Reducing Clinicians’ Cognitive Workload by System Redesign

A Pre-Post Think Aloud Usability Study
Oral presentation

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NICE Online

- NICE Online
  - Real-time web based data query tool
  - Dutch ICU patient data registry
  - For assessment, monitoring and benchmarking
  - *Example: ICU mortality ratio over time*

- **Usability evaluation to assess:**
  - Cognitive task workload in terms of: Task *efficacy* and *efficiency*
  - Usability problem detection

- **Input into system redesign to accommodate users**
Methods

- **Think Aloud testing**
  - Extraction cognitive data user-system interaction
  - Sight on ‘real’ usability issues

- **UAF Classification of usability problems**
  - Norman cycle of interaction  
    
  [Norman, 1993, UCSD, Ch. 3]
  - Organization of usability concepts in knowledge base
Research focus

- Value of HF methods in HI system redesign
  - Usability testing method
  - Usability classification method
Pre-post study design

8 users

6 scenarios
UAF classification

Interaction Cycle

Planning  Translation  Physical Actions  Assessment

Hierarchically structured knowledge base of usability issues, concepts, and guidelines
Planning or translation problem???

[Image of a coffee machine with options for different types of coffee and a selection arrow]
Physical action - Push or ???
Pull??
Results

<table>
<thead>
<tr>
<th>Pre redesign</th>
<th>Post redesign</th>
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<tbody>
<tr>
<td>36</td>
<td>35/ 30 new</td>
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- **Adjusted Overall task efficiency**
- **Overall task efficacy**
Pre-post UAF classification

Pre redesign

- Planning: 22%
- Translation: 42%
- Physical Action: 36%
- Assessment: 0%
Pre-post UAF classification

Post redesign

- Planning: 0%
- Translation: 29%
- Physical Action: 8%
- Assessment: 63%
System query model

QueryAdmin Info
Eigenaar = danielle
Standaard Query = true

Functions
Casemix adjusted model

Splitting/Intersection
Day/night service, gender etc

Mirror
My ICU/national data

Selection subpopulation
Time period, date/year/month
<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Insight into</th>
<th>Compare</th>
<th>Include</th>
<th>Benchmark</th>
</tr>
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<tbody>
<tr>
<td>Bedbeding</td>
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<td>Behandelduur</td>
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<td>Dauwiteit</td>
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<td>Mortaliteit</td>
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<td>Opnames en heronpnames</td>
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<td>Prognostische scores</td>
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<td>SPC Beddimingsduur</td>
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</table>

**Outcome measure:**
- APACHE IV mortaliteit
- SMR, incl. 95% CI
- Verwachte sterfte
- Werkelijke sterfte
- Aantal opnemen
- % zkh overleden

**Compare**
- Opnames
- Gestacht
- Tijd in maanden
- Tijd in kwartaal

**Include**
- Opnames
- Gestacht
- (non-)Cardiochirurgische patienten
- Tijd in maanden
- Leeftijdsgroepen per 10 jaar
- IC Behandelduur
- Hekomst

**Benchmark**
- Mijn Ziekenhuis
- Volumegroep
- Nationaal (gap ouder), inclusief mijn ziekenhuis

**Periode**
- Periode keuze: 4de kwartaal 2009
- Vanaf: 01-10-2009
- Tot: 01-01-2010

**Grafiek Opties**
- Maak tabel
- Query opslaan
- Grafiek bewaren
- Grafiek bewerken
- Toelichting
Conclusion & discussion

- **Value of Think Aloud**
  - Sight on cognitive task behaviour
  - Efficacy / efficiency improved

- **Value UAF – redesign efforts**
  - Cycle of interaction vs. task efficiency/ efficacy
  - Hierarchy: underlying causes problem types
  - Uniform classification of problems
Questions!

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