

# Search with a Little Help from Your Friends

## *Making Web Search more Collaborative*

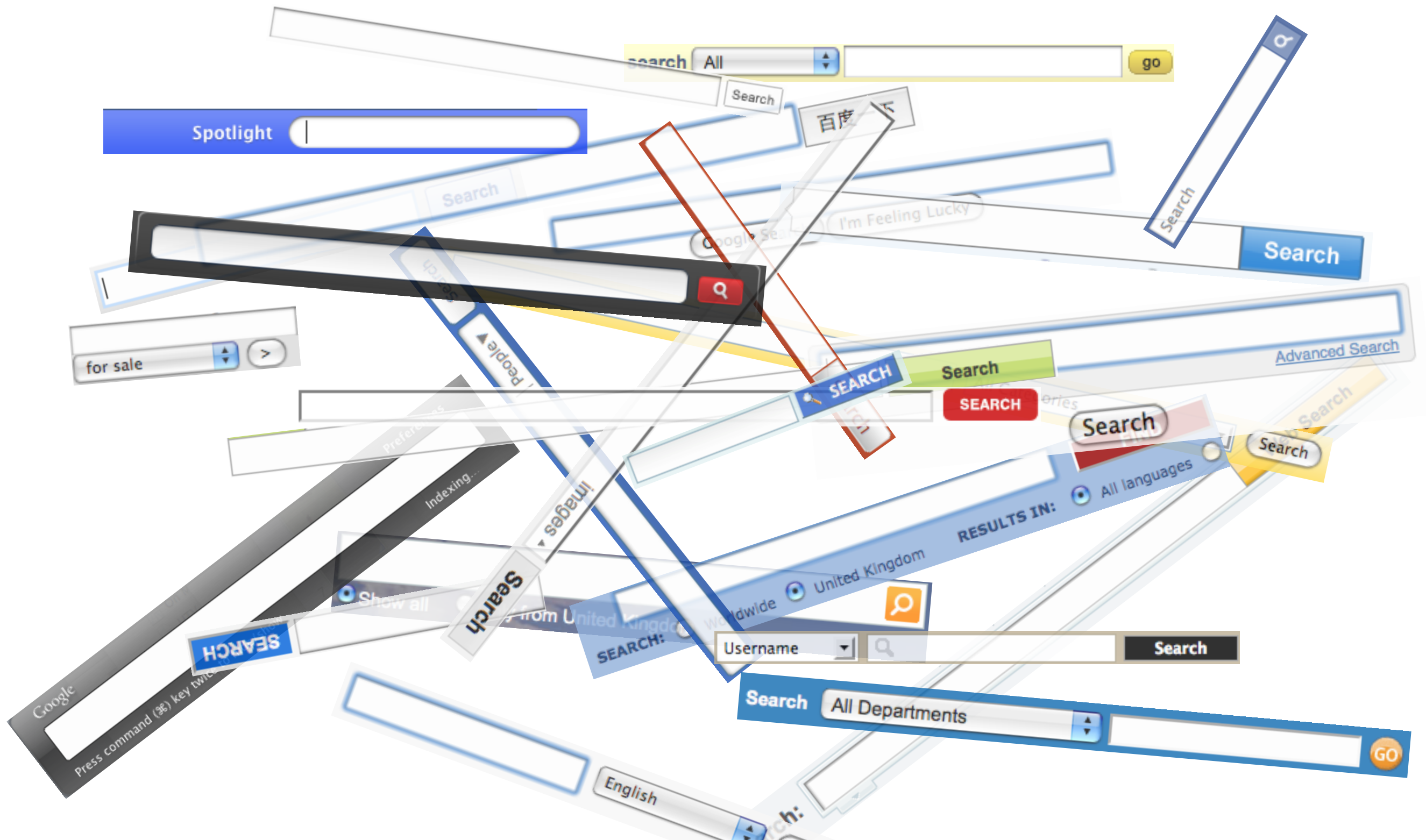
*Barry Smyth*

*CLARITY: Centre for Sensor Web Technologies*  
*University College Dublin*



# The Web's Killer App?

# The Web's Killer App?



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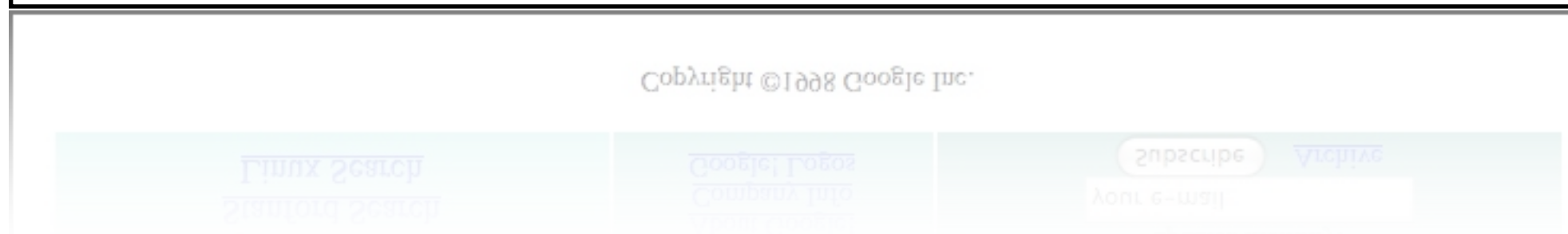
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Check out the most popular web sites for these frequently searched terms:

searched terms:  
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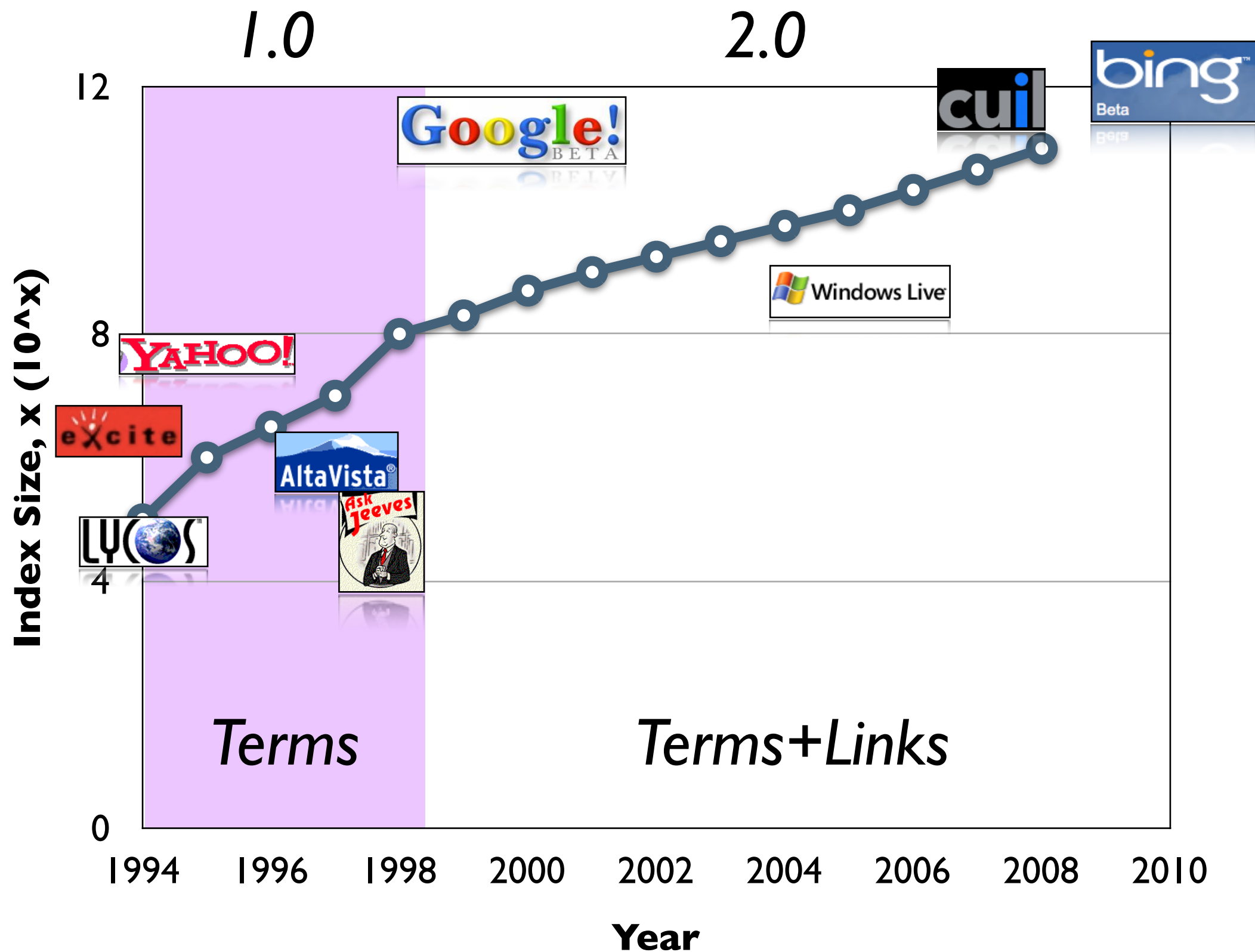
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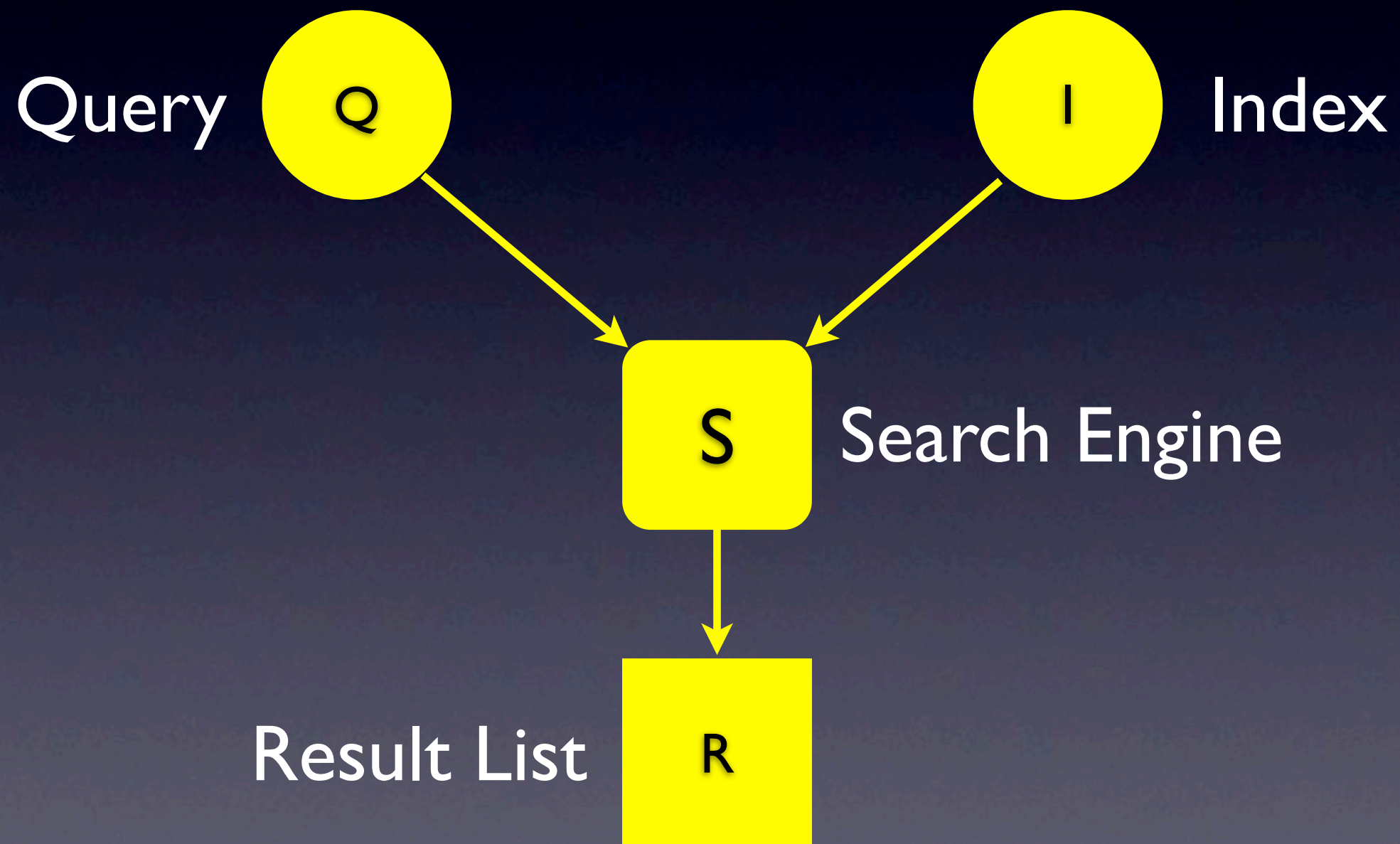
directhit.com (2000)



Approx. 1 billion queries per day!



# Web Search 101



# Overview

The State of Web Search - Key Challenges

Potential Solutions - Context in Web Search

Towards Social Web Search - HeyStaks

# Challenges



# Vague Queries

## The Vocabulary Problem

### One-Size-Fits-All

## Content Farming & SEO

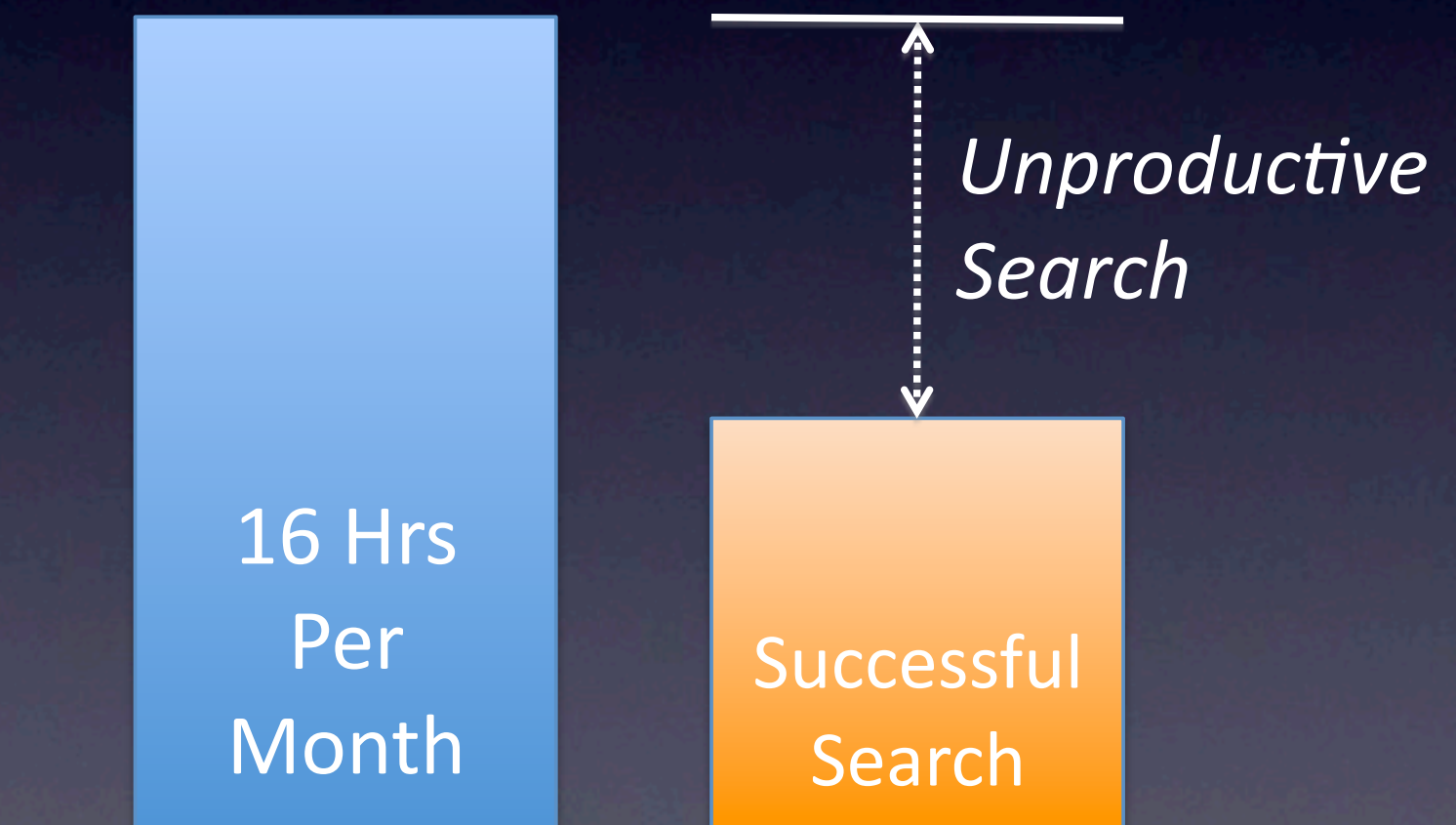


# 50%

## Search Failure Rate

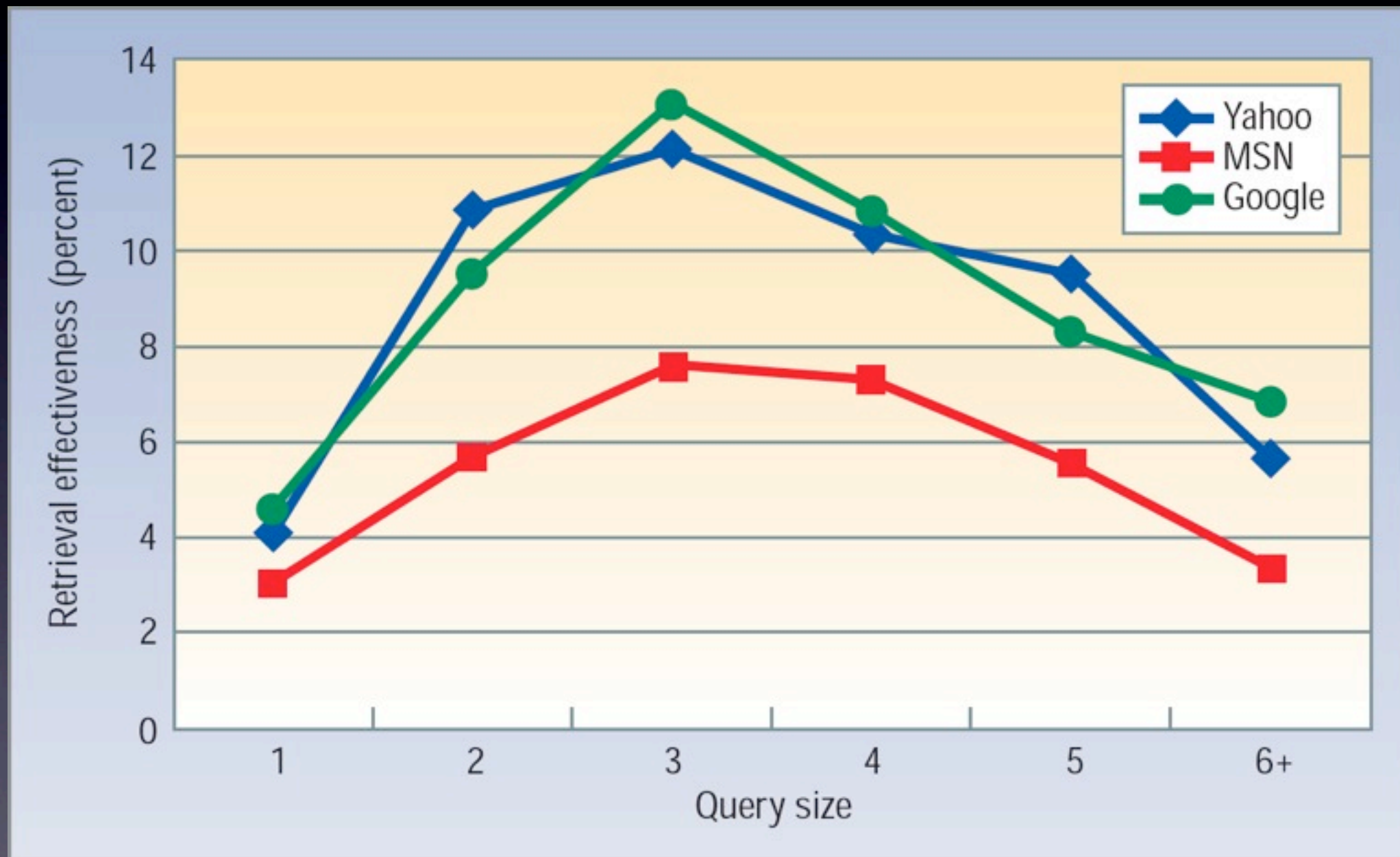
25% of searches  $\Rightarrow$  click to back button!

Average query size (2-3 terms) is insufficient to guarantee effective search engine retrieval



\* iProspect (2006), Jansen & Spink (2007), Morris et al (2008), Coyle et al (2007, 2008)

# The Vocabulary Gap



Does Not  
One Size ^ Fits All

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[Preferences](#)

Web [Show options...](#)

## [UMAP - University Mobility in Asia and the Pacific](#)

**UMAP** Special Workshop " Student Mobility for Language & Culture Studies", 15-17 August 2008, Ramkhamhaeng University, Bangkok, Thailand ...

[www.umap.org/](http://www.umap.org/) - [Cached](#) - [Similar](#)

### [UMAP - University Mobility in Asia and the Pacific -](#)

Facilitate academic and research mobility by providing platforms for networking of interests among **UMAP** participating universities on, -joint degree program ...

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## [Advanced Flash Components](#)

**UMap** is the Universal ActionScript 3.0 Mapping API. The scalable component model allows you to create rich maps with interactive data layers. ...

[www.afcomponents.com/components/umap\\_as3/](http://www.afcomponents.com/components/umap_as3/) - [Cached](#) - [Similar](#)

### [UMap \(AS 3.0\)](#)

In this tutorial we will describe the main principles of using **UMap** Routing API. We will also walkthrough a basic example for Flash. ...

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walkthrough a basic example for Flash. ...





## [UMAP 2009 | UMAP2009](#)

**UMAP 2009.** The biennial conference series User Modeling (UM, 1986-2007) and Adaptive Hypermedia and Adaptive Web-Based Systems (AH, 2000-2008) have been ...

[umap09.fbk.eu/](#) - [Cached](#) - [Similar](#)

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# Content Farms, SEO, Gaming

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How to Tune Up a Car. Your car should receive a **tune-up** (often referred to as "service") every two years or 30000 miles, whichever comes first.  
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[Car Engine Misfires Poor Running - Tune Up](#) ☆  
Car Engine Misfires Poor Running - **Tune Up** 2CarPros.com Professional Mechanics Online will answer it FREE.  
[www.2carpros.com/topics/misfires.htm](#) - [Cached](#) - [Similar](#)

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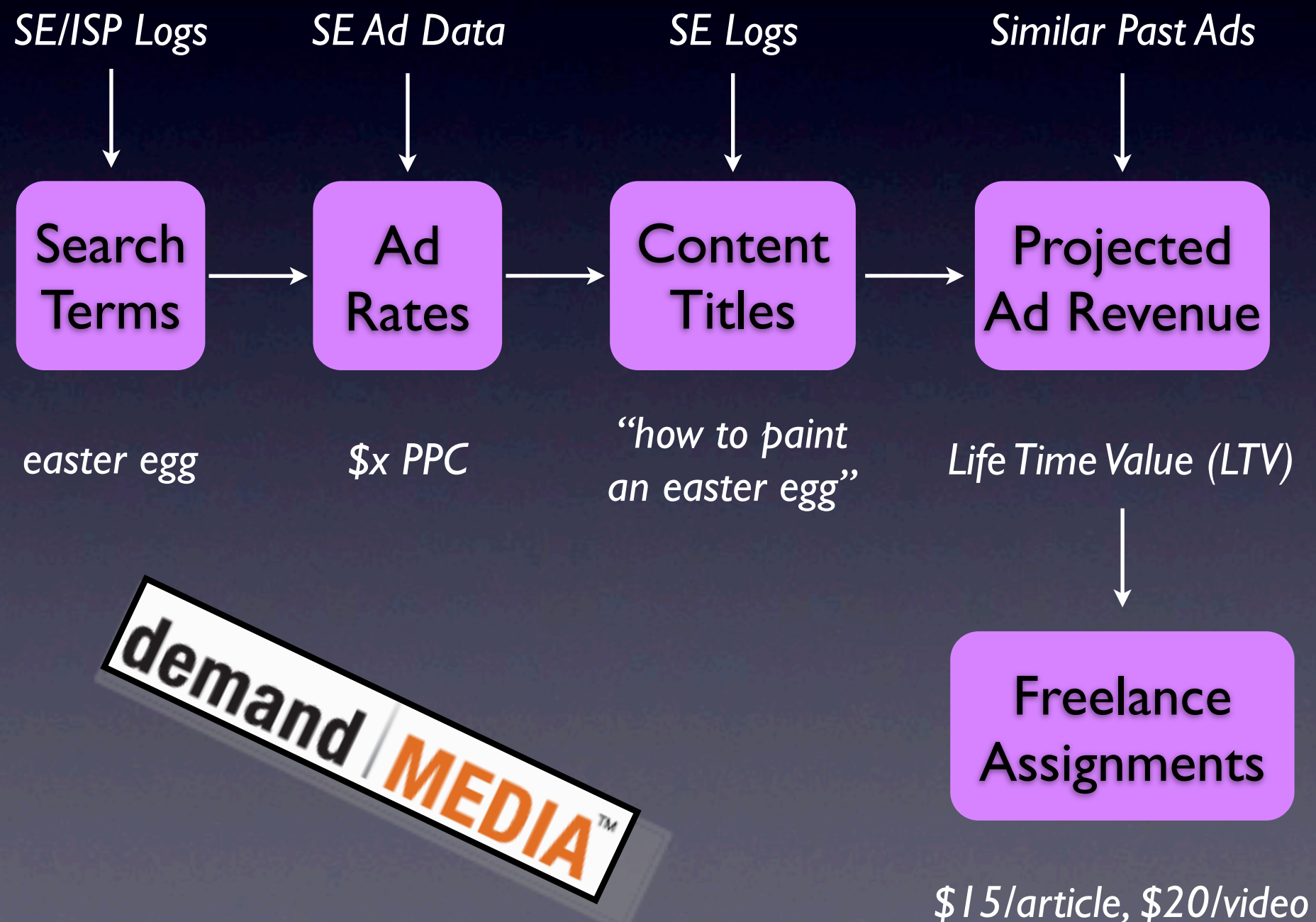
	<a href="#">How to Tune Up Your Car : How to Check Car ...</a> 3 min 33 sec - 14 Nov 2007 <a href="#">www.youtube.com</a>		<a href="#">Car Maintenance Tips : How to Tune Up a Car Engine</a> 2 min 41 sec - 5 Jul 2009 <a href="#">www.youtube.com</a>
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Focused SEO to promote commissioned-content.  
(≈1m items / month)

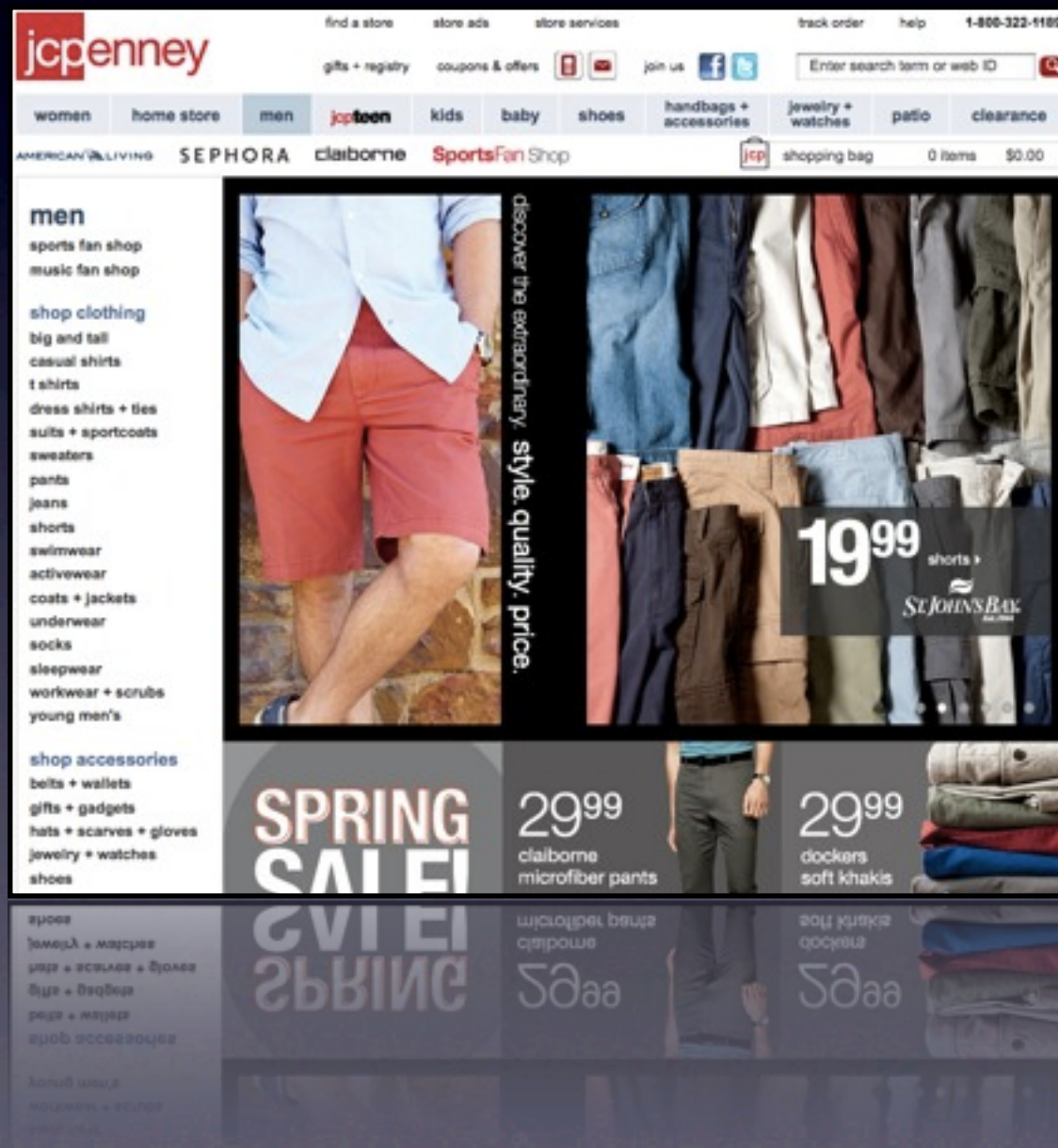
**ReadWriteWeb**  
Content Farms: Why Media, Blogs & Google Should Be Worried (Dec'09)

# The DemandMedia Model





# Black Hat SEO



JC Penny Content Farming  
New York Times, Feb 2011

Large-Scale Link Farming  
2000+ sites linking to JCP for terms  
like “black dresses”, “casual  
dresses”, etc.

Significant Benefits to JCP  
Millions of inbound visitors during  
the holiday season!



# The Google Response

#	Domain	Change	SISTRIX (before)	SISTRIX (after)	# KWs (before)	# KWs (after)
1	<a href="http://wisegeek.com">wisegeek.com</a>	-77%	121,58	28,22	74.024	21.940
2	<a href="http://ezinearticles.com">ezinearticles.com</a>	-90%	65,08	6,65	184.508	54.277
3	<a href="http://suite101.com">suite101.com</a>	-94%	54,04	3,28	178.373	36.904
4	<a href="http://hubpages.com">hubpages.com</a>	-87%	55,16	7,40	152.998	50.178
5	<a href="http://buzzle.com">buzzle.com</a>	-85%	43,25	6,55	86.472	24.423
6	<a href="http://associatedcontent.com">associatedcontent.com</a>	-93%	38,29	2,57	216.429	53.512
7	<a href="http://freedownloadscenter.com">freedownloadscenter.com</a>	-90%	30,26	3,01	42.486	7.992
8	<a href="http://essortment.com">essortment.com</a>	-91%	25,73	2,32	27.501	7.459
9	<a href="http://fixya.com">fixya.com</a>	-80%	28,78	5,83	62.034	36.167
10	<a href="http://americantowns.com">americantowns.com</a>	-91%	24,88	2,18	26.000	9.799
11	<a href="http://lovetoknow.com">lovetoknow.com</a>	-83%	25,75	4,28	49.544	17.833
12	<a href="http://articlesbase.com">articlesbase.com</a>	-94%	19,96	1,16	82.274	31.365
13	<a href="http://howtothings.com">howtothings.com</a>	-84%	21,20	3,39	33.222	7.601
14	<a href="http://mahalo.com">mahalo.com</a>	-84%	20,49	3,23	33.875	9.740
15	<a href="http://business.com">business.com</a>	-93%	17,24	1,13	21.556	4.813
16	<a href="http://doityourself.com">doityourself.com</a>	-77%	20,89	4,90	23.256	6.870
17	<a href="http://merchantcircle.com">merchantcircle.com</a>	-85%	18,43	2,67	93.347	34.681
18	<a href="http://thefind.com">thefind.com</a>	-83%	18,95	3,27	74.506	45.495
19	<a href="http://findarticles.com">findarticles.com</a>	-90%	16,98	1,74	64.810	20.189
20	<a href="http://faqs.org">faqs.org</a>	-91%	16,52	1,46	33.648	11.142

**Major Algorithmic Change**  
Reducing the ranking of low-quality sites, impacting 12% of queries.

**Spam-blocking Extension**  
Google Chrome extension to allow users to block low-quality sites from result-lists.

**Major Impact on Many Sites**  
... including some surprises (SlideShare, Technorati).

# Vague Queries

## The Vocabulary Problem

### One-Size-Fits-All

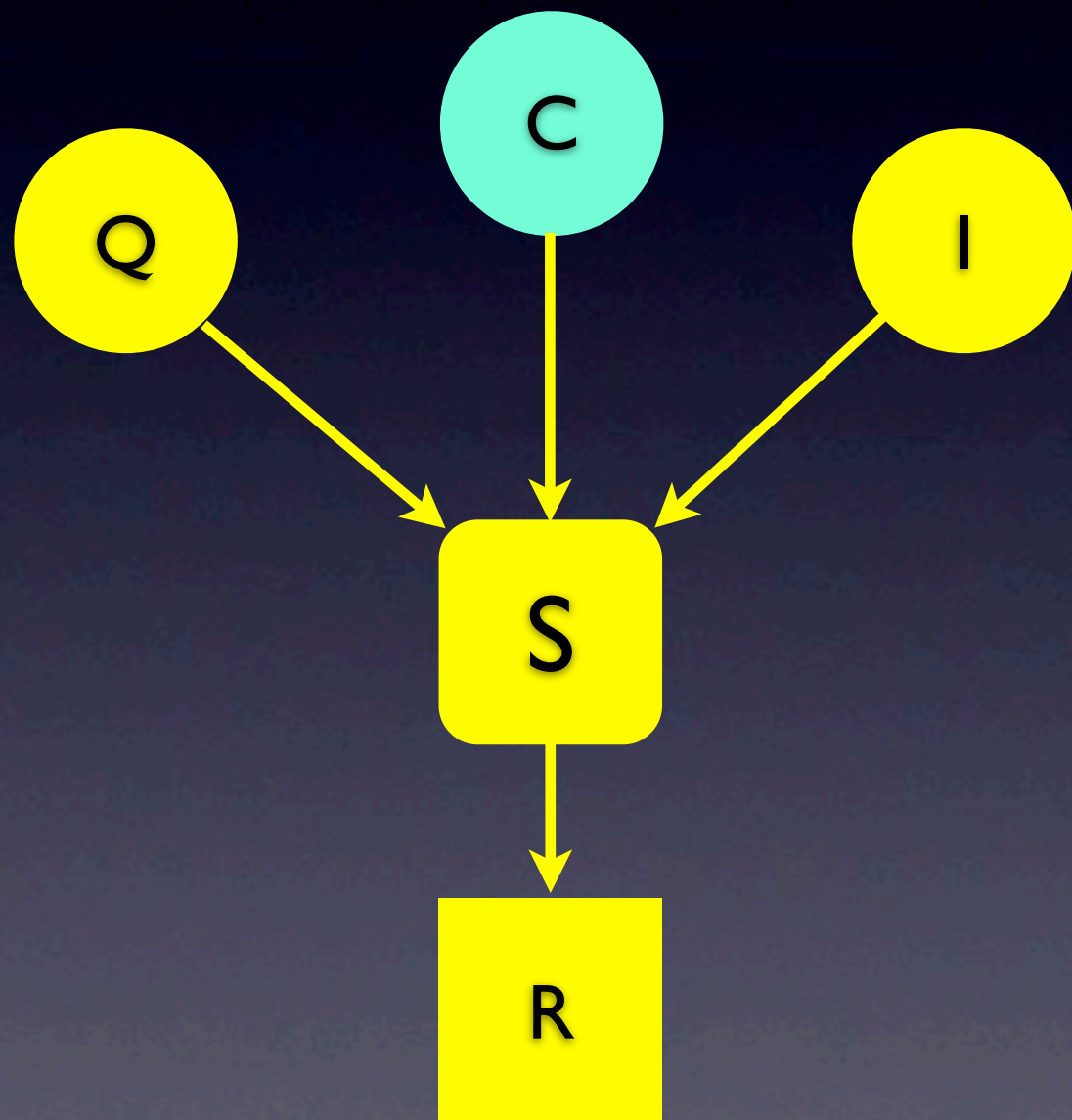
## Content Farming & SEO



# Web Search is changing...

Improving search by  
better understanding  
user needs and search  
context ...

# Context in Search



## User Context

Preferences, usage history, profiles

## Document Context

Meta-data, content features

## Task Context

Current activity, location etc.

## Social Context

Leveraging the social graph.



# User Context

## Personalizing Web Search

Adapting search responses according to the needs/interests of the searcher.

## Modeling User Interests


ODP Categories, query histories, result selections, etc.

## Adaptation Strategies

Re-ranking, query modification, etc.




*See also Chirita et al (SIGIR 2005), Shen et al (CIKM 2005), Teevan et al (TOCHI, 2010)*


Live Search | MSN | Windows Live

Live Search  

Web 1-10 of 3,480,000 results · [Advanced](#)  
See also: [Images](#), [Video](#), [News](#), [Maps](#), [More](#) ▼

[Personalized](#) [WebCache](#) [Desktop](#)

-  [ACL-08: HLT - Home Page](#)  
<http://www.ling.ohio-state.edu/acl08/>
-  [ACL 2008 Workshop on Mobile Language Processing](#)  
<http://www.mobilenlpworkshop.org/>
-  [ACL 2008 Lineup Announced! Sonic Itch Music](#)  
<http://www.sonicitchmusic.com/?p=1863>



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[ACL Connections 2008](#)  
Connections 2008 was a resounding success. Attendees learned new and innovative ways to use ACL technology and got a sneak peak at AuditExchange 2009, including live demonstrations  
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PSearch (Teevan et al, SIGIR 2005)

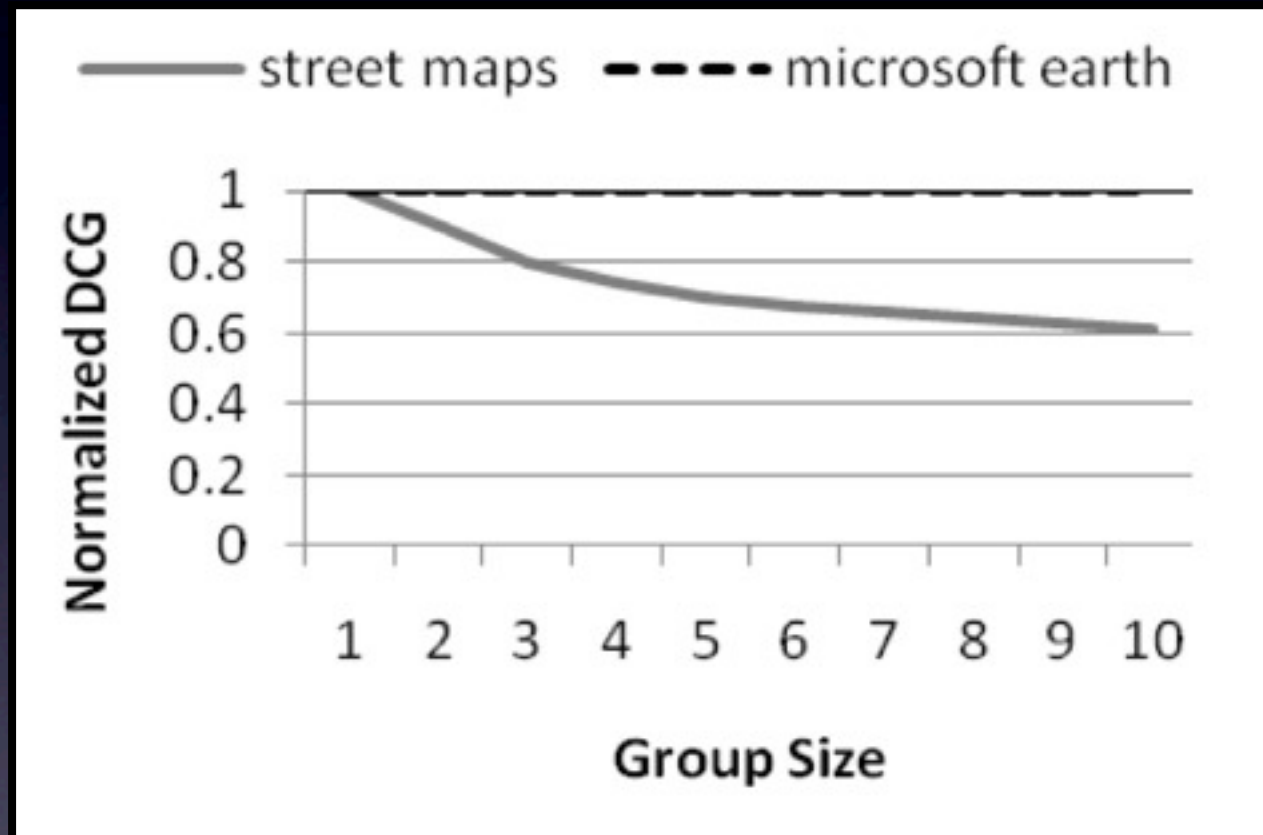
Client-Side Profiling

Explicit, Content, Behaviour

Personalized Ranking

# User Context

# Potential for Personalization



*Potential for personalization (PfP) curves*  
[from Teevan et al (2008)]

Teevan et al (SIGIR 2008)

How well can a single result-list satisfy a group of users?

Not every query benefits from personalization.

Predicting the PfP of search queries (click-based measures)



# Google AdSense

Join the HomeTips Neighborhood!  
Receive free weekend projects & expert advice!  
Your email address

**DON VANDERVORT'S**  
**HOME TIPS**  
COM

*Expert Advice for Home Improvement & DIY Repair*

Home Buying Guides How It Works Repair & Care DIY & Install Search Forums

Home Improvement > Search "flooring"

BOOKMARK EMAIL PRINT LINK

July 8, 2009  
For helpful information on cutting the cost of cooling your home, please see [How to Cool Your Home Without A/C](#).  
--Don

Search HomeTips

**Home Improvement Articles & Advice**

- Interior Improvements
- Exterior Improvements
- Construction & Real Estate

**About HomeTips**  
Don Vandervort, Head Homeboy, has written more than 30 DIY home improvement books, been a segment host on HGTV, served as MSN.com's home improvement expert and written countless magazine articles.

**Search Results**  
**63 Articles Found on HomeTips...**

- Installing Tile Flooring Membrane**  
In most cases, ceramic or stone tile can be installed directly on top of a backerboard or plywood underlayment...
- Cork Flooring**  
Resilient and warm underfoot, natural in appearance, and made from an environmentally sustainable material, cork makes an excellent flooring surface...
- Linoleum Flooring**  
Although linoleum floors are often mistaken for vinyl flooring, and vice versa, linoleum is actually a significantly different material...
- Bamboo Flooring**  
Bamboo flooring is a hard, stable, and reliable flooring material with a pleasingly exotic appearance...
- Recycled Tiles for Flooring**  
Tile floors are durable, easy to clean, and can give a kitchen or bathroom a homey yet sleek look...
- Resilient Flooring Buying Guide**  
Resilient flooring is made from vinyl, linoleum, cork, polyurethane, rubber, and asphalt composites, though vinyl is by far the most common...
- Resilient Flooring Maintenance and Repairs**  
Resilient floors are very sturdy...
- Solid-Wood Flooring**  
When one conjures up the idea of a traditional wood floor, one is usually imagining classic solid-wood flooring...

**Ads by Google**

- Flooring Dublin**  
Get up to 4 Quotes And Compare Prices for Flooring Dublin  
[Tradesmen.ie/Flooring+Dublin](#)
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Carpet tiles, Altro, Marmoleum, Wood Supply/Fit Free Consultation/Design  
[www.vdf.ie](#)
- TerraMai Flooring**  
World's finest reclaimed woods. Teak flooring, Fir flooring, more.  
[TerraMai.com](#)
- Wooden Floors**  
Direct From Manufacturer. Bespoke Finishes. Many Species. Call Now!  
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Carpet tiles, Altro, Marmoleum, Wood Supply/Fit Free Consultation/Design

[www.vdf.ie](#)

### TerraMai Flooring

World's finest reclaimed woods. Teak flooring, Fir flooring, more.

[TerraMai.com](#)

### Wooden Floors

Direct From Manufacturer. Bespoke Finishes. Many Species. Call Now!

[www.ScottsFlooring.ie](#)

# Document Context







# Task Context

## Activity/Task Context

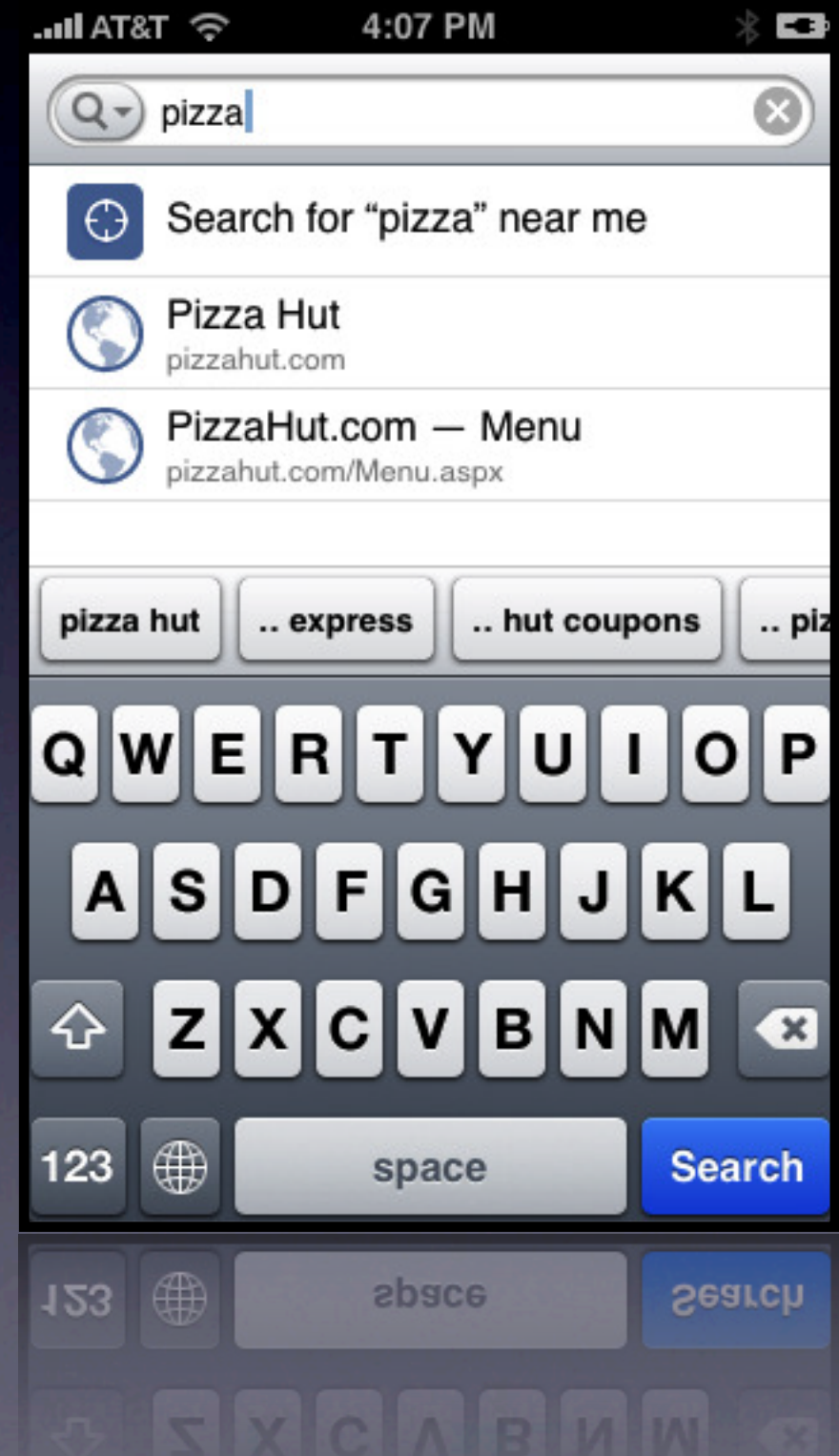
E.g. writing a talk, planning a trip, shopping, etc.

## Location-Based Search

Google on the iPhone ...

## Embedded Web Search

Watson, (Budzik & Hammond, IUI 2000), RemembranceAgent (Rhodes, IEEE Trans. Comp 2003)





# IntelliZap

In appearance the Jaguar is often confused with the Leopard - both cats, depending on the species have a similar brownish/yellow coat. The jaguar is distinctively marked with dark rosettes. The jaguar can be distinguished by the shape of its rosetts or irregular shapes within the larger rosettes. It has a more stocky and muscular body and a shorter tail. Black jaguars are common (see below) are common and are often confusingly labeled as leopards. The name which is also applied to black



Context → Query Augmentation

Finkelstein wt al. WWW 2001





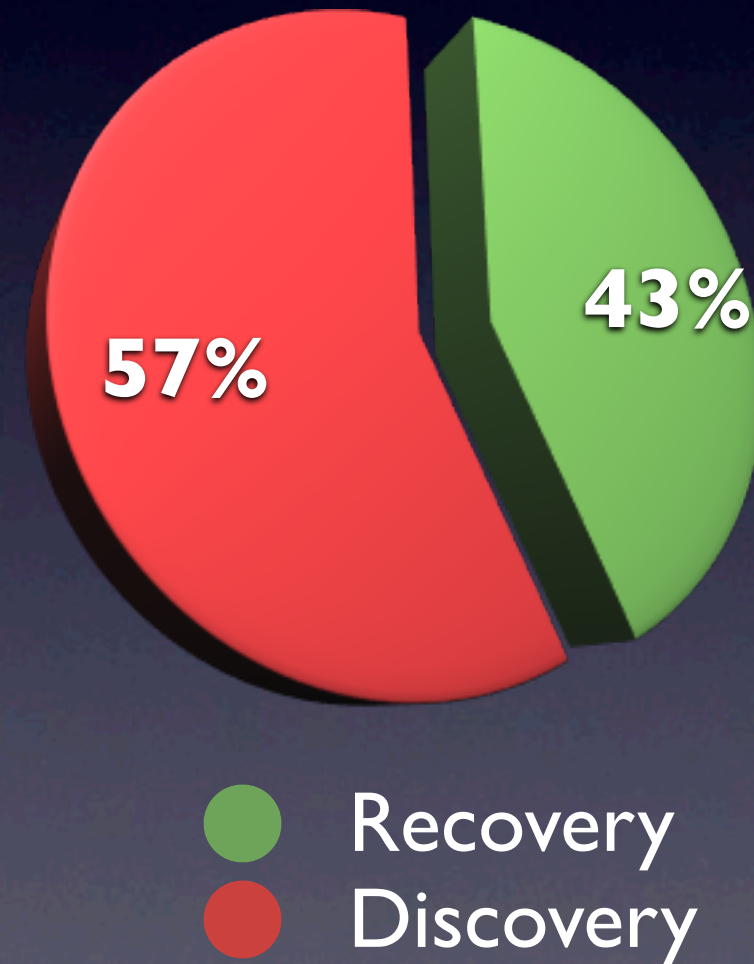
# Web Search as a Solitary Activity





# Recovery vs Discovery

	<i>Repeat Click</i>	<i>New Click</i>
<i>Repeat Query</i>	29%	4%
<i>New Query</i>	10%	57%



*Teevan et al, 2007*

1 in 4

... searches are for something the searcher has already found during a previous search session\*.

2 in 3

... searches are for something that a searcher's friends or colleagues have recently found\*.

*Search should be more personal & collaborative!*

\* Morris et al (2008), Teevan et al (2007), Smyth et al (2004,2006,2008)



# Web Search as a Social Activity





# Search Engines

*Google, Bing, Yahoo, ...*



*Searching*

*>800m users*

*Page Index*

*~20 Billion Pages*

*Queries*

*500m queries/day*

*Relevance*

*Terms, Links, PageRank*

# Social Networks

*FaceBook, MySpace, Twitter, ...*



*Sharing*

*>400m users*

*Social Graph*

*~ 50 Trillion Relationships*

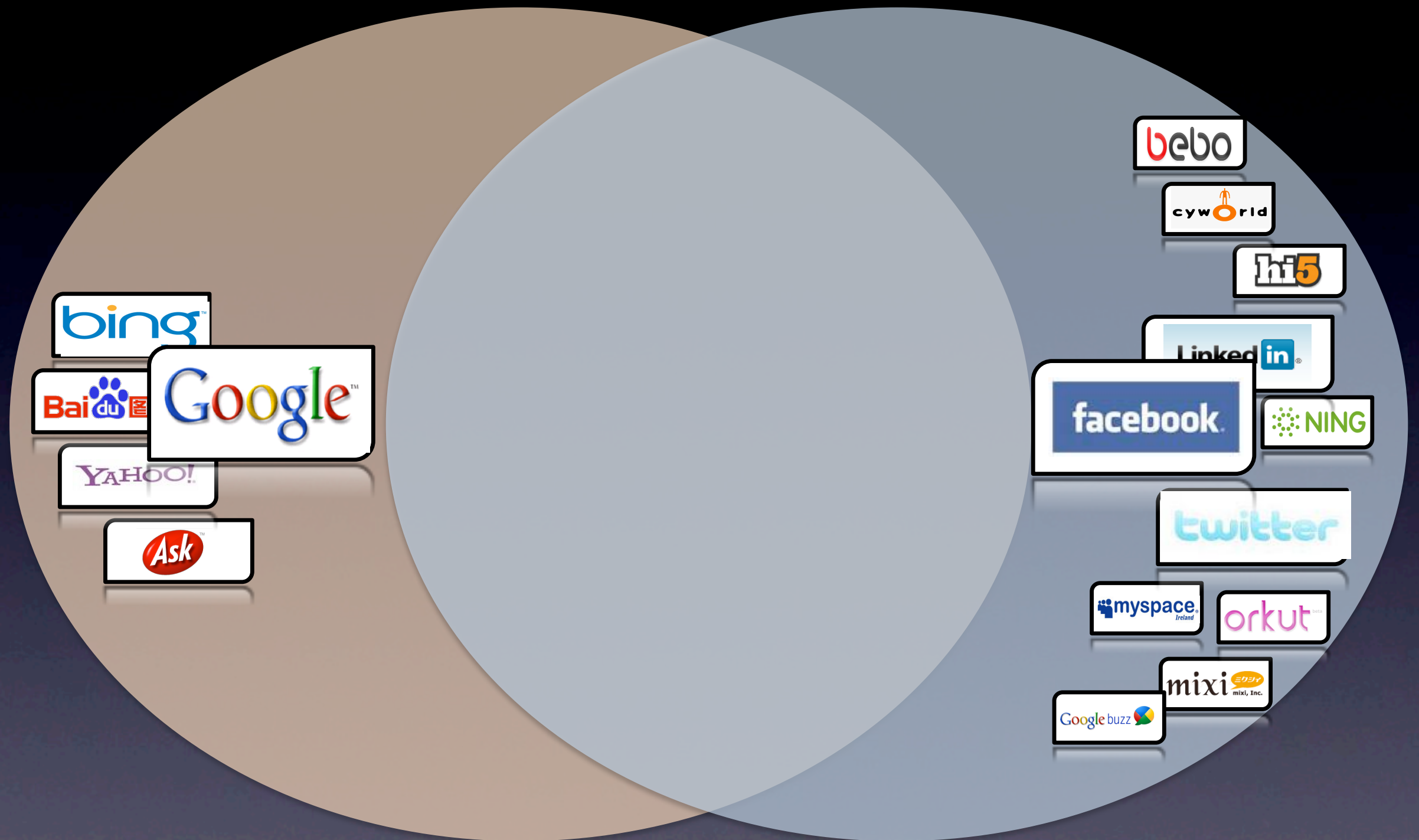
*Communities*

*750m million shares/day*

*Reputation*

*Social Rank?*

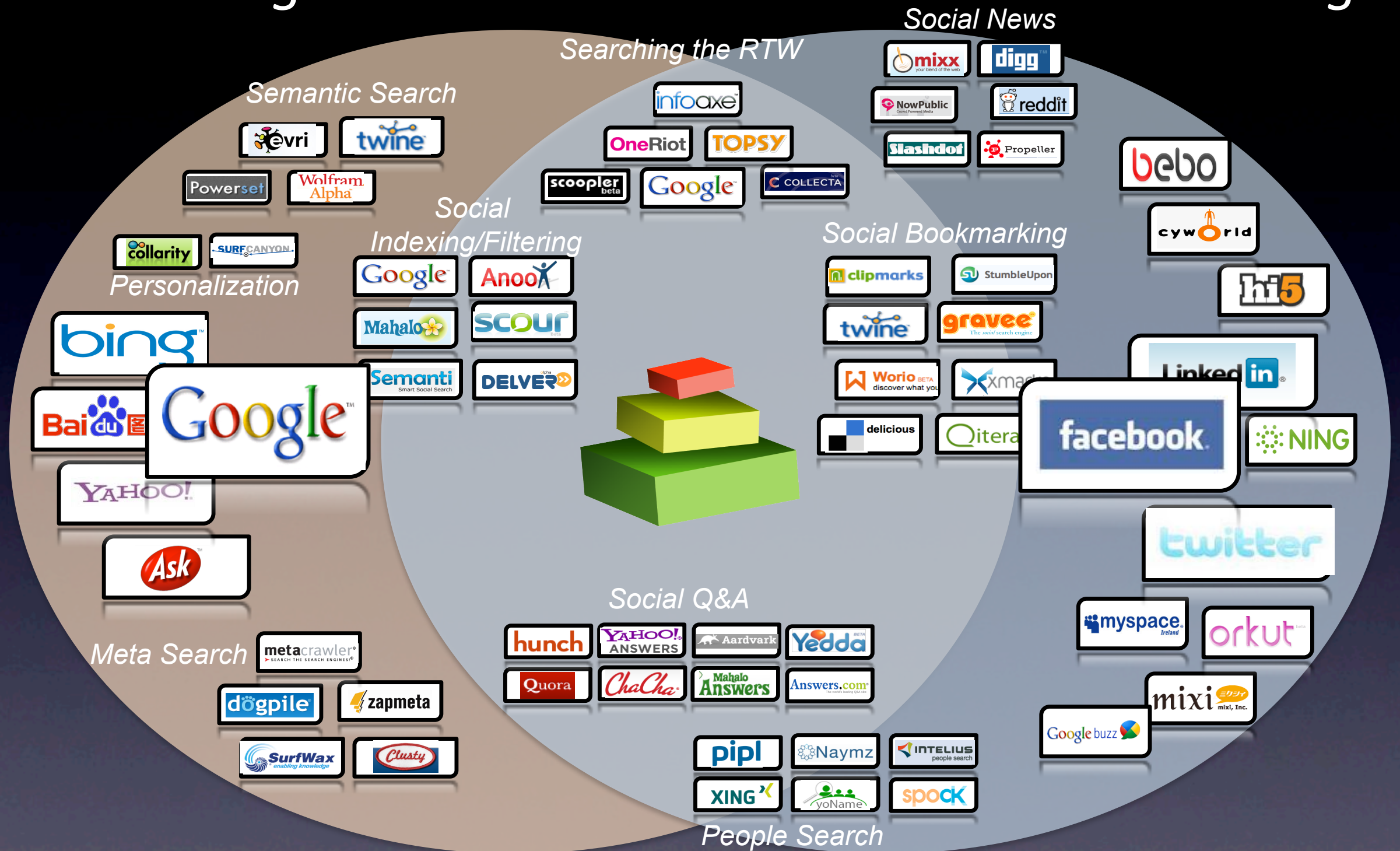
*Searching* ← → *Sharing*



*Queries* ← → *Communities*



Searching ← → Sharing



Queries ← → Communities



# Flavours of Social Search...




# Search & the Real-Time Web

The screenshot shows a Google search for 'toyota'. The search bar at the top contains the word 'toyota' and a 'Search' button. Below the search bar, the 'Web' tab is selected, and a '+ Show options...' link is visible. The results are categorized under 'News results for toyota'. A small Toyota logo icon is shown next to a news snippet titled 'Timeline: a year of pain for Toyota - 1 hour ago'. The snippet describes a recall of 1.3 million vehicles in January 2009 and a first announcement in May 2009. Below this, there are links to related articles from 'Times Online' (8882 articles), 'Chicago Tribune' (8620 articles), 'Calif. suit blames Toyota throttle for fatal crash', and 'Reuters' (109 articles). Further down, there is a section for 'Toyota Cars, Trucks, SUVs & Accessories' with a description of the official site and links to 'RAV4', 'Tacoma', '2010 Toyota 4Runner', and 'Vehicles'. Below this, there is a 'Latest results for toyota' section with a 'Pause' button. This section contains a live Twitter feed. The first tweet is from @bobcesca go, retweeting @owillis, discussing the president of Toyota's name. The second tweet is from WKYC.com, reporting on Toyota's chief apologizing for global recalls. The third tweet is from Purdy Motors, waiting on Toyota to decide on a recall of Prius. A large white curly brace on the right side of the screen groups the Twitter feed tweets under the label 'Live Twitter Feed'.

Google toyota Search

Web + Show options... Results

**News results for toyota**

 **Timeline: a year of pain for Toyota** - 1 hour ago  
January 2009: **Toyota** announces recall of 1.3 million vehicles worldwide because of seatbelt and exhaust system problems. May 2009: **Toyota** announces first ...  
[Times Online](#) - [8882 related articles »](#)  
[Recall puts Toyota on heels](#) - [Chicago Tribune](#) - [8620 related articles »](#)  
[Calif. suit blames Toyota throttle for fatal crash](#) - [Reuters](#) - [109 related articles »](#)

**Toyota Cars, Trucks, SUVs & Accessories**  
Official Site of **Toyota** Motor Sales - Cars, Trucks, SUVs, Hybrids, Accessories & Motorsports.  
[RAV4](#) - [Tacoma](#) - [2010 Toyota 4Runner](#) - [Vehicles](#)

**Latest results for toyota** - [Pause](#)

RT [@bobcesca go](#): RT [@owillis](#) the president of **toyota's** name is toyoda? // yes, and name of prez of Protruding Belly Button Society is Audi.  
[rkref](#) - [twitter.com](#) - seconds ago

Recall Alert: **Toyota's** chief apologizes for global recalls  
[WKYC.com | Cleveland, OH | Toyota's chief apologizes for global ...](#) - [wkyc.com](#)  
[wkyc](#) - [twitter.com](#) - seconds ago

[Purdy Motors Waiting On Toyota To Decide Recall Of Prius](#)  
[Inside Costa Rica](#) - seconds ago

} Live Twitter Feed

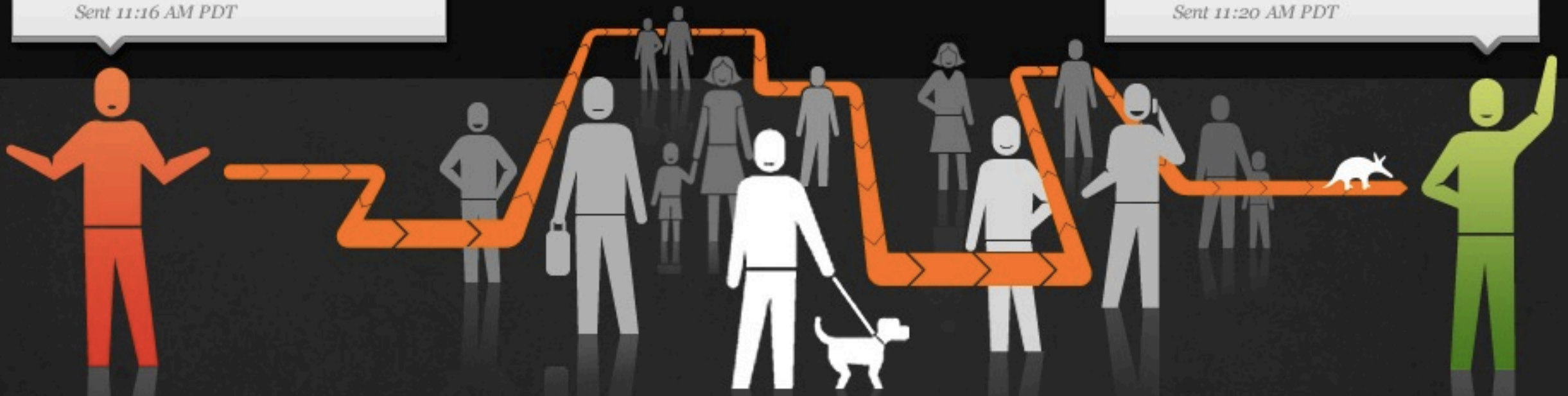
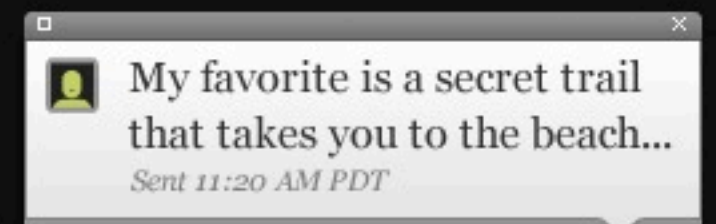
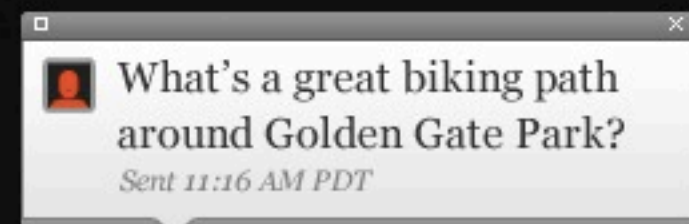


# Exploiting the Social Graph

1. Send Aardvark a question

2. Aardvark finds the perfect person to answer

3. Get their response in a few minutes



[www.vark.com](http://www.vark.com) – Social Q&A



Feb 06, 2010 | Question about **iPhone**

Friend 1

18 / M /

Gaithersburg, US

How much should I sell my iPod touch 3rd gen 8gb I had it for a month I have original headphone I still have the case der no scraches on the front

Answer 1

+ 5 minutes



Robert K.

M / Orlando, US

If you have everything that came in the package, including the original box. The buymytronics.com price is \$107. I think if you listed it on Craigslist or eBay though you could get at least that for it. Probally arround \$150. I would buy it from you but I already have a Jailbroken 8 Gb 2nd Gen and don't really need it. I hope you do good on the sale and let me know how ti goes via the "reply" feature :-)

Friend 1

18 / M /

Gaithersburg, US

Thanks!



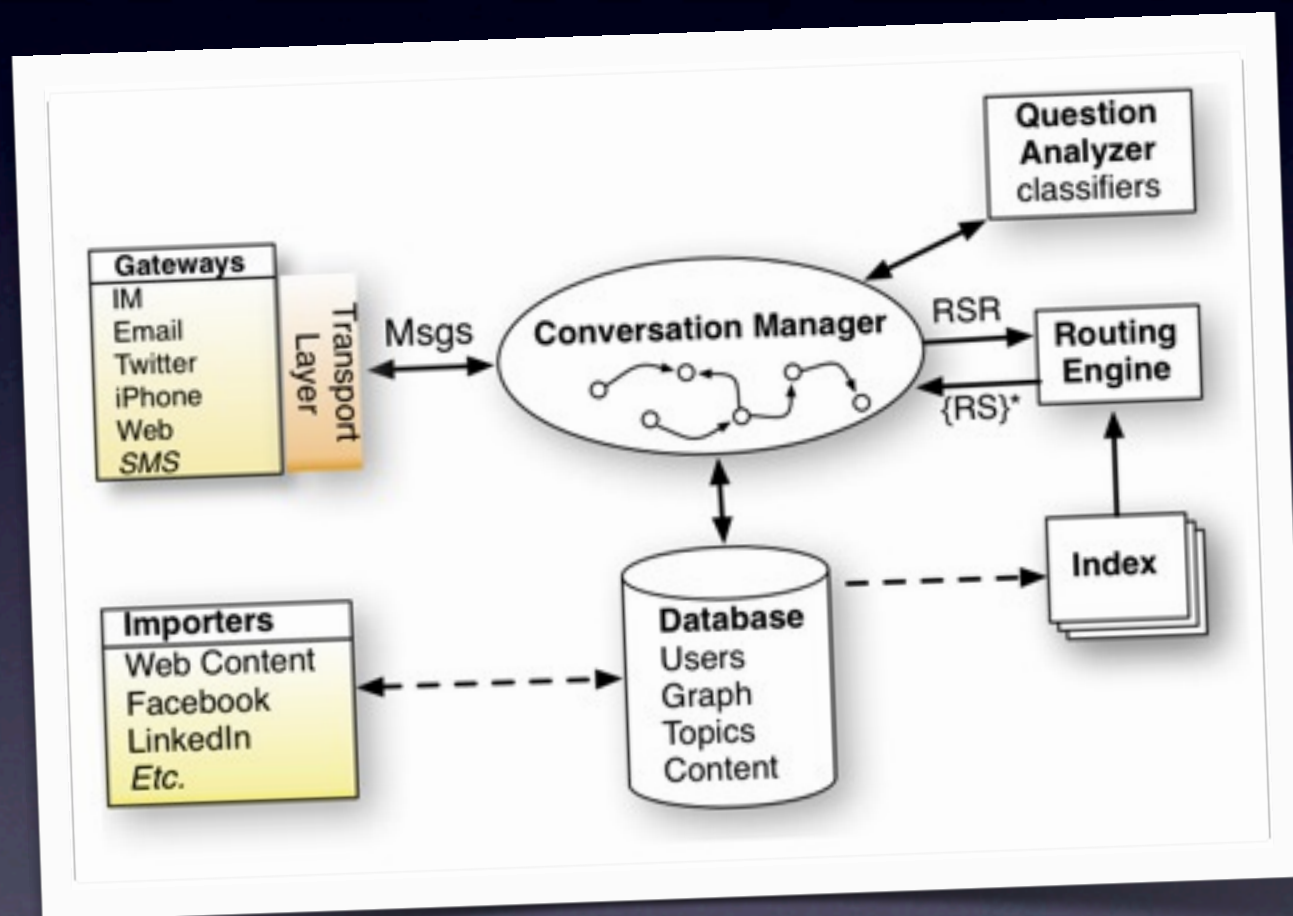
Robert K.

M / Orlando, US

here's the buymytronics.com page for your model btw  
<http://www.buymytronics.com/Apple-iPod/Apple/Apple-iPod-Touch-3rd-Generation-8GB> [  
<http://www.buymytronics.com/Apple-iPod/Apple/Apple-iPod-Touch-3rd-Generation-8GB> ]

# A Conversational Thread on Aardvark

# Key Features



Damon Horowitz, Sepandar D. Kamvar: *The anatomy of a large-scale social search engine.* WWW 2010: 431-440

## Social Indexing

People vs Documents: User-Topic / User-User Relationships

## Question Classification

Scored topic list (classification-based approach)

## Query Routing

An *aspect model* routes questions to potential answerers.

## Answer Ranking

Ranked *candidate answerers* based on topic, expertise, availability.



# Searching Social Content

# Harnessing the Social Graph

...



# Collaboration in Search

Morris et al, 2008

90% of people have engaged in some form of collaboration during Web search.

87% of people have exhibited “back-seat searching.”

86% of people go on to share results with others.

---

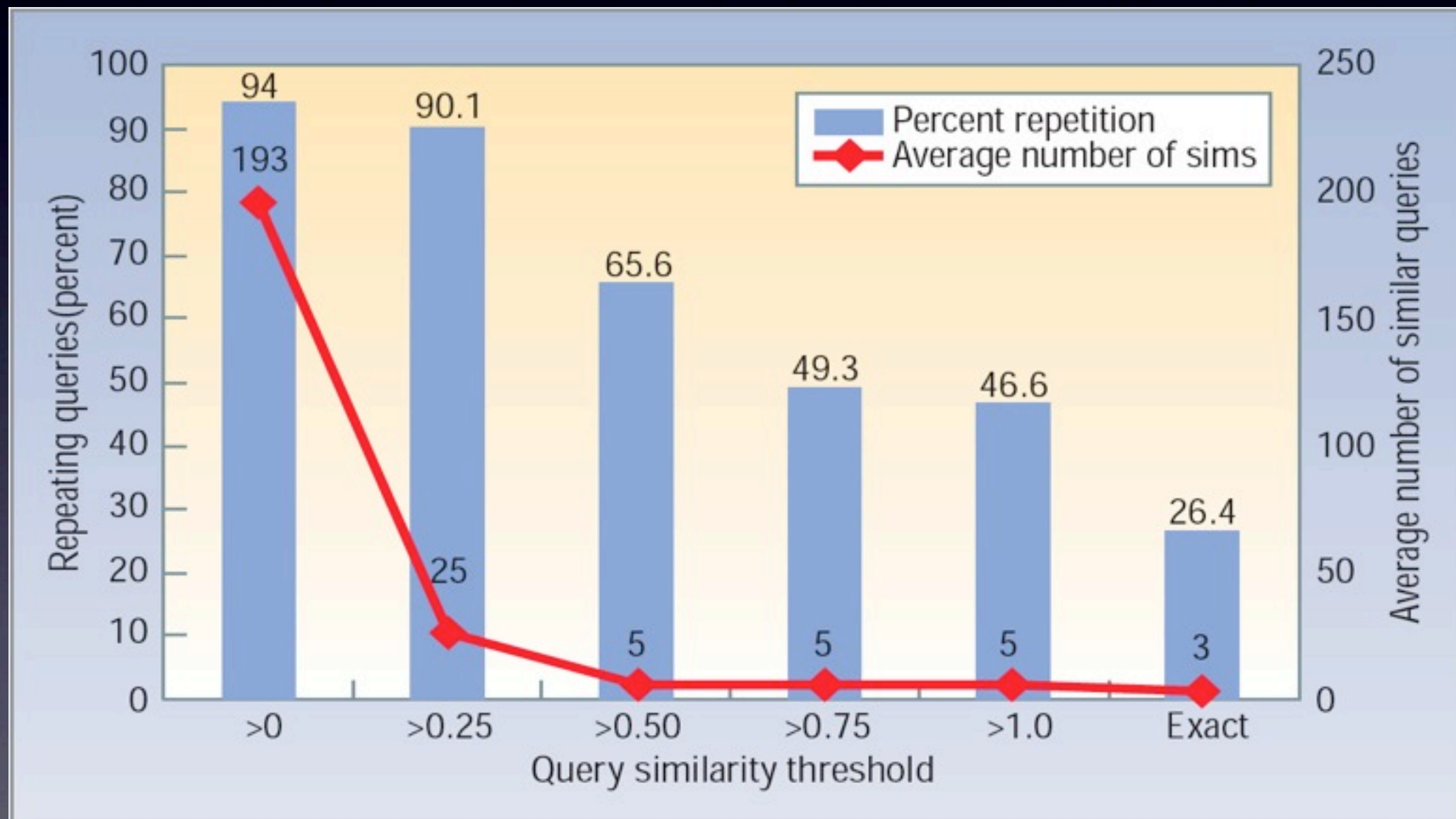
Smyth et al, 2006

Teevan et al, 2007

25%-40% of the time we are *re-searching* for things we have previously found.

66% of the time we are looking for something that a friend or colleague has recently found.

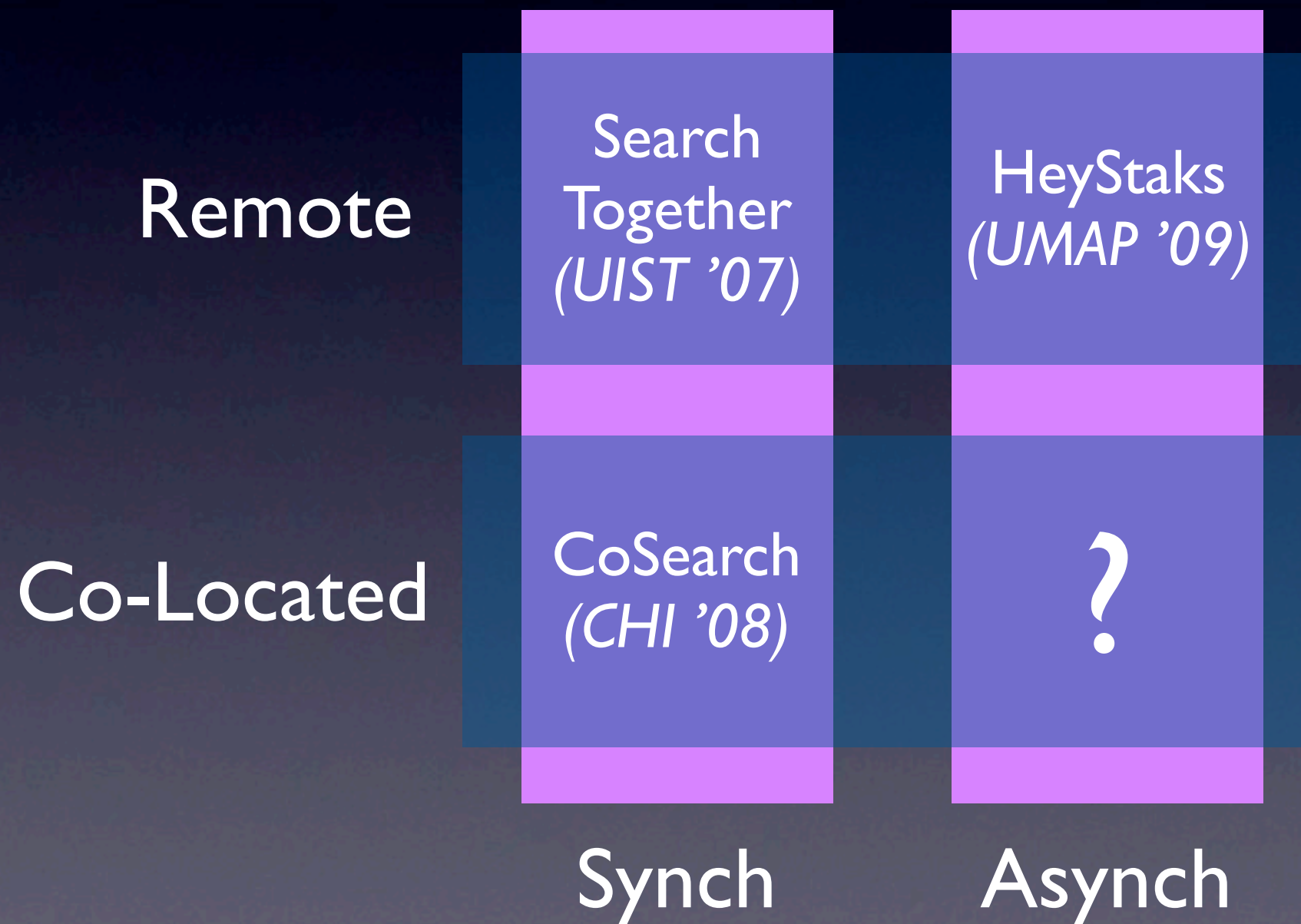
# Repetition & Regularity in Communities ...



Smyth et al, UMUAI 2004



# Collaborative IR



# Search Together

Morris et al (2008)



george: Hi, Mom!

betty: My doctor told me that I should eat a low-sugar diet.

betty: Can you help me find recipes?

george: No problem.

betty: Thanks!

Send IM

george

diabetes friendly recipes

low-sugar recipes

diabetes cooking tips

rachel

diabetes medications

type II diabetes

betty

## diabetes friendly recipes

current search source: Windows Live Search

Standard Search

Split Search

Multi-Engine Search

Current Results Summary

## VGS - Recipes - American Diabetes Association

Provides recipes plus information on diabetes. Eating out, a virtual grocery tour, exchange lists, and sweeteners.

<http://vgs.diabetes.org/recipe/index.jsp>

## Diabetic Recipes

dLife serves up a variety of diabetes-friendly recipes to help you spice up your daily meal planning. With over 1,000 recipes to choose from, just browse our recipe categories to find something new ...

<http://www.dlife.com/dLife/do/recipe/RecipeMain>

## Diabetes Self Management: Recipes

Click on the links to the left to browse a selection of recipes from Diabetes Self-Management magazine. Our diabetes-friendly recipes are generally low in fat and sodium, and each one lists the amount ...

<http://www.diabetesselfmanagement.com/recipeMain.cfm>

## Children's Diabetes Foundation - Recipes

Children's Diabetes Foundation at Denver ... Send us your favorite diabetes-friendly recipes!!

<http://www.childrensdiabetesfdn.org/recipes.html>

## Diabetes-Friendly Holiday Recipes

Prepare these 3 delicious recipes for a satisfying and seasonal holiday meal. ... Lower your blood sugar, lose weight, and live healthier with the program designed especially for ...

<http://www.rd.com/content/openContent.do?contentId=31174>

## Diabetes Friendly Holiday Cookie Recipes

Baking cookies is a large part of the traditions of this holiday season, but when you have diabetes ... Baking cookies is a large part of the traditions of this holiday season, but when you have ...

[http://diabetes.about.com/od/holidaycookies/Diabetes\\_Friendly\\_Holiday\\_Cookie\\_Recipes.htm](http://diabetes.about.com/od/holidaycookies/Diabetes_Friendly_Holiday_Cookie_Recipes.htm)

## AARP - Segunda Juventud - Diabetes-Friendly Recipes

The following recipes were created for people with diabetes (and their families) who want to enjoy their favorite Latino dishes—and good blood glucose control, too.

[http://www.segundajuventud.org/english/food/2005-FM05FM\\_diabetes\\_recipes.html](http://www.segundajuventud.org/english/food/2005-FM05FM_diabetes_recipes.html)

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Book Review: Diabetes Friendly Recipes | Caremark Health

Recommendations:



You can make this for Thanksgiving, Mom!



Back

Forward

Comment

Recommend

A breakthrough  
in insulin  
deliveryImportant Product Information  
If you have Type 1 diabetes, you will still  
take some injected insulin in addition  
to EXUBERA. Some, but not all, patients  
with Type 2 diabetes will also need  
some injected insulin in addition to  
EXUBERA.

Subscribe

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RD.com  
Reader's Digest

Type SEARCH here

True Stories

People

Columnists

National Interest

Health

Games &amp; Humor

RDLIVING&gt;

Food

Family

Home

RD.com home page &gt;

Subscribe and  
Save 61%!  
• Give a Gift  
• Large Print  
• Digital Edition

## Ho-Ho-Holiday Help!

## Diabetes-Friendly Holiday Recipes

Prepare these three delicious recipes for a satisfying holiday meal.

From ChangeOne for Diabetes

EMAIL PRINT SUBSCRIBE to RD FONT A A A

The savory smell of lean baked ham filling the air is just part of what makes this meat a perfect centerpiece for all your Christmas homecomings. Both lean and succulent, ham has an abundance of flavor but can be sliced thin to keep taste satisfaction high and calories low. Side dishes are dominated by vegetables that you can keep replenishing as you linger around the table with laughter and conversation.

Add 6 ounces of lean ham to your plate and build a 550-calorie entrée with a serving of each of the following dishes.

## SCALLOPED POTATOES

## You Will Need

4 onions, thinly sliced  
1/2–3/4 cup chicken broth  
1 can fat-free evaporated milk  
1 1/2 pounds potatoes, peeled and sliced  
Salt and fresh-ground black pepper, to taste  
Pinch of paprika

## What to Do

1. Preheat the oven to 425°F. Lightly spray a shallow 2-quart baking dish with cooking spray.  
2. Bring the onions and 1/2 cup of the broth to a boil in a non-stick skillet over medium heat. Reduce the heat and simmer, stirring occasionally, until



INTERACTIVE FEATURES

Quiz: What's Your Diabetes IQ?

RELATED LINKS

- Exercise: The Diabetes Secret Weapon
- Tips for Exercising in the Cold
- Should You Skip Breakfast?
- Meet Your Diabetes Support Team

MESSAGE BOARDS

What are your shortcuts for holiday cooking?

- Join this discussion

TAKE OUR POLL

Wor  
Learn  
help  
Brought

EX  
(insulin  
In  
Pr

As  
do  
if i  
EX  
is  
yo

Diab  
pill  
not  
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Tall  
to y  
doc

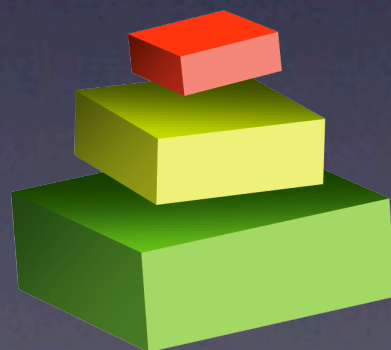
Importa  
some  
addition

EXUBER  
You sh  
Inhalati  
start sm  
less than  
EXUBER  
function  
breathin  
treatme  
time, a



# HeyStaks

## A Case-Study in Social Search





# Motivating HeyStaks

## Web Search. Shared!

Harness the collaborative nature of Web Search by providing integrated support for the sharing of search experiences.

## User Control

Support the searcher by providing fine-grained control over collaboration features and facilities.

## Integrate with Mainstream Search Engines

Users want to search as normal, using their favourite search engines, while, at the same time, benefiting from collaboration.

# HeyStaks: A *Search Utility*



## Create Staks

Users can easily create *Search Staks* (public/private) as a way to capture search activities.

## Share Knowledge

Share Staks with friends and others to grow community/task-based search expertise.

## Search & Promote

As users search within a Stak(s), relevant results are promoted and enhanced.









Stak 5

Stak 6

Stak 4

Stak 2

Stak 3

Stak 7

Stak 1



Task

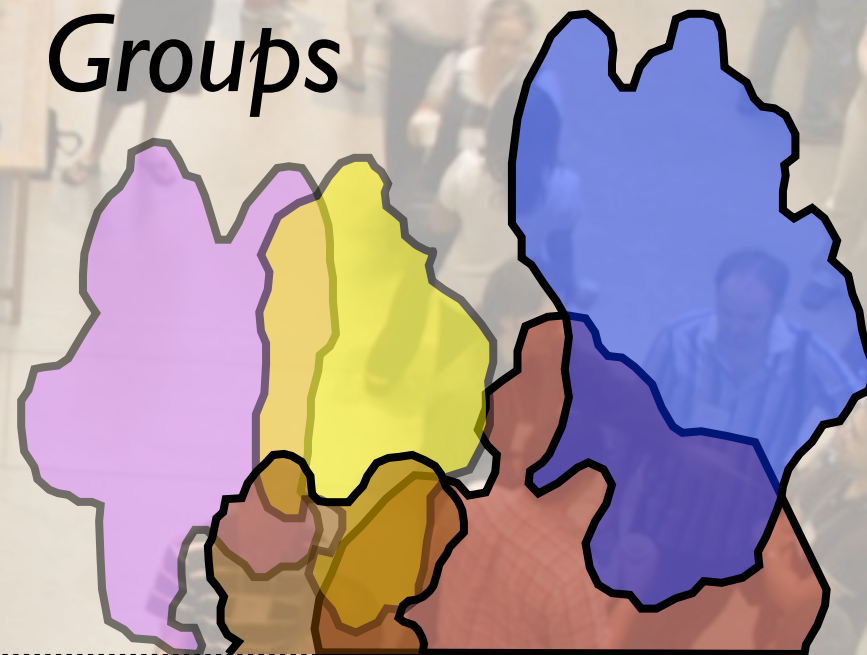
*Multi-Task  
Individual*

*Single Task  
Individual*

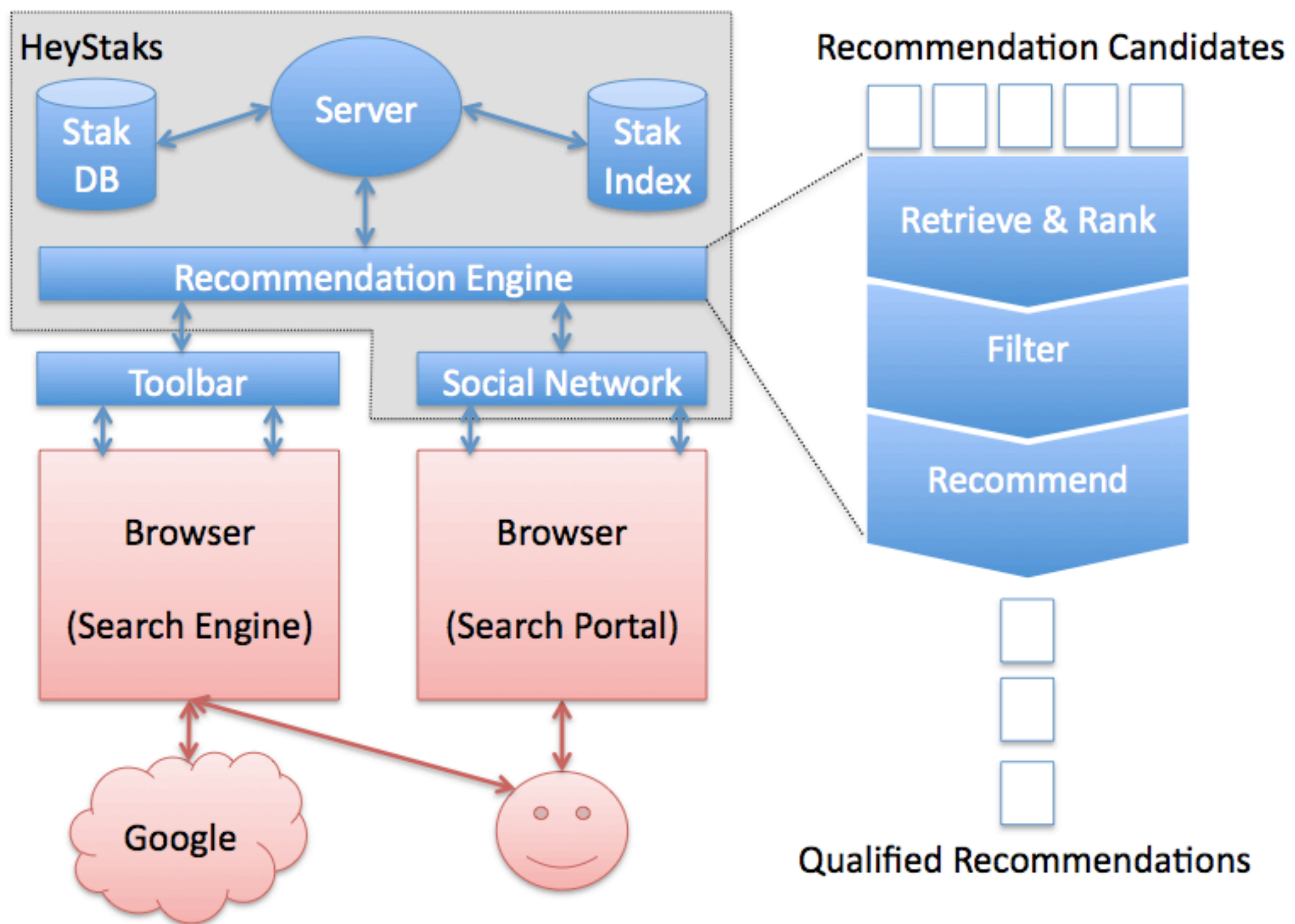
*Multi-Task  
Groups*

*Single Task  
Groups*

Social

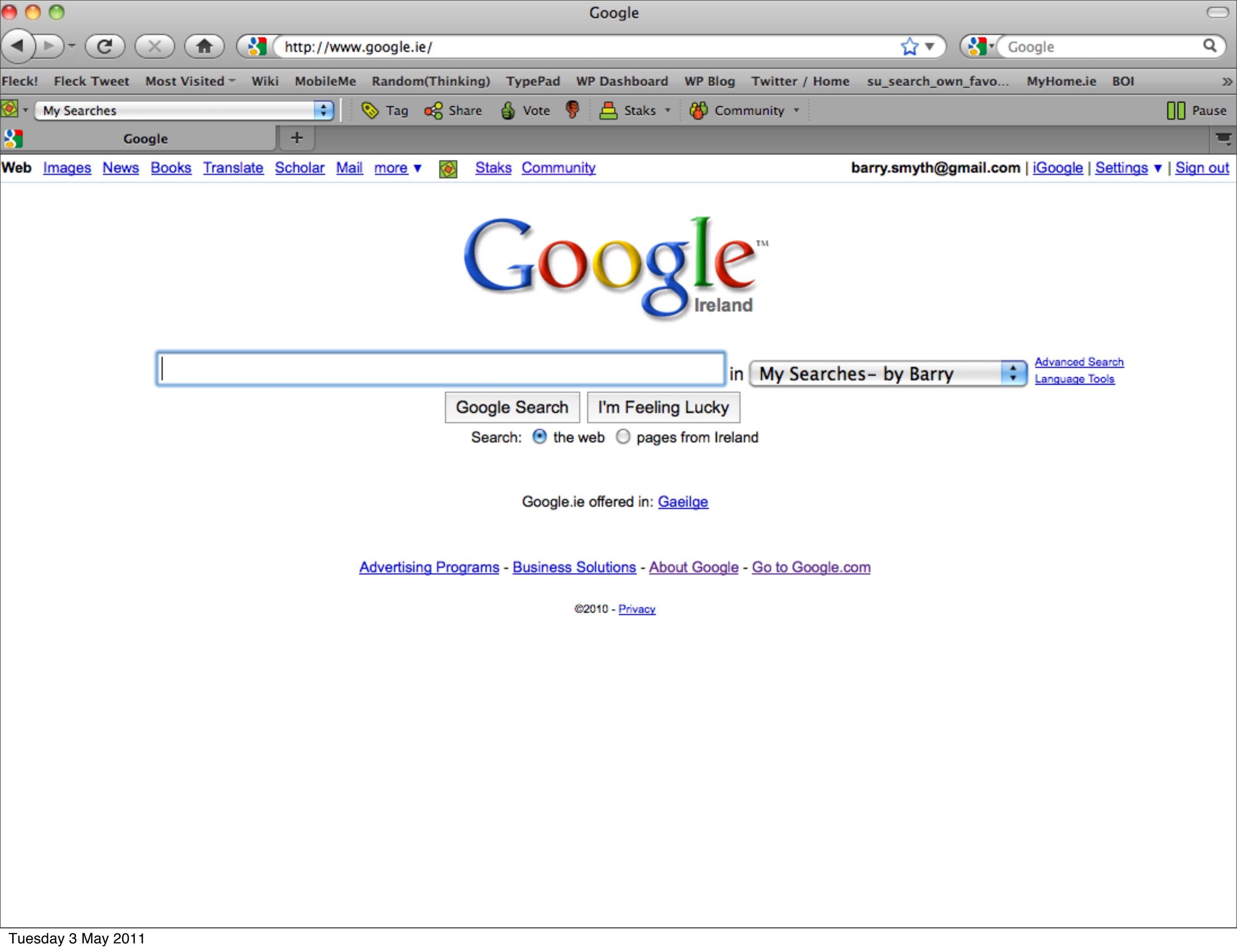






# HeyStaks Architecture





in My Searches - by Barry

[Advanced Search](#)  
[Language Tools](#)

Google Search

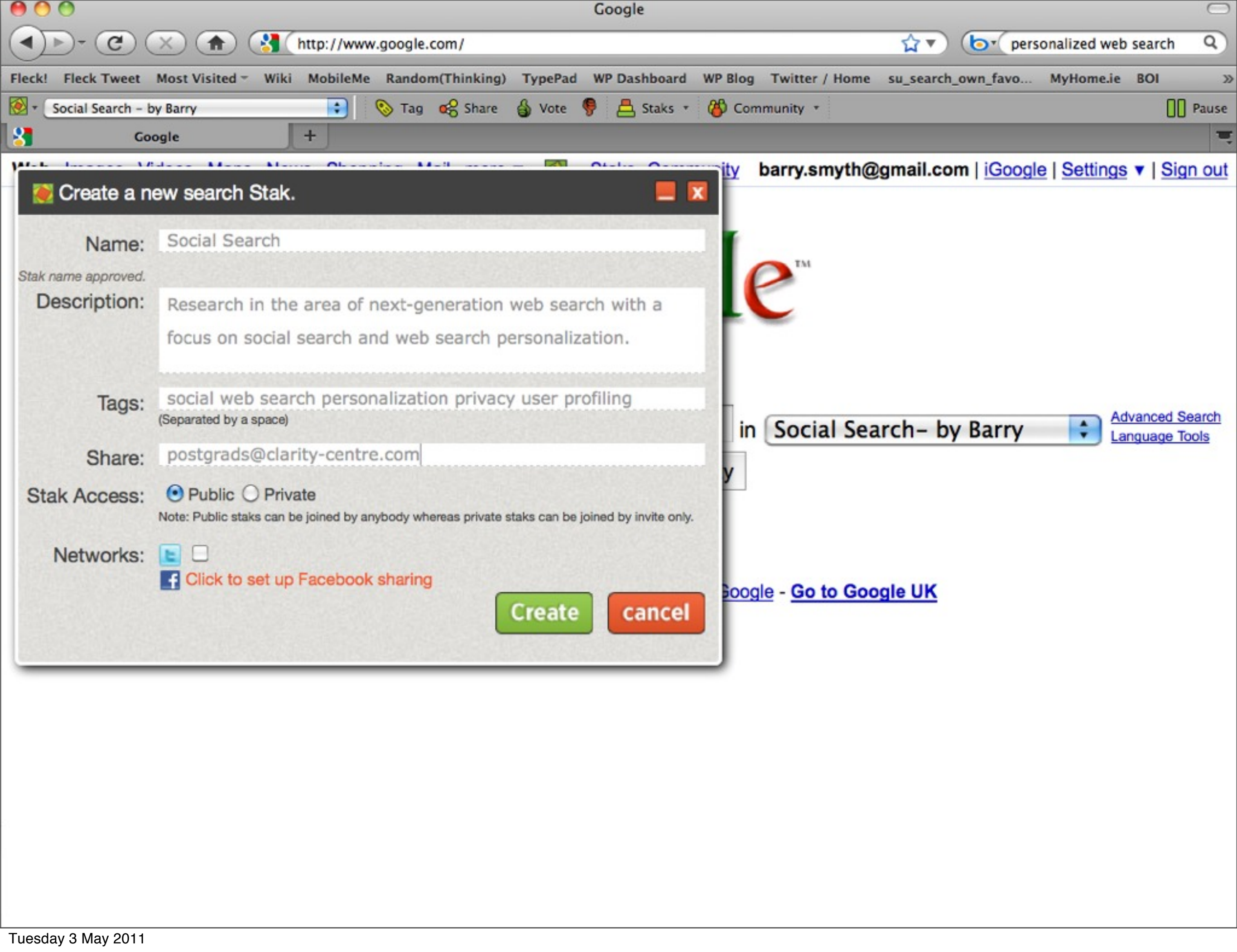
I'm Feeling Lucky

Search: ☒ the web ☐ pages from Ireland

Google.ie offered in: [Gaeilge](#)

[Advertising Programs](#) - [Business Solutions](#) - [About Google](#) - [Go to Google.com](#)

©2010 - [Privacy](#)



## Create a new search Stak.

Name: Social Search

Stak name approved.

Description: Research in the area of next-generation web search with a focus on social search and web search personalization.

Tags: social web search personalization privacy user profiling  
(Separated by a space)

Share: postgrads@clarity-centre.com

Stak Access: ☒ Public ☐ Private

Note: Public staks can be joined by anybody whereas private staks can be joined by invite only.

Networks: ☐ Click to set up Facebook sharing

Create

cancel

in Social Search- by Barry [Advanced Search](#) [Language Tools](#)

Google - [Go to Google UK](#)



personalized web search - Bing

http://www.bing.com/search?q=personalized+web+search&go=&form=QBRE&filt=all

Fleck! Fleck Tweet Most Visited Wiki MobileMe Random(Thinking) TypePad WP Dashboard WP Blog Twitter / Home su\_search\_own\_favo... MyHome.ie BOI BlackBerry Internet S...

Social Search - by Barry Tag Share Vote Staks Community

personalized web search - Bing

Web Images Videos Shopping News Maps More MSN Hotmail Staks Community Sign in

bing personalized web search in Social Search - by Barry

Show all Only from United Kingdom

ALL RESULTS 1-10 of 359,000,000 results Advanced

**£30 of Online Marketing** · [www.tryadCenternow.co.uk](http://www.tryadCenternow.co.uk) Sponsored sites  
Reach your online audiences with advanced Online Marketing with MSN!

**HeyStaks Recommends:**  
**The UMAP 2010 Workshop on Intelligent Techniques for web ... 2010**  
(2) [personalization](#) (2)  
22 Dec 2009 ... Intelligent Techniques for **web** Personalization. & Recommender Systems (ITWP'10).  
Big Island of Hawaii, June 20 2010 ...  
[is13-www.cs.uni-dortmund.de/homepage/ITWP2010](http://is13-www.cs.uni-dortmund.de/homepage/ITWP2010)  
Related Staks: [Social Search](#) [My Searches](#) [ ]

**Scaling Personalized Web Search** [--] [scaling](#) (2)  
Presentation paper. Link Popularity algorithms biased according to a user-specified set of given interesting pages.  
[www2003.org/cdrom/papers/refereed/p185/html/p185-jeh.html](http://www2003.org/cdrom/papers/refereed/p185/html/p185-jeh.html) · [Cached page](#)  
Related Staks: [Social Search](#) [My Searches](#) [ ]

**Potential for Personalization** [personalization](#) (3) [potential](#) (3)  
File Format: PDF/Adobe Acrobat - Quick View  
[people.csail.mit.edu/teevan/work/publications/papers/tochi10.pdf](http://people.csail.mit.edu/teevan/work/publications/papers/tochi10.pdf)  
Related Staks: [My Searches](#) [Social Search](#) [ ]

[Click to view more HeyStaks recommendations](#) from your Staks: My Searches, HeyStaks, Academic Research...

[labs.google.com](http://labs.google.com)  
[labs.google.com/personalized](http://labs.google.com/personalized)

**Google Personalized Search Leaves Google Labs - Search ...**  
Google has also increased password security for **personalized search**. As noted, you can remove individual items from **web**, images or news **search** results.  
[searchenginewatch.com/3563036](http://searchenginewatch.com/3563036) · [Cached page](#)

Sponsored sites

**Personalized**  
Fantastic prices on party items. Buy it. Sell it. Love it. eBay.  
[www.ebay.co.uk/celebration](http://www.ebay.co.uk/celebration)

**Personalized Search**  
Shop for **Personalized Search**. Find NexTag Sellers' Lowest Price!  
[www.NexTag.co.uk](http://www.NexTag.co.uk)

**personalized**  
Bargain prices. Brilliant reviews. Buy & browse online at BizRate.  
<http://www.bizrate.co.uk>

**Personalized Search**  
Clothing & More from 100+ Shops. Buy **Personalized Search** Fast!  
[uk.Calibex.com/Clothing](http://uk.Calibex.com/Clothing)

**Personalized at Amazon**  
Low prices on **Personalized**. Free UK Delivery on Amazon Orders  
[Amazon.co.uk](http://Amazon.co.uk)

[See your message here](#)

Transferring data from www.bing.com...





Tagging page: *The UMAP 2010 Worksh .. er Systems (ITWP'10)*

Tags: personalized web search

(separated by a space)

Stak: Social Search- by Barry

Network:  

 Click to set up Facebook sharing

tag

cancel

Workshop format  
Submission & Important  
dates  
Program Committee

Workshop held at:

*UMAP 2010*

**Paper submission deadline extended to April 6 !**

## Workshop goals

Web Personalization and recommendation systems have been steadily gaining ground as essential components of today's Web based applications, including in e-commerce and customer relationship management, in the delivery of business services, in providing support for Web search and navigation, and in reducing cognitive overload in information rich interactive social Web applications. The proliferation of Web 2.0 applications has allowed users to go beyond simple consumers of information and instead actively participate in shaping collaborative environments in which users, resources, and user-provided content are all networked together. This, in turn has increased the need for more intelligent and personalized services that help users interact with and navigate these complex information spaces. These include a new generation of recommender systems that integrate multiple online channels, are more scalable, are more adaptive, can better handle user interactivity, and are more adept at user preference elicitation. To achieve this, such applications must rely on intelligent techniques from AI, machine learning, Web mining, statistics, and user modelling in order to leverage all available data, including the usage and click-stream data (reflecting user behaviour), the content and meta-data associated with resources, semantic domain knowledge, user profile information, and underlying network structures. Efficient and intelligent techniques are needed to mine this data for actionable knowledge, and to effectively use the discovered knowledge to enhance the users' experience.

The aim of this workshop is to bring together researchers and practitioners From Web Mining, Web Personalization, Recommender Systems, and User Modeling communities in order to foster an exchange of information and ideas and to facilitate a discussion of current





☒ Search Activity ☐ Search Staks


## Photography (Public)

anything about cameras or taking pictures

[options](#)

Created by mojo on 19th of Jan, 2038

7 members | 10 result selections | 3 shared pages | 14 tagged pages

## Stak Members



[kmcc](#)



[iceyou...](#)



[dongrh](#)



[huizhang...](#)

[more](#)



[Nikon D3000 AF-S DX VR NIKKOR 18-55MM F/3.5-5.6 ZOOM LENS buy at the cheapest price, best deals, online shop Nikon D3000 AF-S DX VR NIKKOR 18-55MM F/3.5-5.6 LENS - Ireland](#) was tagged with [slr](#) [cheap](#)



3 weeks 4 days ago



[Find The Best Digital SLR Camera for You in 4 Easy Steps](#) was voted for

3 weeks 4 days ago



[Find The Best Digital SLR Camera for You in 4 Easy Steps](#) was selected for the query [slr](#)

3 weeks 4 days ago



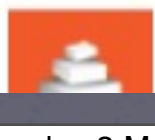
[Find The Best Digital SLR Camera for You in 4 Easy Steps](#) was selected for the query [slr](#)

3 weeks 4 days ago



[2009 in photos \(part 1 of 3\) - The Big Picture - Boston.com](#) was emailed to 3 HeyStaks users and 3 people

14 weeks 6 days ago



[Trius birdshooter 2 trap thrower : Targets at GunBroker.com](#) was selected for the query [review trius birdshooter 2](#)



## My Details

You are currently logged in as: **Barry**

My Buddies (45)

Staks Joined (9)

Staks Created (73)

## staks I've started (73)



[Interactio...](#)



[TA2](#)



[Hotels.com...](#)



[Winter Sun...](#)



[Used Cars](#)



[1st year g...](#)



[All things...](#)



[Leather La...](#)



[House Hunt...](#)



[RecSys](#)

[more](#)

Create a new search stak

## staks I've joined (9)

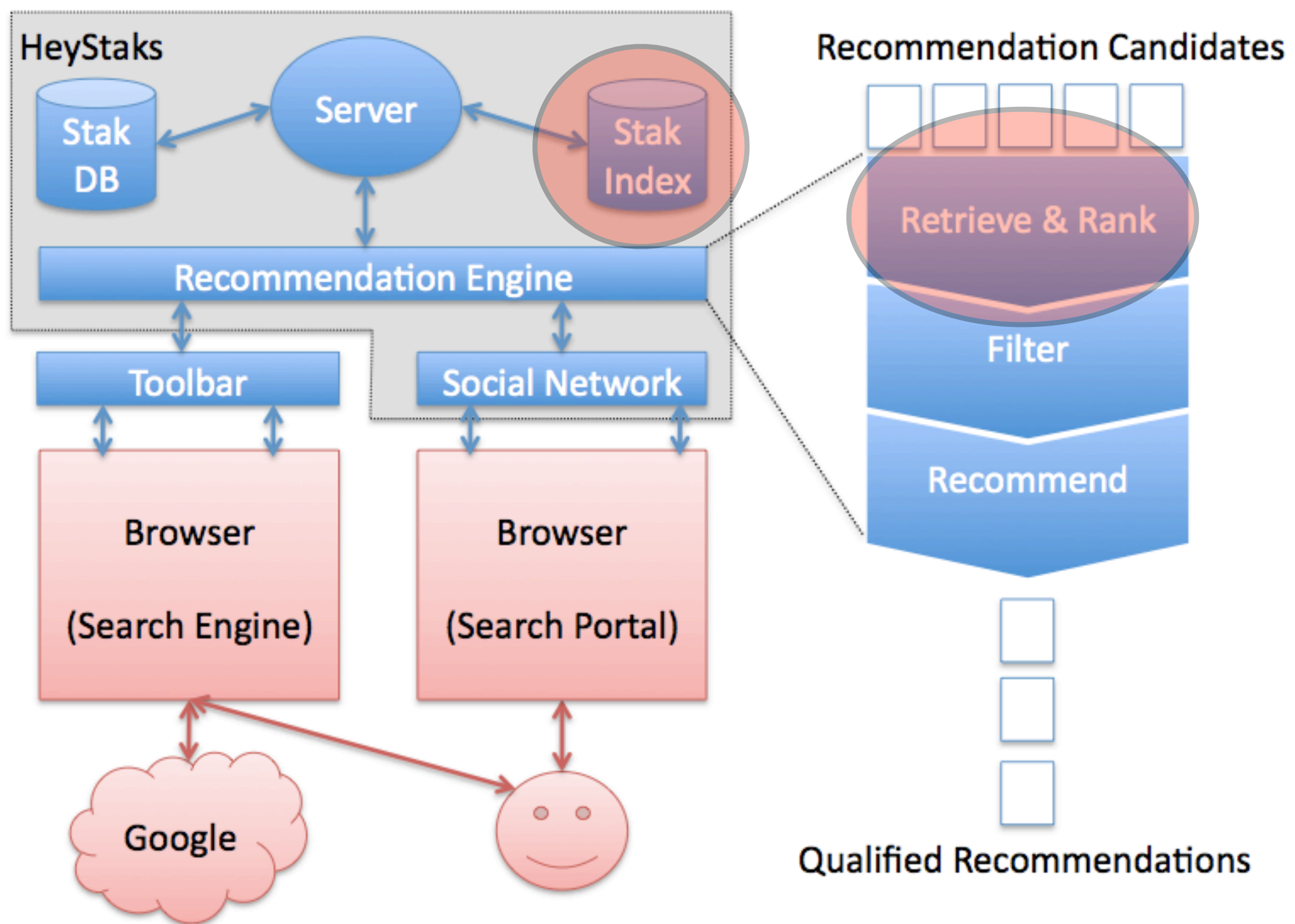


[WRI Travel](#)



[TechCrunch-CrunchBase](#)

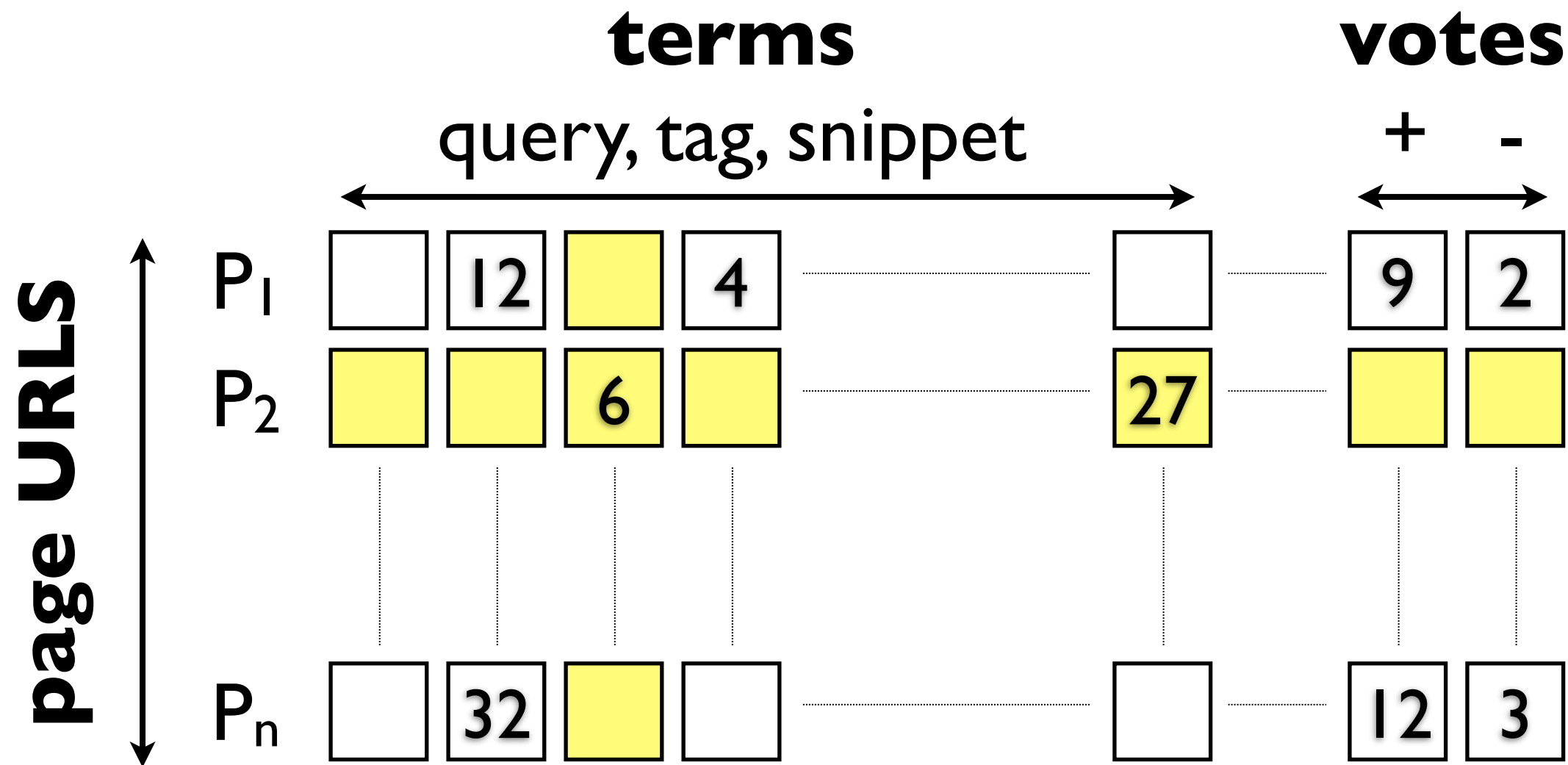




# HeyStaks Architecture



# Search Staks



$$\text{score}(q_T, P_i, S_j) = \text{Rel}(q_T, P_i, S_j) * \text{TFIDF}(q_T, P_i, S_j)$$

# The Social Life of Search



# Initial Evaluation

## HeyStaks Beta Trial

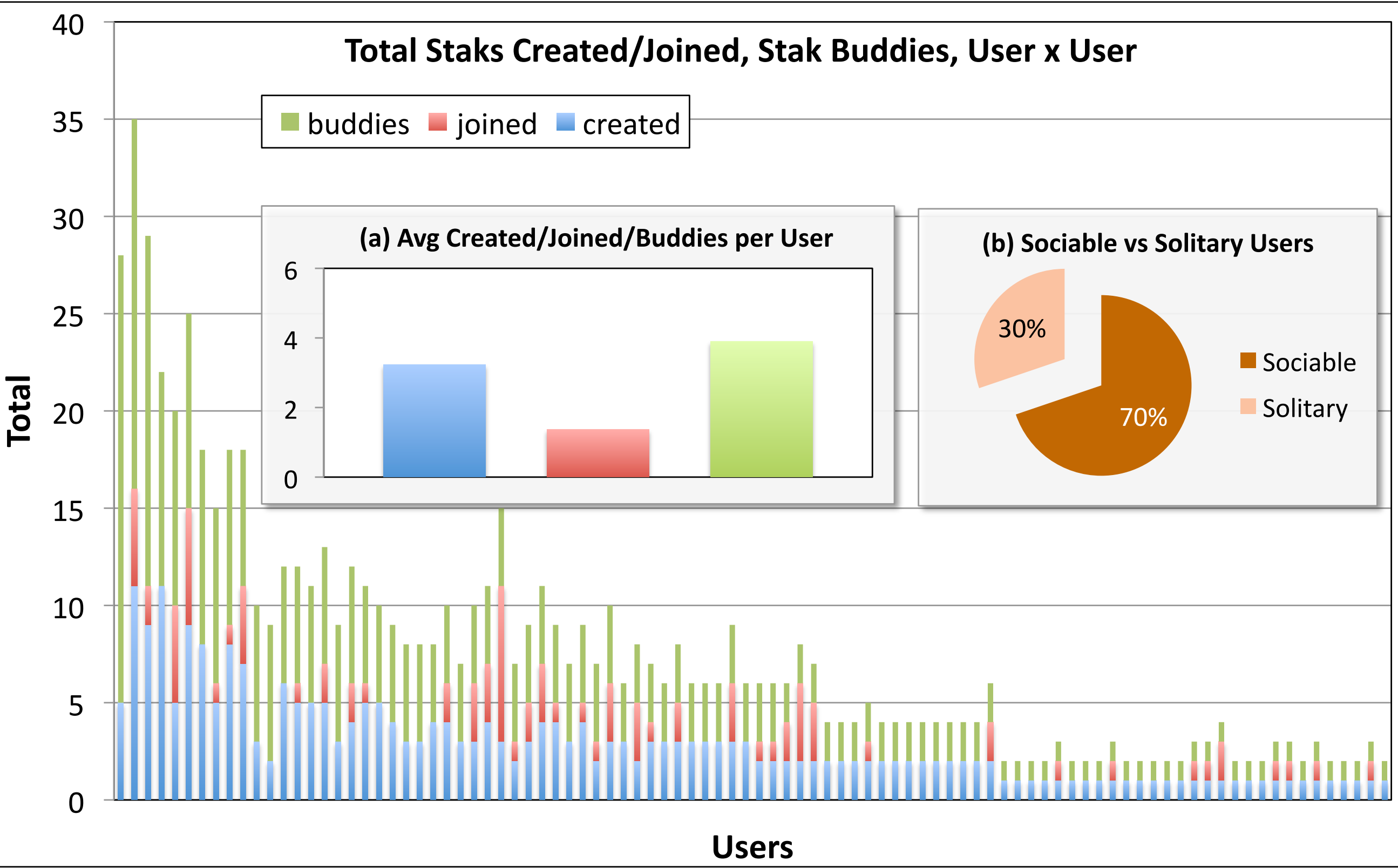
Focus on 95 early, active HeyStaks-Beta users who registered with HeyStaks during the period October 2008 - January 2009.

## Stak Creation/Sharing

Do users take the time to create and share search staks (and search experiences)?

## Collaboration Effects

Do searchers benefit from the effects of search collaboration in general, and stak promotions in particular?



2612

# Stak Creation & Sharing

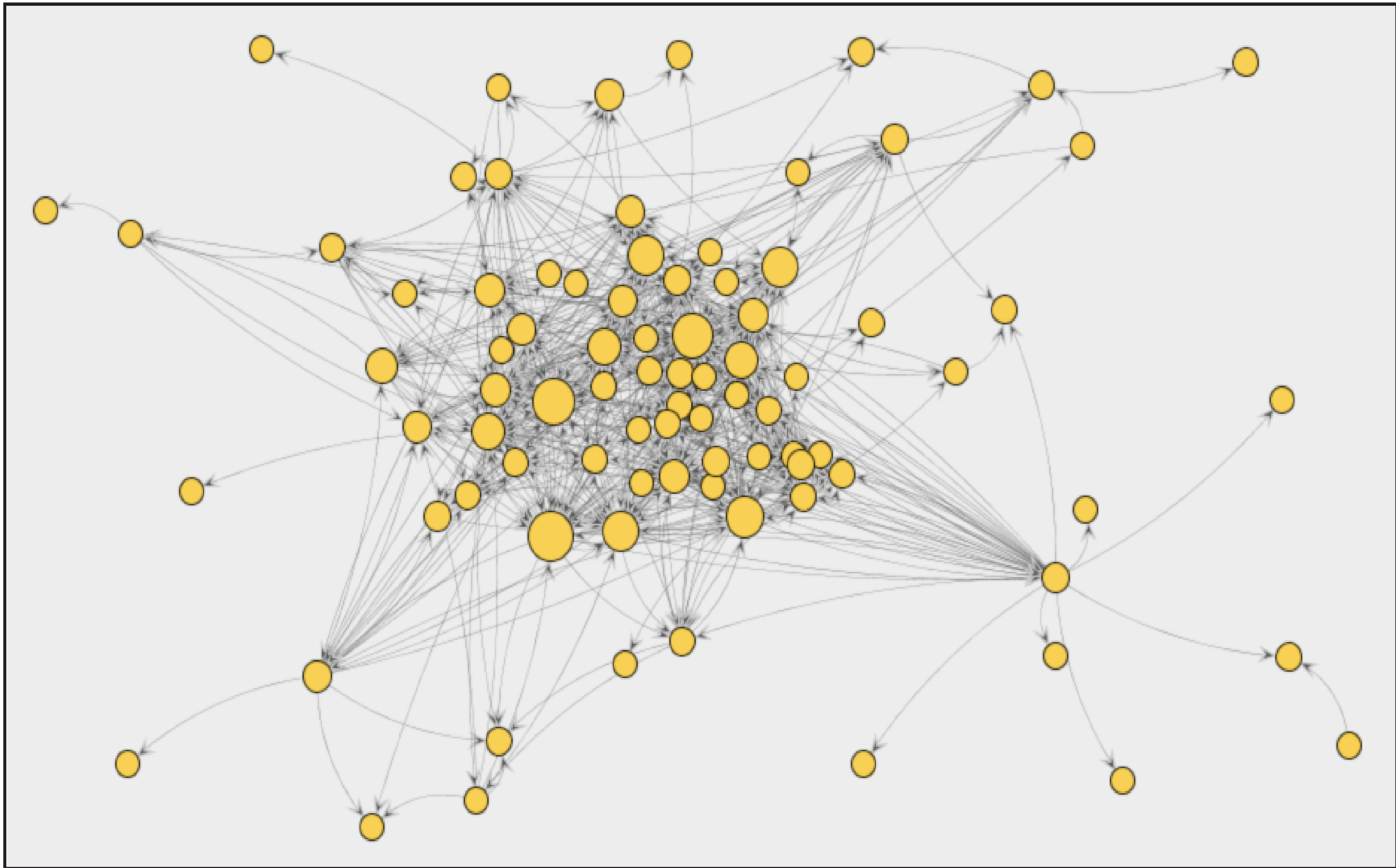


# Producers & Consumers



## Basic Unit of Collaboration

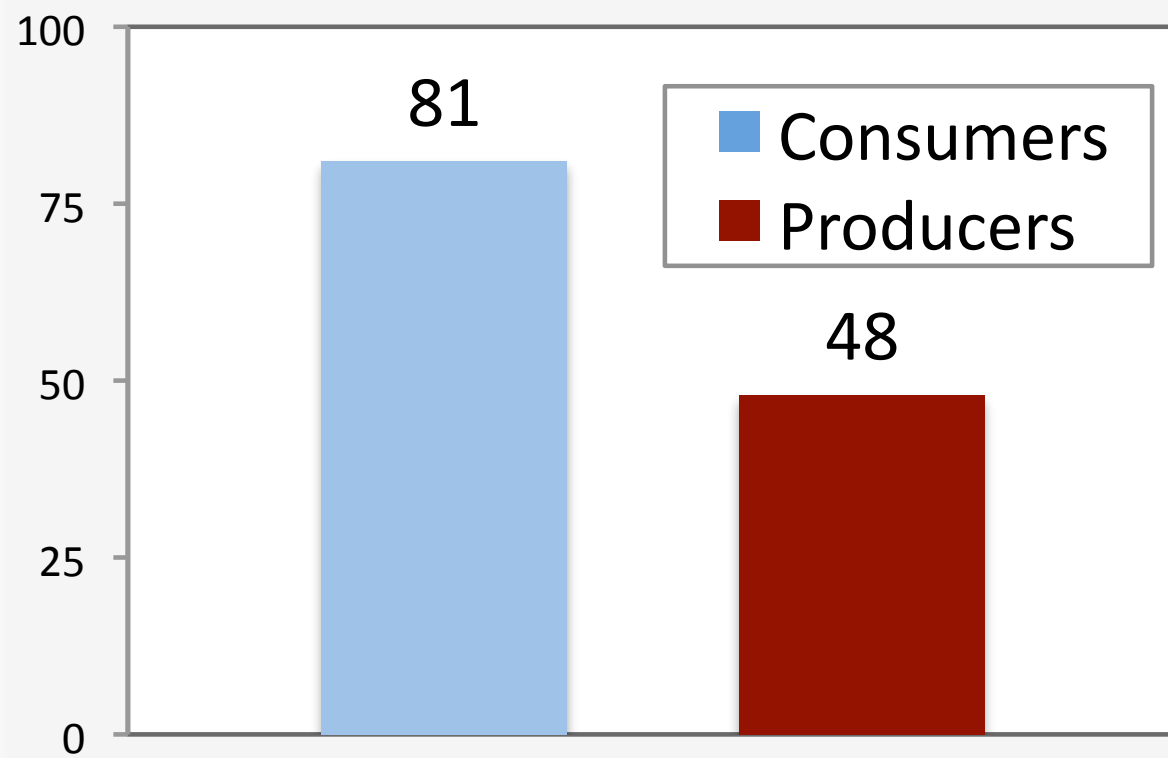
*Searcher **C** selects a promotion previously selected by **P**.*



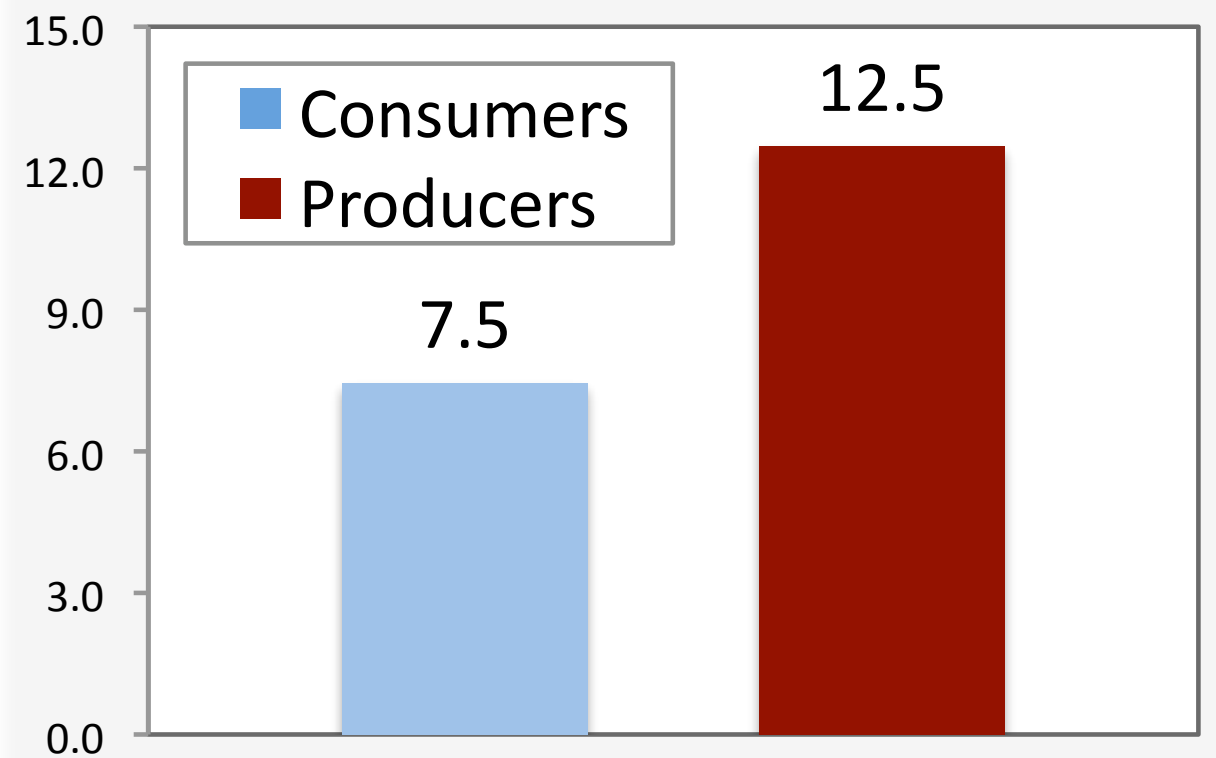
# Search Collaboration



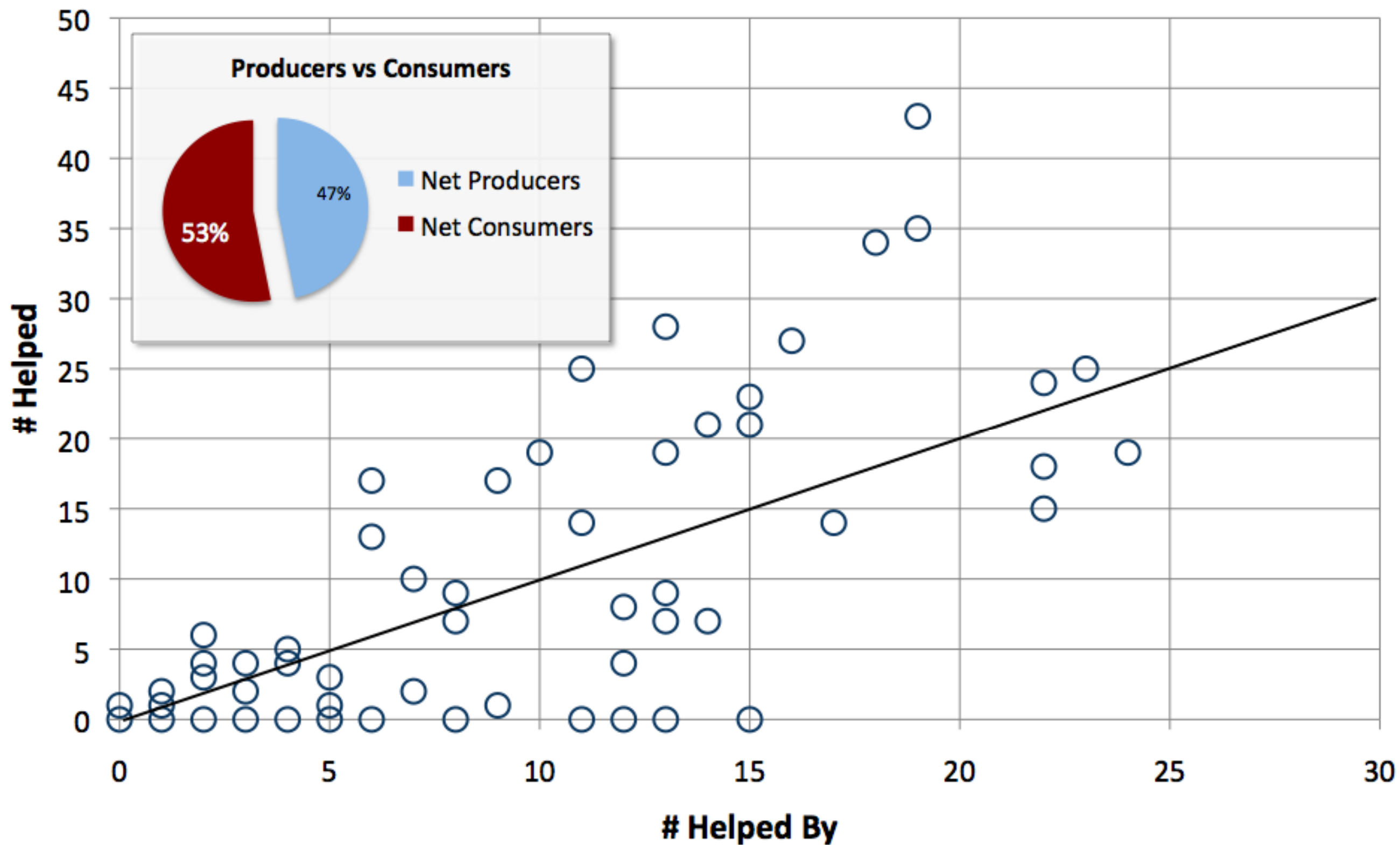
**(a) Producers & Consumers**



**(b) Number of Collaborators**

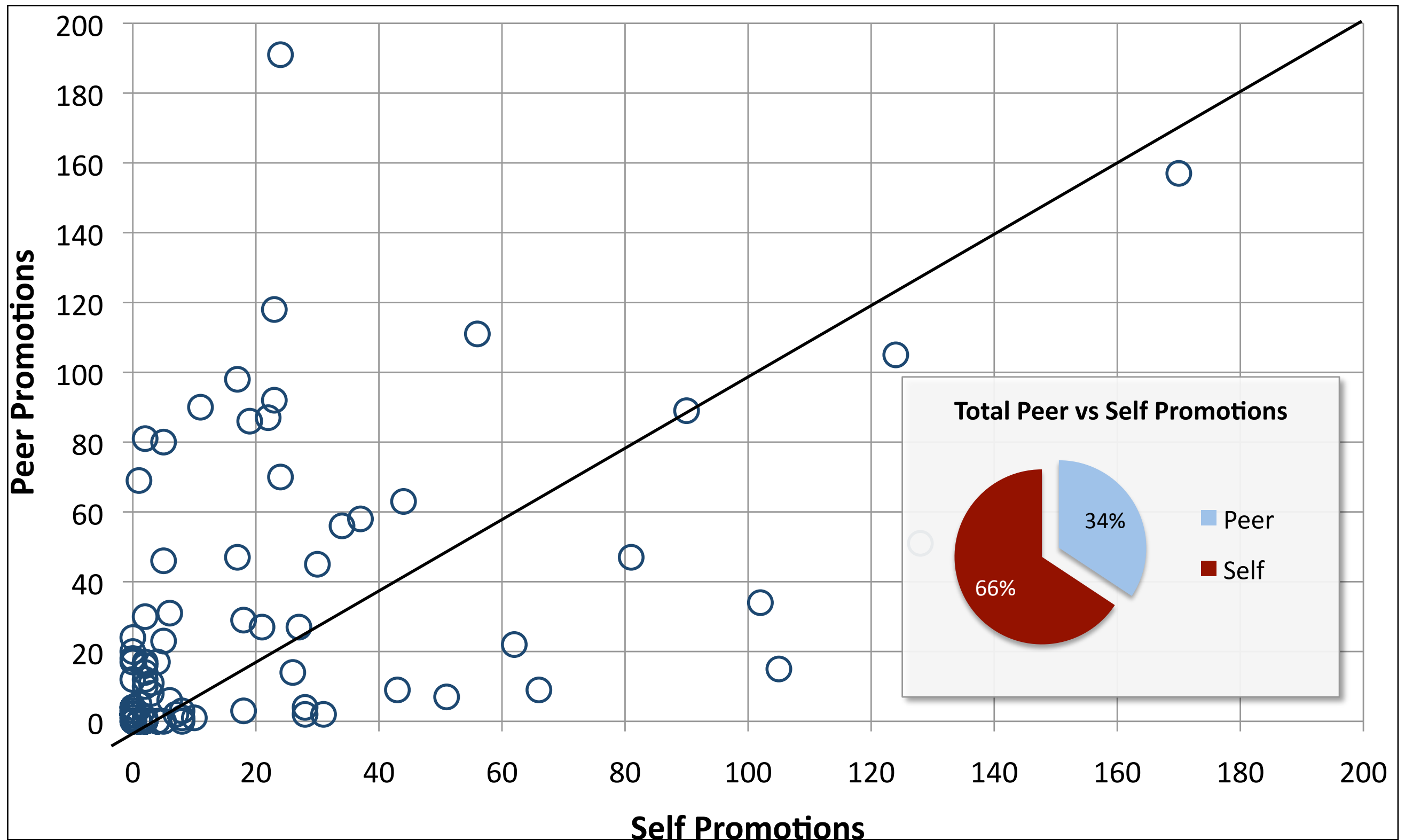


# Producers & Consumers



# Search Leaders & Followers





# Promotion Sources

Users create & share staks.

Collaboration commonplace.

Users benefit from peers.



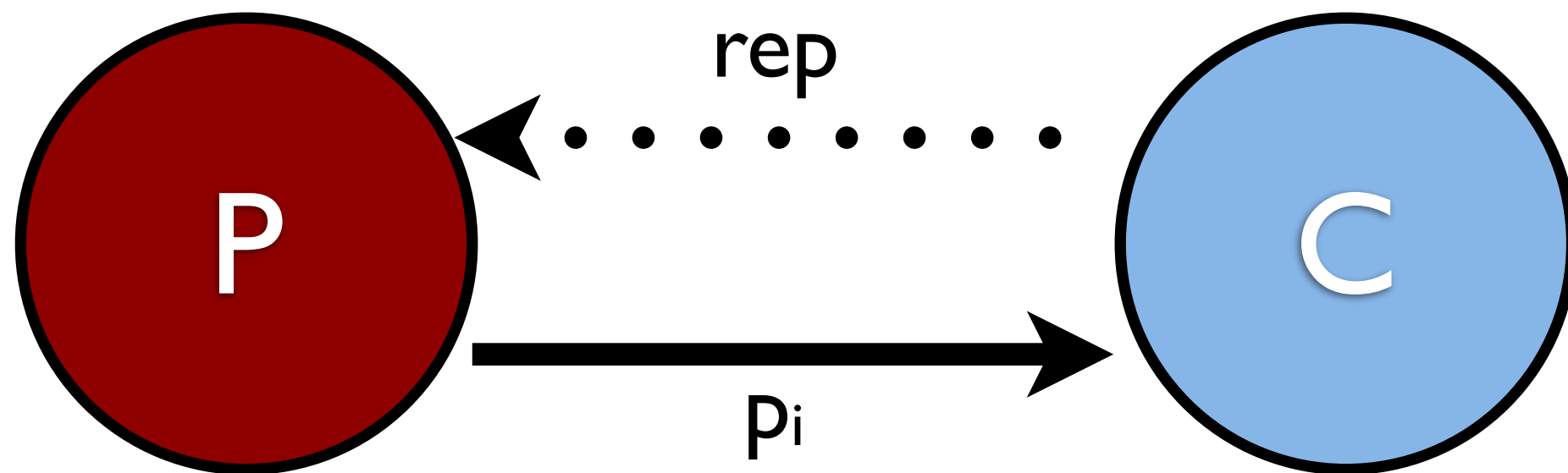
# Reputation

All searchers are not created equal! Staks are likely composed of a mixture of novice and expert searchers.

Can we identify the best searchers? Overall or at stak-level?

Can we use this *reputation* information to further influence recommendation?

# Modeling Reputation

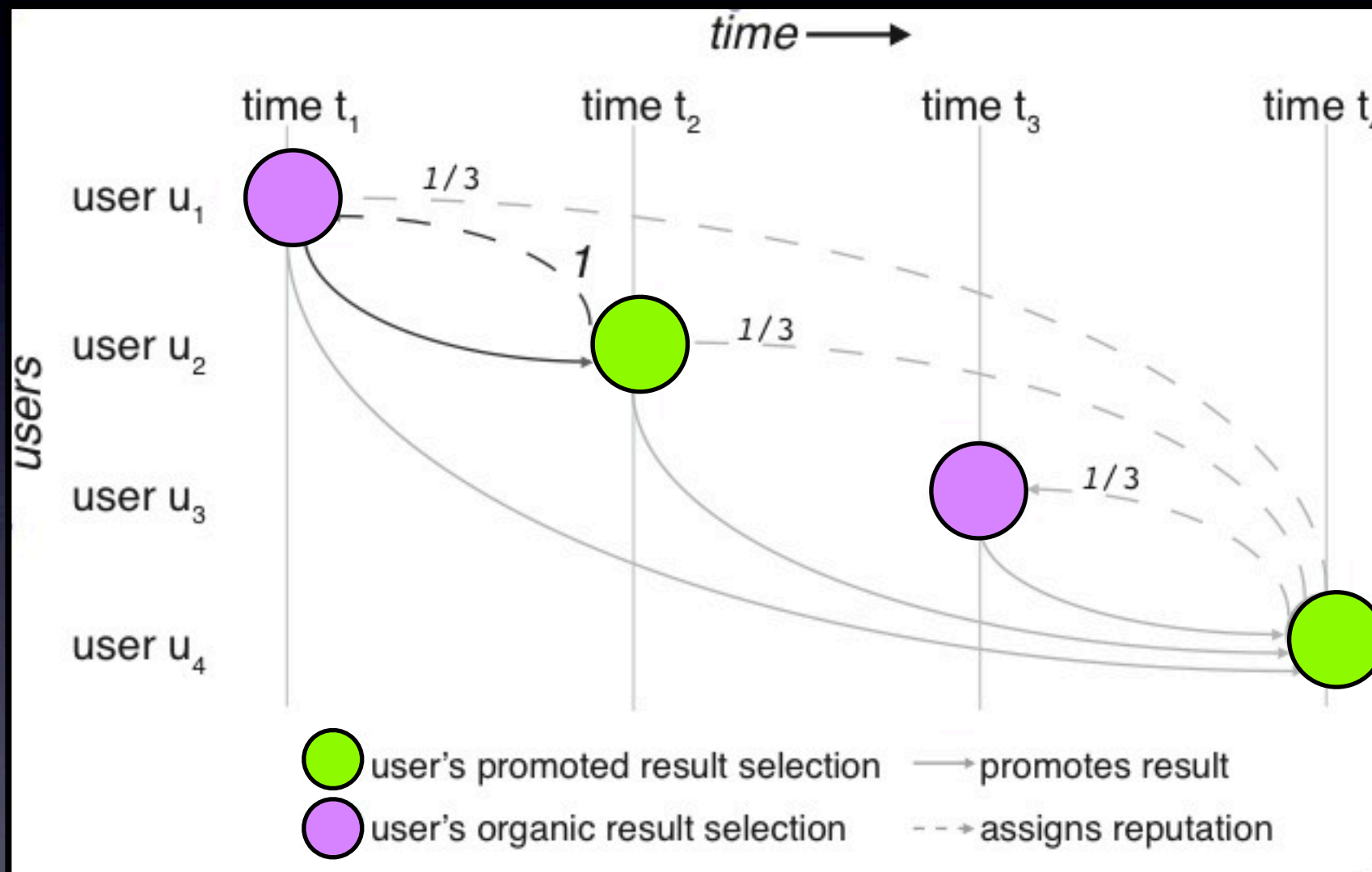


**C confers reputation on P**

*Searcher C selects a promotion previously selected by P.*



# User Reputation



*McNally, O'Mahony, Smyth (IUI, 2010)*

# Reputation Model

$$rep(p_i, t) = rep(p_i, t - 1) + 1/k$$

*Producer Reputation*

*Result Reputation*

$$repscore(r, t) = \max_{\forall p_i \in \{p_1, \dots, p_k\}} (rep(p_i, t))$$

$$rankscore(r, q_t, p_1, \dots, p_k, t) = w \times repscore(r, t) + (1 - w) \times relscore(q_t, r)$$

*Reputation Ranking*



# Initial Evaluation

## HeyStaks Reputation Trial

64 undergraduate students participated in a general-knowledge quiz using HeyStaks to guide their searches.

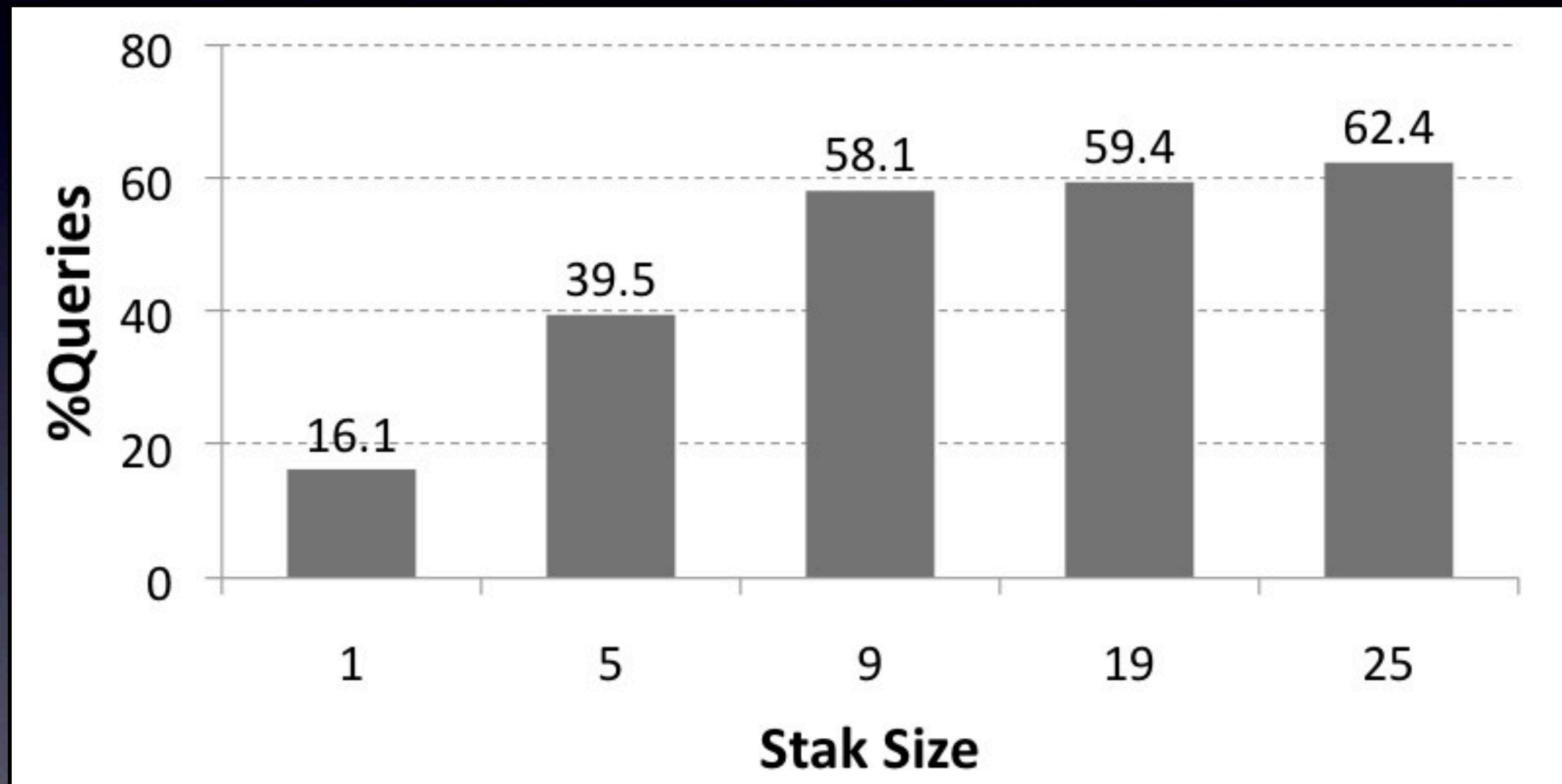
## Multiple Stak Sizes

Users were segregated into different stak sizes (1,5, 9,19, 25) to analyse the relationship between stak size and performance.

## Ground-Truth Based Performance Analysis

Fixed Q&A facilitated a definitive analysis of the relevance of organic and promoted results.

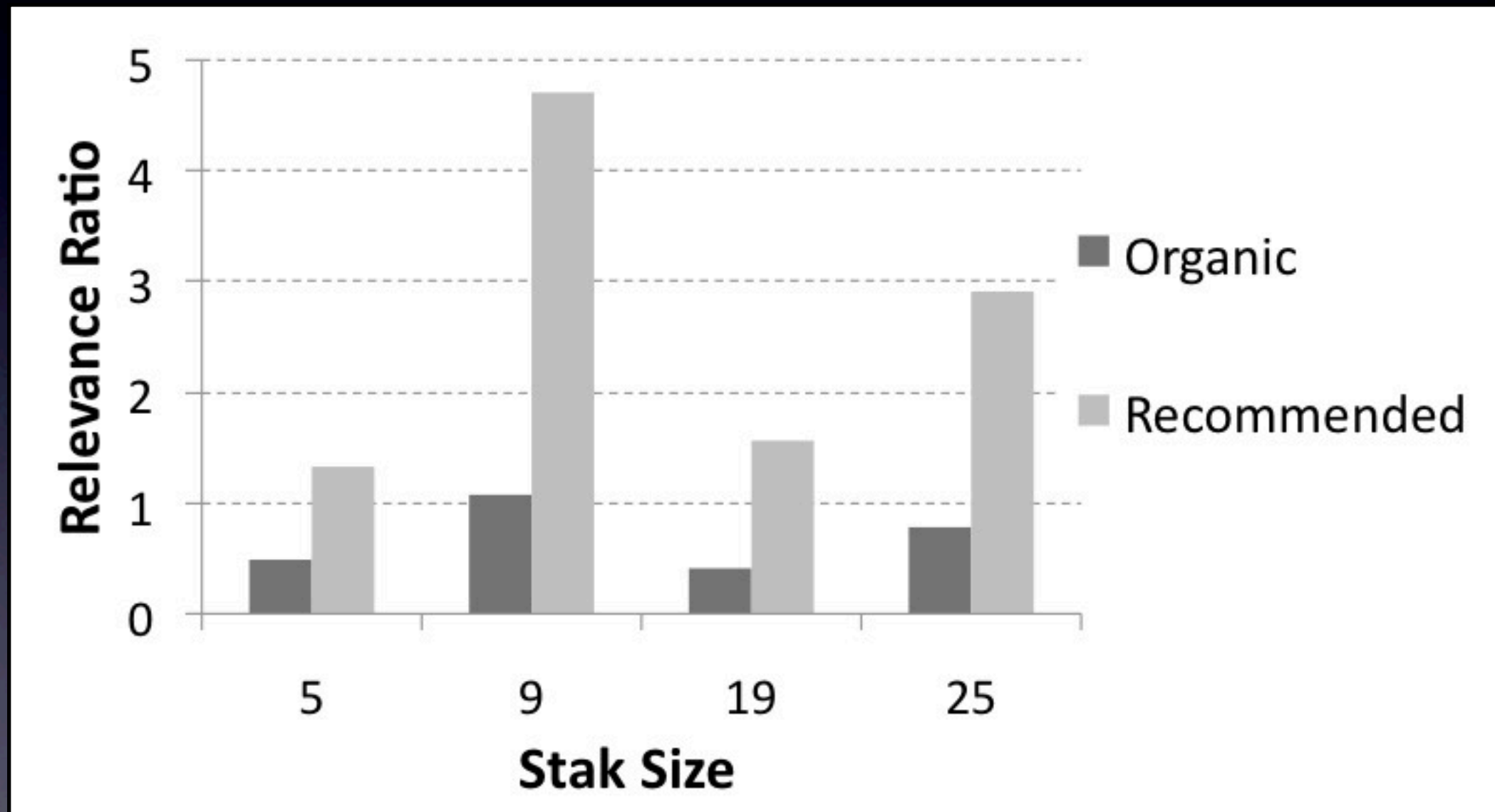
# Query Coverage



*Percentage of queries receiving promotions.*



# Organic vs Promoted

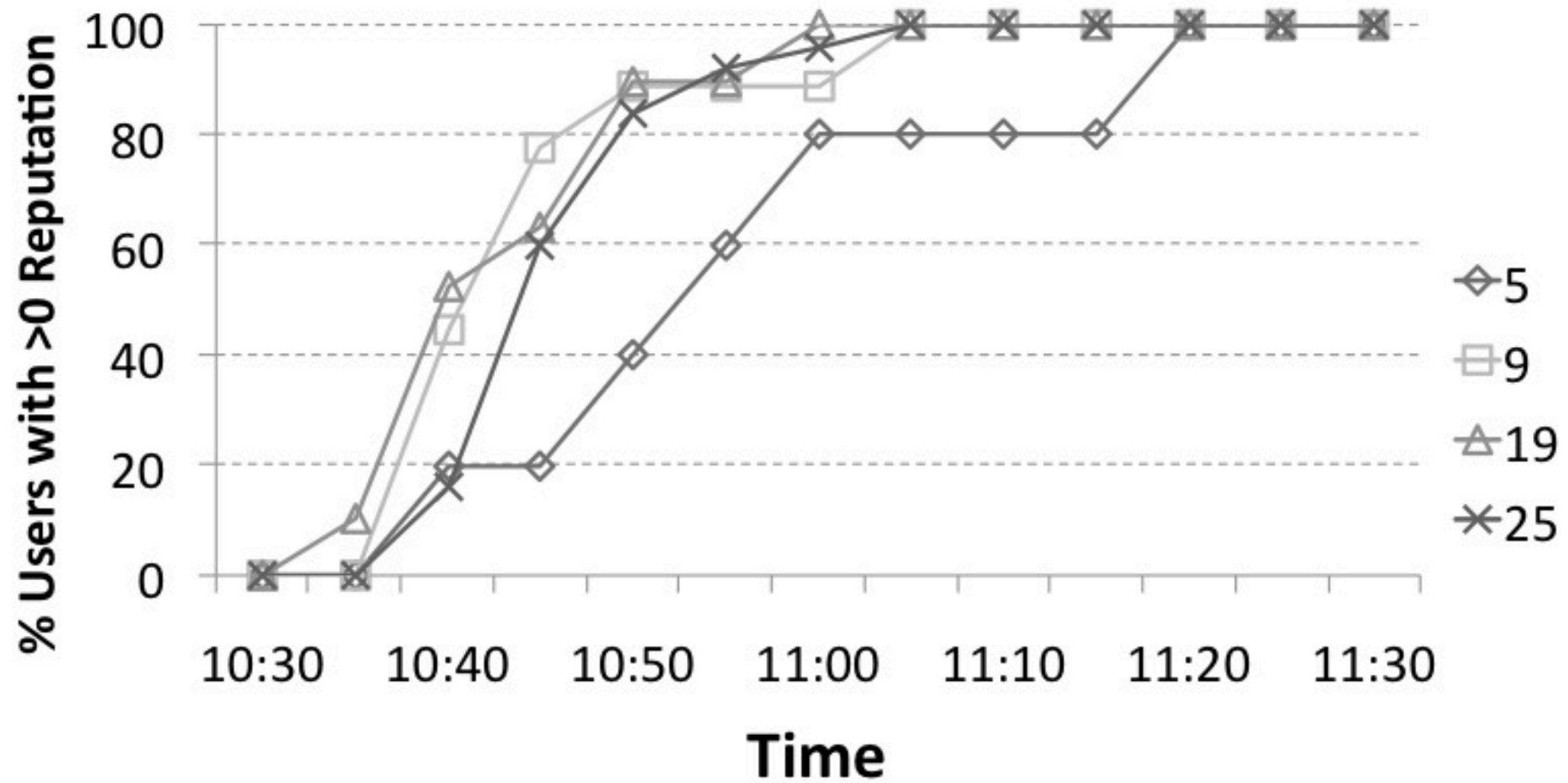


*Relative relevance of organic and promoted results.*

# Reputation Analysis



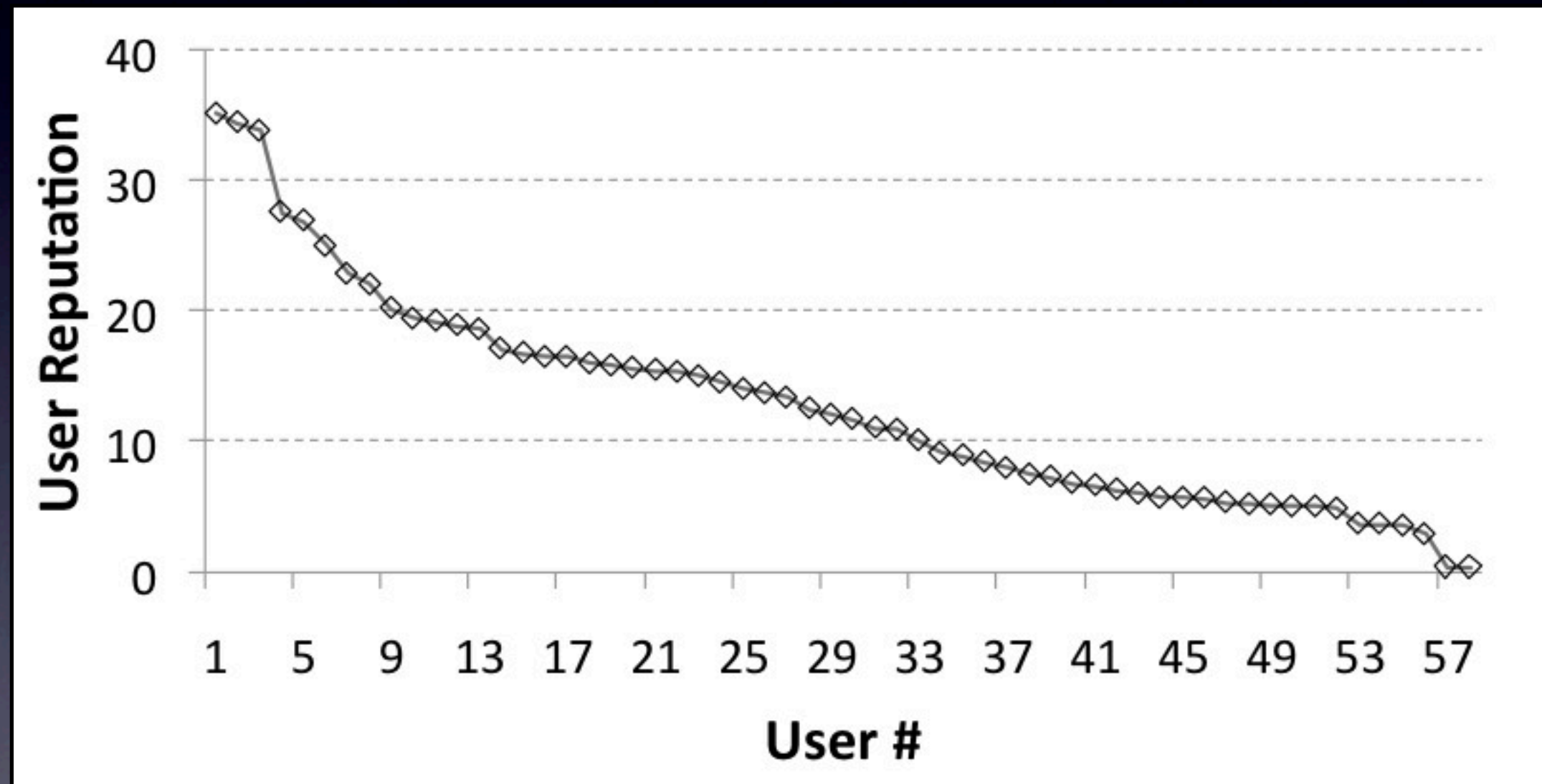
# Reputation x Time



Time

10:30 10:40 10:50 11:00 11:10 11:20 11:30

# Final User Reputation

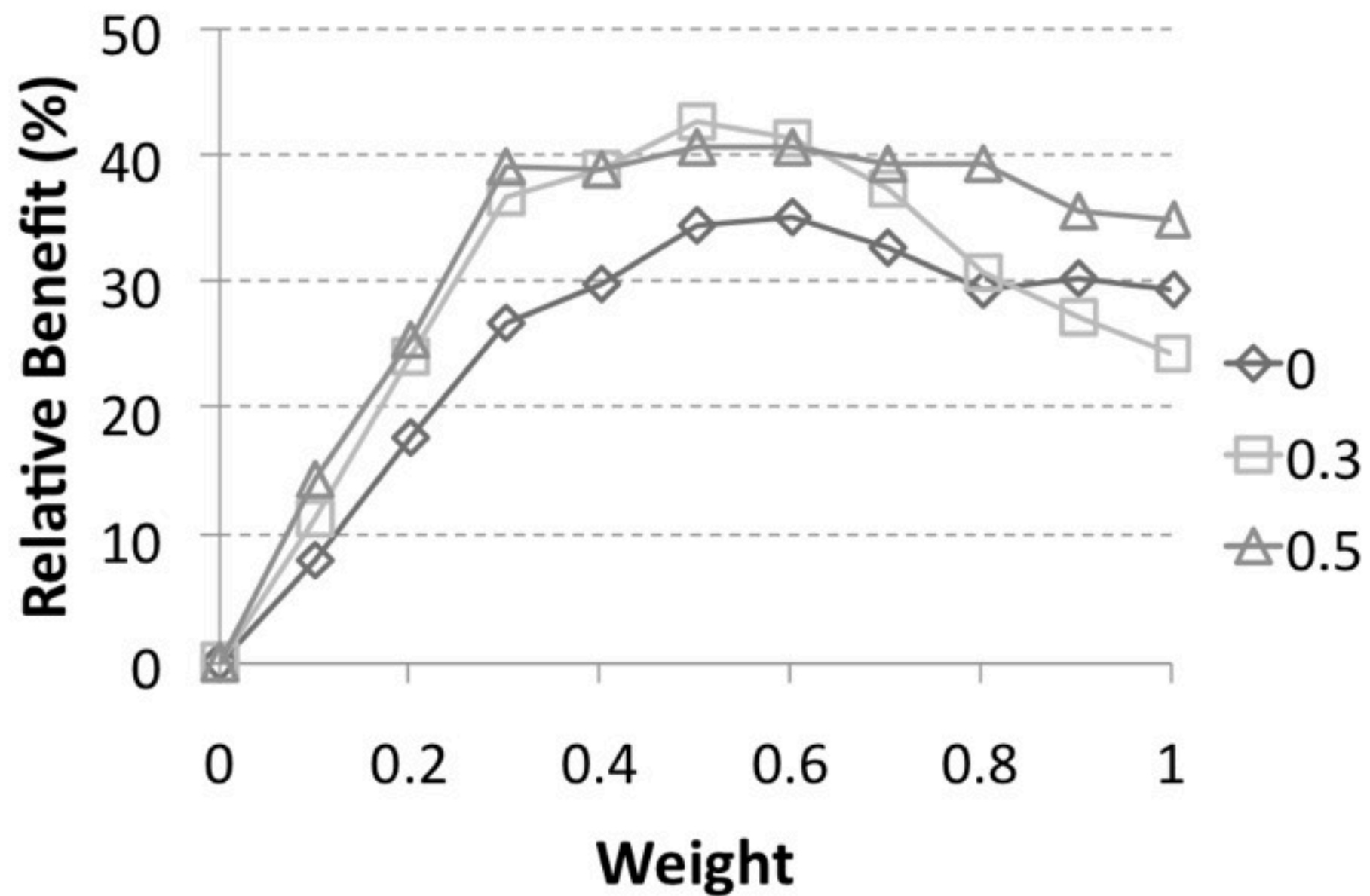


U261 #

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57



# Relative Benefit



Weight



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## HOW IT WORKS

**Try it out >**

**Create Stak** 

For example: "Winter Ski 2010", "Technology & Gadgets", "Old Irish Literature Research", "Creating a Startup", "Social Search"

**Try it out >**

**Create Stak** 

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



# Conclusions

The conservative world of Web Search is changing!

Context in Web search  $\Rightarrow$  Adaptation.

Collaboration in Web Search  $\Rightarrow$  Harnessing the Social Graph.

From relevance to reputation  $\Rightarrow$  Improved click-thru rates.

# Lessons Learned

## Mainstream Web Search Integration

There is little value in developing competing Web search offerings; users want to search as normal using their favourite search engine (Google, Yahoo, Bing, ...)

## Personalization vs User Experience

An improved user experience can translate into much greater user-takeup than incremental improvements in personalization.