The End of Applications

David Karger

MIT
One standard data model is coming

Google/Microsoft/Facebook knowledge graphs
Schema.org

Big benefits for end-user information management

Power to author (not program) my own information management tools
Over whatever data I care about
More control of my data
Loss of power by content carriers (disintermediation)
Personal Information Management

Hard to define
Information I work with “for me” (but may encompass my work roles)
Casual (but some people take it very seriously)
 Unsophisticated users (except for those who are very sophisticated)

Key: personalization aspect
Everyone wants to work with own information selection
Organize, visualize, interact with information their own way

Computers’ main contribution: obstacle!
Force us to manage info their way
Applications force us to fragment our information

Schemas/visualizations are set by developers
Can’t store, view, or connect what we want

Long-recognized problem

Desire for unified, task-oriented interfaces
Very little progress

Data renaissance will solve it

Everyone shapes own applications for own tasks
Gathering necessary data at will

Jones, Teevan (Eds.) PIM 2007
A Data Renaissance: Dark Ages ➔ Modern

**Data Baronies**
Companies create rich structured data sites
People only create text --- blogs, wikis

**Data Fortresses**
Domain-specific sites/applications
Rare to work across application boundaries

**Data Serfs**
Users author content
Companies hold it tight and monetize it

**Data Democracy**
Everyone authors rich structured data
No programming/database/UI expertise needed

**Free Movement**
Flexible interfaces gather all data needed for a task
No boundaries, just overlapping data assemblies

**Data Freeholders**
User content all in personal repositories
User permits access by companies/services
Today’s Data Baronies
Most Sites Are Same-Old CRUD

All provide same interactions
CRUD: Create, Read, Update, Delete information
Over some sort of relational data model

All draw from same visualization/interaction palette
View a collection of items (list, thumbnails, map)
Presented in a uniform template
With faceted browsing and text search to navigate
And forms to edit

Many sites are just CRUD for a specific domain
Flickr (photos), Youtube (movies), Epicurious (recipes), Ravelry (Yarn), B&N (books)....
Data

Items (Recipes)
Each has properties
Title
Source magazine
Publication date
Rating
Ingredients

Can imagine as spreadsheet
One item per row
Columns for properties
Show a collection
Sortable list (here)
Bar chart
Map
Thumbnail set

Bound to properties
Sort by property?
Plot map using which property?

HTML:

```html
<view type="list" sort="price"/>
```
Templates

Format per item
HTML with “fill in the blanks” from data

HTML:
<template>
  <div> <b> <span content="title"/> </b> </div>
  <div> <span content="magazine"/> </span>
  <span content="date"/> 
</div>
</template>
Facets (& Text Search)

Way to filter a collection
Specify a property
E.g. ingredient
User clicks to pick
Restrict collection to matching items

HTML

```html
<facet type="list" expression="ingredient"/>
```
A Very Simple Language

Data
E.g. spreadsheet
Rows are items, columns are properties

Views
Ways of looking at collections of items
Lists, Thumbnails, Maps, Scatter plots
Specify which properties determine layout

Templates
Describe how to display a single item
What properties should be shown where

Facets
For filtering collection
By lists, numeric ranges, text search
Specify filtering property
Putting End Users in Charge

Over a common data model
Identify common visualization elements
Define new HTML tags describing them
End users author (not program) these tags
Users personalize applications to their tasks/data
Developers no longer involved
Could Users Author This?

Already doing so in spreadsheets
The application of choice when there is no application
Write some data (spreadsheet columns)
Choose a view from a collection of possible charts
Associate with data columns
Style as you like

Web equivalent?
### Image tags

```html
<img src=....> 
```

### Commonplace

Any user expects to be able to embed in their documents

### Built in

All editing tools support
Because it just involves placing a tag in the document
An interactive web site from 2 static files
Author HTML + data-HTML to describe presentation
Link to a data file: spreadsheet, CSV, XML, JSON...

Exhibit JavaScript library
Interprets new data-HTML tags
Implements widgets the tags specify on the data

All runs in user’s browser
Nothing to install or configure

Deployed in 2007
1800 sites, 1M hits
Examples

Department directory

MIT
Unsafe bridges

Minneapolis Star Tribune

Bridge watch: Rating Minnesota’s bridges

More than 300 Minnesota bridges receive special scrutiny because of structural deficiencies, outdated design features that make them functionally obsolete or use of gusset plate connectors similar to those on the Interstate 35W bridge that collapsed. Not all of these bridges rank low on the federal government’s 100-point rating scale, however. Generally, a rating below 80 means the bridge needs some rehabilitation, while those of 50 or less may need to be replaced. The map includes main highway bridges and about 35 local bridges that use gusset plates. The data is from the most recently available National Bridge Inventory database and from Minnesota Department of Transportation reports.
Examples

Russian Justice Initiative

Cases at the European Court for Human Rights
State of Oregon

Mineral Information Layer
## Examples

### Publications

**Education Policy and Data Center**

EPDC provides policy-relevant analysis derived from education data and indicators. EPDC uses its expertise in visualizing and analyzing data and focuses its policy work on existing and emerging issues in education policy and practice. The analysis is presented in reports, policy briefs, and technical papers.

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<th>Count</th>
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<tr>
<td>GAR Background Paper</td>
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<tr>
<td>Policy Brief</td>
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**38 Items**

- **1. Educating the World’s Children: Patterns of Growth and Inequality**
  - **Author:** Wils, Carroll, and Barrow
  - **Year:** 2005
  - **Topic(s):** Education Inequalities
  - **Type(s):** Report
  - **Description:** This report analyzes long-term historical trends of primary and secondary school entry, presents projections of education growth to 2025 for 70 countries, and provides alternative estimates for when these countries will reach universal primary education. It examines sub-national inequality of schooling and the impact of inequality on education growth.

- **2. Educational Inequality within Countries: Who are the Out of School Children?**
  - **Author:** Ingram, Wils, Carroll, and Townsend
  - **Year:** 2007
  - **Topic(s):** Education Inequalities
  - **Type(s):** Policy Brief
  - **Description:** This policy brief calculates the correlation of school attendance with four characteristics of pupils: household income, region of residence, urban/rural residence, and gender, and finds independent relations for each of the four characteristics. The relations are strongest for income and region, and...
Floorball in Europe
Examples

Library holdings
Columbia Law Library
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**6th Street Ocarina**

- **6th Street 9 Hole Soprano**
  - $42
  - F3-A5
  - Buy: USA
- **6th Street 10 Hole Soprano**
  - $44
  - F3-Bb5
  - Buy: USA
- **6th Street 10 Hole Alto**
  - $54
  - C5-F6
  - Buy: USA
- **6th Street 9 Hole Zelda**
  - $50
  - C5-F6
  - Buy: USA
Approved drug list
California Dept. of Health

PLEASE READ THIS
Source data for this look-up tool was LAST UPDATED 03 MAY 2012.
This tool searches the CONTRACT DRUG LIST and returns all items in the therapeutic class.
If your search yields too many items, click on the HIGHLIGHT button.
This will highlight the requested search term within the results.
If your search returns no results, the drug requested may not be part of the Contract Drugs List.
To clear the search field, click on the GARBAGE CAN button.
The Medi-Cal Contract Drug List is also available on Epocrates.

ANALGESICS, NARCOTICS

FENTANYL 25MCG/HR PATCH, TRANSDERMAL 72 HOURS
Restricted to NDC labeler code 50458 (Janssen) and to a maximum of ten (10) transdermal patches per dispensing and a maximum of three (3) dispensings of any strength in a 75-day period only.
mgf codes 50458
DURAGESIC

FENTANYL 50MCG/HR PATCH, TRANSDERMAL 72 HOURS
Restricted to NDC labeler code 50458 (Janssen) and to a maximum of ten (10) transdermal patches per dispensing and a maximum of three (3) dispensings of any strength in a 75-day period only.
mgf codes 50458
DURAGESIC

FENTANYL 75MCG/HR PATCH, TRANSDERMAL 72 HOURS
Restricted to NDC labeler code 50458 (Janssen) and to a maximum of ten (10) transdermal patches per dispensing and a maximum of three (3) dispensings of any strength in a 75-day period only.
mgf codes 50458
Teacher Bonuses

Tampa Bay Times

Teacher bonuses by school

About 4,700 Hillsborough educators received a $2,100 bonus through the state's Merit Award Program. Teachers, school-based administrators, guidance counselors and other instructional personnel were eligible. Student test scores and performance evaluations from 2006-07 determined who got the money.

Use the links to see how schools stacked up as of last spring:

Refine results by:

School Name
1. Adams Middle
2. Alafia Elementary
3. Alexander Elementary
4. Alonso High
5. Anderson Elementary
6. Apollo Beach Elementary
7. Combination
8. 133 Elementary
9. High
10. Middle

Add a level filter

Percent of students on subsidized
Percent of minority students

Adams Middle
Level: Middle
Merit pay recipients: 38
Educators eligible: 85
Percent receiving bonus: 44.7

Alafia Elementary
Level: Elementary
Merit pay recipients: 30
Educators eligible: 51
Percent receiving bonus: 58.8

Alexander Elementary
Level: Elementary
Merit pay recipients: 25
Educators eligible: 54
Percent receiving bonus: 46.3

Alonso High
Level: High
Merit pay recipients: 74
Educators eligible: 177
Percent receiving bonus: 41.8
Authoring

HTML language extension, so author like HTML

Hackers can edit source
And lots of people “author” pages by copying someone else’s

Others can use any favorite tool
Write in a blog using blog post editor (Datapress extension for Wordpress)
Write in a wiki using wikitext (Wibit extension for Mediawiki)
Write a document with a WYSIWYG editor (DIDO editor)
Beyond CRUD

Sometimes, task-specific data processing
Calendar alarm, spell check, music library cleanup, reconcile checkbook, complex queries

Data standard will simplify end-user programming
Computational widgets can be wired to data (e.g. facets)
Single data model makes them general purpose, interoperable
End users can author and share ‘macros’
“App store” for views and widgets

Example: Atomate (2009)
User writes rules and actions in controlled natural language
Refers to entities and relations in their data
When data changes to make rules true, actions are triggered
On the web: If This Then That (ifttt.com)
Personal Data Repositories

Natural consequence
Sites hold data because only they can manage it
Once anyone can manage it, why use a site?

I keep my own data
I own it
I decide who can do what with it

Data hosting providers
Hold my data
But can’t see it (encrypted)
Dropbox, Microsoft, Mastercard, Post Office?
Different pieces may be in different places
Libertarians keep it on personal devices

Services ask me for it
I write a review “on Amazon”
It’s actually in my own repository
It shows up at Barnes and Noble too
Wordpress posts it on my “blog”
(just a feed of anything I want public)
Netflix uses it to recommend movies to me

No more facebook?
Everyone generates their own “feed”
Friends have permission to access
Hosting provider serves requests for it
Aggregation is a commodity service
The End of Applications

People can manage and visualize their data their way
Content verticals shrivel to dumb data repositories
Providers will humbly offer to process my data for me
Grim future for embedded advertising
“App store” for views, facets, templates, widgets
In-page structure improves speech interaction (Louise)
End

David Karger
http://simile-widgets.org/exhibit