EXPERT CROWDSOURCING WITH

FLASH TEAMS

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CROWDSOURCING: SMALL TASKS, MANY PEOPLE

Combine many paid non-expert opinions

e.g., text shortening
e.g., image labeling
e.g., data collection
MICROTASK CROWDS STRUGGLE WITH COMPLEX TASKS

Design, engineering, writing, video production, music composition

[Kittur et al. 2013, Kulkarni et al. 2012]
Structured collaborations between crowd experts
COULD WE CROWDSOURCE... THE DESIGN PROCESS, STARTING FROM A NAPKIN SKETCH, IN ONE DAY?
COULD WE CROWDSOURCE AN ANIMATED VIDEO IN 48 HOURS?

MSB: 5-7: “could we...” add text about time limits on the slides

6: you might want to add more text here. mention that it includes animators, character artists, voiceovers, sound design, director...
COULD WE CROWDSOURCE...

AN ENTIRE MOOC PLATFORM IN 24 HOURS?
CROWDS OF EXPERTS

Mechanical Turk
microtask worker
microtask worker
microtask worker
microtask worker
microtask worker

→

oDesk
programmer
designer
video editor
musician
statistician
CROWDS OF EXPERTS FACE COORDINATION CHALLENGES

Microtask techniques do not leverage diverse skills and expertise.

Expert crowd work is independent and uncoordinated.
Self-managed teams are inefficient, riddled with frustrated members, and poorly coordinated. [Bunderson and Boumgarden 2010]
Lightweight team scaffolds significantly outperform pipelined and self-managed efforts. [Valentine and Edmonson 2012]
Could we combine the management strength of team scaffolds with the scale and interactivity of computing?
FLASH TEAMS

Computationally-guided teams of crowd experts supported by lightweight, reproducible and scalable team structures.
SEQUENCE OF LINKED TASKS

Low-fi Mockup -> Revised Mockup

Heuristic Evaluation -> High-fi Prototype
SEQUENCE OF LINKED TASKS

- **Low-fi Mockup**
  - UI Designer

- **Revised Mockup**
  - UI Designer

- **Heuristic Evaluation**
  - UX Researcher

- **High-fi Prototype**
  - Developer
Revised Mockups
UI Designer
Input: low-fi mockups
Output: revised low-fi mockups
Goal: 90min
COMPUTATIONAL AFFORDANCES OF FLASH TEAMS

Modularity → Scale
Elasticity → Grow + shrink
Pipelining → Optimize
Planner → Create on-demand
MODULARITY

REPLICATE TEAM STRUCTURES AT SCALE

DESIGN

DESIGN

DESIGN

MODULARITY
ELASTICITY
PIPELINING
CREATION
MODULARITY

REPLICATE TEAM STRUCTURES AT SCALE

MSB: 18: would be nice to see entire napkin sketch team formulation before you talk about how they’re modular.
MODULARITY
COMBINE TEAMS TO FORM LARGER ORGANIZATIONS

DESIGN

EBOOK

ANIMATION

EDUCATION

MODULARITY
ELASTICITY
PIPELINING
CREATION
EDUCATION

MODULARITY

COMBINE TEAMS TO FORM LARGER ORGANIZATIONS

DESIGN

EBOOK

ANIMATION

MODULARITY

ELASTICITY

PIPELINING

CREATION
ELASTICITY
GROWTH ON-DEMAND

0h 5h 10h 15h 20h 25h 30h

directly-responsible individual (DRI)

Development v1

Development v2

Is it ok to leave DRI on this slide and next slide even though I don't mention it when I speak?
Elasticity enables growth by dynamically adding:
- Extra workers to complete job on time
- Workers with specialized skills
PIPEDLINING
PASS ALONG INCOMPLETE RESULTS

- Lo-fi v1
- Low-fidelity prototype v2
- Development v1
- Development v2
- User testing

can accept in-progress input
can stream in-progress output
Lo-fi v1
Low-fidelity prototype v2
Heuristic evaluation
Development v1
Development v2
User testing
“I have a napkin sketch of a design, and I’d like an animation describing the idea.”
CREATION BY REQUEST

Synthetic team created from compatible blocks from previous teams.
Translate blocks into a STRIPS action planning problem, which utilizes efficient boolean satisfiability solvers.
CREATION BY REQUEST

Translate blocks into a STRIPS action planning problem, which utilizes efficient boolean satisfiability solvers.
FOUNDRY

Web platform that allows:

Requesters to **author** flash teams

Team members to **track the progress** of tasks
AUTHORING IN FOUNDRY
AUTHORING IN FOUNDRY
AUTHORING IN FOUNDRY

EVENT LIBRARY

High-fi prototype  4 hours
Inputs: balsamiq mockups
Outputs: interactive high-fi prototype
FOUNDORY AS MANAGER

NAPKIN SKETCH DESIGN TEAM

Google Drive Folder
Progress Status:

TEAM ROLES

New Member Role +Add

UI Designer X

UX Researcher X

TIMELINE

Low-fi mockups
2hrs 0min
Upload

Structured...
1hrs 0min
Upload

Revise...
1hrs 30min
Upload
Welcome Michael Bernstein!

Your first task will begin as soon as the team starts.
Welcome Michael Bernstein!

Your task is IN PROGRESS
Welcome Michael Bernstein!

Your task is DELAYED
FLASH TEAM EXAMPLES

Recruited from paid crowd marketplace oDesk

Three team types:
- Napkin sketch (design & web programming)
- Animation (video making)
- MOOC (online education)
NAPKIN SKETCH
DESIGN TEAM
**NAPKIN SKETCH**

**OVERVIEW**

**Objective:** initial exploration of flash team structures

- **0h:** Low-fi
- **5h:** (revised) Low-fi
- **10h:** Heuristic evaluation
- **15h:** Hi-fi prototype development
- **20h:** (revised) Hi-fi prototype

- **User testing:** (revised)
- **Low-fi mockup:** (revised)
- **Hi-fi prototype:** user study report

Additional images:
- Developer
- UI
- UX
**USER-TESTED HI-FI PROTOTYPES IN ONE DAY**

<table>
<thead>
<tr>
<th>Design Goal</th>
<th>Completion time</th>
<th>Team size</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotion tracking</td>
<td>31:30</td>
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<td>$744.48</td>
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<tr>
<td>Event bullet board</td>
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<tr>
<td>Social meetups</td>
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IceBreaker is an app that helps you find people in your location that have friends or interests in common with you. You can see all the people around you that share at least one friend or one interest with you. If you click on one of them, you’ll land on the profile page. You can see the detailed list of interests or friends in common, and you can start a chat conversation. If you click on an interest or a friend in common, you’ll see a list of all the people in your location that share that particular interest.
ANIMATION TEAM
Objective: explore how flash teams can support creative outputs and non-engineering domains

-celebrate the work of Professor Terry Winograd, and his building a computer in...

Objective: explore how flash teams can support creative outputs and non-engineering domains

-celebrate the work of Professor Terry Winograd, and his building a computer in...
ON-DEMAND MASSIVE OPEN ONLINE COURSE (MOOC)
Objective: compose multiple modular team structures to complete a large scale project in 1 day
Content Database filled with one example / CSS template created / home page and course page development start

Course 1 Video making

Course 2 Video making

Course 3 Video making

Upload page v1 done
Quiz questions uploaded to the platform
Platform done
Video uploaded
Videos done

Database filled with one example / CSS template created / home page and course page development start
Start building database
## MOOC COMPLETED IN 1 DAY

<table>
<thead>
<tr>
<th>MOOC component</th>
<th>Completion time</th>
<th>Video length</th>
<th>Total cost</th>
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<tr>
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<td>$1,597.32</td>
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<td>Portrait photography</td>
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<td>Towers of Hanoi</td>
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</table>
ARE FLASH TEAMS EFFECTIVE?

FIELD EXPERIMENT

Do flash teams complete tasks equally effectively but in less time?

Controlled experiment: 22 experts across six napkin sketch teams (UI design, UX research, web dev)

Flash teams vs. self-managed teams
CONDITIONS

FLASH TEAMS VS. SELF-MANAGED TEAMS

Flash teams:
full Foundry with flash team workflow

Control teams (self-managed):
full Foundry with just one 13hr block
FLASH TEAMS:
50% FEWER WORK HOURS

Flash teams (mean 13hr2min) are significantly faster than self-managed teams (mean 23hr47min), p = 0.05.

The slowest flash team finished in fewer hours than the fastest team in the control condition.

-Jesse: why were flash teams better? Are most experts just not good at project management?

Jesse - You conclusion is that the flash team is faster, but what are the underlying reasons? Is it because experts are not good at PM? Or is it the communication and notifications that the system provides that speeds things up?
DISCUSSION

Flash teams shift the crowdsourcing narrative from independent homogeneous workers to teams of experts from the crowd.
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Flash teams shift the crowdsourcing narrative from independent homogeneous workers to teams of experts from the crowd.
Crowdsourcing grows up: computational organizational behavior for creative, analytical and engineering work
Thank you for funding from the NSF, Hasso Plattner Research Program, Precourt Energy Efficiency Center and oDesk

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