

# Building a Better Scientist

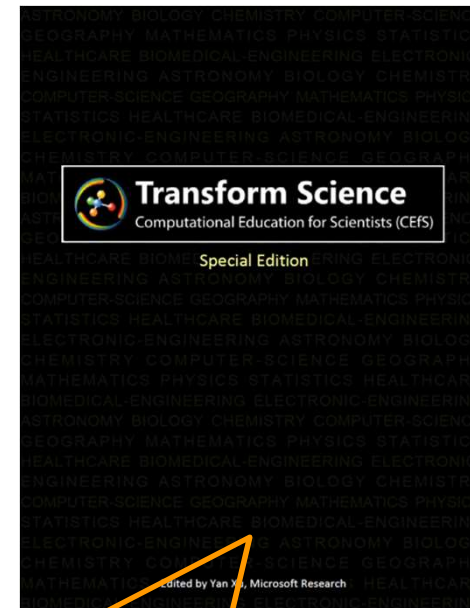
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Microsoft Research

# What Makes a Better Scientist?

- More knowledge of ?
- Additional skills of ?
- New mindset?
  - Computational thinking
  - Interdisciplinary thinking
- Educate the educators
  - Support thought leaders
  - **Work with decision makers**
  - Build the community



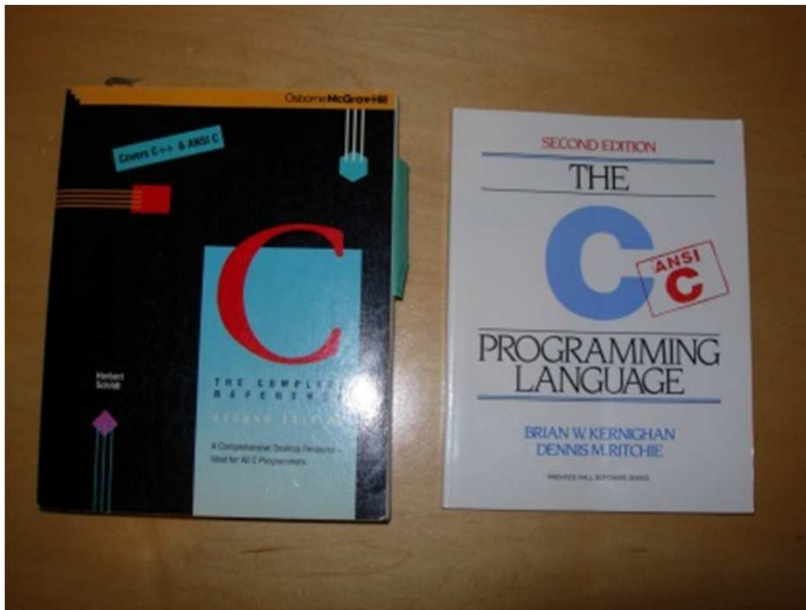
A collective wisdom from 45+ scientists & educators in 15+ different disciplines - 2009

An update in 2012?

- Generate new ideas and community support

# Computational Mindsets

- *“I bought a book and learned how to program myself ...”*
- *“do I care for performance? Not really ...”*
- *“could you (Microsoft) do the IT part for us?”*



# Computational Education for Scientists

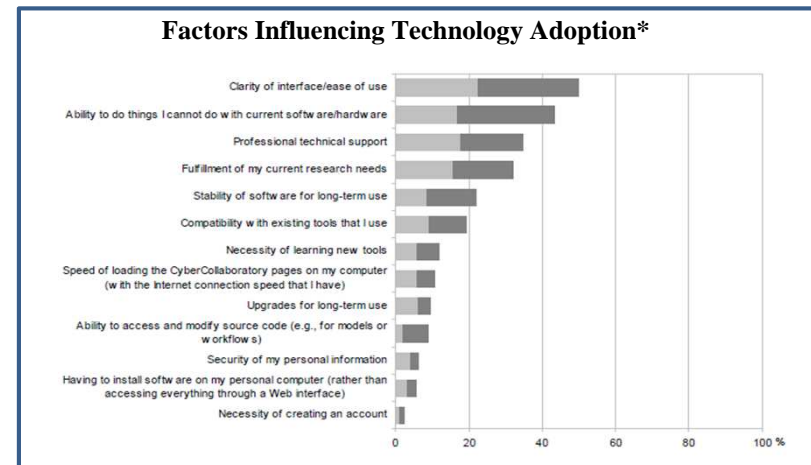
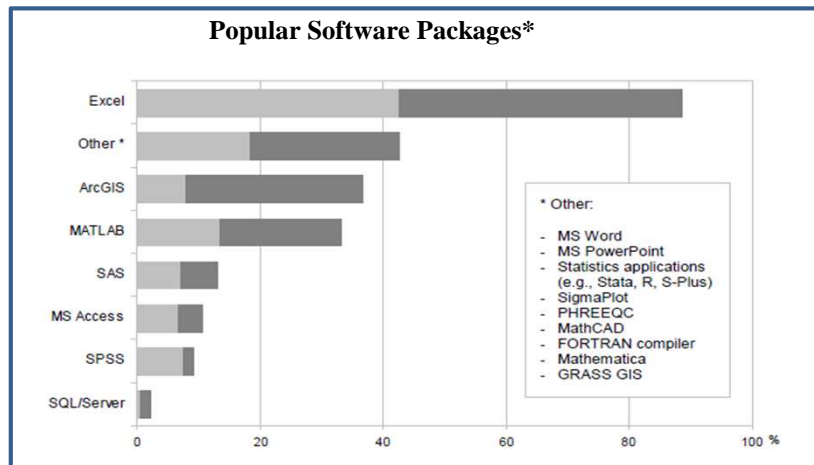
- What works well
  - Problem-based learning (PBL)
    - Student-centric
    - Interactive and participatory learning
  - collaborative teaching – real-world scenarios
- What works not so well (not so right)
  - Traditional computer science curriculum
  - adhoc self-learning?
  - Know just enough to be dangerous?
- Computational thinking v.s. computing
  - [Gim Gray & Alex Szalay story \(1+1 > 2\)](#)
  - Interdisciplinary **collaboration** is the key
  - Set forth examples
  - Understand and work with decision makers

# Computational Education for Scientists

- Understand and work with decision makers -
  - Multiple stakeholders
    - students, teachers, parents, funding agencies, curriculum accreditors (e.g. ABET)
    - Social identity and workforce
    - K-12
- Paradigm shift produced by incremental changes
- Established thought leaders' support for young faculty members
- Develop and showcase design-wins
  - PBL class at GaTech
  - Collaborative teaching at UIUC
  - Xbox and bioinformatics
  - ...

# Computational Thinking- Advance the norms of Technology Use

\*[Cyberinfrastructure for the waters networks: a Survey of AEESP and CUSHAI Members, K.A. Lawrence et al, May 2006.](#)



The Lowest Common Denominator

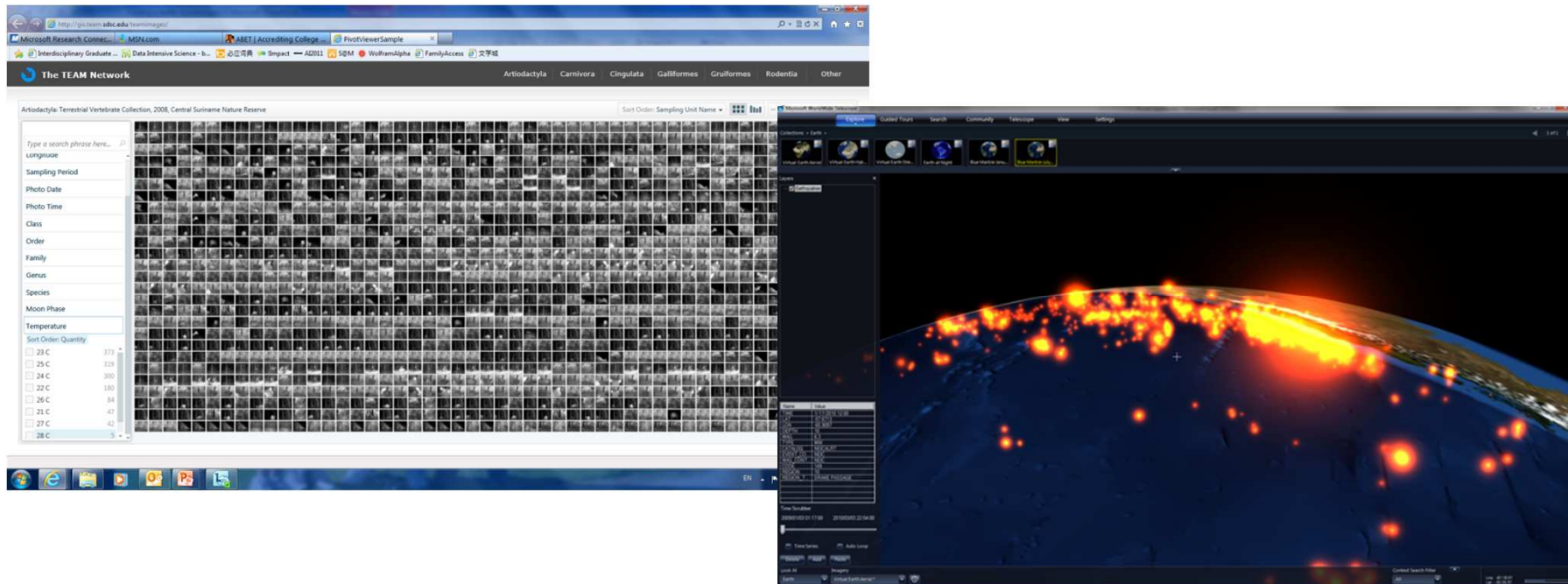


[HTTP://WWW.](http://www)

**Requirements for adopting new technologies:**

- Easy of use
- Additional value
- Professional technical support

# What makes a scientist better?



Computational thinking enables scientists do better science