Agenda

- The landscape of search
- A framework for design
  - Dimensions of search user experience
- Patterns of search behaviour
  - Design implications
- Design resources
- Conclusions
The landscape of search
Understanding the territory
The classical view

Key differences
- Rich link structure
- Redundancy
- Adversarial search & spam
- User goals & tasks:
  - fact finding to exploratory search

Web Search
- Multiple engines
- Single source

Enterprise search
- Single engine
- Multiple sources
Search Patterns,
Peter Morville 2009
A framework for design

Disciplines and dimensions
Design disciplines

How it works
• User interface design
• Information architecture
• Interaction design

How it looks
• Visual design

Design Methodology
• User-centred design

Design Research
Where should the **Faceted Navigation** menu be located and how should it be organised?
How should we present mixed content results to help users discover the most relevant and useful items?
The Dimensions of Search User Experience

User Type
- Electronics Engineer
- Purchasing Agent
- Novice Shopper
- Technical Enthusiast
- ...

Objective
- “Find part #35456...”
- “Discover compatible parts...”
- “Understand part obsolescence...”
- ...

Assets
- Products
- Rich Media
- Textual Info
- Relationships
- Community
- ...

Mode of Discovery
- Analyzing
- Comparing
- Evaluating
- Exploring
- Locating
- ...

...
Users vary in their level of knowledge, confidence & attitude
Objectives vary in breadth & complexity

- I need to find part number 2335456
- I need to discover compatible parts that work for my assembly
- I need to understand part obsolescence & manage our risks
- I want to buy the new Harry Potter book
- I want to buy shoes that match my interview suit
- I want an affordable entertainment system for my family
Dimension 3: assets

COMPLEXITY

Simple
Homogeneous

Highly Faceted
Diverse
Dimension 4: mode of discovery

- Marchionini, 2006
  - Lookup
  - Learn
  - Investigate

- Spencer, 2006
  - Known-item
  - Exploratory
  - Don’t know what you need to know
  - Re-finding

- Morville, 2010
  - Quit
  - Narrow
  - Expand
  - Pearl-growing
  - Pogo-sticking
  - Thrashing
Analysing the Modes

Scenarios
Modes of Discovery: Lookup

Locating
• To find a specific (possibly known) item
  • e.g. I need to find a new part with particular technical attributes and then source it from the most qualified supplier – Engineering

Verifying
• To confirm or substantiate that an item or set of items meets some specific criterion
  • e.g. How can I determine if I am looking at the latest information for a part or supplier? - Supply Chain Specialist

Monitoring
• To maintain awareness of the status of an item or data set for purposes of management or control
  • e.g. I need to monitor at risk/failing customers/dealers so I can prompt my Account Reps to fix the problems - Sales Manager
Modes of Discovery: Learn

Comparing

• To examine two or more items to identify similarities & differences
  • e.g. I need to compare our module set teardowns with competitive teardown information to see if we’re staying competitive for cost, quality and functionality – Engineering

Comprehending

• To generate insight by understanding the nature or meaning of an item or data set
  • e.g. I need to analyze and understand consumer-customer-market trends to inform brand strategy & communications plan – Director, Brand Image

Exploring

• To proactively investigate or examine an item or data set for the purpose of serendipitous knowledge discovery
  • e.g. I need to understand the cost drivers for this commodity so I can negotiate better terms with my suppliers and forecast business risk based on market indices - Procurement
Modes of Discovery: Investigate

**Analyzing**
- To critically examine the detail of an item or data set to identify patterns & relationships
  - e.g. I need to know the cost drivers for a part such as materials that impact cost. Is the relationship a correlation or step function for a part cost driver? – Engineering

**Evaluating**
- To use judgement to determine the significance or value of an item or data set with respect to a specific benchmark or model
  - e.g. I need to determine my current state in my prints so I can evaluate if I have price variation to negotiate a better price – Procurement

**Synthesizing**
- To generate or communicate insight by integrating diverse inputs to create a novel artefact or composite view
  - e.g. I need to prepare a weekly report for my boss (sales mgr) of how things are going - Account Rep
Modes of Discovery

- **Lookup**
  - Locating
  - Verifying
  - Monitoring

- **Investigate**
  - Analyzing
  - Evaluating
  - Synthesizing

- **Learn**
  - Comparing
  - Comprehending
  - Exploring
Patterns of search behaviour
Mode chains and sequences
Comparison–driven search

- **Engineering**: Compare our module set teardowns with competitive teardown information to see if we’re staying competitive for cost, quality and functionality.
- **Portfolio Manager**: Compare a lead's performance claims with relevant benchmarks to assess the lead's claims.
- **Cost Estimators**: Analyze & understand gaps between current costs of commodity versus best in class manufacturing costs
  - Patentability search?
Exploration-driven search

- **Core Engineer**: Identify opportunities to optimize use of tooling capacity for my commodity/parts
- **District Manager**: Identify sales opportunities and targets (increased key customer market share across categories/brands; upsell-cross sell; promotional targets)
- **Category Manager**: Evaluate & optimize our product portfolio: Which products should we de-list and retire? What new products should we be making/selling?
  - ➔ Validity search?
Strategic Insight

- **Engineering**: Track module cost versus functionality over time to determine trends.
- **Portfolio Manager**: Understand a lead's underlying positions so that I can assess the quality of the investment opportunity.
- **Procurement**: Understand the cost drivers for a commodity so I can negotiate better terms with my suppliers and forecast business risk based on market indices.
  - Freedom-to-operate search?
**SVP Sales:** Monitor how well we are tracking to revenue and margin targets by division

**Core Engineer:** Monitor global commodity use in relation to plan/guidelines to identify gaps that require corrective action

**Financial Analyst:** Monitor & assess commodity status against strategy/plan/target

- ➔ Patent watch?
Comparison–driven synthesis

- **Director, Brand Image:** Analyze and understand consumer-customer-market trends to inform brand strategy & communications plan
- **Engineering:** Find out how many parts I have in my module set of parts and find ways to reduce cost across them
- **Core Buyer:** Formulate scope & strategy for sourcing and gap closure
  - Gap analysis (SOTA search)?
Design Implications
Applying the insights
Finding the right balance

- Usability, intuitiveness, engagement
- Power, flexibility, sophistication
**Your Results:**

Part Family: Couplings

Showing Parts 1-20 of 5,534,673

<table>
<thead>
<tr>
<th>PART #</th>
<th>DESCRIPTION</th>
<th>ACTIVE</th>
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<td>026P0864</td>
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### Your Results:

**Part Family: Couplings**

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Your Results:

Part Family: Couplings > Threaded

Showing Parts 1-20 of 15,423

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<td>Ductile Grooved Coupling</td>
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Recalled tear down ISO update strike field testing rustproof exchange rate new composites MagnaDrive

Inner Diameter (mm):
- 0 16 32 48 64 96 128

Max Torque (Nm):
- 0 125 250 375 500 625 750

Screw (ISO 4762/12.9):
- More ▲▲ ▲▼ ▼▼

AVG Fulfillment Time:
- Part 5 45%
- Part 1 1%
- Part 2 7%
- Part 3 18%
- Part 4 29%

More ▲▲ ▲▼ ▼▼
Your Results:

Part Family: Couplings > Threaded

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</table>

Mean Time To Failure:
- 10 (4112)
- 15 (3934)
- 20 (1581)

Inner Diameter (mm):
- 0
- 16
- 32
- 48
- 64
- 96
- 128

Max Torque (Nm):
- 0
- 125
- 250
- 375
- 500
- 625
- 750

Screw (ISO 4762/12.9):
- More

Research Notes:
- recalled tear down ISO
- update strike field testing
- rustproof exchange rate
- new composites MagnaDrive

AVG Fulfillment Time:
- Part 5
- 45%
- Part 1
- 1%
- Part 2
- 7%
- Part 3
- 18%
- Part 4
- 29%
Your Results:

Part Family: Couplings > Threaded
Geo: Lat 50.03 Long 8.68 + radius 1750 Km

Showing Parts 1-20 of 2,791

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Part Family: Couplings > Threaded
Geo: Lat 50.03 Long 8.68 + radius 1750 Km

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**Your Results:**

Part Family: Couplings > Threaded
Geo: Lat 53.83 Long 1.54 + radius 168 Km
Inner Diameter: 96 mm

Showing Parts 1-20 of 5,688

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**Research Notes:**

angular force extreme conditions ISO torqu strike field testing rustproof drilling new composites stress testing DARPA

**AVG Fulfillment Time:**

- Part 2: 21%
- Part 1: 12%
- Part 5: 8%
- Part 4: 13%
- Part 3: 45%
Guided Navigation

- Materials
  - Stainless (1343)
  - Aluminum (302)
  - Copper (117)
  - More...
- Preferred Suppliers
  - Armault (844)
  - Klein (405)
  - Ylan (180)
  - More...
- Mean Time To Failure
  - 10 (1217)
  - 15 (623)
  - 20 (492)
  - More...

Max Torque (Nm)

0 125 250 375 500 625 750

Screw (ISO 4762/12.9)

Mounting length (mm)

Angular Misalignment

Hub length (mm)

More ▲▲ ▲▼

Your Results:

Part Family: Couplings > Threaded
Geo: Lat 53.83 Long 1.54 + radius 168 Km
Inner Diameter: 96 mm

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<td>077P1122</td>
<td>Single joint gear couplings</td>
<td>NO</td>
</tr>
<tr>
<td>042F2636</td>
<td>Ductilic Grooved Coupling</td>
<td>NO</td>
</tr>
</tbody>
</table>

Research Notes

- angular force
- extreme conditions
- ISO
- torque
- strike
- field testing
- rustproof
- drilling
- new composites
- stress testing
- DARPA

AVG Fulfillment Time

- Part 2: 21%
- Part 1: 12%
- Part 5: 8%
- Part 4: 13%
- Part 3: 45%
<table>
<thead>
<tr>
<th>PART #</th>
<th>DESCRIPTION</th>
<th>ACTIVE</th>
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</thead>
<tbody>
<tr>
<td>026P0864</td>
<td>Helical shaft couplings tested for marine and desert...</td>
<td>YES</td>
</tr>
<tr>
<td>08G48950</td>
<td>Single joint gear couplings marine stress tests indicate...</td>
<td>NO</td>
</tr>
<tr>
<td>077P1122</td>
<td>Ductile Grooved Coupling designed for marine environment...</td>
<td>NO</td>
</tr>
<tr>
<td>042F2636</td>
<td>Morris coupling marine MTT is designated as...</td>
<td>YES</td>
</tr>
<tr>
<td>01K23578</td>
<td>Farleigh 4t bin coupling marine conditions and salinity...</td>
<td>YES</td>
</tr>
<tr>
<td>021H7636</td>
<td>Wet vacuum pump coupling high temperature and marine use...</td>
<td>NO</td>
</tr>
<tr>
<td>089G3880</td>
<td>Flanged Gear Coupling brackish salinity for marine rigs...</td>
<td>NO</td>
</tr>
<tr>
<td>097P1995</td>
<td>Klein Series 800 threaded coupling marine...</td>
<td>YES</td>
</tr>
</tbody>
</table>
Your Results:

Part Family: Couplings > Threaded
Geo: Lat 52.74 Long 5.68 + radius 425 Km
Inner Diameter: 96 mm
Search: “marine”

Showing Parts 1-10 of 93

<table>
<thead>
<tr>
<th>PART #</th>
<th>DESCRIPTION</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
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<td>YES</td>
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<td>Flanged Gear Coupling...brackish salinity for marine rigs...</td>
<td>NO</td>
</tr>
<tr>
<td>097P1995</td>
<td>Klein Series 800 threaded coupling...</td>
<td>YES</td>
</tr>
</tbody>
</table>
Your Results:

Part Family: Couplings > Threaded
Geo: Lat 52.74 Long 5.68 + radius 425 Km
Inner Diameter: 96 mm
Search: “marine”
AVG Fulfillment Time: 1

Showing Parts 1-6 of 6

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<th>PART #</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>57G9200</td>
<td>Klein Series 80 threaded coupling ...marine conditions and salinity...</td>
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<tr>
<td>57K9213</td>
<td>Klein Series 800 threaded coupling ...high temperature and marine use...</td>
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<tr>
<td>59G9400</td>
<td>Klein Series 810 threaded coupling ...coated for marine applications...</td>
<td>YES</td>
</tr>
<tr>
<td>39L3291</td>
<td>RIX marine flexi coupling ...salinity is simulated for marine...</td>
<td>YES</td>
</tr>
<tr>
<td>39M3940</td>
<td>RIX extreme torque coupling ...marine stress tests indicate...</td>
<td>YES</td>
</tr>
<tr>
<td>16M4950</td>
<td>Warner maximum M4 coupling ...marine MTT is designated as...</td>
<td>YES</td>
</tr>
</tbody>
</table>

Research Notes:

marine tear down drill salinity field testing rustproof ISO 5839 environment pumping MagnaDrive Sand helical
From forms to facets
Facets & information scent
From forms to facets

- Think facets, not forms
- Stay on the page
- Keep it lightweight
- React immediately

*Designing Web Interfaces*, Bill Scott & Theresa Neil, 2009
Facets at Google?

Methods and apparatus for evaluating semantic proximity  Francois Huet et al

Methods and apparatus to evaluate the semantic proximity between reference free-form text entry and a candidate free-form text request.

Inventors: Francois Huet, Gray Salmon Norton
Assignee: Microsoft Corporation
Primary Examiner: Cam Linh Nguyen
Attorney: Vierra Magen Marcus & DeNiro LLP

Patent number: 7877349
Filing date: Apr 1, 2010
Issue date: Jan 25, 2011
Application number: 12/752,829

U.S. Classification
707/602; 707/708; 707/713; 707/739; 707/750

View patent at USPTO

Citations

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Title</th>
<th>Issue date</th>
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<tbody>
<tr>
<td>6070134</td>
<td>Identifying salient semantic relation paths between two words</td>
<td>May 30, 2000</td>
</tr>
<tr>
<td>6813616</td>
<td>System and method for building a semantic network capable of identifying word patterns in text</td>
<td>Nov 2, 2004</td>
</tr>
<tr>
<td>6901399</td>
<td>System for processing textual inputs using natural language processing techniques</td>
<td>May 31, 2005</td>
</tr>
<tr>
<td>7302383</td>
<td>Apparatus and methods for developing conversational applications</td>
<td>Nov 27, 2007</td>
</tr>
</tbody>
</table>
Design for discovery principles

- Map discovery modes to screen components
  - Avoid “one size fits all”

- Create views by combining components
  - Communicate conceptual relationships through Gestalt principles of organization (e.g. similarity, closure, proximity, etc.)

- Compose applications by combining views
### View: multi-purpose

- **Purpose**
  - Supports exploration, comparison and visualization

- **Modes**
  - Locating
  - Verifying
  - Evaluating
  - Analyzing
  - Exploring

- **Components**
  - Breadcrumb
  - Faceted Navigation
  - Metrics Bar
  - Results Table
  - Chart
  - Cross Tab
  - Guided Navigation
  - Range Filter
  - Cross Tab
  - Record Detail
View: status & alerts dashboard

- **Purpose**
  - Present global overview / summary of key metrics

- **Modes**
  - Monitoring
  - Exploring

- **Components**
  - Metrics Bar
  - Alerts
  - Chart
  - Cross Tab
View: unstructured data discovery

- **Purpose**
  - Explore unstructured data

- **Modes**
  - Comprehending
  - Exploring
  - Synthesizing

- **Components**
  - Search
  - Breadcrumb
  - Faceted Navigation
  - Results List
  - Compare
  - Record Detail
  - Find Similar
Application structure: classic
Application structure: hub & spoke
Application structure: comprehensive

- Explore
  - Multi-purpose
- Monitor
  - Dashboard
- Compare
- Analyze
  - Visualization 2 axes
  - Visualization 4-axes
- Evaluate
  - Visualization 2 axes
  - Visualization 4-axes
- Comprehend
  - Unstructured
Design resources

Building on the foundations
Design process

1. Identify need for human-centred design
2. Understand & specify context of use
   - Specify requirements to drive design
   - Evaluate and modify designs
     - System satisfies specified requirements
3. Produce design solutions which meet requirements
4. Evaluate and modify designs
5. Specify requirements to drive design
   - Identify the business requirements and user goals that must be met for the product to be successful

*ISO 13407: Human centred design processes for interactive systems (renamed as ISO 9241-210)*
Design deliverables

User Experience Treasure Map
by Jeffery Callander and Peter Morville
Design pattern libraries

Welcome
Welcome to the Yahoo Design Pattern Library. We're thrilled to be sharing patterns and code with the web design and development community, hope it's useful, and look forward to your feedback.

The most recent pattern we've released is CalendarPicker, and we've got some great things coming in the new year.

By the way, if you're considering building your own pattern repository or are interested in how we create our pattern collection here (and how we document patterns internally in the parent library to the ones), then you might enjoy an inside look at the Pattern Library.

Happy New Year!

What's a Pattern?
A pattern describes an optimal solution to a common problem within a specific context.

Recent Patterns

- Alphabetical Filter Letters
- Animation Transition
- Calendar Picker
- User Interface Design Pattern Library

Welcome

Welcome to the Endeca User Interface Design Pattern Library. The Endeca User Interface Design Pattern Library (UIPL) provides a collection of design patterns for web designers and developers.

The library includes patterns such as:

- Related Blog Posts
- Faceted Navigation
- Behavior & Design

The patterns are designed to be used in combination with other patterns to create a cohesive and intuitive user experience.

Search Patterns

A sandbox for collecting search examples, patterns, and antipatterns.

Please add tags, notes, and comments, and suggest new examples.

Over time, I hope to add patterns that illustrate our behavior and the information architecture of search.

To learn more about search patterns at Endeca.com. If you have comments or suggestions, please let me know.

Peter Morville

Collections

- Best Bets
- Faceted Navigation
- Behavior & Design

- Auto-Suggest
- Clustering
- Structured Results

- Pagination
- Advanced Search
- Site Search (Small)
- Site Search (Large)
- E-Commerce

Endeca UX Teams is Hiring!

Endeca UX Teams is Hiring!

Designers help design the future generation of Endeca search and discovery applications. A successful designer will contribute to the user experience of Endeca's products, developing user-centered designs and visual experiences.

To apply, please visit Endeca.com/careers.
Conclusions
Final thoughts and reflections
Summary

Don’t think *user interface*…
- ...think *user experience*

Look for patterns of search behaviour
- Identify discovery modes & workflows

Learn from other design contexts
- Apply ideas from the wider search landscape

Stand on the shoulders of giants
- Use proven design processes, methodologies & resources
Thank you!

Tony Russell-Rose, PhD
Vice-chair, BCS IRSG
Chair, IEHF HCI Group

- Email: tgr@uxlabs.co.uk
- Blog: http://isquared.wordpress.com
- LinkedIn: http://www.linkedin.com/tonyrussellrose/
- Twitter: @tonygrr