

# SYNTHESIZING USER INTERFACES AND MOTION GRAPHICS

A Literature Review

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## ABSTRACT

Today's technologies utilize the incredible speed of computational processes and the interconnectivity of data to provide users with a multitude of ways to synthesize information. The interfaces by which users interact with this data create a flexible experience, allowing the user to understand the information in a variety of ways. Despite the intended versatility of these user interfaces, roadblocks such as unclear system messages and abrupt changes in the display create confusion within user interactions, stifling the medium from enabling truly immersive experiences.

Like user interfaces, motion graphics are created with an audience in mind and can be developed under the mantra "form follows function." In this realm, a particular focus is usually placed on creating an experience where the audience is able to follow along and understand the content as it is being presented, but it is rarely customized to allow for each person to experience the presentation of the information in its own way.

User interfaces and motion graphics can be used together in an effort to provide a more impactful experience in which people can interact with and understand data. Combining animation with interactive tools augments a person's the ability to understand and process information by articulating relationships between data sets.

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## INTRODUCTION

The development of new technologies over the past few decades has given us an increasing number of ways to process and understand data. Every day we gain more access to new sources of information and the ways in which that information is displayed rapidly grows and changes as well.

Two ways we currently receive information are through user interfaces, which expose data stored on computers, and motion graphics, which augment our ability to understand how information transitions between forms. Both of these mediums for information processing integrate design principles and user-centered methodologies into their development processes. The overlap between what those principles and methodologies are and how they are applied through design suggests that the two mediums combined create a more effective context for translating information into knowledge than either medium on its own.

## CONTEXT FOR DESIGN

Design as a concept provides a broad context for discussion among a variety of groups, including but not limited to engineers, artists, scientists, psychologists, technologists, and historians. Because of its breadth and use across disciplines, though, the word “has now attained a sort of autonomous existence”[1] because it has a different meaning for each discipline, creating confusion in interdisciplinary contexts and making it difficult to use the word design as a means for focusing a discussion. Providing a definition of design is, therefore, paramount to minimizing confusion in discourse involving more than one field of study.

Since World War II, design has been broadly seen by a diverse pool of fields “as a problem-solving and decision-making activity,”[2] or more specifically “a process... which results in the intentional development of things.”[3] Defining what those “things” are is what has led to the multiple interpretations of design, especially when we attempt to differentiate between what “things” can be designed and what “things” are really developed through a different process warranting its own name. For instance, Raymond Willem suggests that “design makes science visible,”[4] which favors a focus on engineering, science, and technology (and compliments his mechanical engineering background), whereas Per Galle (a civil engineer who reviews literature on design philosophy) considers design as “a primary human function on par with thinking and feeling,”[5] allowing for more abstract applications.

Placing the term design in a context with motion graphics and software interfaces, the definition for design in this discourse needs to incorporate both scientific and artistic aspects. The definition also needs to provide lenses by which both fields can be analyzed and compared. For these reasons, I am defining design for this context as the process of translating data from raw information into more human-digestible formats.

## CONTEXT FOR USER INTERFACES

User interfaces are developed through what we can call a design process because the ultimate product is intended to translate information from a machine to an end user. Since machines understand data in terms of bits and bytes, we rely on the interface's human-centered approach to data so that we can process the information too.

In early days of modern computing, the visuals used to interact with a computer were “relatively simple, but often awkward textual input and output” [6] devices, and were classified as a subset of objects called “I/O Devices,” [7] which provided input (I) and output (O) communication between the user and machines. The keyboard is an example of an early input device and the printer an output device, but the visual displays we know as user interfaces served both functions due to touch (input) and display (output) capabilities.

As these I/O devices became more complex and interfaces adapted to their diverse role as both input and output translators, their place as communicators between humans and machines became more apparent. In an article on the future of user interfaces, Aaron Marcus and Andries van Dam provided the following insight on user interfaces:

The purpose of the user interface is to facilitate user-computer communication by enveloping hardware and software, particularly the semantics of applications, in a dialogue. This dialogue hides the structure of input/output devices, operating systems, networks, and applications, and lets the user switch applications rapidly, unencumbered by technical mechanisms [6].

Though Marcus and van Dam's article was published in September 1991, their explanation of why user interfaces matter is still true today, and the development of these interfaces has expanded to support new features for this dialog. The user interfaces of today showcase a wider variety of color, higher quality of touch and multi-touch interaction, and greater understanding of graphic frameworks [8] than their predecessors. They have also grown beyond their mainly visual realm to other senses, including “understand[ing] spoken requests and gestures,” [6] and creating the notion that, through the user interface, a computer can be a “universal machine” [9] because of its ability to diversify inputs/outputs and communicate a variety of information for the user through the interface.

## CONTEXT FOR MOTION GRAPHICS

Another medium created through design is motion graphics, which in its broadest sense describes images that portray movement. Credited to Eadweard James Muybridge in 1884, motion graphics began as a study “to use photography to freeze rapid action” [10], capturing multiple static images/frames per second and showing these images back to an audience in a fast-paced way, creating the illusion of motion. While advancements such as the research by Harold Edgerton (who is considered the father of high speed and stop action photography) [11] and new technologies in both film and computing have allowed for more complexity in motion graphics, the field has

retained this core process of producing the illusion of movement through showing a sequence of still images.

Though the actual motion that occurs in motion graphics is an illusion composed from still images, the information portrayed in a motion graphic transcends any particular frame. Through transforming elements of a graphic by changing their size/shape/color/ texture, translating elements between positions, or transitioning elements by adding or removing them from the graphic, motion graphics allow their audiences the potential to process more information at one time than their static counterparts [12]. Instead of pictorially through marks and gestures or written through descriptions, motion graphics allow us to visually see connections in an organized and guided fashion.

Expanding on this idea that the motion aspect of motion graphics “is able to convey a vast amount of information in a short period of time”, motion graphics also “holds the promise of allowing... new and powerful ways to comprehend complex phenomena” [13]. Imagery with movement has given us the capability to both slow down and speed up time in order to better understand topics such as how water droplets behave when splashed on a car windshield or the effect of global warming on sea levels. Computers have assisted with creating many of these effects and have been identified as having “numerous advantages over other techniques for creating minimal motion displays” because motion graphics generated by computers “are far more flexible and easier to create than are physical mechanisms constructed to produce desired motions” and “can be easily programmed to display violations in natural dynamics (events in which the laws of physics are violated)” [14].

Therefore, in its largest context, the term motion graphics can be used to broadly describe any sort of animation or image with perceived movement. Creating a motion graphic can be seen as a design process since the product allows people to see and form relationships between static image data, primarily through the use of vision. However, because this definition can cover anything from a sculpture to film, this text will more specifically focus on motion graphics defined as a medium utilizing digital imagery and showcasing movement.

## USER-CENTRIC METHODOLOGIES

In design, one of the questions asked in the initial part of the process is who is the user, or who is our audience? User-centered design places the highest priority on answering this question, for “user-centered design emphasizes that the purpose of the system is to serve the user” [15] rather than the main purpose of the design to be exposing a certain amount of data or creating an aesthetically pleasing piece.

Making the user a central part of the design process can be done in several different ways. Participatory design, for example, is a method of “design in which the people destined to use the system play a critical role in designing it” [16]; this is done by inviting future users to participate throughout the process in different aspects ranging from initial brainstorm to final prototypes. Another approach to a user-centered design is through ethnography, or having designers “look at

naturally occurring situations holistically and from members' points of view" [17] or in other words using observation as a means to better understand the users and their environment. If designers not only observe, but intervene with an environment, this is known as empathetic design [17]. These three ways are by no means an exhaustive list of ways to create a user-centered design process, but indicate a variety in the ways in which users can become a central part of the process.

## INTERACTION DESIGN

Human-computer interaction, product design, front-end engineering, and information architecture are all terms used to partially describe the study/process of creating a user interface. All of these terms have additional components, though, and in many cases see interfaces "as tools that manage a computer or computer software" [18] rather than a user-centered experience. To use a term that regards user interfaces "as frameworks for exploring content" [18] and places the user at the center of those frameworks, the terminology most appropriate is "interaction design[, which] fully recognizes itself as a 'design discipline' in that its ultimate objective is to create new and change existing interactive systems for the better" [19]. We can define interaction design as a user-centered experience because throughout the process, the focus is on what and how the user will experience the interface, and often times the user is invited to become a part of the process by participatory design or ethnography.

The interaction design processes is centered around creating an experience for the user by using interactions as a way "to seek to intervene and manipulate, aiming to convert an undesirable situation into a desirable one" [20]. After defining what the situation is (what is the content, who are the users, where is the content used, etc.), interaction designers synthesize their gathered information "in order to understand how [content]... might impact the design of an interface to that content" [18]. A particular emphasis is placed on discovering moments where the content can benefit from an interaction, which occurs "when one agent creates and then communicates a message to another, to accomplish a particular task" [21]. An agent in this case can be a person or a machine, and the moment of interaction is a point where the system as a whole gives and responds to feedback in an audial, visual, or tactile way.[6]

An interaction designer can create a state transition chart (also called a site map) to visualize these connections between content and interactivity. These sketches "describe the states that that are possible for a given system" and function such that "every node [in the system] represents a state in the input sequence" or a moment of interaction [22]. State transition charts provide a way for designers to sketch out their overall impressions of the system and how different components relate to one another as they alter the display of the system content.

The next round of sketching for an interaction designer is to design each moment (or group of similarly-functioning moments) of interaction. To do this, designers start with sketches that emphasize an "explicit focus on expressing kinaesthetic experience, interactivity, temporal aspects, tangibility, immersion, sound, and haptics" [22] and mainly use pencil and paper rather than computer prototyping tools in order to generate a breadth of ideas. Once a variety of possible

interaction designs have been explored, the process continues by refining these sketches into a more unified direction and iterating on the sketches in varying degrees of fidelity.

Throughout the interaction design process, it is important to keep in mind that the developing user interfaces will most likely exist in a larger “complex environment” where the users may “any one time be carrying out a variety of tasks” and interacting with more systems than just the one being developed [21]. This leads to the notion that it is not only important to be aware of the users and the system (represented by the interface), but also how the users function in an environment that contains more than just the users and the system being developed. Many interaction design teams will utilize user testing to assist with these outside variables as well as collaborate with other fields to ensure that the user interface being developed is appropriate for their content and audience.

## ANIMATION

The variety of components that contribute to the development of a motion graphic allow for varying processes depending on what components are emphasized in an individual piece. They may include “dynamic typography, still text and images, animation and video” [23] among other elements, and each is used with the purpose of engaging the audience/relaying information. Animation, process for using “a sequence of images... to convey the illusion of movement” [24], describes how these different elements work together of a motion graphic.

In order to ensure that the concept and content of a motion graphic is best captured, animators often sketch a storyboard, which entails a series of “quick sketches” for “how all the screens will look in sequence” [25]. Not only do these sketches help the artists organize the layout or ordering of a concept, but they also provide insights on prioritizing information [26] and allow for an easy way to reorder and retry different directions before settling on a single path. Each element of a storyboard (known as a keyframe) focuses on an important moment within the overall motion graphic [27], representing or clarifying important information rather than emphasizing the same level of detail that will be present in the final piece.

As storyboards are refined into a unified concept and artists begin translating the storyboards into higher fidelity digital products, motion graphic artists engage their audience through both private and public events such as focus groups and screenings. Focus groups allow for the artists to get feedback throughout their development process, and “gain new insight” from these sessions [28] whether their content and message make sense to the users. Screenings are utilized by longer motion graphic pieces to get feedback in the final stages or first release for similar purposes, but have less influence on the final output.

Whether the purpose of a motion graphic is to entertain or inform, there has been some debate about whether animated content is more effective than a static graphical counterpart, thus calling into question whether it is beneficial to invest in motion graphics over static graphics for an audience. In a study from the *International Journal of Human-Computer Studies*, it was presented that animations “provided no benefit beyond that of the individual static diagrams” and could even

create more confusion in complex systems such as understanding how a horse moves [29]. This study, however, only looked at complex biological and computational systems, and a different study found that animations did help “when the topic to be learned is explicitly depicted in the animation” and could serve as a direct model of the system [30], indicating that even before beginning to storyboard an idea, an important consideration to make is what medium best suits the content to be presented.

## MEDIUM EXAMPLES

In 1996, *Magazine Interactions* published an article defining eight characteristics that affected a “quality of experience”. While the article was written to help identify quality work created through interaction design [31], the general principles can be extended to evaluate both user interfaces and motion graphics and help gauge the effectiveness of a design with less emphasis on the medium used.

The first evaluation point for a quality of experience is to determine if the end result does a good job of satisfying the needs of the end user or audience; evaluating this involves looking at how the needs of the end recipients were incorporated into the design. The second characteristic of a quality experience is an intuitive design process, which can be analyzed through the different design issues encountered and methodologies employed to get to the final product. Thirdly, the experience is analyzed by what need it fills, or what purpose it serves to a larger society. A quality experience is also communicates a clear purpose or flow, making it easy for someone to either follow or use depending on the context. The fifth characteristic assesses appropriateness, which builds upon whether it is needed by assessing how successful the experience is at satisfying the need. Aesthetics are another quality of experience component, and a quality experience is one that is cohesive and makes good use of the technologies it was built with. Another characteristic is mutability, or whether or not an experience can adapt to different audiences and needs. Lastly, a quality experience is considered to be manageable, or able to assist with more needs than its original intent.

## USER INTERFACES: APPLE’S IOS

Considered to be a revolutionary company in terms of user interfaces, Apple’s operating systems are well recognized for their versatility, ease of use, and compatibility across devices within the Apple ecosystem [32]. What seems to set this suite of products apart, though, is not necessarily the hardware, but instead the consistent user interface experience and familiarity present across the different platforms. iOS in particular provides an interesting platform to analyze since its success has affected Apple’s preceding desktop operating system and contributed to a growing mobile-first trend in the technology industry.

iOS first covers the characteristics of a high quality experience by filling the need of consumers who want to begin customizing their mobile devices and increasing device functionality to not just include calling, but also provide means for listening to music, browsing the internet, etc. With familiar applications from the desktop operating system such as iTunes [33] and Safari, Apple does



so in a way that is familiar to users and tackles their design problems by relating them to solutions that were successful in their other products. It serves a purpose to a larger society by providing innovations to mobile devices that propell other cell phone manufacturers to consider similar user needs in competing products [33]. The concept of using applications or “apps” from the desktop provides an easy-to-follow user flow, and appropriately satisfies the needs of consumers through the versatility of the device. A consistent aesthetic to the desktop version of Apple’s operating system further provides a high quality experience leveraging other existing technologies, and continues to evolve and manage the needs of its users to the present day.

## MOTION GRAPHICS: JAMES BOND TITLE SEQUENCES

One of the more cinematic applications of motion graphics, the James Bond title sequences are well known for their ability to embrace their role as “transition[s] into the movie” [34] from commercials by not only providing information about who was involved in creating the larger film, but also background knowledge and context for what the film will be about. In particular, the *Casino Royale* title sequence has gained particular notice because it incorporated elements of title sequences from former films as it began a new trilogy starring Daniel Craig.

*Casino Royale’s* title sequence acts as a high quality user experience by first filling a cinematic need to transition viewers from commercials to the main film; audiences can recognize this transition from the graphical elements that the film is beginning, regardless of whether this is their first Bond film or not. The title sequence tackles the design challenge of “introducing the film’s hero... as well as the security threat that Bond will thwart” [35] through graphical and moving imagery and text and employs the success of former films. Within the sequence itself, the progression and transition of graphics tells its own small story, providing a flow to the piece that enriches context for the audience. The *Casino Royale* title sequence also builds upon the need for a transition by providing additional narrative and context by adding imagery representing the issues of the time, which involved “global arms dealers willing to sell any actor conventional, biological, or nuclear weapons” [35]. For aesthetics, the title sequence makes repeated use of casino elements such as playing card suits and roulette tables to provide a cohesive experience, and the animation fits in with the style and technology available. *Casino Royale’s* title sequence also exhibits a high quality experience by being adaptable and manageable within the context of the film by appealing to a wide variety of audiences, but also can exist on its own as a motion graphic piece and be shown separately from the film and still have a purpose.

## CONCLUSION

Both user interfaces and motion graphics are design processes utilizing user-centric methodologies and evaluated based on similar characteristics for high quality user experiences. This close relationship and overlap between the two mediums has led to a recent blending of the two fields, where motion graphics are augmented by interactivity and user interfaces have become more cohesive through motion.

In the study from the *International Journal of Human-Computer Studies*, it was suggested that motion graphics might not be the more effective than static graphics on their own; however, the study did find that interactivity “can help overcome the difficulties of perception and comprehension” that made motion graphics less effective than their static counterparts [29]. Likewise, user interfaces including movement add context to the different components and help unify the content within the interface (as opposed to it being unified across products, such as with iOS).

Blending together user interfaces and motion graphics into “high interaction graphics” [36] also allows for the end user/audience to begin making decisions for themselves on “the looks and other features of [this blended medium], thus switching the focus of attention and changing the means of communication” [37] and gives users even more control of the overall experience. The impact of such blending is also affecting the future of both user interfaces and motion graphics, “challeng[ing] our conceptualization” of user interfaces as “page metaphors” and enabling new ways for motion graphics to articulate and express information through interactivity [23].

## BIBLIOGRAPHY

- [1] G. Bonsiepe, "The uneasy relationship between design and design research," *Des. Res. now*, no. May, pp. 25–39, 2007.
- [2] N. Bayazit, "A Review of Investigating Design: Forty Years of Design Research," *Des. Issues*, vol. 20, no. 1, pp. 16–29, 2004.
- [3] R. a. Willem, "On knowing design," *Des. Stud.*, vol. 9, no. 4, pp. 223–228, Oct. 1988.
- [4] R. a. Willem, "Design and science," *Des. Stud.*, vol. 11, no. 1, pp. 43–47, Jan. 1990.
- [5] P. Galle, "Philosophy of design: an editorial introduction," *Des. Stud.*, vol. 23, no. 3, pp. 211–218, May 2002.
- [6] A. Marcus and A. van Dam, "User-Interface Developments for the -Nineties," *IEEE Comput.*, vol. 24, no. 0, pp. 49–57, 1991.
- [7] I. Sutherland, T. Nelson, and A. Kay, "User Interface History," in *CHI '08 Extended Abstracts on Human Factors in Computing Systems*, 2008, pp. 2415–2418.
- [8] Ž. Mijailovic and D. Milicev, "A Retrospective on User Interface Development Technology," *IEEE Softw.*, vol. 30, no. 6, pp. 76–83, 2013.
- [9] C. Gere, "Genealogy of the computer screen," *Vis. Commun.*, vol. 5, no. 2, pp. 141–152, Jun. 2006.
- [10] S. Premeaux, "The Flying Horse: Eadweard Muybridge's Contribution to Motion Study," *J. Appl. Manag. Entrep.*, vol. 8, no. 4, pp. 36–51, 2003.
- [11] T. E. Bell, "'Doc' Edgerton: an EE for all seasons," *IEEE Spectr.*, vol. 26, no. 9, pp. 52–57, 1989.
- [12] R. K. Lowe, "Animation and learning: selective processing of information in dynamic graphics," *Learn. Instr.*, vol. 13, no. 2, pp. 157–176, Apr. 2003.
- [13] A. Doyle, "Web animation: Learning in motion," *Technol. Learn.*, vol. 22, no. 2, pp. 30, 32, 34, 36, 40, 42, 2001.
- [14] D. R. Proffitti and M. K. Kaiser, "The use of computer graphics animation in motion perception research," *Behav. Res. Methods, Instruments Comput.*, vol. 18, no. 6, pp. 487–492, 1986.
- [15] D. A. Norman and S. W. Draper, *User Centered System Design; New Perspectives on Human-Computer Interaction*. Hillsdale, NJ, USA: L. Erlbaum Associates Inc., 1986.
- [16] D. Schuler and A. Namioka, Eds., *Participatory Design: Principles and Practices*. Hillsdale, NJ, USA: L. Erlbaum Associates Inc., 1993.
- [17] M. Steen, "Tensions in human-centred design," *CoDesign*, vol. 7, no. 1, pp. 45–60, Mar. 2011.
- [18] Blair-Early and M. Zender, "User Interface Design Principles for Interaction Design All use subject to JSTOR Terms and Conditions User Interface Design Principles for Interaction Design and Mike Zender Adream," *Des. Issues*, vol. 24, no. 3, pp. 85–107, 2008.
- [19] D. Fallman, "The Interaction Design Research Triangle of Design Practice, Design Studies, and Design Exploration," *Des. Issues*, vol. 24, no. 3, pp. 4–18, 2008.
- [20] D. Fallman, "Design-oriented human-computer interaction," *Proc. Conf. Hum. factors Comput. Syst. - CHI '03*, no. 5, p. 225, 2003.

- [21] E. Coiera, "Interaction design theory," *Int. J. Med. Inform.*, vol. 69, no. 2–3, pp. 205–222, Mar. 2003.
- [22] M. Arvola and H. Artman, "Enactments in Interaction Design: How Designers Make Sketches Behave," *Artifact*, vol. 1, no. 2, pp. 106–119, Oct. 2007.
- [23] S. Skjulstad, "Communication design and motion," *J. Media Pract.*, vol. 8, no. 3, pp. 359–378, 2007.
- [24] G. Robertson, R. Fernandez, D. Fisher, B. Lee, and J. Stasko, "Effectiveness of animation in trend visualization," *IEEE Trans. Vis. Comput. Graph.*, vol. 14, no. 6, pp. 1325–32, 2008.
- [25] K. Thorn, "The Art of Storyboarding," *eLearn*, vol. 2011, no. 8, Aug. 2011.
- [26] M. Sutherland and N. Maiden, "Storyboarding Requirements," *IEEE Softw.*, vol. 27, no. 6, pp. 9–11, 2010.
- [27] D. B. Goldman, B. Curless, D. Salesin, and S. M. Seitz, "Schematic Storyboarding for Video Visualization and Editing," *ACM Trans. Graph.*, vol. 25, no. 3, pp. 862–871, 2006.
- [28] I. F. Litt, "Focusing on focus groups," *J. Adolesc. Heal.*, vol. 32, no. 5, pp. 329–330, May 2003.
- [29] B. Tversky, J. B. Morrison, and M. Betrancourt, "Animation: can it facilitate?," *Int. J. Hum. Comput. Stud.*, vol. 57, no. 4, pp. 247–262, 2002.
- [30] T. N. Höffler, H. Prechtel, and C. Nerdel, "The influence of visual cognitive style when learning from instructional animations and static pictures," *Learn. Individ. Differ.*, vol. 20, no. 5, pp. 479–483, Oct. 2010.
- [31] L. Alben, "Quality of experience: Defining the Criteria for Effective Interaction Design," *Mag. Interact.*, vol. 3, no. 3, pp. 11–15, 1996.
- [32] J. Allen, "To Switch or Not to Switch? That Is the Question!," *Am. J. Fam. Law*, vol. 27, no. 1, pp. 45–52, 2013.
- [33] G. Goggin, "Adapting the mobile phone: The iPhone and its consumption," *Continuum (N. Y.)*, vol. 23, no. 2, pp. 231–244, Apr. 2009.
- [34] G. Stanitzek, "Reading the Title Sequence (Vorspann, Générique)," *Cine. J.*, vol. 48, no. 4, pp. 44–58, 2014.
- [35] L. Q. R. Q. G. Lopv, L. Racioppi, and C. Tremonte, "Geopolitics, Gender, and Genre: The Work of Pre-Title / Title Sequences in James Bond Films," *J. Film Video*, vol. 66, no. 2, pp. 15–25, 2014.
- [36] S. G. Eick and G. J. Wills, "High interaction graphics," *Eur. J. Oper. Res.*, vol. 81, no. 3, pp. 445–459, Mar. 1995.
- [37] N. Babic, J. Pibernik, and N. Mrvac, "Media Study: Motion Graphics," in *ELMAR 50th International Symposium*, 2008, no. September, pp. 499–502.