Methods for Creating Metadata for Shareable Files

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Problem

- My laptop:
  - 144GB consisting of
  - 1.3m files (23k, ~2% under Documents) in
  - 300k directories
- 24,738 registered file types
  [filext.com -- 6/25/08]
- So what?
  - Mounting data loss
  - Digital age becomes a dark age

Common Approaches

- Directories
  - hard to create and remember categories [Lansdale'88]
- File system-wide Search
  - insufficient expressive power [Lansdale'88]
  - scarce metadata: content insufficient, little context
  - high expectations for accuracy
- Information Mgmt Applications
  - metadata silos, no infrastructure/standards
  - file type-specific
  - no infrastructure/standards to share

Collaborative Tagging?

- Web has many successful examples:

Delicious Digg reddit Facebook StumbleUpon

- 28% of Internet users [Pew'06]
  - Complemental to web search

- Enables recommender systems
  - Eases cognitive load of assigning and remembering tags

Questions

- Does the success of collaborative tagging transfer to file systems?
  - Are there enough shareable files?
  - How to name shared files?
  - How about structures within files?
  - How to share metadata of files?

- How do people find time for this?

Shareability Hypothesis

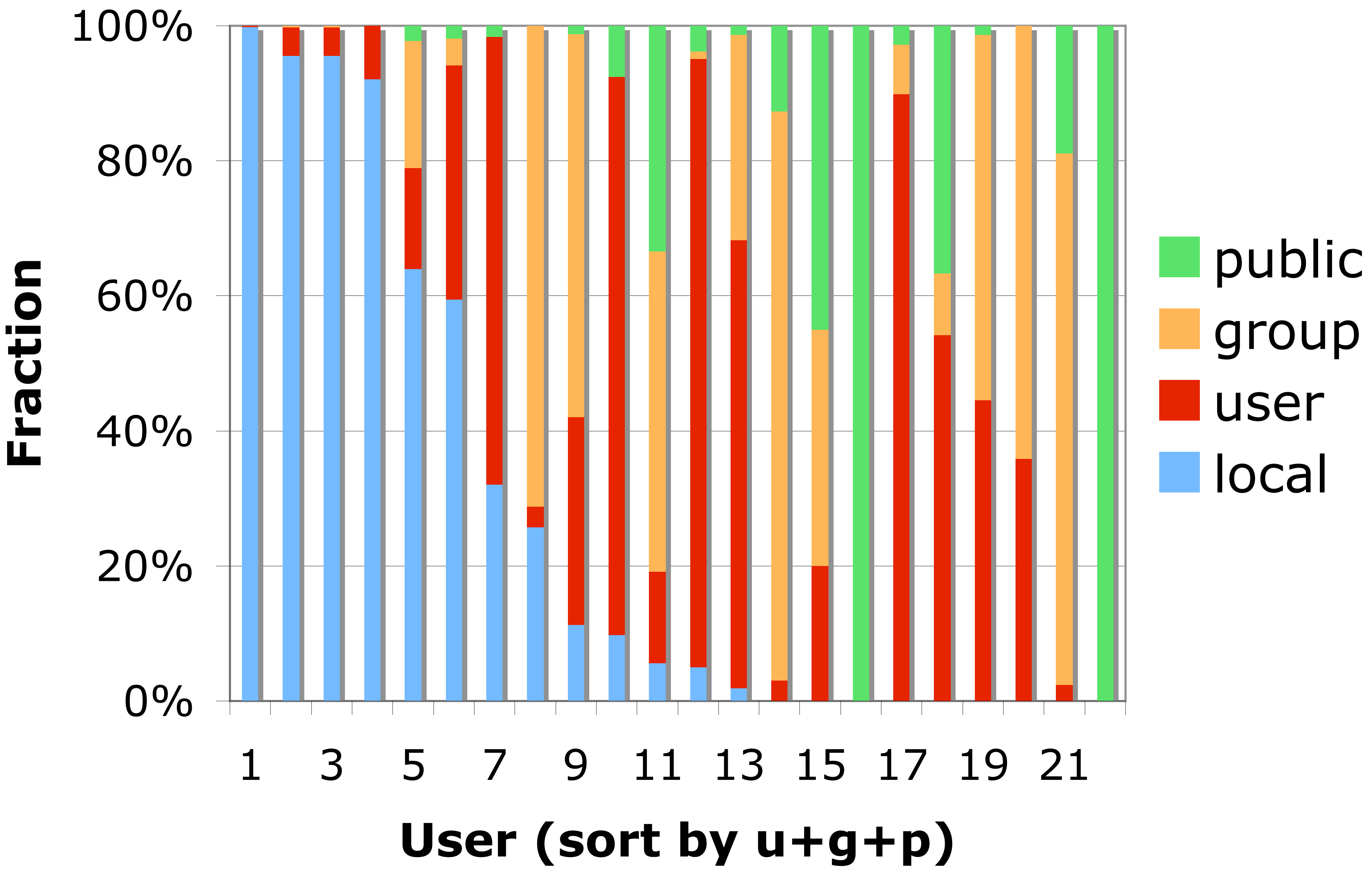
- *shareable file*:
  - *should be* managed across file systems and/or users.
  - not necessarily managed that way, currently.

File systems have enough *shareable files* to make collaborative data management feasible.

Categories

- **skipped:** file is unknown, uninteresting, or irrelevant
- **local:** file never leaves this computer (not shareable)
  - user wants to manage file
  - not suitable for sharing among computers or users
- **user:** file is private (shareable)
  - suitable for sharing among computers of same user
- **group:** file is restricted to group (shareable)
- **public:** file is public (shareable)
  - downloaded or published files

Results:

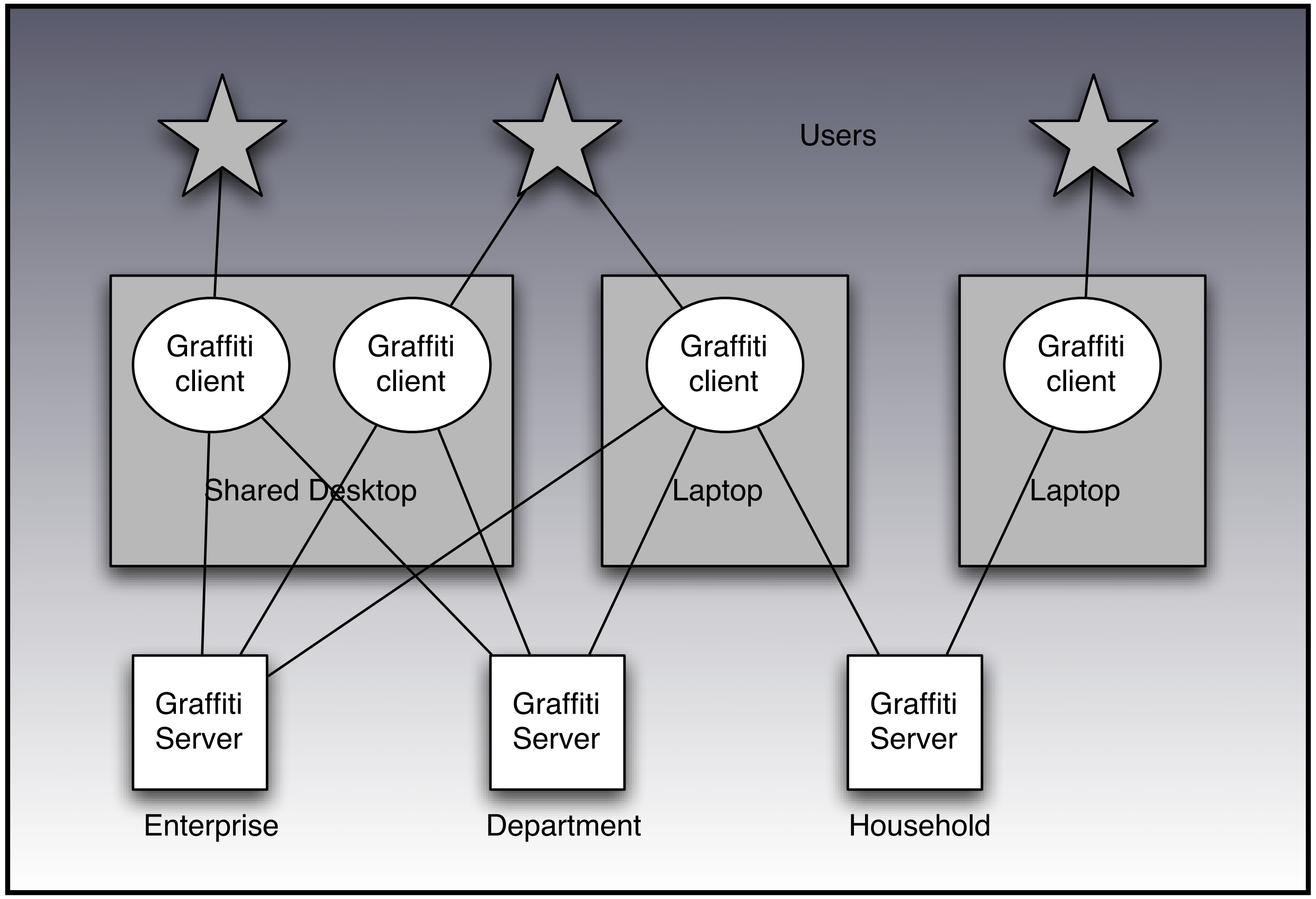


85% of surveyed & relevant files are shareable!

Reactions

- Multiple respondents didn’t take the survey: little or no concept of “files” or “home directory”
- “If I want to share files I move them to our [home/public] server”
- “Are my tax returns ‘private’ or ‘group’ because I eventually share them with the IRS?”
- “You forgot the ‘enterprise’ category”

Graffiti



- Think IMAP email accounts for file metadata
- Users control metadata proliferation to specific servers
- Clients maintain local metadata and coherence with servers

Content-based File Naming

- Global, file system-independent names
- No central naming authority
  - Discovery
  - Scalability
- Checksum overhead can be minimized by landmark chunking, etc.
- Provides similarity metric for recommenders

Experience

- Hierarchical directories are **not** obsolete
  - directories are good for hiding
  - tags are good for finding
- Tagging directories is useful
- Uncovering duplication has great potential
- Tagging, searching, and file browsing are interleaved

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- Approach:
  - Tapping into “Solitaire cycles”
  - Information management as a game

UCSC Computer Game Design

- Michael Mateas (tenured)
- Noah Wardrup-Fruin (just hired)
- Arnav Jhala (just hired)

Inspiring Examples

- Luis von Ahn (CMU):
  Human-based computation
  - Images: reCAPTCHA, ESP Game (Google Image Labeler), Peekaboom, Squigl, Phetch
  - Audio: Tag a Tune
  - Common Sense: Verbosity
- UW, Rosetta@home:
  - Foldit

Thank You !

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