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## A Systems Approach to Graphic Design Practice

Parisa Farmoudehyamcheh

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# A SYSTEMS APPROACH TO GRAPHIC DESIGN PRACTICE

by

PARISA FARMOUDEHYAMCHEH

(Under the Direction of Jason Murdock)

## ABSTRACT

Over the past few decades, design issues have gotten more complex, and designers got responsible for solving more significant problems, from object-level problems to system-level problems to societal-level problems. This thesis is an exploration of employing a systems approach for solving these complicated issues. The systems approach helps designers to look at matters as a whole and consider all connected pieces in a network all together. In this way, proposing solutions to those problems will address all those parts and will solve them at the same time. In this thesis, I will study and analyze case studies such as Canva, Lingo, and Figma that have incorporated the systems approach for resolving current problems in the design field. As a part of my thesis, I will use the same approach to solve traditional graphic design practice difficulties in organizations. I will investigate how to refine the existing design flow and will propose a new system that will address several collaboration issues simultaneously. In this thesis, I will focus on creating a labor-saving and time-saving platform that will provide this opportunity for professional graphic designers and non-professionals to collaborate more efficiently. The goal of this platform is to empower novice designers to do some basics of graphic design themselves. Then professional designers will be responsible for creating and providing visual identity assets and templates for non-designers. Different sets of interviews and surveys will be conducted to collect information about users' preferences. Also, several user testing will be done to observe the users' experience for optimizing the platform.

INDEX WORDS: Graphic design, Systems design, Platform, Visual communications, Systems approach, Designer, Non-designer

A SYSTEMS APPROACH TO GRAPHIC DESIGN PRACTICE

by

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B.F.A., University of Art, Iran, 2010

A Thesis Submitted to the Graduate Faculty of Georgia Southern University

in Partial Fulfillment of the Requirements for the Degree

MASTER OF FINE ART

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Electronic Version Approved:

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## DEDICATION

This thesis is dedicated to my family and my love for always being my cheerleaders. Thank you for always supporting and believing in me.

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## CHAPTER 1

### INTRODUCTION

Graphic design came into existence during the industrial revolution and has been heavily influenced by new developments in technology ever since. The invention of computers affected graphic design practice significantly; graphics software became one of the main tools for designers. These days, it is almost impossible to practice graphic design without the help of computers. New developments in technology are also influencing the designer's perspective. In his paper, "Design in the age of biology" Hugh Dubberly argues that "Emerging design practice is adopting something of the point-of-view or even the philosophy of software and service development—an organic-systems ethos" (Dubberly 2008). Graphic design practice is shifting from its traditional approach of designing objects and is leaning more toward a systems approach. A system is a set of things that work together to form a complex network, and, as graphic becomes more system-oriented, graphic designers are becoming responsible for solving more complex problems.

Over the past few decades, the focus of graphic design has shifted from object- to systems- to societal-level problems. Hugh Dubberly in another paper expresses that "The process of connecting things has already begun to broaden design practice from its traditional focus on stand-alone products to also include systems, platforms, and product-service ecologies" (Dubberly 2017). The systems approach in graphic design suggests providing services instead of stand-alone objects to customers. Figma, Lingo and Canva are some similar examples that will be analyzed in the following chapters.

VIA—the product I am going to focus on in this thesis—is a system that gives non-designers within a large organization access to visual identity assets so that they can create marketing materials themselves, while professional designers will be responsible for creating style guides and assets. This system will also suggest different templates and layouts to the users. This product can make graphic design practice more accessible for team members with different expertise within an organization. This idea that novice designers can create their materials or have more access to graphic design will raise

questions; what the role of graphic designers is and if they will lose their jobs in the future. These questions and concerns will be studied in this paper and will be addressed.

## CHAPTER 2

### DEVELOPMENTS OF SYSTEMS APPROACH

#### What Is System Approach?

The systems approach is a holistic perspective and is the opposite of reductionism. Reductionism focuses more on analyzing and breaking systems into smaller parts and then deals with those parts individually. However, in the systems approach, people look at everything from a bigger perspective. Systems approach studies all pieces together as a whole and looks into interactions between the parts. Systems scientist, C. West Churchman, the writer of the book *The Systems Approach*, and known as a founder of systems approach, defines a system as “set of parts coordinated to accomplish a set of goals” (Churchman 1968). From the twentieth century, the systems approach and its theory started in different fields from business to management to design. This approach considers things as a whole and solves the problems based on the whole network of pieces.

In reductionism approach of problem-solving, each part is being analyzed separately and is given a separate solution according to that specific problem. These solutions may have conflicts with each other and would make more bigger issues. With the systems approach, designers find solutions based on the whole system and consider all parts while connecting. “The systems approach looks to address problems while taking into consideration the consequences of any given action throughout a given system” (Brente 2008).

#### What Is Systems Design?

Systems design is designing systems with smaller parts inside it. Hugh Dubberly describes that systems design “implies a systematic and rigorous approach to design—an approach demanded by the scale and complexity of many systems problems.” In his interview with Dan Saffer, in 2006, Hugh Dubberly asserts that systems design originated before World War II when engineers “formalized their work in the new disciplines of information theory, operations research, and cybernetics. In the 1960s, members of the design methods movement (especially Horst Rittel and others at Ulm and Berkeley)

transferred this knowledge to the design world.” Design practice adopted this systems-oriented approach and centered more on creating networks and platforms. The advent of the internet in the twentieth century helped this approach to grow quickly in design.

Since that time, different services, networks, and platforms are rising (e.g. Airbnb, Uber, Amazon). These systems provide products and services to their clients at the same time. In the past, businesses were trying to sell independent products but now they are trying to deliver both products and services according to those products. Airbnb, as an example, is a platform that provides hospitality services around the world. Customers can use Airbnb’s website or its mobile application to book a place for their trip or they can also host other tourists. Airbnb does not own any of the hosting properties, and the only thing it provides is the experience for their customers. It is a good example of the systems approach; Airbnb focuses on the interactions of parts within the system rather than the parts themselves.

#### Developments of Systems Approach in Graphic Design

As design is shifting from its traditional path, from a focus on objects (i.e parts) to systems (i.e. interactions), the designer’s role is changing. Designers now are responsible for designing networks, services and platforms. Somewhere in his interview, Hugh Dubberly says that “Today, ideas from design methods and systems design may be more relevant to designers than ever before—as more and more designers collaborate on designing software and complex information spaces.” To explain this idea better, I’m looking into the development of systems approach in graphic design during history.

One of the first attempts of creating a system in graphic design is the AEG (Allgemeine Elektrizitäts-Gesellschaft) corporate identity designed by Peter Behrens in 1908. In 1907, Peter Behrens became the artist advisor for the AEG company. “It was at AEG that he created a unified and comprehensive visual brand for every aspect of company—office buildings, factories, products, retail outlets, and print communications material” (Poulin 2012). He designed their logo alongside with a standardized program which consisted of a trademark, a typeface and a system for the layout of the elements. This visual system was for bringing consistency in all of the design materials of the company. Later in the twentieth century, that became a necessity for most industries to have a corporate identity.

The brand identities moved even further and besides the visuals included standards for brand image and communication with customers. This approach moved further in graphic design, and later we saw the rise of companies and businesses that started providing design materials and packages of photos, illustrations, fonts, etc. Shutterstock is an example; it provides stock photos, stock footage, and stock illustrations for designers. It is a big library of supplies, and it is a platform to help designers with their needs for resources like images and icons.

Jonathan Oringer, the CEO of Shutterstock, started the website by selling 300,000 of his images, and when he got more demands from his customers invited other photographers and businesses to help with creating supplies for the company. He created a marketplace for crowdsourced images where photographers can sell their photos, and designers can buy those based on their needs. The systems approach developed even more in the design field, and nowadays, we see the rise of platforms that provide design services to designers and non-designers. Logomaker and graphic design websites are some of those examples. For instance, Canva, a cloud-based graphic design tool website (which will be studied later), offers a simple system to non-designers and professionals to practice graphic design. This platform has made design accessible for everyone and even those who do not have any knowledge of visual communications. These cases illustrate how design has moved from objects to systems.

## CHAPTER 3

### CASE STUDIES

#### Case Study 1: Canva

**Introduction:** Canva is a web-based graphic design tool made for democratizing graphic design and making its process comfortable for everybody. In 2007, Melanie Perkins, founder of Canva, created a system for making school yearbooks and later expanded that idea and designed a platform named Canva. Canva enables its users to develop visual communication materials with merely dragging and dropping elements inside a cloud-based website. With studying this case, I will look into how a systems approach to design can solve some of the design problems.



Figure 1: Canva's Logo

**Description of the situation:** Designers usually practice graphic design with adobe software or similar sophisticated tools. Traditionally, non-designers used to reach to a graphic designer for creating any visual communications they might need for print or digital mediums. It has always been hard for regular people without any knowledge to do graphic design with nobody's help. Practicing graphic design requires enough understanding of how visual communications work. Also, designing with Adobe software or similar tools seems complicated and intimidating for a regular person. In addition to all of that, paying designers are expensive for ordinary people. In short, practicing graphic design for non-professionals is difficult and costly.

**Description of solution:** Canva solves this problem by attempting to make graphic design available and approachable for everyone. Canva is a free program that has changed the creation process to a drag and drop system. It is a website where anybody can create an account with and use its design tools freely. The platform has a simple user flow for any users (professional and non-professional) and provides tools for creating any visuals. It consists of a big library of templates, photos, and other assets needed for design. Users can choose from various types of templates with different formats and sizes and customize them based on their need. These templates are made for both print and digital media with multiple arrangements.

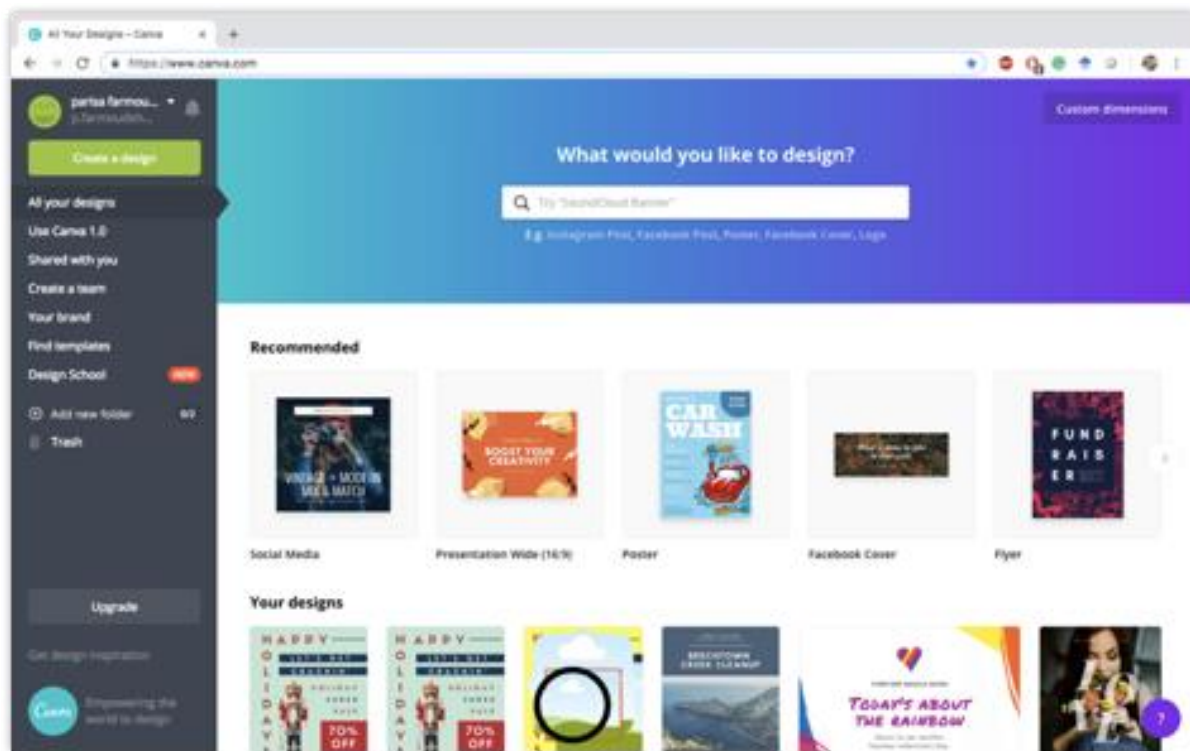


Figure 2: Canva's Interface

**Outcome:** Instead of offering a single product, Canva provides a system that resolves a couple of problems at the same time; Canva has made the design very simple for non-professionals, has made the creation procedure not intimidating anymore, and made the program free and available to everyone. Besides helping non-designers to do the basic design themselves, the app is a great platform to share works with other people for collaboration. Canva solved the problem by offering a system that changed



the process of design for non-designers and made it more intuitive. It has an effortless and understandable user experience for novice designers which does not require spending time to learn. This program is now a popular tool among non-designers worldwide.

Although it is a trendy application among non-professionals, Canva is not a successful program from a professional standpoint. The program does not teach any skills to non-professionals and provides templates that have already been designed. Since non-designers do not have any knowledge of graphic design, when they edit premade templates, they are very likely to ruin the work. They don't have any understanding of typography, grid system, or color theory and can destroy it without even noticing. As a result, the final product will usually unappealing from a professional perspective. The other problem with this platform is that the templates do not follow any specific rule or guideline, and they are made very random. If a non-professional needs to use any of them for any purpose in an organization, it will not follow their original brand identity. In all these cases, there is still a need for a graphic designer's eye to make sure the results are not unpleasant. Also, this program is more planned for layout design and does not have enough design features for professionals. To conclude, Canva needs more development to fulfill all the requirements for creation.

### **Case Study 2: Lingo**

**Introduction:** The second case to be studied in this thesis is Lingo; Lingo is a style guide organizer, a design systems manager, and an asset library for UI components. Like Canva, Lingo is a cloud-based platform that could be used as a desktop application or through their website. This application is for keeping brand consistency and sharing brand assets in one place. By looking closer into this system, I will examine how it is a successful service, and if it could be a solution for organizing design resources in a corporation.



Figure 3: Lingo's Logo

**Description of the situation:** Usually documenting and sharing visual assets for corporations is difficult and time-consuming. These days, the design is changing very fast, and companies need to update their brand materials very often. The problem is that the traditional way of storing these materials is inconvenient. It takes a while for designers to document style guide materials, and when it is about to get ready, they need to upgrade them again. Also, for managing different formats of files, versioning them, and sharing with the rest of the team could be another hassle.

**Description of solution:** Lingo offers a system to solve all these connected issues at the same time and provides a site to organize all these files in one place. It is a hub for visual UI components and a library for brand assets. It has tools for versioning files to keep up with all changes that continually might happen to design files. Users can easily browse through the archives and find needed documents. Lingo can store logos, photos, icons, illustration, colors, fonts, and anything else that is required for a brand and it can support all file formats.

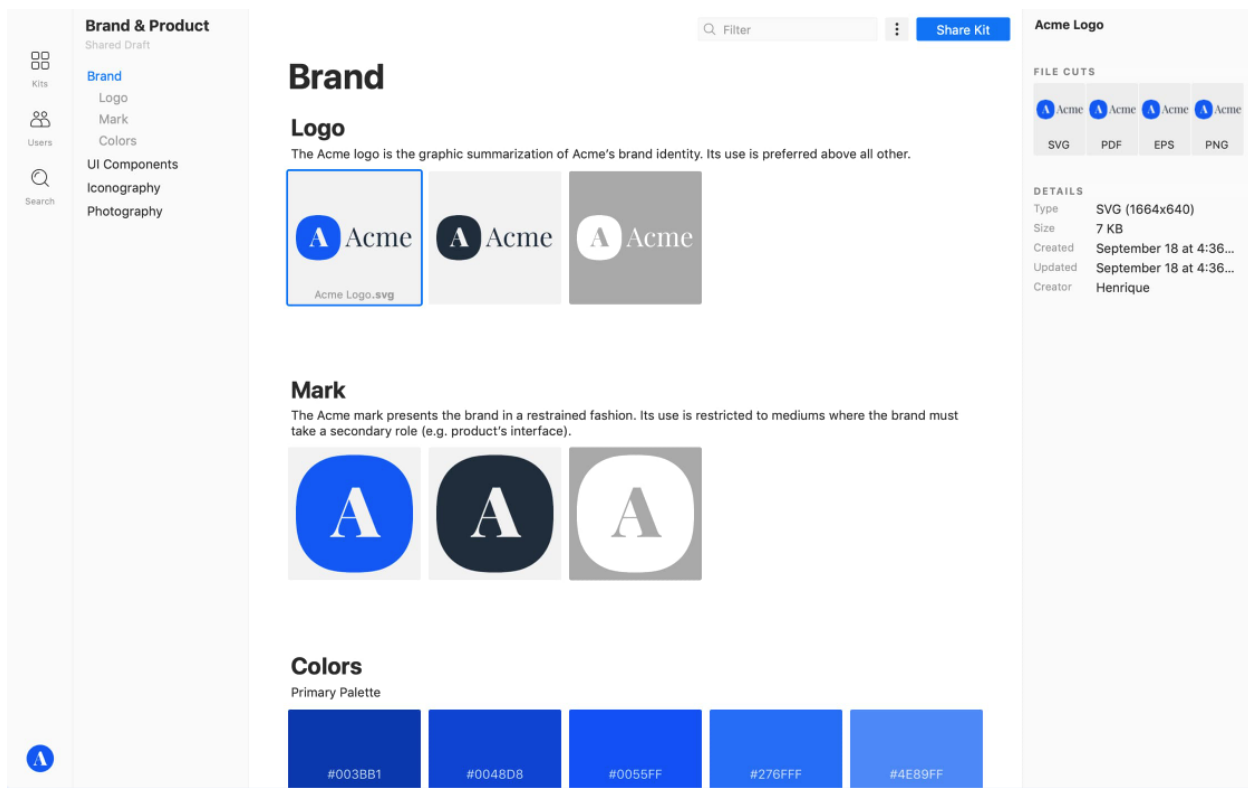


Figure 4: Lingo's Interface

**Outcome:** This application is an excellent example to demonstrate how a system can puzzle out many connected issues at the same time. Not only this application resolved design organization troubles but also made collaboration much faster and more comfortable for teams. Keeping brand consistency and sharing updates are more convenient with this system, and team members could be notified of new versions instantly.

### Case Study 3: Figma

**Introduction:** Figma is a browser-based collaboration tool for user interface design. The program is like Sketch App with the same features but in a browser format. The platform enables designers and developers to do live collaboration through a website and helps the team members to see all changes and edits instantly. The goal of this program is to solve the existing workflow issues for designers, developers, and other team members. The founder of Figma, Dylan Field, says Figma’s goal is “to eliminate the gap between imagination and reality. We can make tools that allow people to express themselves and get ideas out of their heads” (Constine 2015). Figma is designed to reduce the amount of the work designers have to do for sharing design files and collaborating with other team members. In this case, I will look into how Figma as a system could solve workflow problems.



Figure 5: Figma’s Logo

**Description of the situation:** In the current interface design workflow, there is a big gap in communication between designers and developers. Usually, designers use programs like Sketch to design

interfaces, then export the design and components out of the program, and after that upload those components to a shared cloud for developers that they can access to them. Each time that they make a new change to those files, they go through the same process. In this situation, sharing and collaborating the files takes more time than the creation process. “If one team member wants to change an icon, they have to find and download the latest design, check email or Slack for commentary, make an edit, save it, export it, upload or email it, and then wait for everyone else to jump through these hoops.” (Constine 2015).

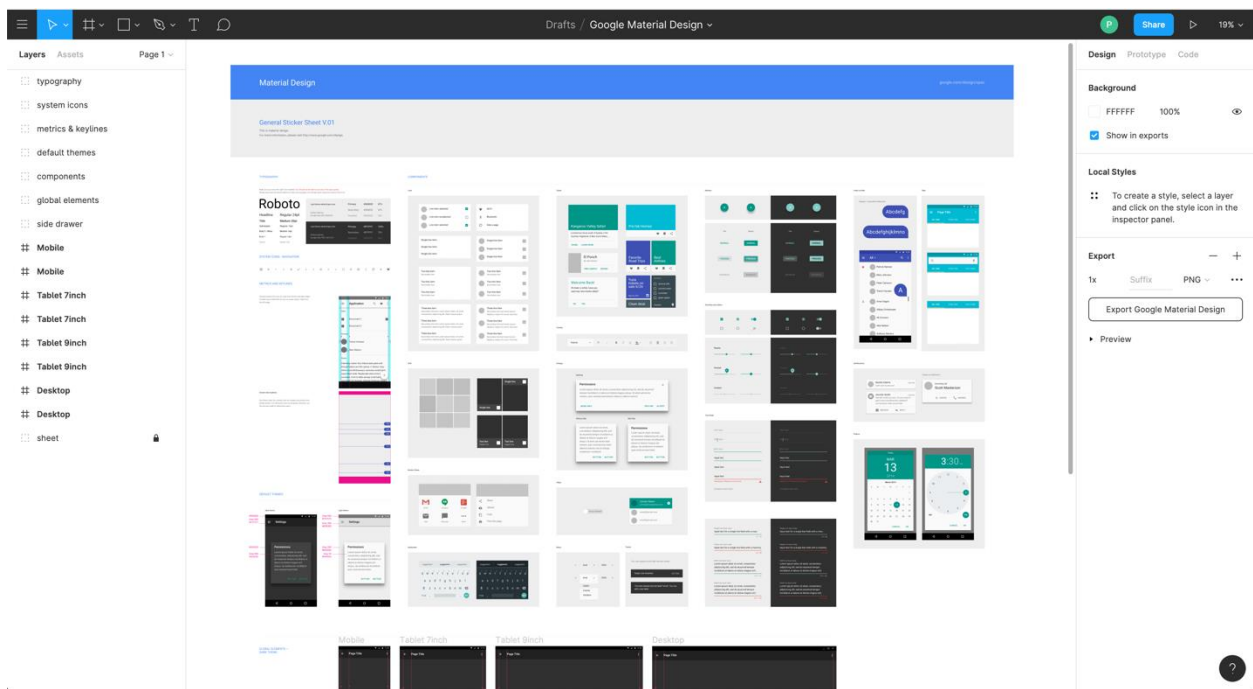


Figure 6: Figma’s Interface

**Description of Solution:** Figma has solved this workflow problem by providing a platform for design, prototyping, and collaboration all at the same place. “Figma wants to do for interface design like what Google Docs did for text editing” (Constine 2015). Figma is a sharable platform that let everyone to have access to files, download or update them. Users can comment about files, get feedback, and update the design inside the browser. The platform also provides codes for developers; anything that is built inside this platform turns to SVG code, CSS, and iOS and Android code. Developers can easily click on

each element and get the code. Figma is also a place for building design systems and assets library. It is a place for contents and different versions and phases of design. The benefit is that the platform runs in a browser, and there is no need to do any program installed on your computer. Additionally, it runs on any system, and users can run it on a Mac, Windows, or Linux.

**Outcome:** This case is an example of a systems approach to solve sharing and collaboration problems; by looking at this problem from a bigger perspective and considering all the parts together, issues could be addressed wholly. In this case, several issues are solved together. Figma is solving workflow problems between teams, and besides that increases efficiency in the design process. This platform reduces the amount of time and energy people used to put in designing interfaces and eliminates continually sending files through emails or clouds. It gathers all the materials teams need at the same place and make them more productive. Team members can do all the design from zero points to one hundred percent finished all in the same place.

## CHAPTER 4

### VIA

**Introduction:** VIA is a system for solving print and marketing design process issues. It is a graphic design platform for empowering designers and non-designers to practice graphic design and collaborate more efficiently. In this project, I will investigate how suggesting a system like VIA could solve several workflow problems.

**Description of the situation:** Usually, in any company or organization graphic designers are responsible for creating design materials for marketing and advertising purposes. These materials need to follow the company's style guide and should be consistent with other works. Designers are responsible for making sure that any new design has continuity with the company's brand identity. That is why a non-designer cannot be responsible for making any material since they do not have enough understanding of the company's guidelines. However, there are situations where there are no available designers, and non-designers need to create or edit some of the materials themselves. Usually, the result does come out pleasant, and non-designers have to wait for a professional to take care of that. The problem is sometimes doing this kind of requests and edits does not require much time, but designers are overwhelmed by other tasks at the same time, and they get to do them very late. This situation is an example of a traditional design workflow.

**Description of the solution:** VIA offers a new workflow that solves the existing design process issues. It is a platform that lets designers create templates with their company's brand guidelines and share them with other team members. In this platform, designers set parameters on design files and let non-designer to change the content of templates. Designers decide what elements and parts of the design could be changed and what should be locked and cannot be modified. In this way, non-professionals cannot ruin the guidelines, and the results will stay visually pleasing.

**Outcome:** VIA is changing the design flow and makes it shorter and more comfortable for both professionals and non-professionals to collaborate quickly and efficiently. In this new design flow, the

process is faster, and non-designers do not have to wait for a long time. It also makes graphic design more accessible for novice designers and helps them to practice graphic design.

### Users

VIA is designed for three main users; designers, non-designers and purchaser. These people could be from any age group. Designers are people who create visual communications materials by using typography, illustration, and photography. Non-designers are people who don't have enough studies in the area of visual communications, but they are interested in creating design materials. Purchaser is people who have this authority in an organization or a company to decide what tools to provide for their goals.

### Personas

**Designer (expert user, graphic designer, art director, marketing designer):** creative, easy to learn, user-friendly, efficient, excellent user interface, good user experience

**Non-Designer:** not intimidating, approachable, welcoming, quick, friendly, simple, practical, easy, understandable, motivating, joyful

**Purchaser (graphic designer, art director, marketing director, creative director):** professional, efficient

### VIA User Testing

Different sessions of user testing were conducted to observe the user experience within the platform. These sessions had two parts with two types of users and tasks. One part was for designers, and the other part was for non-designers using the non-designer section of the platform. After doing the test, modifications were made based on the outcomes.

*Designer View: Tasks:*

1. Enter their username and password for logging in to the platform
2. Find the "Create New" button
3. Find the "Insert" button
4. Find the "Save" button

5. Guess what other buttons are
6. Create a new template
7. Lock and unlock layers and elements in a file
8. If there is any tool that they might need, and the platform does not provide
9. If there is any complication in the process
10. What do they think about the User Interface? If it is user-friendly?
11. Set grids and margins to the file
12. Import a pre-designed file from other folders
13. Set font size for the content in the file
14. Set parameters for each layer of the document

Designer #1: The user easily entered username and password and logged into the website (Fig. 7). He was asked to locate the “New” button for making a new template. The user looked at the top left of the page and clicked on the menu icon, instead. It took awhile for him to find the right button for creating a new document (Fig. 8). After clicking on the “New,” a window popped up. This window had setting options (ex. file name, dimensions, grids, and margins) for any document. All parts were clear and understandable for him (Fig. 9).



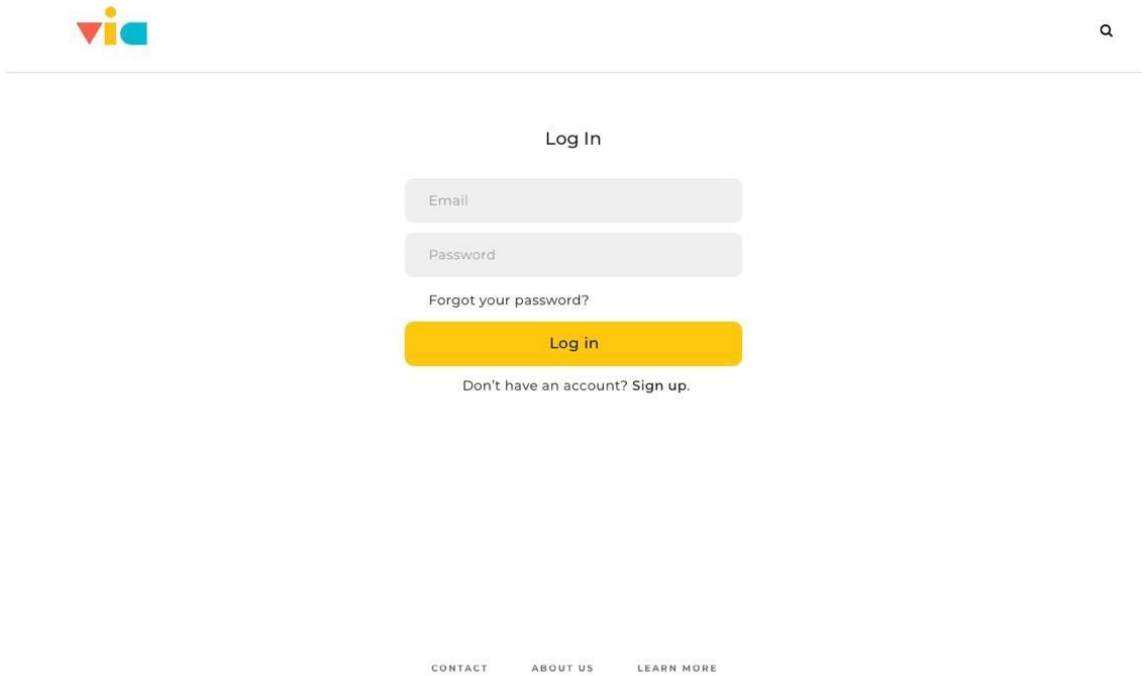


Figure 7: VIA Log-in page

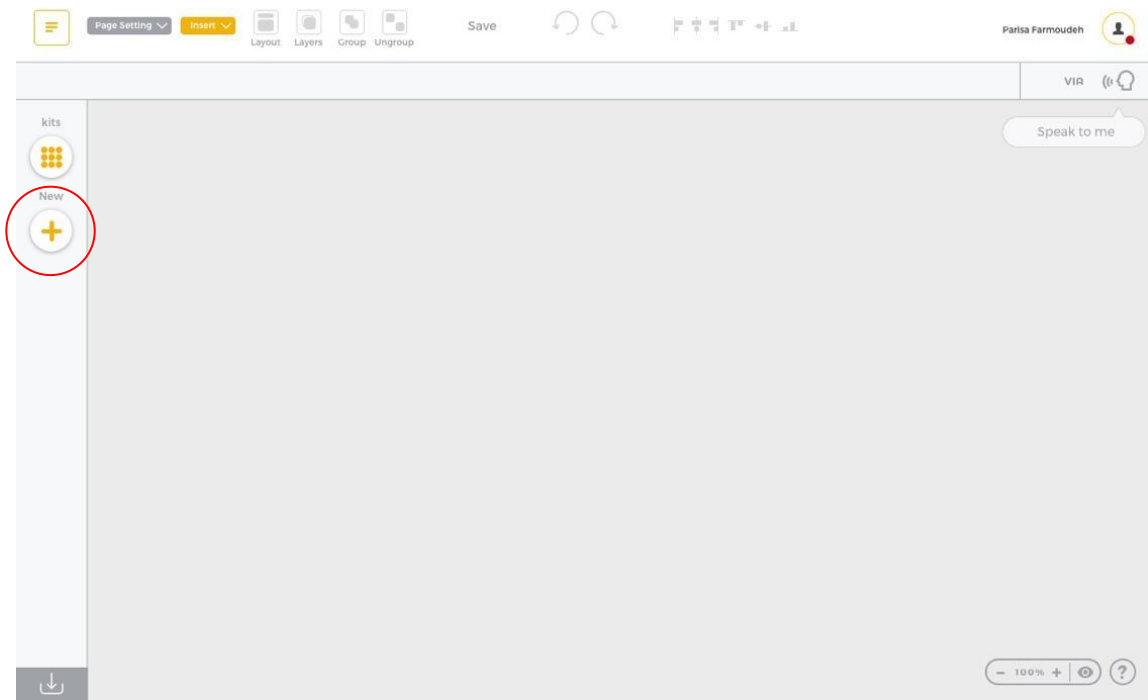


Figure 8: VIA home page: the “New” button is for creating a new document.

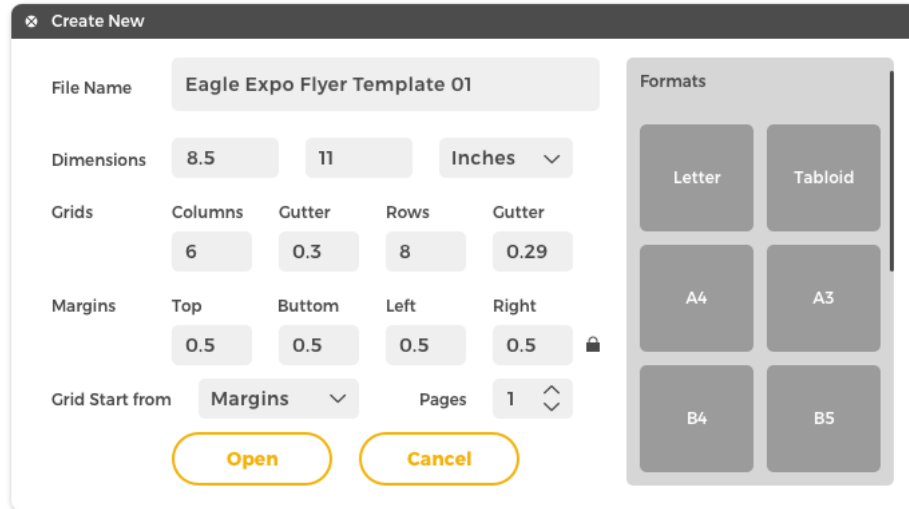


Figure 9: Create a new document window

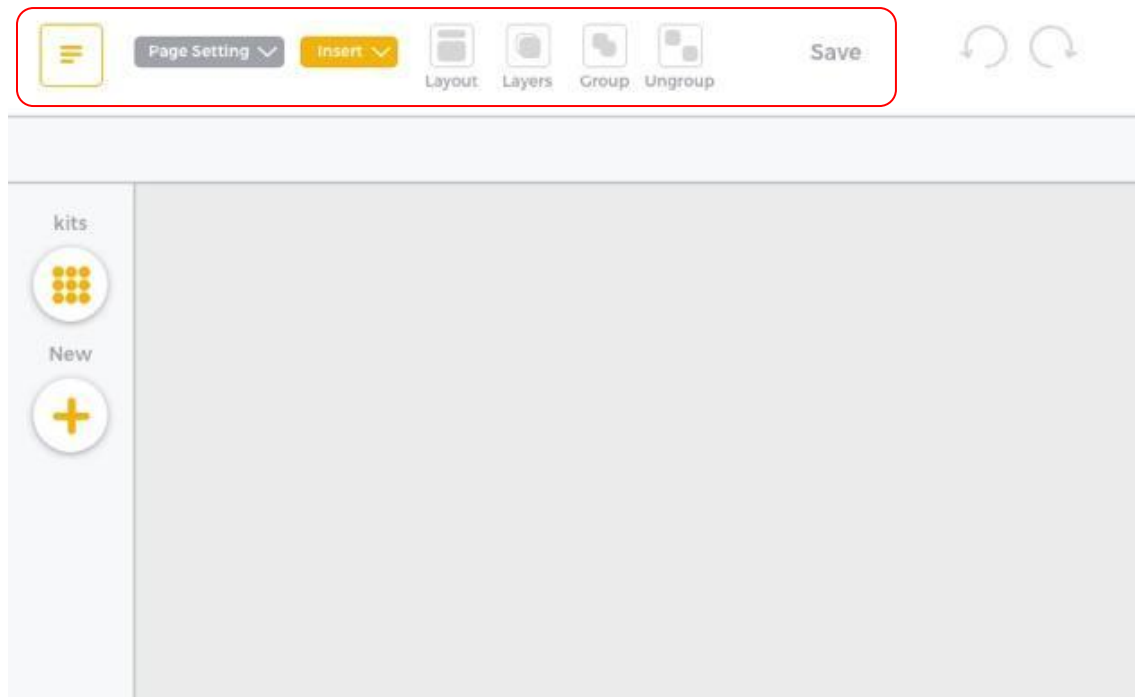


Figure 10: The menu icon, “Page Setting,” “Insert,” “Layout,” “Layers,” “Group,” “Ungroup” and “Save” on the top left corner of the VIA home page

On the top left corner, the menu icon, “Insert,” “Layers,” “Group,” “Ungroup,” and “Save” buttons were clear for the user (Fig. 4). Each time the user was asked to do a task, he was first reaching to the menu icon before doing anything else. This reaction shows that the top left side of the home page of VIA, where the menu icon is located, is the first spot that user would click to find needed tools or features. The “Page Setting” is designed to give access to the designers for changing document settings such as the dimension of an open document or setting grids and margins to the file. The wording “Page Setting” for this button was confusing for the user (Fig. 4). He suggested that a name like “Document Setting” would be more understandable for him. According to the user’s experience, all of the features on the top left of the page were obvious for him (Fig. 11).

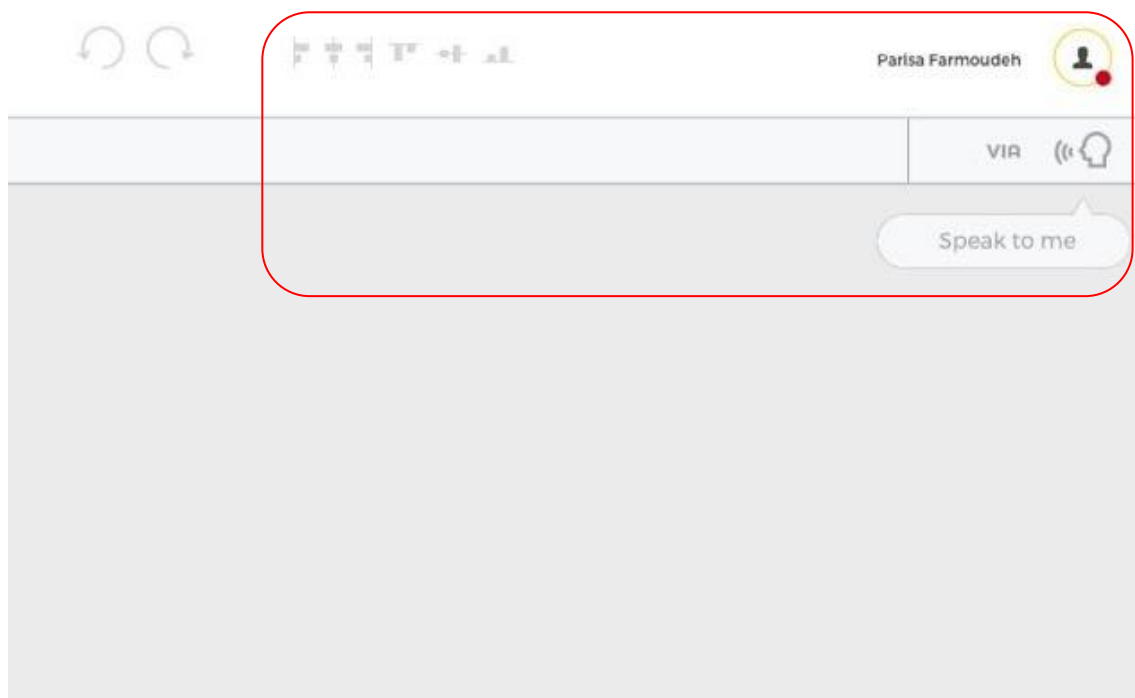


Figure 11: The alignment, profile, and the voice command feature icon on the top right side of the VIA home page

At the bottom of the page icons like zoom in/zoom out, the info and download were distinct as well. (Fig. 12)

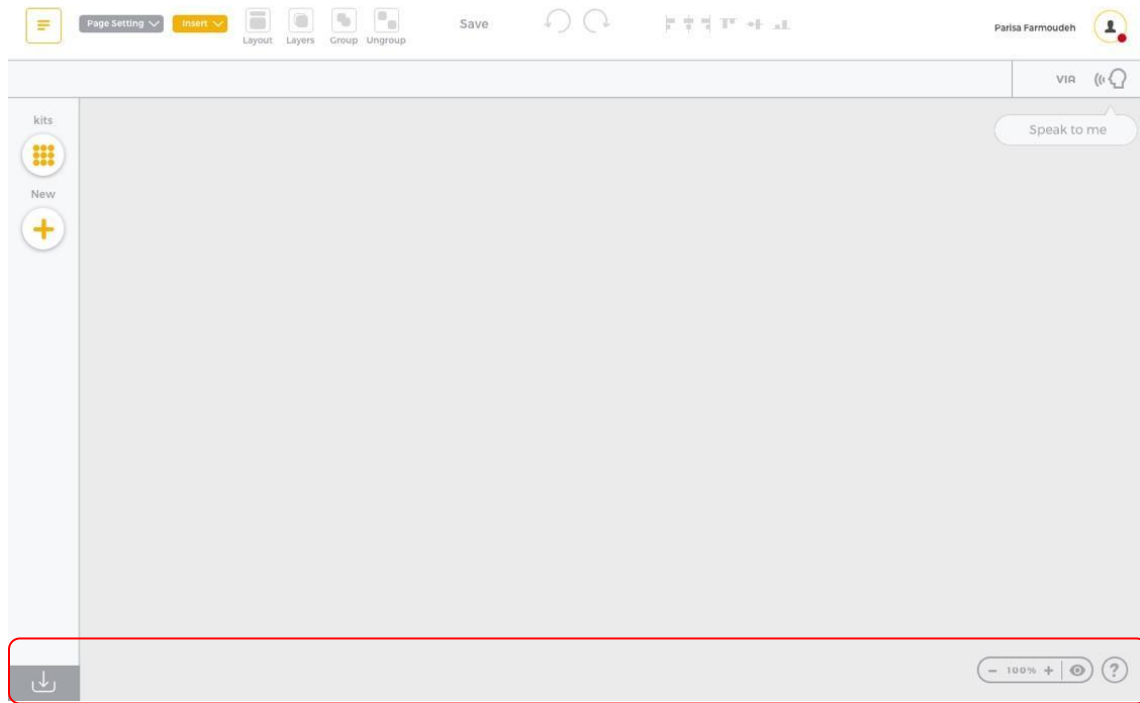


Figure 12: Zoom in/zoom out, the info and download icons at the bottom of the VIA home page

The user was requested to insert the pre-designed file into the template he was creating. Then he was asked to lock some of the layers of the document for non-designers that they cannot manipulate that. It took him 5-6 seconds to find the “Lock” button (Fig. 13). For activating each layer of the file, users need to click on each object to set parameters for that. Also, there is this option on top of the toolbox that is named “Layers.” The user tended to use the “Layers” option over clicking on elements (Fig. 13). In the end, he was assigned to save and close the file. The closing icon was tiny, and he could not find it (Fig. 13). The operator was concerned about the location of the file and asked where the file was stored.

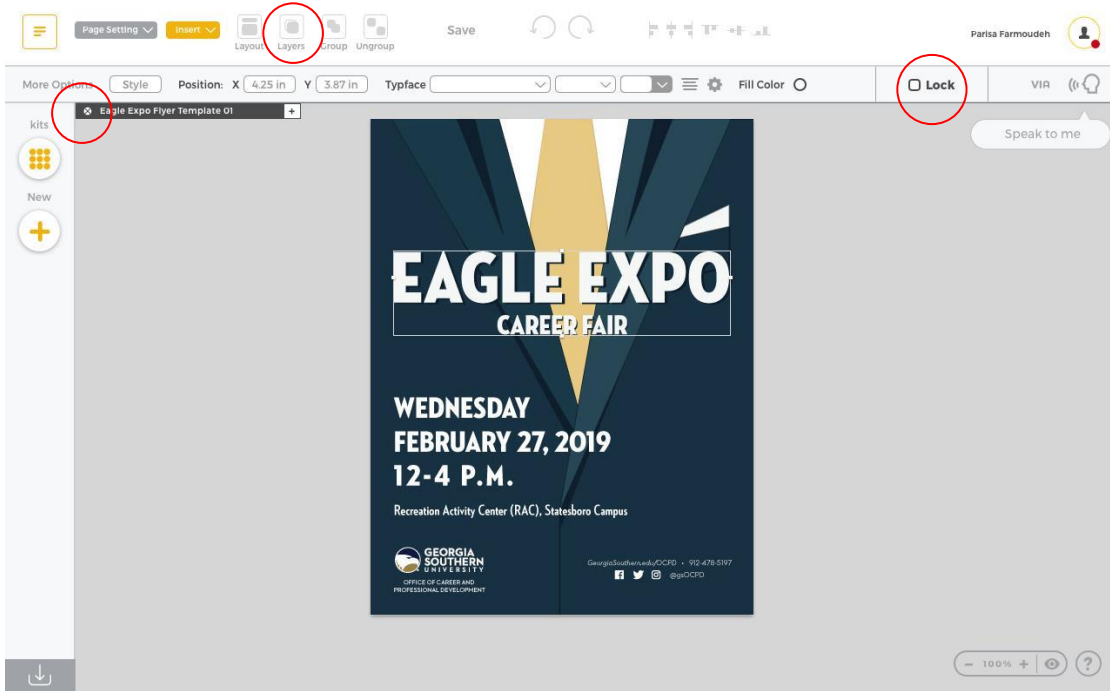


Figure 13: “Layers,” “Lock,” and close button on the VIA home page

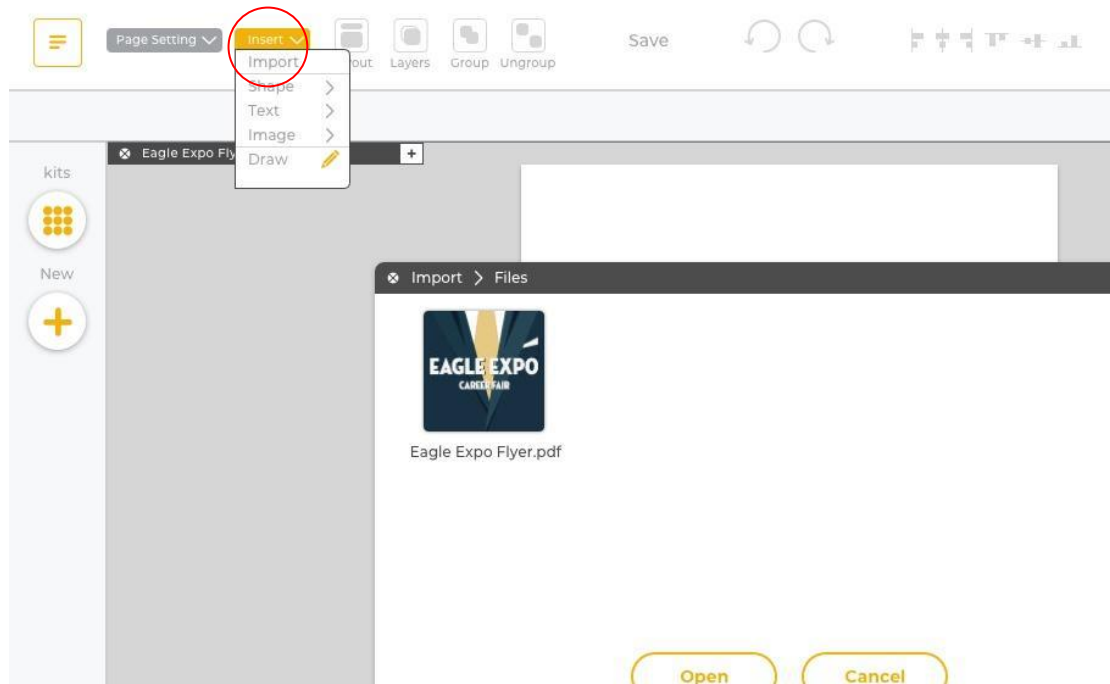


Figure 14: “Insert” button on the VIA home page

Designer #2: In contrast with the first operator, the second person found the “New” button very quick (Fig. 8). She could also locate the “Insert” button easily (Fig. 14). She was questioned if she can figure out how to use VIA text features and set parameters to a text box (Fig. 15). Setting parameters for text boxes is a new feature proposed by VIA platform which allows designers to insert a minimum and maximum font size to each text. These paragraphs will be open for non-designers to add the amount of content they need. When non-designers change the body text, based on the number of words they enter, the size of the font will change to adjust itself within the box. At first glance, it looked confusing for her, but after learning how the system works, she claimed that it would be easy for her from then. She asserted that if there be a tutorial at the start page to show new features will be more helpful for designers to understand them. The operator declared that adding a name or explanation to each button would be useful.

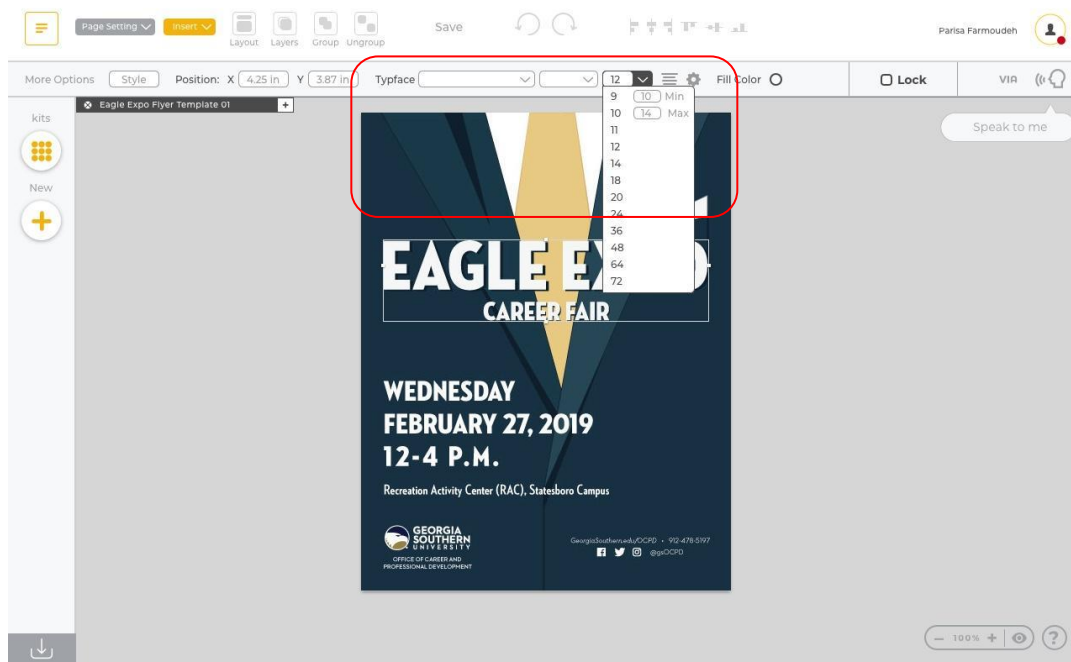


Figure 15: Text box settings in VIA home page



Figure 16: Redo and undo icon at the top toolbar in VIA home page



Figure 17: Zoom in, zoom out, preview, and info icon at the bottom of the VIA home page

The user was questioned about the rest of the buttons and tools and if they are approachable and user-friendly for designers. Among them, the redo and undo icon were unclear for the operator (Fig. 16). She misinterpreted them as a rotation tool. Also, the designer was uneasy with the zoom in, zoom out and preview icons that are located at the bottom of the page. She declared that they would be more accessible if they were located somewhere at the top toolbar. The user believed that these features are much more important than the info feature and should not be grouped (Fig. 17). The download button at the bottom left of the page was not transparent, too. (Fig. 18)



Figure 18: Download button at the bottom of the VIA home page

When the designer was asked to save and close the design file, she could not find the close button, like the first person. She was looking for the icon on the right side of the screen. The second reason she claimed for not being able to discover it, was the dark color of the design (Fig. 13). It made the button invisible. For saving the document, she reached to the menu at the top left of the screen. She expressed that the menu button is the first location she would think about the location of the saving



option. The overall experience for the designer was comfortable. Interface design and colors were elegant. At the end of the user testing, the operator suggested adding explanations pop up to each layer, for active elements inside a file.

*Non-Designer View: Tasks:*

1. Enter their username and password for logging in to the platform
2. Find the design “Kits” and open the Eagle Expo Design Materials
3. Open the Eagle Expo Flyer Template
4. Change the date and time inside the file
5. Change the location information inside the file
6. Upload a new logo and resize it
7. Save the document and close it
8. Guess the buttons functions

Non-designer #1: The first non-designer started with entering the username and password to log into the page. The first steps of getting into the page and starting the alteration of a template went smoothly and with no problems. When it was time to do task number 6, which was replacing a new logo with an exciting one, the user pondered and looked at the screen for a while. She clicked on the logo several times to see if a window or any information may pop up. She could not discover the Replace button which was standing at the top of the page (Fig. 19). This experience showed that the replace option was not intuitive and transparent. Then user was demanded to save the file; she could locate the save button effortlessly, but the save window opened she complained about not having the save as option.

Through the testing process, the user suggested adding a chat box window to the platform to allow non-designers and designers to speak during a design or modification process. As another suggestion, the operator proposed the idea of adding the spell-checking feature to the website; She mentioned issues such as the misspellings that happened to her so often.



Figure 19: The “Replace” button on the top menu of the VIA home page

Non-designer #2: The second operator was very comfortable with the first tasks. Like the first person, she had some trouble with doing the task number 6, and it took awhile for her to figure out the process. The non-designer #2 claimed that she required more options and features for replacing a logo or image in a document; like keeping the original logos and images somewhere that if she changed her mind, it could go back to how it was at the beginning. The task number 8 was uncomplicated for the non-designer, and she could judge the function of most of the buttons based on their looks. The user stated that it would be very accessible for her if all the buttons have a name or explanation under them.

## CHAPTER 5

### CONCLUSION

Today the growth of systems approach in graphic design is inevitable, and designers now are responsible for solving issues entangled within systems. In this thesis, I tried to illustrate the improvement of this approach in the history of graphic design by making examples and studying similar cases. As a part of my thesis, I exercised the same approach to solve traditional graphic design practice issues. I proposed a system called VIA, which creates a new flow for designers and non-designers to collaborate efficiently. VIA tries to make graphic design accessible for non-designers and reduce the amount of time designers usually used to spend. This project raised many questions like VIA would get jobs from designers and enable non-designers to do graphic design themselves. However, the answer is as design tools are becoming more convenient, graphic designers are becoming responsible for more significant and complex issues. Designers can save their time by assigning simple jobs to machines (like VIA) and spend more time figuring out solutions. Therefore, the designer's role will not disappear, although its focus will change, and designers will have to deal with more complicated systems in the future.

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