Laundry Time Pilot

Technical & Consumer Research Report

October 9, 2006

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InternetHomeAlliance
CABA's Research Council

Background & Methodology

- Background & Methodology
- Executive Summary
- Conclusions & Recommendations
- Key Findings

Background

In 2004, the Internet Home Alliance began studying the appeal of home appliance and system notification systems, particularly those related to laundry. The first study indicated that a whole-house notification system had wide appeal among Primary Market consumers. The most compelling notifications concerned appliance maintenance and repair, home safety, and temperature/energy management. Three-quarters of primary market respondents (which are 42% of U. S. households) were receptive to the notion of getting messages about laundry, and a plurality (57%) strongly preferred a message-capable washing machine over a standard machine if all features and prices were the same. Alliance members with an interest in home appliance control applied these consumer learnings to the development of a washer/dryer/laundry notification system, with the goal of providing homeowners with greater appliance efficiency and time efficiency.

By early 2006, Alliance members had collaborated to design and build the Laundry Time system, which connects a washer and dryer to a home network and delivers messages about the status of the laundry and washer/dryer to home PCs, TVs, and cell phones. The Internet Home Alliance commissioned Zanthus to conduct a trial of Laundry Time in six homes in Seattle (technical trial) and Atlanta (pilot).

For participating Alliance members (Whirlpool, Microsoft, Panasonic, HP) the objectives from a technical and implementation standpoint were:

- To learn the realities of the average home in the U.S. in terms of technical implementation issues like wireless networking.
- Do consumers accept the Media Center platform as a way to enable these kinds of services in the home?
- Determine how well mobile phone services and platforms can support the consumer use scenarios anticipated in the pilot.

The consumer research objectives for the Laundry Time pilot were to:

- Gauge consumer reaction to the Laundry Time messaging system and its functionality;
- Obtain feedback on the interfaces (phone, PC, TV screen) and system usability aspects; and
- Understand their impressions of the laundry messages that were delivered.

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Methodology
Screening Qualifications

Six households participated in the Laundry Time pilot:

- The Seattle, WA technical trial ran in three homes from January 23 – March 11, 2006.
- The Atlanta, GA pilot ran in three homes from May 30 – September 7, 2006.

Participants were screened to meet the following criteria:

- Be Active Balancers according to Whirlpool's segmentation. Active Balancers (about 15% of U.S. households) are college educated, employed in white collar professions, have children, and participate in activities that take them away from the house;
- Be the person primarily responsible for doing laundry in the household;
- Use a PC with Internet access regularly;
- Subscribe to cell phone service that uses the Windows Mobile platform;
- Watch TV at least 5 hours per week;
- Have a household income of $75,000 or more; and
- Own their home.

All households were required to:

- Have a washer and dryer hook up—electric, not gas;
- Have a home network with two or more PCs, with anti-virus software running;
- Have at minimum two TVs measuring 20" or larger;
- Not have satellite TV service; and
- Have the washer and dryer on the main floor or in the basement (approximately half in each location).

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Methodology
Laundry Time System / Prototype Consideration

The following items comprised the Laundry Time system as installed:

- A washer and dryer, made by Whirlpool. Both were front-loading, regular capacity, white appliances.
- Laundry Time application software loaded on the primary home PC. The software controlled distribution of messages between the washer and dryer, TVs, router, computer and cell phone, and allowed users to control the washer and dryer.
- A wireless router placed on the home network. It accepted alerts from the washer and dryer and sent them to the TVs, home computer and cell phone.
- An HP Media Center PC connected to the TV watched most frequently by the person responsible for doing laundry. It received messages from the washer/dryer and displayed them on the TV.
- A wireless Media Center Extender placed on a second TV in some homes.
- A phone with wireless Web access.

Laundry Time was designed to deliver messages via "pop-ups" that appeared on the TV, PC (using MSN Messenger), and cell phone (using SMS messaging). Messages included:

Washer:
- Wash complete
- Malfunction
- Unbalanced load
- Door open

Dryer:
- Cycle Complete/Wrinkle Guard On
- Malfunction
- 85% Complete
- 50% Complete
- Door open

In addition, Laundry Time was designed so users could control the washer (remote start) and dryer (extend the fluff cycle or remote start) when prompted by a pop-up message.

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Executive Summary

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Executive Summary

BACKGROUND

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Executive Summary

KEY FINDINGS

Major themes that emerged include the following:

- Of the TV, PC, and cell phone, the TV is the most popular way to get laundry messages.
  - Homeowners tend to do laundry while they are home and either watching TV or have it on for background noise.
  - The TV is often located in a central place where it can be seen.

- Of the laundry messages delivered, finding out when the wash and dry cycles are complete is most beneficial.
  - Laundry doers tend to forget about it once they walk away and get involved in another activity.
  - "Wash complete" and "dry complete" messages act as a reminder so that users can reload machines faster, and thus get more laundry done in a day.

- The ability to remotely activate wrinkle guard/ fluff got a nod from some as a "nice to have" remote control function.

- Design and location of TV pop-up messages is generally well-liked.
  - 20-second duration is sufficient for some, too short for others.
  - Most would prefer to have control of pop-up message settings to suit their viewing habits.

- Laundry Time was designed to deliver SMS messages to cell phones. The feature worked sporadically for Seattle homeowners, dependent on server stability. In Atlanta, SMS delivered messages for two of three homeowners.

- In this trial, homeowners didn't see it as a benefit to get Laundry Time messages on their cell phones. But because the phone keypads were rather difficult to understand and use, it's unclear whether getting messages by phone would appeal more to consumers if phones with more intuitive keypads were used.
  - Most said they do laundry while doing other things at home. Most were willing to leave home with the washer and dryer going, but few actually did.
  - One noted exception was an Atlanta woman who was reluctant to leave her home while running her laundry. She said, "If I knew I'd be alerted to problems, I'd be much more willing to go do errands while my laundry was running."

Executive Summary

KEY FINDINGS (CONTINUED)

- Getting laundry messages on the desktop screen may be beneficial to people who work at home or those who spend their leisure time in front of the PC instead of the TV.
  - Homeowners regularly used their home PCs, but since they weren't in front of them for extended periods of time, they didn't often see laundry messages via MSN Messenger.
  - One woman who worked part time from home was enthusiastic about the pop-ups, however. She lauded the PC pop-ups, saying, "I often get so focused on my work, I forget about everything else. The pop-ups reminded me about my laundry so I could get much more done in a day.

- The potential for remote diagnosis of washer and dryer problems was a positive for most participants.
  - As long as they're assured their information won't be misused, they think it's a good idea.
  - Remote diagnosis and updating are considered a welcome time-saver that could need for reduce the service calls.

- The Media Center PC engaged all family members in the pilot (not just the female laundry-doers). Households embraced it not for just its revolutionary way of watching and recording TV, but for its ability to connect the home to multiple systems. They recognized its potential as the central brain of an integrated "smart home."

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Executive Summary

CONCLUSIONS AND RECOMMENDATIONS

Laundry Time is considered a "nice to have" solution that represents an improvement over regular washer and dryer functionality. Its key benefit is remote notification– getting the message that the washer and dryer are done. Users are reminded about their laundry and thus able to process more loads during the day.

Once developed, Laundry Time promises to be a beneficial component in a home control system.

The system allowed users to control the washer and dryer remotely. The wrinkle guard/remote fluff control was a "nice to have" feature when homeowners were too busy to pull clothes out of the dryer. The system data indicates homeowners occasionally (3 times per month) remote-started the washer or dryer.

Recommendations based on consumer feedback from this pilot:

- Send laundry messages to the TV as the first priority for the system, as it's the screen people attend to most often when doing laundry. The desirability of sending messages to the phone is unclear given the homeowners' difficulty understanding and using the keypad of the phone used in the pilot. Getting laundry messages on the desktop screen may be beneficial to people who work at home or those who spend their leisure time in front of the PC instead of the TV. But based on usage during this pilot, desktop pop-up messages should be considered a 2nd level priority.
- Include the ability to perform diagnostics on the washer and dryer. People are comfortable with the idea, and it may save them the hassle of staying home to wait for a repair man.
- Give users the choice to turn easily turn off pop-ups when they don't want to be bothered and on when they're multitasking around the house.

Executive Summary

Methodology

This pilot was conducted from January through September 2006. A Laundry Time system, comprised of a Whirlpool washer and dryer, application software, a wireless router, HP Media Center PC and extender, and a phone with Web access were installed in three Seattle, WA homes (technical trial) from January 23 – March 11 and in three Atlanta, GA homes (pilot) from May 30 – September 7. All participants were Active Balancers according to Whirlpool's segmentation scheme. Due to small sample size, findings are qualitative and directional only; do not interpret results as representative of the entire market.

About the CABA Internet Home Alliance Research Council

In July 2006, the Continental Automated Buildings Association (CABA), a not-for-profit industry organization that promotes advanced technologies for the automation of homes and buildings, integrated the operations of the Internet Home Alliance. The Alliance is a cross-industry network of leading companies engaged in collaborative research to advance the connected home space. The Alliance's research projects enable participating companies to gain important insights into the connected home space and leverage those insights into viable new business opportunities. CABA will continue to pursue the work of the Council through its new Internet Home Alliance Research Council, which will also encompass wider ranging commercial research projects. For more information about the Council, go to www.caba.org/iha.

About Zanthus

This study was conducted by Zanthus, a market research-based consulting firm serving high-tech companies in Portland, Oregon. The firm provides research-informed strategic consulting as well as print and Web design services. Zanthus is particularly well-known for its commitment to reliable research methods and analytical techniques. For more information, visit www.zanthus.com.

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Conclusions & Recommendations

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Conclusions and Recommendations

Laundry Time is considered a “nice to have” solution that represents an improvement over regular washer and dryer functionality. Its key benefit is remote notification–users are reminded about their laundry and thus able to process more loads during the day. It’s an efficiency tool.

All pilot participants said that connecting washers and dyers to a central home control system makes sense in the grand scheme of things. Once developed, it promises to be a beneficial component in a home control system.

The system allowed users to control the washer and dryer remotely. The wrinkle guard/remote fluff control was a “nice to have” feature when homeowners were too busy to pull clothes out of the dryer. The system data indicates homeowners occasionally (3 times per month) remote-started the washer or dryer.

Laundry Time elicits little reaction from family members other than the primary laundry doer. Other family members don’t perceive laundry to be a challenging or difficult task. Some of those who do the laundry even admit they don’t consider it a chore, but rather a relaxing activity. Their complaints around the laundry process are focused more on the physical aspects like sorting, treating, folding and putting clothes away.

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Conclusions and Recommendations

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- Include the ability to perform diagnostics on the washer and dryer. People are comfortable with the idea, and it may save them the hassle of staying home to wait for a repair man.
- Give users the choice to turn easily turn off pop-ups when they don't want to be bothered and on when they're multitasking around the house.

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  - Technical and Pilot Implementation Learnings
  - Laundry Time Messages
  - Washer & Dryer Functionality
  - Media Center Functionality

Participant Profiles
Seattle

Eileen Ciuba.

- Mother of two young boys. Works part-time as a flight attendant, husband works as a product manager on Xbox at Microsoft. Very active family, into sports, school , PTA. Estimates that she does 15 loads of laundry a week, “every 2 days or so.” Has an organized process of sorting, treating laundry. Admits that laundry is an enjoyable activity.
- She received remote messages for a short period of time, “sporadically” to her cell phone and TV. She reports that she was never able to control Laundry Time through her TV. Messages did not pop up on her MSN Messenger.

Dana Horbelt.

- Stay-at-home mom with a young, energetic son, two dogs and three month old baby. Husband is a civil engineer. Very bubbly, friendly but clearly harried doing chores and taking care of her family. Does 15-20 loads of laundry a week, which she considers a “chore.” “I need a laundry robot – someone to do it for me!” Admits that she and kids have skin allergies, so she is very careful about treating her clothes – often runs an extra rinse load to remove detergent, bleach from clothes.
- The system never worked with her cell phone. The TV that received messages was not the one that Dana watched most frequently because Media Center extenders were not successfully installed. She never used MSN Messenger, because she does not typically use a Messenger tool.

Christine Lott.

- Both she and her husband work full time. Parent of three teenagers – two boys and a girl. Does about a load of laundry every day, and doesn’t particularly enjoy it. She tends to forget laundry in the washer until it “gets smelly.” Is thankful that she gets help with laundry from husband and daughter. Requires her boys to take dirty clothes to the basement themselves. Least favorite part of doing laundry is folding clothes.
- The Media Center was disconnected by the family after a power outage that disrupted their cable service. They were told by the cable company that the Media Center was causing slow downs in their TV and Internet service, so they left it largely disconnected. Christine received some messages to her cell phone, but did not interact with the system remotely.

Photos not available for Seattle participants

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Participant Profiles
Atlanta

Peggy Spencer.

- Teenage daughter, adult son and husband round out her household. She works full time as a teacher. Does about eight loads of laundry per week on certain days. Enjoys the process. Daughter does all of her own laundry. Biggest laundry concern is wrinkled clothes – hangs many items or lays them flat.
- Reports that her cell phone and computer did not receive alerts during most of the study.

Lisa Gunning.

- Part-time sales clerk at a UPS store. Works part-time from home. Lives with son, age 12 and workaholic husband. Has one son away at college. Does about ten loads of laundry a week, doesn't mind – considers it relaxing, "not a big deal." Not very particular about detergent, fabric softener but is prompt about removing laundry from washer/dryer when it is finished.
- Laundry Time sent messages to her TV, computer and cell phone. Notifications to all devices worked during most of the duration of the study. She was the only participant to prefer the computer pop-ups due to her part-time, home-based job.

Michelle Hafford.

- Works part-time in human resources. Mother of two teenage boys. Only does about six loads of laundry per week, always on Fridays. Considers laundry "something you have to do…I enjoy it when it's finished!" Recently purchased a new LG washer and dryer that has more settings, functionality.
- Able to control by cell phone at first, but after awhile just the TV received them. The computer pop-ups never worked. This was okay with Michelle, she watches more TV than she spends time in front of the computer.

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  - Media Center Functionality

Technical and Pilot Implementation Learnings
Microsoft

An overview of what worked and what didn't in each city:

Seattle (Technical trial)

- TV Experience: sluggish due to poor server stability
- TV Dryer Pop-up Notifications: worked but dependent on server stability
- TV Control/Status Screen: worked but dependent on server stability
- 2nd TV Experience: did not work
- Mobile Phone Experience: OK
- Mobile Phone SMS Notifications: worked but dependent on server stability
- Mobile Phone Pop-up Notifications: Did not work
- Mobile Phone Control/Status: Available, but dependent on server stability
- Training: Even though provided with verbal instructions (on installation day) and manuals, participants had basic issues operating the phones. TV did not work well enough to determine if more training was necessary.
- Follow-up Visits: Many visits and phone calls needed. In excess of 20 incidents. Poor server stability made remote administration impossible.

Atlanta (Pilot)

- TV Experience: OK. Some stability problems attributed to tampering by children in one of the households.
- TV Dryer Pop-up Notifications: worked
- TV Control/Status Screen: worked
- 2nd TV Experience: Did not work
- Mobile Phone Experience: OK
- Mobile Phone SMS Notifications: two of three households worked
- Mobile Phone Pop-up Notifications: Did not work
- Mobile Phone Control/Status: Available
- Training: Spent more time talking through TV, phone, and system use and saw fewer basic operational questions. Provided user manuals later in pilot per participant request, but it was more for interest in system features beyond those used in the pilot.
- Follow-up visits: Approx 6 total that were non-press related. Remote administration capability used to provide software updates and fixes.

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Technical and Pilot Implementation Learnings

System data was pulled and analyzed for the three Atlanta households. It indicates the following usage patterns:

- People accessed the messages on their cell phones throughout the study.
- People viewed the status page on the TV more often than had been anticipated. Most status page visits were initiated from the TV interface (80%) rather than from the phone interface (20%).
- In response to laundry messages, participants took the following system actions:
    - Ignore (61% of all Laundry Time messages). This allowed the participant to remove the pop-up from the screen without taking any action.
    - Continue (16%). When drying, participants told the system to continue the dry cycle when it was 50% or 85% complete.
    - Fluff (16%). When drying, participants could extend the cycle using a wrinkle guard/fluff command.
    - Start (4%). When getting a pop-up that the washer or dryer was loaded and had not been started, this command was used to start the appliance. At least once a month households remotely started their washers and dryers.

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Technical and Pilot Implementation Learnings
Microsoft

Stability issues affected the ability to use the system as a consumer technology pilot, but the experience of building and deploying the system was very useful in illustrating integration challenges expected if a real system were to be built and was worth capturing, as well as improving future pilot efforts.

- Anemic Hardware - In hindsight, the decision to use the older 1st generation HP DEC boxes rather than investing in later and more powerful HW adversely impacted efficiency in the development process and the overall user experience. The added issues of heat lock-ups and driver compatibility continually added friction to the Dev process.
- Wireless Networking Performance – In hindsight, concerns about wireless network links to the extension TV's should have been more strongly voiced by the development team, as there was data available that already illustrated the limitations of the current state of the technology. Installation time spent trying to get the extension TV's to work could have been better spent on other efforts.
- Interface and Specification Lock-down – we needed a stronger change review and acceptance process for the interface between the driver software Whirlpool provided and the application software Microsoft provided. In a number of cases, unexpected changes to the driver API caused additional issues during bug fix and design iterations, resulting in wasted developer effort.
- Need for Service Level Agreements – we needed stronger SLA's and troubleshooting support from all commercial carriers and service providers used in the pilot. In the case of the mobile phone carrier, configuration and user support was completely self-service through websites and was prone to error and uncertainty. In the case of MSN Alerts, the service unexpectedly changed the message formatting during the trial and broke our mobile phone application.

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Technical and Pilot Implementation Learnings
Whirlpool

- The cell phone button interface was a poor design for ease of use to getting into text message and doing advance functions. The layout of the key pad on the cell phone and on intuitive design made it difficult for users to pick up the text messages in both Seattle and Atlanta. Additional training in Atlanta did cover some of the issues but the people found the layout of the key pad confusing. If we do a next pilot we need to consider a cell phone that is more intuitive for women to use.
- The wireless component with the extenders never worked in the homes the way it is hyped to the general public. The in home installation staff felt that the antenna on the wireless extenders needed to have more range to cover the distance the information needed to travel.
- Several of the homes in order to bring the DSL up to speed we had to put extra components in the home to boost the signal. This the average person, if they would try to do this themselves, would not have known to add the booster and other items onto the system. They would have to have hired a home networker to do the installation.
- In most of the homes we never were able to get the second TV to work. In Atlanta we did not even try based on all the issues around the second TV in Seattle. According to the one on one interviews people wanted it on several TV's in their home because they travel throughout the home when they are doing household tasks.
- Consumers have to overcome a learned behavior to not shut off the system when they leave home or the software in the DEC needs to be designed to be able to hold the setting of the system when it is shut off and needs to be hard booted.
- The activating the remote start feature on the washer to their system with out having a truck roll exceeded their expectations. It was so seamless and effortless that in the last interviews they did not even mention it.
- The ability to remote fix issues as the study went on was not only useful to the tech side of this project but also required the participants not have to be bothered by a truck roll to fix the system when a setting went out. The people were pretty amazed how much could be done without coming to their homes to fix the problem.

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  - Washer & Dryer Functionality
  - Media Center Functionality

Laundry Time Messages

Of the TV, PC, and cell phone, the TV is the most popular way to get laundry messages.

- In most homes, the TV is often kept on when people are home, either because people are watching or because it serves as background noise.
- Because of its central role in the home, the TV is the most useful way to get laundry messages. "I might pass through the family room between vacuuming the hall and cleaning the kitchen when I see a pop-up message reminding me that I have clothes in the washer."

Of the laundry messages delivered, finding out when the wash and dry cycles are complete are the most beneficial.

- Typically, homeowners have laundry going in the washer and dryer when they're doing other tasks throughout the house. As soon as they turn to other household chores, homeowners promptly forget about the laundry.
- "Wash complete" and "Dry complete" messages remind the homeowner that they're in the midst of doing laundry, and they can then reload the machines faster. "I can get twice as many laundry loads done in a day because I don't let them sit for hours, forgotten." This is especially true in homes with the washer and dryer upstairs or in the basement where the buzzer can't be heard.
- This primary benefit is not surprising: a 2005 qualitative study that explored Laundry Time as a conceptual idea also found that end-cycle notification was most desirable.

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Laundry Time Messages

The system allowed users to control the washer and dryer remotely.

- The system data indicates homeowners occasionally (3 times per month) remote-started the washer or dryer.
- Although homeowners occasionally used the system to remote-start the washer or dryer, they didn't really feel they needed this functionality, even though they used it to some extent. As one woman said, "I turn the washer and dryer on when I'm standing next to it. Then I walk away. It can't get much easier than that."
- A mother in one of the more chaotic homes admitted, "I have tried using the remote control, but my three kids keep me so busy that I was never able to go and check to see whether it worked or not."
- The wrinkle guard/remote fluff control was a "nice to have" feature when homeowners were too busy to pull clothes out of the dryer.

Exploration of remote control as a concept in the 2005 qualitative study suggested that it would be a more useful tool than was borne out by this pilot.

- The ability to take some action as a result of a message nearly always drew smiles from the participants in the 2005 study. Two-way communication raised the benefit of the concept for most.
- One woman thought she would use two-way communication to start the dryer while she was away from home so that the drying would be almost done when she was home. Another woman called the idea "neat" and thought she might use it to extend the dry cycle, because sometimes the load is not completely dry even when indicated as such by the dryer.

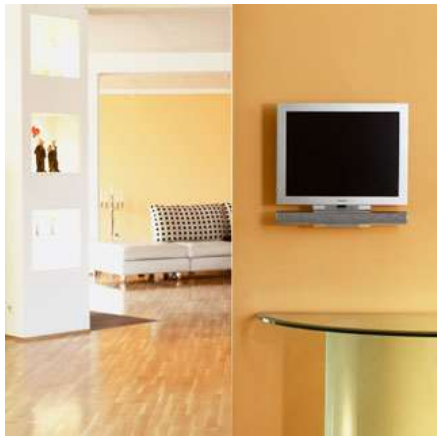
Laundry Time Messages

A few moms (particularly those who consider laundry a "chore") confided they hoped the messages would inspire family members to get involved in doing laundry. Unfortunately, not.

- They believed that increasing awareness of the frequency and "hassle" of the task would generate sympathy, and, ultimately, help.
- One woman reported that the messages had an impact in this fashion: "Well, my boys shout to me if they see a message while they are watching TV, so that's a start…and my husband actually folded one load of laundry himself!"

The design and location of the pop-up messages on the TV screen is generally well-liked.

- Most say the size and placement at the bottom center of the screen makes sense. As one noted, "I can ignore it and keep watching my show."
- Duration of the message is sufficient for some, but not enough for others, such as Lisa who says, "I'd rather have it stay up until I click to remove it. I'm in and out of the room so much that I often miss them when they're up for only 20 seconds or so. Or maybe an audible "beep" would help."



Most prefer to have control of whether pop-ups appear or not.

- One homeowner explains, "It would be nice to disable the pop-ups with a push of a button. For example, if the family gets together to watch a movie and we don't want to be interrupted, or the kids watch cartoons and are going to ignore the messages anyway."

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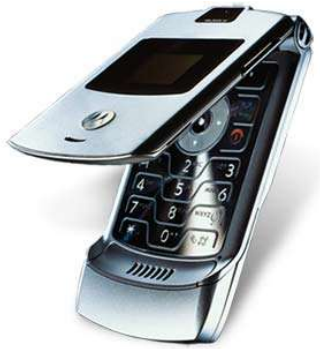
Laundry Time Messages



Laundry Time was designed to deliver SMS messages to cell phones. The feature worked sporadically for Seattle homeowners, dependent on server stability. In Atlanta, SMS delivered messages for two of three homeowners.

If desired, homeowners could use wireless Web access on their cell phone to get to their Laundry Time "home page" and see the status of the washer and dryer.

- Participants didn't recall using this feature, although system data indicates that they did indeed access the home page on their phones.

In this trial, homeowners didn't see it as a benefit to get Laundry Time messages on their cell phones. But because the phone keypads were rather difficult to for homeowners to understand and use, it's unclear whether getting messages by phone would appeal more to consumers if phones with more intuitive keypads were used.

- Most participants said they do laundry while doing other things at home. Most were willing to leave home with the washer and dryer going, but few actually did leave the home. Therefore, participants saw no need for getting messages on their cell phones. As Michelle explained, "Laundry is not on my mind once I leave the house."

In the 2005 qualitative Laundry Time concept test, most women said they would not want to get messages about laundry when they were away from the house – whether it be running errands or while at work.

- They felt it wouldn't be helpful to get laundry messages while they were away from home because they could only take action on the laundry while at home (e.g., moving from washer to dryer).
- Some thought that getting information they couldn't act upon would be stressful.

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Laundry Time Messages

The cell phone was thought to be appropriate for notification about a one-time problem.

- In the 2005 qualitative concept exploration, participants liked the idea of being alerted of a machine failure, so they could take steps to get the washer or dryer working again. (Note that we did not discuss what kind of information might be delivered, but women assumed it was enough to act upon.) Most importantly, women wanted the system to tell them if the washer was seeping water on to the floor–flooding and water damage were seen as the most urgent problem.
- One Atlanta pilot participant had a dryer malfunction that she was alerted about. She said she made a point of staying home when the dryer was running, so she didn't have to worry about a fire or an appliance malfunctioning. Her experience having received a malfunction alert to her Laundry Time phone made her reconsider her "stay home" policy: "If I knew I'd be alerted to problems, I'd be much more willing to change my behavior and go do errands while my laundry was running."

When asked if receiving voicemail messages rather than text messages would improve the usefulness of using cell phones with Laundry Time, most said no.

- Some feel it would be too disruptive. One Seattle participant said, "I can't talk on my cell phone at work, so that wouldn't work for me."
- Others say that it would add to complexity of the system. One Atlanta participant stated, "I have a hard enough time figuring out how to get my voicemails on this fancy [Web-enabled] phone. It would just add to my frustration."

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Laundry Time Messages

Homeowners regularly used their home PCs, but since they weren't in front of them for extended periods of time, they didn't often see laundry messages via MSN Messenger.

Getting laundry messages on the desktop screen may be beneficial to people who work at home or those who spend their leisure time in front of the PC instead of the TV.

- One homeowner (Lisa, who worked at home) sat at her PC for extended periods of time. Others generally had the monitor turned off when the PC wasn't being used and so they didn't see laundry messages on the desktop screen.
- Lisa, the work-at-home participant, was enthusiastic about the PC pop-ups. She spends more time in front of the PC than in front of the TV, so messages on the PC caught her attention more than TV pop-ups. She said they helped her manage her time better: "I often get so focused on my work, I forget about everything else. The pop-ups reminded me about my laundry so I could get much more done in a day."
- Did getting Laundry Time messages on the PC lead homeowners to spend more time using their PC because they could track their laundry at the same time? No; homeowner PC behavior/time spent did not change as a result of Laundry Time. Messages delivered to the TV and cell phone reached participants more effectively than PC pop-ups because they were in front of those screens more often.

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Key Findings

- Background & Methodology
- Executive Summary
- Conclusions & Recommendations
- Key Findings
  - Participant Profiles
  - Technical and Pilot Implementation Learnings
  - Laundry Time Messages
  - Washer & Dryer Functionality
  - Media Center Functionality

Washer & Dryer Functionality

The potential for remote diagnosis is a positive for most participants.

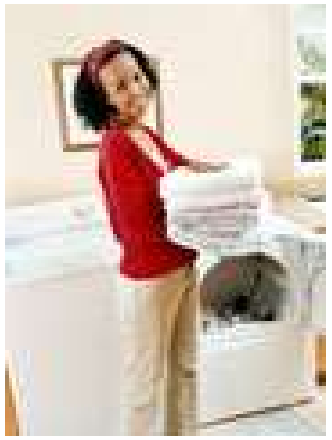
- Homeowners think Laundry Time's ability to diagnose appliance problems is a good idea, as long as they are assured that homeowner data is in safe hands and will not be misused.
- Remote diagnosis and updating are considered a welcome time-saver that could reduce the need for service calls on the washer and dryer.

Most participants say the washer and dryer capacity is smaller than they're used to.

- As a result, they have to do a few more loads of laundry every week.

Despite the additional loads, the pop-ups remind homeowners to change their laundry so many report feeling that laundry takes less time out of their day.

- The exception was one Seattle washer that apparently had a faulty control board, resulting in hour-long cycles. Remote diagnosis did not determine the cause of the problem.



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Media Center Functionality

The Media Center PC engaged all family members in the pilot (not just the female laundry-doers). Households embraced it not for just its revolutionary way of watching and recording TV, but for its ability to connect the home to multiple systems. They recognized its potential as the central brain of an integrated "smart home."

- Its ability to connect systems in their home also made sense for sake of convenience.
- Interest in this "cool" new technology made it tough to pry the Media Centers away from the teenage boys, in particular, who were curious to explore its capabilities.

As other Alliance research has found, the most desired functionality for a networked and Internet-enabled home control system is safety and security. This was echoed by Laundry Time participants:

- "I could see connecting other home systems like security, temperature control, even kitchen appliances to a 'home brain' like this."
- "It would be great to dial in to the system with my cell phone when I'm on the way home to turn on the stove, or turn up the home temperature to where I wanted it."

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Media Center Functionality

In the 2005 qualitative concept study, most participants seemed to think the Laundry Time concept was a valid use of technology, albeit a surprising application. It was seen as another way technology can help people live "a more integrated life," as one woman put it.

The Media Center was the most challenging piece of the system for homeowners to learn to use, because it was a change from their very habitual TV-control behavior. Once homeowners had built new habits with the new remote and interface, interacting with the system was considered "easy" and "intuitive."

- Some women reported having problems learning to change channels, play DVDs or record shows, but that was quickly remedied by instruction from their husbands or teenage children. None report having read the manual.

The only negative feedback about the Media Center was that it was perceived to have occasionally resulted in slow channel-changing or a slowdown in broadband speed. The cable company's recommendation was to disconnect the unit, which would have turned off the remote diagnosis and updates of the Laundry Time system.

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