses	Bottoms Finder	Long Sleeve Shirts	Jackets
Skirts	Pants	Sweaters	Fleece
Skorts	Leggings & Tights	Hoodies & Sweatshirts	Vests
Jumpsuits & Rompers	Joggers	Short Sleeve Shirts	Puffer Jackets
Matching Sets	Capris	Tank Tops	Running Jackets
Built-in Bra Dresses	Shorts		
Sweater & Sweatshirt Dresses	Hiking Pants		
Vest Dresses	Wide Leg Pants		

APPAREL & GEAR / BOTTOMS

WOMEN'S OUTDOOR PANTS

Thematic Category

New   Apparel & Gear   Swim   Sports Bras   (Activity)   Women-Owned   Brands   Sale   Explore

Running & Training   Pickleball & Tennis

Hiking   Yoga & Studio

Camping   Swimming

THE TRAIL SHOP

ANALYZING EXISTING SITES

- Study the content, use, and placement of
  - **Categories on the page**, with explanatory text,
  - **Tabs** organizing content,
  - **Menus**: sidebar vs top vs footer
  - **Breadcrumbs**
  - **Repeated info**: which, where, and why?

- These are all choices about how to organize content

- Diagramming them is a good way to learn

Examples of Richly Structured Sites

- Many US Government websites were modernized in 2009-2016
  - *Focus on usability, plain text, helping people get their tasks done*

- Huge collections of information; have to meet many peoples' needs

- Often highlight services; these are often phrased as questions, and are thematically structured

- Examples:
  - sba.gov (Small Business Administration; activity-centric)
  - usa.gov (Overview of all Federal Agencies; uses github!)
  - cbo.gov (Congressional Budget Office; Lots of data and reports)
  - uspto.gov (US Patent and Trademark Office, complex activities / data)

Browse Topics

Agriculture

Budget

CBO Operations

Climate and Environment

COVID-19

Defense and National Security

Disaster Preparation and Relief

Dynamic Analysis

Economy

Homeland Security

Housing

Immigration

Income Distribution

Infrastructure and Transportation

Mandates

Poverty and Income Security

Retirement

Science and Research and Development

Topics and Subtopics

- Any -

Content Type

- Any -

Congressional Session

- Any -

Apply

Housing

The federal government plays a substantial role in the housing market by providing significant tax subsidies for homeownership and by guaranteeing many mortgage loans. (Such guarantees are made primarily by Fannie Mae, Freddie Mac, and the Federal Housing Administration.) CBO analyzes the effects of those policies and possible changes in the policies.

Report

The Role of the Department of Veterans Affairs in the Single-Family Mortgage Market

September 14, 2021

CBO describes VA's mortgage guarantee program, provides estimates of the budgetary costs of the program, and compares those costs with expenditures for other federal guarantees.

Report

Effects of Recapitalizing Fannie Mae and Freddie Mac Through Administrative Actions

August 18, 2020

CBO examines how recapitalizing Fannie Mae and Freddie Mac through administrative actions would affect such factors as CBO's budget projections and cash flows between the two enterprises and their shareholders, including the

Example of Service website:
sba.gov organizes by "what you can do"

Plan your business

You've got a great idea. Now, make a plan to turn it into a great business.

- Market research and competitive analysis
- Write your business plan
- Calculate your startup costs
- Establish business credit
- Fund your business
- Buy an existing business or franchise

Launch your business

Turn your business into a reality. Register, file, and start doing business.

- Pick your business location
- Choose a business structure
- Choose your business name
- Register your business
- Get federal and state tax ID numbers
- Apply for licenses and permits
- Open a business bank account
- Get business insurance

Manage your business

Run your business like a boss. Master day-to-day operations and prepare for success.

- Manage your finances
- Hire and manage employees
- Pay taxes
- Stay legally compliant
- Buy assets and equipment
- Marketing and sales
- AI for small business
- Strengthen your cybersecurity
- Prepare for emergencies
- Recover from disasters
- Close or sell your business
- Hire employees with disabilities

Grow your business

When business is good, it's time to expand. Find new funding, locations and customers.

- Get more funding
- Expand to new locations
- Merge and acquire businesses
- Become a federal contractor
- Export products
- Women-owned businesses
- Native American-owned businesses
- Veteran-owned businesses
- Military spouse businesses
- Rural businesses
- Minority-owned businesses

Example of Service website:
uspto.gov includes services too

Digital.gov

← All Resources

Required Web Content and Links

A list of required links that all federal websites need to hav

If you manage a public website in the federal government's executive branch, you are required to have certain content — or provide links to content — from specific places on your website.

This page makes it clear:

- what links are required and the purpose they serve
- the text that you should use for each link
- where the link should be located on your site
- which law or policy requires those links

Use the guidance below to implement these required links in a clear, user-friendly way.

Questions? send an email to digitalgov@gsa.gov

In this page

About Page

Accessibility Statement

Budget and Performance Reports

Equal Employment

External Links

Freedom of Information Act (FOIA)

Government Customer Support

Privacy Policy

Report Fraud to the Inspector General

Security

EXERCISE: ANALYZE A SITE'S INFORMATION ARCHITECTURE

- Look at one of these:
  - *sba.gov, uspto.gov, or cbo.gov*
  - *rei.com, titlenine.com*

- Try to infer the organization that underlies the pages

- Look for faceted categories, taxonomies, and thematic relations

- Determine under what circumstances a page can be accessed via multiple different paths

HCI COURSES IN THE I SCHOOL

- User Interface Design & Development (I 213)

- User Experience Research (I 214)

- Information Visualization & Presentation (I 24

- Interface Aesthetics (C256)

- Tangible User Interfaces (C262)

- Front end web architecture (253A)

  (Many others offered on an occasional basis)

Kimiko Ryokai

Nilofaur Salehi

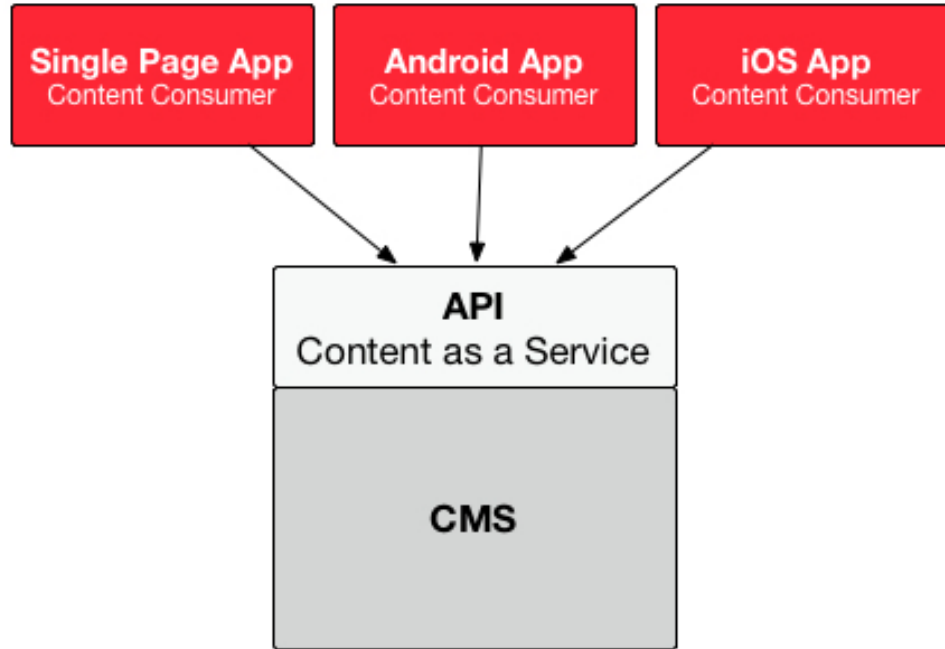Stef Hutka

Kay Ashoalu

Steve Fadden

Laith Ulaby

Content Management Systems

- Helps organize the information

- Allows multiple authors

- Allows generation of websites from the info

- The technology is always changing

Content Management System: Simple Deployment

"headless" CMS: uses a restful API

Simple Website - Detailed Architecture

SaaS

Search Engine

Index data to service

Query data and get result

Client

www.

Browser/mobile/devices

Request

Response

CDN

Populate forms via custom fields

Fetch/submit forms on page

Request

Response

Show analytics on widget/dashboard

Collect analytics data

Load Balancers / Firewalls

CI / CD

Frontend Server
Apache / NGINX

Node.js App

Frontend app cluster

Infra as a Service

CMS

Auto-scaling group

Fetch content via API

SUMMARY: INFORMATION ARCHITECTURE

- Information architecture is a combination of a category system and a navigation structure

- Website design, and information-heavy apps, are a combination of information architecture, graphic, and interaction design

- There are specialized content management systems that aid in creating information architectures, but they are often complex

Next week

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Categories
  - Types of categories
  - Cognitive / language aspects
        - Naming / Lexical similarity
  - Structure
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  - **Use in Navigation & Search**
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Social / Ethical Aspects
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