When Acceptance Isn’t Enough; Improving Evaluations of Novel Decision Support Tools

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The Difficulty Introducing Novel Technology

• Need to integrate with existing
  • Processes and procedures
  • Tools and technology
  • Tasks and goals

• Many organizations rely on prospective users to evaluate new tools

The User Acceptance Gap

### A user can...

<table>
<thead>
<tr>
<th>Potential for Operational Benefit</th>
<th>User Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Reject</td>
</tr>
<tr>
<td>Low</td>
<td>Accept</td>
</tr>
</tbody>
</table>

**User acceptance methods provide a means to evaluate technology**

- **Challenges:**
  - May not address potential for operational benefit or identify means to improve
  - May not account for additional skills or process changes required

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**User Acceptance Table**

- **Reject**
  - High benefit tool
- **Accept**
  - High benefit tool
  - Low benefit tool
Users, Technology, and Interfaces

User decision making and environment
- Past experience
- Goals
- Operational environment

User Interface Experience

Technology capabilities and structure
- Technology capabilities
- Data and code structure

User Tool Interface

I wouldn’t use this.

- Users experience the technology through the interface
- Reducing project risk and targeting efforts requires proper interpretation of user feedback
Application Experience Framework\(^2\): Anticipating and Interpreting User Experience

**Application Experience Layers**

*Visual/UI*
- Presentation
- Functional

*Cognitive*
- Procedural
- Model mapping

Does the look and feel match with user expectations? Are users able to interpret system behavior? Are users able to complete operational tasks? Can users form goals and leverage the application to meet them?

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# Application of Framework

<table>
<thead>
<tr>
<th>Layer</th>
<th>Focus</th>
<th>Formative / Evaluative</th>
<th>Suggested Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation</td>
<td>Does the look and feel match with user expectations?</td>
<td>Formative / Evaluative</td>
<td>Review existing, new concepts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Formative</td>
<td>Review of best practices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluative</td>
<td>Usability assessment</td>
</tr>
<tr>
<td>Functional</td>
<td>Are users able to interpret system behavior?</td>
<td>Formative</td>
<td>Review existing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluative</td>
<td>Cognitive walk-through</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluative</td>
<td>Usability assessment</td>
</tr>
<tr>
<td>Procedural</td>
<td>Are users able to complete operational tasks?</td>
<td>Formative</td>
<td>User interviews, walk-through</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Formative</td>
<td>Critical decision study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluative</td>
<td>Cognitive assessment</td>
</tr>
<tr>
<td>Model Mapping</td>
<td>Can users form goals and leverage the application to meet them?</td>
<td>Formative</td>
<td>Task, goals assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Formative</td>
<td>User interviews, walk-through</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Formative</td>
<td>Team interviews, walk-through</td>
</tr>
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<td>Evaluative</td>
<td>Cognitive assessment</td>
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</table>
Case Study:
Metrics Management for the Military Sealift Command (MSC)

Data Identification

Terms can have different meanings; data may be stored locally

Data Integration and Curation

Time-intensive to gather, clean, and compile data for each metric

Decision-Making

Time intensive to manage, update, and maintain data

Data Management: Semi-manual process for updates or changes

Goal: Introduce technology to improve metrics management
Case Study: Identifying Initial Focus

**Current Capability**
- Managed manually and stored locally
- User process and data understanding is tied closely to current artifacts

**New Capability**
- Web-based process and management, semantic data structure
- User process and data understanding will need to change

**Initial Focus: Cognitive Layers**

<table>
<thead>
<tr>
<th>Application Experience Layers</th>
<th>Cognitive</th>
<th>Procedural</th>
<th>Model mapping</th>
<th>Functional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Research steps:**
- Understand current process and goals
- Understand technology analog
- Map current to new
Case Study: Mapping Steps

1. Current concept

Metric: Shipping Time

Definition: Ratio of
\[ n_{\text{shipped}} = \# \text{ orders shipped on or by the requested date, divided by} \]
\[ n_{\text{total}} = \text{total number of orders} \]

Calculation: \[ n_{\text{shipped}} / n_{\text{total}} \]

Data Source: Shipping Orders Database

Managed by: Program Management, John Doe

Leadership Approval: Sue Adams

2. Map to New Technology

Term definitions and descriptions

Process management

“Tribal” data knowledge

Example semantic data structure.
Summary and Conclusions

- Introducing novel technology into existing processes is complicated, and success can be difficult to measure.

- Effective use of user acceptance measures requires robust understanding of user experience with technology interfaces.

- Novel framework was developed to guide interface analysis and interpretation of user feedback, and was applied to support research and development of prototypes for MSC.
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