

Personal Information Management: “Where is my next meeting?”

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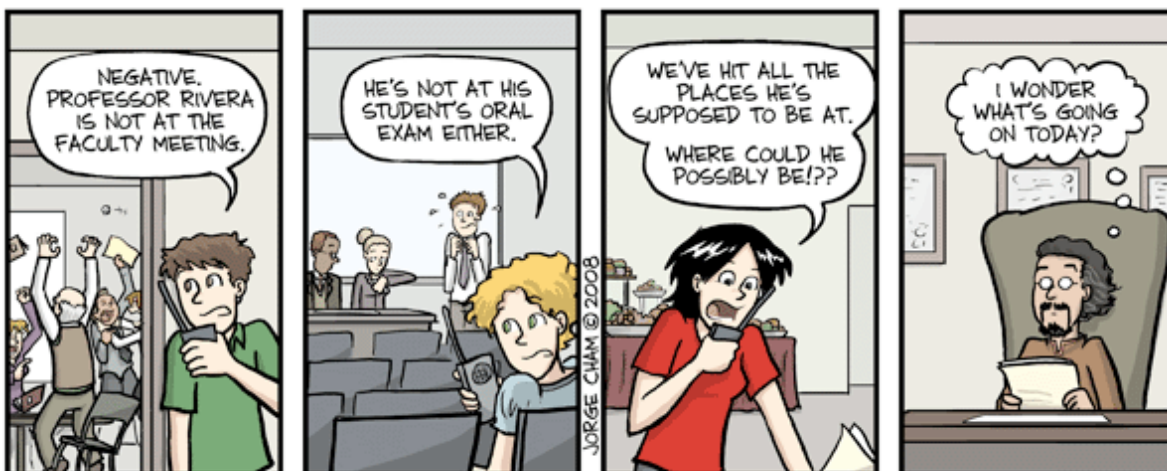
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Calendar Failure...



WWW.PHDCOMICS.COM

Vast amounts of information, ...



massive proliferation of devices, ...

... and not just at the office.

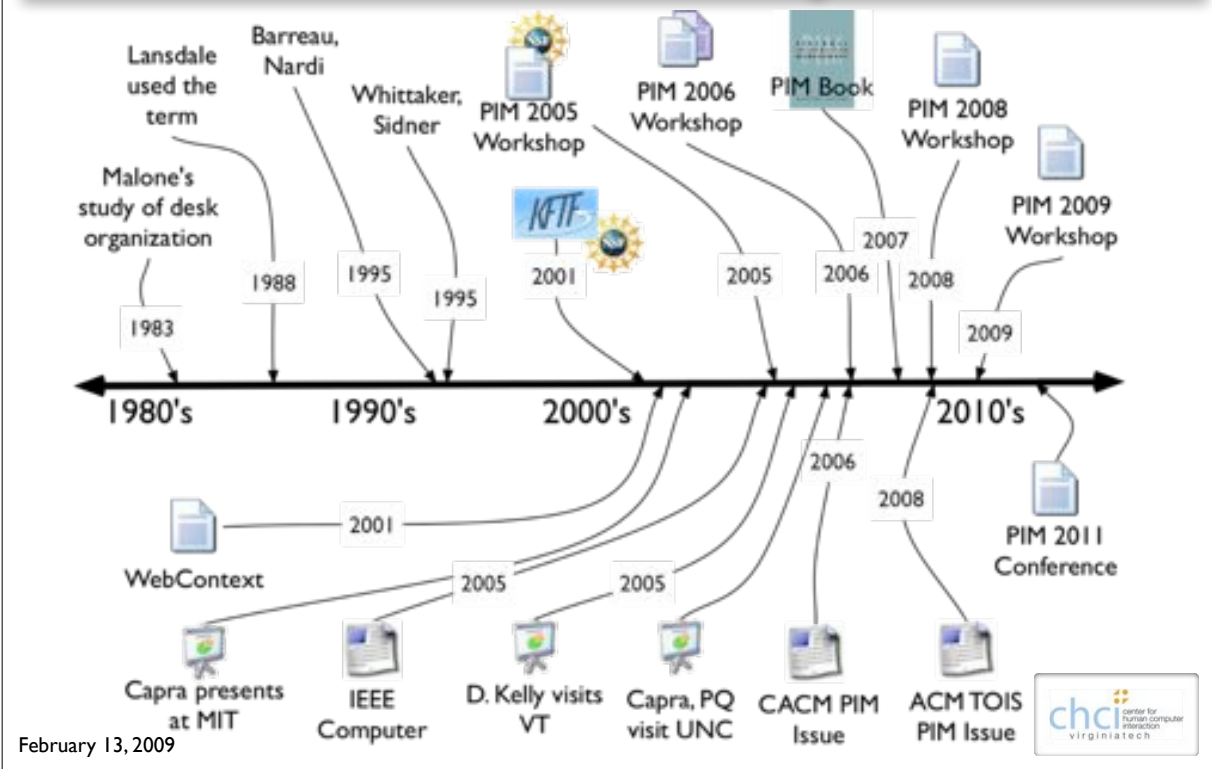


Personal Information Management Research

- Definition: *Study how people find, keep, organize, and refind (or reuse) information in and around their personal information space*
- PIM Framework:
find, keep, organize, reuse
- Why study it?
 - Information overload, information demands attention causing distraction, productivity, tool design



PIM Research History



Why hard to study?

- Key challenge to research is including the realistic setting of PIM
 - *My files are organized different than yours*
- User are invested in tools, strategies, collections
 - e.g. Gmail tags vs folders vs “smart folders”
 - Study them outside of that context and the study unrealistic
- Approaches: diary studies, interviews, observations, longitudinal, and controlled lab studies

Finding Information

- Search, browse - locate information as needed
 - PIM focus on finding information for personal use or in personal store
- Encounter (serendipity) - “run” into information
- Orienteering (small, local steps) vs Teleporting (jumping directly to goal) [Teevan]
- There are different finding strategies for the different information collections (finding email vs files is different)

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Keeping Decision

- People encounter information in everyday activities
 - Face the decision: *do I keep this information? what possible future value might it have? what if I keep too much, how do I organize it?*
- Amount of information encountered today is huge!



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What to keep?

- Keep too much and cost of refinding information goes up
- Don't keep but useful, refinding is more costly
- Post-value recall

	Keep	Don't Keep
Info is useful	success	miss
Junk	false positive	correct rejection

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William Jones (2004) *Finders, keepers? The present and future perfect in support of personal information management*, First Monday v9 n3.



Organization



- Filing is cognitively demanding
- How will I reuse this information?
- Might lead to fragmentation
- Filers vs Pilers - strategies
- Spring cleaners
- Filing vs Tagging
- Some benefits of a structured file system: rehearsal

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Variety of strategies



Reality: we live somewhere between the two extremes

Some strategies

- Save everything (Lifebits)
- Structure everything (Ontologies, taxonomies)
- Unify everything (Haystack)
- Search for everything (no organization)



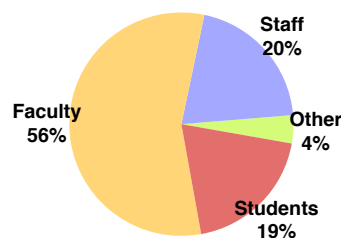
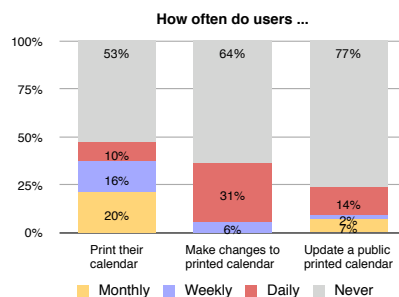
We have become our own personal librarians

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I: Calendar use

- How do people use calendar management software, particularly in today's multi-device environment?
- Mixed mode study, 98 survey participants, 16 followup interviews, request of copies of calendars
- Questions about calendar use, practices, devices, etc.



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Some Findings

- Proxy Calendar Artifacts - scraps and notes used to capture events while away from desk
- Calendars are printed for portability, quick capture, and sharing view with associate
- Separate family and work calendars; family calendar more likely to be paper wall-calendar
- Paper calendars continue to be of value and used by some. Some reasons: paper trail, annotations, and opportunistic rehearsal.
- Calendars as memory aid, for reporting purposes



Calendar Samples



Implications for Design

- Paper trail - digital evidence of changes and use
 - Show when events have been deleted
- Tentative event scheduling
 - Mark several dates as possible, when one is finalized the others disappear.
- Intelligent alarms (please!)
 - Avoid my cellphone, ipod, laptop, and desktop all beeping at once

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II: Refinding Study

- Information Refinding - relocating information that has been found (or seen) previously
- Web information refinding is a problem for a number of reasons
- How is refinding different from finding?
- What factors affect refinding?

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Dr. Rob Capra's dissertation (VT)

Capra, Pérez-Quirónes (2005) *Using Web Search Engines to Find and Refind Information*, IEEE Computer v38, n10, pp. 36-42.



Finding vs Refinding

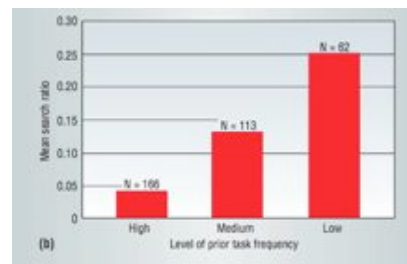
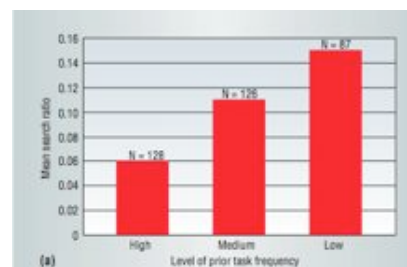
- *Finding*: exploratory activity, where is the info? Search and browse, information foraging, uncertainty if the information is out there, relies on recognition.
- *Refinding*: some certainty that info is available (*I know I saw it before*), more focused, relies more on recall
- Study: 18 tasks in 2 sessions, weeks apart
 - Day 1: find some information
 - Day 2: refind same (similar) information

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Some Results

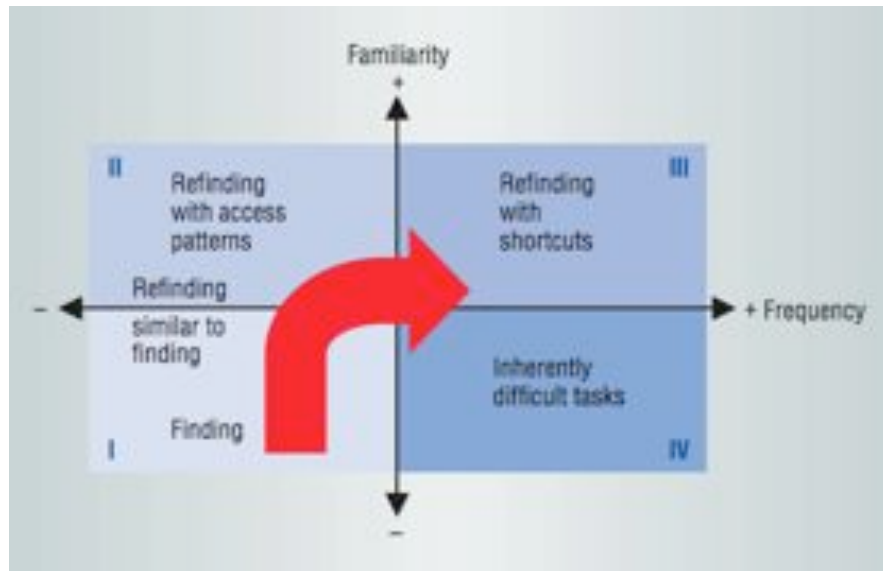
- Search engine use did not change from finding to refinding
- Prior task frequency and familiarity had strong effect
- Task had effect (some easy, some harder)
 - Known sites used often (dictionary)



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Model of Finding/Refinding



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III: Collection of Devices

- New problems arise when using a *collection* of devices, problems that were not there when we used each individually.
- How do we design the *user experience* when it is dictated by many vendors, platforms, protocols, etc?
- How do we talk about these 'collections' of devices?



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How are these devices used together?

- Survey of 220 knowledge workers (Bay area, Blacksburg)
- Trend is toward mobility and multi-function
- Laptop most common device (96%), more than cellphone!
- Advanced handhelds are replacing laptops on particular trips

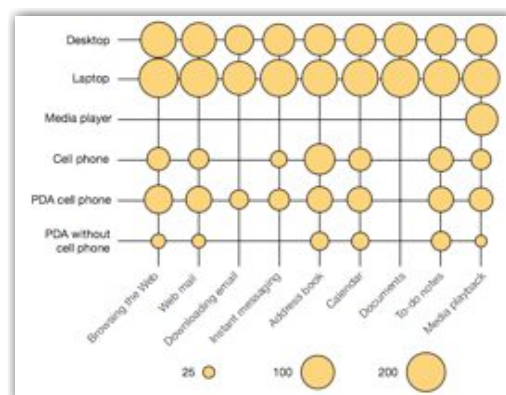
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M. Tungare, M. Pérez-Quinones (2008) *It's not what you have, but how you use it: Compromises in mobile device use*. CoRR arXiv:0801.4423v1.



Devices Used Together

- Cellphones + laptops (share network)
- Specialization: Music (mp3 player) + laptop
- Context important: multiple mp3 players
- Multi function over simpler devices (iPhone, Blackberry, Treo over plain PDA)



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Some Initial Observations

- How do we study the collection of devices together as an interactive unit?
- We need a framework with which to discuss, evaluate, study, and design the device collective.
 - Must all devices provide same functionality?
 - Are all *pairings* equal?
 - Which information goes where?

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Mobile and Desktop Apps

- Are mobile applications just a smaller version of their desktop counterpart?
- Weiser's ubicomp vision had device sizes, but must applications come in sizes?
 - MS Word Small = phone
 - MS Word Medium = desktop
 - MS Word Large = wall?
- Do small devices need to be functional replicas of the desktop counterparts?



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Address Book Example

- Context and use changes the interaction (or at least it should)
- e.g. Dial a number from desktop and from Cell phone



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Devices Are Used Together

- Set an alarm on your laptop
- Synchronize your laptop to your desktop, phone, ipod
- Watch the alarm go off...



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Task-based



“Usually my contacts on the phone are just with numbers while my contacts on the computer are just with email addresses (makes sense since I’m using the former to make calls and the later [sic] to send emails). [...]”



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Context-based



“I have two MP3 players: A small one for the gym and large one for long travel, etc. and I do not have the same music on both of them. It is generally difficult to make the synchronization software for each player understand that I do not want it to grab my entire music library, only the portion that I want to send to that particular player.”



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How Do We Study PIM With Many Devices?

- Usability of each device does not translate to usability of the collection
- Design of collection is done by different companies
- Our solution:
 - Framework to set terminology and concerns of study
 - Measure areas that traditional usability does not capture

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IV: Personal Information Ecosystems

Definition: A *personal information ecosystem* is a system of devices and applications that are present in the information environment of a user helping the user fulfill his/her information needs.

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M.A. Pérez-Quñones, M. Tugare, P. S. Pyla, and S. Harrison (2008) *Personal Information Ecosystems: Design Concerns for Net-Enabled Devices*. 6th LA-Web 2008, Oct 28-30, Vila Velha, Espírito Santo, Brazil.



Interdependencies

- **Symbiosis** - one organism obtains food from another one, the other one benefits from relationship
- PIE examples
 - Laptop + Cellphone together gain wireless access
 - iTunes + iPod



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Interdependencies

- **Commensalism** - one organism obtains benefits while the other one is not affected
- PIE examples
 - Logitech Harmony remote controls
 - RSS feeds, content syndication, calendar subscriptions - benefit the device subscribed, no harm to publish information



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Interdependencies

- **Parasitism** - one device benefits while harming the other
- PIE Example
 - Email-enabled devices that use POP3 mail protocol
 - Bluetooth headsets

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Example: Apple iTunes/iPod




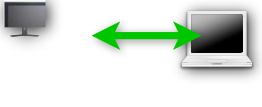


- Not functional replicas of each other
- Individually not as useful as in ecosystem
- Easy transition between them
- *Natural information flow*



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V: Measuring Work Between Devices

	Files	Calendar	Contacts
Level 0	 <p>No support for file migration</p>	 <p>Multiple paper calendars</p>	 <p>No support for synchronization</p>
Level 1	 <p>System supports file migration</p>	 <p>Online calendars</p>	 <p>Devices support synchronization</p>

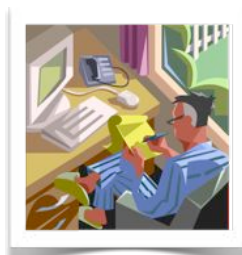
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Manas Tungare's dissertation



Future Work

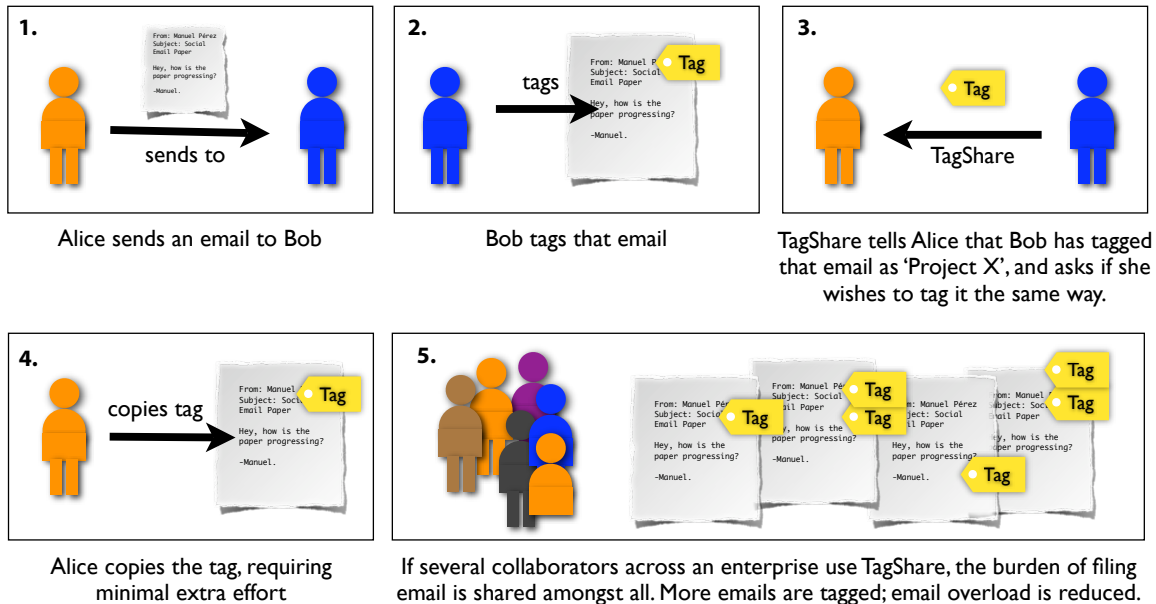
- Email work
 - Email - temporal data (CHI 09 Workshop)
 - *You Scratch My Back and I'll Scratch Yours: Combating Email Overload Collaboratively* (CHI 09 WIP) We communicate and collaborate along our social network. Why not share email organization along social ties?
- Social PIM - Ricardo's research
- PIM at home - Ben's research
 - Sharing of responsibilities



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TagShare



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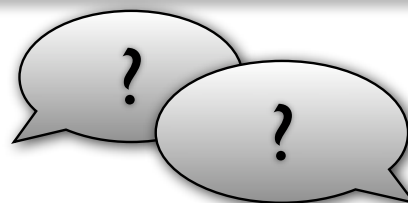
Conclusions

- Information overload is here... we are becoming a *personal librarian* of our own information at the expense of our own work
- PIM studies how we find, keep, and reuse information
 - To inform the design of new software and devices
- Our work has focused the use of multiple devices to accomplish every day information tasks
 - More work to be done...

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Discussion



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Lookout for 6xxx PIM Course

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