1. Call Meeting to Order
Joe called the meeting to order at 12:35 PM. A buffet style lunch preceded the business meeting.

2. Introductions
All attendees introduced themselves, stated their employer, NCITE involvement, and answered the questioned posed: “What is your favorite candy?” The favorite was Reese’s followed by Snickers and a 4-way tie for 3rd place. The total attendee count was 69. The breakdown was as follows:
- 66 in-person attendees (5 ITSO attendees)
- 3 online attendees

3. Announcements
Joe made the following announcements:
- NCITE will begin accepting 2016 scholarship applications later this week.
- The 2017 NCITE Election will begin this Friday, October 21. Members will receive an email to cast their vote.
- NCITE has created a new committee, the Younger Member Committee. It will operate in the same way as other existing technical committees.
- Joe introduced John Davis, ITE District 4 Director. John congratulated NCITE for its winning bid to host the 2018 ITE Annual Meeting! The 2017 MWITE Annual Meeting will be in Madison, Wisconsin June 18-20. John presented ITSO with the championship “trophy” (plaque) for winning the Traffic Bowl competition in June at the MWITE Annual Meeting.
- The NCITE Annual Meeting will be on November 10 at Whirlyball in Maple Grove.

4. Technical Presentation: Computerized Crash Reports Usability and Design Investigation
Jacob Folkeringa introduced Dr. Nichole Morris from CTS to present on the computerized crash reports usability and design investigation.
- Nichole was hired by the State of Minnesota to overhaul the state’s crash report form MnCrash. Specifically, the project entailed the design and creation of a crash report interface that improves accuracy, speed, reliability, and meaningfulness of crash report data utilizing Human Factors (HF) analyses and principles as well as capitalizing on the experience and expertise of law enforcement.
- Phase 1 consisted of assessing the existing crash report using HF principles to address human and system performance issues. This included Hierarchical Task
MEETING MINUTES
NCITE October Section Meeting
Monday, October 17, 2016; 11:00 AM– 1:00 PM

Analysis, Cognitive Walkthrough Analyses, Interviews, Card Sorting Tasks, and Survey.

- Interviews consisted of samples from 12 officers from 7 different agencies with 1-20+ years of experience.
- Issues that impede complete data on crash reports included court implications and reconstruction constraints. Officers are hesitant to include factors they cannot prove in court. However, defense attorneys use it all of the time! Officers are hesitant to contradict findings of a reconstruction report.
- Phase 2 consisted of Design & Usability Testing. This was to build a mock-up crash report based on the findings and recommendations of the HTA, card sorting, and cognitive walkthrough analysis. This was where focus was placed on the type of interface style, either wizard or full form.
- After extensive testing, users were split in preference between wizard and form-based interface. Therefore, both interfaces were recommended for use.
- MnCrash went live on January 1, 2016. Feedback has been positive so far.

5. Adjournment
Jacob thanked the speaker and adjourned the formal business meeting at 1:38 PM.

Respectfully submitted,

Scott Poska
2016 NCITE Secretary
Computerized Crash Reports
Usability and Design Investigation

Nichole L. Morris, Ph.D.
HumanFIRST Laboratory
University of Minnesota
Human Factors Overview

• Human factors psychologists study human capabilities and limitations
• Apply knowledge to systems and environments
  – Enhance human performance
  – Minimize error
  – Multidisciplinary approach
• Why do we need Human Factors?
  – Increased system complexity
  – Cost of redesign is extremely costly
I apologize for being too stupid to print a state report.
Project Objectives

• Design and create a crash report interface that improves accuracy, speed, reliability, and meaningfulness of crash report data
  – Utilize Human Factors analyses and principles
  – Capitalize on the experience and expertise of law enforcement
Phase 1: Human Factors Analysis

- Assess existing crash report using HF principles to address human and system performance issues
  - Hierarchical Task Analysis
  - Cognitive Walkthrough Analyses
  - Interviews
  - Card Sorting Tasks
  - Survey
Hierarchical Task Analysis (HTA)

• HTA is a systematic process of examining tasks
  – Analysis of plans, goals, and sub-goals

0. Document Motor Vehicle Crash

1. Complete MN Crash Report

1.1 Enter officer information
  1.1.1 Enter the Local Case #
  1.1.2 Enter Officer Name
  1.1.3 Enter Rank
  1.1.4 Select agency Type
  1.1.5 Enter Badge #
  1.1.6 Enter State Patrol STA#

1.2 Locate Crash

Plan 1: 1-2-3. Then 4 and/or 5 as appropriate

Plan 1.1: 1 to 5. Then, if state patrol-6

Plan 1.2: 1—2. Then, if crash occurred on a divided highway—3. Then, if state patrol—4; otherwise 5 or 6 as appropriate—then 7. Then 8—9.

Plan 0: 1-then, if death occurs within 30 days of crash--2
HTA Results

• The HTA describes the tasks shared between the user and the system
  – There are up to 175 steps in total
  – Division of responsibilities between the user and the system is 151:24

• The goal of future iterations of the crash report will be to shift more responsibilities to the system
Phase 1: Human Factors Analysis

• Cognitive Walkthrough Analyses
  – Evaluate current user interface usability
  – Identify goals: are the actions correct?
  – Assess validity and reliability

• Interviews
  – Sampled 12 officers from 7 different agencies with 1-20+ years of experience
Validity & Reliability Issues

• Hit & Run or Parked Vehicles
  – Elements under-used, required for accurate entry of other required elements

• Sequence of Events
  – Unclear inclusion of *Collision with “Motor Vehicle in Transport”*
  – Non-collision events under utilized
Other Issues Impeding Complete Data

• Court implications
  – Officers are hesitant to include factors they cannot prove in court
  – Crash report is inadmissible in MN courts
    • “Defense attorneys use it all of the time”

• Reconstruction constraints
  – Officers are hesitant to contradict findings of a reconstruction report
Card Sorting Task

- Driver Violation?
- Reference Point
- City
- Roadway
- Bridge
- Narrative
- Sequence of Events
- Factor 1
- Maneuver
- Safety Equipment
- Airbag
- Fire?
- Weather
- Injury Severity
- Intersection
- Name
- Last Harmful Event
- Driver’s License
- Most Harmful Event
- Maneuver
- Roadway
Card Sorting

• Online card sorting software, OptimalSort
  – Feb. 28th-Mar. 20th, 2014
  – 167 officers participated
    • Varied experience level ($M=19.9$, $SD=10.9$)
  – 68 law enforcement agencies participated
    • 57 Police departments, 10 Sheriff’s departments, and Minnesota State Patrol
Best Merge Method

Graphical depiction of percent of agreement for item grouping based on actual agreement and best merge method algorithm.
Possible Report Structure

Graphical depiction of one possible organization of the items within the crash report. Organization is based upon card sorting analyses and cognitive walkthroughs.
HF Design Outcomes

• Users preferred a one-to-many structure and ordering
Phase 2: Design & Usability Testing

• Aim: Build a mock-up crash report based on the findings and recommendations of the HTA, card sorting, and cognitive walkthrough analysis

• Test law enforcement on mock report
  – Assess error rate, subjective usability and acceptance, and mental demand
  – Select best interface style
    • Wizard vs. Form
Wizard vs Form-Based Interface

- **Wizard**
  - e.g. Software Installation
  - Step-by-step queries through a series of dialog boxes in a predetermined order of succession
  - Each dialogue box is devoted to that single question/group of related questions
  - Questions are split up at decision points

- **Form**
  - Interface is divided into clearly defined sections
  - Content within another section is just an easy click away
  - Interrelationships between all the pieces are made apparent
  - Less restrictive workflow
  - Larger screens containing more entry fields
  - Less detailed queries

Any Passengers?

If yes, Input details

If no, End
Interface Design

- Created both Wizard and Form-Based Interfaces
  - Justinmind Prototyper Pro Software
    - Based on findings from users & New attributes from MMUCC
    - Largely matched by Functionality, Order, and Content

<table>
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<th>1 Unit</th>
<th>2 Units</th>
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<th>2 Unit Fatal</th>
<th>3 Units</th>
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Decision Aids

- Embedded hyperlinks and information bubbles
Decision Aids

State of Minnesota Traffic Crash Report

Unit 1:

1st Event 2nd Event 3rd Event 4th Event

What was the 1st event that happened to unit 1?

- Lane Departure or Non-Collision
  - Collision w/ Non-Fixed Object
  - Collision w/ Fixed Object

- Ran Off Roadway Right
- Ran Off Roadway Left
- Cross Median
- Cross Centerline
- Reentering Roadway
- Separation of Units
- Downhill Runaway
- Overtake/Rollover
- Fire/Explosion
- Immersion (Full or Partial)
- Jackknife
- Cargo/Equipment Loss or Shift
- Fell/Jumped From Motor Vehicle
- Thrown or Falling Object
- Other Non-Collision

Save & Exit Submit
Usability Testing

Conducted 4 major rounds of usability testing

• **Within-subject design:** order of interface presentation was counterbalanced across participants
  – Participants documented a pre-determined crash scenario
  – “Think aloud” method
  – Sessions (~1.5 hours) were recorded through screen video imaging and audio recording using Morae software

• **Participants:**
  – 41 law enforcement officers (varied age, rank, and experience)
    • 23 agencies

• **Measurements:**
  a) Subjective usability
  b) Subjective mental workload
  c) Duration
  d) Preference & overall impression
Outcomes

• Preference
  – Users were largely split in preference between Wizard and Form-based interface
  – Both interfaces are recommended for use

• Usability, Mental Effort, and Duration
  – No significant differences between interfaces
  – Form slightly better under complex scenarios

• Iterative Design

• Shift of Responsibilities
  – Nearly 1:1 ratio!

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<td>Total Entry Fields</td>
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</table>
Implementation

Minnesota DPS hired Appriss to build interfaces based on HumanFIRST designs – 3 data entry methods created:

- Quick Capture
- Wizard
- Form

2 platforms:

- Website
- Standalone platform

HumanFIRST Laboratory
Final Stretch!

• Collaborated with Appriss to ensure interface designs were fully implemented
  – Quality control, Beta Testing, User Acceptance Testing

• Continued usability testing to guide final modifications
  – 2 final rounds of testing of final report platforms
    • Quick Capture, Wizard, and Form
  – 18 law enforcement officers (9 agencies)
    • Recommended final design modifications to resolve any observed errors, confusion, or frustration
Go Live!

• Where are we now?
  – Positive feedback!

• What’s next?
  – Crash data audit
    • Examine converted data
    • Determine the reliability and validity of new crash data
    • Make new recommendations for improvement
Acknowledgments

• Research Staff from HumanFIRST Laboratory
  – Jacob Achtemeier, B.S., Jennifer Cooper, B.A., Alice Ton, M.S.

• Minnesota Traffic Records Coordinating Committee
  – Kathleen Haney (MnDPS)
  – Brad Estochen & Katie Fleming (MnDOT)

• Minnesota Crash Data Users Group

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Thank you!
Questions??

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nlmorris@umn.edu