Schema.org Update

Guha

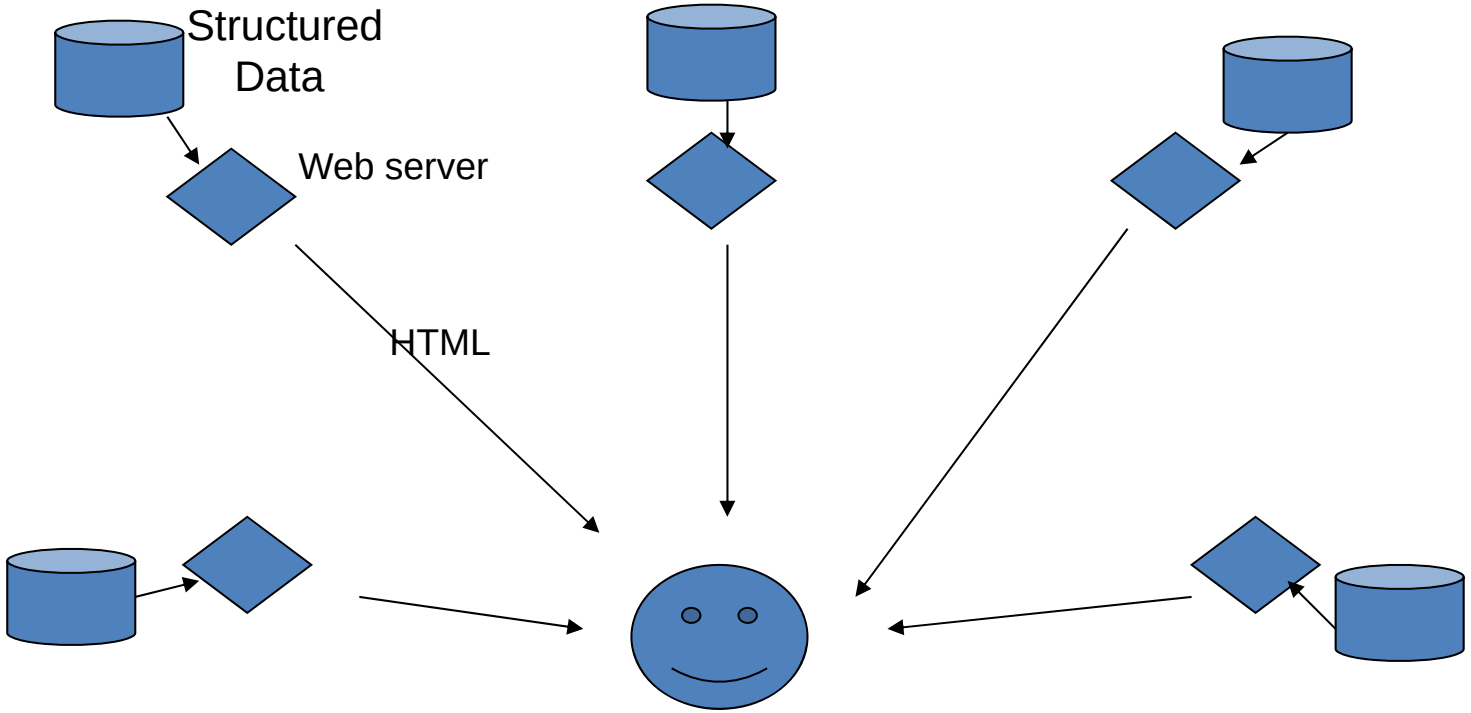
Outline of talk

- The context
  - How did we end up where we are with the ‘Semantic Web’
- Schema.org
  - What it is, status of adoption
  - Interesting examples & applications
  - Schema.org principles, how does it work
  - Schemas in the pipeline
- Research problems/opportunities

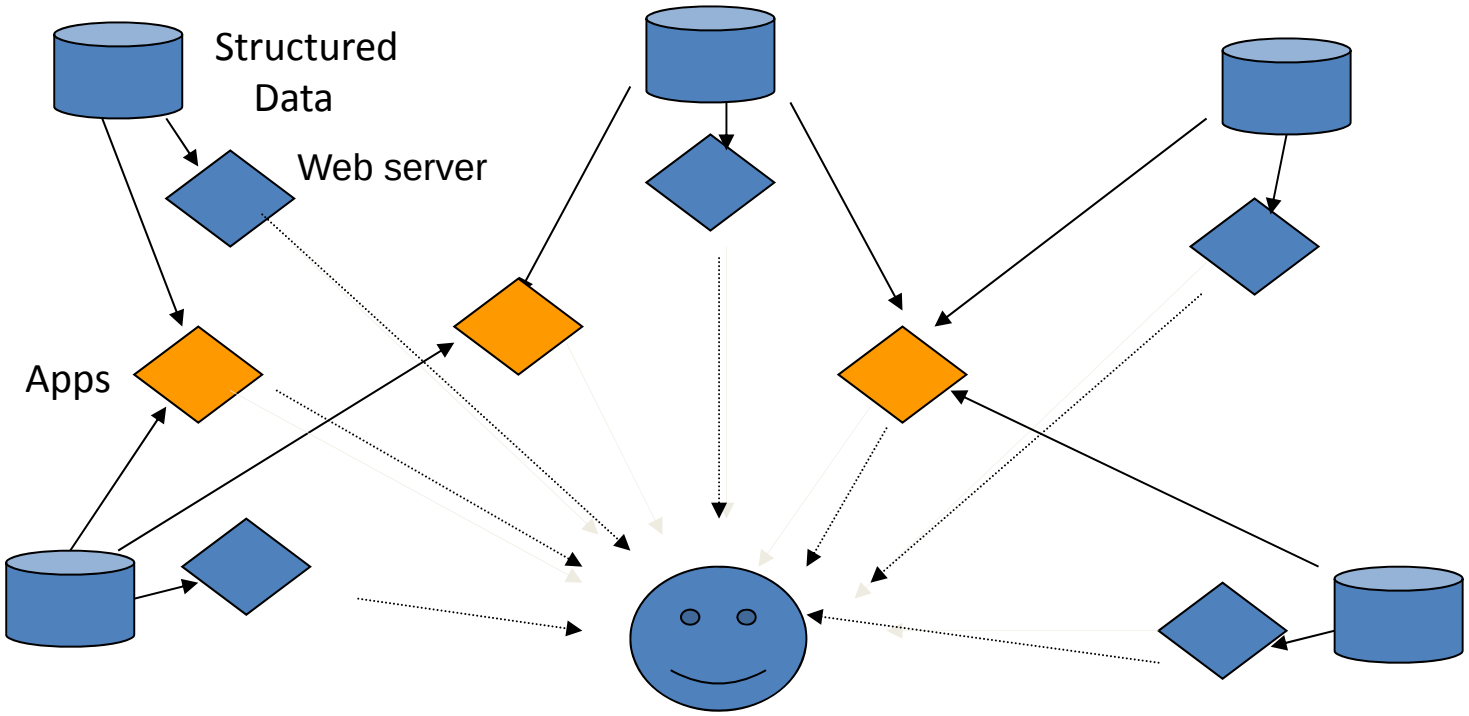
About 17 years ago, …

- People started thinking about structured data on the web
  - A few people from Netscape, Microsoft and W3C got together @MIT
- Trying to make sense of a flurry of activity/proposals
  - XML, MCF, CDF, Sitemaps, …
- There were a number of problems
  - PICS, Meta data, sitemaps, …
- But one unifying idea

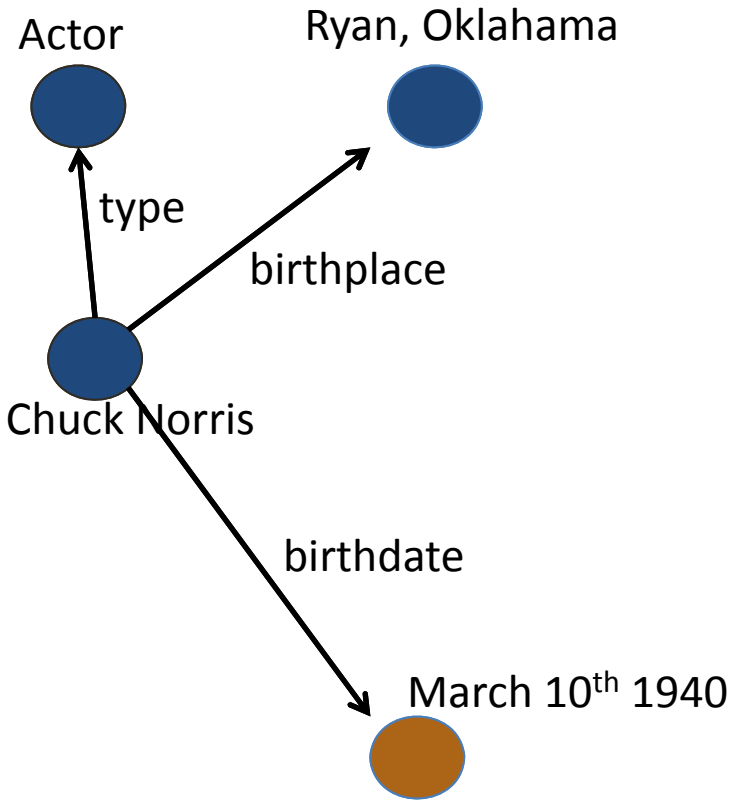
Context: The Web for humans



Goal: Web for Machines & Humans



What does that mean?



How do we get there?

- How does the author give us the graph
  - Data Model: Graph vs tree vs …
  - Syntax
  - Vocabulary
  - Identifiers for objects

- Why should the author give us the graph?

Going depth first

- Many heated battles
  - Lot of proposals, standards, companies, …
- Data model
  - Trees vs DLGs vs Vertical specific vs who needs one?
- Syntax
  - XML vs RDF vs json vs …
- Model theory anyone
  - We need one vs who cares vs what's that?

Timeline of ‘standards’

- ‘96: Meta Content Framework (MCF) (Apple)
- ’97: MCF using XML (Netscape) → RDF, CDF
- ’99 -- : RDF, RDFS
- ’01 -- : DAML, OWL, OWL EL, OWL QL, OWL RL
- ’03: Microformats
- And many many many more … SPARQL, Turtle, N3, GRDDL, R2RML, FOAF, SIOC, SKOS, …

- Lots of bells & whistles: model theory, inference, type systems, …

But something was missing …

- Fewer than 1000 sites were using these standards
- Something was clearly missing and it wasn’t more language features
- We had forgotten the ‘Why’ part of the problem
- The RSS story

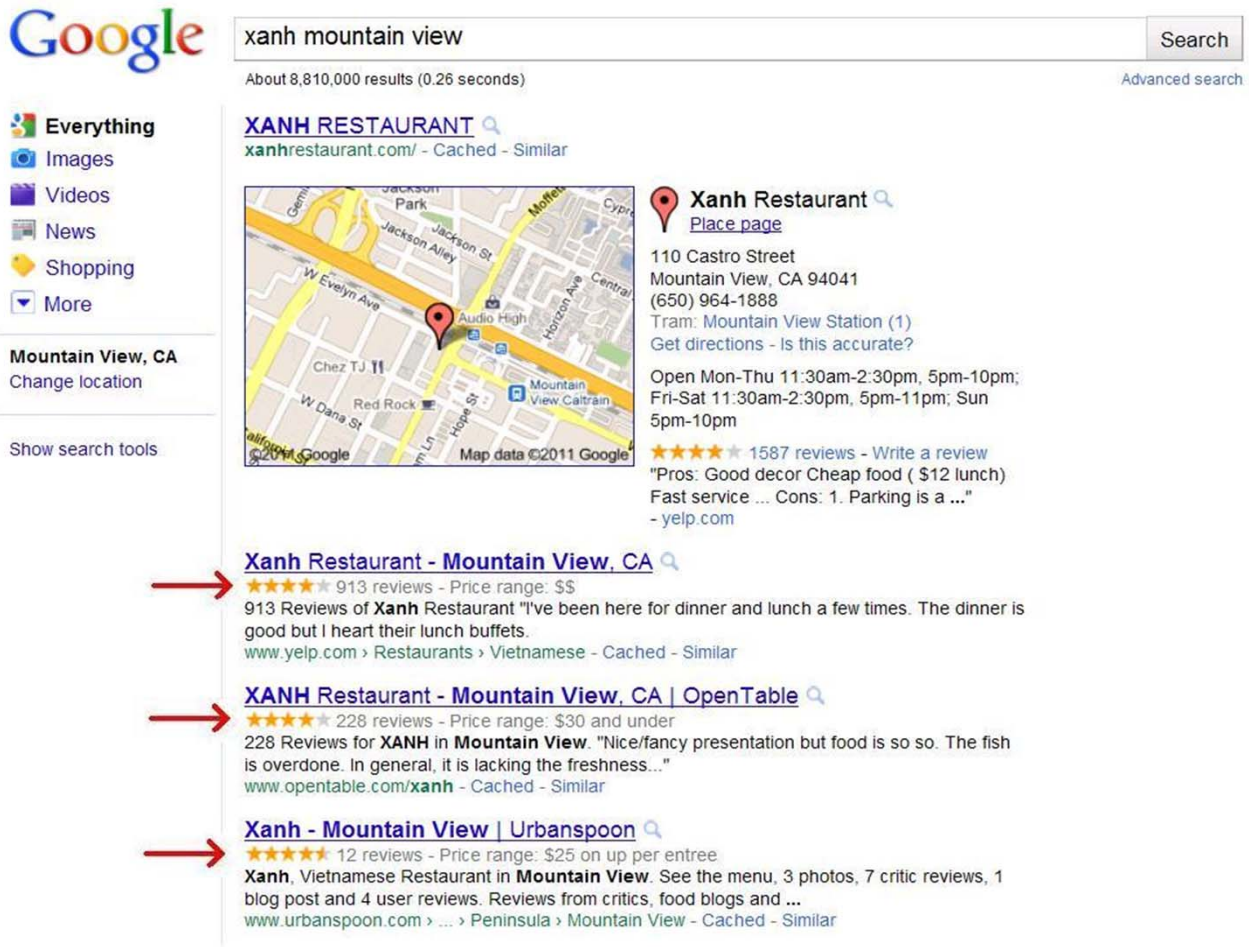
’07 - :Rise of the consumers

- Yahoo! Search Monkey, Google Rich Snippets, Facebook Open Graph
- Offer webmasters a simple value proposition
- Search engines to webmasters:
  - You give us data … we make your results nicer
- Usage begins to take off
  - 1000x increase in markup’ed up pages in 3 years

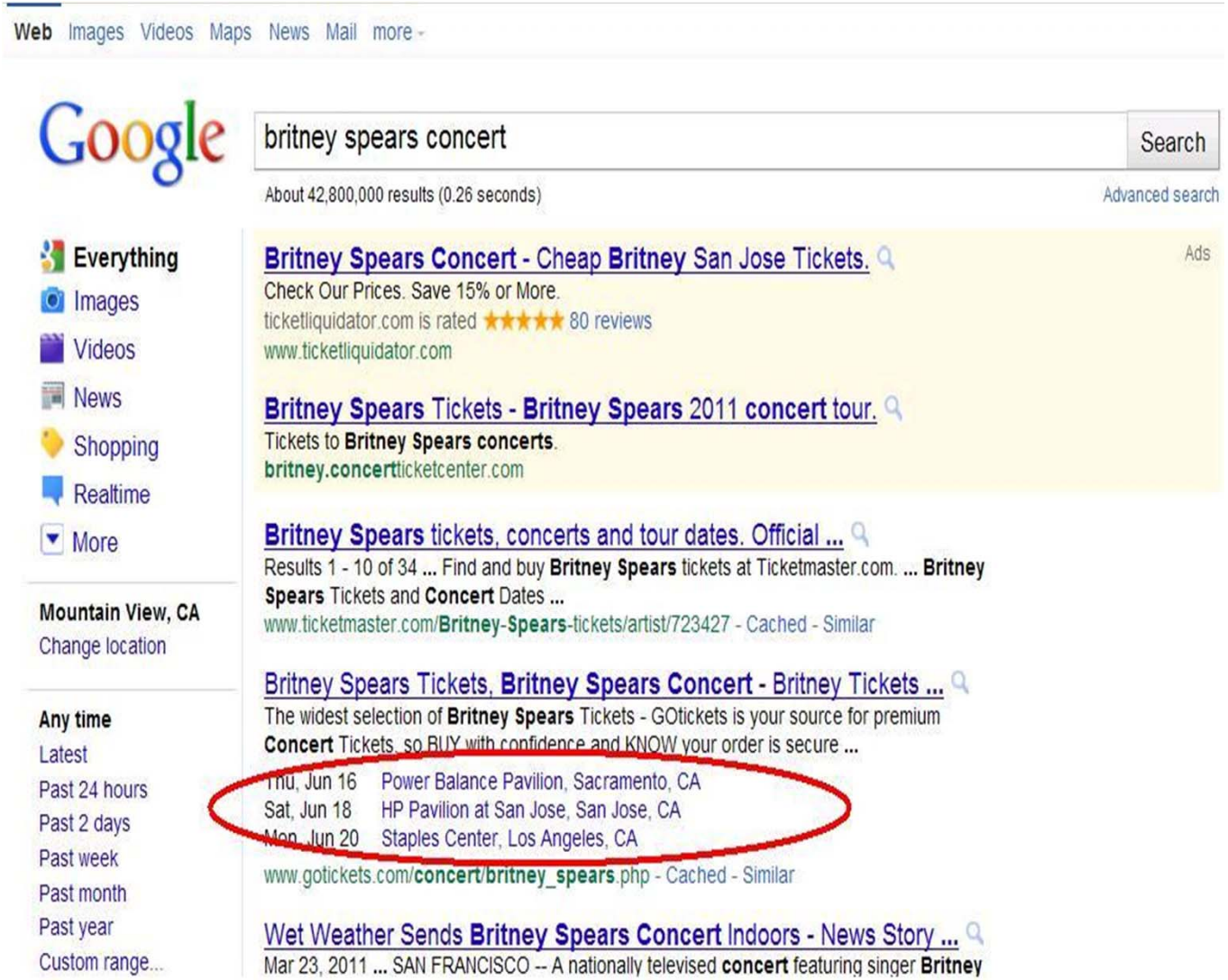
Yahoo Search Monkey

- Give websites control over snippet presentation
- Moderate adoption
  - Targeted at high end developers
  - Too many choices

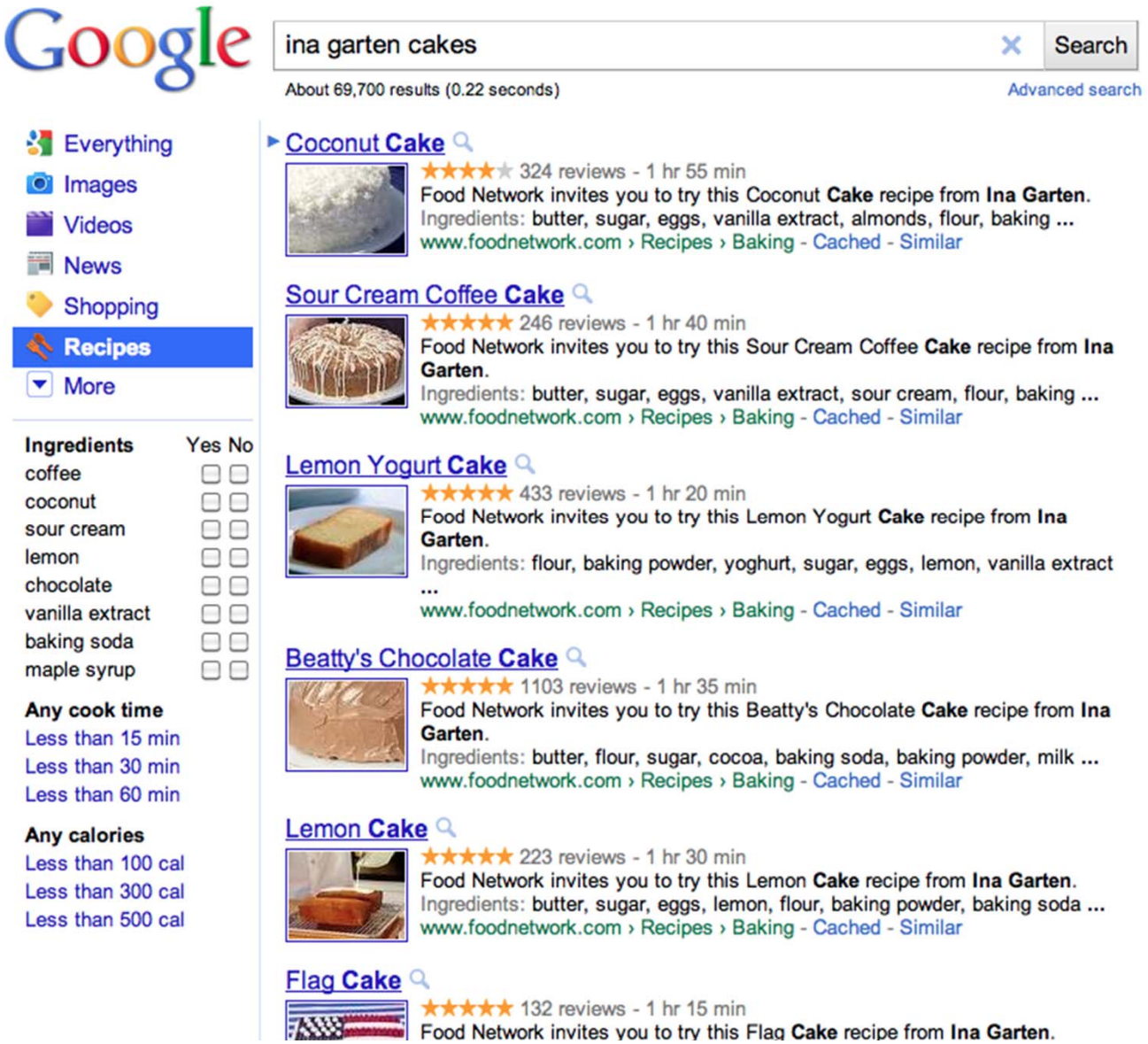
Google Rich Snippets: Reviews



Google Rich Snippets: Events



Google Rich Snippets: Recipe View



Google Rich Snippets

- Multi-syntax
- Adhoc vocabulary for each vertical
- Very clear carrot
- Lots of experimentation on UI
- Moderately successful: 10ks of sites
- Scaling issues with vocabulary

Situation in 2010

- Too many choices/decisions for webmasters
  - Divergence in vocabularies
    - Too much fragmentation
    - N versions of person, address, …
- A lot of bad/wrong markup
  - ~25% for micro-formats, ~40% with RDFA
  - Some spam, mostly unintended mistakes
- Absolute adoption numbers still rather low
  - Less than 100k sites

Schema.org

- Work started in August 2010
  - Google, Yahoo!, Microsoft & then Yandex (Baidu, sort of)

- Goals:
  - One vocabulary understood by all the search engines
  - Make it very easy for the webmaster

- It is A vocabulary. Not The vocabulary.
  - Webmasters can use it together other vocabs
  - We might not understand the other vocabs. Others might

Schema.org: Major sites

- News: Nytimes, guardian.com, bbc.co.uk,
- Movies: imdb, rottentomatoes, movies.com
- Jobs / careers: careerjet.com, monster.com, indeed.com
- People: linkedin.com,
- Products: ebay.com, alibaba.com, sears.com, cafepress.com, sulit.com, fotolia.com
- Videos: youtube, dailymotion, frequency.com, vinebox.com
- Medical: cvs.com, drugs.com
- Local: yelp.com, allmenus.com, urbanspoon.com
- Events: wherevent.com, meetup.com, zillow.com, eventful
- Music: last.fm, myspace.com, soundcloud.com

Schema.org: categories

- Most used categories by occurrence
  - Person, Offer, Product, PostalAddress, VideoObject, ImageObject, BlogPosting, WebPage, Article, AggregateRating, LocalBusiness, Place, Organization, MusicRecording, JobPosting, Recipe, Book, Movie, Blog, Photograph, ImageGallery

- Most used categories by domains
  - ImageObject, WebPage, PostalAddress, BlogPosting, Product, Person, Offer, Article, LocalBusiness, Organization, Blog, AggregateRating, Review, VideoObject, Place, Event, Rating, AudioObject, MusicRecording, Store

Schema.org: properties

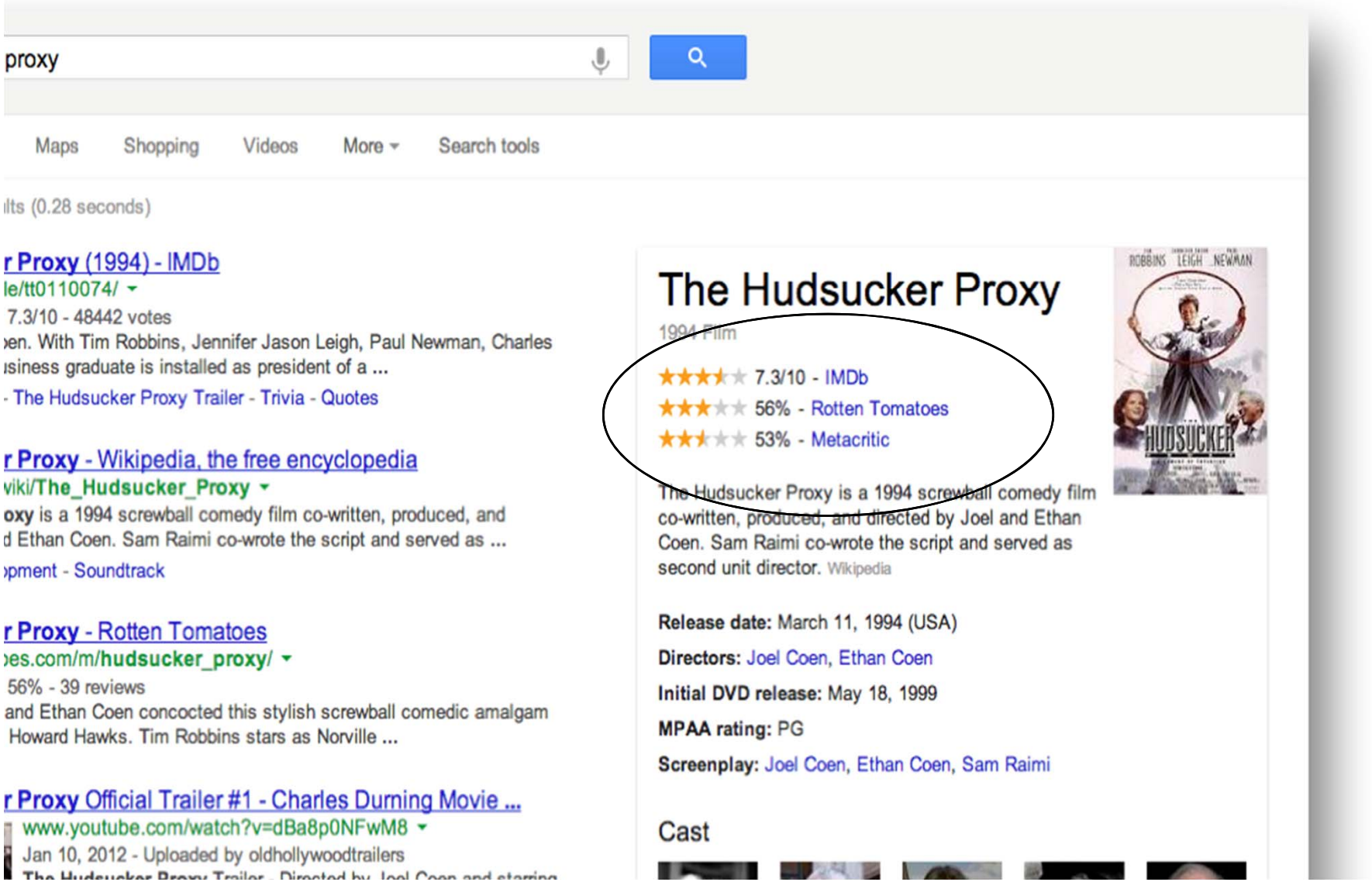
- Top properties by occurrence
  - name, url, image, description, offers, author, price, thumbnailUrl, datePublished, addressLocality, address, itemOffered, duration, streetAddress, isFamilyFriendly, priceCurrency, playerType, paid, regionsAllowed, postalCode, hiringOrganization, jobLocation,

- Top properties by domain
  - Name, description, url, image, contentURL, address, author, telephone, price, postalCode, offers, ratingValue, priceCurrency, datePublished, addressRegion, availability, email, bestRating, creator, review, location, startDate

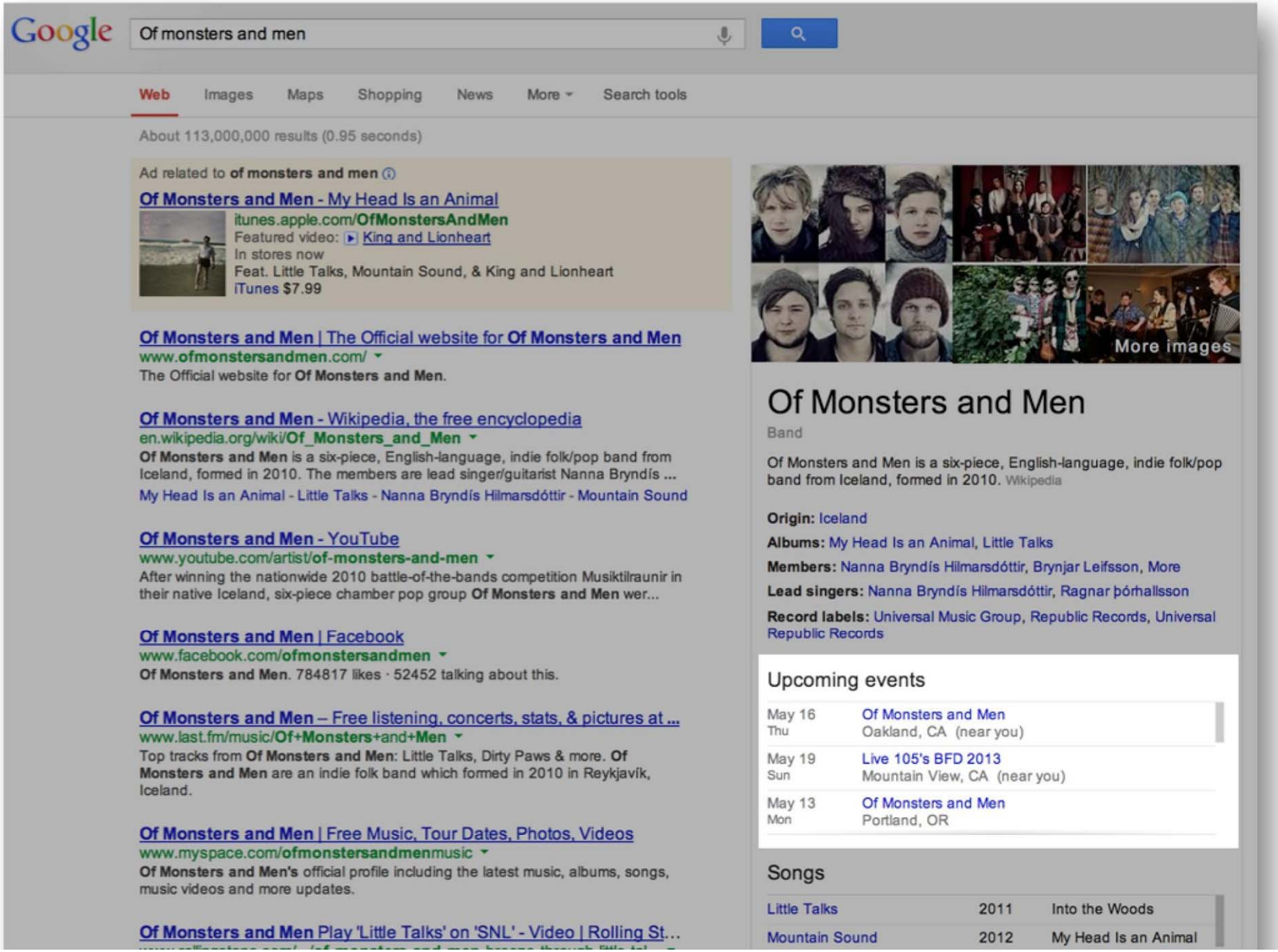
Applications

- Applications drive adoption
- First generation of applications
  - Rich presentation of search results
- Many new applications are coming up
  - On search page and beyond

Newer Applications: Knowledge Graph

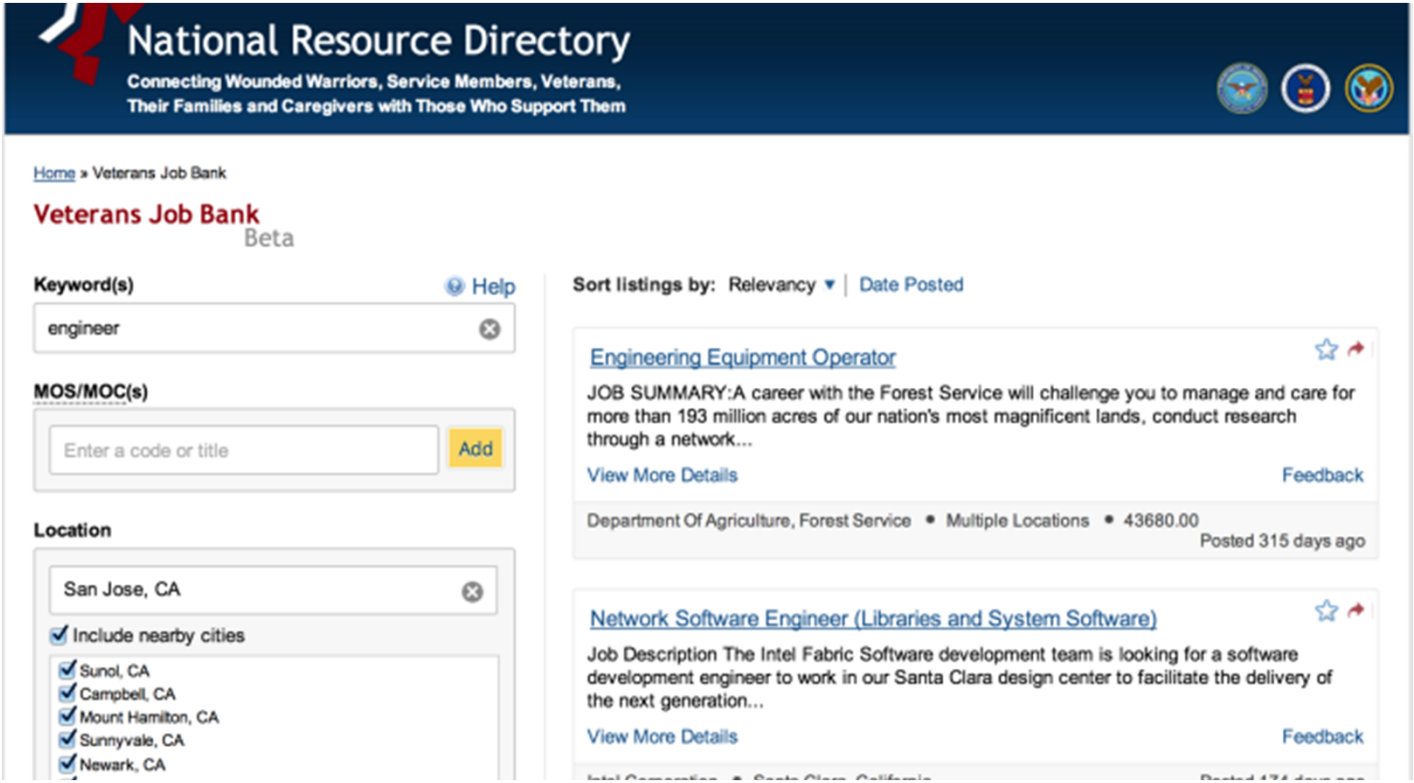


Newer Applications: Knowledge Graph

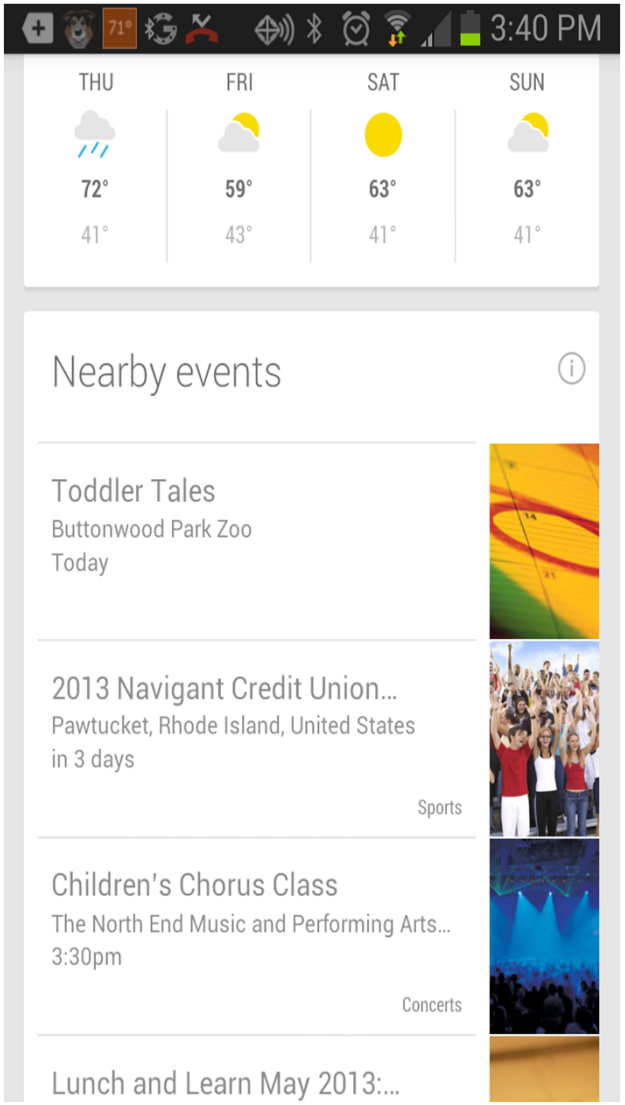


Non web search Applications

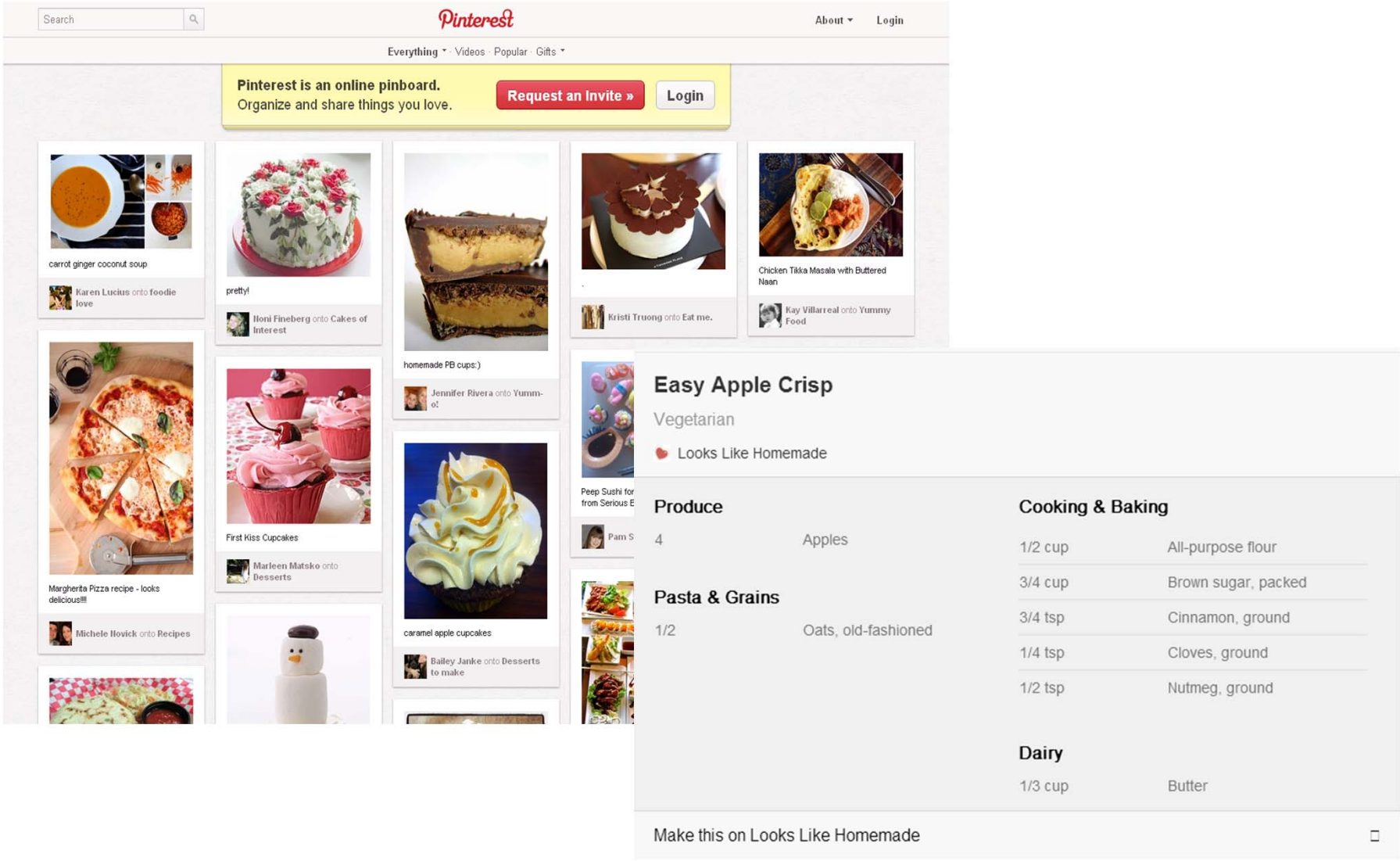
- Searching for Veteran friendly jobs



Non search applications: Google Now

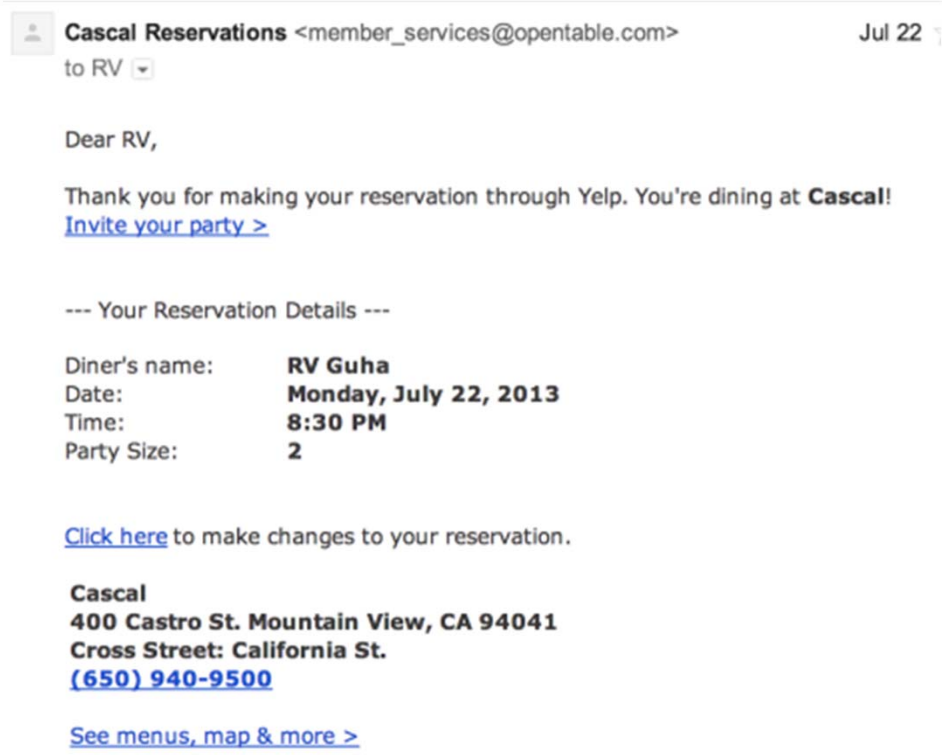


Pinterest: Schema.org for Rich Pins



Non search Applications

- Open Table website → confirmation email → Android Reminder



Cascal Reservations <member_services@opentable.com> Jul 22
to RV

Dear RV,

Thank you for making your reservation through Yelp. You're dining at **Cascal**!
Invite your party >

--- Your Reservation Details ---

Diner's name:	**RV Guha**
Date:	**Monday, July 22, 2013**
Time:	**8:30 PM**
Party Size:	**2**

Click here to make changes to your reservation.

Cascal
400 Castro St. Mountain View, CA 94041
Cross Street: California St.
(650) 940-9500

See menus, map & more >

```
<span itemscope
      itemtype="http://schema.org/Restaurant"
      itemid="/restaurant">
        Cascal
</span>

....
<span itemprop="address"
      itemscope
      itemtype="http://schema.org/PostalAddress">
     <span itemprop="streetAddress">
       400 Castro St. Mountain View, CA 94041
     </span>
</span>

...
```

Schema.org principles: Simplicity

- Simple things should be simple
  - For webmasters, not necessarily for consumers of markup
  - Webmasters shouldn’t have to deal with N namespaces
- Complex things should be possible
  - Advanced webmasters should be able to mix and match vocabularies
- Syntax
  - Microdata, usability studies
  - RDFa, json-ld, …

Schema.org principles: Simplicity

- Can’t expect webmasters to understand Knowledge Representation, Semantic Web Query Languages, etc.
- It has to fit in with existing workflows
- Avoid KR system driven artifacts
  - domainIncludes/rangeIncludes
  - No classes like ‘Agent’
  - Categories and attributes should be concrete

Schema.org principles: Simplicity

- Copy and edit as the default mode for authors
  - It is not a linear spec, but a tree of examples

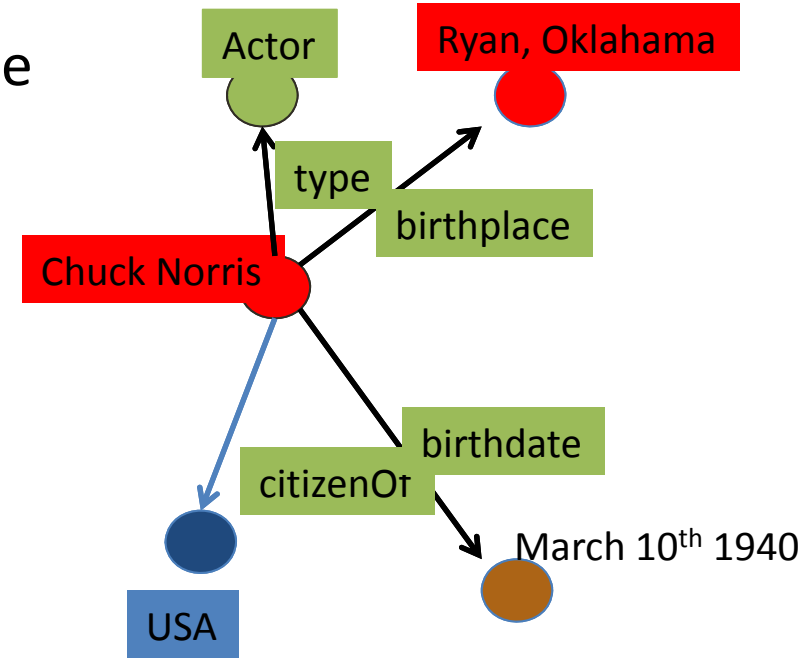
- Vocabularies
  - Authors only need to have local view
  - But schema.org tries to have a single global coherent vocabulary

Schema.org principles: Incremental

- Started simple
  - ~ 100 categories at launch
- Applies to every area
  - Add complexity after adoption
  - now ~1200 vocab items
  - Go back and fill in the blanks
- Move fast, accept mistakes, iterate fast

Schema.org Principles: URIs

- ~1000s of terms like Actor, birthdate
  - ~10s for most sites
  - Common across sites
- ~10ks of terms like USA
  - External enumerations
- ~1b-100b terms like Chuck Norris and Ryan, Oklahama
  - Cannot expect agreement on these
  - Reference by description
  - Consumers can reconcile entity references



Schema.org Principles: Collaborations

- Most discussions on public W3C lists
- Work closely with interest communities
- Work with others to incorporate their vocabularies
  - We give them attribution on schema.org
  - Webmasters should not have to worry about where each piece of the vocabulary came from
  - Webmasters can mix and match vocabs

Schema.org Principles: Collaborations

- IPTC /NYTimes / Getty with rNews
- Martin Hepp with Good Relations
- US Veterans, Whitehouse, Indeed.com with Job Posting
- Creative Commons with LRMI
- NIH National Library of Medicine for Medical vocab.
- Bibextend, Highwire Press for Bibliographic vocabulary
- Benetech for Accessibility
- BBC, European Broadcasting Union for TV & Radio schema
- Stackexchange, SKOS group for message board
- Lots and lots and lots of individuals

Schema.org Principles: Partners

- Partner with Authoring platforms
  - Drupal, Wordpress, Blogger, YouTube

- Drupal 8
  - Schema.org markup for many types
    - News articles, comments, users, events, …
  - More schema.org types can be created by site author
  - Markup in HTML5 & RDFa Lite
  - Come out early 2014

Recent/Upcoming Vocabularies

- Actions, Fleshing out Events
- Commerce: Orders, Reservations, …
- Communication: Fleshing out TV, Radio, Email, Q&A, …
- Media: Scholarly works, Comics, Serials
- Sports
- and many many more …

Big initiatives underway

- Representing time
  - Lot of triples with associated time interval
- Tabular / CSV data
  - Census data, Scientific data, etc.
  - Need mechanisms for external specification of the meaning of these tables

Research ideas

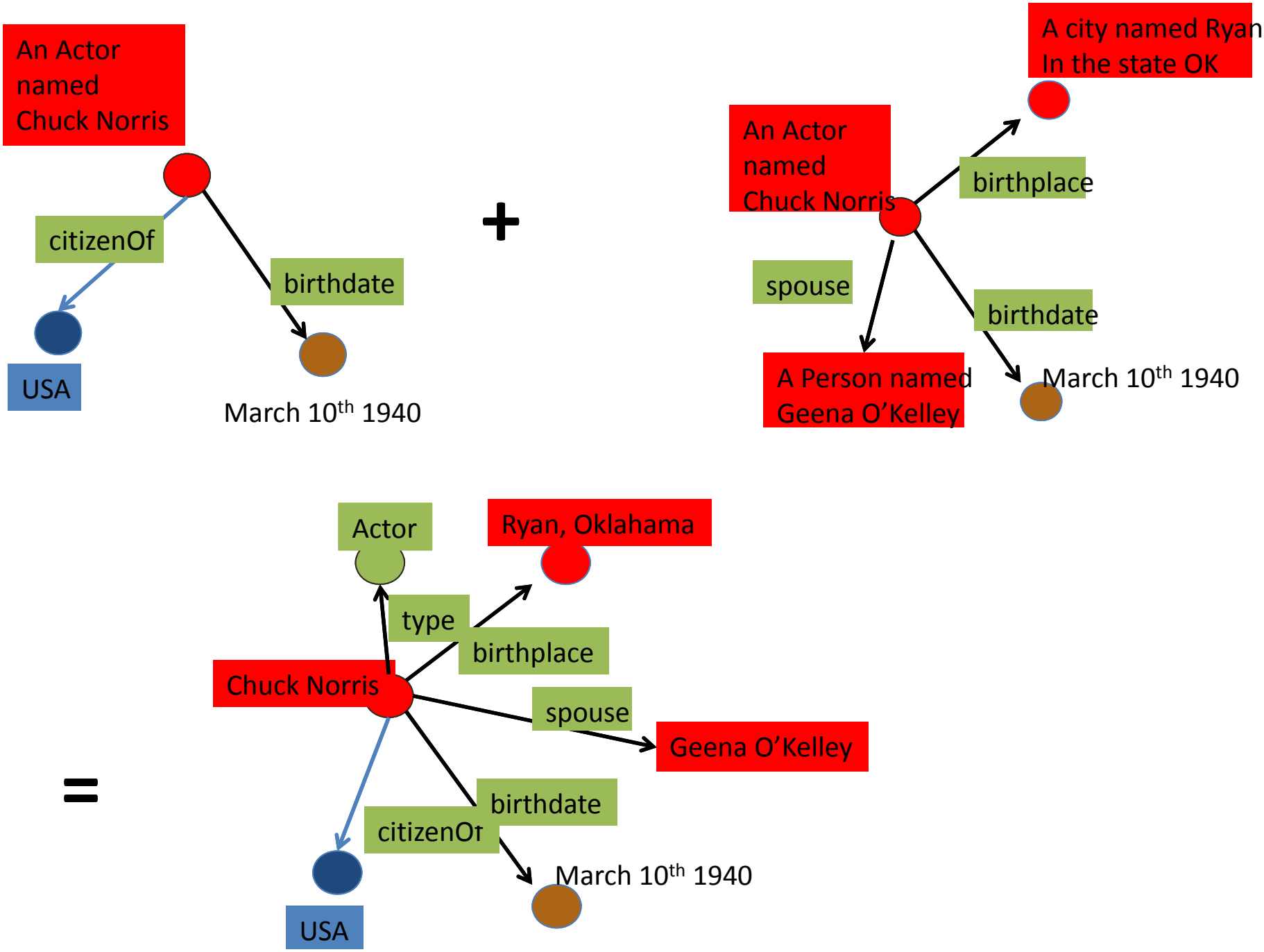
- There are a large number of projects (e.g., Nell@cmu) that are trying to extract triples from the web

- Schema.org markup == Very large training set

Research Idea: Stich

- Billions of triples sharded across millions of sites
- Lots of common entities, but no cross pointers

- Need to put together the graph
  - Like solving the puzzle


An Actor named Chuck Norris
citizenOf
birthdate
USA
March 10th 1940
+
A city named Ryan In the state OK
An Actor named Chuck Norris
birthplace
spouse
birthdate
A Person named Geena O'Kelley
March 10th 1940
=
Actor
Ryan, Oklahama
type
birthplace
Chuck Norris
spouse
Geena O'Kelley
birthdate
citizenOf
March 10th 1940
USA

Lessons from schema.org

- Schema.org has succeeded beyond anyone's imagination

- Make sure you have your carrot!
  - Carrots work much better than sticks!
- Find the right initial level of generality
- Start simple and iterate fast

This program was brought to you by the generous support from folks at Microsoft, Yandex, Yahoo!, Google and over five million webmasters

Questions?