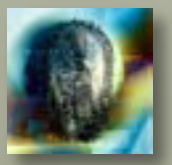

Using research to determine product attributes and stratification for the design and marketing of user authentication.

[Study 3:
A conjoint analysis of desired authentication product attributes]

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Study 3: **A conjoint analysis of desired authentication product attributes**

The purpose of this study was to determine preferences in product attributes by college student entering the job market to work in the corporate environment. The specific product was a two-factor authentication device that allowed them to control access to their computers and the personal data that may be stored on those computers.

Method

Participants

25 undergraduate students were asked to participate in a questionnaire regarding two-factor authentication and express their preference in products with predetermined attribute sets (factors) and the ordered selection of those factors.

Materials

Each participant was given a single page survey. The survey listed a scenario and 16 sets of product attributes. A second sheet accompanied the survey that gave specific explanations of the functionality of those attributes.

Design and Procedure

Six product attributes (or factors) are the focus of this survey. Each factor considered options that ranged from two to four levels each.

The factors, along with the options for each factor are as follows: *Authentication type*, choice of either two-factor or password replacement, *Form factor* with a choice of flash drive, USB key or fingerprint scanner, *Operating System*, choice of Windows, Macintosh or both, *Data Encryption* with a choice of the operating systems included software, shareware, or a solution provided with the product, *Password Vault*, either included or not, and a *Cost* structure that includes options of $50, 90, 125 and 160.

The number of possible combinations for these attributes totaled 432. Asking respondents order preferences amongst such a large number of combinations is unreasonable. Given that large number of options, an orthogonal array was generate so that the respondents had only to rank a set of 16 attribute sets. The attribute sets were selected using the orthogonal array function of SPSS's Conjoint Analysis Software. The simplicity afforded by the orthogonal is necessary trade off as it does present an increased margin of error (Green and Srinivasan, 1978). These attribute sets are referred to as profiles and are numbered one through sixteen.

The survey was completed by a group of 25 participants gathered in a single room. A moderator was present to answer specific questions that participants might have beyond the explanations that accompanied the survey form.

A scenario was presented to the participants orally for consideration as follows: "You are a new employee at a company of over 150 employees. You have just moved to a new city in order to take this job. Your job includes 25% of your time traveling with a Windows laptop that the company has issued to you. The remaining 75% of your work time is spent in your cubicle working on a Macintosh desktop computer. The cubicle is open to others when you are away at lunch or in the evenings and weekends after work. Officially, you are the only person assigned to these two computers. You do not have to share them with other personnel. You have the company's permission to use either or both of these computers for personal tasks. Consider that you will likely have personal and company Emails, web site bookmarks and that you may have one-click purchase, bank and credit card account access and even Quicken type household data on one or both of these computers. You will definitely use one of the computers to track your business expenses for reimbursement. You will likely store contact information, company report data and other job related files on either or both computer. This is a personal purchase that you are making in order to protect the data on these computers."

All of the participant in this study currently have access to and regularly use both Macintosh and Windows computers. No attempt was made to segregate or control their preference. Further, there are no logical assumptions that can be made about their operating system preference. This group of individuals was a mix of interior design, graphic design, and industrial design students. While the general public is more likely to be familiar with only a Windows operating system, these students are familiar with both. Apple's market share is currently estimated worldwide at only 3-5% (New York Times, April 2006).

Results and Discussion

Once the data from the surveys was entered into the statistical application, the syntax was adjusted correctly and the data run, the output results were produced. A second check of the input numbers was performed to assure that all data was accurately transcribed from the forms, to the spreadsheet format and then to the statistical package in the exact and correct format.

When looking at the initial data, it was hard to ignore some significant trends in the importance numbers, particularly as it applies to the factors or product attribute categories. Some of the individual results were dramatic in terms of which feature sets were most important. For a single attribute set to have a relative significance of 50 to 70+ percent was not uncommon. In the case of one specific respondent the Operating System factor scored near 73% relative importance. For that

individual, the next greatest percentages were 12.04 and 10.94 percent respectively for cost and authentication type. The lowest number of any respondent for a single attribute or factor of primary importance was 31.67 percent. Given there were six attributes, a completely indifferent score would have shown each attribute at 16.666 percent. This lack of ambiguity in importance is a significant factor in prioritizing attribute inclusion or exclusion.

Aggregate scores across the entire group showed the selection of an Operating System scored 36.59 percent. The next largest attribute scores were fairly closely grouped at 19.96 for Form Factor, 16.15 for Authentication Type and 13.9 for Cost of the product. Encryption and the Password Vault fell behind at 7.53 and 6.62 respectively (figure 10.)

When looking at individual preference scores we see that two factors dominate the concerns of the participants. By far the largest number considered the Operating System as the most significant or important factor. Fifteen of the twenty-five individuals show it as their primary concern. Another six choose form factor. Together, these two attributes account for approximately 80% of the participants. Amongst the 15 that chose Operating system as the primary factor 11 showed the option of compatibility with both operating systems to have the highest utility, two selected windows and one selected the Macintosh OS. Looking at the span between utility scores within individual results, reveals a significant lack of concern for either Windows or for the Macintosh OS, leading to the belief that they would be primarily using one system or the other for the storage of sensitive data. Within the results of those who chose Form Factor as the primary concern four, or 66.6% chose fingerprint scan as the hardware option of choice with the remaining two choosing the USB key.

Secondary concerns echoed the results of the primary concerns with Form Factor and Operating System as top concerns. The, however, also showed Authentication Type as being a top concern. Six individuals ranked OS as secondary, six ranked Authentication and five ranked Form Factor as secondary. Following closely behind was cost, with four listing it as secondary. The inclusion of a Password Vault and Encryption fell behind with two each. Within those that chose OS as a concern, all but one had both Windows and Macintosh as their preference, with one choosing Windows and another split between Macintosh and the combination of Windows and Macintosh. USB Key was the choice of three individual with one showing equal preference for the use of a flash drive. The last two preferred the Fingerprint solution.

Amongst those that chose Authentication Type as either their primary or secondary concern (10 in all), only one chose the convenience of a Password Replacement. The remainder preferred the additional protection that two-factor authentication affords.

The inclusion of a password vault and encryption of data seemed unimportant to nearly all of the respondents. Encryption has historically had a reputation for slowing overall performance, and

proved problematic in the early years of personal computing. That may explain its lack of importance, but the data certainly indicates that it is far less significant than other features. The Macintosh operating system comes with its own form of password vault called Keychain. It is a feature that not all users are aware of, but its existence, and that it comes free with the system, may explain some lack of interest.

Curiously, cost came as a relatively low priority in both the results for primary and secondary concerns. The utility scores showed two instances of complete indifference and 5 cases where cost utility scores were the inverse of expectations.

Clearly, given the proposed scenario and the results of this survey the company should make the combination of Windows and Macintosh compatibility a priority. With regards to fingerprint scanning as used for the hardware component, it has previously been either expensive, or unreliable. As the technology improves the company should be putting itself in position to offer that component as an option.

There appears to be significant elasticity in the pricing of the product, but referring to Zaltman and others, a sample survey may not be an accurate representation of willingness to pay. That can only be shown with reliability in the marketplace.

It is clear from these results that this population is not likely to pay for the additional benefits of a Password Vault or Data encryption. Encryption is included in both Operating Systems and the Vault is a feature within the Macintosh OS. If a superior solution is developed it should be a lower priority for this market. One strategy might be to include a trial version with the product and charge additionally for the continued use of those components.

This is a component of research done in part as a thesis project in graduate school and initiated during my role as Vice President of Marketing. It is highly topical to Griffin Technologies without which this project would not have been necessary or possible. My thanks to all of those individuals for their help and support.

Tables, figures and some of the conclusionairy content have been omitted from the versions published on the web site. Some of that content is available by request.

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