The New ABCs of Research

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Founding Director (1983-2000), Human-Computer Interaction Lab
Professor, Department of Computer Science
Member, Institute for Advanced Computer Studies
Interdisciplinary research community
- Computer Science & Info Studies
- Psych, Socio, Educ, Jour & MITH

www.cs.umd.edu/hcil
vimeo.com/72440805
Design Issues

- Input devices & strategies
  - Keyboards, pointing devices, voice
  - Direct manipulation
  - Menus, forms, commands
- Output devices & formats
  - Screens, windows, color, sound
  - Text, tables, graphics
  - Instructions, messages, help
- Collaboration & Social Media
- Help, tutorials, training
- Search
- Visualization

www.awl.com/DTUI
Sixth Edition: 2016
Children’s Hospital in DC: Trauma Bay
Children’s Hospital Trauma Care: EventFlow
Children’s Hospital Trauma Care: EventFlow
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The New ABCs of Research (Oxford, 2016)

- Guide for junior researchers
- Manifesto for senior researchers, business leaders & funding agencies
- Reframe the research agenda & methods
  Teamwork when done right can produce high impact

http://ukcatalogue.oup.com/product/9780198758839.do
The New ABCs of Research

Context

Guiding Principles

Lifecycle Strategies

New Knowledge

Immense Problems
The New ABCs of Research

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New Technologies
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Immense Problems

New Technologies

Raised Ambitions
ABC Principle

**Applied & Basic Combined**

Combining applied with basic research produces more rapid progress in both
Blending Science, Engineering & Design produces higher-impact research
Science, Engineering, Design

https://books.google.com/ngrams
Scientist, Engineer & Designer

NY Times articles

http://chronicle.nytlabs.com/
The New ABCs of Research

Context

- Immense Problems
- New Technologies
- Raised Ambitions

Guiding Principles

- Applied & Basic Combined

Lifecycle Strategies

- Science, Engineering & Design

New Knowledge
The New ABCs of Research

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- Science, Engineering & Design

Lifecycle Strategies

- Choose actionable problems: civic, business & global priorities
- Apply observation, intervention & controlled experiments
- Form teams with diverse individuals & organizations
- Test ideas & prototypes with realistic interventions
- Promote adoption & assess impact

New Knowledge
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Applied & Basic Combined
Science, Engineering & Design

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New Knowledge

Solutions
Theories
The New ABCs of Research

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New Knowledge

Solutions

Theories
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<th>Context</th>
<th>Guiding Principles</th>
<th>Lifecycle Strategies</th>
<th>New Knowledge</th>
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Form teams with diverse individuals & organizations
The New ABCs of Research

Context

Guiding Principles

Lifecycle Strategies

New Knowledge

Form teams with diverse individuals & organizations
Teamwork is the New Norm

Percentage of publications by more than one author

Cooke & Hilton (Eds), *Enhancing the Effectiveness of Team Science*
http://www.nap.edu/catalog/19007/enhancing-the-effectiveness-of-team-science
Teams: WHY?

• ???
Why work in teams?

- To complete a substantial project in time
- More ideas - Getting unstuck
- Combine strengths/skills in different areas
- Backup - redundancy
- Motivating - responsibility to peers
- Modularity helps - accountability
- Learning
- It’s fun! (potentially)
What are the problems of working in teams?

- People get in the way
  - Disagreements
  - Communication gaps
- Overstressed – not living up to expectations
  - Inferiority complex
  - Fear of letting down peers
- Dealing with messing up
- Leadership troubles
- Lack of trust - unbalanced contributions
- Risk - of others not doing their share
- Personality, working style conflicts
How to work in teams?

- **Social structure**
  - Who sets the agenda/tasks/schedule
  - Who measures quality or approves results
  - What is the pacing - forms of coordination

- **Technology support**
  - Email
  - Chat
  - Phone
  - Video-conference or phone
  - F2F
Teams: Guidelines

- Previously successful collaborations
- Balanced teams
- Clearly defined goals & roles
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- Explicit statements of who does what by when
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- Collaboration readiness
- Technology readiness for remote teamwork
- Technology readiness for collaboration
Teams: Guidelines

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• Balanced teams
• Clearly defined goals & roles
• Explicit statements of who does what by when
• Regular and open discussions
• Good communication
• Collaboration readiness
• Technology readiness for remote teamwork
• Technology readiness for collaboration
• Trained experienced leadership
• Adequate administrative resources and services
• Use of effective brainstorming strategies
### National Academies Report (2015): Enhancing the Effectiveness of Team Science

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Low</th>
<th>High</th>
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</thead>
<tbody>
<tr>
<td>Diversity</td>
<td>Homogeneous</td>
<td>Heterogeneous</td>
</tr>
<tr>
<td>Disciplinary Integration</td>
<td>Unidisciplinary</td>
<td>Transdisciplinary</td>
</tr>
<tr>
<td>Team or group size</td>
<td>Small (2-10)</td>
<td>Mega (1000s)</td>
</tr>
<tr>
<td>Goal alignment</td>
<td>Aligned</td>
<td>Divergent</td>
</tr>
<tr>
<td>Permeable boundaries</td>
<td>Stable</td>
<td>Fluid</td>
</tr>
<tr>
<td>Proximity</td>
<td>Co-located</td>
<td>Globally distributed</td>
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<td>Task interdependence</td>
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Teams: Winning Strategy

• **Powers of Two** *(End of the Lone Genius) (Shenk, 2014)*

• Teams: Difficult to form, hugely effective

• Takes practice to gain skills
  • Clear goals, clear roles
  • Trust, communication, recognition
  • WJU2007: teams $\rightarrow$ 2.1 times the impact

• Large teams need administrative support
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scienceofteamscience.org      www.teamsciencetoolkit.cancer.gov
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- FUN!

scienceofteamscience.org      www.teamsciencetoolkit.cancer.gov
Research Project: 2 parents, 3 children

Basic Theories → Research Project → Refined Theories
Applied Problems → Research Project → Practical Solutions

Guidance to Future Researchers
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- Solutions
- Theories
The New ABCs of Research

Promote adoption & assess impact
Promote Adoption & Assess Impact

- Clear writing begets clear thinking
  - Story-telling trajectories

- Promote adoption
  - Send Five & Thrive
  - Papers, websites, videos, tweets, blogs

- Assess impact
  - Citations, downloads, tweets, blogposts
  - Best Paper Awards, testimonials, usage reports
Promoting Adoption: Becker Model

- Ideas travel through networks and relationships
- Cultivate champions.
- Present, Present, Present!
- Join relevant committees & insert your findings into decision making
- Don’t wait for publication. Disseminate early

https://becker.wustl.edu/impact-assessment/strategies
Online Services

- **Open Research:** arXiv.org, PLOS, Open Science

- **Community Building Sites:**
  - **Academia:** platform for academics to share research papers… to accelerate the world's research (19M users)
  - **ResearchGate:** connect researchers share scientific output, knowledge & expertise
  - **ORCID, VIVO, FORCE11, …**

- **Research Paper Managers:**
  - **Mendeley:** The best free way to organize your research
  - **Zotero:** free, easy-to-use tool to help you collect, organize, cite & share your research sources
  - **CiteULike:** free service to help you to store, organise & share the scholarly papers you are reading
The New ABCs of Research

Applied & Basic Combined
Achieving Breakthrough Collaborations
Ask Bigger Questions
Analysis Based on Creativity
Actively Build Connections
Aspire to Be like Colwell
**Books: Teamwork**

  


Books: Writing


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