

# “Unraveling the Technological Knot in Homes”

2009 UW/MSR Summer Institute  
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(with thanks to Dina Papagiannaki)



# Welcome!

- \* UW/MSR Summer Institutes:
  - \* Pick a research topic ripe for exploration
  - \* Typically cross discipline boundaries
  - \* Assemble a group of experts
  - \* Exchange views to further the topic
- \* We have:
  - \* A shared interest in computing in the home
  - \* A mix of experts in networks, systems, HCI, ubicomp, security, and AI, from academia and industry
  - \* Three days to produce something useful
- \* (self introductions)

# Our topic in a nutshell: Managing computing in the home

- \* We're in the midst of an explosion of computing devices in the home (TV/home entertainment, computers/ mobiles, sensing systems, etc., etc.)
- \* These devices are often connected, raising issues of installation and maintenance, etc.
- \* It is a mess for users, an expense for companies
- \* The challenge is to create usable, inexpensive strategies to manage computing in the home
- \* This hope is that this will lead to a wave of innovation in new products and services

# A simple past



consumers



SENECA  
CAMERA



Radio  
Man



# A complex present ... and confusing future

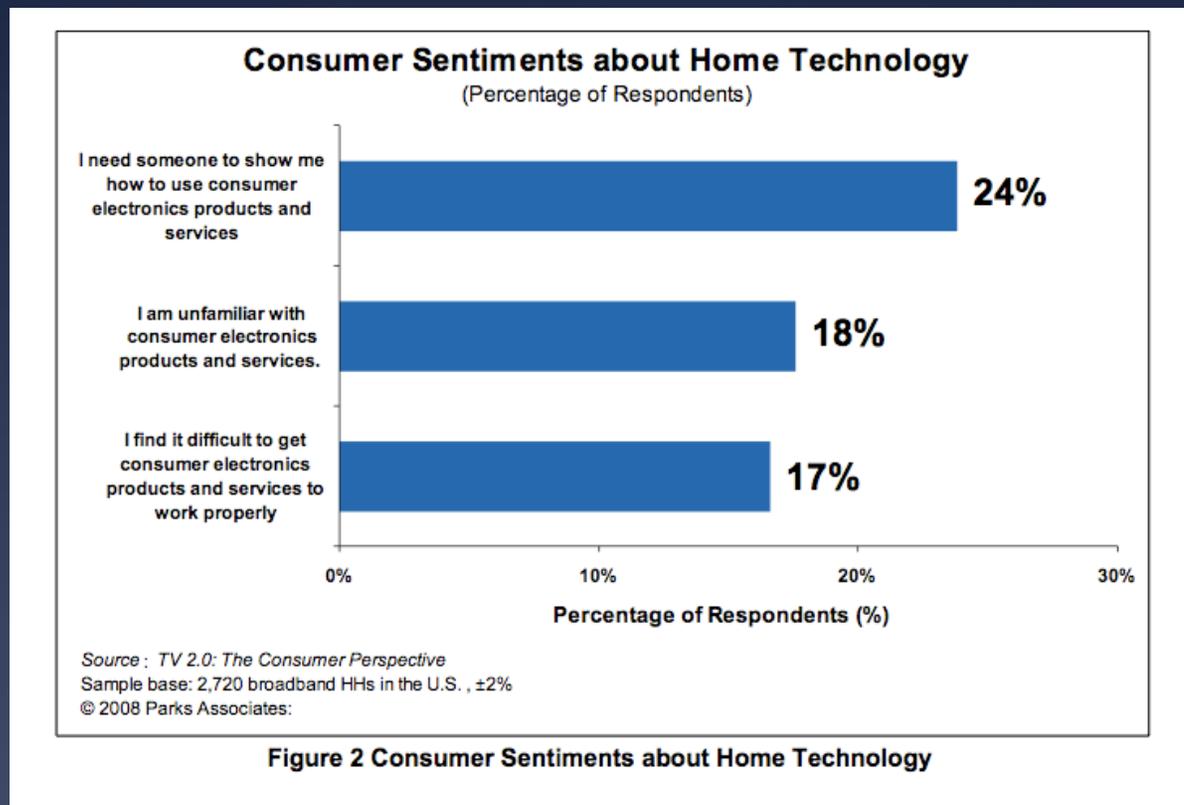


# Complicating factors

- \* Most users are non-technical
  - \* No IT support
- \* Devices are increasingly connected
  - \* Via wireless, often dynamically and “24/7”
- \* Many and varied devices
  - \* With a growing amount of content to manage
- \* Services can be in the home or in the cloud
  - \* Difficult to know where the problem lies
- \* Home computing is increasingly personal
  - \* Healthcare, security, sensing, etc.

The trend is for these factors to get worse!

# Consumers are often confused by home technology



“The average American is wasting 12 hours per month due to problems with their home computer.”

- Kelton Research, the "Cyber Stress" study, Jan 2007.

# And they have modest needs now ...

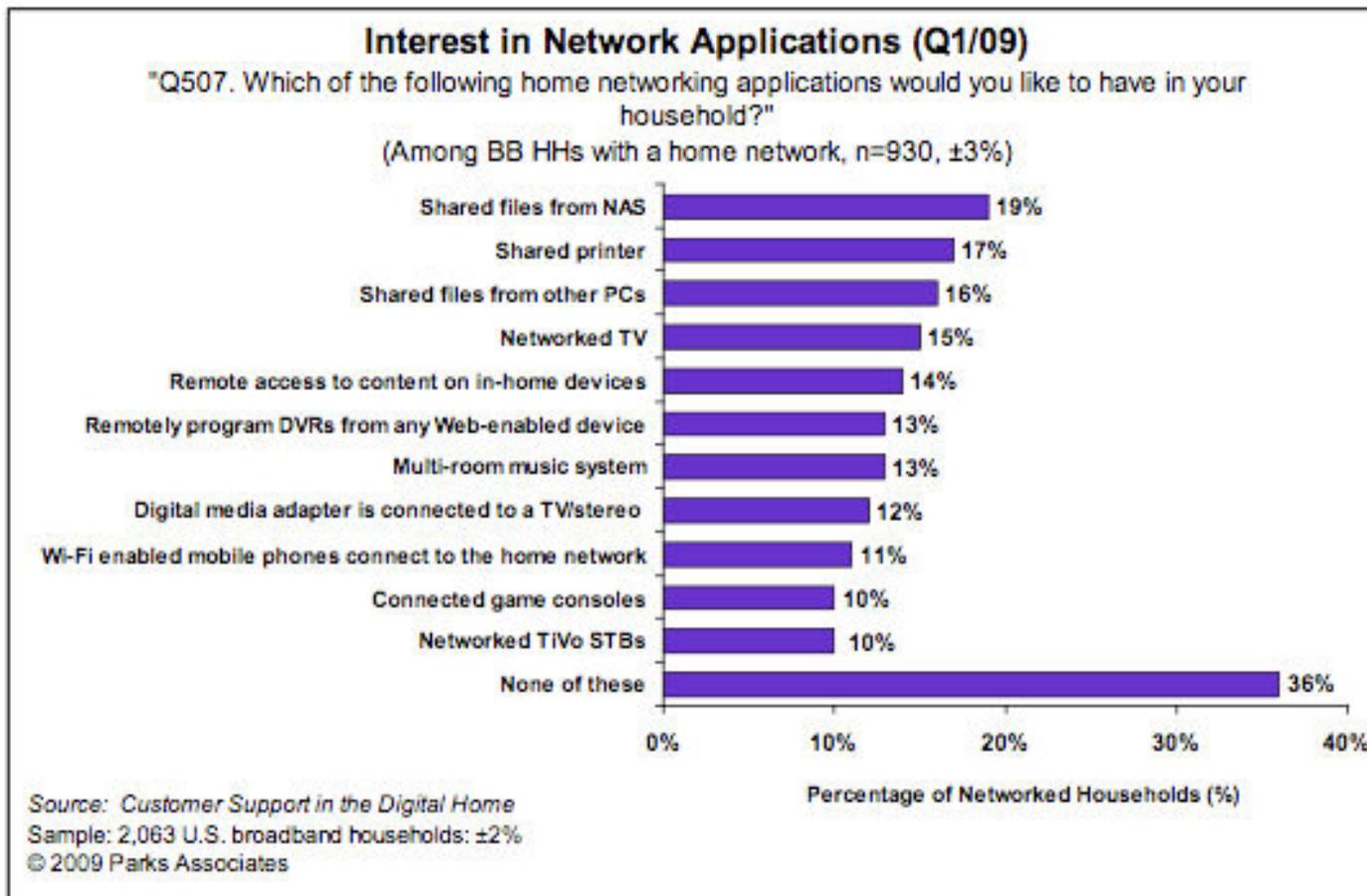


Figure 15 Interest in Networked Applications

# Providers need better ways to manage home technology

- \* 20-50% broadband customer support calls today are unrelated to the broadband service!
- \* Each call last 9-25 minutes at \$0.75-0.85/minute.
- \* Total U.S. revenues for digital home support services are projected to grow from \$3.9 billion in 2009 to \$6.4 billion by year-end 2013.

From "Digital Home Tech Support: Analysis and Forecasts," Parks Associates, May 2009

# How are we meeting this challenge in Industry?

- \* Service offerings, remote diagnosis, standards, etc.
  - \* AT&T and Verizon created home computing customer support centers
  - \* Cisco purchased Linksys, Scientific Atlanta, Network Magic and Pure Digital, entering home network market but also CE space
  - \* Geek Squad followed by a number of companies, like plumchoice
  - \* Intel RPAT / Intel Connect service launched
  - \* Alcatel-Lucent driving OMA-DM for management of cell phones



# How are we meeting this challenge in Academia?

- \* Look to the left, look to the right ...
- \* This topic needs interdisciplinary research (over networks, HCI, security, ...).
  - \* It lacks a well-defined community
  - \* It is also difficult to know how to do effective research in this space.
- \* Those are some of the reasons for this workshop.

# An opportunity

- \* Identify research directions and approaches that will let:
  - \* Users introduce new kinds of computing into their homes that is easy to install, control and maintain as well as secure
  - \* Vendors produce a rich variety of products and services for the home without large support costs



# Some research questions

- \* What does usable home technology require of the network architecture?
  - \* Should users “connect devices”?
  - \* What functions should reside in the cloud?
- \* What is the balance between helping users and enabling experts?
  - \* Do we need facilities for remote diagnosis?
  - \* Do we need collaboration and AI?
- \* How do we build home systems with deployment in mind?
  - \* What do the different stakeholders care about?
  - \* Is it all just a matter of the right standards?
- \* What capabilities do home devices need to be well-managed?
  - \* Do many problems go away with wireless networks?
  - \* Do we need trusted hardware, identities, etc.?
- \* How do we provide security in the home context?
  - \* Is this different than for other mobile/PC computing?
  - \* How does pervasive sensing change the situation?

# What will make a difference?

- \* We'd like you to think "outside the box"
- \* If every device knew where it was ...
- \* If we had remotely accessible instrumentation ...
- \* If every device knew to where it belonged ...
- \* If we had reliable gigabit wireless in the home ...
- \* If every device had a trusted identity ...

# Our goals for this Institute

- \* To articulate the research agenda that will improve the management of computing technology in the home of the future
  - \* Agree on a framing of the important problems
  - \* Identify low-hanging fruit and dead ends
  - \* Highlight needs of the research community
- \* To create a groundswell of research in the area
  - \* Through the above, and meeting fellow travelers

# Agenda

## \* **Monday, July 27**

- \* 8:00-9:00 am Breakfast (Pierside)
- \* 9:00-9:30 am Welcome and introductions (Victoria)
- \* 9:30-10:30 am *A Peek at the Problem* (Victoria)
- \* 10:30-11:00 am Break
- \* 11:00 am-12:30 pm *Usability and System Design* (Victoria)
- \* 12:30-2:00 pm Lunch (Pierside)
- \* 2:00-3:30 pm *Helping Users Help Themselves* (Victoria)
- \* 3:30-4:00 pm Break
- \* 4:00-5:00 pm *Leave it to the Experts* (Victoria)
- \* 5:00-5:30 pm Breakout Planning (Breakout Leaders)
- \* 5:30-6:00 pm Break
- \* 6:00-8:00 pm Dinner (Seaview Terrace)

## \* **Tuesday, July 28**

- \* 8:00-9:00 am Breakfast (Pierside)
- \* 9:00-10:40 am *What is Different about the Home?* (Victoria)
- \* 10:40-11:10 am Break
- \* 11:10 am-12:30 pm *New Interfaces for Home Network Management* (Victoria)
- \* 12:30-2:00 pm Lunch (Pierside)
- \* 2:00-4:00 pm Breakout Groups I & II in parallel with kayaking (half participants in each)
- \* 4:00-6:00 pm Breakout Groups III & IV in parallel with kayaking (half participants in each)
- \* 6:00-8:00 pm Dinner (Pierside)
- \* 8:00 pm continue break out sessions as needed (various locations)

## \* **Wednesday, July 29**

- \* 8:00-9:00 am Breakfast (Pierside)
- \* 9:00-10:30 am *"Adapting to Users and Other Lessons Learned"* (Victoria)
- \* 10:30-11:00 am Break
- \* 11:00-12:30 am Breakout Groups continue (various locations)
- \* 12:30-2:00 pm Lunch (Pierside)
- \* 2:00-3:30 pm *Eye to the Future* (Victoria)
- \* 3:30-4:00 pm Break
- \* 4:00-5:00 pm Debriefing from Breakout Groups (15 min each group) (Victoria)
- \* 5:00-5:30 pm Wrap-up and Next Steps (Victoria)
- \* 5:30-6:00 pm Break
- \* 6:00-8:00 pm Farewell Dinner (Pierside)

# Breakouts

- \* Our breakout leaders are: Victor Bahl, Bruce Davie, Deborah Estrin, and Haym Hirsh. (Thanks!)
- \* Monday, 5-5:30pm, topic discussion
- \* Tuesday, 2-6pm four breakouts and kayaking
  - \* Half of us kayak while the other half discuss
  - \* Rooms also available after dinner if wanted
- \* Wednesday, 11-12:30pm, breakouts continue
- \* Wednesday, 4-5pm, report-outs (15 mins/group)

# Output of the Institute

- \* We intend to synthesize a brief workshop report based on the breakouts and discussion notes and disseminate it
  - \* E.g., a short article in CCR
  - \* We'll ask for interested parties afterwards
- \* Other concrete suggestions and plans welcome!

# Questions?

\* On with the show!