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The Impact of variable data print on usability in design

William Wells

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The Impact of Variable Data Print on Usability in Design

William Wells
June 2007

Graduate Graphic Design Program
School of Design
College of Imaging Arts and Sciences
Rochester Institute of Technology

A Thesis submitted to the Faculty of the College of Imaging Arts and Sciences in candidacy for the degree of Master of Fine Arts
Special Thanks

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<th>Institution</th>
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<td>Professor Deborah Beardslee</td>
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</tbody>
</table>

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<tr>
<td>William Wells</td>
<td>MFA Candidate</td>
<td></td>
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</tbody>
</table>
# Table of Contents

6  **Project Definition**

9  **Precedents**  
   - Gestalt Principles for Document Design  
   - Web Accessibility and Usability  
   - Securian Financial Group Newsletter  
   - Bang & Olufsen Music System

14  **Research**  
   - Digital Printing  
   - Variable Data Print  
   - Print Customization  
   - Usability  
   - User Differences  
   - Universal Design  
   - Typography  
   - Grids / Visual Organization  
   - Systems Design

35  **Synthesis**  
   - Customization Examples with Usability Analysis  
   - Customization Objectives vs. Degree of Customization  
   - Design Strategies Related to User Difficulties  
   - Semantic Operations  
   - Print Customization Criteria and Applications

48  **Ideation**  
   **Application Establishment**  
   - Potential and Selected Direction - Museum Guide  
   - Types and Elements of Museum Guides  
   - Potential and Selected Museum - George Eastman House

**Application Conceptualization**  
   - Prototypical Users  
   - Content Customization  
   - Design Approaches to Address Variability

**Application Development**  
   - Transition from Existing Museum Guide  
   - New Museum Guide Layout Versions
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td>Intermediate Evaluation</td>
</tr>
<tr>
<td>81</td>
<td>Implementation</td>
</tr>
</tbody>
</table>
| 91   | Dissemination  
|      | Short Term Involvements  
|      | Long Term Goals |
| 93   | Retrospective Evaluation  
|      | Outside Evaluation  
|      | Self Evaluation |
| 97   | Conclusion |
| 98   | Glossary of Terms |
| 99   | Bibliography |
| 102  | Appendices  
|      | Appendix A: Gestalt Principles  
|      | Appendix B: Multiple Intelligences  
|      | Appendix C: Sample Museum Guides  
|      | Appendix D: Layout Adjustment Exercises  
|      | Appendix E: Existing George Eastman House Guide  
|      | Appendix F: Thesis Peer Presentation  
|      | Appendix G: MFA Thesis Exhibition Panels |
Problem Statement

In a world where people see, process and remember information differently, the question arises: Is technology being used in a manner that acknowledges and addresses user differences to the fullest extent? Currently, new print technologies like Variable Data Printing (VDP) are only being used to create customized direct mailing pieces and personalized products for the purpose of marketing, sales and promotion. However, VDP introduces the ability to change data and design elements in printed documents on an individual basis, making it possible to address differences in visual and cognitive abilities, language and culture, and situational considerations. Applying this concept of customization to educational or informational documents would allow a small amount of input from a user to influence unique output (different sequences or layouts, typographic decisions and appropriate content choices) that are more relevant, usable and engaging. While using VDP as a means to explore and achieve this customization, the focus of this thesis study would not be the technology, but the development of a graphic design strategy that also accommodates this customization goal to make information more accessible and usable on an individual basis.

Project Relevance and Importance

Whether due to practical constraints, lack of knowledge, or other factors, designers may not always be able to address user differences in their projects. This means that considerations related to visual or cognitive abilities, language and culture, or situational considerations are often lacking. This results in design solutions that may seem strong on the surface but fail to address the individual needs of a diverse range of users. An approach to design called Universal Design aims to create design solutions that are usable by the greatest possible audience. Although intended to be inclusive, this approach can sacrifice depth and richness of content by generalizing or simplifying information. Instead of creating a single solution that generalizes to the lowest common denominator or creating a multitude of versions to address the many differences, VDP introduces the option of creating a single design that is customized as needed for each user.

As a recent development in digital printing technology, VDP parallels the development of customizable webpages on the World Wide Web. Whereas webpages have been actively employing computer technologies to allow variable content and address accessibility issues, print design has only recently started to explore the possible applications of customizing data and design. Currently, VDP focuses primarily on targeted marketing campaigns, financial transactional documents and customized merchandise, but can and should also be used toward other types of meaningful, useful applications.
Key Questions

Do people read documents differently? If so, what factors are influential?

Can differences in thinking and learning styles be mediated through customized design solutions?

Will customized documents make information more accessible and/or usable to individuals?

What level of customization will be appropriate in addressing user differences?

Which types of materials would be viable and useful in a customized format?

What are the inherent constraints of print that may impact its customization?

How will graphic design accommodate this customizing while maintaining its integrity?

Will the benefits of on-demand VDP be worth the costs?

Associated Areas of Study

<table>
<thead>
<tr>
<th>Usability &amp; Accessibility</th>
<th>Universal Design</th>
<th>Variable Data Printing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language &amp; Culture</td>
<td>Systems Design</td>
<td>Print On-Demand</td>
</tr>
<tr>
<td>Learning Styles</td>
<td>Information Design</td>
<td>Database Publishing</td>
</tr>
<tr>
<td>Memory and Perception</td>
<td>User Interface Design</td>
<td>Customization</td>
</tr>
<tr>
<td>Visual Abilities</td>
<td>Typographic Design</td>
<td></td>
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</table>

Potential Applications

If applied toward usability and accessibility, VDP has the potential to create documents that are tailored according to the needs of each user. Using on-demand customization in this manner will be most helpful in situations with a large, diverse user group. Possible areas of use and related applications include museum guides, governmental forms, product instructions and teaching materials. This thesis study will culminate with a design application that uses VDP to implement a variable, but systematic, design solution. By using VDP customization to address issues of user differences these documents will be more accessible and usable, and foster greater inclusiveness.
Project Definition

Explanatory Diagram

Graphic Design

Variable Data Print

- Digital Printing
  - Single / On Demand
- User Information
  - Input
    - User Selected
    - System Determined
- Database
  - Images
  - Text
  - Layouts
- Considerations
  - Visual Abilities
  - Learning Styles
  - Language & Culture
  - Memory and Perception
  - Task & Environment
- Usability
  - Criteria
    - Usefulness
    - Efficiency
    - Error Tolerance
    - Learnability
    - Satisfaction
- Systems Design
  - Spatial
    - Typographic Language
- Information Design
  - Visual Organization
    - Communication
- Marketing, Sales, Promotion
  - Direct Mail, Transactional, Merchandise
- Educational / Informational
  - Contexts
    - Government, Museums, Parks
  - Applications
    - Guides, Maps, Instructions
- Typographic Design
  - Hierarchy & Layout
    - Type Variables
- Universal
  - One Solution
- Customized
  - Multiple Solutions
    - Versions
    - Personalization
    - Transactional
- Single Version Print
  - Offset Printing
    - Quantity / In Advance

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Gestalt Principles for Document Design

In the chapter entitled *Using Gestalt Principles to Understand Readers Interpretations of Spatial Cues* of her book *Dynamics in Document Design: Creating Text for Readers*, Karen Schriver illustrates how Gestalt principles relate to document design. Gestalt principles, which are based on human psychology and visual perception, play important roles in the perceptual process between the visual organization of content and the reader. These principles explain how individual elements on the page are perceived and understood in relation to each other. With research, examples and case studies, Schriver’s book provides an insightful look at how designers can use these principles to practically address real user needs.

The following quotes from this source, one from each subsection of the chapter, provide concise explanations of each of the Gestalt principles:

**Perception is an Active Process**

“When people look at a page, a picture, a computer screen, or the environment around them, they actively organize what they see. They resolve ambiguities, impose structure, and make connections. They make use of all of the visual cues in the visual field to help them in constructing meaning for the content.” (Schriver, 304)

**People Organize What They See into Figure and Ground**

“The figure is generally the focus of attention and is seen as a whole since it is surrounded by a contour. The rest of the field is the ground which is apt to be in the margin of attention and is usually seen as further away [or behind] the figure. However, the space around, between and within the figure can be employed to show rhetorical relationships among the content elements as well as provide continuity, emphasis, and an elegant appearance.” (Schriver, 306)

**How People Group Figures Depends on the Visual Properties of the Figures**

“Document designers need to consider how the design of contrasting visual cues encourages readers to group the content. They need to evaluate whether the grouping helps readers to make reasonable (and appropriate) inferences about the internal relationship among the parts of the document.” (Schriver, 309)

**How People Group Figures Depends on Good Continuation**

“The Gestalt principle of good continuation says that graphic elements that suggest a continued visual line tend to be grouped together. In addition, visual patterns with good continuation may suggest to the viewer that the pattern continues beyond the end of the pattern itself.” (Schriver, 313)

**How a Figure Looks Depends on its Surroundings**

“The various parts of the visual field interact and influence one another. The perceived size, brightness, and shape of a figure depends on its surrounding, on other figures in the neighborhood.” (Schriver, 315)

**Strong Figures Are Stable**

“Some figures are more resistant to contextual influences that others. These strong figures tend to share the properties of simplicity, regularity, closure, and symmetry. Strong figures resist change or disintegration under poor viewing conditions or variations in the viewer’s attention.” (Schriver, 316)
This multilingual spread from an instruction manual for a stereo system is an example of how Gestalt principles affected how users read documents. This example illustrates several of the principles, including figure / ground relationships, continuation, strong figures and interacting page elements. The framed horizontal rectangle with diagrams in the example on the top was intended to be seen as a single strong, stable figure. However, the lines within the rectangle made the figure weaker and caused users to consider the subdivisions separately. The strong vertical text columns, which may be perceived as the ground, have a strong sense of continuation behind the rectangle with illustrations. (See Appendix A for a larger version.)

Significance

This book’s explanations provide an excellent guide to the influence Gestalt principles have on readers. Its impact on this thesis is multi-faceted. First, it helps establish which design elements can be used and adjusted to provide effective spatial cues to different readers. Second, it provides tools and considerations for how to coordinate changing design elements with static elements to ensure that the varying layouts remain cohesive and consistent.

Source

*Dynamics in Document Design: Creating Text for Readers*, Karen A. Schriver
Precedent B

Web Accessibility and Usability

Description
The Internet has undergone rapid advances in technology that make it potentially difficult for everyone to use equally. New multimedia tools like Flash and Javascript often add interactivity and graphical interfaces that exclude users that depend upon text readers or simple, clear layouts with contrasting elements to access information. Fortunately, many advocates have placed this issue as a priority and much progress has been made in making the Internet more usable and accessible. Although many approaches relate specifically to adjusting elements to fit on screens and provide alternate navigation devices, many more address issues that relate to general topics like readability, legibility and comprehension. The U.S. Government website on usability provides many models and processes to follow in analyzing, designing and testing websites for usability. Well-known usability advocate, Jacob Nielsen, has a website that presents his findings on web usability by outlining the issues, the research behind them and many solutions. Even large corporations like Microsoft have taken this issue seriously. This accessibility website provides excellent descriptions of the various user challenges and technical issues involved in making the Internet accessible to all.

Significance
The issues of usability and accessibility on the Internet have many correlations to Variable Data Print and print customization. Precedent B is important to this thesis study because most of the issues and solutions addressed in web usability can also be applied to print, as in the adjustment of type size or varying page layouts based on format or user goals. Of special interest to this thesis are the measures being taken to ensure that websites with highly variable content maintain their design integrity.

Sources
Precedent C
Securian Financial Group Newsletter

Description
Noel Ward's presentation Data-Driven Documents: The Transactional Side, includes a case study examining the benefits that Variable Data Print had for the Securian Financial Group monthly newsletter and statement. As a large provider of retirement plans Securian needed to communicate to their customers the status of their accounts as well as important information on services and some basic educational information. Using VDP they reduced the number of pages from ten or twelve to four by reorganizing and customizing the sections to the individual customer and including only essential information. This produced a more personalized, action-oriented statement and more useful educational content in the newsletter.

Significance
The meaningful implementation of VDP to the Securian newsletter shows how relevant information can be chosen and arranged such that extraneous content is eliminated. This provides a clearer, simpler, more useful document. This case study is important to this thesis study in that it demonstrates how VDP can add value to a user through the choice of content. It also illustrates how a design template that incorporates a simple, well thought out grid can accommodate varying content types and amounts.

Source
Data-Driven Documents: The Transactional Side, Noel Ward
Precedent D
Bang & Olufsen Music System

Description
In his book *Information Graphics*, Peter Wildbur presents a case study on a music system by Bang & Olufsen that incorporates the idea of progressive disclosure. Beneath the sleek and elegant exterior design is a system that employs selective information presentation to display only relevant options at any given moment. All other options are hidden, eliminating the need for users to mentally remove extraneous options and distractions on their own. “*Bang & Olufsen’s Beocenter 9000 is designed on the principle that unless you need to use something, it is not there.*” (Wildbur)

Significance
This case study presents an interesting approach to customization information. It aims to make the designs more usable by focusing on the information users need. Many kinds of design solutions (publications, websites, maps) try to meet everyone’s needs by including information for all possible scenarios in an attempt to acknowledge all user groups. This approach could be employed in this thesis by removing, hiding, or de-emphasizing unnecessary elements thereby reducing potentially distracting and irrelevant content to a particular user.

A photo of the Bang & Olufsen’s music system in which only relevant options are illuminated.

Source
*Information Graphics*, Peter Wildbur
Introduction

Research for this thesis began with a survey of books and journals relating to the three identified main topics: Variable Data Print, Usability and Graphic Design. Through the information contained in these sources, it was apparent that the initial focus should be on the larger concepts of print customization and user differences. From these broader concepts it was possible to understand the scope of variables involved as well as similarities between examples. For example, considering the larger subject of user differences, as opposed to just usability, offered insight into a wider range of user influences that could be considered. For each topic or source, research is not intended to be a detailed report but a comprehensive summary, that focuses on addressing the aspects that are relevant to print customization and usability.

Digital Printing

In The Very Last Designer’s Guide to Digital, On-Demand, and Variable-Data Color Printing, Frank Romano gives a thorough overview of digital printing that focuses on hardware and technical considerations. He addresses many text issues encountered with variable data, specifically text reflow and text overflow as well as how digital printing relates to offset printing. The table below compares the print run length between traditional offset printers and digital printers in relation to document customization, which Romano divides into mass market, customized, and personalized.

Significance

Aside from pointing out typographic considerations for addressing text reflow and overflow, Romano introduces a few technical points about digital printing that this thesis should take into consideration. These include choosing the appropriate digital printer, paper and fonts. As with any design project, technological and practical constraints play an important part in forming the end result. For this thesis digital printing provides opportunities like variable content and print on demand but imposes constraints on paper selection and design decisions, like the placement or size of text areas, which must account for variable content.

The Affect of Variability on Run Length and Printer Type

<table>
<thead>
<tr>
<th>Variability</th>
<th>Variable Data / Images</th>
<th>Fixed Data / Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalized</td>
<td>Short Run</td>
<td>Long Run</td>
</tr>
<tr>
<td></td>
<td>Digital presses</td>
<td>Offset presses</td>
</tr>
<tr>
<td>Customized</td>
<td></td>
<td>Flexographic presses</td>
</tr>
<tr>
<td>Mass Market</td>
<td></td>
<td>Gravure presses</td>
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</tbody>
</table>

<table>
<thead>
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<th>Run Length</th>
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<tr>
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<tr>
<td>500</td>
</tr>
<tr>
<td>2000</td>
</tr>
<tr>
<td>5000</td>
</tr>
</tbody>
</table>
Digital Printing (continued)

What are the inherent constraints of print that may impact its customization?

A conversation was held with John Eldridge, the Printing Facilities Coordinator in the School of Print Media at Rochester Institute of Technology. Its focus was to determine the physical and practical limitations involved in digital printing.

Color Conflicts Removed

The first point discussed was the flexibility digital printing offers. In addition to one of the primary benefits digital printing makes possible, the ability to print a single copy as easily as a thousand copies, it also grants more freedom to the designer to use color throughout a document. This is because it does not suffer from the complications of color ink distribution inherent in offset lithography. In digital printing, color can be used anywhere on the page regardless of other elements on the same page or other pages within the same signature. In variable data print consistency of color across multiple copies or versions is a less substantial dilemma, since most users will only see a single version. However, ensuring near identical color on double sided documents and for corporate brand colors still remains important.

Additional Capabilities & Constraints

Other considerations discussed in this conversation were related to bleeding, stapling, scoring, folding and drying time. In regard to bleeding color, a term referring to extending color to the edge of the paper and eliminating margins, John Eldridge said, “as a rule, the C or B level printers (where the highest A level printers are high volume commercial printers and the lowest C level printers are low resolution office copiers) will not print full bleed.” Thus, this constraint would have to be addressed by either removing bleeds in the actual document design or performing post-print trimming to eliminate visual margins or edges.

If multiple pages were involved, post-print stapling is a capability that almost all business level digital printers are capable of performing. The ability to fold post-print is also available for B level printers. Scoring is not an operation usually performed in the process of digital printing. It would need to be performed by print operators after the actual printing process with a special scoring device to prevent cracking the toner on digitally printed documents.
Digital Printing (continued)

Digital Printer Selection
After discussion of the constraints of digital printing, it was important to establish the basic thesis application requirements to be used. The requirements established were that the printer be capable of producing the required image quality and be within the price range of a medium sized organization. With these requirements high resolution business level printers were the best choice. This range of digital printers, what John Eldridge calls B+ level printers, are capable of printing high quality 400-600 dpi, color documents for business and commercial purposes. These printers can print on a limited set of coated, smooth surface paper sheets up to 12” x 18” in size. These printers are more affordable to small and medium sized businesses. However, they become even more affordable when leased from the print manufacturer, often with technical assistance and maintenance included.

Significance
The discussion with John Eldridge clarified what typical B level business class digital printers can do. These capabilities and constraints will be taken into consideration when making decisions about size, format and layout for a final application in this thesis study.

B Level Printers

Presented are digital printers offered as business solutions by three major digital printer manufacturers. They are all within the B+ range and possess the print quality and capabilities necessary for the purposes of this thesis project’s design application.
Variable Data Print

This form of customization, used in digital printing, allows portions of content and imagery to be taken from a database and combined or recombined for various users. With the advent of electronic document creation and digital printing it is possible to develop documents on a one-to-one basis. Using this one-to-one approach means that each solution can have elements unique to an individual, from simply inserting their name to employing detailed statement histories. Currently, this type of customization is being used to help businesses get better response rates from mailings, command more attention from marketing pieces, and generally increase return on investment. Examples from a range of sources are almost exclusively direct mail, marketing, and transactional applications of Variable Data Printing.

Frank Romano, author of *Designing4Digital*, a free monthly online newsletter produced by the Digital Printing Council, often addresses how to effectively create documents for digital printing. Focusing primarily on marketing and direct mailing applications, this resource presents many new and innovative ways, like image manipulation and personalized web tie-ins, in which customization is being integrated to help business objectives.

**Significance**
As a general model for integrating variable data into print documents, VDP offers many insights into methods and techniques to achieve customization on this one-to-one basis. The widespread use of VDP for direct mailings and transactional documents shows that the technology to integrate variable information and print unique documents is available and developed.

In *Data-Driven Print*, Patricia Sorce and Michael Pletka provide clear categories of print customization:

<table>
<thead>
<tr>
<th>Types of Print Customization</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Versioning</td>
<td>A few versions based on geographical location</td>
</tr>
<tr>
<td>Mail Merge</td>
<td>A single document customized with name and address</td>
</tr>
<tr>
<td>Personalized Printing</td>
<td>Targeted offers based on recorded purchasing history</td>
</tr>
<tr>
<td>Transactional</td>
<td>Billing statements with monthly purchases and totals</td>
</tr>
<tr>
<td>Print on Demand</td>
<td>Template-based documents printed as needed</td>
</tr>
<tr>
<td>Fully Customized Communications</td>
<td>A unique document based on past and predicted consumer needs</td>
</tr>
</tbody>
</table>
Variable Data Print (continued)

**VDP Workflow**

There are several aspects of the variable data print workflow that make it different from a typical print workflow. First, in addition to the content and design being based on general user goals, variable data documents are based on information known about an individual. Second, in addition to content and layout decisions made by a designer, variable data rules determine some of the content. Third, while images are normally embedded in a document, variable printing can also store images outside the document and insert them as needed. Fourth, although parts of most variable documents will be fixed, they also contain variable content areas. Finally, printing traditional print documents results in a single version while variable data documents output many unique versions, often reusing shared elements.

The diagram below illustrates the main components of a variable data workflow. User data, text and images are stored in databases outside the design file. VDP software handles both the design and the rules that control what content gets inserted. The VDP software then takes each set of user criteria, inserts text and images according to the rules and exports a file to be printed. This setup is significant because it allows content to be stored and updated separately from the design and allows designs to be customized.

**Workflow Diagram**

![Workflow Diagram](image-url)
Conditional Logic Statements

Customization decisions in the VDP workflow depend on conditional logic rules. These rules can be conceptually thought of as a sequence of Yes/No questions similar to the process of elimination. When implemented in the VDP workflow, designers can create rules that connect user information from a database to text and image assets thereby controlling how a document is customized. The software then translates these rules into conditional logic statements, implemented in computer programming language as If-Else statements.

The diagram from Data-Driven Print by Patricia Sorce and Michael Pletka illustrates how the If-Else decision-making process functions like a flow chart.

Significance
Conditional logic rules can greatly reduce the work involved in designing multiple versions and creates the opportunity for one-to-one customization. A basic knowledge of conditional logic programming is important to this thesis because it fosters the kind of sequential decision-making process a designer needs to consider when creating these customizable documents. This basic overview also makes it clear that the general logic-based language is flexible enough to accommodate any type of information, including user characteristics.
Variable Data Print (continued)

*Will the benefits of on-demand VDP be worth the costs?*

To understand the current capabilities of VDP software and determine the costs affiliated with employing VDP, Erich Lehman, Prepress Facilities Coordinator in the School of Design at Rochester Institute of Technology was interviewed.

**Variable Content Software**

According to Erich Lehman, current VDP software does exist that would make implementation of variable layouts possible. Plug-ins like XMPie uDirect, for industry standard design software like Adobe InDesign, enable designers to add database connectivity and variable text and imagery to their projects. However, to achieve overall page layout variability, cumbersome work arounds and complex database rules would need to be employed and the time involved could quickly outweigh the benefits. Software plug-ins like XMPie uDirect that enable content variability, costing only a few thousand dollars, are much more accessible to small and medium sized organizations.

**Variable Layout Software**

More powerful software like Pageflex begin to add support for variable layout. Pageflex's Persona Cross Media Suite can customize “the selection of content, the size and position of each and every design element, the appearance and attributes of every design element, the number and size of pages and the delivery method (print, web, e-mail).” (Pageflex, 2007) This Pageflex software can also perform adjustments based on the inserted variable content to “distribute the amount and location of white space on each page, insert additional elements based on the space available, and reduce or eliminate images when there is too much text for the document.” (Pageflex, 2007) However, this additional functionality comes at a high price, with a price tag in the tens or hundreds of thousands of dollars. This places this type of software outside the budget of most small and medium sized design firms and companies.

**VDP for Consistent Brand Identity**

Erich Lehman described a Pageflex case study where variable data print software was being used by car dealerships to customize direct mail while allowing the company headquarters to control brand identity on these printed materials. In this approach the company can design templates and control the possible layouts, images and tag lines. This ensures that the individual dealerships adhere to brand identity guidelines while using their customer database and dealership-specific information to make more relevant customer communications. This use of VDP, in which variable text and images are selected and placed into a limited number of templates, is an approach that could be a useful influence for the design application of this thesis. It offers control over design integrity while still allowing variability of content.
Variable Data Print (continued)

Training and Support Costs
Related to the cost of the software are expenses associated with training designers, software users and support personnel. While plug-ins like XMPie uDirect that integrate into existing software are more easily learned in a few days, more complex software like PageFlex could take months to master. In either case a designer with the appropriate VDP knowledge would be required for the initial design as well as for any updates and technical support down the line.

Turnaround Production
A possible approach to implementing VDP that was discussed involves designing and programming a touch screen kiosk interface that could take the visitor’s responses to questions and create and print a customized document, much like a Kodak Picture Maker prints photos with borders and text based on customer’s input on a kiosk. Erich Lehman suggested two reasons why this may be difficult. Current VDP software requires the designer to manually connect to a database and export a set of variations in Portable Document Format (PDF). Then, this PDF is also manually submitted to the printer. Therefore, this scenario would require special scripts to be programmed for both the VDP software and computer operating system.

Erich Lehman suggested a more feasible scenario where a potential customer would fill out a form online and either have their customized document mailed to them or pick it up somewhere. The customer’s selections could be easily stored in a database and a remote operator could create and print a bundle of customized documents at the end of the day. Although requiring more time this method could be easily be implemented.

Significance
This conversation was beneficial to this thesis in two ways. First, it provided a good overview of the types of VDP software currently available and their capabilities. This allows any decisions about ways to implement VDP in a thesis application to take into account the practical constraints of the software and real world technical concerns. Second, it offered insight in a less hardware focused way, allowing for more understanding of workflow necessities and how VDP solutions fit into a business organization.
Print Customization

Marketing and Direct Mailing

In their research-based book *Data-Driven Print*, Patricia Sorce and Michael Pletka present data and strategies on how to make VDP a valuable marketing asset in business. They use data-driven print as a more general term to describe printed personalized communication. The many real world data-driven examples examined in this text help illustrate how the information that companies already possess can be implemented through VDP into valuable documents that help acquire, serve and retain customers.

Significance

The ability to customize documents to each user demonstrates VDP’s potential to address differences on an individual level. By simply adjusting the content, and thus the message, different outcomes are possible. In the same way, by adding the ability to change design elements, designs can be tailored to convey content in more meaningful and focused ways to specific individuals.

This example, used in *Data Driven Print*, is a typical example of a direct mail piece used in the automotive industry. It takes information known about a customer (name, car purchased, date last serviced) and uses it to create a personalized communication that captures the customer’s attention and business.
Print Customization (continued)

**Transactional Documents**

By far the oldest and most common form of VDP documents today are transactional documents. These documents are printed pieces that list transactions or entries from a database, like billing statements or purchase receipts. The purpose behind these documents is usually to present a large amount of data to a user in an organized form that makes it easy for them to understand and refer to.

**8vo**

One company that has been dealt with transactional documents for quite some time was 8vo. Since 1991, when they worked on the American Express billing statement, 8vo was involved in redesigning transactional documents for credit card, energy, and telecommunication companies. In each case, they not only integrate solid typographic and spatial grid systems, but also address user difficulties related to readability and legibility.

**Significance**

Although transactional documents often deal with numerical data from a database, they face many of the same challenges as documents with variable text and imagery. Most transactional documents resolve problems related to hierarchy and use of space, as well as the challenge of an uncertain amount of content, by employing grids and clear typographic hierarchy. It is clear that both of these aspects of design will be important to consider when designing a system to accommodate customizable information.

This example of billing statement by 8vo is a template that specifies distinct content modules and their locations, with a strict adherence to the baseline grid.
Print Customization (continued)

In her article *Designing for Translation or Other Variable Data Printing*, Elisabetta Bruno introduces how customization can create cost savings when dealing with multiple language translations. Using VDP allows a single template to be used to substitute each of the different languages as appropriate. She presents the text and layout problems, like text overflow and variable content area overlaps, that can occur and provides some tips for dealing with this application of variable data print.

Significance

In Ellen Lupton’s book *Thinking with Type* she states that “Polygot (multilingual) books display a text in several languages simultaneously, demanding complex divisions of the [page layout].” Thus, Bruno’s article shows how VDP can address a real design problem. Language translation also addresses a key user difference that could be instrumental in making a document more usable to a large audience. Finally, the article helps expand the definition of variable data print beyond direct marketing.

In this example from the book *Graphis Diagrams*, the text is translated into three languages that coexist on every page. The same written information could be displayed using a single column with VDP, thus increasing space for imagery and removing the two unused languages.
Usability

The International Standards Organization (ISO), well-known for its development of standards for industrial processes and product quality, defines usability as “…the effectiveness, efficiency and satisfaction with which specific users can achieve specified goals in a particular environment.” (ISO 9241-11) This standard then further defines each component as follows:

**Effectiveness**  
The accuracy and completeness with which specified users can achieve specified goals in particular environments

**Efficiency**  
The resources expended in relation to the accuracy and completeness of goals achieved

**Satisfaction**  
The comfort and acceptability of the work system to its users and other people affected by its use

In her article *The Five Dimensions of Usability*, Whitney Quesenbery attempts to move beyond the task and performance focused definition provided by ISO, and expands the definition of usability to five aspects that describe the end result the user experience:

**Effective**  
The completeness and accuracy with which users achieve their goals, which range from finding information and completing a task to just having fun.

**Efficient**  
The speed and accuracy with which users can complete their task.

**Engaging**  
The degree to which the tone and style of the product makes it pleasant or satisfying to use.

**Error Tolerant**  
How well the design prevents errors, or helps recovery from those that do occur.

**Easy to Learn**  
How well the product supports both initial orientation and deepening understanding of its capabilities and content.

Significance

These definitions are useful to this thesis in that they provide concrete ways to look at, address and evaluate design solutions. Addressing effectiveness involves understanding the user and his or her goals, and customizing the information to reach these goals. Addressing efficiency involves considering user task models and adjusting layout and categorization accordingly. Addressing engagement methods might involve varying the choice of language, mode of interaction or aesthetic decisions in a visual layout. Addressing error tolerance involves anticipating different types of mistakes and misunderstandings based on certain user characteristics and incorporating adjustments accordingly. Finally, addressing the ease of use involves simplifying or providing additional aids depending on a user’s background or experience with a topic.
Usability (continued)

Every design situation has differing priorities and needs that often require trade-offs between which aspects are given the most attention and which aspects will remain less developed. While one design project may have a stronger focus on accuracy and efficiency, another may have more focus on engagement and usefulness. Ideally, a design solution will address all the aspects of usability to some degree.

In her article, *The Five Aspects of Usability*, Whitney Quesenbery introduces a model that illustrates this concept of determining the varying weight and importance of the aspects of usability. She explains that different users have conflicting needs and that these needs vary depending on function, time, and context changes. Another view of the trade-offs involved in addressing usability is presented in Lidwell, Holden and Butler’s book, *Universal Principles of Design*. In their example, the trade-off is between flexibility and usability. In this case, as a product is designed to include a wider audience with greater ranges of abilities, skills and needs, the product generally becomes more complicated and the usability of the product declines.

Significance

Considering usability trade-offs will be important to this thesis study. When a final application is chosen, some consideration will need to be placed on which aspects are vital to success and which can suffice with minimal attention. The size and diversity of the audience for any particular product will also influence how much flexibility, or customization, the final design solution should include.

(Above) This example from *Universal Principles of Design* by Lidwell, Holden and Butler demonstrates the trade-off between ease of use and efficiency to added functionality and relevance. By customizing design for the purpose of usability this thesis study aims to achieve the best of both worlds.

(Above Left) This diagram shows the priority put on each of the five dimensions of usability for a specific product. In this case “efficiency and error tolerance will require special attention to ensure that failures in these dimensions do not undercut the overall success.” (Quesenbery, 2003)
## User Differences

**Individual Differences**

In Patrick Jordon's book *An Introduction to Usability*, the author presents a scope of usability in which four overall user characteristics affect usability: experience, domain knowledge, culture and age.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experience</strong></td>
<td>Relates to both the specific or related products</td>
</tr>
<tr>
<td></td>
<td>Example: User knowledge of the page layout software QuarkXPress would be a factor in how a tutorial for InDesign would be presented.</td>
</tr>
<tr>
<td><strong>Domain Knowledge</strong></td>
<td>Refers to knowledge of the task or subject matter</td>
</tr>
<tr>
<td></td>
<td>Example: User knowledge of design and layout would be a factor in how a tutorial for InDesign software is constructed.</td>
</tr>
<tr>
<td><strong>Culture</strong></td>
<td>Affects how people interact with products; includes standards, conventions, and physical differences</td>
</tr>
<tr>
<td></td>
<td>Example: The color red may evoke different associations for people from different countries, from love and celebration to war and mourning.</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>Impacts interests, physical strength and differing sets of accumulated knowledge</td>
</tr>
<tr>
<td></td>
<td>Example: Chairs are often designed for users of different ages, such as chairs whose seats are easier to get in and out and children's seats that place them at normal table height.</td>
</tr>
</tbody>
</table>

**Significance**

Users are a primary focus of this thesis and play an important role in the design process. It is beneficial to include feedback from end users in almost any stage of the product design process from research through implementation. Performing user testing and getting feedback allows improvements based on actual user concerns to be incorporated and eliminates assumptions or stereotypes about users that designers may have. While usability focuses on the ability of users to accomplish tasks, it is also important to understand individual and collective challenges users face in order to anticipate and address their needs. Thus, collecting and determining a wide range of user traits and associated abilities is an important part of this thesis.
User Differences (continued)

Multiple Intelligences

Howard Gardner, a psychologist and professor at Harvard University, has had a substantial influence on education and learning with his theories on human intelligence. In his book *Frames of Mind: The Theory of Multiple Intelligences* he presents a view of human intelligence in which everyone actually possesses several different intellectual strengths.

The eight intellectual tendencies he describes are: Linguistic, Bodily-Kinesthetic, Spatial, Musical, Logical-Mathematical, Intrapersonal, Interpersonal and Naturalist. Each type of intelligence is predisposed to different modes of understanding and learning. For example, someone who has a strong disposition towards spatial intelligence would be sensitive to colors, shapes, symmetry and images. They would be inclined to representing ideas visually, notice visual details and be good at drawing.

One prominent advocate of Howard Gardner’s theory of multiple intelligences is Thomas Armstrong who has published several books related to learning and human development. In his book *Multiple Intelligences in the Classroom* he shows how multiple intelligences related to learning and teaching. See Appendix B for examples.

Significance

With the proper understanding of each of these intelligences teachers, or anyone who needs to effectively convey information or concepts, can apply different presentation or teaching methods to ensure that everyone has an equal chance to be engaged. Although addressing multiple intelligences would greatly aid usability it would be difficult to integrate this theory into this thesis since the methods of identifying these intelligences often involves lengthy questionnaires and direct observations.

Learning Styles

Silver, Strong and Perini, in their book *So Each May Learn*, take this idea of multiple intelligences, or the ways people demonstrate intellectual ability, and make connections to three learning styles: visual, auditory, and kinesthetic. Users who are disposed to a certain type of intelligence will generally be inclined to learn through one of these channels. By cross referencing learning styles with multiple intelligences, the authors demonstrate how each type of intelligence can best be taught in order to produce the most effective transmission of information.

Significance

Learning styles provide a model of users based on how they understand and learn best from different presentation methods. Many of these learning styles also involve methods other than visual, printed materials such as lectures and interactive activities that would be difficult to implement in variable data print documents. However, the approaches used in this theory provides insight into additional design approaches that may be helpful, such as incorporating a strong visual rhythm, changing the style of prose or including self-reflective questions.
User Differences (continued)

Accessibility

Creating solutions that are designed to be usable regardless of a user’s visual or physical disability or impairment is the focus of accessibility. Demographic groups included in these types of considerations range from people with low vision to blindness, to situational or emotional impairment, to permanent physical disability as well as any other situation where average sensory or physical abilities do not function within the normal human range of capabilities.

Microsoft’s Accessibility website and Paul Arthur, of Public Works Canada, provide informative explanations, conditions and examples of many types of disabilities. The following three excerpts relate strongly to vision and language in design. Additional impairments include literacy impairment, which is “descriptive of persons that are functionally illiterate in the language that the message is expressed in” (Arthur, 1988), and situational impairment, which includes “persons that are [temporarily] angry, apprehensive, confused or distraught.” (Arthur, 1988)

Disabilities and Impairments

Visual Impairments include persons with low vision or poor eyesight, partial eyesight, and sight anomalies such as color deficiency and reduced fields of vision. Most of these impairments create issues of legibility and are often addressed through careful typographic choices. (Arthur, 1988) (Microsoft, 2006)

Learning Impairments include persons with conditions from “dyslexia and attention deficit disorder to retardation.” These conditions often create difficulties in processing problems and can interfere with the learning process. “Many individuals with learning difficulties and impairments are perfectly capable of learning if information is presented to them in a form and at a pace that is appropriate to them individually. Reducing visual distractions can also aid the learning process for many people.” (Microsoft, 2006)

Language Impairments include persons with “conditions such as aphasia (loss or impairment of the power to use or comprehend words, often as a result of brain damage), delayed speech (a symptom of cognitive impairment), and other conditions resulting in difficulties remembering, solving problems, or perceiving sensory information. For people who have these difficulties and impairments, complex or inconsistent visual displays or word choices can make [tasks] more difficult.” (Microsoft, 2006)

Significance

Understanding the difficulties and challenges people face when using printed matter is vital to addressing their needs. By drawing on the extensive research and proven results from large corporations and advocacy organizations, addressing these users becomes a matter of identifying the challenges and implementing the corresponding design adjustments. However, usability goes beyond simply making design accessible, it makes it effective, efficient, easy to learn, error tolerant, and engaging. The hurdle of making it accessible is simply the first step in making customized design usable at the individual level.
Universal Design

When accessibility is expanded to making design usable by as many people as possible, it is called universal, inclusive, or barrier-free design. Lidwell, Holden and Butler describe this approach as one in which “designs should be usable by people of diverse abilities, without special adaptation or modification.” In their book, *Universal Principles of Design*, they describe four characteristics of universal design.

**Perceptibility**
Everyone can perceive the design, regardless of sensory abilities

**Operability**
Everyone can use the design, regardless of physical abilities

**Simplicity**
Everyone can easily understand and use the design, regardless of experience, literacy, or concentration level

**Forgiveness**
Everyone can easily avoid and minimize consequences of errors

The Center for Universal Design at the North Carolina State University also produced a set of principles that describe the aspects of Universal Design. These principles share the consideration of the user, however are more focused on ensuring that design is equally easy to use and accommodating to everyone regardless of any user differences or abilities.

**Equitable**
Does not disadvantage, stigmatize or privilege any users.

**Flexible**
Accommodates a wide range of individual user preferences and varying functional abilities.

**Intuitive**
Is easy to understand regardless of the user’s experience, knowledge, language skills or concentration level.

**Perceptible**
Communicates all necessary information to all users regardless of ambient conditions or the user’s abilities.

**Safe**
Minimizes hazards and adverse consequences of accidental or unintended actions.

**Easy**
Can be used efficiently, comfortably and with minimal fatigue.

**Accommodating**
Provides appropriate size and space for approach and use regardless of body size, posture, or functional abilities.

Significance

At first, this approach of designing a single universal solution may seem at odds with producing many customized print documents. However, they shared the underlying goal of reaching the widest possible audience and meeting everyone’s needs. Aside from addressing issues of physical and cognitive abilities, this approach to design touches upon many other important user differences that this thesis hopes to address, like previous experience and knowledge, culture and language, and situational variables. This thesis shares the goal of making design equally usable for everyone.
Rolf Rehe's book, *Typography: How to Make it Most Legible*, is a collection and analysis of research that offers many insights into typographic design. The research focuses primarily on reading speed and comprehension and “finding the typographic arrangements best facilitating these factors, [as well as] finding such typographic variables which please the eye [and achieve] reader attention and response.” (Rehe, 12)

For several aspects of typography, Rehe offers recommendations:

- **Typeface**: Avoid all caps, use large lowercase type or bold
- **Type Size**: Between 8 - 12 points depending on typeface
- **Leading or Line Spacing**: For 10 point type, use leading of 1 - 4 points
- **Line Length**: Typically 10 - 12 words per line or 80 mm
- **Typographic Arrangement**: Use unjustified, possibly aids legibility
- **Color and Contrast**: Black type on white or cream background

In addition, Rehe mentions that left aligned paragraph text creates a more contemporary, relaxed typographic style and old style and Arabic numerals are more legible than Roman. He stresses that “type size, line width, and leading should always be considered together since these variables greatly inter-relate.” (Rehe, 21)

**Reading and Comprehension Speed**
Throughout the book Rehe explains how each variable either helps or hinders reading speed, cognition and visual time spent comprehending text. For example, he found that “smaller type sizes simply reduce visibility of the type and hamper the all important word recognition” and “larger sizes force readers to perceive words in sections, rather than as a whole, and consequently slow down reading speed.” (Rehe, 28)

**Learning Materials**
For addressing learning and tables, Rehe offers some specific suggestions. “When learning is the major concern, diagrammatic presentation should be used, and, when reader preference is taken into consideration, tabular presentation should be selected. Tables should be set in at least 8 point type, with generous leading. The material should be broken into vertical groups of five, with the first column in bold face, and at least one pica space and/or rule between the columns. Tables should not be too long and not be crowded by too many columns.” (Rehe, 44)

**Significance**
Rehe’s research-based approach to making typographic decisions is actually quite user-centered and lends itself well to this thesis. Although many of the suggestions provide one final solution, many others like his advice on type size and reading comprehension illustrate how to adjust the typographic variable for different objectives. Rehe’s collection of research is important to this thesis because it provides some concrete ways to adjust type for various users and purposes.
In her book, *Thinking with Type*, Ellen Lupton presents contemporary typography as having “borrowed not from literary criticism but from human-computer interaction (HCI) studies and the fields of interface and usability design. The dominant subject of our age has become neither reader nor writer but user, a figure conceived as a bundle of needs and impairments - cognitive, physical, emotional.” (Lupton, 73)

From this user-centered frame of mind, Lupton proceeds to explain the importance of typographic hierarchy to the user. She explains that a typographic hierarchy is both an organizing system for content and a method to emphasize or diminish information importance. It helps a reader “scan a text and pick and choose among its offerings.” (Lupton, 94)

A typographic hierarchy is composed of levels that are “signaled by one or more cues, applied consistently across a body of text.” These cues can take many forms from indentation, line spacing and page placement to the size, style or color of the typeface. “Infinite variations are possible.” (Lupton, 94)

An example that illustrates the power and flexibility of a well devised typographic hierarchy are Internet search engines. When the results of a search are listed on the webpage, typographic style sheets differentiate the parts through the use of color, size, weight or underlining (Lupton, 99). These typographic styles establish a hierarchy that makes the job of sifting through the results easier.

**Significance**

It is clear that by employing typography and typographic hierarchy, the effort placed on the user to differentiate and prioritize information can be greatly reduced. What makes set typographic styles even more relevant to this thesis are their ability to be implemented on variable data, like search engine results.
Grids / Visual Organization

How will graphic design accommodate this customizing while maintaining its integrity?

Ellen Lupton’s *Thinking with Type* also offers substantial insights into the use of grids and their ability to structure collections of data and text. Among the aspects of the grid covered are columns and zones. Lupton suggests that multi-column grids “provide flexible formats for publications that have a complex hierarchy or that integrate text and illustrations” and that “the more columns you create, the more flexible your grid becomes.” The grid can also be used to “articulate the hierarchy by creating zones for different kinds of content.” (Lupton, 142) In this way the clarity and consistency of content placement makes finding information easier.

“Designing in response to the internal pressures of content (text, image, data) and the outer edge or frame (page, screen, window), an effective grid is not a rigid formula but a flexible and resilient structure, a skeleton that moves in concert with the muscular mass of information.” (Lupton, 112)

The grid offers a strong yet flexible way to not only structure and organize information but to unify sets of pages with varying content. Grids establish rules and constraints on graphic variables that ensure consistency among the set of possible layouts. However, in his book *Designing Programmes*, Karl Gerstner brings up the point that although the typographic grid facilitates consistency within a design the real challenge in employing the grid is finding the right balance between the greatest possible variability and constant elements. (Gerstner, 57)

This example from Karl Gerstner’s book *Designing Programmes* shows how a set of rules and underlying unit grid can be used to create designs that are flexible to varying sizes and formats.

**Significance**

When Ellen Lupton describes the role of the grid as one of “unifying sets of pages with varying content” (Lupton, 110) she could very well be talking about variable data print. Karl Gerstner also suggests that grids are useful in working with variability. Thus, it is clear that grids will be vital to the final thesis application to not only structure and organize variable text and images but also to help maintain a strong visual identity across each version.
Systems Design

A systems approach to design means that considerations of relationships, similarities and connections between the components of individual layouts of a design series are carefully attended to. These components can relate to any aspects related to design from color, typography and imagery to spatial, language and concept considerations. In addition to providing consistency, systems design creates a unity among all the individual pieces which serves to strengthen the series as a whole. It allows each additional piece to provide more depth and meaning to the rest.

This series of book covers from the book *Making and Breaking the Grid* by Timothy Samara shows how a set of book covers for the gospels of the Bible employ spatial, imagery and typographic systems considerations. An imagery system uses only duotone photographic images. A typography system is used to consistently differentiate title, subtitle and authors. A spatial system is used for the placement of text elements and focal points in the imagery.

Significance

Systems design will play an important role not only in visually uniting the varying versions of the application for this thesis but ensuring a consistent level of quality in the varying content as well. Spatial and typographic systems will be important to coordinate the varying layout and text adjustments. Also, language systems will help ensure variables such as content depth and sentence complexity will remain compatible with other design components.
Matrix A  
Customization Examples with Usability Analysis

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Will customized documents make information more accessible and/or usable to individuals?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>To address this key question examples of customization were collected, including examples outside of print customization. This wide range of examples, from maps and clothing to postcards and magazines, allowed for greater insight into customization in the broadest sense. These examples were then evaluated on five key aspects of usability and the impact customization played in making the product easier to use.</td>
</tr>
</tbody>
</table>

Five key aspects of usability were devised based on Quesenbury’s five dimensions of usability and the ISO usability definitions covered in the research section. (See page 20)

Usefulness  The degree to which the design helps users achieve their goals.  (Value, Relevance, Helpfulness, Completeness)
Efficiency The degree to which the design facilitates speed and accuracy.  (Consistency, Visibility, Automation)
Satisfaction The degree to which the design makes users feel comfortable.  (Attractiveness, Likability, Credibility)
Forgiveness The degree to which the design prevents errors and helps recovery from those that do occur.  (Validation, Feedback, Reversibility)
Learnability The degree to which the design supports both initial orientation and deepening understanding of capabilities and content.  (Intuitiveness, Predictability, Flexibility)

Significance Evaluating customized products according to these five criteria offered insight into which aspects of usability are primarily being addressed. It became apparent that certain types of information and products used customization in more productive ways. These were the cases where customization was used to make the user’s task easier to perform. Examples like large text versions and multiple language books use versions to present information in alternate formats and focused on adding usefulness and efficiency.

In cases where the focus of customization was more for the company’s sake, usability aspects were more focused on creating relevancy to the customer (usefulness) and their needs (satisfaction). These included cases like postcard promotions and magazine covers where personal information such as the customer’s first name, address or previous purchase was the focus of customization. They were generally less successful because the degree to which they made the product more usable to the user was relatively low.

See matrices on pages 36 - 38 for examples of customization usability analysis.
Matrix A
Customization Examples with Usability Analysis

<table>
<thead>
<tr>
<th>Description</th>
<th>Usefulness</th>
<th>Efficiency</th>
<th>Satisfaction</th>
<th>Forgiveness</th>
<th>Learnability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value and completeness</td>
<td>Speed and accuracy</td>
<td>Likability and comfort</td>
<td>Error prevention and recovery</td>
<td>Intuitiveness and orientation</td>
</tr>
<tr>
<td>Satisfy Unique Needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reader’s Digest Same format and content but with larger print.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mapquest.com Highlighted routes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harry Potter Translated book</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dell Computers Hardware is mixed and matched online as desired</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Customization helped
- Tremendously
- Substantially
- Somewhat
- Not at all
Matrix A
Customization Examples with Usability Analysis

<table>
<thead>
<tr>
<th>Description</th>
<th>Usefulness</th>
<th>Efficiency</th>
<th>Satisfaction</th>
<th>Forgiveness</th>
<th>Learnability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Signage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directional wayfinding signage that is unique to individual spaces in a building</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Statement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numbers, graphs, news and advice are unique to each customer’s account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sell Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VDP Postcard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name and address, coupon amount and code, and photo are all customized based on customer profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason Magazine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personalized cover with aerial photo of subscriber’s home</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Customization helped
- Tremendously
- Substantially
- Somewhat
- Not at all
## Matrix A
### Customization Examples with Usability Analysis

<table>
<thead>
<tr>
<th>Description</th>
<th>Usefulness Value and completeness</th>
<th>Efficiency Speed and accuracy</th>
<th>Satisfaction Likability and comfort</th>
<th>Forgiveness Error prevention and recovery</th>
<th>Learnability Intuitiveness and orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalize Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music Song</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited number of preselected names replaced in the song’s lyrics</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Vanity Plates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle license plate characters are chosen as desired</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

**Customization helped**
- Tremendously
- Substantially
- Somewhat
- Not at all
Matrix B
Customization Objectives vs. Degree of Customization

<table>
<thead>
<tr>
<th>Purpose</th>
<th>What levels of customization will be appropriate in addressing user differences?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>To explore the relationship between the degree of customization and the impact of the customization, this matrix plots customization objectives against the number of possible unique outcomes. This matrix uses the examples from Matrix A and cross references the degree and purpose of customization in each.</td>
</tr>
<tr>
<td>Significance</td>
<td>This matrix provides a comparative view of customization examples in order to assess what an appropriate balance of objectives to amount of customization might be. By placing customization examples in this arrangement it is possible to see patterns in the goals of products with similar degrees of customization. This matrix also sheds light on the relationships between the degree of customization and types of information customized.</td>
</tr>
</tbody>
</table>

In the top left corner of Matrix B the products all achieve relatively useful objectives with only a few variations, such as books with several language versions or computer system customization with a limited set of choices. In the bottom right corner, the high degree of customization of the products provides relatively little actual benefit to the user. Examples include T-shirts with custom designs printed on them and magazines with personalized text and images meant simply to attract attention.

*See matrix on page 40.*
## Matrix B

### Customization Objectives vs. Degree of Customization

<table>
<thead>
<tr>
<th>Purpose of Customization</th>
<th>One Possible Customized Outcome</th>
<th>Infinite Possible Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfy Unique Needs</td>
<td><img src="example_images.png" alt="Examples" /></td>
<td><img src="example_images.png" alt="Examples" /></td>
</tr>
<tr>
<td>Provide Information</td>
<td><img src="example_images.png" alt="Examples" /></td>
<td><img src="example_images.png" alt="Examples" /></td>
</tr>
<tr>
<td>Sell Products</td>
<td><img src="example_images.png" alt="Examples" /></td>
<td><img src="example_images.png" alt="Examples" /></td>
</tr>
<tr>
<td>Personalize Products</td>
<td><img src="example_images.png" alt="Examples" /></td>
<td><img src="example_images.png" alt="Examples" /></td>
</tr>
</tbody>
</table>

### Example Descriptions

- **Satisfy Unique Needs**: Harry Potter book translations, Dell custom computers, Levi’s custom fit jeans
- **Provide Information**: Site specific wayfinding signage, merchandise labels, customized newsletter content
- **Sell Products**: Personalized car dealership postcard, Reason Magazine personalized cover
- **Personalize Products**: Jessica Simpson music with name substitutions, vanity license plate, custom graphics t-shirt
**Matrix C**  
**Design Strategies Related to User Difficulties**

**Purpose**

*Do people read documents differently? If so, what factors are influential?*

*Can differences in thinking and learning styles be mediated through customized design solutions?*

**Criteria**

To address the many different factors that influence how a product or design is used, a compilation and organization of user differences was created. Based on research sources and feedback from thesis advisors, three main sections were devised. These sections were intended to encompass the wide range of influences on usability:

<table>
<thead>
<tr>
<th>Inherent</th>
<th>Visual Impairments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inherited or developed physical and cognitive traits</td>
<td>Low Vision, Color Blindness</td>
</tr>
<tr>
<td>Learning Disabilities</td>
<td>ADD, Dyslexia</td>
</tr>
<tr>
<td>Cognitive Abilities</td>
<td>Memory, Perception, Attention Span</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learned</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquired or conditioned language or social tendencies</td>
<td>Vocabulary, Reading Level, Literacy</td>
</tr>
<tr>
<td>Culture</td>
<td>Standards, Values, Schema</td>
</tr>
<tr>
<td>Language</td>
<td>Conventions, Translation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situational</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumstantial or imposed task and environmental factors</td>
<td>Goal, Time, Past Experience</td>
</tr>
<tr>
<td>Environment</td>
<td>Lighting, Distance, Materials</td>
</tr>
<tr>
<td>Emotions</td>
<td>Attitude, Expectations</td>
</tr>
</tbody>
</table>

**Significance**

Within these broad sections in the matrices on the following pages are lists of both specific and general differences that users face or may be influenced by. Adjacent to each of these specific differences are associated aspects that may cause difficulty. Finally, the last column lists possible design strategies, obtained from research, to address the specific difficulties users may face related to inherent, learned, or situational differences.

The matrices on the following pages brings together a wide range of user differences and provides several benefits. First, it organizes them in a way that makes connections not only between similar user difficulties but shared design approaches. Secondly, this matrix provides a quick reference when making design decisions for variably customized documents.

*See matrices on pages 42 - 43.*
<table>
<thead>
<tr>
<th>Inherent Differences</th>
<th>Possible Difficulties</th>
<th>Design Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning</strong></td>
<td>Impairments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADD</td>
<td>need to learn by doing</td>
</tr>
<tr>
<td></td>
<td>Dyslexia</td>
<td>difficulty processing info</td>
</tr>
<tr>
<td><strong>Visual</strong></td>
<td>Impairments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low vision</td>
<td>legibility</td>
</tr>
<tr>
<td></td>
<td>Red/Green Color blindness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age-associated Astigmatism</td>
<td>reading small print</td>
</tr>
<tr>
<td><strong>Cognitive</strong></td>
<td>Impairments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short-Term Memory</td>
<td>trouble remembering and solving problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>difficult to focus on elements distinguishability</td>
</tr>
<tr>
<td></td>
<td>Perception</td>
<td>inability to discern details with distracting elements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>selective attention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>comprehensibility</td>
</tr>
<tr>
<td></td>
<td>Attention Span</td>
<td>limited time to get info</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learned Differences</td>
<td>Possible Difficulties</td>
<td>Design Strategies</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>comprehension</td>
<td>sentence complexity</td>
</tr>
<tr>
<td>Reading Level</td>
<td></td>
<td>grouping / clustering</td>
</tr>
<tr>
<td>Literacy</td>
<td></td>
<td>word choice</td>
</tr>
<tr>
<td><strong>Culture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventions</td>
<td>miscommunication</td>
<td>visual vs. written</td>
</tr>
<tr>
<td>Standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Values</td>
<td>offensive text/images</td>
<td>alternate text/images</td>
</tr>
<tr>
<td>Schema / Mental Models</td>
<td>different understandings</td>
<td>organize info differently</td>
</tr>
<tr>
<td></td>
<td></td>
<td>meaning names/icons use familiar metaphors</td>
</tr>
<tr>
<td><strong>Language</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Language</td>
<td>comprehension</td>
<td>information zoning</td>
</tr>
<tr>
<td>Translation</td>
<td>reading conventions</td>
<td>visual vs. written</td>
</tr>
<tr>
<td></td>
<td>readability</td>
<td>interchangeable modules</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situational Differences</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task</strong></td>
<td>previous knowledge</td>
<td>complexity of information</td>
</tr>
<tr>
<td>Content / Domain</td>
<td>amount of detail</td>
<td>amount of detail</td>
</tr>
<tr>
<td>Experience</td>
<td>interest</td>
<td>interest</td>
</tr>
<tr>
<td>Goal</td>
<td>different design needs</td>
<td>different design needs</td>
</tr>
<tr>
<td></td>
<td>learning vs. reference</td>
<td>learning vs. reference</td>
</tr>
<tr>
<td></td>
<td>entertainment vs. work</td>
<td>entertainment vs. work</td>
</tr>
<tr>
<td>Time</td>
<td>limited timeframe</td>
<td>informative headings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>content organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>progressive disclosure</td>
</tr>
<tr>
<td>Environment</td>
<td>poor / low</td>
<td>higher contrast</td>
</tr>
<tr>
<td></td>
<td></td>
<td>larger type</td>
</tr>
<tr>
<td>Lighting</td>
<td></td>
<td>less condensed layout</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>close / far</td>
<td>focal points / emphasis</td>
</tr>
<tr>
<td>Attention</td>
<td>divided / multi-tasking</td>
<td>ample negative space</td>
</tr>
<tr>
<td></td>
<td></td>
<td>typographic rules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>clear hierarchy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pattern / rhythm</td>
</tr>
<tr>
<td><strong>User (Affect)</strong></td>
<td>low motivation</td>
<td>simpler approach</td>
</tr>
<tr>
<td>Attitude</td>
<td></td>
<td>relate to interests</td>
</tr>
<tr>
<td>Expectations</td>
<td></td>
<td>more depth / complexity</td>
</tr>
<tr>
<td>Emotional State</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Matrix D
Semantic Operations

**Purpose**

The first part of the matrix on the following page looks at the elements, principles, and methods that graphic design employs and their relationship to semantic operations. Do certain graphic elements and principles lend themselves to certain operations? Which ones can be changed in multiple ways?

The second part of this matrix explores the ways in which various difficulties faced by innate, learned, and situational user differences can be changed at the most basic level. Could these user difficulties be addressed through the use of semantic operations by adding, subtracting, adjusting, substituting, or exchanging elements on a page?

**Criteria**

Each user and graphic design consideration is categorized into one of the five basic operations that can be performed upon them. These operations are:

- **Subtraction**  Taking something away
- **Addition**  Adding something new
- **Adjustment**  Changing an existing element
- **Substitution**  Taking something away and replacing it with something new
- **Exchange**  Changing positions between existing elements

**Significance**

Looking at graphic design elements, principles, and methods and how they relate to the semantic operations helps establish the ways in which they can be customized. Correlating this knowledge helps identify the shared operations between the two. By identifying the shared methods in which both of these topics can be changed, the appropriate graphic design approaches can be selected for specific user needs.

*See matrices on pages 45 - 46.*
### Matrix D

**Semantic Operations - Graphic Design Considerations**

<table>
<thead>
<tr>
<th>Elements</th>
<th>Principles</th>
<th>Methods</th>
</tr>
</thead>
</table>
| **Subtraction**  
  taking something away | Negative Space |          |
| **Addition**  
  adding something new | Emphasis  
  Typographic Rules | Redundant Coding  
  Focal Point  
  Repetition |
| **Adjustment**  
  changing an existing element | Type Size & Weight  
  Typeface  
  Colors  
  Value / Density | Similarity  
  Scale  
  Contrast | Hierarchy |
| **Substitution**  
  taking something away and replacing it with something new |          | Clustering  
  Modules  
  Information Zoning  
  Written vs. Visual Explanations |
| **Exchange**  
  changing positions between existing elements | Columns  
  Flowlines  
  Figure & Ground | Pattern & Rhythm  
  Sequence  
  Continuation, Alignment  
  Proximity | Grouping or Clustering |
<table>
<thead>
<tr>
<th>Matrix D</th>
<th>Semantic Operations - User Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inherent</strong></td>
<td><strong>Learned</strong></td>
</tr>
<tr>
<td><strong>Subtraction</strong></td>
<td>Attention Span</td>
</tr>
<tr>
<td>taking something away</td>
<td>Low Motivation</td>
</tr>
<tr>
<td>Example</td>
<td></td>
</tr>
<tr>
<td>Removing elements simplifies and unclutters the page so less attention is required.</td>
<td></td>
</tr>
<tr>
<td><strong>Addition</strong></td>
<td>Attention Span</td>
</tr>
<tr>
<td>adding something new</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td></td>
</tr>
<tr>
<td>Adding elements, like color or lines, can help point out important information.</td>
<td></td>
</tr>
<tr>
<td><strong>Adjustment</strong></td>
<td>Color Blindness</td>
</tr>
<tr>
<td>changing an existing element</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td></td>
</tr>
<tr>
<td>Changing a property of an element, like size or tone, can make it easier to read.</td>
<td></td>
</tr>
<tr>
<td><strong>Substitution</strong></td>
<td>Comprehension</td>
</tr>
<tr>
<td>taking something away and replacing it with something new</td>
<td>Misinterpretation</td>
</tr>
<tr>
<td>Example</td>
<td></td>
</tr>
<tr>
<td>Replacing text with a simpler language alternate can make it easier to understand.</td>
<td></td>
</tr>
<tr>
<td><strong>Exchange</strong></td>
<td>Cultural Conventions</td>
</tr>
<tr>
<td>changing positions between existing elements</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td></td>
</tr>
<tr>
<td>Using a language’s conventional date and time formatting promotes familiarity and helps avoid misinterpretation.</td>
<td></td>
</tr>
</tbody>
</table>
Print Customization Criteria and Applications

**Purpose**

*Which types of print materials would be viable and useful in a customized format?*

**Criteria**

Introducing variability and a usability focus to print documents offers many advantages, but also includes constraints. In order to make variable print documents focused on usability viable (cost and time effective) and useful (providing additional benefits, certain basic criteria must be met. Based upon practical considerations, the following criteria were determined to help select appropriate formats:

- **Print Artifact**
  - The final application must relate to print since Variable Data Print involves customizing print.

- **Large, Diverse Audience**
  - Productive customization requires a substantial number and an appropriately diverse range of users.

- **Task-Oriented**
  - Usability considerations focus primarily on user tasks and how design solutions help or hinder users in achieving their objectives.

**Applications**

Using the above criteria and examples from research the following lists of possible application locations, content and formats were assembled:

<table>
<thead>
<tr>
<th>Locations</th>
<th>Types of Information</th>
<th>Formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>Educational</td>
<td>Forms</td>
</tr>
<tr>
<td>Museums</td>
<td>Informational</td>
<td>Guides</td>
</tr>
<tr>
<td>Parks</td>
<td>Directions</td>
<td>Maps / Directions</td>
</tr>
<tr>
<td>Transportation</td>
<td>Reference</td>
<td>Product Instructions</td>
</tr>
<tr>
<td>Schools</td>
<td>Instructions</td>
<td>Information Brochure</td>
</tr>
</tbody>
</table>
Introduction

With research collected and analysis performed on the relationships between variable data print, usability and graphic design, the beginnings of design application could be established. Working from the initial criteria and directions explored in the final synthesis question, an appropriate application was established. Next, ideation moved into conceptualization including identifying scenarios and exploring ways to variably adjust documents with layout and design variables. Finally, all of the research, synthesis and conceptualization were combined and developed into a prototype design which was refined over several versions.

Below is an outline of the major pages within this section.

**Application Establishment**
- Three Potential Directions
- Selected Direction - Museum Guide
- Types and Elements of Guides
- Museum Selection Criteria
- List of Museums Explored
- Selected Museum - George Eastman House

**Application Conceptualization**
- Prototypical Users
- Types of Content Customization
- Reasons for Customization Choices
- Layout Adjustment Exercises
- Levels of Variability
- Fully Variable - Relative Positioning Approach
- Fully Variable - Modular Approach

**Application Development**
- Transition from Existing Museum Guide
- New Layout - Version 1
- New Layout - Version 2
- New Layout - Version 3
- New Layout - Version 4 - Equal Emphasize Layout
- New Layout - Version 4 - Modular Approach
- New Layout - Version 4 - Relative Positioning Approach
Potential Direction 1
Customs Declaration Form

Summary
Redesigning the U.S. Customs Declaration form as a variable data document would allow different methods of organizing and presenting questions to be used. Questions and data obtained would remain intact but the task of the traveler, filling out the form, would be easier and clearer. Applying VDP would involve setting up a basic grid or module framework upon which changes to layout, communication approach (simple labels, explanatory text, or imagery), and typographic variables could be adjusted.

Thesis Content
This application addresses many user differences including: visual abilities, cognitive abilities, language comprehension, multiple languages, and cultural conventions. Designs for this form would customize typographic variables like type size and weight, text/background contrast, spoken language and language complexity, levels of and choices of imagery used, amount of text in instructions/labels/descriptions, and order and arrangement of elements. To facilitate these customizations it is clear a strong, modular grid would need to be employed to help strengthen the variable spatial system.

Additional considerations that need to be addressed include how, when, and what information can and should be collected and how customization decisions influence each other and interact in the final design.

These examples of the current and previous United States Customs Declaration forms (left, center) and a previous Canadian Declaration Card (right) illustrate the content density and design approaches used for these types of documents.
Potential Direction 2
VDP / Usability Planning Guide

Summary

This direction would be a short guide in the form of a pamphlet which would take the research and synthesis thesis content and present the concepts involved in designing for usability using VDP. This application would incorporate a large amount of thesis content including user differences and elements of graphic design that are most meaningful to print customization.

The planning guide would include three sections. Section One would have meaningful groupings of user differences / usability concerns and common impediments. It would be similar to the Matrix C: Design Strategies Related to User Difficulties presented in the Synthesis section. (See matrices on pages 42-43.) Alongside this table would be illustrative examples of the difficulties and potential graphic design solutions. Section Two would be explanations of the variable data technology and design systems involved in combining multiple individual design adjustments into one final design solution. Section Three would contain existing case studies with potential VDP solutions to show how the concepts could be applied to real world situations.

Section One
Grouped user difficulties with potential design solutions and illustrative examples.

Section Two
Overview of the variable data decision model and design systems for variable elements.

Section Three
Case studies with examples of potential VDP design solutions.
Potential Direction 3
Museum Tour Guide

Summary
As both wayfinding and educational tools, museum (and other public building) guides have the potential to address the different ways people interpret, assimilate and use information. These guides, which are often used by many people of different backgrounds, must include a wide variety of content depth, choice, and presentation. A variable museum guide would not only allow text adjustments and content changes but enable building maps to be customized to the user’s specific goal.

Thesis Content
This application addresses user differences in visual abilities, spatial perception, attention and short term memory, language comprehension, multiple languages, and learning styles. It would also include considerations of environmental lighting, user interests and purpose (educational research vs. casual visit). Solutions for this guide would customize typographic variables like type size and weight, text/background contrast, written language and language complexity, choice of imagery used, amount of text in labels/descriptions, memory aides, and arrangement of elements.

A design system to customize tour guide elements with the above considerations would require an underlying grid that is flexible enough to allow for different layouts with varying relationships between informational and wayfinding elements.

This example guide from the *The National Gallery of Art* shows how a museum guide can be customized to users with specific goals, in this case someone with limited time.
Selected Direction
Museum Guides

Based upon the initial discussion of tour guides with thesis committee members, the decision to proceed with museum guides as an application format was agreed upon. In regard to addressing the criteria set in the Synthesis section (see page 47), this location and format satisfied all three constraints (print artifact, large, diverse audience and task-oriented) and included all the types of information listed on that page (educational, informational, directions and reference).

Printed Materials
Although museum guides are often in the form of either actual people, or docents, leading tours or informational audio devices, printed guides are always available for self-guided tours and are, unfortunately, often under developed. These printed guides are often either simple map guides or, on the other end of the spectrum, dense informational booklets. Thus, an opportunity to make printed self-guides more usable was identified.

Large, Diverse Audience
One of the roles museums play is that of a recreational destination and many attract a substantial number of visitors each year. As a handout used by most visitors, museum guides have large circulations, from a few hundred to several thousand copies each day. This substantial museum audience meets the minimum requirement for designing and implementing variably printed museum guides (as described on page 47) as well as making them cost effective.

Most museums are public and open to everyone and so attract a wide range of visitors. This means that anyone from children, families, seniors, students, researchers or tourists can and will visit museums. Depending on the location and type of museum an audience such as this is often culturally diverse, with many different languages, customs and backgrounds. The diversity of age, education and culture lends itself well to the variability and user-centered focus of this thesis.

Task-Oriented
Museum self-guides have a clear purpose: to help visitors move through and explore a museum. As mentioned above, museums also have a wide array of users with different abilities, as well as different motives for visiting. Some visits may be casual and others educationally-focused. Some visitors may want to see the whole museum, while others just want to see a certain aspect or section of the museum. It is easy to see how museum self-guides often need to perform many tasks. Customization is a solution that lends itself to addressing each these tasks on an individual level. It allows just the information each visitor needs or wants to be shown and can make allow this information to be presented in the best possible way.
Types of Guides

With new, variably printed museum guides as an application direction, some additional analysis of existing museum guide examples was performed. (See Appendix C for an excerpt examples collected.) From this external audit of museum guides it was determined that several types of guides exist, including audio guides, docent lead tours, simple map guides, and self-tour guides. Each of these types of guides provides various amounts of information in different ways. Interestingly, docent led tours provide the greatest customization to the visitor. Docents can adjust their tone, topics and pace depending on the group they are leading.

Through the collection and analysis of museum guides it was clear that a printed self-guide was the appropriate format. The ability of a docent to adjust their tour to the specific needs of a group demonstrated the need and ability of museum information to be customized. The various formats of self directed guides, such as brief or dense histories or backgrounds, map-based, or for specific routes showed that printed guides still had merit and range in the materials they could present. It was evident that combining these two world of docent and printed guides could address differing user needs and thus, the goals of this thesis.

Based on the examples of museum self-guides collected, the following listing shows the common components and types of information contained in these self-guides:

Elements of Self Guides

<table>
<thead>
<tr>
<th>Wayfinding</th>
<th>Maps (Basic / Factual Information)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Layout / floor plans</td>
</tr>
<tr>
<td></td>
<td>Location of amenities / exits / artifacts</td>
</tr>
<tr>
<td></td>
<td>Room labels</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Paths (Directing / Instructing / Potential Routing)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starting location</td>
</tr>
<tr>
<td></td>
<td>Descriptions of rooms / galleries</td>
</tr>
<tr>
<td></td>
<td>Directions</td>
</tr>
<tr>
<td></td>
<td>Numbers / Letters</td>
</tr>
<tr>
<td></td>
<td>Intended sequences</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational</th>
<th>Interpretive Content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Artifact highlights / points of interest</td>
</tr>
<tr>
<td></td>
<td>Commentaries</td>
</tr>
<tr>
<td></td>
<td>Text / facts about object (critical information)</td>
</tr>
<tr>
<td></td>
<td>Text about creator</td>
</tr>
<tr>
<td></td>
<td>Text about context / connections</td>
</tr>
<tr>
<td></td>
<td>Photos of objects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activities</th>
<th>Scavenger hunts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Questions and answers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Informational</th>
<th>Other Related Location Offerings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current / upcoming exhibits</td>
</tr>
<tr>
<td></td>
<td>Activities, programs, events</td>
</tr>
<tr>
<td></td>
<td>Dates / times</td>
</tr>
</tbody>
</table>
**Museum Selection Criteria**

With a clear idea of what a museum self-guide encompasses, the next step was locating an appropriate museum self-guide to redesign. A search for museums in cities within a few hours' drive was performed. From this list, on the following page, one was selected based on these criteria: proximity to Rochester, actual need for a guide redesign, existence of an appropriately diverse audience and richness and complexity of content.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Would a variably customized guide benefit the museum?</em></td>
</tr>
<tr>
<td>Format choices (paper, size, format)</td>
<td></td>
</tr>
<tr>
<td>Design decisions (layout, approach)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Audience</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Is the user base large and diverse enough to warrant a variably customized guide?</em></td>
</tr>
<tr>
<td>User range (ages, cultures, education, special needs)</td>
</tr>
<tr>
<td>Visitor goals (casual, educational, research, special interests)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Does the content lend itself to being presented in a variably customized format?</em></td>
</tr>
<tr>
<td>Diversity (collection, environment)</td>
</tr>
<tr>
<td>Information (depth, complexity, amount)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>How could this information be customized usefully?</em></td>
</tr>
<tr>
<td><em>Are there distinct enough separations in user groups for meaningful design variations?</em></td>
</tr>
<tr>
<td><em>Do opportunities exist for multiple levels of depth and presentation of information?</em></td>
</tr>
</tbody>
</table>
## List of Museums Explored

**Rochester**
- ArtisanWorks: artisanworks.net
- Cary Graphic Arts Collection: wally.rit.edu/cary
- The Center at High Falls: centerathighfalls.org
- Corning International Museum of Glass: cmog.org
- Ganondagan State Historic Site: ganondagan.org
- Genesee Country Village & Museum: gcv.org
- George Eastman House: eastmanhouse.org
- Memorial Art Gallery: mag.rochester.edu
- Mount Hope Cemetery: fomh.org
- Rochester Museum & Science Center: rmsc.org
- Seneca Park Zoo: senecaparkzoo.org
- Strong Museum of Play: strongmuseum.com
- Susan B. Anthony House: susanbantony.com

**Buffalo**
- Albright-Knox Art Gallery: albrightknox.org
- Buffalo & Erie County Botanical Gardens: buffalogardens.com
- Buffalo & Erie County Naval Park: buffalonavalpark.org
- Buffalo Museum of Science: sciencebuff.org
- Buffalo Zoo: buffalozoo.org
- Burchfield Penney Art Center: burchfield-penney.org
- Darwin D. Martin House Complex: darwinmartinhouse.org
- Hallways Contemporary Art Center: hallwalls.org
- Pedaling History Bicycle Museum: pedalinghistory.com
- University of Buffalo Art Galleries: ubartgalleries.buffalo.edu

**Toronto**
- Art Gallery of Ontario: ago.net
- Bata Shoe Museum: batashoemuseum.ca
- Design Exchange: dx.org
- Hockey Hall of Fame: hhof.com
- MZTV Museum of Television: mztv.com
- Ontario Science Center: ontariosciencecentre.ca
- Royal Canadian Military Institute Museum: rcmi.org
- Royal Ontario Museum: rom.on.ca
- St. Lawrence Market Gallery: stlawrencemarket.com
- Textile Museum of Canada: textilemuseum.ca

**Syracuse**
- Erie Canal Museum: eriecanalmuseum.org
- Everson Museum of Art: everson.org
- Museum of Science & Technology: most.org

**Albany**
- New York State Museum: nysm.nysed.gov
- Schenectady Museum & Planetarium: schenectadymuseum.org
Selected Museum
George Eastman House

The George Eastman House: International Museum of Photography and Film, was selected as the content focus for the final application because it satisfied all the requirements for an appropriate location: a large and diverse audience, depth and richness of content and opportunities to improve the current guide to better address user differences.

Audience

As an internationally known museum of photography, it serves a large and wide ranging audience, from local researchers to foreign tourists. While the museum does very well with primary and secondary school groups interested in history, film and photography, they also attract many college and university students and professors with their unique film and photography collections and preservation programs. By far the largest group served by the museum are first-time national and international visitors. Regularly changing museum exhibits, as well as weekly films at the associated Dryden Theatre also attract many local, repeat visitors.

These groups represent a large span of age, education, cultural backgrounds, familiarity with subject matter and reasons for visiting. The complete spectrum of age from small children to senior adults requires the aspects of the museum be presented in different ways and with varying amounts of detail. The span of educational backgrounds and objectives that visitors possess means that varying the choice of subjects will help visitors achieve their goals. Also, the different degrees of familiarity with these subjects means that varying their depth will be beneficial.

Content

In addition to being a historic estate, the George Eastman House also has permanent galleries and travelling exhibits, a film theatre and extensive photography, motion film and technology collections and archives. As a national landmark, the mansion and fully restored gardens allow visitors to immerse themselves in the turn of the century time period. Discovery galleries within the historic house provide further background on George Eastman’s life, the Eastman Kodak company and explanation of photography. Museum galleries in the newly added branch of the museum display world-class exhibitions of film and photography. Not only does the George Eastman House possess one of the world’s largest archives of film, photography and related technology, but it provides many educational and research opportunities with it’s collections. The museum is a great source of film and photography history.

Need

The current guide offered by the George Eastman House is quite large in size and provides a lot of information all at once. This large amount of information is dense and can be overwhelming to a casual or rushed visitor. The guide prominently features maps of the house and gardens and provides very detailed text histories of the house, garden and George Eastman. The amount and size of text may be difficult for some people to read and cause frustration or disinterest. Also, the tour sequences are hard to follow because of a lack of clear progression and illogical starting points. While smaller alternate guides with no map and less content are available in other languages, they do not compensate for main guide’s inability to address differences in visitor backgrounds and objectives. (See Appendix E to view the current George Eastman House guide.)
Prototypical Users

In order to reign in the scope of the thesis application, sets of prototypical users were established. These users represent five different typical visitors to the George Eastman House and were chosen to address many of the primary user differences as described on page 56. The first column in the matrix below displays the characteristics of each prototypical user. In the second column, specific criteria for the content and design of the brochure were chosen based on these users’ characteristics. The following page categorizes and explains how these design criteria relate to usability and graphic design problem solving.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Criteria for Design Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First-time Casual Visitor</strong></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>No content prioritization</td>
</tr>
<tr>
<td>First-time visitor</td>
<td>1-2 sentence content paragraphs</td>
</tr>
<tr>
<td>Casual visit</td>
<td>Prose text</td>
</tr>
<tr>
<td>No specific interests</td>
<td>1-2 hour timeframe</td>
</tr>
<tr>
<td>Will stay for approximately 1.5 hours</td>
<td></td>
</tr>
<tr>
<td>No special needs</td>
<td></td>
</tr>
<tr>
<td><strong>International Tourist</strong></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>Galleries and house prioritization</td>
</tr>
<tr>
<td>First-time visitor</td>
<td>1-2 sentence content paragraphs</td>
</tr>
<tr>
<td>Casual visit</td>
<td>Prose text</td>
</tr>
<tr>
<td>Interested in house and galleries</td>
<td>2-3 hour timeframe</td>
</tr>
<tr>
<td>Will stay whole afternoon</td>
<td>Written language</td>
</tr>
<tr>
<td>International (French speaking)</td>
<td></td>
</tr>
<tr>
<td><strong>Parent with Kids</strong></td>
<td></td>
</tr>
<tr>
<td>With kids (1 and 3 years old)</td>
<td>Garden, galleries prioritization</td>
</tr>
<tr>
<td>First-time visitor</td>
<td>1-2 sentence content paragraphs</td>
</tr>
<tr>
<td>Casual visit</td>
<td>Lists of bulleted content</td>
</tr>
<tr>
<td>Interested in aspects that kids will enjoy</td>
<td>1 hour timeframe</td>
</tr>
<tr>
<td>Will stay as long as kids behave</td>
<td>Easily read typeface, size, leading</td>
</tr>
<tr>
<td><strong>Teen with School Group</strong></td>
<td></td>
</tr>
<tr>
<td>Teen with school group</td>
<td>Mr. Eastman and collections</td>
</tr>
<tr>
<td>Repeat visitor</td>
<td>3-6 sentence content paragraphs</td>
</tr>
<tr>
<td>Educational visit with guided group tour</td>
<td>Activities based on content</td>
</tr>
<tr>
<td>Interested in Mr. Eastman and cameras</td>
<td>4-6 hour timeframe</td>
</tr>
<tr>
<td>Will stay whole day</td>
<td></td>
</tr>
<tr>
<td>Winter visit (gardens closed)</td>
<td></td>
</tr>
<tr>
<td><strong>Local Senior Citizen</strong></td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td>Galleries, film and photography</td>
</tr>
<tr>
<td>Local repeat visitor</td>
<td>3-6 sentence content paragraphs</td>
</tr>
<tr>
<td>Casual visit</td>
<td>Prose text</td>
</tr>
<tr>
<td>Interested in galleries and film aspects</td>
<td>1 hour timeframe</td>
</tr>
<tr>
<td>Will stay approximately 1 hour</td>
<td>Easily read typeface, size, leading</td>
</tr>
</tbody>
</table>
Types of Content Customization

Working with the design criteria for each user from the previous page, five areas of content customization were established. Accompanying each of these five areas are the reasons various aspects of the design would be changed, the type of content changes that would be performed and the semantic operations (as introduced on page 44) that could be applied.

Below, the first five aspects of design and content that will be customized are the aspects of design that do not lend themselves as easily to customization. They will be implemented on each variation and will also help address usability.

<table>
<thead>
<tr>
<th>Goals</th>
<th>Potential Changes to Content</th>
<th>Semantic Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Prioritization</td>
<td>Emphasizing</td>
<td>Sections</td>
</tr>
<tr>
<td></td>
<td>Focusing</td>
<td>Size, placement, weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Color Value</td>
</tr>
<tr>
<td>Content Depth</td>
<td>Interest</td>
<td>1-2 sentences</td>
</tr>
<tr>
<td></td>
<td>Attentiveness</td>
<td>2-3 sentences</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-6 sentences</td>
</tr>
<tr>
<td>Text Presentation</td>
<td>Accessibility</td>
<td>Prose</td>
</tr>
<tr>
<td></td>
<td>Engagement</td>
<td>Lists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activities</td>
</tr>
<tr>
<td>Adjustments</td>
<td>Readability</td>
<td>Sentence complexity</td>
</tr>
<tr>
<td></td>
<td>Comprehension</td>
<td>Tone of writing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Written language</td>
</tr>
<tr>
<td>Language</td>
<td>Legibility</td>
<td>Type (size, leading, face)</td>
</tr>
<tr>
<td></td>
<td>Visibility</td>
<td>Image (choice, style, size)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Color (contrast, value)</td>
</tr>
<tr>
<td>Overall Design</td>
<td>Ease of Use</td>
<td>Reduce visual distractions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintain adequate margins / whitespace</td>
</tr>
<tr>
<td></td>
<td>Learnability</td>
<td>Image / text relationships</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual aids (numbers, rules)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Color coding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strong underlying grid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modules / zones</td>
</tr>
<tr>
<td></td>
<td>Forgiveness</td>
<td>Redundant coding</td>
</tr>
</tbody>
</table>
### Reasons for Customization Choices

Drawing on the matrix from the previous two pages, this page gives a quick overview of how the aspects of design that are customized benefit usability. The matrix below connects the user criteria from the prototypical users and areas of content customization to each other as well as the five aspects of usability as discussed on page 35.

<table>
<thead>
<tr>
<th>User Criteria</th>
<th>Content Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effectiveness</strong></td>
<td>Time frame, Interest</td>
</tr>
<tr>
<td></td>
<td>Content depth</td>
</tr>
<tr>
<td></td>
<td>Information prioritization</td>
</tr>
<tr>
<td></td>
<td>Text presentation</td>
</tr>
<tr>
<td><strong>Usefulness</strong></td>
<td>Relevance, Emphasis</td>
</tr>
<tr>
<td></td>
<td>Content depth</td>
</tr>
<tr>
<td></td>
<td>Information prioritization</td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td>Visual Needs, Engagement</td>
</tr>
<tr>
<td></td>
<td>Text presentation</td>
</tr>
<tr>
<td></td>
<td>Adjustments</td>
</tr>
<tr>
<td></td>
<td>Language</td>
</tr>
<tr>
<td><strong>Learnability</strong></td>
<td>Overall Design</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Forgiveness</strong></td>
<td>Overall Design</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Layout Adjustment Exercise

An initial exercise was performed with simple image and text paragraphs to illustrate how design elements could be varied and adjusted. These layouts on pages 60-63 were created in order to test the initial concepts of how design elements can changed. They demonstrate how typography, hierarchy and sequencing can affect how identical content can be presented to a viewer. In the process of experimenting with these full page layouts some insight into which approaches were most successful were established. The complete set of full size examples can be found in Appendix D.

Original

This layout was established as a base from which all others were modified. It contains the basic placement and elements to be varied.
Layout Adjustment Exercise (continued)

Prioritized Content

This layout uses size and the relationships of sizes to create emphasis. Prioritized image and text sets are enlarged and the remaining sets are reduced in size.

Clear Visual Hierarchy

This layout uses size and placement to establish priority. Images for emphasized text and image sets are enlarged and placed at the top of the page, two across. The remaining sets remain the same size but with smaller columns and arranged underneath the emphasized sets.
Typographic Adjustments

This layout only changes typographic variables. Text size was increased and the typeface was changed to a serif font.

Secondary Typographic Elements

This layout adds typographic elements to group and sequence image and text sets. The rule and spacing above and below the groups signals the start and end of a group. The numbers further identify the groups as units and reinforces the top to bottom sequencing.
Levels of Variability

Having established the aspects of content that will be variable (page 58) and some design approaches to address them (pages 60-62), it was important establish how customization of the whole page could be facilitated with design. The table below was conceived to place the different levels of page variability in context in order to identify the most appropriate approach. For each level, the layout, type and images are either fixed or variable. Based on which of the three elements are variable, each level allows different semiotic operations to be performed. For example, a document at the versioned level might have a few choices of layouts each with fixed text and images.

<table>
<thead>
<tr>
<th>Layout</th>
<th>Type</th>
<th>Image</th>
<th>Possible Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Fixed</td>
<td>Variable</td>
<td>Add, Subtract, Substitute</td>
</tr>
<tr>
<td>Partially Variable</td>
<td>Fixed</td>
<td>Variable</td>
<td>Add, Subtract, Substitute</td>
</tr>
<tr>
<td></td>
<td>Variable</td>
<td>Variable</td>
<td>Exchange</td>
</tr>
<tr>
<td></td>
<td>Fixed</td>
<td>Variable</td>
<td>Exchange, Add, Subtract, Substitute</td>
</tr>
<tr>
<td>Full Variable</td>
<td>Variable</td>
<td>Variable</td>
<td>Exchange, Add, Subtract, Substitute, Adjust</td>
</tr>
</tbody>
</table>

**Fixed**

At this level, the entire design is fixed and does not change. This is the level at which most print documents function. One version is created for all users which allows for simpler production.

**Partially Variable**

At this level, text and imagery can be added, subtracted or substituted and text can be adjusted depending on the needs of users or objectives of the business. This is the level of functionality at which most VDP documents operate. It allows more relevant information to be used on an individual basis.

**Versioned**

At this level, entire design versions are interchanged. Individual text paragraphs and images are not changed independently but may be different on each version. This approach allows common differences among groups of users to be addressed.

**Fully Variable**

At this level, text and image content as well as layout can change according to individualized needs. This level of variability enables documents to adjust entire approaches to presenting content and accommodates greater variability in content.

This level of layout and content variability was chosen to proceed with since it provides the greatest possibilities in terms of design customization and is the most unexplored area of the levels.
**Fully Variable Relative Positioning Approach**

**Concept**
In this hypothetical design approach to creating fully variable documents, each page component, such as an image or block of text, would retain its relative position to others regardless of adjustments to itself. To achieve this, components must respond to changes in adjacent ones. For example, if a component was emphasized by enlarging the space occupied on the page, its relative location on the page would stay the same and surrounding components would get smaller or move over.

**Strengths**
This approach would allow individual components to be adjusted without having to adjust the whole page layout or sequence. It offers the potential for greater freedom in customizing individual parts.

**Weaknesses**
In order to implement this approach, sophisticated software would need to be used to control how surrounding components are affected by changes to individual components. This becomes even more complex when multiple components are adjusted and both affect a shared adjacent component.

The concept sketch above shows how as one component is enlarged to require more space on the page, surrounding elements adjust accordingly. In the left example all components are equal. In the center and right examples one, then two components cause the rest to resize.
Another hypothetical design approach to creating fully variable documents is by implementing interchangeable modules. Each module, or group of components, would have a set size and basic compositional arrangement that would only fit into predetermined locations on the page. Each of these module locations could either allow modules with different presentations of the same information to be used or modules with different content altogether. Depending on which of these approaches was used, a design could facilitate content prioritization or content customization.

This approach lends itself well to setting up and dividing information zones on the page, thereby allowing certain types of content to fit into predetermined locations. It also enables each module to vary independent of other modules.

While this approach enables independent adjustments within each module without affecting other modules, it also requires each module to be created in advance. It would also be necessary to plan how the modules would visually interact when placed in certain combinations in the final design.

The concept sketch above shows how modules with different layouts and content could be placed in predetermined locations on the page.
Transition from Existing Museum Guide

The first step taken in redesigning the existing George Eastman House museum guide was transferring the content from the existing 16” x 24” guide to the smaller 12” x 18” printing size necessary for this thesis application. (See conversation with John Eldridge, page 16.)

In order to determine if the amount of content from the existing guide could feasibly fit onto the new paper size existing guide content was reduced by 75% and arranged on a 12” x 18” sheet. It was determined that the photos that were still useful at this reduced size but that the smaller text was difficult to read. To remedy this full size text was used and with the reduced images.

This process of arranging existing elements on a smaller size paper revealed that amount of text would need to be reduced, unnecessary images would need to be removed and that the four different maps used in the existing guide would need to condensed into one detailed map.

See Appendix E for a larger, complete version of the existing George Eastman House museum guide.
New Layout
Version 1

Format
After establishing that most of the content from the original brochure would plausibly fit on an 12" x 18" sheet, ideation continued using this paper size. In order to accommodate the largest map possible the brochure remained a horizontal trifold.

Layout
To facilitate a sequential tour order, the inside spread divided each panel of the brochure into two columns. In this way every garden and room could be placed in their own columns and be sequenced from left to right. This version does not implement any customization and has fixed content with fixed locations. The house and gardens are emphasized on the inside spread and the inside front panel briefly lists all the activities available at the George Eastman House.

Imagery
The front cover uses the same photo from existing brochure thought with a more vertical crop. This photo appropriately represents the historic and photographic subject matter of the George Eastman House. On the inside, a single detailed map was selected and enlarged to reduce the number of maps. On the back cover two photos were selected to help show what is offered at the museum. The remaining images from the existing brochure were excluded.

Color
The green and orange-red colors used in the existing map were used as color bands to designate and highlight the location of text relating to the garden and house respectively.

Typography
A transitional typeface, Optima, was used for titles, subtitles and body text for added readability. The nine point text was easily read and fit comfortably within the three inch columns.
New Layout
Version 2

Format
This version uses the same 12" x 18" horizontal trifold format as the previous version.

Layout
This version implements a modular approach to each topic within the museum. Using the same two columns per panel, a system of single, double and triple column sections was used to place emphasis on certain topics. Each topic (Garden Tour, House Tour, Galleries, Film and Photography, George Eastman, and Families and Kids) is then given a weight based on its importance to the user and placed into the section corresponding to its importance. The greatest emphasis section with three columns was positioned in a more central location to command more attention. Colored title bars were placed at the top of each section to easily identify their beginning and end.

Imagery
Images were situated directly under the title bars to help identify and reinforce the topic of each section. A photo that shows both the historic architecture of the house and the full splendor of the garden was selected for the cover.

Color
The color palette from the previous version were extended to include a royal blue often used in George Eastman House collateral and a magneta used in many of their promotional brochures.

Typography
This version continued to use the Optima typeface but increased the contrast between the type sizes of the titles and subtitles.
New Layout
Version 3

Format
This new set of layouts uses the same 12” x 18” size but was changed to a vertical trifold format. This was done to move the map to the inside panel thereby freeing more space for text on the inside spread.

Layout
This was the first version to implement three separate layout approaches. An equal emphasis approach in which each section is displayed and given equal space on the page. A modular approach similar to the previous version where sections with greater emphasis are given more columns, instead of rows, and again placed more centrally on the page. Finally, a relative position approach was used. The sections emphasized on this approach are given more space and affect the size of the other sections.

Imagery
Similar to the previous version, images were placed directly under the title bars to help identify and reinforce the topic of each section. Each section in all of these versions have the same number and sizes of images. The relative positioning approach reduced the image size for de-emphasized sections.

Color
Further extending the previous four color palette (green, orange-red, royal blue and magenta) were teal, olive green and yellow-orange colors to represent the Galleries, George Eastman and Families and Kids sections respectively. Also implemented in the relative positioning approach was the use of color screens to help emphasize sections by giving them more visual weight.

Typography
In this version the typeface was switched to Microsoft’s new serif typeface, Constantia, to further increase readability.
New Layout
Version 4 - Equal Emphasis Layout

Format
This version uses the same 12” x 18” vertical trifold format as the previous version.

Layout
Implementing a grid of six units across and nine down (see right layout below), the equal emphasis layout used one grid for each section photograph, two for the color title bar and six units for the section text. This allowed more space and a wider column for section text. The color title bars were then also used for supplemental information.

Imagery
A single image was used to represent and help identify each section. Colors now correspond to rooms and spaces on the map.

Color
The six colors used in the previous version were refined to match similar colors used as variations for the logo on the museum’s website. These adjusted colors were brighter and more distinct from each other.

Typography
A sans serif typeface, Univers, was implemented to reflect the typeface used in the George Eastman House logo and give the guide a more contemporary look while still retaining its readability.
New Layout
Version 4 - Modular Approach

Format
This version uses the same 12” x 18” vertical trifold format as the previous version.

Layout
Implementing a grid of four units across and six down (see right layout below), this modular layout used a horizontal set of twelve, eight, and four units for the three levels of section emphasis. The width of these units easily accommodated columns and helped dictate where text was placed and how it flowed within the sections. Like the previous version, sections are interchangeable and placed according to emphasis.

Imagery
The number of images used for each section decreases with the declining emphasis of the sections. In addition, numbers corresponding to the subsections of each section were placed on each image if a representative image was shown.

Color
This version uses the same six colors and also uses them to color code the areas on the map. In addition to the numbered images, numbers also label where each subsection is on the map.

Typography
A serif typeface, Constantina, was implemented on this version as a potential typeface for users with low vision.
New Layout
Version 4 - Relative Positioning Approach

Format
This version uses the same 12” x 18” vertical trifold format as the previous version.

Layout
Implementing the same grid of four units across and six down (see right layout below), this relative positioning layout allocated either two or eight units depending on a section’s emphasis. This allowed much more content in the emphasized sections and much less content in the de-emphasized sections.

Imagery
Two images were used for emphasized sections and half-sized images were used in de-emphasized sections. The two images helped provide more information for the emphasized sections and the half-sized images helped to de-emphasize the smaller sections.

Color
This version also uses the same six colors and again used them to color code the areas on the map. No numbering of images or subsections on the map were implemented on this version. Color screens were again used to further emphasize the larger sections.

Typography
The typeface Constantina was used on this version as a potential typeface for visitors with low vision.
Overview

The purpose of this intermediate evaluation was to test the helpfulness and appropriateness of the current ideation models shown on pages 70-72. Three sets of questions were posed. The first set of questions related to practical and technical issues such as the choice of size and format as well as typographic decisions. The second set of questions focused on visual and aesthetic concerns such as whether the approaches to prioritizing content were successful and referencing between them map and text easy. The third set of questions concerned the clarity of meaning and the communicative success. These questions endeavored to determine if images were used effectively and whether the different amounts of text were appropriate. Through these questions it was possible to evaluate the differences among the two VDP approaches, relative positioning and modular. These questions also helped determine if the graphic design decisions and ways in which usability was addressed were also successful. Because these questions related to overall approach issues only a single set of versions was used, that of the first-time adult visitor. Together with the questionnaire, the two versions helped obtain constructive feedback.

Audience & Location

The audience for this project is very diverse. It includes people of many ages, cultures and backgrounds with different needs, interests and objectives. To survey this wide audience in a reasonable time frame, the Student Alumni Union on campus at the Rochester Institute of Technology was selected. The large volume of students, faculty, and visitors that pass through this building provided the needed variety of evaluators.

Evaluation Procedure

Each participant was given a single page questionnaire and asked to answer the questions based on two sample designs presented to them (shown on pages 75-76). First, they filled out the evaluator background section on the questionnaire which collected information about their age, occupation and whether they had children. It also asked questions related to the George Eastman House, such as whether they had visited it, how many times they had visited, and which aspects they would be interested in learning about. Next, they were shown the two versions of the guide, the relative position approach and the modular approach, and asked to answer a series of questions for each version.

The following pages display a sample questionnaire form, the two versions of the guide that were used and the results of the survey.
George Eastman House Brochure Evaluation

Evaluator Background and Interests

<table>
<thead>
<tr>
<th>Age: _____</th>
<th>Occupation: ___________________________</th>
<th>Do you have children?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you visited the George Eastman House?</td>
<td>Yes</td>
<td>No</td>
<td>If Yes, how many times: __________</td>
<td></td>
</tr>
<tr>
<td>Length of time typically spent at museums:</td>
<td>1-2 hours</td>
<td>2-3 hours</td>
<td>4-6 hours</td>
<td></td>
</tr>
</tbody>
</table>

Pick TWO aspects of the George Eastman House you would be interested in learning more about:

- House
- Gardens
- George Eastman
- Galleries
- Archive & Collections
- Family

Brochure Evaluation

*Please fill in your responses to the following statements based on the two layouts you have reviewed.*

<table>
<thead>
<tr>
<th>Practical / Technical</th>
<th>Version A</th>
<th>Version B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The text size, font and spacing is easy to read.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2 Opening and using the guide is logical.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3 The size and format is easy to use.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Comments / Suggestions:

<table>
<thead>
<tr>
<th>Visual / Aesthetic</th>
<th>Version A</th>
<th>Version B</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Text columns and margins feel comfortable.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5 Cross referencing between text and map is easy.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6 Approach to prioritizing interests is effective.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Comments / Suggestions:

<table>
<thead>
<tr>
<th>Meaning / Communicative</th>
<th>Version A</th>
<th>Version B</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Selected imagery helps reinforce written text.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8 Expanded text on select interests is valuable.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9 Amount of text is appropriate.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

10 Which version do you feel was more successful?

- A
- B

Comments Overall?
Intermediate Evaluation

**Version A (continued)**

*Inside Three-panel Spread*

---

**Gardens**

The history, architecture and horticulture of the landscape during George Eastman’s period of ownership (1902 - 1932) are being carefully preserved, conserved, and interpreted for the public by museum staff, volunteers and docents. Garden tours are offered daily, May through September.

**George Eastman**

As the founder of Eastman Kodak Company, he is heralded as the father of popular photography and inventor of motion-picture film. During his life Eastman donated more than $100 million to education and charities around the world. Learn more at the George Eastman Archive and Study Center on the second floor of the historic house.

**Galleries**

**Brakett Gallery**

**DARFUR/DARFUR**

Jan 20, 2007 - Apr 22, 2007

Genocidal conflict in Darfur, Sudan has resulted in the death or injury of more than 400,000 civilians since 2003. In partnership with the DARFUR/DARFUR organization, this large-scale, multimedia exhibition depicts the crisis and placing the atrocities occurring in Darfur in context with its vibrant, courageous people...

**Entrance Gallery**

**Ghosts in the Landscape: Vietnam Revisited**

Feb 17, 2007 - May 20, 2007

George Eastman House presents Ghosts in the Landscape: Vietnam Revisited, an exhibition of 40 prints by ex-combat marine and photographer Craig L. Barber. Now recognized as one of today’s premier platinum printers, Barber spent twenty months in Vietnam as an 18-year-old, rarely knowing exactly where he was or the logic of what he was being told to do.

**South Gallery**

**Voices from South of the Clouds**


George Eastman House will transport visitors to the Yunnan Province of China via the exhibition Voices from South of the Clouds, on view March 3 through May 28, 2007. The display of more than 30 color photographs taken by the local people (many of whom had never used a camera) — all using Kodak cameras and film — also features accompanying first-person stories...

**Mees Gallery**

**Machines of Memory: Cameras from the Technology Collection**

May 1, 2005 - Jan 1, 2010

“All the things the public most wants to see from the technology collection,” that’s how Technology Curator Todd Gustavson describes this exhibit of photographic highlights from camera obscuras through digital imaging designed to show the evolution of photography as well as it’s revolutions.

**House**

**Dining Room**

This room has been restored to the original carved, lime-washed oak walls, oak parquet floor and elaborate plaster strapwork ceiling. It also features a fireplace mantel with Argand lamps, original mahogany table and chandelier.

**Conservatory**

This is a room of grand proportions with limestone walls and marble floors. The elephant head is a replica of the original head from Mr. Eastman’s 1926 safari. Hidden behind the lettucework on the upper floors of the house are the pipes for an Aeolian pipe organ.

**Billiard Room**

This room highlights are teak paneling and butterfly joints in the teak floor, and the raised platform for watching billiards and storage. Details include rounders on the windows representing modes of transportation at the turn of the last century.

**Library**

This room has many decorative touches including carved printers’ mark details on doorways and wooden plaques of a lion and a rhinoceros over the doors. Mr. Eastman’s card catalogue system appears on the letters and numbers on the shelves, and his ivory, bone, and wood netsuke collection is displayed in a case on the wall.

**Hall**

The hall’s grand mahogany staircase has spindle designs reminiscent of ship’s ropes. Its oculus (oval opening) reaches to the third-floor skylight. The hall also features original torchères with reproduction aurene glass and the original sofas, pier table, and grandfather clock.

**Living Room**

This room is a marble mantel, an oak floor, and wall coverings of silk damask. The living room features the original Stainway piano, the original center table with French-polish finish and corner ceiling medallions representing the four seasons and paintings.

**Bedroom**

This second floor room with adjoining closet and bathroom was used by Mr. Eastman’s mother, Maria Kilbourn Eastman. The moat feminine room in the house, the bedroom has a movable chival mirror and displays personal items, such as her comb, jewelry, prayer book, andshawl.

**Film and Photography**

**Traveling Exhibitions**

One aspect of George Eastman House’s mission is to share our collections through traveling exhibits. We are fortunate in that our photography collection has great depth and breadth encompassing the entire history of the medium. Eleven of our offered exhibitions are completely from our collections.

**Families and Kids**

Our family visitors are important to us and we offer many opportunities specific for our young visitors. See the list to the right and feel free to inquire further at the front desk. Be sure to include the Garden Tours, Mees Gallery, Discovery Room & Galleries, and Museum Store and Cafe in your plans.
Intermediate Evaluation

Version B (continued)

Inside Three-panel Spread

House

House Tours
Tues - Sat, 10:30 am and 1:30 pm
Sun, 3:00 pm

1 Dining Room
This room has been restored to the original carved, lime-washed oak walls, oak parquet floor and elaborate plaster strapwork ceiling. It also features a fireplace mantel with Argand lamps, original mahogany table and a chandelier with replica incandescent filament bulbs. Mr. Eastman installed a safe for storing silver and china.

2 Conservatory
This is a room of grand proportions with limestone walls and marble floors. The elephant head mounted on the wall is a replica of the one from Mr. Eastman’s 1928 safari. The extensive iron grillwork was designed by Samuel Yellin and behind the latticework on the upper floors are the pipes for an Aeolian pipe organ.

3 Billiard Room
This room is notable for its teak paneling and butterfly joints in the teak floor, the blanket chest on the far wall, and the raised platform for watching billiards and storage. Details include the photos of Mr. Eastman and his mother on the mantel, and rounders on the windows representing modes of transportation at the turn of the last century.

4 Library
This room has many decorative touches including carved printers’ mark details on doorways and wooden plaques of a lion and a rhinoceros over the doors. Mr. Eastman’s card catalogue system appears on shelves, and his ivory, bone, and wood netsuke collection is displayed in a case on the wall.

5 Hall
The hall’s grand mahogany staircase has spindle designs reminiscent of ships’ ropes. Its octagon oval opening reaches to the third-floor skylight. The hall also features original torchieres with reproduction aurene glass and the original sofa, pier table, and grandfather clock.

6 Living Room
This room has a marble mantel, an oak floor, and wall coverings of silk damask. The living room features the original Steinway piano, the original center table with French-polish finish and corner ceiling medallions representing the four seasons.

7 Bedroom
This second floor room with adjoining closet and bathroom was used by Mr. Eastman’s mother, Maria Kibour Eastman. The most feminine room in the house, the bedroom has a movable chival mirror and displays personal items, such as her comb, jewelry, prayer book, and shawl.

More to Explore

Garden Tours
A walking tour discusses the plants and design of the restored gardens that reflecting Eastman’s love of horticulture.

Tues - Sat, 11:30 am & 3 pm
Sun, 3 pm from May - September

George Eastman
As the founder of the Eastman Kodak Company, he is heralded as the father of popular photography and inventor of motion-picture film.

George Eastman Archive and Study Center
Located on the second floor of the house, the center stores and makes accessible Mr. Eastman’s personal artifacts, collections and memorabilia.

Archive & Collections
The Eastman House has one of the worlds largest collections of film titles, photo negatives and related photographic technology.

Learn more about opportunities to access the collections by inquiring at the front desk.

Families and Kids
Our family visitors are very important to us and we offer many opportunities like the Garden Tours, Mees Gallery, the Discovery Room and our Store and Cafe.
## Evaluation Results

### Practical / Technical

<table>
<thead>
<tr>
<th></th>
<th>Version A</th>
<th></th>
<th>Version B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The text size, font and spacing is easy to read.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Opening and using the guide is logical.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>The size and format is easy to use.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

*Overall brochure is very bulky.*

*Very large brochure.*

*Pamphlet is too large.*

### Visual / Aesthetic

<table>
<thead>
<tr>
<th></th>
<th>Version A</th>
<th></th>
<th>Version B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Text columns and margins feel comfortable.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Cross referencing between text and map is easy.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Approach to prioritizing interests is effective.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

*A looks more attractive as a whole but B makes more sense to read.*

*B reads better with the trifolds.*

*I like the number approach on Version B.*

*The numbers on version B were useful.*

*Numbered map on the same page works better.*

*A flows easier but B’s map is better.*

*Map is hard to relate in A.*

*Make colored backgrounds darker on use on all sections.*

*Use screens on B?*

*Take numbers off of images.*

*Thin black line bothered me.*

### Meaning / Communicative

<table>
<thead>
<tr>
<th></th>
<th>Version A</th>
<th></th>
<th>Version B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Selected imagery helps reinforce written text.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Expanded text on select interests is valuable.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Amount of text is appropriate.</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*A little more info about other areas might be nice.*

### Which version do you feel was more successful?

<table>
<thead>
<tr>
<th></th>
<th>Version A</th>
<th></th>
<th>Version B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Which version do you feel was more successful?</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>A</td>
<td>13</td>
</tr>
</tbody>
</table>
Evalution Analysis

The range of the eighteen evaluators ended up being much narrower than expected. The age range of evaluators was between 18 and 23 years old. Also, the evaluators were all primarily students. Eight evaluators had previously been to the George Eastman House a single time and one evaluator had been six times. Ten evaluators said they typically spend two to three hours at museums, six responded one to two hours and two responded four to six hours. The most popular choices for areas of interest at the George Eastman House in order from highest responses to lowest were the galleries, the historic house, the archives and collections, the gardens and finally George Eastman.

Based on the responses to the questionnaire, a few aspects if the guides were identified as needing improvement. First, many evaluators found both versions of the 12”x18” guides to be too large. Second, many evaluators found the text columns and margins in version A to be slightly uncomfortable and the text columns and margins in version B to be fine. Some evaluators also found version A to be less logical to open and use than version B and quite a few did not find cross referencing between text and the map easy in version A. For both versions, evaluators found the expanded text on selected interests valuable but some still felt the amount of text in other areas to be lacking. Version B received great praise for its approach to prioritizing through placement within the guide and its use of numbers to connect specific areas to the map. It was apparent from the results, comments and answers on the final question, that version B, the one that used the modular approach, was the more successful method of implementation.

Significance

This intermediate evaluation provided a clear indication of which approach to addressing usability with a variable design was more successful. It also provided insight into what a subset of visitors to the George Eastman House would value in a museum guide. The lack of a diverse set of evaluators and the time and motivation constraints of the evaluation would need to be addressed in order to make this evaluation a credible source of results.
Introduction

The final implementation of this thesis application is the result of continued refinement based on comments and suggestions from thesis committee members and the participants of the intermediate evaluation. It used the most successful design approach, the modular version, and improved on design, usability and variable data print aspects. Below are the overall design modifications made to the modular layout approach used in the intermediate evaluation. (See page 77-78.)

Design Modifications

The first decision made was to implement the modular approach. An overwhelming response from the intermediate evaluation agreed that this approach was more successful than the relative positioning one. The modular approach allowed the map to be positioned on the top of the three panel inside spread which made referencing easier from both the inside spread and folding panel.

The second decision was to address the concerns from evaluators that the guides were too large and awkward to handle. This was easily remedied by changing the paper size to 11”x17”. Surprisingly, adjusting the design to fit this smaller space was easily accomplished, perhaps in part due to a change described in the next paragraph.

Although most readers found the 11 point body type with 15 point line spacing easy to read it was apparent from observation that the average user did not need text this big. In an effort to allow more space for content and improve the rags in the small columns, the type size was reduced by one point size.

One aspect that was encouraged in the early stages of ideation by advisors and was found very successful in the modular version, was the use of corresponding numbers on the map for each part of a content section. Evaluators found this helped them refer between text descriptions and map locations. Evaluators also found that having the map always visible no matter which content section they were looking at, as was done in the modular version and not the relative positioning version, made using the guide easier.

Final Designs

With these changes implemented, three iterations of the modular design approach were created. Each iteration shows how a prototypical visitor’s interests and needs are met through this thesis application. The choice to use these specific prototypical users was made because the combination of traits was sufficient to show most major concepts developed in this thesis.

The following pages are the final designs with descriptions of each visitor and the rationale behind the design decisions.
Final Design - Visitor 1

Characteristics
First-time, casual adult visitor
Will stay the whole afternoon.
Interested in house and galleries.

Design Decisions
Use normal type size and leading.
Use prose text with 1-2 sentence content descriptions.
Prioritize house and gallery content.

Implementation

Front Cover

Back Cover

Visit the House Open every day in May with all day 10 am–5 pm hours at week.
Closed Thanksgiving and Christmas.

Store
Offers books on photography, motion pictures, and gardening as well as jewelry, posters, toys, and collector gift items.

Cafe
Serves gourmet baked goods and a rotating menu of tempting soups and sandwiches.

Handicapped Accessibility
George Eastman House is fully accessible to everyone. Wheelchairs and handheld hearing devices are available on request. Programs may be signed for the deaf and hard of hearing with one week's notice.

George Eastman House is supported with public funds from the New York State Council on the Arts, a State agency; the Institute of Museum and Library Services; the National Endowment for the Arts; the County of Monroe and with private contributions from individuals, corporations, and foundations.
Final Design - Visitor 1 (continued)
Implementation

Final Design - Visitor 1 (continued)

House Tours
Tues.-Sat. 10:30 am and 1:00 pm
Sun. 1:00 pm

Dining Room
This room has been restored to the original carved, lime-washed oak walls, oak parquet floor and elaborate plaster stripwork ceiling. It also features a fireplace mantle with Aigard lamps, original mahogany table and a chandelier with replica incandescent filament bulbs.

Conservatory
This is a room of grand proportions with limestone walls and marble floors. The elephant head mounted on the wall is a replica of the one from Mr. Eastman’s 1859 salon. The embossed iron grillwork covers one wall and behind the lattice work on the upper louver are the pipes for an electric pipe organ.

Hall
The hall’s grand mahogany stairway has panel designs reminiscent of English peer, the oval mirror and the mahogany floor. The hall also features original bookcases with reproduction inlay glass and the original sofa, table, and grandfather clock.

Billiard Room
This room is highlighted by the paneling and butterfly prints on the walls. The billiard room’s original chandelier, the original sideboard, the marble and mahogany table representing the four seasons.

Library
This room has many decorative touches including carved printers’ mark details on doorways and wooden plaques of a lion and a rhinoceros over the doors. Mr. Eastman’s bird collection system appears on shelves, and his ironing board, and wood netsuke collection is displayed in a case on the wall.

Bedroom
The second-floor room with adjoining closet and bathroom was used by Mr. Eastman’s mother, Marie-Victoire Eastman. The bedroom has a movable chaise longue and displays personal items such as hair comb, jewelry, prayer book, and sheets.

Garden Tours
A walking tour discusses the plants and design of the restored gardens featuring Eastman’s love of horticulture. May–September
Tues.-Sat. 11:30 am and 3 pm
Sun. 3 pm

George Eastman
As the founder of the Eastman Kodak Company, he is heralded as the father of popular photography and inventor of motion-picture film.

George Eastman Archive and Study Center
Located on the second floor of the house, the center stores and makes accessible Mr. Eastman’s personal archives, collections, and memorabilia.

Archive & Collections
The Eastman House has one of the world’s largest collections of films, photographs, and related photographic technology. Learn more about opportunities to access the collections by inquiring at the front desk.

Families & Kids
Our family visitors are very important to us and we offer many opportunities like the Garden Tour, Movie Gallery, the Discovery Room and our Shop and Cafe.
Final Design - Visitor 2

Characteristics
Parent with kids
First-time visitor
Will stay a short time.
Interested in aspects that kids will enjoy.

Design Decisions
Use normal type size and leading.
Use lists of facts with short length content descriptions.
Prioritize gardens and gallery content.
Final Design - Visitor 2 (continued)

Northeast Garden

Rock Garden
- Based on original garden
- Reconstructed using photos (c. 1920)
- 254-foot grape arbor
- Orange, yellow, and orange-yellow flowers

Garden Tour
- Thu - Sat, 11:30 am & 1:00 pm
- 45 min, $10 per person

Inside Spread
Top Panel

Inside Front Panel

Schuyler C. Townsend Terrace Garden
- Restored to 1912-1922 era design
- Atrium formal garden
- Formed primarily with perennials
- Contains 90 varieties of plants
- Provides color from spring to fall

East Vista
- Enhances the length of the property
- Informal, naturalistic planting
- Mixed shrub border
- Eye-catching backdrop

Library Garden
- Cul-de-sac garden
- Hedges planted to add color blocks
- Benches on 1921 garden stages
- Porch garden on top of an underground Avenue archive

Front Lawn
- Originally a woodland drive
- Rehabilitation in 1909
- 29 new trees and 320 new shrubs
- Bluestone walk and brick accents

West Garden
- Original wisteria vines
- Original arbors from Ettman's time
- Restored walkways and bed designs

Garden Tours
- Thu - Sat, 11:30 am & 1:00 pm
- 45 min, $10 per person

Top Panel

Front Panel
Our family visitors are important to us. We'd like to suggest some ways to enhance your visit.

**Mees Gallery**
- A Machine of Memory: Cameras from the Technology Collection
- May 1, 2009 – Jan 1, 2010
- All the things the public most wants to see from this collection.
- Includes photographic highlights from camera obsessions through digital imaging
- Designed to show the evolution and revolutions of photography.

**Ntozow Collection Store**
- Offers a variety of children's books and toys
- Our staff would be happy to show you what's available.

**Cafe**
- No visit would be complete without a visit to our Cafe.
- Soups and salads
- Sandwiches
- Cakes, cookies and pastries.

**Historic House**
- Explore Eastman's Colonial Revival home and learn about Eastman's unique and beloved estate.
- The 35,000 square-foot house
- 37 bathrooms, 9 fireplaces
- Cost $300,000 to build
- Eastman left his estate to the University of Rochester.
- A national landmark.
- Short, remodeled museum
- Be sure to visit all the fully-restored rooms including: Dining Room, Conservatory, Billiard Room, Library, West Living Room, and the Bedroom.

**Discovery Galleries**
- On the second floor of the house.
- Contains several informational and interactive galleries that explore and explain many topics including:
  - George Eastman's life
  - Eastman Kodak company
  - Photography and Camera.

**More to Explore**

**Galleries**
- Nearly 100 galleries and display areas host a wide variety of changing exhibitions from the Museum’s collections as well as from other museums around the world.

**Gallery Talks**
- Tues - Sun, 1:15 pm

**George Eastman**
- As the founder of the Eastman Kodak Company, he is heralded as the father of popular photography and inventor of motion picture films.

**George Eastman Archive and Study Center**
- Located on the second floor of the house, the center's stores and makes accessible Mr. Eastman's personal artifacts, collections and memorabilia.

**Archive & Collections**
- The Eastman House has one of the world's largest collections of film artifacts, press materials, and related photographic technology.
- Learn more about opportunities to access the collections by inquiring at the front desk.
## Final Design - Visitor 3

**Characteristics**
- Senior, repeat visitor
- Will stay an hour.
- Interested in film and galleries
- Uses reading glasses.

**Design Decisions**
- Use large type size with extra leading.
- Use prose text with 3-6 sentence content descriptions.
- Prioritize film and gallery content.
Final Design - Visitor 3 (continued)

Galleries

Gallery Talks
Tues - Sun, 1:15 pm

Entrance Gallery
Ghosts in the Landscape: Vietnam Revisited
Feb 17 - May 20, 2007
An exhibition of 40 prints by ex-miitary
and photographer Craig J. Barber.

Meiss Gallery
 Machines of Memory: Cameras from the Technology Collection
May 2005 - Jan 2010
A photographic exhibit of
treasures from camera
in the context of its
vignetted and courageous
people.

South Gallery
Voices from South of the Clouds
Mar 3 - May 20, 2007
A display of more than
300 color photographs
taken by the local people
from the Yunnan Province
of China all using Kodak
cameras and film.
Implementation

Final Design - Visitor 3 (continued)

Inside
Three-panel Spread

Film and Photography

1. Photography Collection
   This collection includes more than 400,000 photographs and negatives dating from the invention of photography to the present day. More than 14,000 photographers are represented in the collection, including virtually all the major figures in the history of the medium. The collection includes original vintage works produced by nearly every process and printing medium employed.

The Gannett Foundation Photographic Study Center, is open by appointment, Tues - Fri, 10 am to noon and 1 to 4 pm. Please call (605) 271-3361 x499.

2. Motion Picture Collection
   This collection, one of the major moving image archives in the United States, was begun in 1949 by the first curator of film, James Card (1915-2000). His vision, clarity, and persistence helped to establish the holdings of over 25,000 rolls and a collection of stills, posters and papers with over three million artifacts.

The Film Study Center is open for questions and researchers, Tues - Fri, from 10:00 am - 4:30 pm.

3. Technology Collection
   One of the world’s largest collections, it contains nineteenth- and twentieth-century objects of photographic technology, including cameras, processing equipment, motion picture devices, and a broad range of early historical accessories.

The Dryden Theatre presents screenings all year round, and over the years has hosted hundreds of visiting artists.

The collection can be accessed Tues - Fri, 10 am - 5 pm. For appointments, call (605) 271-3361 x269.

More to Explore

Garden Tours
From May - September tours are offered Tues - Sat, 11:30 am & 3 pm and Sun, 3 pm

House Tours
All year round tours of Eastman’s Colonial Revival house are offered Tues - Sat, 10:30 am & 2 pm; Sun, 2 pm

George Eastman Archive and Study Center
Learn more about George Eastman at this study center located on the second floor of the house.

Families and Kids
Our various offerings for families include the Garden Tours, Meiss Gallery, the Discovery Room and our Stors and Cafe.
During the Winter Quarter, a Powerpoint presentation was shared with the design faculty and first-year graphic design MFA students. It included content related to project definition, precedents, research, synthesis and some ideation. (See Appendix F for full presentation.)

For this presentation it was important to introduce new viewers to the two main topics of this design thesis, Usability and Variable Data Print, in a succinct yet comprehensive way. The presentation not only helped form clear summaries of the main topics but prioritized key examples and organized synthesis matrices into presentable formats. This aided with the writing of this thesis document.

During the early Spring Quarter, an exhibition was installed in the Bevier Gallery on the Rochester Institute of Technology campus. A set of large presentation panels summarized and explained the key components of this thesis and included preliminary ideation and application content. This presentation took near final research and synthesis work and translated it into a condensed yet thorough form that could be understood by viewers new to the material. (See Appendix G for exhibit panels.)

In the process of creating this exhibit and establishing design and content for the system of panels, thesis research became even more clear and connections between topics further solidified. Overall the exhibit helped develop the thesis into ideation and implementation as well as share the content to a broader audience.
After completion of this thesis study, the design concepts and application could be condensed and presented in the form of an article or whitepaper. Potential audiences for these publications would be in the usability and variable data printing fields.

**Usability Field**

Connecting the two fields of usability and graphic design as explicitly as this thesis has done enlightens both designers and project managers to the impact good design has on usability. The role that customization can play in addressing usability is also explored by this thesis and could be a key aspect of an article published in this area.

**Journal of Usability Studies**

[www.usabilityprofessionals.org/upa_publications/jus/](http://www.usabilityprofessionals.org/upa_publications/jus/)

This peer-reviewed, online publication promotes the practice, research and education of usability engineering. An article published in this journal would reach a large, international audience. The article would focus on the feasibility and value of how design and customization can address usability in printed documents.

**User Experience Magazine**

[www.usabilityprofessionals.org/upa_publications/user_experience/](http://www.usabilityprofessionals.org/upa_publications/user_experience/)

This magazine publishes articles dealing with the broad field of usability and the user experience. It provides an ideal avenue for sharing this thesis because it would reach industry professionals focused on one of the key topics of this thesis, usability. An article published in this magazine would draw attention to how graphic design and customization can be instrumental in aiding usability.

**Printing Industry**

The exploration of print customization in this thesis would be relevant to the digital printing industry. As businesses and manufacturers continue to strive for profits and added value for customers, technology plays an important part. Variable data print is one of these important technologies that offers many potential opportunities. The exploration of ways printed materials can be customized from design and usability perspectives pushes the constricted views of the value of variable data print and offers new possibilities. An article about points raised in this thesis, like how VDP can help accessibility and usability, would hopefully start this conversation.

**Graphic Arts Monthly**

[www.gammag.com](http://www.gammag.com)

This magazine covers the printing and graphic arts industries and provides news and trends in printing technology and graphic arts products and services. It would be an ideal candidate to publish an article showcasing a case study that successfully implemented some of the customization approaches from this thesis. This article would convey how variable data print can benefit business beyond personalization.

**OnDemandJournal**

[www.ondemandjournal.com](http://www.ondemandjournal.com)

This online site provides news, special reports, whitepapers and case studies about digital printing and on-demand solutions. It offers a unique opportunity to showcase the possibilities VDP can bring to on-demand products. Through a case study or whitepaper related to this thesis study, print executives seeking information about digital printing might be persuaded to implement more complex and meaningful customization.
Outside Evaluation

Overview of Process

The final versions of this thesis application were sent to two professionals, one involved with variable data print and another with museum studies. The goal of this outside evaluation was to solicit feedback that would provide insight into the practical value of this thesis, both in the printing industry and in small and medium sized companies, like museums.

The following project overview, instructions and questions were sent to both Erich Lehman, Prepress Facilities Coordinator at Rochester Institute of Technology, and Kathy Connor, Curator at the George Eastman House. With this information, both persons also received three versions of the final museum guides along with corresponding descriptions of the visitors they were designed for.

Information Provided to Evaluators

Project

These brochures are the product of a thesis study combining graphic design, usability and customized print to create more usable documents on an individual basis. The goal of the thesis study is to push the current boundaries of variable data print and explore ways that graphic design can be employed to aid and increase usability.

Museum guides were selected as the application format for this thesis because they offered a scenario with a large, diverse audience with many physical, cognitive and situational differences. The George Eastman House was selected as the subject matter because the multi-faceted museum provides a scenario where users would have many different interests, goals and needs while visiting.

If actually implemented, users would approach a kiosk at the entrance of the museum and answer a few questions on a touch screen. A customized brochure would be printed out that corresponded to their selections.

Instructions

Please review the three brochure variations and answer the following questions with explanations and specific examples when possible.

Prototype Visitors

Visitor 1

Adult, first-time visitor, interested in house and galleries, will stay the whole afternoon. Design Approaches: emphasize galleries and house and use short 1-2 sentence prose text.

Visitor 2

Parent with kids, first-time visitor, interested in aspects that kids will enjoy, will stay a short time. Design Approaches: emphasize gardens and galleries and use short lists of facts.

Visitor 3

Senior, repeat visitor, interested in galleries and film aspects, will stay an hour and uses reading glasses. Design Approaches: emphasize galleries and film and photography and use detailed 3-6 sentence prose text with a large type size.
Outside Evaluation
Erich Lehman, Prepress Facilities Coordinator

Do the brochures employ VDP in a productive and innovative way?
I think the grid you chose lent itself nicely to what you were trying to accomplish. All the brochures were easy to read but still informative within the constraints you set. It is very productive but does not strike me as a blatantly VDP piece. That, to me, is not a bad thing. It’s more seamless that way, and the user I think, is more likely to focus on the content.

Do the brochures maintain a consistent design identity across the variations? 
Do they successfully accommodate typographic changes?
Very much so. My only beef is the identification of photos with numbers. Across the three, one didn’t have numbers, and they all had different placements. Now, the average user probably wouldn’t see this, but it could lead to design complications (placement of dynamic content boxes, etc).
Overall they seem typographically [sound], although, as I note below, I think the larger type for the elderly visitor leads to less-desirable line breaks in the content.

Do you see any situations where the brochures might pose obvious challenges to pre-press preparation or printing, other than issues related to using a kiosk?
We’ve spoken about a lot of them previously. You will need consistent placement of some type elements (the numbering ID for the photos) to make sure that the proper dynamic content gets to the proper container. The true answer to this question really depends on which software you use, the experience of the operator programming the variable piece and how you choose to implement this solution at the kiosk.

Additional comments or suggestions would also be greatly appreciated.
Overall, I personally don’t like the use of repeated numbers, even with alternate colors. I would instead use numbers for one and letters for another or preferably, one set of numbers for the entire map. I would like to see you use consistent placement of the position of the ID numbers in the variable photos.
For the Visitor 2 version, I like the bulleted format for the garden description, because it’s more conducive to lists of facts. On the inside, however, the bulleted format seems really forced, and I think it would be better as little paragraphs.
For the Visitor 3 version, the inside looks pretty good, but I think the large type on the gallery flap leads to an undesired break, particularly in the Brackett gallery blurb.
Outside Evaluation
Kathy Connor, George Eastman House Curator

Questions and Answers
Do the brochures appropriately portray the Eastman House and reflect the many aspects of the museum?

The brochures do appropriately portray the Eastman House and reflect the many aspects of the museum. All of our photo exhibits (Dar Fur, Dar Fur, Ghosts in the Landscape) are different now from what your brochures reflect. Since we make exhibit changes every two to three months your brochures on demand would have to be constantly updated. That means new photos inserted and if there were sponsors involved with each show, then a sponsor logo or two to be included in the brochure, etc. Garden tours go Memorial Day through Labor Day not May through October.

Do the brochures address individual visitor needs and interests through the use of design and content emphasis changes?

The brochures may reflect different audiences but I think this could be even more effectively done if different pictures and color designs were used both inside and outside of the brochure. If you look at all three [versions] now from the front cover they all look the same. I would change the pink square Visitors Guide section to reflect the audience it was for – Family Guide, Adult Guide, First Time Visitor, etc. Many of our visitors take their guides home with them as souvenirs of their visits, if they are looked at by others it would be good for people to know they were designed for a specific audience.

Do the selected images help reinforce the written text? Does the varying amount of text seem adequate and appropriate for the different visitors?

I liked the color coding on the map and floor plans. They are clearly understood and I think can be easily followed. I would add different pictures in the family guide like a kid eating chocolate cake in the cafe, holding a toy in the shop, smelling the flowers in the garden or making a photogram. Our Garden Vibes programs in the summer are also great activities for kids too. Also, our musicales on Sundays are great for regular visitors or seniors, as well as the classic musical performances by local artists on select Sundays in the house. Different photos would make a big difference in each. Instead of the muffins and books on back cover use an ice cream cone or peanut butter and jelly sandwich for the family guide and a kid item from the shop. If the front covers and back photos were different it would accomplish what you are trying to do even better than the pieces do now.

Additional comments or suggestions would also be greatly appreciated.

I would also add a treasure hunt element to the kids/family guide. We have developed many of these and something like that would keep the kid’s attention and allow the parents [to also enjoy other aspects of the museum]. Under the education component of the the Eastman Legacy portion of our website there are some puzzles and kid’s activities you may want to incorporate into your brochure.

The larger print is great in the senior brochure. For the family guide I would add more visuals and less text.
Self Evaluation

Building on a strong background in design, hands on experience with variable data print software and a cursory understanding of usability, this thesis provided an outlet to establish common ground for all three of these topics. It is the opinion of the author that the design solution created in this thesis successfully integrates graphic design, usability and variable data print together as a cohesive whole. However, as with any product, it has its strengths, weaknesses and areas of improvement.

Strengths

As mentioned above, the design application for this thesis incorporates all three topics it set out to include. The end goal of usability is achieved through both customization and graphic design. While customization is the overall approach to addressing usability, graphic design determines what and how elements are changed. Graphic design also provides and controls the framework upon which customization is implemented. It structures and orders the variable elements and helps provide a visual unity within a single guide and across many different guide iterations.

Weaknesses

The final thesis application did employ design as a crucial element but it could have further benefited if the underlying grid was even more flexible. The modular approach only allowed for three variable sections, each with fixed content. If the content within each of these sections had more options, or if a greater number of sections were created, then the application could potentially aid usability more. Either way the underlying grid would need to have smaller units and customization decisions would need to deal with more variables. Although every design has different usability requirements in terms of usability (as discussed on page 26), it was apparent that two aspects of usability, error tolerance and learnability, did not play substantial roles in this thesis application and thus were less explored.

Future Refinements

There are a few ways that this thesis application could be improved. First, the application would actually be implemented in variable data print software. The process of doing this would quickly point out potential flaws in design approaches as well as provide new opportunities for customization and addressing usability. Second, the application would be created by a team of production professionals: a graphic designer, a print usability expert, a variable data software operator and a museum staff member familiar with the specific content and visitor needs. Finally, a more comprehensive and focused evaluation would need to be performed. This might be best achieved by pre-selecting a fixed number of people for each version of the guide that match the target users of the guide (as defined on page 57). This evaluation process would also need to allocate adequate time and a procedure that uses a non-biased comparative evaluation of both a control guide and second version of the guide. Combined, this type of evaluation, production team and direct contact with technology would be more efficient and produce a higher quality application.
This thesis began with the intention of making printed documents easier for people to use. It took the developing technology of variable data print and paired it with graphic design problem solving to address usability through customization. The resulting individualization of documents to suit each person’s needs proved to have great potential.

Ranging from a survey of each topic to collecting examples of existing customized solutions and factors affecting usability, the research for this thesis covered a lot of ground and unearthed many useful sets of knowledge. Synthesizing these examples and information revealed many unique perspectives and connections between the topics of design, usability and VDP. For example, by pairing graphic design elements to specific user difficulties it was possible to determine concrete ways that simple design decisions can influence the usability of a document. In addition to establishing concrete connections between user needs, design solutions and usability, the levels of variability were mapped out and several conceptual approaches to implementing customization were established. Combining the research and synthesis together with these conceptual approaches helped make the final application a meaningful one. Finally, an evaluation of how the culmination of all this knowledge was implemented, in the form of a customized museum guide, demonstrates that this thesis successfully merged the three topics.

While the final design application and written thesis documentation are successes, each also has its weaknesses. Primarily, the research for this thesis could be more extensive. Perhaps more examples of print customization would have provided a clearer view of what types of information and current changes would be useful to usability. Similarly, the development of a greater number of design systems for varying sizes of formats might have revealed useful insights for alternate design approaches for the thesis application.

Overall, this thesis has collected, analyzed and implemented information that will be useful to anyone involved in projects relating to customization and usability in print. It provides a solid base from which to further explore each related area and some practical approaches to implementing more meaningful customized print projects. Hopefully designers and user advocates alike will see the potential that design and technology have to accommodate each user’s individual needs.

In addition to achieving its goal of exploring and integrating the three main topics, this thesis study has also taught and refined many skills. The extensive writing provided an opportunity to strengthen written communication skills and heighten attention to detail. Managing both an extensive workload and conflicting time requirements taught many lessons in large-scale project management. Finally, having developed substantial knowledge and understanding of usability and variable data print, it is now possible to incorporate these factors into design projects with confidence.
Variable Data Print (VDP)
“The concept of printing that allows for the production of varied or changing elements in a design on the same press run.” (FLAAR, 2006)
This form of digital printing involving a layout with variable content areas that can be customized according to certain rules which then incorporates data from a database or digital asset repository to be integrated into the document just before it gets printed. (Adobe, 2006)
Also known as personalized printing/publishing, personalization, customized printing/publishing, database publishing, data driven print, one-to-one communications/publishing. Because VDP is often used to create documents for promoting and selling products and services it is also commonly known as direct marketing and one-to-one marketing. (Citationsoftware, 2006)

Usability
The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” (ISO 9241-11)

Universal Design
An approach to the development of “products and environments that can be used effectively by all people, to the greatest extent possible, without the need for adaptation or specialized design” (North Carolina State University, 1997). It is an inclusive process aimed at enabling all of us to experience the full benefits of the products and environments around us regardless of our ages, sizes or abilities. Also known as Inclusive or Barrier-Free Design. (Tauke, 2006)

Accessibility
The degree to which products, buildings, services, or information are equally accessible and usable to everyone regardless of physical or mental abilities.

Impairment
Any loss or abnormality of psychological, physiological, or anatomical structure or function. (Arthur, 1988)

Disability
Any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being. (Arthur and Passini, 1990)

Legibility
Ability of a viewer to see or discern the message displayed. (Arthur and Passini, 1990)
Information is often conveyed in a way that is too difficult to see clearly enough to understand. (Arthur, 1988)

Readability
Ability of the viewer to comprehend or understand the message displayed. (Arthur and Passini, 1990)
Words, symbols or patterns that are unfamiliar, or that are used in an ambiguous, confusing, or simply ungrammatical way are, at best, useless and, at worst, misleading and frustrating. (Arthur, 1988)
## Bibliography

### Variable Data Print

#### Books

#### Websites

#### Presentation
# Bibliography

## User Differences and Usability

### Books


### Articles


### Websites


Books


Appendix A
Gestalt Principles

Source
Dynamics in Document Design: Creating Text for Readers, Karen A. Schriver
### Appendix B
Multiple Intelligences

#### The Eight Ways of Learning

<table>
<thead>
<tr>
<th>Children who are highly:</th>
<th>THINK</th>
<th>LOVE</th>
<th>NEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linguistic</td>
<td>in words</td>
<td>reading, writing, telling stories, playing word games</td>
<td>books, tapes, writing tools, paper, diaries, dialogue, discussion, debate, stories</td>
</tr>
<tr>
<td>Logical-Mathematical</td>
<td>by reasoning</td>
<td>experimenting, questioning, figuring out logical puzzles, calculating</td>
<td>materials to experiment with, science materials, manipulatives, trips to the planetarium and science museum</td>
</tr>
<tr>
<td>Spatial</td>
<td>in images and pictures</td>
<td>designing, drawing, visualizing, doodling</td>
<td>art, LEGOs, video, movies, slides, imagination games, mazes, puzzles, illustrated books, trips to art museums</td>
</tr>
<tr>
<td>Bodily-Kinesthetic</td>
<td>through somatic sensations</td>
<td>dancing, running, jumping, building, touching, gesturing</td>
<td>role play, drama, movement, things to build, sports and physical games, tactile experiences, hands-on learning</td>
</tr>
<tr>
<td>Musical</td>
<td>via rhythms and melodies</td>
<td>singing, whistling, humming, tapping feet and hands, listening</td>
<td>sing-along time, trips to concerts, music playing at home and school, musical instruments</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>by bouncing ideas off other people</td>
<td>leading, organizing, relating, manipulating, mediating, partying</td>
<td>friends, group games, social gatherings, community events, clubs, mentors/apprenticeships</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>in relation to their needs, feelings, and goals</td>
<td>setting goals, meditating, dreaming, planning, reflecting</td>
<td>secret places, time alone, self-paced projects, choices</td>
</tr>
<tr>
<td>Naturalist</td>
<td>through nature and natural forms</td>
<td>playing with pets, gardening, investigating nature, raising animals, caring for planet earth</td>
<td>access to nature, opportunities for interacting with animals, tools for investigating nature (e.g., magnifying glass, binoculars)</td>
</tr>
</tbody>
</table>

**Source**

*Multiple Intelligences in the Classroom*, Thomas Armstrong
### The Eight Ways of Teaching

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>Teaching Activities (examples)</th>
<th>Teaching Materials (examples)</th>
<th>Instructional Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linguistic</strong></td>
<td>lectures, discussions, word games, storytelling, choral reading, journal writing</td>
<td>books, tape recorders, type-writers, stamp sets, books on tape</td>
<td>read about it, write about it, talk about it, listen to it</td>
</tr>
<tr>
<td><strong>Logical-Mathematical</strong></td>
<td>brain teasers, problem solving, science experiments, mental calculation, number games, critical thinking</td>
<td>calculators, math manipulatives, science equipment, math games</td>
<td>quantify it, think critically about it, put it in a logical framework, experiment with it</td>
</tr>
<tr>
<td><strong>Spatial</strong></td>
<td>visual presentations, art activities, imagination games, mind-mapping, metaphor, visualization</td>
<td>graphs, maps, video, LEGO sets, art materials, optical illusions, cameras, picture library</td>
<td>see it, draw it, visualize it, color it, mind-map it</td>
</tr>
<tr>
<td><strong>Bodily-Kinesthetic</strong></td>
<td>hands-on learning, drama, dance, sports that teach, tactile activities, relaxation exercises</td>
<td>building tools, clay, sports equipment, manipulatives, tactile learning resources</td>
<td>build it, act it out, touch it, get a &quot;gut feeling&quot; of it, dance it</td>
</tr>
<tr>
<td><strong>Musical</strong></td>
<td>rhythmic learnings, rapping, using songs that teach</td>
<td>tape recorder, tape collection, musical instruments</td>
<td>sing it, rap it, listen to it</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td>cooperative learning, peer tutoring, community involvement, social gatherings, simulations</td>
<td>board games, party supplies, props for role plays</td>
<td>teach it, collaborate on it, interact with respect to it</td>
</tr>
<tr>
<td><strong>Intrapersonal</strong></td>
<td>individualized instruction, independent study, options in course of study, self-esteem building</td>
<td>self-checking materials, journals, materials for projects</td>
<td>connect it to your personal life, make choices with regard to it, reflect on it</td>
</tr>
<tr>
<td><strong>Naturalist</strong></td>
<td>nature study, ecological awareness, care of animals</td>
<td>plants, animals, naturalists’ tools (e.g., binoculars), gardening tools</td>
<td>connect it to living things and natural phenomena</td>
</tr>
</tbody>
</table>

**Source**  
*Multiple Intelligences in the Classroom*, Thomas Armstrong
Appendix C
Sample Museum Guides

The National Postal Museum, Washington, DC

NATIONAL POSTAL MUSEUM SELF-GUIDE

1. Moving the Mail
   The museum’s atrium features vehicles that moved the mail. Look up to see the airplanes soaring overhead. Look down to find out more about the building’s design.

2. Video Center
   The mall features a complex route to its destination. Follow the journey of mail today and in years gone by.

3. Finding the Nation
   Enter the forest and follow the path mail carriers traveled from New York to Boston in 1673. Throughout American history mail brought news to all. Learn about dangers and challenges postal workers faced in the line of duty.

4. Customers and Communities
   See how the postal system works to get mail to every person living in America. This exhibit highlights city and rural delivery including whimsical mailboxes seen along country roads.

5. What’s in the Mail for You?
   Meet Montgomery Ward in this interactive experience and learn how businesses use the mail to reach their targeted customers.

6. Ford Education Center
   Use an interactive database to search the museum’s collections, play a matching game, and send a selection of stamp images to an e-mail address.

7. US & International Stamp Gallery
   This room holds thousands of stamps. The panels present stamps from all over the world. Put one out to see the stamps inside.

8. Stamp Gallery
   Every stamp tells a story. Changing exhibits highlight a variety of stamps and their stories. Be inspired by the aviation theme in Stamps Take Flight. Learn about major forms of printing used for U.S. stamps.

9. Artistic License: The Duck Stamp Story
   Duck stamps cannot be used to send mail. Instead revenue from the Federal Duck Stamp Program is spent to protect and expand wetlands.

10. Art of Cards & Letters
    Visit the emotional heart of the museum and hear the stories that have brought soldiers closer to the people they left behind. A second exhibit in this space shows the evolution of the American envelope.

Don’t Miss These Postal Treasures:
- Owney: the mascot of the Railway Mail Service.
- MOVING THE MAIL
  - Railways and the Real World: See some of the places to sort mail in this realistic re-creation.
  - MOVING THE MAIL

- Mail Wagon: climb in and hear stories of crossing the American West with the mail.

- BINDING THE NATION
  - USS Oklahoma: Hand Stamps recovered after Pearl Harbor, December 7, 1941.

- ART OF CARDS & LETTERS
  - 1847 5-cent Franklin: one of the first stamps used in the United States.

New on Display 2005–2006
- Delivering to You at the Video Center
- Musician John Lennon collected stamps as a child. See his stamp album in the US & INTERNATIONAL STAMP GALLERY.
- See the inverted Jenny, block of four. This famous upside down airplane error is featured in the STAMP GALLERY.
- Compare past and present postal trucks in ON THE ROAD.
Appendix C (continued)
Sample Museum Guides

The Australian Museum, Sydney, Australia

Welcome to the Australian Museum, where you can discover Australia’s natural history and Indigenous cultures.

Appendices

English version

Chinese version
Appendix C (continued)
Sample Museum Guides

The South Australian Museum, Adelaide, Australia

Ground floor

North Terrace

Level 1 North
Level 1 East
Level 1 North

Level 2
Level 3

We invite you to enjoy your Museum visit.

Please note:
• No large bags - in the interest of visitor safety and security, please check them at the security desk.
• No flash photography
• No eating
• No drinking
Appendix C (continued)
Sample Museum Guides

The Field Museum, Chicago, IL (Family Adventure Guide, excerpt)
Appendix C (continued)
Sample Museum Guides

Welcome to Center Market

You've traveled back in time to the year 1900 in Washington, D.C.!

- How many different ways of traveling can you find here?
- How did these foods you see on the platform travel to the market?

Find the vehicle that each wheel belongs to in the exhibition.

Families can travel quickly from their new homes in the suburbs into the city in this vehicle.

Foods from the train station and local farms got delivered by this vehicle.

A hundred years ago, mostly adults rode these and convinced the government to flatten and smooth the roads so riding would be easier.

In 1900, there were over three million horses working in the cities. Horse manure had to be cleaned up constantly!

Find this in the video. Some folks traveled this way, but most people walked, as everything was nearby in the city.

Answers: A. trolley, B. bicycle, C. hansom cab, D. wagon, E. roller skates
Appendix C (continued)

Sample Museum Guides

The Minnehaha Creek Watershed District, Minnetonka, MN (Historical Map)
Now spot Claude Monet's *Haystacks (Effect of Snow and Sun)* in a nearby gallery.

Practice makes perfect. Maybe that's what the artist, Claude Monet, was thinking. In about a year and a half he painted more than thirty versions of the haystacks near his house.

* Why do you think he painted so many?

During the winter, Monet commented, "... the sun sets so fast I cannot follow it." In this painting, the sunlight is so brilliant you almost need sunglasses.

* How has the artist made it seem so bright?

* Monet was looking for what he called "instantaneity" when he painted. What do you think that means? (Think about the word "instant").

Take the elevator at the end of the corridor down to the first floor. Turn left and enter the Arts of Africa, Oceania, and the Americas galleries on your right. Find the 8th-century *Cylindrical Vessel with Throne Scene* from Guatemala in a glass case against the left wall.

What's cold weather without hot cocoa? It seems that we're not the only ones who like to warm up with a steaming chocolaty drink—the Maya beat us to it by more than a thousand years. Plenty of evidence has been found in tombs that tells us that the Maya consumed chocolate.

* Can you find the picture of a vessel (cup) on the actual vessel? (It's on the ground, in between the two seated figures.)

The foamy liquid you see on top of the illustrated cup may be cocoa, a kind of chocolate drink—and the actual cup you're looking at may have been used for cocoa. It's a cup on a cup—got that!
LESS THAN AN HOUR?

West Building Highlights

If you only have a short time to visit the National Gallery of Art, here are twelve must-see works. Laminated guides with commentaries are available throughout the Gallery. Some objects may be temporarily off view.

1. Leonardo da Vinci, Ginevra de' Benci (obverse), c. 1474/1478, Gallery 6

2. Florentine 15th or 16th Century, probably after a model by Andrea del Verrocchio and Orsino Benintendi, Lorenzo de' Medici, 1478/1521, Gallery 7


4. Raphael, The Alba Madonna, c. 1510, Gallery 20

5. Orazio Gentileschi, The Lute Player, c. 1622/1623, Gallery 29


7. Sir Peter Paul Rubens, Daniel in the Lions' Den, c. 1614/1616, Gallery 45

8. Rembrandt van Rijn, Self-Portrait, 1659, Gallery 48

9. Johannes Vermeer, A Lady Writing, c. 1665, Gallery 50C

10. Claude Monet, Rouen Cathedral, West Façade: Sunlight, 1894, Gallery 85

11. Edouard Manet, The Railway, 1873, Gallery 86


West Building, Main Floor

Hall Entrance

To Sculpture Garden...
Appendix C (continued)
Sample Museum Guides

The National Gallery of Art, Washington, DC

English gallery guide

Appendices

Appendix C
Sample Museum Guides

The National Gallery of Art, Washington, DC

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Equivalent French version

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Appendix C (continued)
Sample Museum Guides

Royal Ontario Museum, Toronto, Canada

General Information

Royal Ontario Museum
100 Queen’s Park
Toronto, Ontario M5S 2C4

General Information

Hours:
Monday to Saturday: 10 a.m. – 5 p.m.
Sunday: 11 a.m. – 5 p.m.

Admission:
Free admission for children 12 and under, students with a valid student ID, and seniors 65 and over. Members receive free admission and discounts on most programs. Memberships are available online. For more information, visit our website: www.ROM.org

Membership:

Rom: We're Open!
If you visit today, you’ll enjoy our exhibitions, shop, and the best of the collection. You can make an appointment online, and we’ll email you a free admission ticket. You can also take a guided tour of the museum.

Code of Conduct:

• Please observe our standing, sitting, and smoking regulations. The museum’s code of conduct applies to everyone.

• Visitors are welcome to sketch in the galleries using pens and pencils only, with the exception of some temporary exhibits.

• Photography and video are allowed in selected galleries, subject to the discretion of the staff.

• No food or drink is allowed in the galleries, except for water bottles.

Appendixes

Normal guide

Large print version

Interactive Exhibitions

Experience the ROM in sight, sound and touch. Many galleries include audio, video and touch experiences to enhance your Museum visit. Be sure to visit our most popular interactive galleries on Level 2, including the Hands-On Biodiversity Gallery and the CBC Discovery Room.

Many galleries include more than one interactive experience. Look for one of the interactive icons on the map followed by a number in the upper right corner as a guide.
Appendix D
Layout Adjustment Exercises

Library Garden
The library garden is a 1990 adaptation of DeForest’s 1921 cut-flower garden. The double row of arborvitae outlines the original central axis with spring-flowering tulips planted in solid blocks of red, white, and purple.

Rock Garden
Restoration of the rock garden was completed in 1992 and was based on historical photographs (ca. 1910) of the original garden. The 250-foot grape arbor was Alling S. DeForest’s 1902 grounds plans.

West Garden
The west garden was designed and built by Claude Bragdon in 1917. The wisteria vines on the garden house are original. The three perimeter garden borders and four central beds were planted with perennials and bulbs during Eastman’s time.

Northeast Garden
The northeast garden, established during the North Property Rehabilitation Project, is the shadiest, most informal garden on the grounds. A brick walk leads from the grape arbor to the pedestrian gate of the reconstructed University Avenue fence.

East Vista
The east vista, which extends the length of the property from East Avenue to University Avenue, was designed by landscape architect Alling S. DeForest with an informal, naturalistic planting along the eastern border.

Front Lawn
Rehabilitation of the front lawn on East Avenue began in 1996 and was completed in fall 1999. New plantings include 29 trees (maples, dogwood, and hickory) and more than 300 ornamental shrubs (viburnum, forsythia, jet bead, spireas).
Library Garden
The library garden is a 1990 adaptation of DeForest’s 1921 cut-flower garden. The double row of arborvitae outlines the original central axis with spring-flowering tulips.

Rock Garden
Restoration of the rock garden was completed in 1992 and was based on historical photographs (ca. 1910) of the original garden.

West Garden
The west garden was designed and built by Claude Bragdon in 1917. The wisteria vines on the garden house are original.

Northeast Garden
The northeast garden, established during the North Property Rehabilitation Project, is the shadiest, most informal garden on the grounds.

East Vista
The east vista, which extends the length of the property from East Avenue to University Avenue, was designed by landscape architect Alling S. DeForest.

Front Lawn
Rehabilitation of the front lawn on East Avenue began in 1996 and was completed in fall 1999 including 29 new tree plantings.
Library Garden
The library garden is a 1990 adaptation of DeForest’s 1921 cut-flower garden. The double row of arborvitae outlines the original central axis with spring-flowering tulips planted in solid blocks.

Rock Garden
Restoration of the rock garden was completed in 1992 and was based on historical photographs (ca. 1910) of the original garden. The 250-foot grape arbor was Alling S. DeForest’s 1902 grounds plans.

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East Vista
The east vista, which extends the length of the property from East Avenue to University Avenue, was designed by landscape architect Alling S. DeForest with an informal, naturalistic planting along the eastern border.

North Garden
The northeast garden, established during the North Property Rehabilitation Project, is the shadiest, most informal garden on the grounds. A brick walk leads from the grape arbor to the pedestrian gate of the reconstructed University Avenue fence.

West Garden
The west garden was designed and built by Claude Bragdon in 1917. The wisteria vines on the garden house are original. The three perimeter garden borders and four central beds were planted with perennials and bulbs during Eastman’s time.

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### Northeast Garden
The northeast garden, established during the North Property Rehabilitation Project, is the shadiest, most informal garden on the grounds. A brick walk leads from the grape arbor to the pedestrian gate of the reconstructed University Avenue fence.

### East Vista
The east vista, which extends the length of the property from East Avenue to University Avenue, was designed by landscape architect Alling S. DeForest with an informal, naturalistic planting along the eastern border.

### Front Lawn
Rehabilitation of the front lawn on East Avenue began in 1996 and was completed in fall 1999. New plantings include 29 trees (maples, dogwood, and hickory) and more than 300 ornamental shrubs (viburnum, forsythia, jet bead, spireas).
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<tr>
<th>Garden</th>
<th>Details</th>
</tr>
</thead>
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<td></td>
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<td></td>
<td>• An informal, naturalistic planting along the eastern border</td>
</tr>
<tr>
<td><strong>Front Lawn</strong></td>
<td>• Rehabilitation began in 1996 and was completed in 1999</td>
</tr>
<tr>
<td></td>
<td>• New plantings include 29 trees</td>
</tr>
<tr>
<td></td>
<td>• More than 300 ornamental shrubs</td>
</tr>
</tbody>
</table>
Appendix E
Existing George Eastman House Guide

Welcome to George Eastman House!

George Eastman House consists of the KFS building, the George Eastman Mansion, and the Eastman Museum and Science Center. If you have questions, please don't hesitate to ask your visitor's assistant. There are no enclosed spaces, but you may keep the guide or store it in your pocket.

Thank you for choosing to spend your day with us. Enjoy your visit!

Appendices
Appendix E (continued)
Existing George Eastman House Guide

Appendices
Back Cover

A Tour of George Eastman House

A Tour of the Gardens and Grounds

Folded Flat Inside Six-panel Spread
Appendix F
Thesis Peer Presentation (Powerpoint format, Winter 2006)

The Impact of Variable Data Print on Usability in Design

Thesis Presentation / Graduate Graphic Design / RIT
William Wells

What is Usability?

“The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.”
(International Standards Organization. 9241-11)

- Task & Environment
- User Differences
Appendix F (continued)
Thesis Peer Presentation

What is Variable Data Print (VDP)?

A form of digital printing involving a layout with variable content areas that can be customized according to certain rules which then incorporates data from a database or digital asset repository to be integrated into the document just before it is printed.

(http://www.adobe.com/products/vdp/)

- Digital, On-Demand Printing
- Variable Components

Combining Graphic Design, VDP, and Usability

Variable Design Elements
Layout and Sequence
Typographic Decisions
Content Choices

Adjust Design for Contextual and User Differences
Task / Goal
User Experience
Environmental Factors
Visual and Cognitive Abilities
Learning Differences
Cultural Conventions

Definition Precedents Research Synthesis Ideation
Appendix F (continued)
Thesis Peer Presentation

Web Accessibility

The fridge door
A place to stick reminders and notes along with other quirky and interesting things that catch your attention.
Source Order, Skip links and Structural labels
Is page source order important to screen reader users? This paper reports on our research into the relevance and importance of page source order, skip links and structural labels for screen reader users.

Welcome
Web Usability is working to make the web more usable for everybody, including those with disabilities. We provide advice on website usability and accessibility to corporate and government clients throughout Australia.
Roger Hudson established Web Usability in 2000. Since then, he has assessed the usability and accessibility of nearly 100 sites.
A main aim of this site is to promote website accessibility tools

Accessibility tools
Use these accessibility tools to customise the site to suit your needs.
Text size:
- Normal
- Larger
Text style:
- Sans-serif
- Serif
Page layout:
- Normal
- FMD

Definition Precedents Research Synthesis Ideation
Appendix F (continued)
Thesis Peer Presentation

Web Accessibility

Source Order, Skip links and Structural labels
Is page source order important to screen reader users? This paper reports on our research into the relevance and importance of page source order, skip links and structural labels for screen reader users.

Appendices
## Appendix F (continued)

### Thesis Peer Presentation

### Customization Research

**Customization**
Collection of broad range of examples

**Variable Data Print**
Types of Print Customization
Workflow & Conditional Logic
Language Translation

<table>
<thead>
<tr>
<th>Definition</th>
<th>Precedents</th>
<th>Research</th>
<th>Synthesis</th>
<th>Ideation</th>
</tr>
</thead>
</table>

### Variable Data Print

Lisa Martin... your 2003 Buick Century is due for maintenance now!

Your Last Visit
Was 02/15/04, at
22,187 Miles!

$50.00 off any service over $300.
Otherwise, when you save $50 or more, we'll offer you
tires, oil, and filter service for ONLY $50!

For more information, please call 345-6789.

Customer Service
1-800-123-4567
www.doxtire.com

<table>
<thead>
<tr>
<th>Definition</th>
<th>Precedents</th>
<th>Research</th>
<th>Synthesis</th>
<th>Ideation</th>
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</table>
Appendix F (continued)
Thesis Peer Presentation

Customization

Customization
Appendix F (continued)
Thesis Peer Presentation

User Differences Research

Usability
Definitions
Aspects

User Differences
Visual and Cognitive Abilities
Multiple Intelligences and Learning Styles
Language and Culture

Accessibility
Disabilities and Impairments

Universal Design

Definition Precedents Research Synthesis Ideation

Graphic Design Research

Typography
Variables
Hierarchy
Legibility

Systems Design
Spatial
Typographic
Language

Grid Systems

Gestalt Principals

Definition Precedents Research Synthesis Ideation
Appendix F (continued)
The Thesis Peer Presentation

Systems Design

```
Nutrition Facts

Serving Size 1 bar (46g)
Serving Per Container 12

Amount Per Serving
Calories 260
Total Fat 8g 13%
Saturated Fat 2g 14%
Trans Fat 0g
Cholesterol 0mg 0%
Sodium 260mg 11%
Potassium 165mg 5%
Total Carbohydrate 36g 12%
Dietary Fiber 5g 18%
Sugars 3g 8%
Protein 7g 16%

Valeur nutritive

pour 1 tasse (264g)

Quantité % valeur quotidienne
Calories 260
Lipides 13g 20%
Saturés 3g 15%
Trans 0g
Cholestérol 0mg 0%
Sodium 660mg 28%
Glucides 31g 10%
Fibres 0g 0%
Sucres 5g 0%
Protéines 5g 16%

Vitamine A 4% • Vitamine C 2%
Calcium 15% • Fer 4%

Nutrition Facts

Serving Size 1/4 pizza (121g)
Serving Per Container about 4

Amount Per Serving
Calories 270
Total Fat 10g 15%
Saturated Fat 4g 26%
Trans Fat 0g
Cholesterol 90mg 3%
Sodium 530mg 22%
Total Carbohydrate 35g 11%
Dietary Fiber 2g 8%
Sugars 1g
Protein 3g

Vitamin A 6% • Vitamin C 4%
Calcium 30% • Iron 15%

Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Definition Precedents Research Synthesis Ideation
```
Appendices

Appendix F (continued)
Thesis Peer Presentation

Matrix A: Customization Goals and Degree

Matrix B: Customization Examples & Usability Analysis
## Appendix F (continued)
Thesis Peer Presentation

### Matrix C: Semantic Operations

<table>
<thead>
<tr>
<th>Subtraction</th>
<th>User Differences</th>
<th>Graphic Design</th>
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<td><strong>Taking something away</strong></td>
<td><strong>Learned</strong></td>
<td><strong>Principals</strong></td>
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<td><strong>Attention Span</strong></td>
<td><strong>Innate</strong></td>
<td><strong>Negative Space</strong></td>
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<td><strong>Situation</strong></td>
<td><strong>Closure</strong></td>
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<td><strong>Divided Attention</strong></td>
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<td><strong>Low Motivation</strong></td>
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**Definition** | **Precedents** | **Research** | **Synthesis** | **Ideation**

### Matrix D: Design Strategies for User Difficulties

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<th>Design Strategies</th>
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<td><em>ADD</em></td>
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<td><em>Dyslexia</em></td>
<td>processing problems</td>
<td>reduce visual distractions</td>
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<td>Visual</td>
<td>Impairments</td>
<td>legibility</td>
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<td><em>Low vision</em></td>
<td></td>
<td>type/background contrast</td>
</tr>
<tr>
<td><em>Color blindness</em></td>
<td></td>
<td>color value choice/contrast</td>
</tr>
<tr>
<td><em>(Red/Green)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Age associated</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>Impairments</td>
<td>reading small print</td>
</tr>
<tr>
<td><em>Short-Term Memory</em></td>
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<td>type size, typeface choice</td>
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<td><strong>Trouble remembering</strong></td>
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<td></td>
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<tr>
<td><strong>Solving problems</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Spatial memory tasks</strong></td>
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</tr>
</tbody>
</table>

**Definition** | **Precedents** | **Research** | **Synthesis** | **Ideation**
Appendix F (continued)
Thesis Peer Presentation

Application Criteria

Printed Material
Variable Data Print deals with customizing print, so the final application must relate to print.

Large Audience
Considerable effort is put into developing a design system, so usage by a substantial number of people is desirable.

Diverse Audience
Productive customization requires a substantial number and diversity of different options.

Task Oriented
Usability considerations and measurability focus primarily tasks and how design helps users achieve their objective.

Museum Guide

Less than an hour?

National Gallery of Art, West Building

Definition	Precedents	Research	Synthesis	Ideation
Appendix G
MFA Thesis Exhibition Panels

The Impact of Variable Data Print on Usability in Design

William Wells
MFA Graphic Design

Overview

Introduction

In a society where people see, process and remember information differently, the question arises: Is technology being used in a manner that acknowledges and addresses user differences to the fullest extent?

Currently, new print technologies like variable data printing (VDP) are only being used to create customized direct mailing pieces and personalized products for the purpose of marketing, sales and promotions. However, VDP introduces the ability to change data and design elements in printed documents on an individual basis, allowing it to be possible to address differences in visual and cognitive abilities, language and culture, and individual considerations.

Applying the concept of customization to print documents would allow a small amount of input from users to influence unique output. Different sequences or textures, typographic decisions and appropriate context choices that are more relevant, usable and engaging.

While using VDP as a means to explore and achieve this customization, the focus of this thesis study would not be the technology, but the development of a graphic design strategy that accommodates the customization goal to make information more accessible and usable on an individual basis.

Explanatory Diagram
Appendix G (continued)
MFA Thesis Exhibition Panels

Appendices

Usability

What is Usability?

Well-known for the development of standards for industrial processes and product quality, the International Standards Organization (1956) defines usability as "the extent to which a product can be used by specified users to achieve specified goals in a particular environment."

The expanded dimensions of usability to the right were compiled from two additional sources: an article by Whitman Quarles and Greene, "The Four Dimensions of Usability" and the Usability Professional's Association, "Usability Body of Knowledge Project."

They provide a broader definition of usability that moves beyond simple focusing on task performance to incorporating considerations of the entire user experience.

- Usability
  - The degree to which the design facilitates speed and accuracy consistent, expected, visible
  - Reliability
  - The degree to which the design makes the user feel comfortable, adaptive, credible, respectful

- Usability
  - The degree to which users can achieve specified goals in a particular environment.

- Usability
  - The degree to which users can achieve specified goals in a particular environment.

Which User Characteristics Affect Usability?

Understanding the differences in abilities and challenges people face when using printed materials is vital to addressing issues which will in turn increase usability.

Thus, determining and organizing the range of user traits and abilities related to print design was an important part of the research in this thesis.

Inherent
- Inborn or developed physical and cognitive traits

Learned
- Acquired or conditioned language or social tendencies

Situational
- Environmental or imposed task or environmental factors

How will Customization Help Usability?

A range of examples were collected from music and clothing to postcards and magazines, showing the greater impact of customization in the broader sense.

It was discovered that in cases where personal information was the primary concern being changed, added value was focused on creating identity and relevance. In cases where the aim was the customization of how information was presented, such as varying typographic variables, the focus was on task and efficiency.

Key
- Inessential
- Secondary
- Subordinate
- Essential

Reader's Digest
Same format and content but with larger print.

Reason Magazine
Personalized cover with serial photo of subscriber's home.

Verity Plates
Vehicle license plate characters are chosen as desired.

Dell Computers
Components are mixed and matched online as desired.
Appendix G (continued)
MFA Thesis Exhibition Panels

Graphic Design

How will Graphic Design be Used?

This thesis uses graphic design as a mediator between usability and VDP. Graphic design is both the element that gets varied and the element that addresses usability. It does so by also having the opportunity to visually unite the designs being produced.

Changing Elements that Address Usability

A few examples of ways that design elements could be adjusted to aid usability include: addressing engagement by varying choice of language, style of interaction or visual layout, and ease of use by incorporating knowledge of a user’s background or experience and providing the correct level of depth to the content.

Maintaining a System by Using a Grid

This grid is a strong and flexible way to unify a set of varying designs. Clear proportions, spaces, and guides are established by implementing an underlying grid plan adjustable design elements. Grids establish rules and restrictions on various graphic variables that ensure consistency among the set of assistant works.

What Elements of Graphic Design will Help Usability?

It is clear that the design of a document plays a role in how it is used, but which aspects of graphic design are needed?

Based on knowledge gained from previous research and findings, an organized list of graphic elements that are useful in addressing usability was created and summarized in the following: key research sources included Karen Salmon’s book Dynamics in Document Design: Creating New Form for Reading, and Nell Nunn’s book Typography: How to Make it Work Well.

It includes three main areas of graphic design and the components of each that have relevance to making documents more usable.

Gestalt Principles

Proximity
Figure / Ground
Continuity
Closure
Similarity

Typographic Design

Type
Size, Weight, Form, Color

Hierarchy

Axes, Alignment

Systems Design

Spatial
Guides, Zones, Composition, Proportions

Language
Structure, Patterns, Complexity

How could Graphic Design Decisions be Customized?

Looking at the elements, principles, and methods that graphic design employs and the relationships to the semantic operations helps develop an understanding of what ways they can be customized.

A corresponding table was created with possible usage challenges to using print documents. The desired operations between user challenges and graphic design elements helps link user needs to actual graphic design tools.

The five basic semantic operations are subtraction, addition, adjustment, substitution, and exchange.
Appendix G (continued)
MFA Thesis Exhibition Panels

Variable Data Print

What is Variable Data Print (VDP)?

The Adobe Variable Data Publishing Resource Center defines VDP as a "new art of digital printing involving a layout with variable content areas that can be customized according to certain rules. It incorporates data from a database or digital asset repository into the document just before it gets printed."

With the advent of electronic documents and digital printing, it is now possible to create documents on a one-to-one basis. Using one-to-one approach means that each print can have parts unique to an individual from simply a name to a detailed statement history. Currently, this kind of customization is being used to help businesses get better response rates from mailings, command more attention from marketing pieces, and generally increase return on investment.

How does VDP Work?

The VDP workflow has several elements that make it different from a traditional static print document workflow. To the right are the main components and how variable document creation differs.

- User Data
- VDP Application
- Template with Variable Components
- Image and Test Database
- Digital Print

What Degrees of Variability would be Useful?

This matrix was assembled to explore the relationship between degrees of customization and the meaningfulness of customizations, to provide a comparative view of customizable examples in order to assess what an appropriate level of objective to amount of customization might be.

In the top left corner, the products all achieve somewhat useful objectives with only a few violations. In the bottom right corner, the high degree of customization of the product provides relatively little actual benefit to the user.

<table>
<thead>
<tr>
<th>Purpose of Varying Points</th>
<th>Number of Possible Customized Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10-10,000</td>
</tr>
<tr>
<td>Provides Information</td>
<td>up to 10</td>
</tr>
<tr>
<td>Persuases</td>
<td>up to 1,000</td>
</tr>
<tr>
<td>Persuases</td>
<td>up to 1,000,000</td>
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<tr>
<td>Persuases</td>
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</tbody>
</table>
Appendix G (continued)
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Application

Criteria
Printable Material
Variable data printing deals with
sustaining print documents, making the final printed output relate to print.

Large Audience
Considerations for this is put into
developing a design system, an aspect by a substantial number
of people is desirable.

Diverse Audience
Printed customization requires
a substantial number and density
of different options.

Task Oriented
Usability considerations focus on
user tasks and how design helps
users achieve their objectives.

Museum Guides
To satisfy all four criteria identified,
museum guides were chosen. Museum guides help a large and
diverse audience explore and learn
about museum collections.

As the primary printed material
that a museum offers, guides often
serve a substantially large and
diverse audience. The range of ages,
educational backgrounds, cultures
and a variety of personal preferences
are well-fit for the variety and
unmetered focus of this thesis.

In addition, the substantially large
and diverse audience makes the
design and implementation of variable
printed museum guides more useful
and cost-effective.

George Eastman House
The George Eastman House was
selected as the content of the final
application because it satisfied all
the requirements for appropriate location;
unusually large and diverse audience, depth
and richness of content, and a need for
improvement in the current guide to
address user differences better.

Audience
As an internationally known museum
of photography it serves a large and
versatile ranging audience, from local
residents to foreign tourists.

Content
In addition to being a museum with
a historic house and gardens, it is also
a history museum, gallery and traveling
exhibits; a film theatre and an
extensive film archive and collection.

Need
The current guide offered provides an
overwhelming collection of information. While smaller analog
printers are available in other languages,
the main guide does not address
the differences in visitor backgrounds and
objectives.

Preliminary Application Ideation
Illustrative examples based on age,
time constraints and visit goal.
User 1
Other Adult, All Day, Tours
User 2
Adult, Half Day, Research
User 3
Teenager, Couple of Hours, Exhibits

Existing Guide Design