

DRAPER™

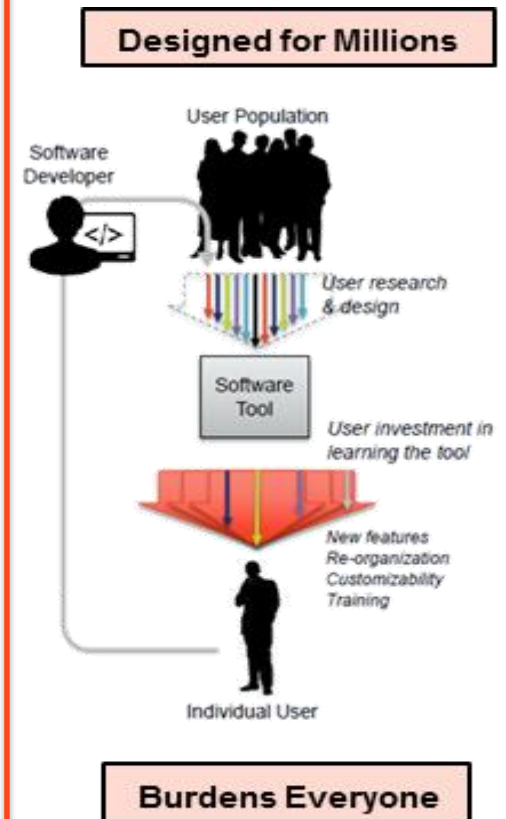
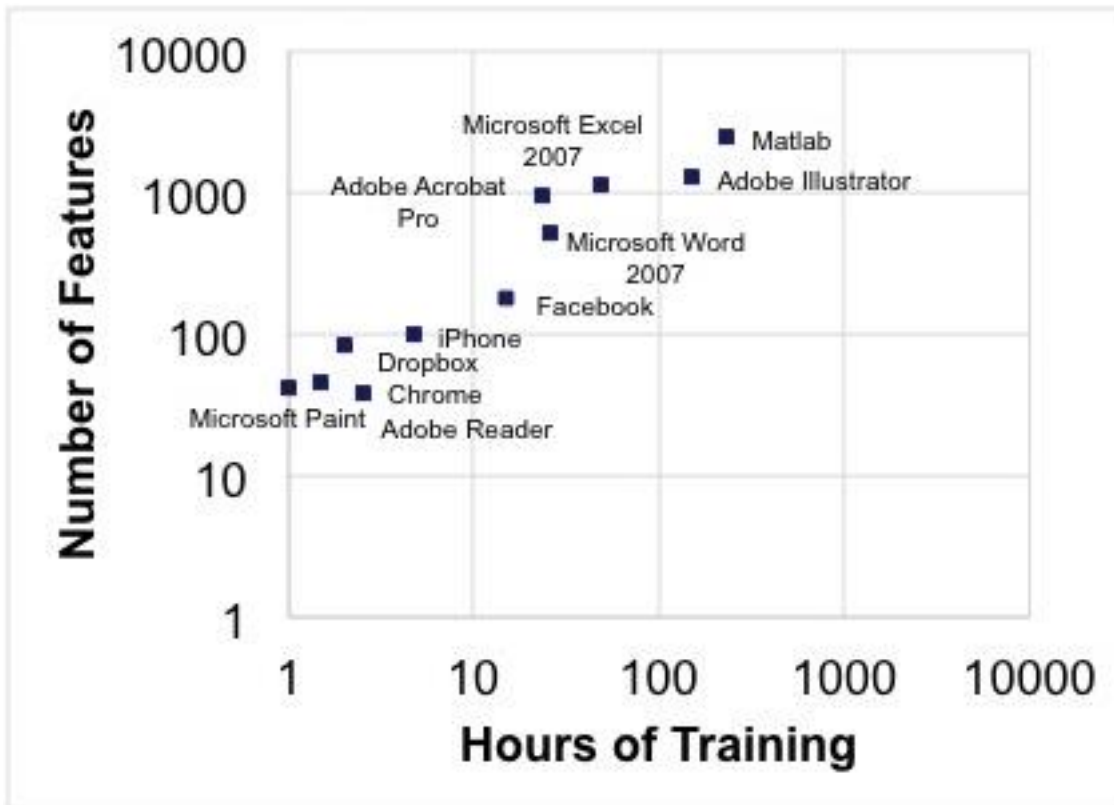
Operator Traits and Adaptation Styles for a Co-Adaptive System

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**NDIA Human Systems Conference
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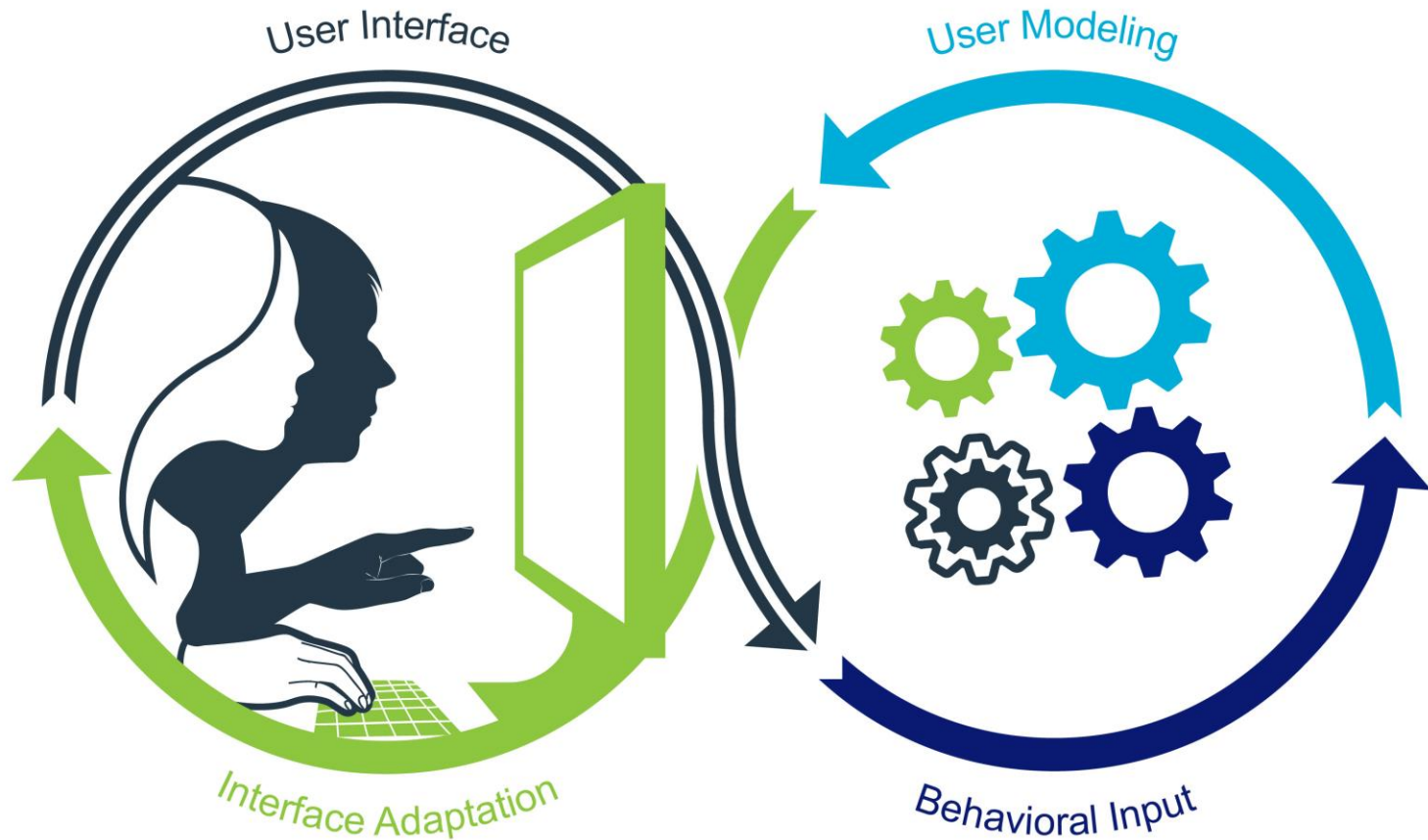
The Charles Stark Draper Laboratory, Inc.
555 Technology Square, Cambridge Mass. 02139-3563
CAGE Code: 51993

Challenge: “One size fits all” fits no one



Increasing software complexity impacts necessary training time

Goal: A Co-Adaptive System



Making the powerful approachable

Background: Existing Gaps in Adaptive Software Human-Computer Interaction Research

Gaps

Comparing human performance between adaptation & baseline

Performance differences by trait for adaptation types

Existing Research

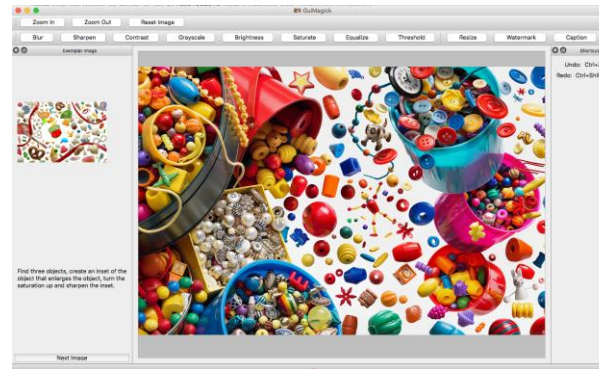
Adaptive Software Strategies (e.g., Amditis et al., 2006; Gajos et al., 2006; Kühme, 1993)

Effect of stable user traits on usage of adaptation (e.g., Gajos & Chauncey, 2017)

Study: Do adaptation styles affect task performance?

Control

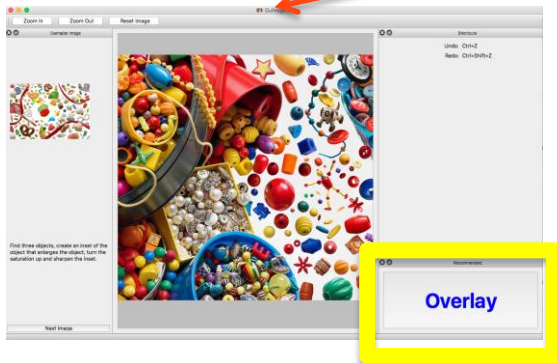
Task: Image Editing, using ImageMagick



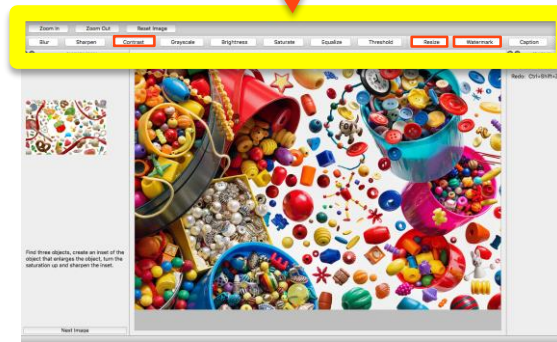
Limit choices

Suggest

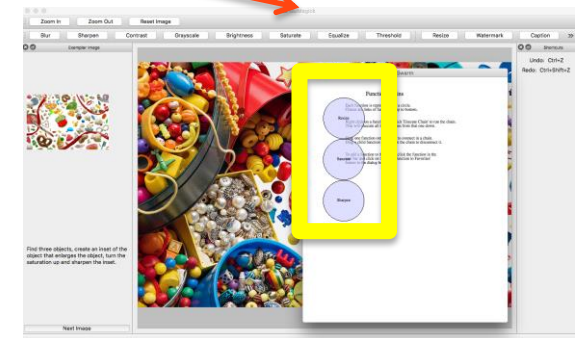
Automate



Big Buttons (BB)



Highlighting (HL)



Macro (MA)

Study Design & Participants

Within-subjects design

- Blocks of 2 tasks per condition
- 4 conditions (order counterbalanced)
- Minimal training on interface

28 participants:

- Gender distribution: 11M, 17F
- Age range: 18-55

Dependent Variables

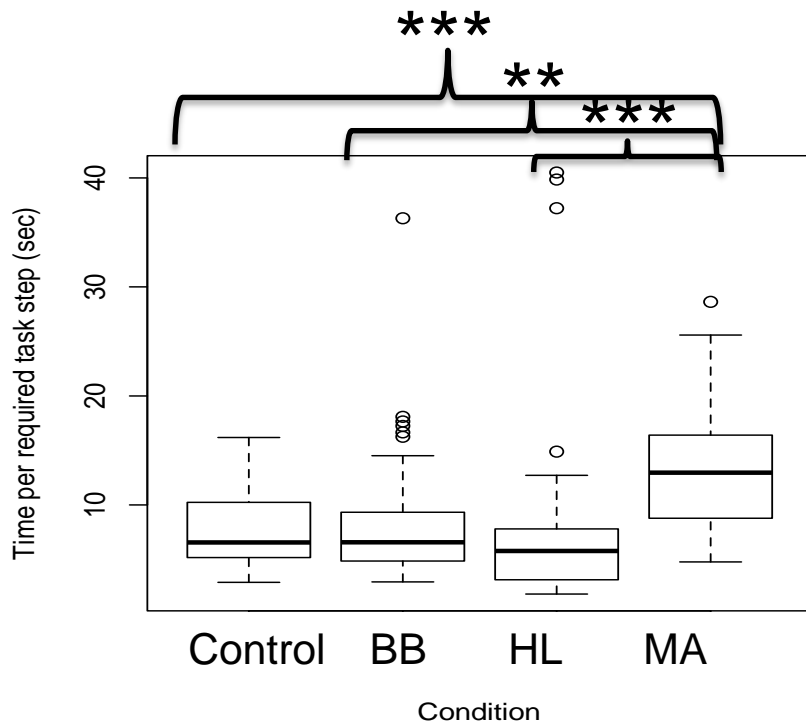
- Efficiency: Time per required task step
- Usability: System Usability Scale
- Trust: Buy-in survey

Independent Variables

- Need for cognition (NFC)
- Extraversion
- Dispositional Trust
- Locus of Control
- Neuroticism
- Openness to new experiences

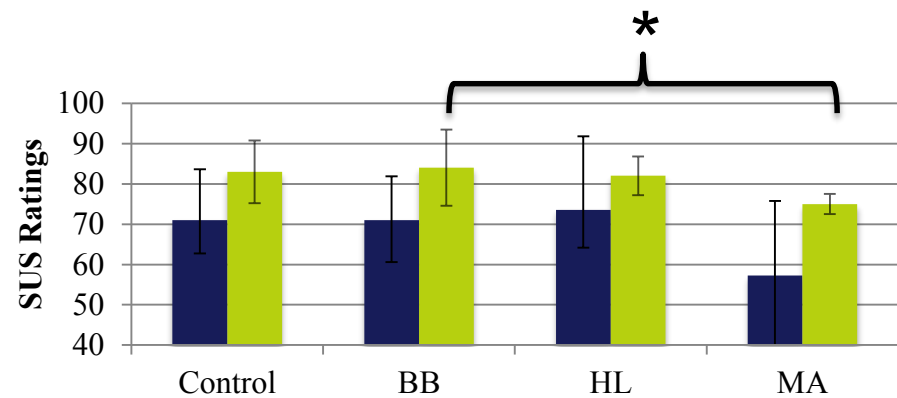
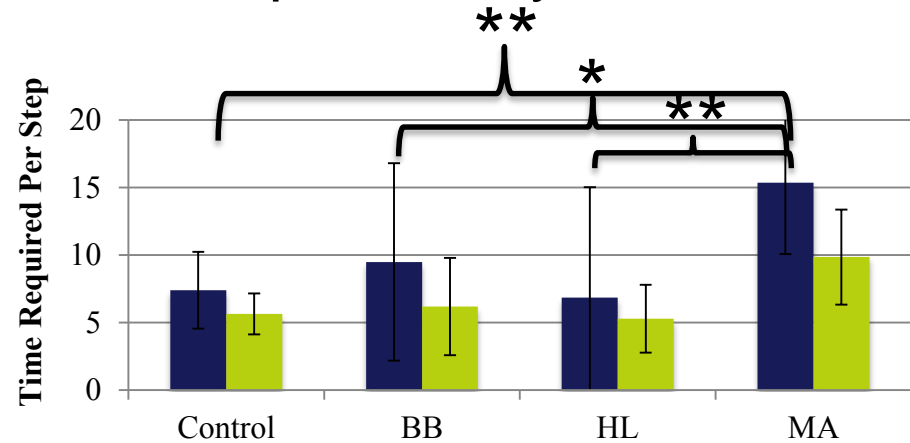
Results: Adaptation Styles Produce Differing Performance, Reactions

Do adaptation styles affect task performance? Yes.



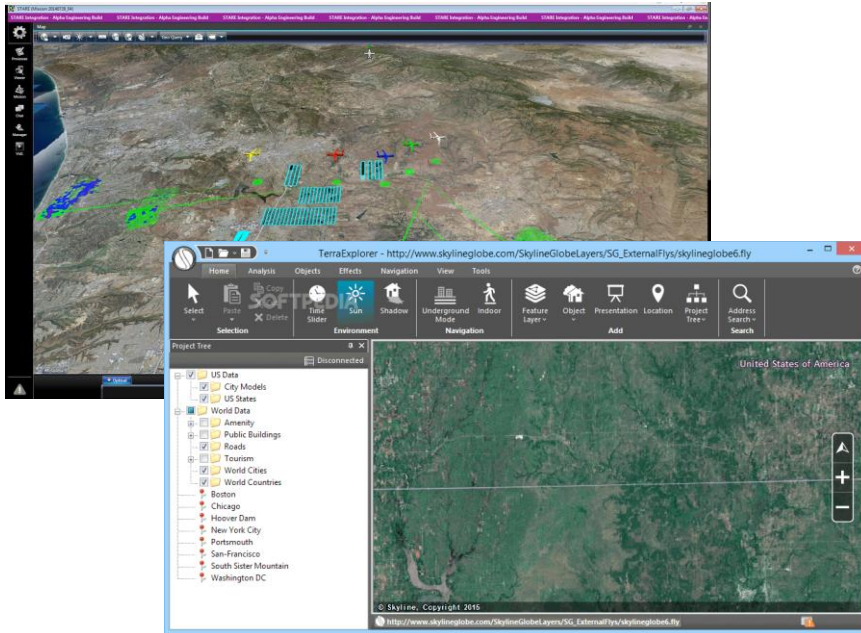
$F(1, 222) = 19.5, p < 0.001$

Do traits affect interaction with adaptation styles? Yes.



■ Low Dispositional Trust ■ High Dispositional Trust

Applications: Co-adaptive Software Can Ease Increasing Burden on the Warfighter



Ex: Mission Planning Software

Ex: Predator Ground Control Station

Warfighter use of complex feature rich tools will increase as technology advances

Ongoing & Future Work

- In-depth testing of more advanced adaptations
 - How much can an adaptation help users?
 - Do traits affect size of performance change?
- Currently creating co-adaptive version of online data collection game, Dr. Data



Play Dr. Data: <https://chcidata.com/>

Thank you!

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