Intellectual Push & Pull:
Broader Impact Through Curricular Infusions

Valerie Barr

Union College

Broader Impacts For Research and Discovery Summit
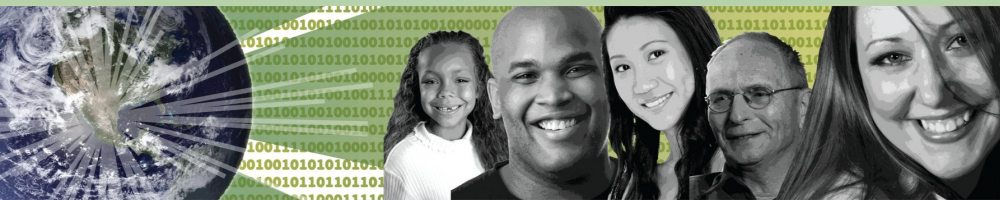
My Research

Creating a Campus-Wide Computation Initiative

- CPATH funded project at Union and Lafayette

- Give proper foundation to those who are or should be using computation in teaching and research.

- Broader Impact category: Advance science while promoting teaching, training and learning

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Original Broader Impact Statement

- Increase number of students with ability to develop scripts and programs in context of primary area of study.

- Broaden cohort studying computation to reflect diversity existing in other disciplines.

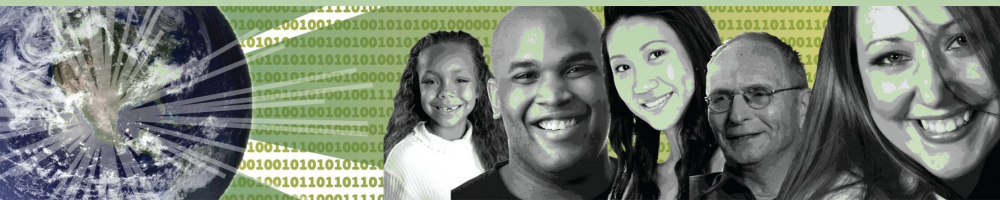- Disseminate model and strategies for implementation

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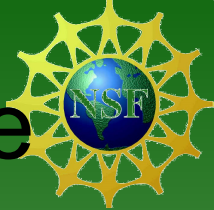**Broader Impacts For Research and Discovery Summit**
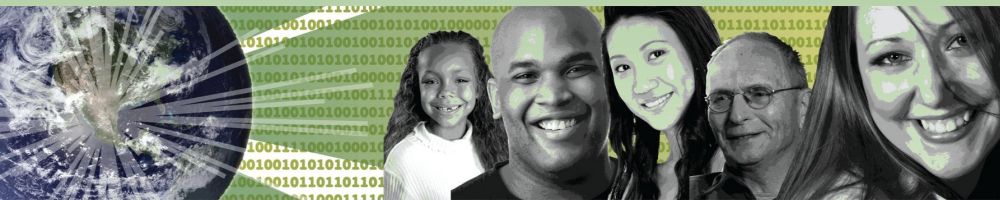
Intellectual Push and Pull

- Pull – infuse interesting themes into CS courses (change intro, intermediate, minors)

- Push – infuse computation into non-CS courses (change courses in other depts.)

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Pull – Multiple Intro and Intermediate Courses

- Taming Big Data
- Robots Rule!
- Game Development
- Can Computers Think?
- Creative Computing
- Programming for Engineers

- Natural Lang. Proc.
- Modeling & Sim.
- Web Programming
- Bioinformatics
- CS of Computer Games
- Visualization

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Pull – Minor programs involving CS

- Computer Science
  - Standard CS minor

- Computational Methods
  - 3 CS combined with any 3 other computationally oriented courses

- Digital Media
  - 3 CS and 3 Visual Arts

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Pull – Students Come From....

- Old intro course
  - Bio
  - Engineering (computer, electrical,mechanical)
  - Econ
  - Math
  - Undecided science

- Now – The old places plus
  - Chem
  - Neuro
  - Arts
  - East Asian Studies
  - English
  - History
  - Physics
  - Psychology
  - Philosophy
  - Political Science
  - ..... and more....

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Pull – Gender Breakdown

- Old introductory course
  - 17.7% female enrollment over 7-year period
- New course scheme
  - 21.5% female enrollment overall
  - 27.7% women in AI, media comp., computational sci.
- Note that some fields from which we draw have their own gender issues.

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Push

- Faculty (non-CS) incorporate computation into their courses

    – through labs, lectures, homework, projects

    – Astronomy(2), biology(2), chemistry, civil engineering, classics, economics(3), electrical and computer engineering(2), film studies, mechanical engineering(2), physics, political science, psychology (neuroscience).
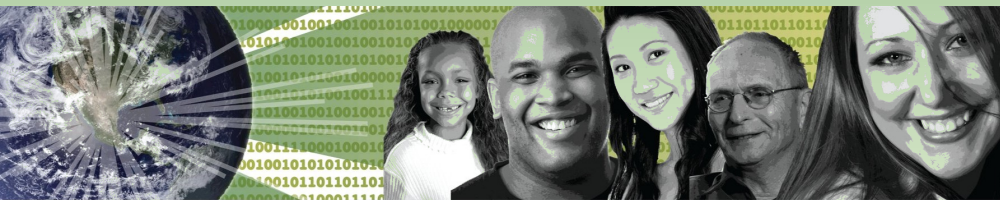
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Push – Does it work?

Key outcomes:

1) faculty say it's "doable"!

2) students say

- enhanced understanding of course material

- increased interest in future activities that will involve computational methods

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Impact – is it broad?

- Through August 2009
  - 13 faculty
  - 10 departments & programs
  - 16 courses modified

Push >11% of student body

And 96 high school students

- Through August 2010
  - 18 faculty
  - 12 departments & programs
  - 22 courses modified
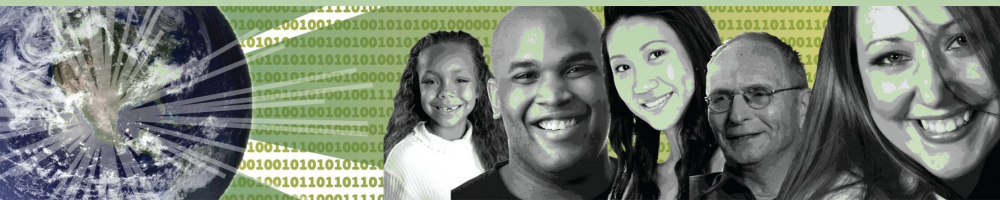
Push & Pull >23% of student body.

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Side Benefit for CS Dept.

- Seen as department that can and will work with students with hybrid interests.

- In 2009, over 50% of CS graduates did double or interdepartmental major with another discipline
  - arts, biology, classics, economics, math, philosophy, political science

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Join Us!

- Workshops in January 2011 at Union & Lafayette
  - Should be attended by faculty pairs, one CS, one non-CS
  - Come with an infusion idea, leave with a solid plan to develop curricular infusion for AY 2011-2012
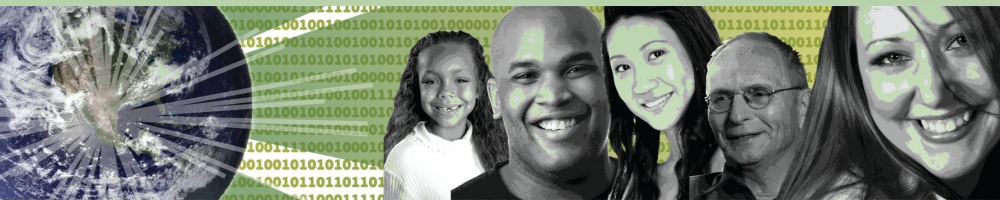
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Contact Me!

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