Making Checklists
Social

Scott Klemmer
Jesse Cirimele
Nicolas Kokkalis

Thursday, April 5, 2012
How many of you...?

Milkman, K et. al. in PNAS 2011
### Surgical Safety Checklist (First Edition)

**Before induction of anaesthesia**

- **Sign In**
  - Patient has confirmed:
    - Identity
    - Site
    - Procedure
    - Consent
  - Site marked/not applicable
  - Anaesthesia safety check completed
  - Pulse oximeter on patient and functioning
  - Does patient have a:
    - Known allergy?
      - No
      - Yes
    - Difficult airway/aspiration risk?
      - No
      - Yes, and equipment/assistance available
    - Risk of >500ml blood loss (7ml/kg in children)?
      - No
      - Yes, and adequate intravenous access and fluids planned

- **Time Out**
  - Confirm all team members have introduced themselves by name and role
  - Surgeon, anaesthesia professional and nurse verbally confirm:
    - Patient
    - Site
    - Procedure
  - Anticipated critical events
    - Surgeon reviews: What are the critical or unexpected steps, operative duration, anticipated blood loss?
  - Anaesthesia team reviews: Are there any patient-specific concerns?
  - Nursing team reviews: Has sterility (including indicator results) been confirmed? Are there equipment issues or any concerns?
  - Has antibiotic prophylaxis been given within the last 60 minutes?

- **Sign Out**
  - Nurse verbally confirms with the team:
    - The name of the procedure recorded
    - That instrument, sponge and needle counts are correct (or not applicable)
    - How the specimen is labelled (including patient name)
    - Whether there are any equipment problems to be addressed
    - Surgeon, anaesthesia professional and nurse review the key concerns for recovery and management of this patient

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Pronovost et al, 2006
Ten-day Trial: infection rates from 11% to 0.

Michigan hospital study: infection down 66%
saved $175 million
saved 1500 lives

Pronovost et al, 2006
Checklists are Mobile

N Seyff et. al. in Software IEEE 2006
Checklists can be Socially Created or Used
Creating Checklists Socially: Providing Action Plans helps people complete Tasks

Nicolas Kokkalis, Johannes Huebner, Steve Diamond, Dominic Becker, Michael Chang, Thomas Koehn, Florian Schulze, Moontae Lee, Scott Klemmer
Can personal task lists benefit from social creation?
Complete more and easier

<table>
<thead>
<tr>
<th>Less Effort</th>
<th>Less Completed</th>
<th>More Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No Action Plans</strong></td>
<td></td>
<td><strong>Provided Action Plans</strong></td>
</tr>
<tr>
<td><strong>Self-created Action Plans</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Can the crowd provide actionability to people’s tasks?
Taskgenies Platform

To enable our studies we created an online community around tasks: TaskGenies

People can submit their tasks, others can decompose them

Access is provided via WWW for desktop, App for mobile, and e-mail
TaskGenies User Interfaces

**Desktop**: Submit Task & Create Plans

**Mobile**: Submit Tasks

Thursday, April 5, 2012
Experiment: Method & Measures

280 people submitted 20 tasks they planned to complete

Control: no intervention
Crowd: provided with crowd-created plans
Self: asked to create own plans

1 week later: measured number of tasks completed
Crowd-created plans helped people complete more tasks.

F(2,230)=6.10, p<.05
Crowd Plans help diverse Tasks

High Level Tasks

- small & well defined: (χ²=3.68, p=0.052)
- high-level: (χ²=16.00, p<0.0001)

Lingering Tasks

- non-lingering tasks: (χ²=6.24, p<0.05)
- lingering tasks: (χ²=17.72, p<0.0001)
69% of tasks had at least one analog
Scaling Up by reusing Action Plans

Using a corpus of 6000 action plans
95% of tasks used an existing plan
5% of tasks used crowd

*NLP condition* better than *Control*
Email: de facto task list of people
Gmail Valet is a simple and free tool that allows you to give restricted access of your Gmail messages to a personal assistant.

I want to give a Gmail valet ticket to an assistant. Start here:

Connect my Gmail

I am an assistant who has been given a valet ticket:

Username: [input field]

Password: [input field]

Login
Restricting Access: Only 1 label, Only the last 100 messages

<table>
<thead>
<tr>
<th>Username</th>
<th>Labels</th>
<th>Last Login</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>NicolasStartX</td>
<td>INBOX</td>
<td>Mar 23, 2012 02:31 PM</td>
<td></td>
</tr>
</tbody>
</table>

Create a new assistant account

- **Username:** NicolasStartX
- **Name (Send as):** Nicolas’ Assistant
- **Password:** ************
- **Repeat password:** ************

- **Label:**
  - Misc
  - Priority
  - Recorded!
  - Task

[Create | Clear]
The Valet View

Re: Let's chat about fundraising
Any chance you'll be in SF during the weekend. If...

Cameron Teitelman
Mar 14 01:13 PM
Re: Let's chat about fundraising
I am in a conference all week. I have time over th...

Mariya Yao
Mar 14 11:11 AM
Let's chat about fundraising
Got time tomorrow (Thurs)?

From: Mariya Yao <mariya@zokuapp.com>
To: Cameron Teitelman <cjtman@startx.stanford.edu>
Subject: Re: Let's chat about fundraising

Any chance you'll be in SF during the weekend. If not, Sunday evening-ish?

~Mariya

On Wed, Mar 14, 2012 at 1:13 PM, Cameron Teitelman
<cjtman@startx.stanford.edu> wrote:
I am in a conference all week. I have time over the weekend.

On Wed, Mar 14, 2012 at 11:11 AM, Mariya Yao
<mariya@zokuapp.com> wrote:
Got time tomorrow (Thurs)?

Cameron Teitelman
Founder of StartX, formerly SSE Labs
cjtman@startx.stanford.edu
Trust but verify: Record all actions

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fri Mar 23 14:32:08 GMT-700 2012</td>
<td>Opened message [From: Se Hayes <a href="mailto:sehayes@sse.stanford.edu">sehayes@sse.stanford.edu</a>, Subject: [Community_StartX] SSS 700 2012]</td>
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<tr>
<td>Fri Mar 23 10:23:27 GMT-700 2012</td>
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<tr>
<td>Fri Mar 23 10:20:21 GMT-700 2012</td>
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</tr>
<tr>
<td>Fri Mar 23 10:20:11 GMT-700 2012</td>
<td>Opened message [From: Ivan Lee <a href="mailto:ivanlee88@gmail.com">ivanlee88@gmail.com</a>, Subject: [Community_StartX] Sunday]</td>
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<tr>
<td>Fri Mar 23 10:20:08 GMT-700 2012</td>
<td>Opened message [From: Cameron Teitelman <a href="mailto:cjtman@startx.stanford.edu">cjtman@startx.stanford.edu</a>, Subject: Re: [Community StartX] Office]</td>
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<td>Fri Mar 23 10:19:58 GMT-700 2012</td>
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</tr>
<tr>
<td>Fri Mar 23 10:14:16 GMT-700 2012</td>
<td>Archived message [From: Mike Tung <a href="mailto:mike@cs.stanford.edu">mike@cs.stanford.edu</a>, Subject: [Community_StartX] Fwd: 2012]</td>
</tr>
<tr>
<td>Fri Mar 23 10:14:12 GMT-700 2012</td>
<td>Opened message [From: Mike Tung <a href="mailto:mike@cs.stanford.edu">mike@cs.stanford.edu</a>, Subject: [Community_StartX] Fwd: 2012]</td>
</tr>
</tbody>
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Take aways

Action plans facilitate effective work, but we have them too rarely. Making checklists social helps us get things done.
Using Checklists Socially: Supporting crisis response teams with checklists and multiple displays

Jesse Cirimele, Leslie Wu, Kyle Barrett, Katherine Chen, Kyle Harrison, Larry Chu, Stu Card, Scott Klemmer
Surgery
Surgery

- Pervasive and essential
  (234 million surgical procedures per year)
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- Pervasive and essential
  (234 million surgical procedures per year)
- Complex
  178 tasks per day in ICU
Surgery

- Pervasive and essential
  (234 million surgical procedures per year)
- Complex
  178 tasks per day in ICU
- High mortality
  1/300 die in surgery
Types of errors
Types of errors

- Social
- Team coordination problems
- Communication issues (miss something)
Types of errors

- Social
  - team coordination problems
  - communication issues (miss something)
- Individual
  - lose time (late)
  - get treatment algorithms wrong
Brain

can be slow, error prone
Brain

can be slow, error prone

Cognitive Aid

Fast and Accurate
Brain can be slow, error prone

Cognitive Aid
Fast and Accurate

... but
Cognitive Aid
Static, Visible to One

Interactive Aid
Dynamic, Visible to Group
insights

• Always ready
insights

- Always ready
- Nurse as primary controller
insights

• Always ready
• Nurse as primary controller
• Big display facilitates group coordination
Cog Aid => Resource Management

• cognitive aids are a resource to help the doctor during a crisis

• but so are
  • other people in the room
  • information about the patient
  • people on-call in case of emergency
  • communication
OR layout
Tablet Controller

Large Screen Display
Scenario walkthrough
The Wizard of Oz
and the OR

Thursday, April 5, 2012
Conclusion

- Checklists (cognitive aids, task lists)
- can play an important role in many situations
- can help us more when we carry them with us
- can be more effective when support socially
Thank you!

Questions?