Toward Personal Health Record Usability

National Library of Medicine

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Outline

- Emerging PHR
- The science of usability
- Usability issues and design space for PHRs
- New user interface styles and implications for PHRs
- Toward PHR usability guidelines

MHR→PHR

- MHRs: health costs, errors, IT culture, high profile
- PHRs:
  - Increase patient empowerment and improve decision making
  - Demographics (baby boomers)
  - IT and installed base of expertise and expectations
  - Health care costs and policies
  - Genetics, data mining, and personal histories
  - Self-serve society
- Growing literature on PHR advocacy but little on usability

Emerging Design Space

- PH record vs. PH system
- Print vs. electronic vs. hybrid
- Online vs. standalone vs. hybrid
- Generic vs. specialized (e.g. disease, function)
- Online or hybrid layering
  - To devices (personal monitors)
  - To MHRs and health care institutions
- Adjunct services
  - Help
  - Coaches

The Science (and Art) of Usability

- What we investigate
  - User interface techniques (treatment interventions)
  - Human capabilities and behaviors (ergonomics, work practices with emphasis on cognitive, affective, and physiological responses)
  - Socio and economic contexts (e.g., ROI)
- How we investigate
  - Prototypes and models
  - Laboratory experiments and field studies
    - Usability labs with logging (video, keystroke), eye tracking, biometrics (GSR, pulse, respiration, MRI)
    - Field studies with surveys, focus groups, observations, transaction logs
  - Effectiveness, efficiency, satisfaction
    - Time to learn, time to complete, accuracy, error types and rates, general satisfaction, adoption, engagement

Toward Usability Guidelines

- Interdisciplinary team at UNC-CH (Public Health, Medicine, Information & Library Science, Journalism & Mass Communication) integrates different knowledge bases and leverages existing usability labs
- Cross the PHR usability challenges with PHR functions and PHR data types to create a PHR usability matrix

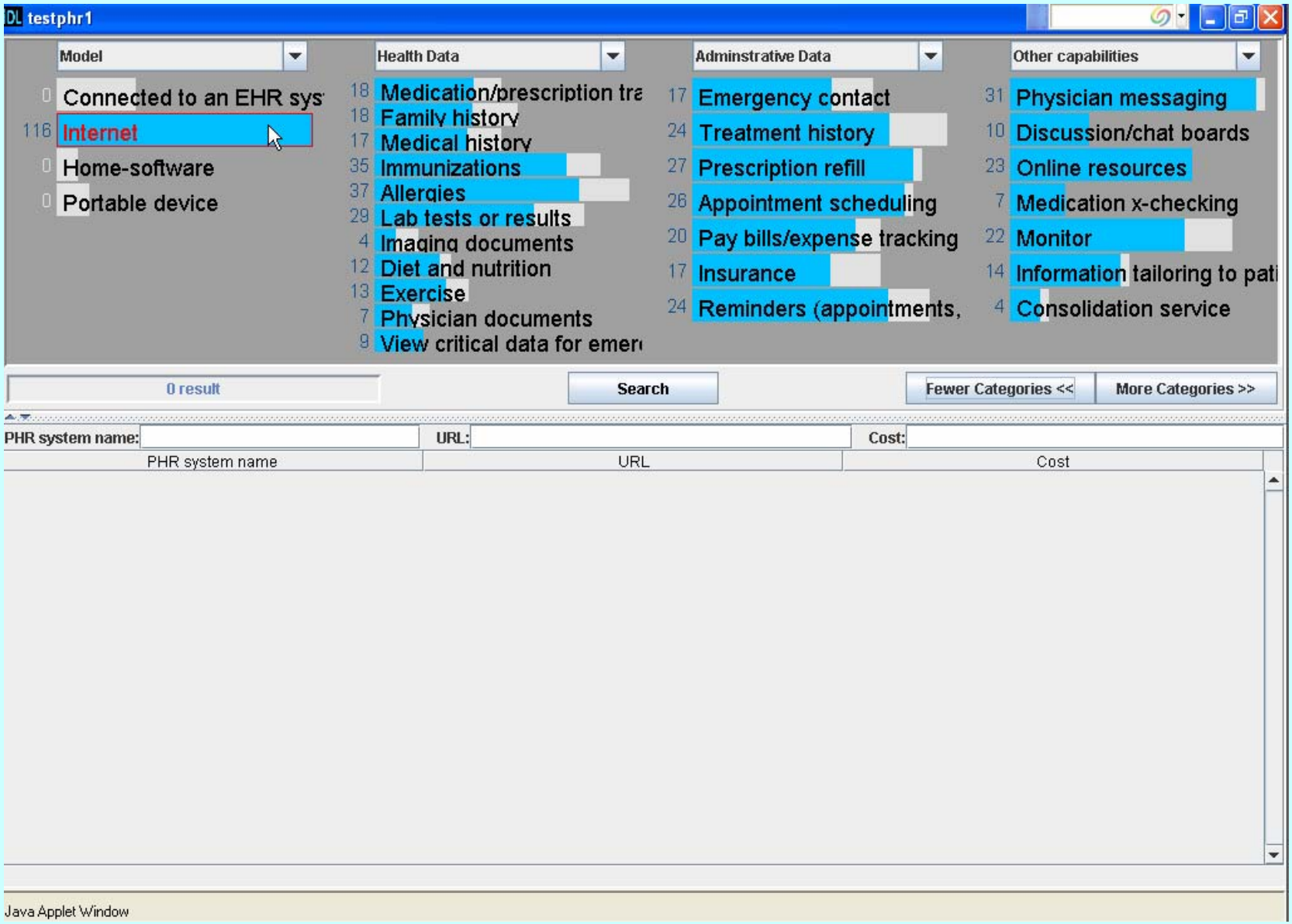
Multiple Facets

- Literature synthesis
- PHR system landscape
- Four usability studies
- Design Mockups
- Synthesize framework

Extant PHRs

- Markle Foundation's Personal Health Technology list of 175 PHR products
- Characteristics
  - Connect to MHR? 36 (21%) yes, 139 (79%) no
  - Internet based? 151 yes (86%), 10 (6%) standalone, 15 (9%) device specific
  - Cost? Range from free to $199 with some subscription models

New Interaction Styles



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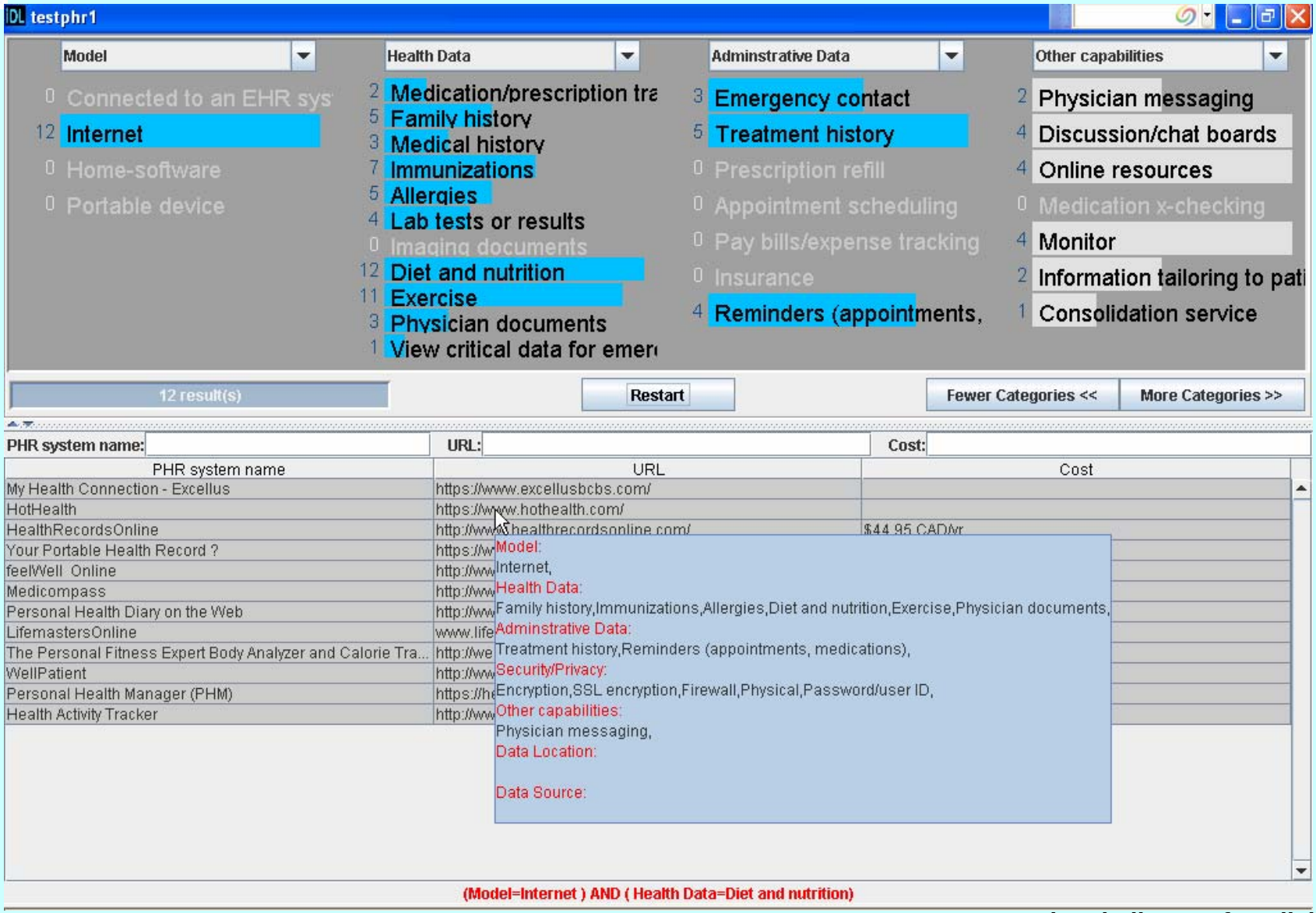
Usability for Installed Base and New Interaction Styles



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User Needs Assessment

- 43 semi-structured interviews, each 30-45 minutes with participants in four groups
  - Parents of young children
  - Adults with chronic illnesses
  - Adults caring for elderly parents
  - Older adults
- Qualitative coding

Results

- Current status:
  - Health records of some kind (primarily financial) are kept
  - Little confidence in ability to find and use records
  - Sharing records across health providers resulted in repetition of tests and procedures
- Ideal PHR
  - Data: lab test results, medications, appointments and their outcomes, providers' notes, and personal notes
  - Uses: prior to a visit to the doctor, to monitor trends in their health indicators over time, and when needed for emergency care
- Access and use
  - Comfortable with their health care provider accessing/updating, but very wary of anyone having access who is not directly involved in their care
  - Not universally comfortable with any external entity holding their records
  - Uncomfortable with responsibility of holding records themselves

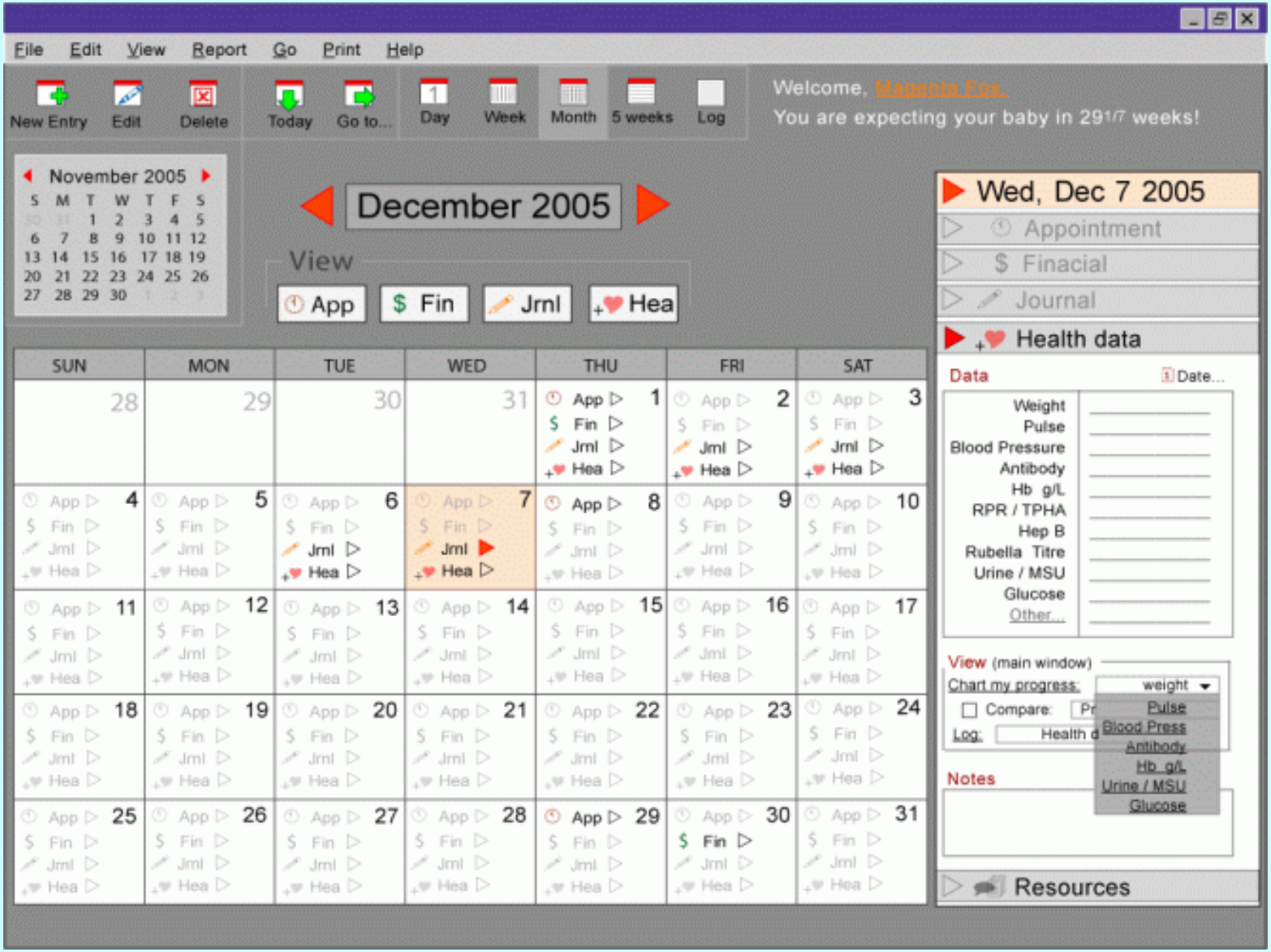
Test Result Format

- 106 participants in two laboratory studies of display effects for bar charts versus tables with variation by number of results, normality, and order
- Experiment 1 (between subjects)
  - Quicker when looking at bar charts
  - Recall more accurate (strict criterion) when looking at bar charts
- Experiment 2 (within subjects)
  - Bar charts perceived to be easier to use
  - Tables especially disliked when compared to bar charts

Design Mockups for a PHR for Pregnancy

- Designs by UNC students: Songphan Choemprayong, Sanghee Oh, and Laura Sheble
- Time as the organizing dimension
  - Calendar motif
  - Timeline motif
- Five key facets: events (appointments), money, health data, journal, and resources

Flat Calendar Design



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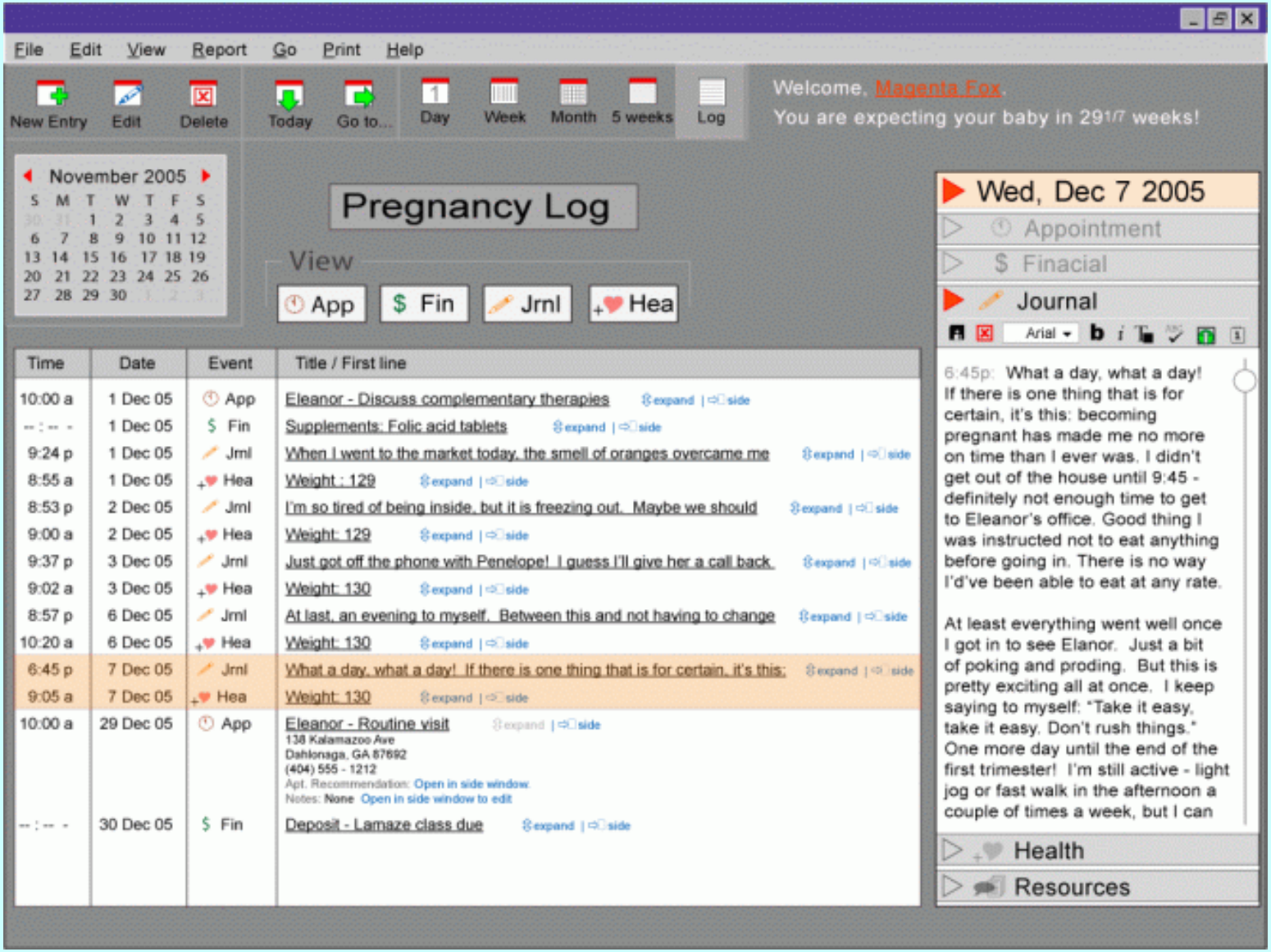
Vertical Flat Timeline



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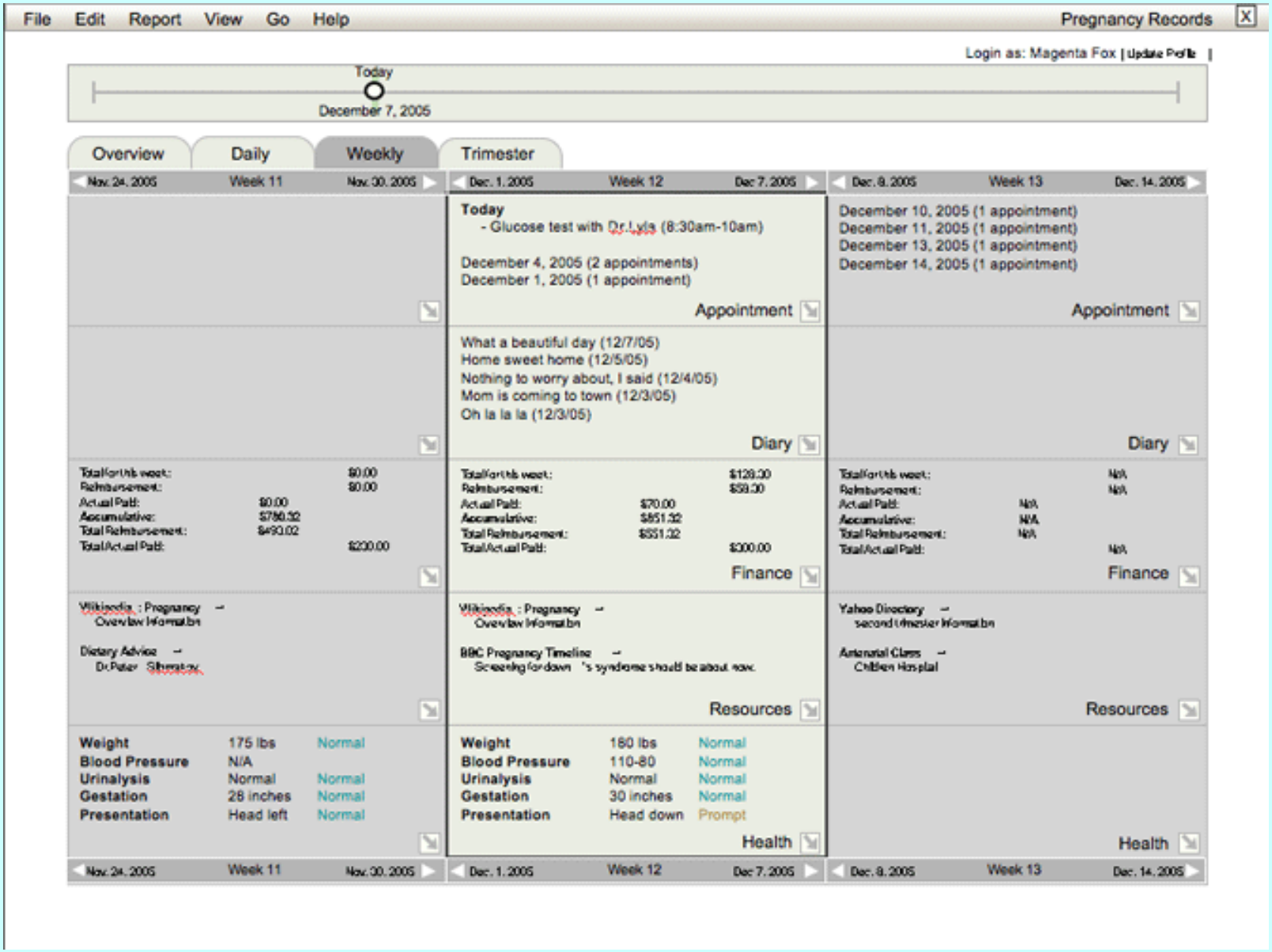
Layered Timeline



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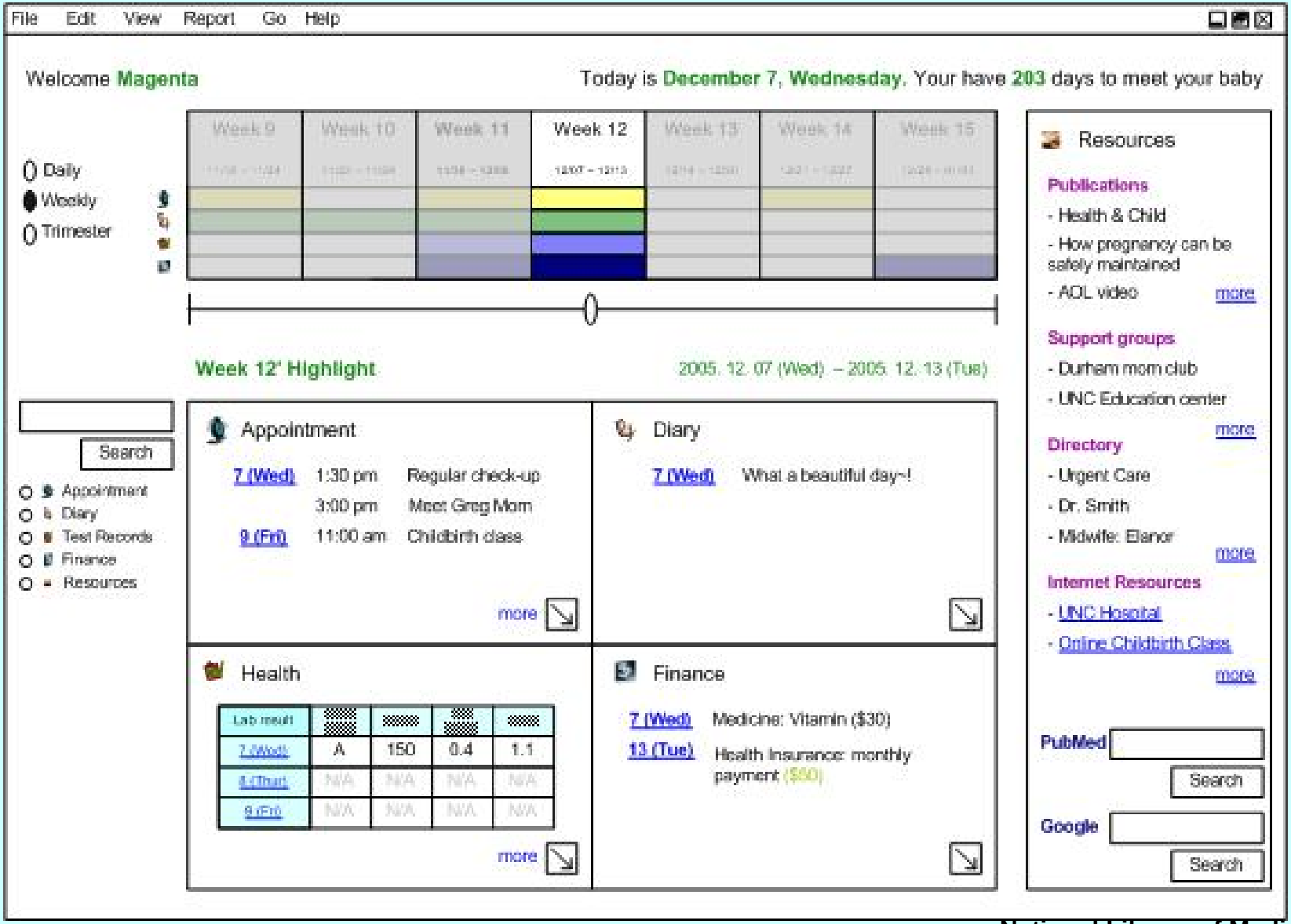
Multilayered Timeline



PHR Usability Challenges

- Challenges related to interaction design
  - Complexity
  - Vocabulary mappings
  - Older users
  - Health literacy
- Challenges related to access and control
  - Data entry and data collection
  - Error checking
  - Online/Offline
  - Privacy/security
  - Preservation and life long use

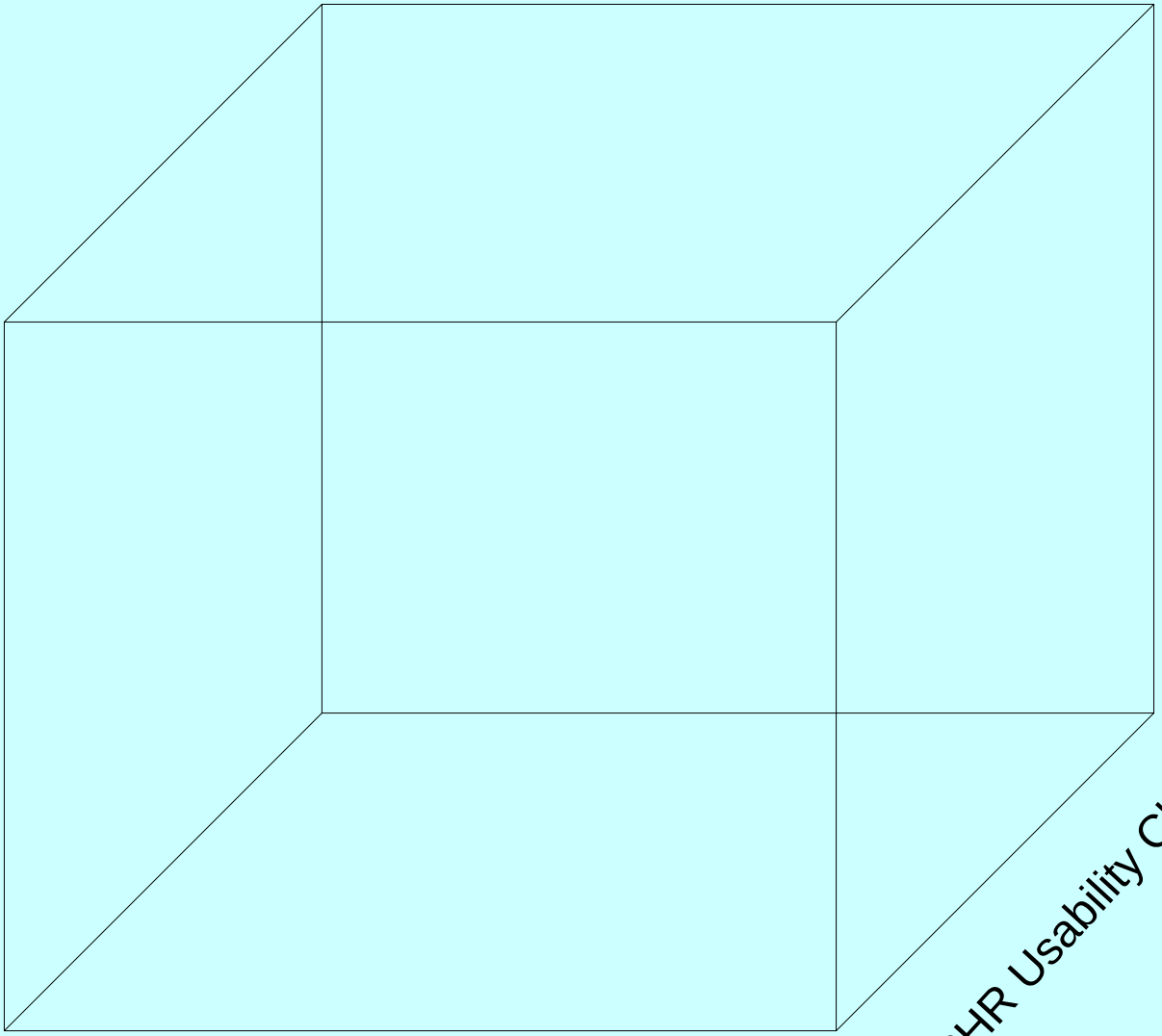
PHR Functionality Space

- Find and view data
- Enter and collect data (direct or download)
- Exchange data (send and receive, including local and intermediate devices)
- Make decisions (information, tools)
- Alerts and Reminders
- Manage finances
- Manage PHR (e.g., security, preferences)

PHR Data Space

- Personal Information (individual, family, health care providers and contact info, insurers, history, pets)
- Complaints (problem list)
- Diagnoses
- Procedures
- Lab results
- Immunizations
- Allergies
- Medications
- Advance Directives
- Nutrition and diet
- Exercise
- Personal commentaries
- Information Resources (literature, glossaries, encyclopedias, webpages, listservs)

PHR Usability Guideline Framework



PHR Data Types

PHR Functions

PHR Usability Challenges

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Develop the PHR Usability Guideline Framework

- Link the cells to evidence
  - Related specifically to PHRs
  - Related to MHRs or other similar systems
  - General studies of usability on systems that could generalize to PHRs
- Evaluate specific vectors within a health behavior framework (e.g., cancer treatment plans)
- Influence new PHR system design to promote adoption and leverage new capabilities

The Vision:

Usable PHRs will be adopted.

this implies:

Patient involvement will increase
People will lead healthier lives
Health resources will be maximized