How user interfaces represent and benefit from a faceted classification system

SOASIS&T
July 8, 2004

Keith Instone

http://user-experience.org/uefiles/facetedbrowse/

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About me

- IBM > ibm.com > user experience design > information architect
  - User experience standards
  - User interface and interaction design
  - IA strategy, user research & modeling, content management

- Argus Associates
  - IA & Usability specialist

- User experience professional
  - Retired: UsableWeb.com, CHI-WEB, CHI reviewing, ...
  - Member: ACM/SIGCHI, ASIS&T, UPA, AIGA, (STC), ...
  - UXnet

- Toledo
• What is faceted browsing?
  – Terminology so that we can communicate better
  – (New terms for old ideas)

• How is it being implemented?
  – Examples, examples, examples
  – (Real world application is fun)

• What do we know (and not know)?
  – Lots of questions to help spur dialog
  – (Dialog because you can learn as much from each other as you can from me)
Ok, I like these Thomas bed sheets – what else do they make?

Home fashions for kids
Home fashions for kids > Preschool & educational > Thomas & friends

Whether it’s learning colors, shapes or numbers; how to get along with others; or getting ready for bed, it’s just easier to do with friends. That’s why kids love Raccoon’s Cove, Sesame Street, Stuart Little, Clifford, The Big Red Dog, Dragon Tales, Bob the Builder® Treme, the Explorer and Thomas & Friends. Dan River’s colorful, character-themed bedding makes those preschool experiences come to life.

Thomas & Friends

Thomas the Tank Engine is a cheery, funny, little engine who wears a #7 on his side and never lets anyone forget it. Joining him in his adventures are his engine friends: Percy, James, Harold and even Sir Topham Hett, the kindly boss who keeps...
There it is!

## Thomas and Friends
### Available Products

<table>
<thead>
<tr>
<th>SHEET SETS</th>
<th>COMFORTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twin</td>
<td>Twin</td>
</tr>
<tr>
<td>Full</td>
<td>Full</td>
</tr>
<tr>
<td>Individual Pillowcase</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PILLOWSHAMS</th>
<th>COMFORTER SHEET SET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Twin</td>
</tr>
<tr>
<td></td>
<td>Full</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WINDOW FASHIONS</th>
<th>PILLOWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drape 92 x 83</td>
<td>16&quot; Square</td>
</tr>
<tr>
<td>Valance 84 x 15</td>
<td>Snuggle</td>
</tr>
</tbody>
</table>

Brands, Sports, Just girls, All boys, Preschool & educational
Girls vs. Boys Scooby-Doo

Scooby-Doo: By gender

<table>
<thead>
<tr>
<th>Product</th>
<th>All Boys</th>
<th>Just Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thumbprints</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Scooby-do</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Silhouettes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Nostalgic</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5. What’s up Scooby-Doo?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Sports Legend</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>7. Scooby-Doo’s Bold Adventure</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>8. Day Dream’h (Toddler)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>9. Sweetheart</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>10. Springtime</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
**“Faceted browsing” defined**

- Interaction style where users filter a set of items by progressively selecting from only valid values of a faceted classification system

- Interaction style (& user interface)
  - Focus on what appears on the glass and how it feels

- Facet values selected in any order the user wishes
  - Supports many ways to achieve the same goal

- “Design away the errors”
  - Null results are never achieved (hide non-relevant choices)
  - Common facet values hidden

- Leverages faceted classification schemes
  - "Real library science" for consumers

- “Slow and steady wins the race” interaction
  - Click-page-click-page: trial and error, learning

- Drill-down choices “naturally” reflect depth so far
  - Is there some psychological theory here?
### Browse

Here you can browse more than 16,000 recipes — much as you would leaf through your favorite cookbook for inspiration, only better. As you explore, you may filter and narrow the recipes by category.

<table>
<thead>
<tr>
<th>MAIN INGREDIENT</th>
<th>PREPARATION METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans, Beef, Berries, Cheese</td>
<td>Advance, Bake, Broil, Fry, Grill, Microwave, No Cook, Poach, Quick, Roast, Slow Cook, Steam, Stir Fry</td>
</tr>
<tr>
<td>Chocolate, Citrus, Dairy, Eggs, Fish, Fruits, Garlic, Ginger, Grains, Greens, Herbs, Lamb, Mushrooms, Nuts, Nuts, Olives, Onions, Pasta, Peppers, Pears, Potatoes, Pudding, Rice, Shrimp, Tomatoes, Vegetables</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CUISINE</th>
<th>SEASON/OCCASION</th>
</tr>
</thead>
<tbody>
<tr>
<td>African, American, Asian, Caribbean, Eastern European, French, Greek, Indian, Italian, Jewish, Mediterranean, Mexican, Middle Eastern, Scandinavian, Spanish</td>
<td>Christmas, Easter, Fall, Fourth of July, Hanukkah, New Years, Picnic/Spring, Summer, 4th of July, Thanksgiving, Valentine's Day, Winter</td>
</tr>
</tbody>
</table>

### Preparation method: Microwave

<table>
<thead>
<tr>
<th>COURSE/MEAL</th>
<th>ARTICLES/BLOGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appetizers, Bread, Breakfast, Brunch, Condiments, Cocktails, Desserts, Entrees, Main Dish, Salads, Sandwiches, Sauces, Side Dish, Soups, Sushi, Vegetables</td>
<td></td>
</tr>
</tbody>
</table>

### ARTICHOKE WITH GARLIC Saffron SAUCE

Gourment April 1990

### ARTICHOKE WITH BACON TOMATO VINAIGRETTE

Gourment April 1992

### BAKED APPLES WITH APRICOT AND WALNUT FILLING

Gourment December 1990
Selecting a Course/meal is next

<table>
<thead>
<tr>
<th>Course / meal = Main dish</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Title</th>
<th>Magazine</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTICHOKE WITH GARLIC SAIFFRON SAUCE</td>
<td>Gourmet</td>
<td>April 1990</td>
</tr>
<tr>
<td>ARTICHOKE WITH SCALLION TOMATO VINAIGRETTE</td>
<td>Gourmet</td>
<td>April 1990</td>
</tr>
<tr>
<td>BAKED APPLES WITH APRICOT AND WALNUT FILLING</td>
<td>Gourmet</td>
<td>September 1989</td>
</tr>
<tr>
<td>BROILED FISH WITH PEPPERS</td>
<td>Gourmet</td>
<td>June 1993</td>
</tr>
<tr>
<td>BREAKFAST-FOR-SUPPER TOFU BURRITOS</td>
<td>Bon Appetit</td>
<td>December 2000</td>
</tr>
<tr>
<td>CHICKEN BREASTS WITH TARRAGON VINAIGRETTE</td>
<td>Gourmet</td>
<td>May 1999</td>
</tr>
</tbody>
</table>
Scanning the 12 items so far

BRIOCHE BUNDBUNTS WITH PEPPERS
Gourmet: May 1996

BREAKFAST FRI-SUPPER TOFU BURRITOS
Tex Appeal: December 2000

CHICKEN BREAST WITH TARARON FINOCCHIATA
Gourmet: May 1992

CHINESE-STYLE BRIOCHED BEEF WITH TURNIPS
Gourmet: October 1991

COOKED IN
Gourmet: December 1998

FILLET OF SOLE WITH LEEK SAUCE
Gourmet: October 1990

MUSHROOM BARLEY-TRIOTTO
Gourmet: November 1992

MUSHROOMS WITH CHERRY TOMATOES
Gourmet: December 1992

POLENTA WITH VEGETABLES
Gourmet: December 1992

STEAMED FISH FILLETS WITH SCALLOP GINGER OIL
Gourmet: April 1991

TOMATO SOUSTO
Microwave Gourmet

TWO STRONGS
William Marion and Co., Inc.

ZUCCHINI WITH JALAPENO MONTEREY JACK
Gourmet: July 1993

1 - 12 of 12

Chicken main dishes you can prepare in the microwave

Epicurious: The World's Greatest Recipe Collection

CHICKEN BREAST WITH TARARON FINOCCHIATA
Gourmet: May 1992

COOKED IN
Gourmet: December 1998
Part of a trend: Filtering instead of Hierarchies

- Old days (danriver.com): Click-click-click on categories and finally get to the goodies \textit{at the leaf nodes}
- Trend: One click, get a sample of results ("1-10 of 149"), select a category to get fewer results

The pieces of the faceted browse flow
The pieces of the faceted browse user interface

- Facet selection: How do you select a facet and/or facet value?
- Facet history: How do you know what you have selected? How do you undo it?
- The results: How are results displayed? How are they laid out wrt the facet selection and history?
- Item: the basic unit of information, what you are looking for, what gets classified along different facets
- Item count: how many things do we have?
- *The classification*: behind the scenes but very, very important

Pieces of the user interface
• Faceted browsing (what caught on within IBM)
• Faceted metadata search & browse (searchtools.com, Flamenco)
• Guided navigation (Endeca)
• Faceted navigation (Siderean)
• Facetmap (facetmap.com)
• Faceted classification: the back end stuff (vs. my user interface stuff here)

• Faceted classification: Approach to KO that assigns concepts from multiple orthogonal categories (facets) to info objects in a collection. Retrieval = post-coordination.
• Facet: fundamental category by which an object or concept is described.
• Term: In a KO system, concepts are represented by terms – string of characters.
• Concept: node, idea, subject, descriptor.

From *The Barrington Report on Advanced Knowledge Organization and Retrieval*, V1N1, Mar-Apr 2004. kmconnection.com
Browsing vs. Searching vs. Querying

Detailed examples

- IBM finder
- Flamenco
- MSN shopping
- DC2003 proceedings
- Forrester
Example 1 – IBM product finders

Notebook finder

So many features to choose from! Find and compare the IBM notebook that’s right for you. Standard shipping is included with any IBM notebook purchased online.

Select a feature

- Processor
  - Intel Core i7
  - Intel Core i5
  - Intel Core i3
  - AMD Athlon II
  - AMD A4

- Battery
  - At least 3 hrs
  - At least 4 hrs
  - At least 5 hrs

- Display size
  - At least 13.3" Wide screen
  - At least 15.6" Wide screen

- Price
  - Less than $1,000
  - Less than $1,500
  - Less than $2,000
  - Less than $2,500
  - Less than $3,000

- Availability
  - In stock
  - Within 2 weeks

- Operating system
  - Windows 7 Professional
  - Windows 7 Home Basic
  - Windows 7 Home Premium

- Memory
  - At least 2 GB

- Hard drive
  - At least 320 GB

- Travel weight
  - Less than 4 lbs

- Bluetooth
  - Yes

- Wi-Fi
  - Yes

- Additional features
  - More features...

---

IBM Finder – Page 2

Feature(s) selected

- Memory: At least 32 MB (removable)

There are 2,148 results to view results and below. To further refine your results, select another feature.

- Processor
  - IBM ThinkPad T
  - IBM ThinkPad W
  - IBM ThinkPad L
  - IBM ThinkPad G

- Battery
  - At least 3 hrs

- Display size
  - At least 13.3" Wide screen

- Price
  - Less than $1,000

- Availability
  - In stock

- Operating system
  - Windows XP Professional

- Memory
  - At least 2 GB

- Hard drive
  - At least 320 GB

- Travel weight
  - Less than 4 lbs

- Bluetooth
  - Yes

- Wi-Fi
  - Yes

- Additional features
  - More features...

---

Sort by: Price (low to high)

ThinkPad T400 1.80 GHz Intel Core 2 Duo, 1 GB RAM, 80 GB HDD, Windows XP Professional, 15.6" Wide screen, 4-cell battery, Windows XP Home Edition, 32-bit, 1.66 GHz, 1 GB RAM, 80 GB HDD

Price: $1,099

Availability: In stock

Compare selected items

---

$1,265.00 IBM web price
IBM finder – Some results lead to configurators

Let me build it
To build your own system choose the items you wish to include from the drop downs below and then click "View Configuration" button at the bottom of the page.

IBM recommends Microsoft® Windows® XP Professional
Dissecting IBM finders

Example 2 – Flamenco (fine arts)
Flamenco – 3 elephants

Flamenco – An item
Dissecting Flamenco

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.thefan.org

Search

Define your search further within these categories:

Media: ritual object

Location: Oceania > Indonesia

Facet history

Facet selection

7 results (ungrouped, sorted by Object Title)

Item count: sort by: date, artist

Example 3 - MSN shopping (TVs)
Dissecting MSN Shopping

### Search Shopping

<table>
<thead>
<tr>
<th>Narrow your search</th>
<th>15 results found</th>
<th>Page 1 of 1</th>
</tr>
</thead>
</table>

#### By Price Range

- $0.00 - $249.99 (6)
- $250.00 - $499.99 (3)
- $500.00 - $699.99 (3)
- $700.00 - $899.99 (3)

**Show all price ranges**
- Show sale items only (12)

#### By Brand

- Sony (13)
- Show all brands

---

### Televisions

**$350.00 - $599.99 - Sony**

<table>
<thead>
<tr>
<th>Product</th>
<th>Sale From</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV-275S210</td>
<td>$491.99</td>
</tr>
<tr>
<td>KV-32TV110</td>
<td>$507.00</td>
</tr>
<tr>
<td>KV-27TV110 - TV - CRT - 27&quot;</td>
<td>$501.99</td>
</tr>
</tbody>
</table>

---

**Facet selection**

- Facet history
- Facet selection
Dissecting DC 2003 proceedings

Results

Facet history

Imagining the Northwest: A Digital Library Partnership in Oregon

This paper documents the development of a digital library of art images created by photographer Lyle Albeck in the Umatilla Indian Reservation at the turn of the 20th century. The University of Oregon Libraries, working with the Umatilla Cultural Institute of the Confederated Tribes of the Umatilla, developed a Dublin Core compliant metadata structure. The metadata struct...
Dissecting Insight

Comparing examples

<table>
<thead>
<tr>
<th></th>
<th>Epicurious</th>
<th>IBM</th>
<th>Flamenco</th>
<th>MSN</th>
<th>DC2003</th>
<th>Forrester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top page (no results)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Facet selection</td>
<td>1 facet at a time</td>
<td>More facets</td>
<td>Top</td>
<td>Left</td>
<td>Left</td>
<td>&quot;More brands&quot;</td>
</tr>
<tr>
<td>Facet history</td>
<td>Single Breadcrumb</td>
<td>Commas [remove]</td>
<td>Blocks [x]</td>
<td>Dead breadcrumb</td>
<td>&quot;Show all&quot;</td>
<td>Separate breadcrumbs [X]</td>
</tr>
<tr>
<td>Results</td>
<td>Plain</td>
<td>Sort</td>
<td>Compare</td>
<td>Grouping</td>
<td>Sort</td>
<td>Compare</td>
</tr>
<tr>
<td>Destination pages</td>
<td>Islands</td>
<td>Islands</td>
<td>Exposed values/links</td>
<td>Islands</td>
<td>Islands</td>
<td>Islands (?)</td>
</tr>
</tbody>
</table>
Near-examples & Non-examples

- IBM software Find-by
  - Just a gateway to sub-sites
- Amazon.com Shop-by browsing
  - Shop by brand: not FB
- Yahoo! Electronics Finder & Zilog Parametric search
  - “Faceted querying”
- Boston Scientific
  - “Faceted searching”
- Dick’s Sporting Goods Shoes
  - 3 steps: Brand is contextual to size
- CNET Shopper Filter-by
  - Filter values are generic
### Zilog Parametric Search

#### Microprocessors

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin Count</td>
<td>28, 40, 44, 46, 56, 68, 80, 84, 100</td>
</tr>
<tr>
<td>Package</td>
<td>280, 5180, 2183, 280</td>
</tr>
<tr>
<td>Speed (MHz)</td>
<td>4, 6, 8, 10, 12, 16, 20, 30, 50</td>
</tr>
<tr>
<td>External Memory</td>
<td>No Preference</td>
</tr>
</tbody>
</table>

#### Other Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1MB EPROM, 2x25M, 2xUARTs</td>
<td></td>
</tr>
<tr>
<td>1MB EPROM, 2x25M, 2xUARTs, 8-bit Operation</td>
<td></td>
</tr>
<tr>
<td>2xUARTs, SPI, I2C</td>
<td></td>
</tr>
<tr>
<td>2xUARTs, SPI, I2C, MACC, 2x280 Peripherals (SIO, PIO, CTC) WDT, CTC</td>
<td></td>
</tr>
<tr>
<td>CTC, SIO, PIO</td>
<td></td>
</tr>
<tr>
<td>Four 8-bit CTC, Selectable Trigger</td>
<td></td>
</tr>
<tr>
<td>SIO8 Memory, 2x280 channels, 18550 RS-232</td>
<td></td>
</tr>
<tr>
<td>SIO8 Memory, 2x280 channels, 18550 RS-232, 3.3V operation</td>
<td></td>
</tr>
<tr>
<td>Two 8-bit Ports</td>
<td>No Preference</td>
</tr>
</tbody>
</table>

### Instructions

1. Select all your options in the order of their importance to you, then click Search.
2. Your matches will be sorted by the order of your selections.

### Number of Matches: 128
### Zilog results

#### Instructions:
1. View list of matching products by clicking View List.
2. On continue to select more options, then click Search.

#### Number of Matches: 9

<table>
<thead>
<tr>
<th>Pin Count</th>
<th>Package</th>
<th>Clock Serial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Controller</td>
<td>UART</td>
<td>CSIO</td>
</tr>
<tr>
<td>I/O</td>
<td></td>
<td>Serial</td>
</tr>
<tr>
<td>Speed (MHz)</td>
<td></td>
<td>10 20 30 50</td>
</tr>
<tr>
<td>Other Features</td>
<td></td>
<td>1MB MPU, 2xDMA's, 2xUARTs, 3.3V Operation</td>
</tr>
</tbody>
</table>

#### View List

<table>
<thead>
<tr>
<th>Pin Count</th>
<th>Package</th>
<th>Clock Serial</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Speed (MHz)</td>
<td></td>
<td>10 20 30 50</td>
</tr>
<tr>
<td>Other Features</td>
<td></td>
<td>1MB MPU, 2xDMA's, 2xUARTs, 3.3V Operation</td>
</tr>
</tbody>
</table>

---

### DV Camcorders

#### Instructions:
- Select at least 2 products to narrow search.
- Check at least 2 products to narrow search.
- Check at least 2 products to narrow search.

#### Number of Matches: 9

<table>
<thead>
<tr>
<th>Make</th>
<th>Model</th>
<th>Screen Size:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canon</td>
<td>ZR50MC</td>
<td>3.5&quot; LCD Screen</td>
</tr>
<tr>
<td>Samsung</td>
<td>SC200</td>
<td>3.5&quot; LCD Screen</td>
</tr>
<tr>
<td>Panasonic</td>
<td>PV900U</td>
<td>3.5&quot; LCD Screen</td>
</tr>
</tbody>
</table>

#### View List

<table>
<thead>
<tr>
<th>Make</th>
<th>Model</th>
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</tr>
<tr>
<td>Panasonic</td>
<td>PV900U</td>
<td>3.5&quot; LCD Screen</td>
</tr>
</tbody>
</table>
• What I can confidently recommend:

This page intentionally left blank...

The model – “natural” selection?
High level questions re: Faceted browse

- What is the best flow?
  - Top page: good or bad?
  - How integrated should the destination pages be?
- How should the elements be arranged on the page?
  - Facet selection on top vs. left, for example
- How easy is this to learn?
  - Special words or phrases to clue users in?
  - Is it just a matter of trying it out?
- What contexts does this work well in?
  - "Finders" vs. "Configurators"
  - Shopping (by physical) attributes
  - More abstract/diverse objects: how homogeneous?
  - Flamenco (CHI ’03): better than keyword search for image collection

Facet selection questions

- What if you have too many facets?
  - Show / hide or eliminate?
  - How many is too many? (Too few?)
- What if you have too many facet values?
  - Selected set and "show all"?
- Do you show the hits on the links?
- What if users need to select more than 1 value for a given facet?
- Can we think of keyword search as just another type of facet selection?
Facet history questions

- Are breadcrumbs a good user interface for this?
  - vs. “undo” metaphor
- Do users understand what they are doing when they undo?
- How useful is the “remember what you chose” aspect?
- Should history be integrated with selection?

More tough questions

- Which is better: menus or lists of links?
  - Menus: less real estate
  - Many facet selections at once: that is better, no?
- How does FB fit into the top-down IA of a site?
  - Just an overlay on items vs. integrated items
• How does the faceted classification & user interface work go hand-in-hand?
  – Classification first and then UI? UI drives classification?

• Determining facets
  – Hierarchical facets, # of facets, usefulness of each facet

• Facet values
  – Labels, thus, user interface

• “Spectrum” (numerical facets)
  – Range-making at the UI layer vs. tagging

Is it worth the effort?

• Forces “data cleansing”
• ROI (sell more stuff)
  – Conversion rate
  – Goal attainment
  – Decision to purchase
• Strategic value
  – Personalization
What you learned (aka what I babbled about)

- Faceted browsing (UI & interaction)
- UI pieces: Facet selection, facet history, results
- The flow: Top page, middle pages, destination page
- The IA: Faceted classification
- Lots of examples
- Lots of questions
- So what? What are you going to do next?

Stay in touch

- Information Architecture Summit
  - Austin, TX, Feb '04. Montreal, 2005
  - http://iasummit.org/

- If you are a student/professor who wants to research concepts related to FB, contact me

- If you are applying any of this, let me know what you discover

- IAslash.org – where IAs blog
  - FB: http://iaslash.org/taxonomy/page/or/166

- http://user-experience.org/uefiles/facetedbrowse/