Lost Opportunities: Policy and Computing Research

Jon M. Peha
www.ece.cmu.edu/~peha
peha@cmu.edu

Carnegie Mellon University
Associate Director
Center for Wireless and Broadband Networks

Cyphermint
Chief Technical Officer

Example 1: E-Commerce Payment Systems

- E-commerce payment systems are typically designed to meet narrow technical requirements.
  - such as security, speed, atomicity, memory/CPU/bandwidth consumption, ...
  - Broader societal concerns are rarely considered.
- Sales tax (my initial involvement)
  - Lawyers arguing that sales tax must be based on location of buyer at time of purchase, which is often technically infeasible.
  - E-commerce merchants arguing that efficient collection of sales tax is not technically feasible.
  - Others say it is feasible and trivial - seeking solution where consumer must reveal *all* information to payment system, e.g. credit card company.
  - Basic technical research essential to select good policy.
  - I wrote technical papers *and* testified before policy-makers

More in E-commerce

- Electronic signatures (from my year in Congress)
  - Should they ever be valid? Congress says yes in ESIGN bill.
  - Changing the technology would fundamentally change many established legal and policy concepts.
    - such as presumption of guilt, definition of "original" document, level of proof that documents were received and understood.
  - Ignoring policy context of technical innovation can cause big problems.
- Electronic cash
  - For people without credit cards.
  - For privacy protection - to avoid spam, identity theft.
  - Greatly reduces transaction costs.
  - Current anti-money-laundering laws may ban valid transactions while failing to prevent real money laundering.
  - Current banking regulations may accidentally prohibit privacy protection even when it is not a problem.
  - Advancing technology means developing plans to both improve technical capabilities *and* meet social needs. (www.cyphermint.com)

Example 2: Broadband Open Access

- Many consumers will have one or two broadband access providers.
  - DSL, cable modems, fixed wireless, satellite
- Should these companies have complete control over the information that flows over their network?
  - Simplify design, increase revenue, encourage deployment?
- Should they be regulated in some way?
  - Insure competition for content and services, give consumers a choice?
- This decision could cause a fundamental shift in our national communications infrastructure.

Technical Questions Must Be Answered

- Will regulation make broadband access infeasible? Overly expensive?
  - Example: many of today's multicast mechanisms would break if regulators required open access. Are there solutions? (We showed that there are technical solutions, and they have pros and cons.)
- To what extent can the entity that controls the physical layer also control the application layer if there is no regulation?
  - Example: Quality of service mechanisms may influence what is and is not practical.

More Example Issues

- Spectrum management
- Missile defense systems
- Restructuring of power industry
- Digital intellectual property rights
- Applying surveillance laws to computers
- Airport safety requirements

Serious technical research is needed
to support policy decisions

An Opportunity for Impact

- The community values computing research that influences the products and services of the future.
- What about computing research that influences policies of the future?
- For example, few inventions have had more impact on telecom and Internet than policy decisions to
  - separate local telephony from long distance
  - separate telephony from "enhanced" (Internet) service

Policy-Relevant Technical Research

- Policy-relevant research is *not* editorial-writing.
  - Our unique contribution is our technical expertise, not our personal preferences.
- Bring clarity *without personal values*.
  - What is feasible and what is not?
  - What are the tradeoffs?
  - What would happen if ... ?
  - What would it cost to ... ?
  - Who would be helped and who would be harmed?
  - How can we construct a system that meets these competing social objectives?
  - How many years until we can build devices that ...?

Should Policy-Makers Analyze These Technical Tradeoffs?

- Legislative bodies are staffed with generalists, experts in the *process* of creating legislation. Most cannot and should not be subject experts.
- Staff do not create useful information. They consume it.
- Staff are not in the habit of searching for information.
  - Stakeholders constantly bombard them with "information"
  - The typical role of policy-makers is to reconcile divergent views, seek effective compromises
    - This system usually works, but can be problematic with technical issues.
  - Shortage of technical information from non-stakeholders

Technology-Based Policy Research Is Rare, Even in Academia

Why does the computing community fail so miserably?

- Funding is more difficult to obtain than for purely technical research.
- Academic departments rarely reward or support policy-relevant research as they would other research of comparable quality and impact.
  - hiring, tenure, raises, resource allocation
- Research sometimes requires interdisciplinary expertise.

Research and Outreach

- Research alone can be extremely valuable. You can contribute even more if you also convey the results to policy-makers.
  - Policy-makers do not read ACM journals.
  - Deliver results to policy-makers,
    - in a form that is *comprehensible* to laymen,
    - at the right time.
- Examples
  - Formal testimony
  - Briefing influential activists who will convey results to policy-makers.
  - Filing documents with agencies. (Often possible through web sites.)
  - Informal briefings to policy-makers
    - Relationships help
  - Working through technical associations
    - USACM, IEEE-USA, CRA, etc.

Seizing the Opportunity

- Does your organization have technical expertise on a hot policy topic? Will you use it
  - to launch policy-relevant research?
  - to offer assistance to policy makers?
- Do your departmental policies encourage or discourage policy-relevant technical work?
  - hiring, raises, tenure, resource allocation
- For funding agencies:
  - Do you have good mechanisms to evaluate policy-relevant (interdisciplinary) technical research?
- For universities:
  - Are your students exposed to the connections between policy and technology?

For More Information

Jon M. Peha
www.ece.cmu.edu/~peha
peha@cmu.edu

For related discussion from the author on

- Bridging the divide between technologists and policy-makers, see www.ece.cmu.edu/~peha/bridging_divide.pdf
- Important new e-commerce payment systems, see www.cyphermint.com
- Sample policy issues of e-commerce, see www.ece.cmu.edu/~peha/ecommerce_policy.pdf and www.ece.cmu.edu/~peha/ecommerce.html
- Author's year in Congress as an IEEE Fellow, see www.ieeeusa.org/forum/GOVFEL/reports/pehafinrpt.pdf
- Other policy-relevant work, see www.ece.cmu.edu/~peha/policy.html