Improving End-User Adoption of New Systems with Human Factors

Anna Haskvitz

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Conflict of Interest Disclosure
Anna Haskvitz, MS, MBA

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- Royalty: No
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- Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers’ bureau): No
- Contracted Research: No
- Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): No
- Other: No
Learning Objectives

• Distinguish between user research methodologies
• Identify key issues moving to a new user interface
• Use a case study as an example of incorporating user research to produce more user-friendly (adoptable) applications
Despite working together, vendors and their clients still have challenges when it comes to user adoption and usability
Rolling out new systems can be stressful for everyone

ROI
Brand Experience
Job Performance
End-User adoption of new systems is important to all of us
Understand Specific Ways Human Factors Can Improve End-User Adoption
Human Factors

<table>
<thead>
<tr>
<th>Human Factors ...</th>
<th>is applying an understanding of the way humans work to design.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Human Factors Engineer ...</td>
<td>is an advocate for and an expert in human factors and behavioral user research who provides recommendations based on data to provide the highest levels of software usability.</td>
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Usability

| Usability... | is how well software supports a user completing a relevant task. |
Usability Battery

- User
- Task
- Context
End-user Adoption

**Is:** Intended users completing intended and relevant tasks with the intended system

**Is Not:**
- Avoidance
- Disappointment
- Revolt
- Unexpected Paths
<table>
<thead>
<tr>
<th>Reason Given For Low System Adoptions</th>
<th>Human Factors Can Diagnose</th>
<th>Human Factors Can Treat</th>
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</thead>
<tbody>
<tr>
<td>Difficult to use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Missing features (or not found)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>System is slow/technical issues</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Wasn’t rolled out/other initiatives</td>
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Understand Specific Ways Human Factors Can Improve End-User Adoption
Human Factors Methodologies Are Designed To Address Usability

Treatment of usability problems

• Correct diagnosis
• Correct diagnostic tools
# User Research Methodologies

## Behavioral – usability analysis

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## Attitudinal – market and business analysis

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## Usability Testing
- Mental Models
- Workflow Model
- Contextual Inquiry
- Personas

## Interviews

## Surveys

## Focus Groups

## Demos
# User Research Methodologies

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- Interviews
- Surveys
- Focus Groups
- Demos
User Research Methodologies

**Behavioral – usability analysis**

*Usable*

How things really get done, how users think about what they are doing

*Effective*

**Attitudinal – market and business analysis**

*Useful*

Preferences, opinions, business rules

*Desirable*

Interviews
Surveys
Focus Groups
Demos

Usability Testing
Mental Models
Workflow Model
Contextual Inquiry
Personas
Select Behavioral Research Tools

• **Mental model:**
  – how users think about what they do

• **Workflow model:**
  – what users actually do

• Systems supporting a user at work need to support both models

• **Contextual inquiry:**
  – technique to gather the data for these models from end-users
Why These?

- Fundamental concern of users when introduced to a new user interface is reduced job performance
- You can’t address this concern without having an accurate view of what the user is doing and how they think about what they are doing
- These tools let you identify and mitigate usability issues: Planning for it is better than discovering it after go-live
Staged User Research

Level 1
• Apply Human Factors methods to verify if there is a usability problem

Level 2
• How impactful is the problem?

Level 3
• Apply Human Factors methods to further diagnose and treat or diagnose and mitigate those problems
Level 1 Diagnostic

• Is there a mismatch between the users’ mental model and the software?
• Survey or interview based on usability testing format
• In person or remote
Level 1 Diagnostic

• Task: “you are using this system to ….”
• Show screen shot
• “What do you think you would do on this screen?”
• “How would you explain each of these items to a co-worker?” (each field, each button)
• “What would you do next?”
• Next screen shot – repeat
• All questions are open ended
Level 2 Diagnostic

- What is the impact of the problem on usability?
- Benchmark Usability Testing

Usability is how well software supports a user completing a relevant task.
Level 3 Diagnostic

• What does this user need and what are the gaps in the system?
• Mental model/workflow model hybrid
• Exposes missing features and illustrates the root cause of many user adoption issues
• “Job model”
Job Model

1 Contextual Inquiry

- Record and take notes on observed actions
  - Try to observe the whole job
  - At least go one step beyond the understood task boundary
  - Note what is used for each task
- Ask user open-ended question like:

  “What would you say you are doing at this point?”
  “What does looking at this tell you?”
  “What are you looking for when you...?”
The visualization

Place tasks (workflow) AND user thoughts (mental model) in boxes, put in quotes any exact users words *generally* in chronological order – use visual spacing for breaks in flow

- Check board for scheduled surgeries
- Check log book for notes from last shift
- Review patient charts
- Wonder about patients from last shift, check condition
- Prepare patient for transport

Format and Concept based on Indi Young’s book: Mental Models

Adjusted the idea to merge observed workflow with mental model
## Group tasks

### Prepare for the shift
- Check board for scheduled surgeries
- Check log book for notes from last shift
- Review patient charts
- Wonder about patients from last shift, check condition

### Draw Samples
- Scan Patient and confirm Name and DOB
- Label “tubes”
- Collect Sample

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Format and Concept based on Indi Young’s book: Mental Models

Adjusted the idea to merge observed workflow with mental model
Job Model

4. Add task support
Color-code for “your” system, other systems, off-system, current vs future features

Prepare for the shift
- Check board for scheduled surgeries
- Check log book for notes from last shift
- Review patient charts
- Wonder about patients from last shift, check condition

Draw Samples
- Scan Patient and confirm Name and DOB
- Label “tubes”
- Collect Sample
- Patient ID Device
- “Chart Labels”

White Board
Notes on desk
“eHIS” System lookup
Look at the Big Picture

5 How much job support is the system providing?

Does your system support a flow of tasks, or is it only in use for small parts of the day?

What is supporting your user at each task (there will be something)
Case Study – Applying the Methods

Same system
Same “task”
One user group has 100% adoption
The other user group has none
Level 1 Diagnostic

• Recognizability Survey
• Both user groups
• Screener
  – User is experienced in the task “collecting samples”
  – User collects samples in ER or “on the floor”
  – No training with this particular system
All the words/controls in the screens designed to support this task

All the words/controls in the screens correctly described by user group with full adoption

All the words/controls in the screens correctly described by user group with no adoption
Mismatch between the system and the users' Mental Model

60% of the data on the screen was visual noise

Level 1 Diagnostic

ER Nurse
Lesson: same task not enough to justify same solution
Level 2 Diagnostic

• Usability Testing
• May catch other issues
• Primarily to set a benchmark
Level 2 Diagnostic

ER Nurse no training

**Perceived** success rate: 100%
**Actual** completion rate: 60%
Average completion time: 3m

Result: Visual Noise & Low *Actual* Task Completion
Level 3 Diagnostic

Task Flow/Mental Model hybrid
To verify problems with task support
To explain differences in usage between users
Detail depends on use
Level 3 Diagnostic
User With 100% Adoption

Result:
Contiguous support from system
Level 3 Diagnostic User With 0% Adoption

Result: Little job support from system

Not contiguous
Analysis

- Both users complete the same “task”
- But the rest of their JOB is different
- Users that interact with your system less are not as able to “get used to” any system models that don’t match their mental model
- The user that adopted the system is the one we help to do their job
Recommendations and Treatment

- Matching mental model of this user is particularly essential due to low system support
- Difference in user adoption explained by how different their models are
- Develop a user interface that matches their mental model for the areas in which the system will provide support
Human Factors Impact

ER Nurse no CLM training
Perceived success rate: 100%
Actual completion rate: 60%
Average completion time: 3m
Human Factors Impact

ER Nurse no CLM training
Perceived success rate: 100%
Actual completion rate: 60%
Average completion time: 3m

Perceived success rate: 100%
Task completion rate: 100%,
Average completion time 1.5m
At least 2 fewer clicks
More uses for the model
Using the Model to Identify Opportunities
Using The Model To Plan A Roll-out

• Evaluate visual noise with your target users to make sure there is really one user/task/context in play

• Use mental model to make sure task you are rolling out will be entirely supported

• Roll-out to users with most workflow support first
Using the Model to Plan a Roll-Out

**User 1**

- **Determine urgency of care (triage):**
  - If critical, skip registration and go to room and gather materials – admitting is called to put on wristband with available ID.
  - Get important medical information.
  - Triage nurse observes patient.
  - Patient answers questions.
  - If Patient is not critical, send to registration.

**Admitting: Enter the Patient into a system for billing and tracking purposes:**

- Paperwork and patient registration.
- Wristband.
- Patient answers questions.

**Room consult – Nurse:**

- Patient is led to an exam room.
- Patient is given gown.
- Patient answers questions.
- Nurse thinks about what the likely workup would be, takes notes, might start IV.

**Room consult – Nurse, Critical:**

- Physician gets verbal notification of chest-pain patient.
- Nurse verifies the patient.
- Scan wristband, verbally confirm name.
- Critical Patient: Nurse starts IV collects samples for core set of labs for cardiac patients (CBC, INR, Trop, etc).
- Nurse starts IV and tries to make all collection with 1 “poke”.
- Nurse labels tubes.

**User 2**

- **Start the case record:**
  - Label assets.
  - Label assets with foreign IDs or CoPathIDs.

- **Assign Pathologist or Cytotechnologist:**
  - Add or verify case specialty?

- **Move assets to next SPOT:**
  - Send case to Path or cyto workflow base on staff.
  - System updates tracking.
  - Verify that asset is in correct SPOT.
  - Reconcile.
  - Asset integrity.

**Support:**

- **Software Functionality:**
  - User goals and actions.

**Tasks:**

- Emergency Workflow Temp Labels.

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CoPathPlus functionality:

- System determines and displays sub-specialty based on first part-type.
- Print/Engrave Labels.
- Label format driven by sub-specialty.
- Update Tracking with collection tracking information (user, time, place).
- Update Tracking for case assets with user, time and spot.
- Sort to show foreign ID in tracking and search results.
- Determine route for all case assets based on part and asset route dictionary.
- System selects Pathologist, Resident, and Cytotechnologist assignments based on specialty, schedule, and load.
- Send case to Path or cyto workflow based on staff.
- System updates tracking.
- Verify that asset is in correct SPOT.
- Reconcile.
- Asset integrity.
Modeling Your Users to Improve Adoption

• All users moving to a new user interface are primarily concerned with job performance

• Moving from one user interface style to another (Command-line to GUI, for example) is easier for users if the new user interface matches their mental model

• Mental model and workflow match between a new user interface and your users can be evaluated, and this information lets you mitigate issues
MEDICAL CENTER

NAME ___________________________ AGE ___________________________
ADDRESS _________________________ DATE ___________________________

Rx
Human Factors (Behavioral Research) For System Adoption

SIGNATURE

☐ LABEL
REFILL 0 1 2 3 4 5 PRN NR
Thank You!

- Anna.haskvitz@sunquestinfo.com