

Envisioning Future Home IT Usage With The Customer In Mind

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Technology manufacturing companies have recently oriented their products as potential solutions for establishing and maintaining the connected digital home. To be accepted by customers, these home-based products must be designed with thoughtful consideration of the lifestyle needs of people who will rely on them to entertain, communicate with others, manage the home and work. As computing products become more complex in the home, how can the goal of appealing to the psyche of the end-user be attained in the world of corporate interests, proprietization and confusing jargon?

The reality of today is that computing products are already saturated in homes around the world in the form of PC's, routers, set-top boxes, game consoles, mobile devices and digital appliances. Many of these products have their own proprietary standards and are often impossible or difficult to network with other devices. Will consumers be motivated to replace the existing technology in their home with newer, interoperable products that promise to fulfill the usages of the digital home future? Or will a home networking solution add additional complexity and frustration to people's lives?

How do companies such as Intel, communicate end user-needs so product development decisions are made with thoughtful consideration of the issues relating to Home IT connectivity? This position paper describes a process for establishing usage requirements for Home IT that can be consumed by product architects, developers and designers.

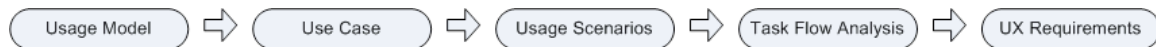
Products designed to work in a home environment often experience returns, escalated support costs, poor design and incompatibility with existing hardware because the context of use, scenarios, and task flows weren't clearly communicated or understood by product teams. Documenting this information leads to user-centered thinking that promotes a products usefulness and customer satisfaction.

To kick-off the process of designing a Home IT product with the end-user in mind, a Human-Factors specialist needs to conduct user research and work with product marketing executives to identify potential use cases to be considered when the product will be introduced to the market. The following use case examples depict issues end-users may face in the near future after they arrive home with a newly purchased home networking device:

- Someone purchases a new product that promises 'wireless streaming of movies' only to discover the current home wireless router isn't fast enough to support that usage (802.11b instead of 802.11n).
- Several members of the family attempt to simultaneously enjoy content stored on a PC at home (game playing, movies, music, transcoding) via different rooms in the home but the PC doesn't have enough CPU bandwidth to support the requests.
- A wireless router stops working unexpectedly because someone is cooking popcorn in the microwave, causing an abrupt end to streaming a downloaded digital movie.

- Home Network devices are unplugged and tucked away after each use because they ‘look ugly’ in the home (game consoles, digital media adaptors).
- The user powers up a PC , but there is no video – it looks like the device is on, but nothing appears on the screen.

Once potential use cases are identified, additional detail is needed to flush out the optimal user experience. This is done through the communication of the following user-centered design concepts to product development groups:



Usage Model – A high level, general description of the usage area as defined by marketing.

Example:

Initial setup of home network appliances – The appliance is set up for the first time and is unable to detect a home network connection.

Use Case – A directed user goal which is derived from collections of usage scenarios. Use cases are developed based on data from personas, user environments and user goals/activities that cover a general instance or task/capability area.

Example:

The user attempts to configures their new ‘smart’ refrigerator to work on the wireless home network but his refrigerator is unable to establish a connection.

Usage Scenario – A Day-in-the-life type narrative that describe people fulfilling their needs through tasks, tools, and the environment. Scenarios cover a series of user tasks and interaction sequences.

Example:

George has recently received his new refrigerator and needs to set it up for first-time use on his wireless home network. He’s excited about his purchase because it will allow him to remotely check inventory, control the temperature of each compartment, and even defrost individual food compartments from any Internet-connected device inside his home and out. George powers on the refrigerator for the first time and uses the touchscreen to select ‘setup’ from the main menu. The setup wizard is initialized and walks George through the steps of establishing a network connection. After 30 seconds of searching, no network connection is found. The screen presents George with a list of troubleshooting questions and answers, George indicates that his wireless router is located about 1500 feet away, on his third-floor office. This prompts the software to suggest that George’s wireless signal is too weak to establish a reliable connection and he should move his router to a more centralized location or purchase an antenna upgrade. George decides to move his wireless router to a more centralized location but then realizes he’ll also need to purchase and install a new wireless card in his office PC (which will no longer be connected directly to the router).

Task Flow Analysis - The logical breakdown of critical task sequences into sub-tasks and interactions. Also includes exceptions which could occur if something unexpected happens or the user deviates from the main course of actions.

Example:

The user powers on the refrigerator for the first time and sees the built-in screen display a main menu. The user touches the setup icon displayed on the screen and is prompted to search for an

available network connection. A 'detecting home network' graphic appears while the refrigerator attempts to detect the homes wireless router. After 30 seconds, no network is detected. A 'troubleshooting' wizard appears prompting the user to check their router's power, location, and security settings. The user moves the router and re-runs the installation wizard by selecting 'setup' on the refrigerator's screen. The wireless network is detected and the user is prompted to enter the security code. The user enters the code, and sees verification the device is connected.

The user heads to their office PC and sees the refrigerator appear as a connected network device. The user selects the refrigerator and the remote user interface is loaded. The user can now view inventory characteristics, control temperature, and program the cooking/heating compartment (when food is detected) to activate at a certain time.

User Experience Requirements & Conceptualization - Individual system capabilities that facilitate user needs and tasks performed. These are described as both functional (features, components, user interactions) and non-functional (ease of use, acoustics) requirements. Concept diagrams help communicate product requirements and overall end-user vision to architects.

Example:

- The refrigerator's operating system must be DLNA 2.0 compliant to be automatically discovered and communicate with other devices in the home.
- The user shall be notified via the refrigerator's on-screen user interface when it has lost connectivity with the home network.
- The user shall be presented with troubleshooting options if the refrigerator cannot establish a connection with the home network (wireless or wired).
- If a home security code has already been configured with the home wireless router, the user shall be prompted to enter the home network security code via the refrigerator's user interface to authenticate with the home router when the refrigerator set-up for the first time.
- The user shall enter an e-mail address either locally or remotely that is to receive alerts and status messages.
- The user shall configure the type of alerts and status messages to receive such as notification when there is a power failure, or when inventory in a certain compartment is expired.



The above example demonstrates how use cases can be developed with concrete scenarios and cooked down into detailed usage requirements. In turn, this exercise allows planners and engineers to clearly conceptualize potential solutions and desired user experiences when innovating emerging product concepts. Use case scenarios also aim to communicate research data collected from interviews and surveys in a meaningful and actionable format. The example presented in this paper is one method for bringing the process of product development closer to the goal of developing solutions that are desirable and accepted by end-users.