

Search:

Search

# Models and Interactions

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Design for **Context**

Making software applications and web sites easy to use

[www.designforcontext.com](http://www.designforcontext.com)

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# Consider how you get stuff into that 'box'

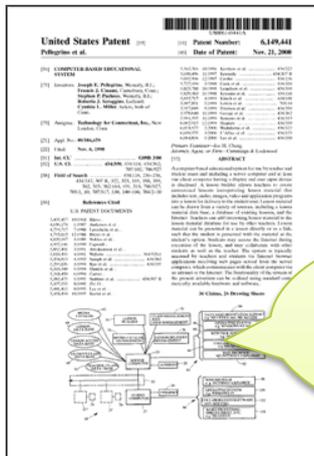


## Where shall we go for dinner?

- You: I want Greek food  
Harry: As long as it has pasta too  
Jack: Coffee, I need coffee  
Eric: That place on the corner of Clark & Kent  
Jamie: Let's find a place where we can sit outside



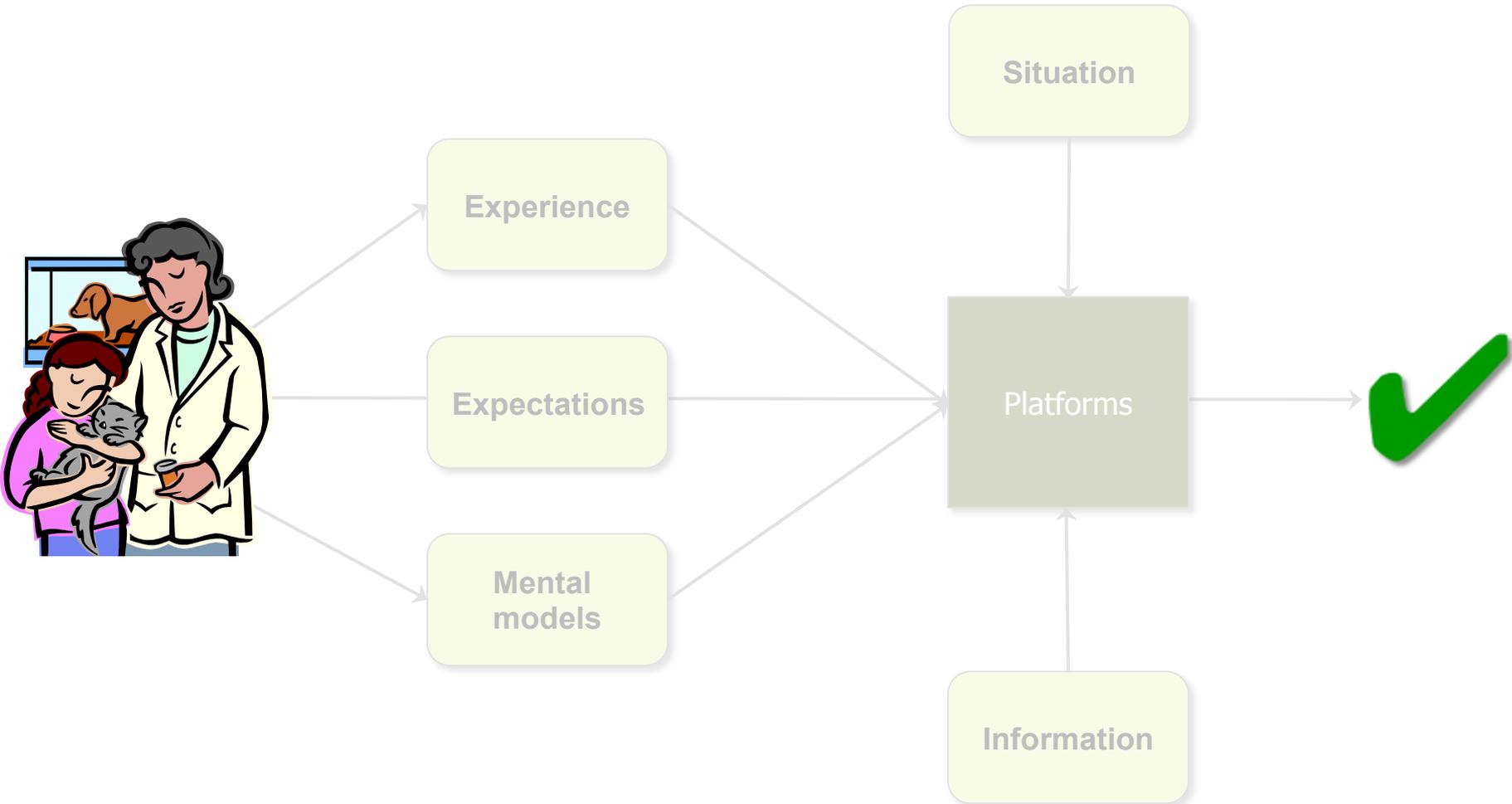
Search



Find only medications that have been approved for pediatric use in this country

closest gas station

# Goals: External to the seeking task

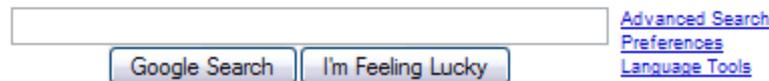


## Trends: How have search and navigation changed?

- » Simple starting points
- » Focus on results
- » More inter-relatedness
- » Services & APIs

# Simple starting points

- » Simple search is the norm



- » Even “advanced” search is getting simpler

- » And it gets even simpler...

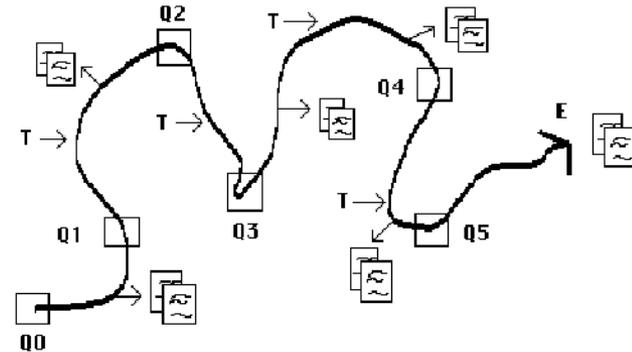
<http://www.apple.com/iphone/features/siri.html>



# Focus on results

## » Finding something is a journey of *refinement*

- Search within results
- Facet filtering
- Dynamic clustering
- Preview



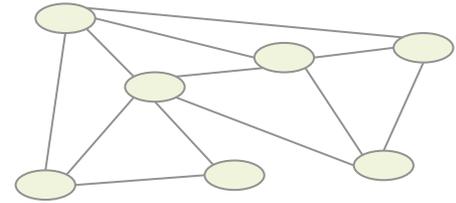
The Design of Browsing and Berrypicking Techniques for the Online Search Interface  
Marcia Bates, 1989, <http://pages.gseis.ucla.edu/faculty/bates/berrypicking.html>

## » Re-search is exploratory and multi-session

## » Outside situations (context) drive expectations

# More inter-relatedness

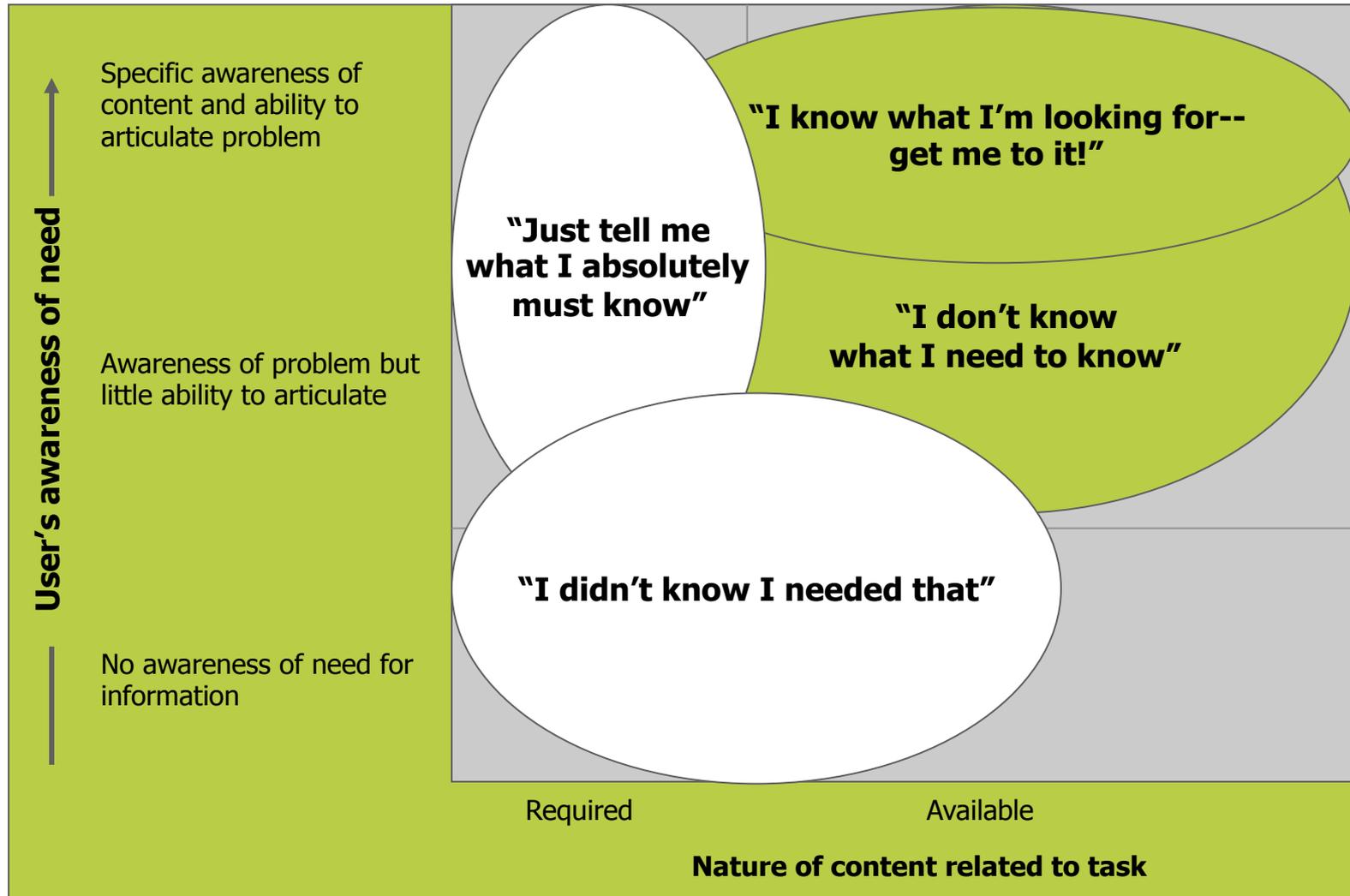
- » Everything is connected
- » Connections driven by metadata, not just manually created and managed
- » Avoid overwhelming the user
  - ... everything has a place
  - ...however, avoiding clutter is a UI challenge



- » Adding value has become the norm
- » Lesson of Web 2.0: encourage collaboration
- » “Open Data” follows Open Source
- » You can't do it all
  - Decide what other people do well, then provide data to them
  - What do you get back?

# Thinking about seeking

# Need & awareness: For us, proactive information is a goal



Adapted from Degler/Battle (2003). *Can Topic Maps Describe Enterprise-Wide Context?*  
[http://www.designforcontext.com/publications/dd-lb\\_topic-maps\\_context\\_extreme2003.pdf](http://www.designforcontext.com/publications/dd-lb_topic-maps_context_extreme2003.pdf)

# When users seek & what designers must transcend

“The deepest form of understanding another person is empathy... [which] involves a shift from...observing how you seem on the outside, to ... imagining what it feels like to be you on the inside”

— attributed to Harvard Negotiation Project, Indi Young, Mental Models

Focus on...

» Needs

» Awareness

» Perception



Novices? Experts in specific domain?  
Experts outside of domain?

Ability to articulate search problem

Knowing when to change tactics

Urgency and persistence of seeking

Accuracy and precision

Authority, trust, and credibility

Recognizing success

# Not all searching is casual

medical researchers | scientists | lawyers | intelligence analysts | patent examiners | librarians

Engage in a broad variety of search strategies

Tend to be very articulate when formulating search strategy / tactics

Longitudinal perspective of search tasks

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We ❤️ hardcore seekers

# General stages of seeking



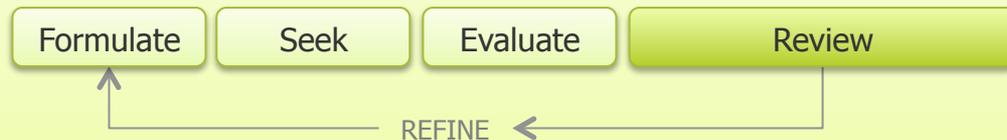
## Motivations and understanding when seeking

- 1 Survey
- 2 Targeted
- 3 Exploratory
- 4 Archival
- 5 Routine
- 6 Collaborative

# Survey

“ What are the symptoms of arthritis? ”

Seeking Process / Stages



- » Satisficing: "good enough"
- » Tend to be single session
- » Look for correlations between results to bolster confidence
- » Focused on authoritative sources
- » Preview to support decision-making

# Survey: Examples of design features

Google

## Arthritis



[www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)

**Arthritis** is inflammation of one or more joints. A joint is the area where two bones meet. There are over 100 different types of **arthritis**. Symptoms: **Arthritis** causes joint pain, swelling, stiffness, and limited

[Causes](#) - [Symptoms](#) - [Tests](#) - [Treatment](#)

## Arthritis Foundation | Symptoms Treatment

[www.arthritis.org/](http://www.arthritis.org/) - Cached

A voluntary health agency covering all **arthritis** and related conditions.  
[Osteoarthritis](#) - [Rheumatoid Arthritis](#) - [Local Office](#)

## WebMD Arthritis and Joint Pain Center:

[arthritis.webmd.com/](http://arthritis.webmd.com/) - Cached

Get in-depth **arthritis** information here including related conditions.

## Arthritis - Wikipedia, the free encyclopedia

[en.wikipedia.org/wiki/Arthritis](http://en.wikipedia.org/wiki/Arthritis) - Cached

**Arthritis** (from Greek arthro-, joint + -itis, inflammation) is a form of disorder that involves inflammation of one or more joints.  
[Rheumatoid arthritis](#) - [Osteoarthritis](#) - [Knee arthritis](#)

Structured metadata on source sites/content is one key to these search results having so many directed links, beyond the individual results pages. This kind of metadata can be embedded in content with semantic standards.

Bing

## Arthritis

**Arthritis** is inflammation of one or more of your joints. The main symptoms of **arthritis** are joint pain and stiffness, which typically worsen with age. The two most common types of **arthritis** are osteoarthritis and rheumatoid...

[Read the full article by Mayo Clinic](#)

See more articles in Bing health by: [Medline Plus](#) · [NCCAM](#) · [Healthwise](#) · [Harvard Heal...](#)

### Related conditions

[Rheumatoid Arthritis](#)  
[Osteoarthritis](#)  
[Psoriatic Arthritis](#)  
[Juvenile Rheumatoid Arthritis](#)

### Related medications

[Methotrexate](#)  
[Remicade](#)  
[Enbrel](#)  
[Humira](#)

Recent Tweet @arthritis\_org · Do U play tennis? Submit a photo of U playing tennis when the Ultimate Tennis Package - valued ovr \$800 <http://t.co/E7RPSI78> · 4 hours

## Arthritis Foundation | Symptoms Treatments | Prevention Tips ...

A voluntary health agency covering all **arthritis** and related conditions.  
[www.arthritis.org](http://www.arthritis.org)

## Arthritis - Wikipedia, the free encyclopedia

[Classification](#) · [Signs and symptoms](#) · [Diagnosis](#) · [Treatment](#)

**Arthritis** (from Greek arthro-, joint + -itis, inflammation; plural: arthritides) is a form of disorder that involves inflammation of one or more joints.  
[en.wikipedia.org/wiki/Arthritis](http://en.wikipedia.org/wiki/Arthritis)

## Arthritis Pain and Symptoms Relief, Symptoms and Causes ...

Find information and resources about **arthritis** including **arthritis** pain and symptom experience and knowledge for OA and RA at **Arthritis.com**.  
[www.arthritis.com](http://www.arthritis.com)

Previews (Bing)



### PAGE SECTIONS

1. [Classification](#)  
Primary forms of arthritis: Osteoarthritis  
Rheumatoid arthritis  
Septic arthritis  
Gout and ...
2. [Signs and symptoms](#)  
Regardless of the type of arthritis, the common symptoms for all arthritis disorders include ...
3. [Diagnosis](#)  
is made by clinical examination from an appropriate health professional, and may be supported ...
4. [Treatment](#)
5. [Epidemiology](#)
6. [History](#)
7. [See also](#)
8. [References](#)

Search within en.wikipedia.org

# Targeted

"What is the maximum dosage for aspirin per day?"

DOSAGE v | aspirin

Search

Seeking Process / Stages



- » Typically start out with a known domain
- » Clear, known expectation of outcome or nature of outcome
- » High recognition when evaluating result set

# Targeted: Examples of evaluation design features

Different views and varying degrees of detail, depending on what is needed for recognition

Select All / Select None

Page 1 of 3

Title	Number	Date	Class	Inventor	Type	Preview
<a href="#">Paper-based adaptive testing</a>	20040091847	11/06/2003	434/353	Creamer	Patent	
<a href="#">Computer-based educational system</a>	6,149,441	11/06/1998	434/350	Pellegrino et al	Patent	
<a href="#">Apparatus and method for scoring nonobjective assessment materials through the application and use of captured images</a>	5,672,060	07/1992	434/322	Poor	Patent	

Filter / Expand Results

- [Test generating and formatting system](#)
- [Testing system including removable storage means for transfer of test related data and means for issuing a certification upon successful completion of the test](#)
- [Extensible exam language \(XML\) protocol for computer based testing](#)

Select All / Select None

Page 1 of 3

Title	Number	Date	Class	Inventor	Type	Preview
<a href="#">Paper-based adaptive testing</a>	20040091847	11/06/2003	434/353	Creamer	Patent	
<p>Abstract: A system and method for administering adaptive tests employs computer technology for item storage, response storage and...            Snippet: ...administering an <b>adaptive assessment</b> on paper media... (d) providing a unique identification for each <b>assessment document</b>, each unique identification being associated with one <b>examinee</b>; (e) allowing each <b>examinee</b> to prepare... <b>scoring each</b> response using the stored...</p>						
<a href="#">Computer-based educational system</a>	6,149,441	11/06/1998	434/350	Pellegrino et al	Patent	
<p>Abstract: A computer-based educational system for use by teacher and student users and including a server computer and at least...            Snippet: ...teacher and <b>student</b> users, comprising... server and client input and output elements... teacher for <b>grading and an evaluation</b>...</p>						
<a href="#">Apparatus and method for scoring nonobjective assessment materials through the application and use of captured images</a>	5,672,060	07/1992	434/322	Poor	Patent	
<p>Abstract: An apparatus and method are provided for scoring nonobjective assessment materials...            Snippet: ...displaying to a human <b>scorer</b> an image... material... by the scorer... a <b>digitized image</b> of said <b>assessment material</b>...</p>						

Select All / Select None

Page 1 of 3

[Paper-based adaptive testing](#)  
20040091847, 11/06/2003, 434/353

[Apparatus and method for scoring nonobjective assessment materials through the application and use of captured images](#)  
5,672,060, 07/1992, 434/322

These views don't have to be separate pages. They can be zoomable renderings of the same page!

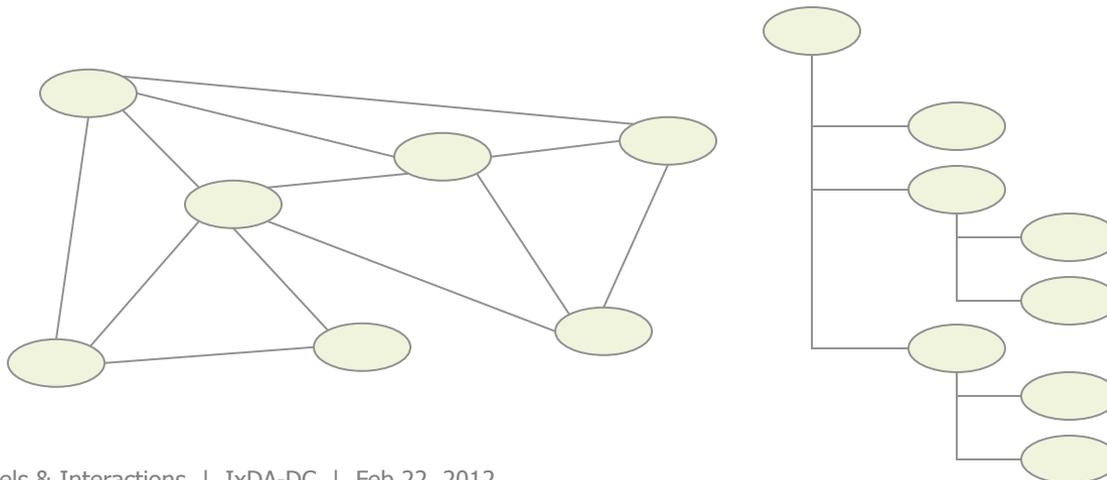
# Targeted: Examples of design features

Summary information to disambiguate, and help get to the most relevant result sets

Recommended dosage for treating...	Dosage based on age...	Dosage based on drug form...	Recommended dosage based on drug interactions...
<ul style="list-style-type: none"><li>• <a href="#">Pain &amp; anti-inflammatory</a></li><li>• <a href="#">Headaches</a></li><li>• <a href="#">Stroke</a></li><li>• <a href="#">Heart attack</a></li><li>• <a href="#">Arthritis</a></li></ul>	<ul style="list-style-type: none"><li>• <a href="#">Infant</a></li><li>• <a href="#">Under 18</a></li><li>• <a href="#">18-65</a></li><li>• <a href="#">65 and over</a></li></ul>	<ul style="list-style-type: none"><li>• <a href="#">Liquid</a></li><li>• <a href="#">Powder</a></li><li>• <a href="#">Solution</a></li><li>• <a href="#">Tablet, delayed release</a></li><li>• <a href="#">Rectal suppository</a></li></ul>	<ul style="list-style-type: none"><li>• <a href="#">salicyclates</a></li><li>• <a href="#">antidiabetic</a></li><li>• <a href="#">corticosteroids</a></li><li>• <a href="#">immunosuppresants</a></li></ul>

search results

...



Underlying models are the key to these kinds of supportive categorizations. They should be "lightweight" and easy to interpret. They also should not be a huge multi-year project to produce! Keep them simple!

# Trust... expectations reflected in interaction

- » Google's success is measured by:
  - "Good enough" (survey)
  - Retrieving something specific; "I know it exists" (targeting)
  
- » Many sites' success is measured, at least in part, by *user confidence*:
  - Is what I'm seeing an accurate reflection of what I am looking for? (precision)
  - Have I seen *everything*? (recall)
  - Can I **trust** the provider... based on my **experience**?

# Exploratory

“Preparing research paper on effectiveness of physical therapy vs. drugs for arthritis treatment”



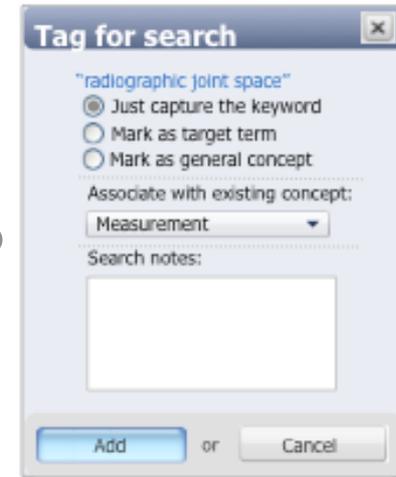
- » Longitudinal
- » Iterative, layered, evolving
- » Formulating search strategy is a critical component
- » Inputs to search formulation must be actionable
- » Outcomes must be actionable: capture, organize, save

# Exploratory: Examples of design features

Search input must be actionable e.g. tagging or flagging for search

The increase in OA-related musculoskeletal pain especially in the growing elderly population has created heightened interest in effective treatments with better safety profiles. The Glucosamine/chondroitin Arthritis Intervention Trial (GAIT) was designed to examine the effects of the dietary supplements glucosamine and chondroitin sulfate given alone or in combination as compared to celecoxib or placebo on pain associated with osteoarthritis of the knee. The primary symptomatic outcome assessment of the GAIT study was after 24 weeks of randomized, double-blinded, placebo-controlled therapy.[6] An ancillary structural study describing the effects of the agents on radiographic joint space width loss for up to two years has also recently been reported. To date, very few data have been reported for the long-term treatment of OA with any agent including the supplements a celecoxib studied here. Patients in the structural study continued to have safety and clinical efficacy assessments at all scheduled visits. This paper details the clinical efficacy and safety experience with these agents alone and in combination along with celecoxib as compared to placebo in patients from this subset of GAIT over 24 months offollow-up.

Add note, action  
Search on this now  
Tag for search



Tag for search

"radiographic joint space"

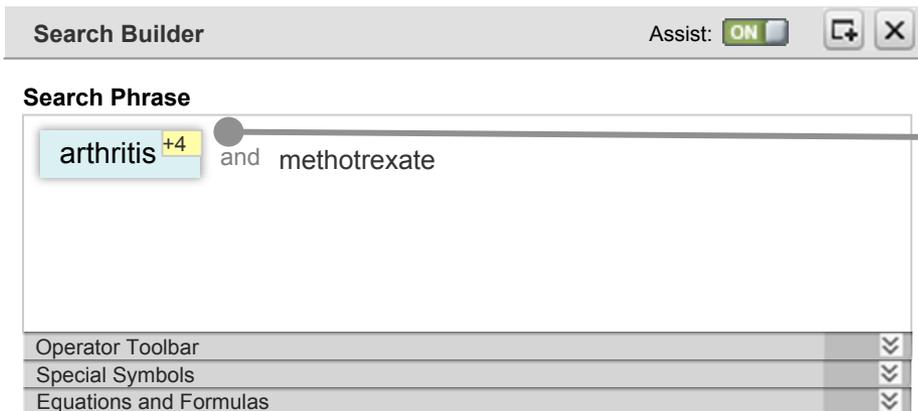
Just capture the keyword  
 Mark as target term  
 Mark as general concept

Associate with existing concept:  
Measurement

Search notes:

Add or Cancel

Prior search formulations are products, under user control



Search Builder Assist: ON

Search Phrase

arthritis<sup>+4</sup> and methotrexate

Operator Toolbar  
Special Symbols  
Equations and Formulas

**arthritis** – synonyms and instances

- Ankylosing spondylitis
- Gonococcal arthritis
- Gout
- Juvenile rheumatoid arthritis
- Psoriatic arthritis
- Reactive arthritis (Reiter syndrome)
- Rheumatoid arthritis (in adults)
- Scleroderma
- Systemic lupus erythematosus (SLE)

[+ Add another](#)

# Exploratory: Examples of design features

## Outcomes must be actionable

Title	Date	Publication	Author	Preview
<input type="checkbox"/> <a href="#">Dietary supplements for osteoarthritis.</a>	1989 May;18(4 Suppl 2):	Semin Arthritis Rheum 7	Gregory PJ, Sperry M, Wilson AF.	
<p>Abstract: A large number of dietary supplements have been used to treat osteoarthritis and as many as one third of those patients have used a supplement to treat their condition. Glucosamine-containing supplements...</p> <p>KWIC: Following feedback from Osteoarthritis Research International members on the draft guidelines and six Delphi rounds consensus was reached on 25 carefully worded recommendations. Optimal management of patients with OA hip or knee requires a combination of non-pharmacological and pharmacological modalities of therapy. Recommendations cover the use of 12 non-pharmacological modalities: education and self-management, regular telephone contact, referral to a physical therapist, aerobic, muscle strengthening and water-based exercises, weight reduction, walking aids, knee braces, footwear and insoles, thermal modalities, transcutaneous electrical nerve stimulation and acupuncture. Eight recommendations cover pharmacological modalities of treatment including acetaminophen, cyclooxygenase-2 (COX-2) non-selective and selective oral non-steroidal anti-inflammatory drugs (NSAIDs), topical NSAIDs and capsaicin, intra-articular injections of corticosteroids and hyaluronates, glucosamine</p>				
<input type="checkbox"/> <a href="#">OARSI recommendations for the management of hip and knee osteoarthritis. Part II: OARSI evidence-based expert consensus guidelines.</a>	2008 Feb; 16(2): 137-62	Osteoarthritis Cartilage	Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, et al.	
<p>Abstract: To develop concise, patient-focussed, up to date, evidence-based, expert consensus recommendations for the management of hip and knee osteoarthritis (OA), which are adaptable and designed to assist physicians and allied health care professionals in general and specialist practise throughout the world....</p> <p>KWIC: Loss of cartilage in OA is usually assessed as a radiographic interbone distance. Precision and reproducibility in the measurement of this distance are improved by application of standardized acquisition protocols. Each protocol attempts to address difficulties inherent in obtaining reproducible positioning and projection of the joint. At the inception of this study, both anteroposterior (AP) and posteroanterior (PA) projection protocols using various degrees of knee flexion with or without fluoroscopic guidance of positioning were under scrutiny (6-12). Fluoroscopy was not commonly employed due to limited availability, difficulty in achieving and maintaining technician training and the need to minimize cost and radiation exposure. Using available approaches, a narrowing of approximately 0.25mm per year was observed and reported (9). The metatarsophalangeal (MTP) view of Buckland-Wright, a PA directed flexed knee view, was thought to have a balance of ease, thrift and precision adequate to detect the anticipated change in joint space width (JSW) over the two year study (10).</p>				
<input type="checkbox"/> <a href="#">The effect of glucosamine and/or chondroitin sulfate on the progression of knee osteoarthritis: A report from the glucosamine/chondroitin arthritis intervention trial.</a>	07/2007	Drugs Aging. 2007;24(7): 573-80	Sawitzke AD, Shi H, Finco MF, Dunlop DD, Bingham CO, 3rd, Harris CL, et al. 322 Poor	
<p>Abstract: An apparatus and method are provided for scoring nonobjective assessment materials recorded on paper, such</p>				

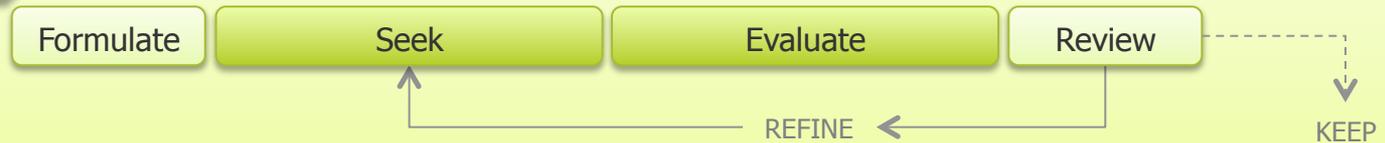
- Tag Categories
- 1 Best bets (3)
  - 2 Likely (5)
  - 3 Interesting (1)
  - 4 Check on (9)
- Add Category

# Archival

"Where methotrexate caused or contributed to patient adverse events"

Seeking Process / Stages



- » Search has been comprehensive and complete
- » Important to know you have found all that there is (within limit)
- » Haven't missed critical findings
- » Comprehensive search is itself a product;  
if I can't find it, that could mean:
  - it likely doesn't exist
  - it's not relevant to the context that I have applied

# Archival: Examples of design features

Tools to help prompt evaluations of completeness

Related to...Methotrexate

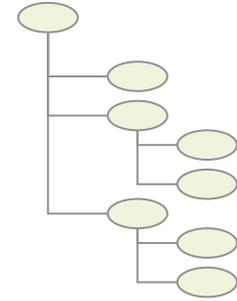
**Extend search to other similar categories**

- Anti-metabolites ▾
  - Folic acid antagonists
  - Pyrimidine antagonists
  - Purine antagonists
  - Adenosine deaminase inhibitor
- Anti-folates ▸

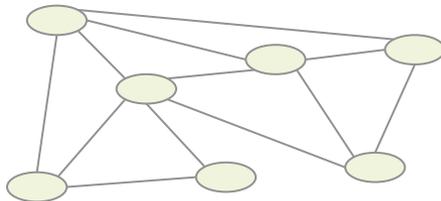
**Extend search to other known names**

- amethopterin
- MTX
- Maxtrex (UK)
- Metoject (UK)
- Rheumatrex®
- TrexallTM

Update or Cancel



Facets for expansion or re-orienting, not just for filtering. Again... requires good underlying models!



NAL  
FBI African Americans  [Advanced](#)

Your query has been expanded. [Show Expansions](#)

FBI AND African AND Americans

<input checked="" type="checkbox"/> <b>Stemming</b>	<input checked="" type="checkbox"/> <b>Synonyms</b>	<input checked="" type="checkbox"/> <b>Non_preferred</b>
<input checked="" type="checkbox"/> americanism	<input checked="" type="checkbox"/> United States (North and Central America) nation	<input checked="" type="checkbox"/> America
<input checked="" type="checkbox"/> americanized		<input checked="" type="checkbox"/> Estados Unidos de América
<input checked="" type="checkbox"/> americanization		<input checked="" type="checkbox"/> ISO840
<input checked="" type="checkbox"/> americanisms		<input checked="" type="checkbox"/> US
<input checked="" type="checkbox"/> americanize		<input checked="" type="checkbox"/> USA
<input checked="" type="checkbox"/> americanisation		<input checked="" type="checkbox"/> United States of America
<input checked="" type="checkbox"/> americanizing		<input checked="" type="checkbox"/> Vereinigten Staaten von Amerika
		<input checked="" type="checkbox"/> Verenigde Staten
		<input checked="" type="checkbox"/> États-Unis d'Amérique
<input checked="" type="checkbox"/> <b>Non_preferred+stemming</b>	<input type="checkbox"/> <b>Broader Terms</b>	<input type="checkbox"/> <b>Narrower Terms</b>
<input checked="" type="checkbox"/> americas	<input type="checkbox"/> North and Central America	<input type="checkbox"/> Amerasians
<input checked="" type="checkbox"/> americae		
<input checked="" type="checkbox"/> usas		

select all for this term

Update Search Cancel

# Routine

"Keep me up-to-date on hematological cancer involving Velcade as an agent"

Seeking Process / Stages



- » Take a successful search strategy and give it an identity
- » Focus on new and unique results
- » Search parameters and filters are not necessarily related to a specific result set

# Routine: Examples of design features

"Keep me up-to-date on hematological cancer treatments involving Velcade as an agent"

## "Leukemia treatments" searches encompass...

Leukemia 1947 to present  
Hodgkin Lymphoma  
Myeloma 1960 to present not involving radiation  
Plasma cell neoplasms

## "drug delivery agent" searches encompass...

subcutaneous injection  
nano-particle passive carrier  
monoclonal antibody  
radioimmunotherapy

Search Now



No results found

Monitor >>



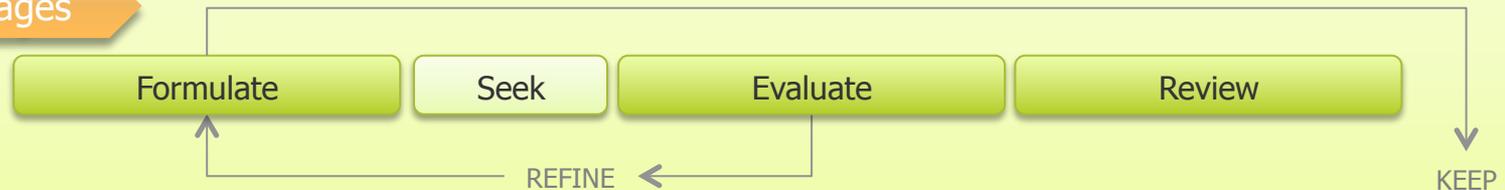
# Collaborative

"What is the maximum dosage for aspirin per day?"

Is this for a child or an adult?

How many milligrams is your aspirin pill?

Seeking Process / Stages



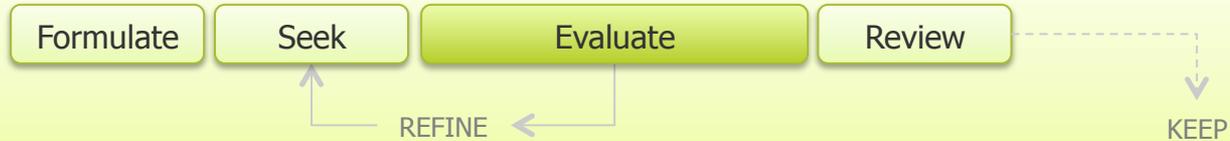
- » Agent for others
- » Sharing
- » Refinement might be multi-session, iterative, not real-time
- » Formulation task requires:
  - Negotiation to articulate goals and scope
  - Translation

# Summary: Seeking Behaviors by Process / Stage

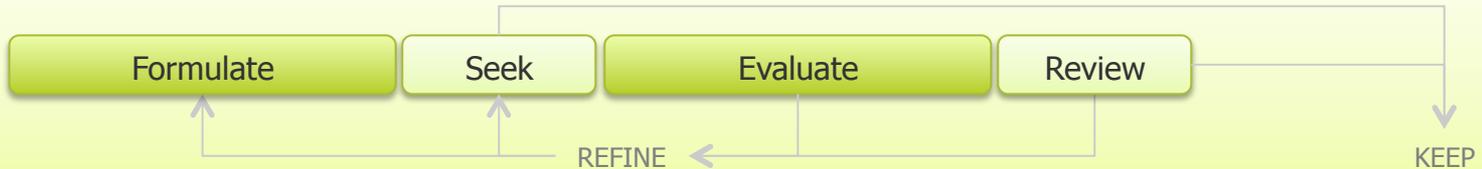
Survey



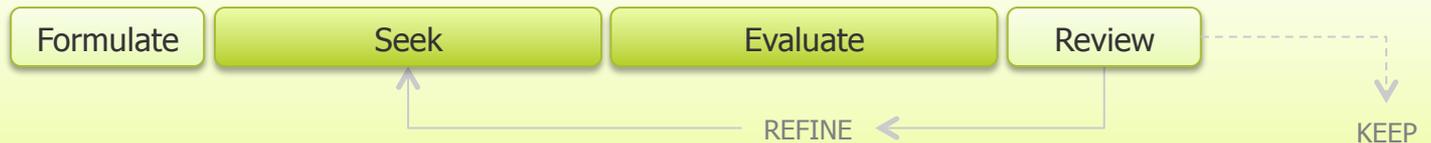
Targeted



Exploratory



Archival



Routine



Collaborative



# Breakout group design scenario 1: Patient

## Randall Smith

**Audience: Recent Parent**

**Profile Type: Primary**

Randall's wife has just given birth to their first child. Although she appears to be a happy, healthy three-week old baby, they've just been notified by their doctor's office that her screening results returned positive for PKU. While Randall vaguely remembers being told that the screening would take place, he was not fully prepared for what to expect. His wife is inconsolable upon hearing the news, and feels that the nurse who relayed it to her was "dismissive" of her concerns. Unable to reach the doctor for more information, and hoping to mitigate some of the stress his wife is feeling about the results, he decides to do some online research to figure out what the results mean and what they need to do next.

Feeling quite upset about the results himself, he knows that the first thing he needs to do to ease his mind and his wife's is to understand what the abnormal screening results mean - is there a chance that the results were wrong? The nurse mentioned that they would have to go back for confirmatory testing - what would be expected of them? How long will they have to wait for the confirmatory results and is there anything they should do while they wait? He also wants to learn more about what PKU is and what it would mean for his daughter to have the disease

### Goals:

- Mitigate his and his wife's anxiety with more information
- Accurately assess the likelihood and the severity of the situation
- Understand what to do and what to expect next



“Looking at it in the sense that ‘it’s this screening test, and it has this wide range of false positives in order to catch the actual positives,’ that would be better than ‘Oh, it could be a false positive. We need to recheck, it’s no big deal.’ We still didn’t sleep, but it was better knowing our chances and why the results came back that way.”

# Breakout group design scenario 2: Doctor

## Dr. Modesky

**Audience: Pediatric Doctor**

**Profile Type: Secondary**

Having received his first positive newborn screening result for one of his patients, Dr. Modesky wants to be prepared to discuss the results with the parents. While he knows that the result is likely to be a false positive, recent research has started to emerge about the negative psychological effects that these results can have on parents who are not fully aware of the screening process and the likelihood of receiving abnormal results. He needs to know the best way to relay the information to the parents without causing any unnecessary stress, but also needs to be prepared for the chances that his patient may actually have the condition.

### Goals:

- Relay information to the parents without causing additional stress.
- Learn how to conduct the confirmatory testing.
- Find resources and information about the disease.



“I know that patients tend to respond better to the news when they hear it from their doctors, but I want to make sure that I can also answer their questions and be prepared for the worst.”

# Thank you



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