Crowds, Computation, and the Future of Work

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HOW WILL WE ACHIEVE COMPLEX GOALS?
The team scaling fallacy: Underestimating the declining efficiency of larger teams

WHO'S IN CHARGE HERE? HOW TEAM AUTHORITY STRUCTURE SHAPES TEAM LEADERSHIP

TEAM FAMILIARITY, ROLE EXPERIENCE, AND PERFORMANCE: EVIDENCE FROM INDIAN SOFTWARE SERVICES

STRUCTURE AND LEARNING IN SELF-MANAGED TEAMS: WHY “BUREAUCRATIC” TEAMS CAN BE BETTER LEARNERS

THE INFLUENCE OF SHARED MENTAL MODELS ON TEAM PROCESS AND PERFORMANCE

SOME UNINTENDED CONSEQUENCES OF JOB DESIGN

OUT OF SIGHT, OUT OF SYNC: UNDERSTANDING CONFLICT IN DISTRIBUTED TEAMS

THE MUTUAL KNOWLEDGE PROBLEM AND ITS CONSEQUENCES FOR DISPERSED COLLABORATION

COORDINATION NEGLECT: HOW LAY THEORIES OF ORGANIZING COMPLICATE COORDINATION IN ORGANIZATIONS
HOW MIGHT COMPUTING HELP US ACHIEVE COMPLEX GOALS?
Flash organizations

Valentine, Retelny, To, Rahmati, Doshi, Bernstein. CHI 2017.
Flash organizations: rapidly assembled and reconfigurable organizations composed of online collaborators
Flash organizations carry out open-ended, complex goals that were previously out of reach for crowdsourcing: product design, software development, and game production.
FOUNDERY

Web platform that supports authoring, reconfiguring, and running flash organizations
Inspiration: film crews and disaster response teams
[Bigley 2001; Bechky 2006; Klein et. al 2006; Valentine & Edmondson 2015]

Role structures enable interaction based on knowledge of roles rather than asset-specific knowledge of each other
COMPUTATIONAL ORGANIZATIONAL STRUCTURES

**Roles:** parametrize required expertise

**Teams:** groups of workers with shared goal

**Hierarchy:** nested roles that determine decision rights
ON-DEMAND HIRING FROM UPWORK

Task Available

Congratulations! You are at No. 1 position to work on the Application project.

Please read the following information carefully:

It is in your interest to stay in the hiring queue. However, to reinforce again, we will remove this task from the hiring queue (only for this case).

As stated in the job description, we will begin working hours on User Profile Wireframes.

Project overview: You need to answer a question.

Your Task

This is YOUR task. You can now end this tour, and click on the task rectangle and click start to read about your task, and start tracking work time. Note that time for reviewing the previous materials, etc. are accounted for as work time.

Pay close attention to the task description, the 'inputs' (what other workers have handed off to you), and the deliverables you are expected to create.

Automated, role-specific onboarding

Foundry hiring queue
To enable reconfiguration of the organizational structures: **branching and merging** inspired by version control
End users spun up and led entire organizations in six weeks, convening new workers on-demand within fourteen minutes on average.
2 mobile applications, 3 full-stack web applications consisting of 52,000 lines of code, 2 illustrated card decks, 639 tasks across 566 pull requests, 3261 person-hours of work across 35–46 days including engineers, designers, testers, and poets. Passed quality review by neutral experts.
Android companion app spun up in the final week
ENTERPRISE WORKSHOP PORTAL
Dream Team

WHAT IS THE BEST WAY FOR TEAMS TO ORGANIZE THEMSELVES?

Organizations rely on teeming and ad-hoc collaboration [Edmondson 2012]

But: Should teams be flat or hierarchical? Encouraging or critical? Enforcing equal turn-taking?

These roles, norms, and interaction patterns define team structures [Ilgen et al. 2005]

Researchers theorize ideal structures, then build systems nudging teams toward those structures [Olsen & Olsen 2000; Ackerman 2000; Dourish & Bellotti 1992; Erickson & Kellogg 2000; Winograd 1986; Lykourentzou et al. 2017]
ORG. BEHAVIOR: THERE ARE NO UNIVERSALLY IDEAL STRUCTURES

**Structural contingency theory**: the best team structures depend on the task and the team members [Donaldson 1999]

The wrong structures will doom teams to dysfunction [Ilgen et al. 2005; Schippers, Edmondson, & West 2014; Ancona, Okhuysen & Perlow 2001]

Managers — who are trained and paid for choosing effective team structures — are not effective at the task [de Brujin, Ten Heuvelhof, & In 't Veld 2002]
DREAMTEAM

Rapid self-experimentation with different team structures to converge on one that works well for the team and task.
liz  9:21 AM
hello

haoqi  9:21 AM
hi

darren  9:21 AM
Hi everyone!

puzzle-robot  9:21 AM
INSTRUCTIONS

SUBMISSION
This round change the following...

Be super cheery! Make sure to write encouraging comments to all your teammates, despite any losses!
Hierarchy
None, Centralized, Decentralized

Interaction Patterns
Emergent, Round-robin, Equally distributed

Norms of Engagement
None, Professional, Informal

Decision-Making Norms
None, Divergent, Convergent, Informed, Rapid

Feedback Norms
None, Encouraging, Critical

<feedback>
NETWORK OF MULTI-ARMED BANDITS

Multi-armed bandits efficiently explore multiple options over time.

However, this results in so much simultaneous change that **teams become quickly overwhelmed**
TEMPORALLY CONSTRAINED BANDITS

Model when teams are open to change, and how much change they are open to simultaneously

e.g., teams are most open to change at the midpoint of their progress
[Okhuysen and Waller 2002]

e.g., teams are resilient to exploring hierarchical structures early on, but less resilient to changing them later
[Marks, Mathieu, & Zaccaro 2001]
TEMPORALLY CONSTRAINED BANDITS

Redistribute the probability of arm selection via Thompson sampling to respect desired expected value of changes
Global constraint on expected number of changes
Prioritize which bandits can change and when
DreamTeam outperformed:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Outperformance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager-chosen</td>
<td>by 46%</td>
</tr>
<tr>
<td>Collectively-chosen</td>
<td>by 45%</td>
</tr>
<tr>
<td>Unconstrained bandit-chosen</td>
<td>by 41%</td>
</tr>
<tr>
<td>Control</td>
<td>by 38%</td>
</tr>
</tbody>
</table>

Repeated measures ANCOVA $p<0.05$, all post-hoc Tukey pairwise comparisons to Dreamteam $p<0.05$. N=45. Non-intervention training round used as a covariate, to control for teams’ initial performance.
Rather than structuring the future of work as an algorithm, let’s create computationally augmented organizational structures.

Organizations were originally designed with inspiration by mechanical systems. What might a computational infrastructure offer them?
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