Area 1: *Advancing science, while promoting teaching, training and learning*

Example activities:

- include students (grad, undergrad, K-12) and postdocs in research activities; establish mentoring programs
- develop, disseminate research-based educational materials
- involve grad students, postdocs in teaching
- recruitment, training, professional develop., K-12 teachers

Broader impact activity undertaken by all research grants

Area 1: *Advancing science, while promoting teaching, training and learning*

Speakers:

- *Jim Kurose,* "Broader Impacts: From Centers to Single-PI Awards to Textbooks"
- *Mary Rosson,* "Repositories of Scaolded Examples for Learning"
- *Valerie Barr,* "Intellectual Push & Pull: Broader Impact Through Curricular Infusions"
- *Susanne Hambrusch,* "Integrating Computational Thinking into Courses for Non-majors"
- *Gregory Hislop,* "Active Communities and Repositories for Computing Educators"

From centers to single-PI awards to textbooks:

advancing science (while promoting teaching, training and learning)
at scale and over the long term

Jim Kurose

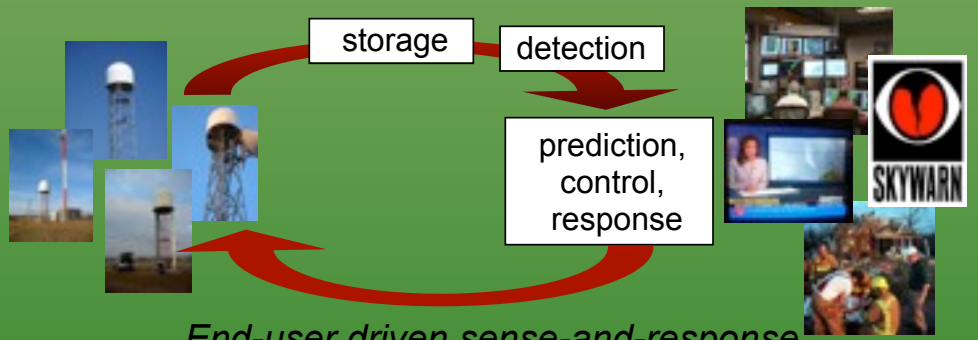
University of Massachusetts Amherst

My research: computer networking

- *Network protocols, architecture:* system structure, rules for communicating among distributed system components
- *emphasis on application-level needs:* multimedia, cyber-physical systems

Collaborative Adaptive Sensing of the Atmosphere

an NSF Engineering Research Center



End-user driven sense-and-response (DDDAS)

Impacting teaching, training, learning

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small-scale grants:

- graduate mentoring
- postdoc mentoring
- REU

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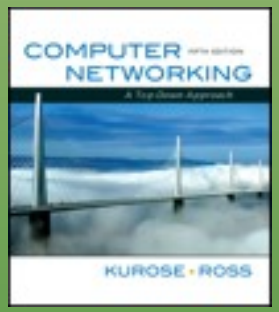

- informed, inspired by research
- unfunded (do it for love)
- curricular materials
- highly personal

Impacting teaching, training, learning

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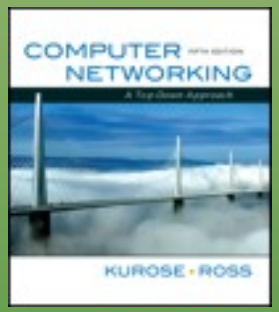
- ❖ REU



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- ❖ highly personal

10-year center lifespan
- ❖ sustainable programs
- ❖ new degrees, focus, curriculum, state/national
- ❖ embed in institutional cultures

Impacting teaching, training, learning

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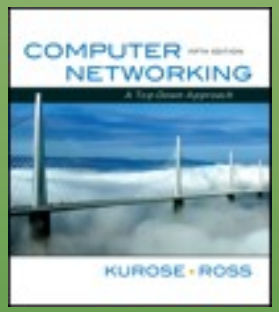

- informed, inspired by research
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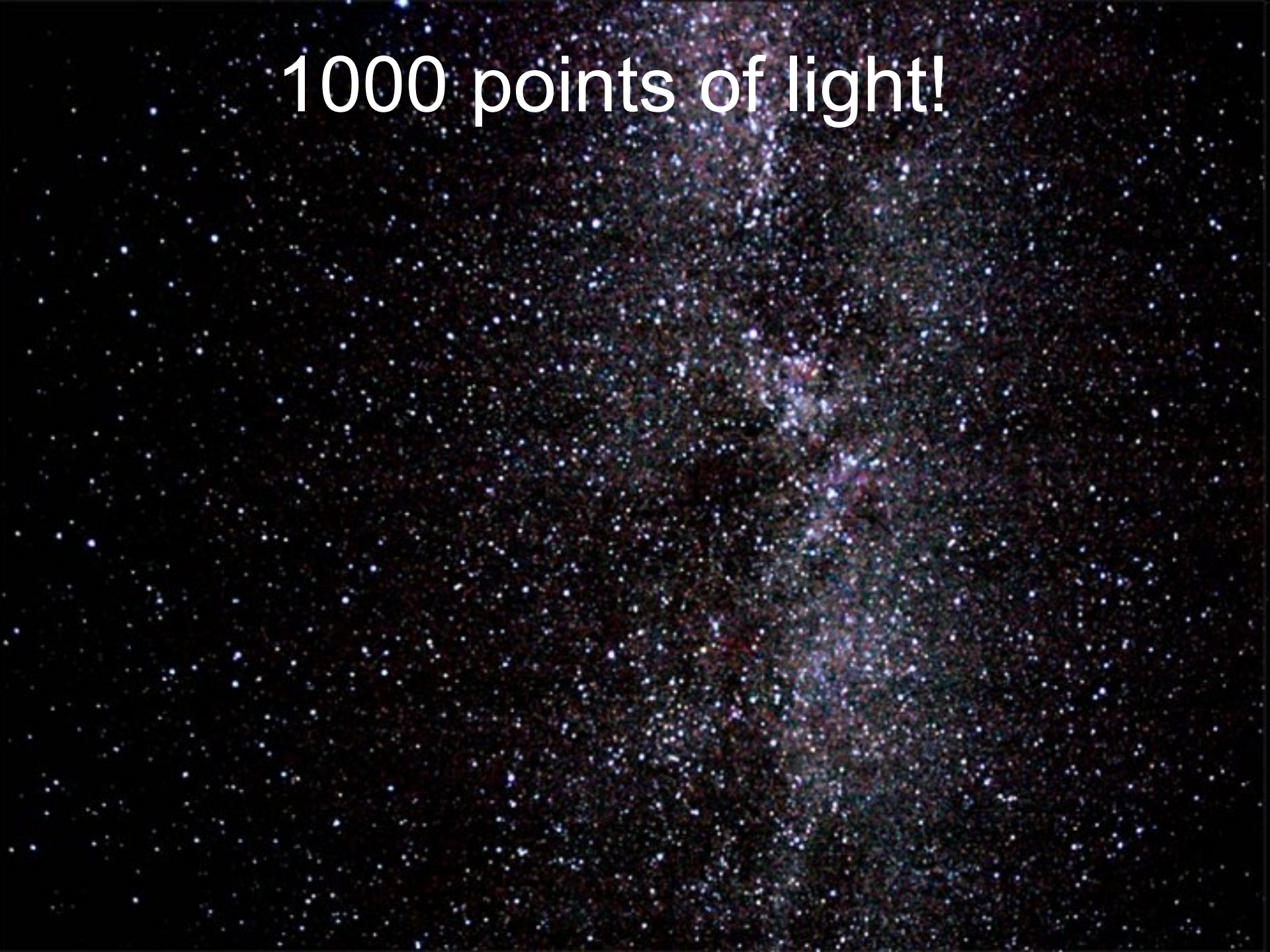
10-year center lifespan
- sustainable programs
- new degrees, focus, curriculum, state/national
- embed in institutional cultures

highly personalized, 1-1, one-year-at-a-time

impacting many (scale) over long-term (sustainability)

J. Kurose/UMass Amherst


1000 points of light!

1000 points of light!

Challenges:

- fusing many high-quality individual efforts into sustainable, large-scale “movement”
- common challenge along all five dimensions of broader impact
- possible paths forward:
  - linking individual efforts to large-scale, longer term efforts
  - specialized broader impacts programs: BPC, CPATH