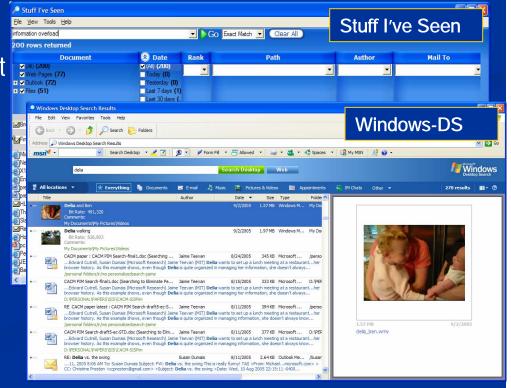
### Desktop Search

### Susan Dumais Microsoft Research http://research.microsoft.com/~sdumais

SIMS 141: October 17, 2005 Search Engines: Technology, Society, and Business

# Outline

- Search  $\neq$  Web Search
  - E.g., Desktop Search, and many verticals
- Desktop Search ≈ *My Stuff*
- Stuff I've Seen (SIS)
  - Case study: Research prototype system, deployment experiences, usage data
  - → MSN Desktop Search; MS Vista Search (<u>http://toolbar.msn.com</u>)
- Future directions
  - Contextualized search
  - Personalized search



# My Stuff

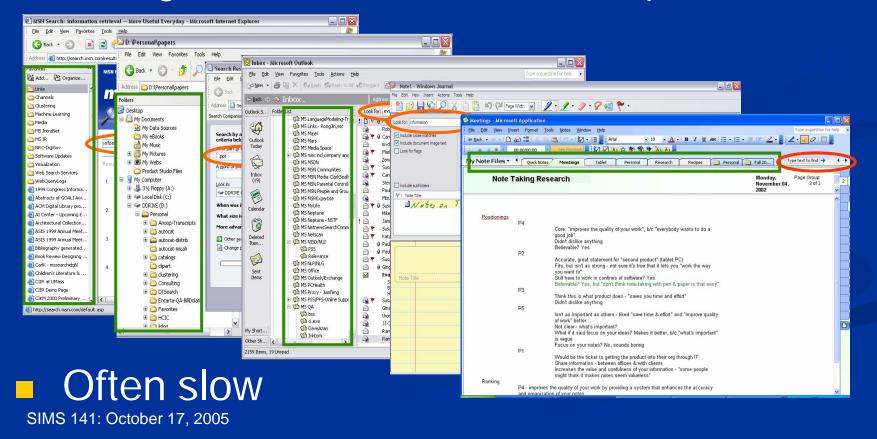
#### Information acquisition vs. access

- Easy to create or encounter lots of information
  - Types: email, docs, web pages, calendars, pictures, music, etc.
  - Amount: 100+ gig drives
- Hard to organize
- And, even harder to re-find
- Information discovery vs. recovery
  - Many tools for finding information (discovery)
  - Fewer tools for keeping information (recovery)
  - Yet, many tasks involve re-using information

## **Desktop Search Today**

### Information silos

 Many locations, interfaces for finding things (e.g., web, mail, contacts, docs, photos, notes)



### **Desktop Search With SIS**

### Unified index of stuff you've seen

- All types of info (e.g., files, email, calendar, contacts, web pages, rss, im)
- Index content plus metadata (e.g., time, author, title, size, usage)
- Automatic and immediate update of index

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- Rich UI possibilities, since it's your content (e.g., consider usage)
- Get back to information you've seen
   Recovery vs. discovery
  - SIMS 141: October 17, 2005

### **Related Work**

#### Research projects

- Haystack [Adar et al., 1999; Huynh et al. 2002]
- Keeping Found Things Found [Jones et al., 2001]
- MyLife Bits [Gemmell, Bell et al., 2002]
- Lifestreams/Scopeware [Fertig, Freeman, Gelernter, 1996]
- Commercial systems/software
  - OS: Mac OS X Spotlight, MS Vista Search
  - DS Apps: Enfish, dtSearch, Copernic, X1/Yahoo!, G-DS, MSN-DS, etc.

#### What's new with SIS ...

- Full content and metadata for many different sources
- Extensible architecture (gather, filter, word break)
- Focus on user interface and user experience
- Iterative design guided by usage and experimental data

## **SIS Design Principles**

Indexing experience ... No additional work is required User sees something, and it gets indexed Retrieval experience ... Fast, flexible Interactive refinement Sort and filter on metadata Note: Sort/filter automatically triggers query Ul innovations Previews, Top/Side, Sort order Richer visualizations

## SIS Demo

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### **SIS Architecture**

- Indexing infrastructure uses MS Search components (note: IR platform)
  - Gatherer interface to content sources, e.g., files, http, MAPI
  - Filters decode different file types, e.g., word, powerpoint, html, pdf, journal notes
  - Tokenizer break into words, including date normalization, stemming, etc.
  - Indexer standard inverted index
  - Retriever Boolean, best match (Okapi), fielded
- User interfaceClient side indexing and storage

# **Evaluating SIS**

#### Internal deployment

- ~3000 users
- Users include: program management, test, sales, development, administrative, executives, etc.

#### Research techniques

- Free-form feedback
- Questionnaires; Structured interviews
- Usage patterns from log data
- Ul experiments (randomly deploy different versions)
- Lab studies for richer UI (e.g., timeline, trends)

# SIS Usage Data

### Personal store characteristics

5k - 500k items	Su	ie's (Laptop) Wo	rld
	Туре	N	Size
	Web	3k	0.2 Gb
	Files	28k	23.0 GB
<u>Query characteristi</u>	Mail	60k	2.2 Gb
<ul><li>Short queries (1.6 w</li><li>Few advanced oper</li></ul>	Total	91k items	25.4 Gb
- Four advanced oper	Index		190 Mb
			+1.5 Mb/week
Many advanced ope	erators and qu	ery iteration ir	n UI (48%)

Filters (type, date); modify query; re-sort results

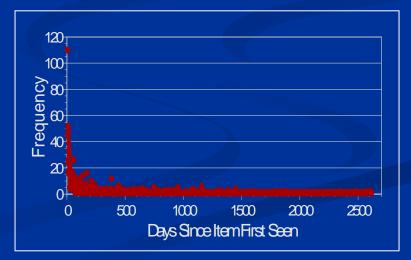
# SIS Usage Data, cont'd

### Characteristics of items opened

- File types opened
  - 76% Email
  - 14% Web pages
  - 10% Files
- Age of items opened
  - 5% today
  - 21% within the last week
  - 47% within the last month
  - 50% of the cases -> 36 days
    - Web: 11 days
    - Mail: 36 days
    - Files: 55 days

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### Top vs. Side Views

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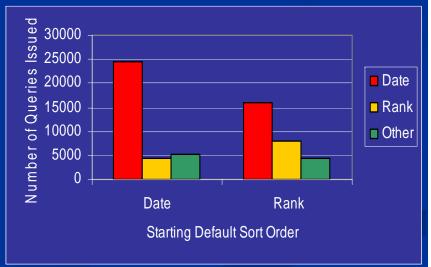
### SIS Usage Data, cont'd

#### <u>UI Usage</u>

 Small effects of: Top/Side, Previews/NoPreviews

#### Large effect of Sort Order:

- Date by far the most common sort field, even for people who had Okapi Rank as default
- Importance of time
- Few searches for "best" match; many other criteria ...



### Metadata vs. Best-match list

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## SIS Usage Data, cont'd

### **Observations about unified access**

#### Metadata quality is variable

- Email: rich, pretty clean
- Web: little, not very useful for retrieval
- Files: some, but often wrong

#### Need abstractions, e.g., "Useful date", "People", "Picture"

- Initially, used 'date seen'
- But ...
  - Appointment, when it happens
  - File, when it is changed
  - Email and Web, when it is seen
- "Useful date" abstraction

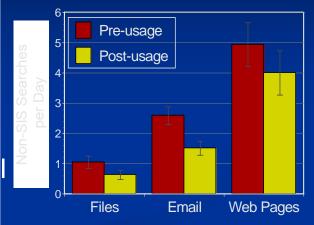
# SIS Usage Data, cont'd

#### Ease of finding information

- Easier after SIS for web, email, files
- Non-SIS search decreases for web, email, files

#### Additional benefits

- "The ability to *find misfiled documents* and email has been extremely helpful." -- A sales executive in Washington D.C.
- "Thanks again for the MARVELOUS tool! I find myself unable to live without it! It saves me at least 10-15 minutes a day looking for information; saves even more time *not having to file things*. It makes me more effective, as more time goes to thinking and deciding, and less to overhead." -- An executive in Redmond.

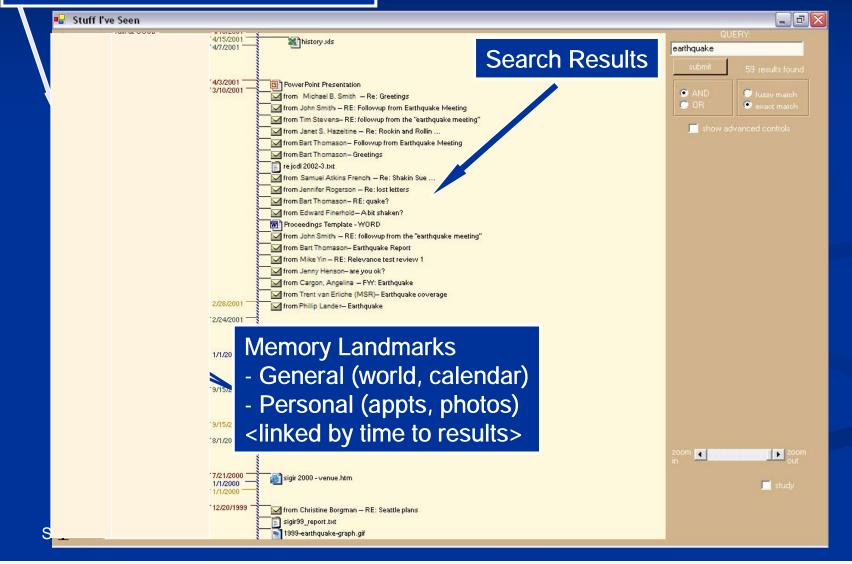


### SIS, Timeline w/ Landmarks

- SIS: time as important access cue
   Importance of "landmarks" in human memory
- Identify and use landmarks to facilitate information management and search
- Timeline interface, augmented with landmarks
  - General landmarks: holidays, world events
  - Personal landmarks: important photos, appointments
  - Heuristics or Bayesian models to identify memorable events

### SIS, Timeline w/ Landmarks

#### Distribution of Results Over Time



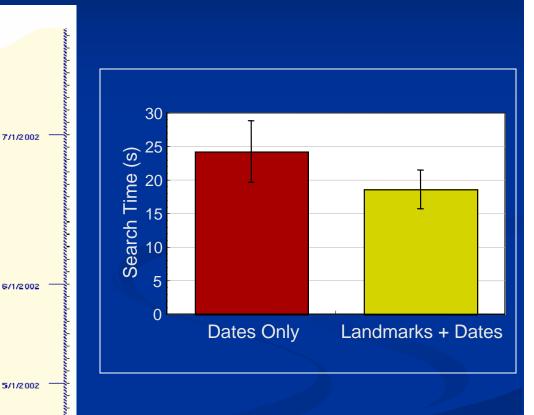
# SIS, Timeline Experiment

4/1/2002

#### With Landmarks

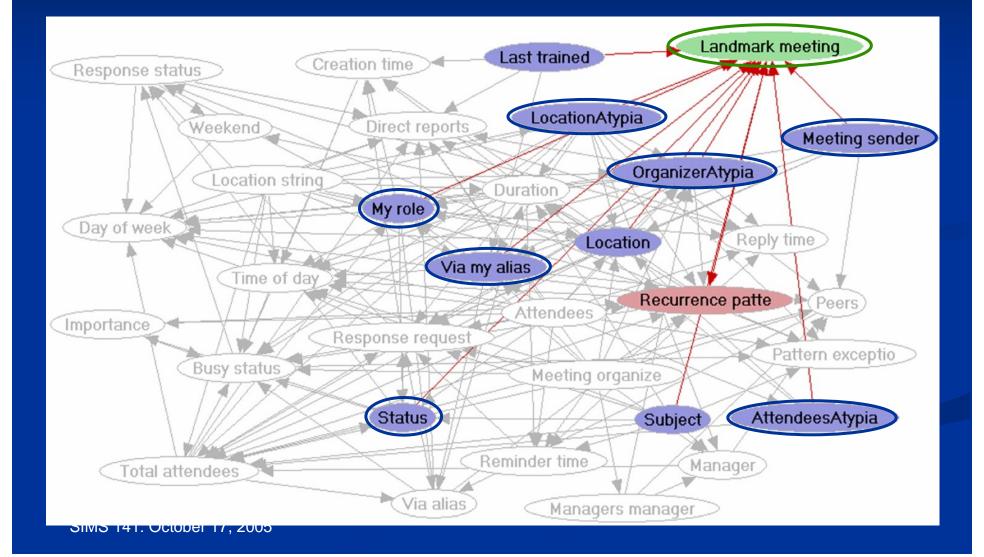
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#### Without Landmarks



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### Landmarks, key dependencies (from learned graphical model)



### SIS, Visualizing Patterns

Summarize the results of a search Abstraction beyond individual results Grid-based design Axes represent topic, time, people, etc. Cells encode frequency, recency Supports activities like: What newsgroups are active (on topic x)? What people are active, authoritative (on topic x)? When did I last interact w/ people?

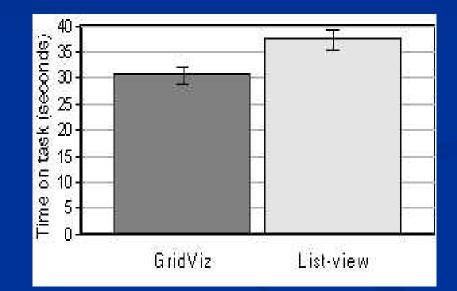
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## SIS, Grid vs. List Experiment

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Grid View



List View

### **Contextualized Search**

Search is not the end goal ...

Need to support information management in the context of ongoing work activities

SIS

Search always available

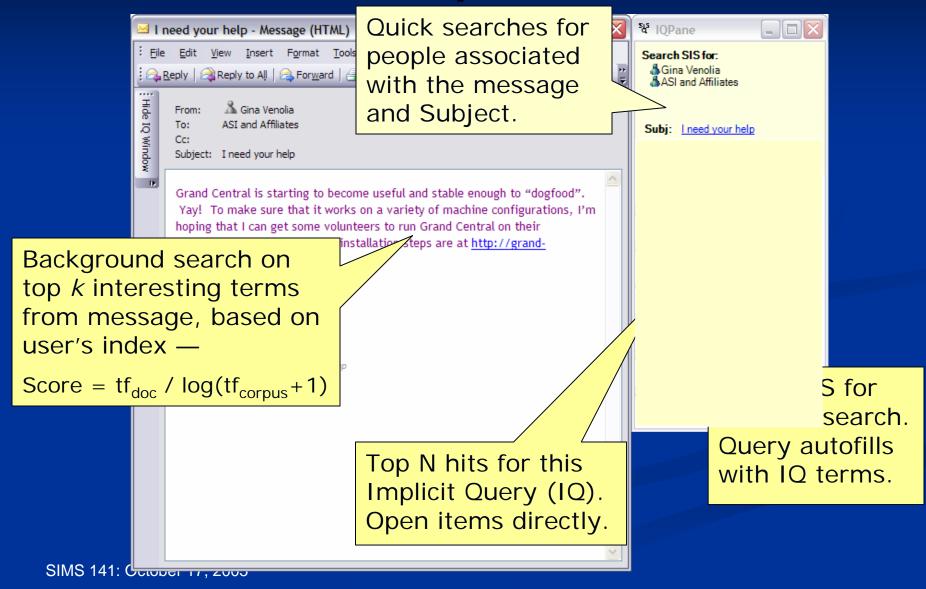
 Search from within apps (select keywords/regions, full docs)

Show results in context of apps

ed in algorithms and interfaces for improved inf ues in and human-computer interaction. Since joining Micro have worked on a wide variety of information management ersonal information retrieval, <u>squestion answering</u>, text cates information retrieval, question answering, text ca pring search and nav X Cut prative filtering, individua But, they lac ranking Bullets and Num - Microsoft Word Window Help Format Tools Table Read Bond Szafir Times New Roman • 10 • B I U 臣 喜 臣 臣 譯 . . . . . . . . . . . . . . . . . . Research unen. Incame. gavn S. Maineginatio 001016 Search for: We developed a system called Shiff I are decismed to makes it easy for people to find inform Grand Central  $\rightarrow$ before. Two key aspects the SIS design the system provides a unified index of nd marcing pressionch Stuff I've Seen that facilitate Back -01 I need your help files, the email folder h or history for web pages. ome useful and s...Gina Ve ources are integrated into a single inde Tags tion originated. Secon survey data conal context so rank is ab ternative for ordering results. With a much richer variety of cues can be u RE: MSR Grand Central - Quick. present information RELATED WORK MSR Grand Central quick updat Vanney ar Bush's vision of me to facilitate communications, and which is mech short miery they do a consulted with exceeding speed and fle. A Canceled: Metadata tagging econce of SIS. The details

SIMS 141: October 17, 2005

# Context, Implicit Queries

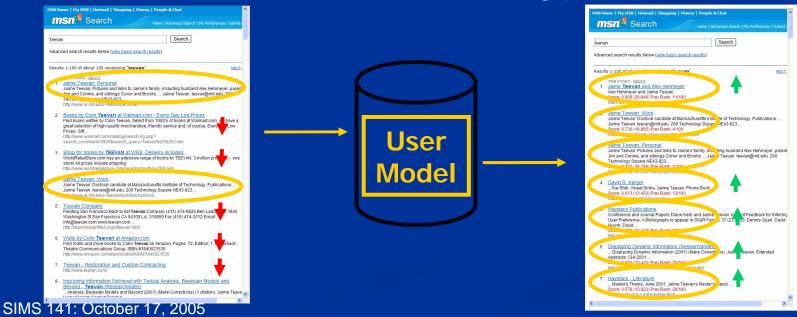


### Personalized Search

### Today:

All users get the same results, independent of previous search history, current context, etc.

Personalized Search Prototype:



### **Desktop Search Summary**

### Desktop search with SIS

- Unified index to stuff you've seen
- Heterogeneous content: files, email, web, etc.
- Fast and flexible access
- Supports new capabilities for personal information management
  - Rich metadata vs. single hierarchy or ranked list
  - Landmarks, patterns, implicit queries, etc.

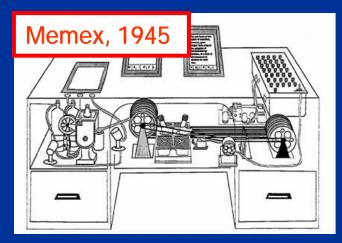
### New directions

- Contextualized search
- Personalized search

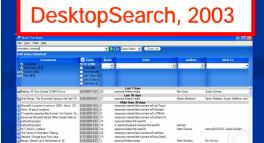
### Vannevar Bush's Vision

V. Bush (1945). As we may think. *Atlantic Monthly, 176*, July 1945, 101-108.

Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, "memex" will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.







### Thank You

Questions/Comments ...

More info, <u>http://research.microsoft.com/~sdumais</u>

MSN Toolbar and Desktop Search, <u>http://toolbar.msn.com</u>