

THE GPII SHOPPING AID – THE FIRST WORKING PROTOTYPE

Denis Anson, MS, OTR
Misericordia University, Dallas, PA
Raising the Floor – US, Washington, DC

INTRODUCTION

The purpose of the Global Public Inclusive Infrastructure (GPII) is to ensure that everyone who faces accessibility barriers due to **disability, literacy, digital literacy, or aging**, regardless of **economic resources**, can access and use the Internet and all its information, communities, and services for education, employment, daily living, civic participation, health, and safety (Raising the Floor, 2011). The mechanism behind this effort is the creation of a system that allows the individual to define a set of access preferences which are stored “in the cloud,” then to call up those preferences from any information technology which is GPII enabled, and have the system automatically configure the device to match the individual’s needs. When the individual is done using the device, it will automatically revert to its base state.

Allowing the individual to call personal preferences from the cloud independently saves the individual from being forced to disclose his/her, and assures that the individual will have access to any information technology device that is connected to GPII, even if they have never encountered it before. If GPII were available only to people with disabilities, using GPII would be tantamount to disclosing a disability. To avoid this, the GPII will be available to all users of information technology who would like to customize their user experience.

The genesis of the GPII Shopping Aid was the realization that, in the search for appropriate assistive technology, typical users do not need more information. In fact, in many cases, people searching for assistive technology are overwhelmed by the number and variety of choices that are available.

Among the customizations that will be available through GPII are assistive technology accommodations. With modern information sources and web searches, finding information about assistive technology is not difficult for the computer literate. Indeed, the larger problem is finding too much

information, resulting in information overload (Bartlett & Green, 1966; Malhotra, 1982; Palme, 1984; Wallace, 2007). The challenge is to provide the user with **enough** information to make a good decision, but to filter the noise of products that do not meet the identified needs of the user.

In order to improve the selection process, we conceived the idea of a Shopping Aid that prefilters information based on the needs of the individual. The individual provides some information about what their preferences are, and this preference list is used to select the assistive technologies that are likely to be useful. The more information the user provides, the more specific the sorting process can be, so that the user can match disclosure (anonymous) with information load.

The complexity of filtering information to that relevant to the end user was increased by the expansion of the mission of the Shopping Aid to include information about consumer electronics that may or may not have features that accommodate users with functional limitations.

The first prototype of the Shopping Aid, now on-line, has five approaches to disclosure of the filtering information, and the end-user can choose among them as desired.

PRODUCT SEARCHING TECHNIQUES IN THE GPII SHOPPING AID

Shelf Browsing

For the individual who simply wants to keep up with what is available, the GPII Shopping Aid has a “shelf browsing” mode. A person who is looking for a new keyboard for his/her computer might move to the keyboard aisle to browse. However, the Shopping Aid uses sub-categorizations to group similar keyboards together, which may allow the user to discover types of products that were not previously known to the shopper.

In the broad category of keyboards, for example, the shelves of the Shopping Aid include 27 discrete types of keyboard or keyboard-adapting products. Browsing among the 400+ keyboards in the Shopping Aid, the shopper may discover the existence of waterproof keyboards. If the new keyboard is needed because of a spilled drink, knowing that there are spill-resistant keyboards might affect choice.

In Browsing mode, the only information that the user need provide is the broad category of product being sought. However, the resulting number of choices is likely to be large.

Specialty Shops

While broad categories of functional limitation are not uniform, there are categories with similar needs. Just as a shopper might enter a kitchen equipment store, finding products that are primarily intended for the kitchen, but which are also useful in other settings, a user of the Shopping Aid can enter specialty shops which pre-filter products to focus on those products likely to be appropriate.

For example, with normal aging, there are common changes in physical and sensory capacity that are common. These include reduced joint mobility, reduced tactile acuity, difficulty with close focus, and need for brighter lighting. A person entering an Elder Shop might find products with larger controls and higher contrast labels. No personal information has been disclosed other than an interest in age-appropriate products (I have a friend who is getting older...).

Within the Elder Shop, the individual is free to browse the shelves just as they would in the general browsing approach, except that the products with small, difficult to use controls would not be on the shelves.

Simple Search

At times, the individual knows the name of the product they are looking for. They may be seeking additional information about that product, or a source for it.

To accommodate this type of shopper, the Shopping Aid includes what appears to be a conventional search bar, much like that of any store. However, the Shopping Aid's search bar has special features that improve its function.

One of the most common complaints of conventional search is that, unless you know the magic words, you find many things that are not what you were looking

for. A person looking for a new television or can opener is likely to have a good idea of what the thing they seek is called, but for the first time shopper for assistive technology, this is not the case.

If a person had difficulty reading on the computer screen, should they look for larger print, easier to read fonts, different colors, or something entirely different. The Shopping Aid includes, as part of its search engine, a thesaurus created by asking individuals what terms they use to describe accommodations, and matching those terms to the professional language of assistive technology. This "common terms registry" is invisible to the user, will grow automatically, and will make finding desired products easier.

Unsearch

On first introduction to the Unsearch feature of the Shopping Aid, many people assume that it is similar to the "Show me more like this" functionality of many shopping sites. While Unsearch has the capability of "Show Me More," it also has features that improve the search.

Unsearch is targeted at individuals who currently use assistive technology, or products with assistive features. At times, a person may look for a product that is "better" than what they are currently using.

"Better," in this case, can mean one of a number of things. If the individual has been using a product for a number of years, they may feel that there must be something newer, shinier, or more capable. On the other hand, the person may be experiencing changes in function such that the current product is no longer meeting all of a person's needs.

To use Unsearch, the individual first identifies the product that they are currently using. Because the Shopping Aid has catalogued the features of existing products, it is able to product a list of all of the features of the current product, and ask the individual which of these features are currently being used.

Because many manufacturers create "omnibus" products that have features for a wide range of potential users, in many cases, users of these products may be using only a small number of the available features, and may not even be using the primary feature. For example, ZoomText uses "XFont" technology which, on many monitors, makes the font much easier to read, even without magnification. A ZoomText user may primarily use XFont, and seldom use magnification. Another user of ZoomText might feel that, when tired, they wished that they had a

product that would read out loud, not knowing that this is a feature of ZoomText.

When the user identifies the features of their current technology that they are using, they have created a personal preferences list for the Shopping Aid. The Shopping Aid can then use this list of preferences to identify all of the products that provide these features, ordered by the degree of fit. The user may find that his/her current product is the best fit, or that there exists a different product that more accurately fits his/her needs, with fewer unneeded features.

Discovery by Question and Answer

A person who is newly experiencing a disability may not have the vocabulary to speak meaningfully about his/her experience. For example, most people with visual/perceptual deficits after a stroke or brain injury describe their problem as having double vision or needing new glasses. This is almost never the actual problem, but it is what they know about vision. The Question and Answer method uses structured queries to narrow the range of potential issues, and help the user identify the problem.

If starting from no information about the user, the Shopping Aid might ask, "Do you have more problems seeing and hearing your device, or operating it?" This question discriminates sensory from physical issues as the greatest concern.

If the user answered that their problem was in operating the device, the next question would be, "Do you have more problems holding your device steady, or operating the controls?" This question discriminates the need for support assistance from interface accommodations.

In general, fewer than six questions will lead the system from no information about the needs of the client to useful product recommendations.

Advanced Search

Although this search is described as advanced, it requires the least prior knowledge from the user. The advances live in the structure of the search.

The Advanced Search display includes a product taxonomy on the left, and a needs or difficulties taxonomy on the right.

The Product Taxonomy, based on publications of the Consumer Electronics Association, uses a collapsible outline to show broad categories of consumer electronics and assistive technologies. Each category

is followed by a number indicating the number of products in that category. If the user selects a broad category, such as "Health and Fitness," it expands into subcategories such as "Active Gaming," "Fitness," and "Health Monitors." The user can explore more specific categories until a reasonable number of choices are displayed.

On the right of the screen, the user has a choice of identifying required features or personal difficulties. A sophisticated user might be able to know that "I want accommodations for Vision, to make things easier to see, by making the labels larger." Making this choice will filter the products on the left, showing only the number of choices having that feature. Each time the user selects an additional required feature, the product list on the left shrinks.

Alternatively, if the user doesn't know what "features" would be useful, or even what features exist in the world, s/he can describe areas of difficulty. The user might report difficulty seeing the display of a device because the print is too small, or that there is too much glare. As before, each difficulty identified reduces the number of products shown to those that address, in some form, that difficulty.

In either case, should the user request so many features that no options remain, they will be prompted to remove the least limiting feature or difficulty to expand the choices.

PRODUCT DISPLAY

Once the user has provided information to the Shopping Aid, it can select and display products meeting the individual's needs using the sorting routine described by Anson (Anson, 2015). With the expansion of the Shopping Aid to inclusion of consumer electronics, the choices are somewhat more complex. Some products will meet the user's needs as delivered, some products will meet the user's needs when paired with assistive technology or other adaptive interfaces, and some products provide those adaptive interfaces.

CONCLUSIONS

The GPII Shopping Aid has been in development for several years. The version that is now available through GPII.net is the first intended to be used by professionals and individuals without access to AT professionals. Over time, this version will develop additional search strategies, broader libraries of

products, and more in-depth knowledge of the products listed. We expect its utility to increase, and the process of finding appropriate information and assistive technologies to become simpler over time.

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