Cutting Edge Design or a Beginner's Mistake? -- A Semiotic Inspection of iOS7 Icon Design Changes

Christian Stickel, Hans-Martin Pohl, and Jan-Thorsten Milde

Fulda University of Applied Sciences, Fulda, Germany
{Christian.Stickel,Hans-Martin.Pohl}@verw.hs-fulda.de,
milde@hs-fulda.de

Abstract. This work follows an ongoing discussion on the implications of skeuomorphic vs. flat design for interface design. Therefor two subsets of the standard iOS6 and iOS7 system icons were reviewed with a semiotic inspection method and compared against each other. The subsets were chosen according to an open online user rating. The findings suggest that missing information due to design simplification is a major issue for less user acceptance. This study shows that especially flat design affords a more careful focus on the semantics of the used elements.

Keywords: Semantics, Meaningfulness and Satisfaction, Attractiveness, Interface visualization, semiotic engineering.

1 Introduction

In human life exists virtually nothing that doesn't contain a certain meaning. Every conscious perception must indeed have a meaning as it's filtered from the large amount of sensory data that pours into the human mind every second. The scientific study of meaning in many fields is joined under the term semiotics. A recent approach in HCI in this direction is the Semiotic engineering theory, from which emerged the semiotic inspection method [1]. This study reports the results of a semiotic inspection carried out on the icon design changes in Apples iOS7. A design update which truly polarized Apples fans and community of the famous iDevices. The question is, what was done, why and to which extend? And of course, what can be learned from that case?

The computer is humanity's greatest technological achievement for symbol manipulation nowadays. The invention of graphical user interfaces (GUI) in the first Apple Macintosh computer back in 1984 enabled non-programmers to use them and was indeed the dawn of the personal computer.

The Macintosh GUI featured icons and windows, thus allowed a more intuitive and direct symbol manipulation. Instead of typing in complex commands the end-users would just point and click. What a revolution. The idea of the GUI was thus characterized as "user-friendly". Today we know that it was just the first of many steps in the direction of optimizing the interactions between man and machine. It was

A. Marcus (Ed.): DUXU 2014, Part II, LNCS 8518, pp. 358–369, 2014.

since indeed an interdisciplinary journey, which converges nowadays in the questions of how to design and improve interactions on the one hand and how to shape the user experience on the other hand.

All along this path scientist, developers and designers worked with the digital version of meaningful symbols, concepts and audio-visual metaphors that allowed them to express, create and interact with information of all kind. Extensive libraries of elements are now available for everybody who seeks to implement a GUI in order to give a 'user-friendly' access to otherwise sophisticated functions (e.g. Google Closure UI, JQuery UI or Xcode UI). These libraries of predefined elements help a lot shortening the development cycles of software and increase the generalizability of such elements. However the dilemma is that developers don't need to think anymore much about the inherent meaning of the elements they use to implement a certain function. Just picking something fancy from a library or naming something, without thinking about the meaning, resp. semantically appropriate connections, can result in fatal usability issues.

Vice versa the proper, resp. meaning driven use of certain symbols and audio-visual metaphors should improve the usability and therefor in semiotics lies asleep a great potential for usability engineering. Research based on the concepts of Organizational semiotics brought forth the idea of a 'methodology for requirements analysis and specification' (MEASUR) showing the valuable use of semiotic methods for user requirements analysis [10].

2 Theoretical Background

This chapter covers some important ideas and aspects of semiotics and design theory, introducing terms and notations that will be used later on.

2.1 Semiotics, Signs and Concepts

Semiotics is the science of meaning. It basically attempts to answer the question: 'What does X mean?'. Focusing on GUI elements X can be anything from a menu icon, to names of menu items, animations, interaction mechanisms or tooltips. The central task of semiotic analysis is thereby the determination of the relation X=Y, where Y encodes the meaning of X [1]. Although this relation varies in complexity, the basic nature of the inquiry remains the same for all elements.

An example might be the basic shape of two diagonal crossing lines. Depending on the context that very shape can have a host of different meanings. If it appears alone or inside a text it might be the character 'X', if it appears inside an error message in combination with red, it might denote a failure or restricted function. As a button it might also denote closing something as well as deleting or removing. Looking outside the frame of GUI elements would provide a whole galaxy of other meanings including a certain point on a map or the rejection of something by crossing it out.

The process of deriving a meaning from the observed object 'red cross', which happens within the observer, is called signification [1]. The process of signification is

thus the relation X=Y itself. A sign is everything that stands for something else than itself [9], thus our two diagonal crossed lines are a sign. They constitute as a certain shape, which Pierce calls the representamen (or symbol). The thing which a sign refers to is the object, also known as referent. In case of a GUI the object can be any system function or program, while the representamen will mostly consist of static or dynamic visual cues, e.g. all types of 'buttons' and icons.

Semiotics usually draws a distinction between two kinds of objects - abstract and concrete. Thereby concrete refers to something that exists in the world, while abstract refers to imaginary thoughts and ideas. It's important to note that signs allow referencing things and ideas, even though they might not be physically perceivable.

The connection of the representamen and the object is an active process of the user (interpretant). The scheme seen in Fig.1 is usually denoted as a semiotic triangle and originates from Charles Pierce [9].

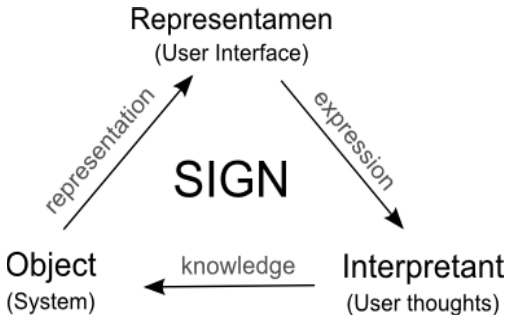

Fig. 1. Semiotic triangle based on the ideas of Peirce & Nadin, [9],[5]

A Google picture search in the size of a pictogram using each of the following terms: close, delete, error will reveal that the most results are two diagonal crossed lines in combination with the color red, which is already a sign on its own. This kind of 1:n relation, where one sign can hold multiple meanings is called polysemy (X=Y=Y'=Y'') [1]. So how does the end-user know which meaning is applicable for a certain task?

2.2 Semiotic Engineering Theory

Semiotic engineering is a theory within HCI, though it proposes a different view of HCI, defining it as a process of meta-communication between the system designer and the end-user through the means of the interface [2]. In fact the object of scientific investigation is defined as the set of all computer encoded conversations between the user and the interface.

While HCI theories focus on the user, Semiotic engineering theory focuses on how systems designers communicate through the product, more precisely how they came to certain design decisions, because of their knowledge and expectations regarding the users. Therefor this theory articulates important aspects of design- and use-contexts within the same perspective as user-centered theories [6].

Semiotic Inspection Method. The Semiotic Inspection Method (SIM) [3] is a qualitative inspection method from Semiotic engineering theory, which allows researchers to identify computationally encoded strategies, which designers use to communicate design intent and design principles, thus determining the communicability of a system. Communicability refers to communication that is organized and resourceful (efficient) and achieves the desired result (effective). SIM does so by supporting the analysis and reconstruction of the meta-communication between designer and end-user [4]. It therefor assumes that the system's interface tells the end-users a message, about how they can or should use the system, why, and to what effects. The content of the message is paraphrased with the following 'meta-communication template': *"Here is my understanding of who you are, what I've learned you want or need to do, in which preferred ways, and why. This is the system that I have therefore designed for you, and this is the way you can or should use it in order to fulfill a range of purposes that fall within this vision."* [4] This template is used as guide for the analysis in the first three of the five SIM core steps [3],[4].

- Inspection of metalinguistic signs
- Inspection of interface static signs
- Inspection of interface dynamic signs
- Comparison of the meta-communication messages generated in the previous steps
- Final evaluation of the inspected systems communicability

The additional use of the following questions, which are usually used by linguists for semantic analysis, is helpful, especially when it comes to the analysis of single elements like icons. Beginning with what, one asks for how and then why. The triad of questions arises from Pierce' semiotic triangle, as depicted in the following figure.

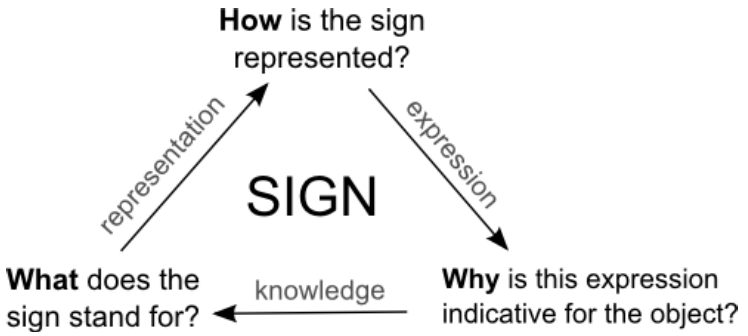

Fig. 2. Questions for a semiotic analysis of a single sign

Metalinguistic signs take into account every linguistic object like words, headlines or whole texts. The analysis of interface static signs takes as input instant representations of interface components like screen layout and GUI elements. Interface dynamic signs communicate through interactions. This includes system state transitions, animations and further time-based system behavior.

The interpretation of these signs in each step allows a reconstruction of the according meta-communication message. The comparison strives to identify inconsistencies and/or consistent relationships and patterns between the elements collected in the steps before. The final step is a full evaluation of the communicability of the system by reconstructing a unified meta-communication message, as well as judging benefits and issues of the communicative strategies identified before [4].

2.3 Skeuomorphism and Flat Design

Skeuomorphism. and Flat Design are two approaches of visualization from design theory, which are said to be opposed to each other. Skeuomorphism uses imagery of real objects as representation for the function, e.g. an analog clock, compass or cassettes. Thereby it utilizes textures, illumination, depth, lighting, shadows and 3D elements. Basalla (1988) describes skeuomorphism as: "An element of design or structure that serves little or no purpose in the artifact fashioned from the new material but was essential to the object made from the original material" [11]. This design element can appear as a single element like an icon for an app or as an element in an interaction like the turnover of a digital page. Skeuomorphs in interface and interaction design strive to emulate real objects and real interactions giving the user contextual clues. They enable designers to use generalized understandings and assemble complex meanings in a straightforward way. This helps the user to identify a known object and possible interaction mechanisms more easy and thus supports the learnability of a system interface. iOS6 can be considered as example for a skeuomorphic interface.

Flat Design neglects a realistic or pseudo realistic 3D representation of the intended object, because screens are two dimensional. Instead it strives to implement a minimalistic "less is more" philosophy of clean information, reverting back to the basics of design as a functional tool. It thereby focuses on the reduction of the interface towards the important elements. The design of the elements is mostly independent of real world objects and utilizes spacious clean sans serif fonts, simplified 2D shapes with gradients or plain bright, contrasting colors, which emphasize the commitment to being easy to use due to the focus on the message and content at hand. This also includes the use of abstract iconic symbols. . Flat Design could also be considered more economical for developers, plus it uses less system resources for rendering the interface. Windows 8, Windows Phone 8, Android and iOS7 are operationalizes this design approach.

3 Methods and Materials

This work analyses and compares a set of the native iOS 6 and iOS7 System icons. In order to define the set, the scores of an open online questionnaire from www.neuevsold.com were used. On this website users can rate, which native system icon they prefer, either the iOS7 or the iOS6 version. The total score table is then

displayed, showing how many users rated for each icon. In January 2014 this online rating contained the opinions of over 100000 users, thus it can be considered a solid base for observation. In order to build a comparable set for the semiotic analysis it was necessary to find out, which icons were successful translated to the new design and which were not. Therefor the quotient [iOS7 ratings] / [iOS6 ratings] was used to order the list. A ratio above 1 was considered as unsuccessful, while a ratio below 0.4 was considered successful. From the total set of 22 native system icons 4 successful and 4 unsuccessful were selected, as can be seen in the table below.

Table 1. Rating data and ratio of the subsets 'unsuccessful' and 'successful' icons

unsuccessful icons			
application	**iOS7**	**iOS6**	**ratio**
Settings	36880	65378	1,773
Safari	44472	60760	1,366
Camera	45083	56617	1,256
Game Center	43574	54357	1,247

successful icons			
application	**iOS7**	**iOS6**	**ratio**
App Store	67184	30004	0,447
Clock	73302	28105	0,383
Phone	75705	27617	0,365
Maps	76975	21713	0,282

These icons were used for a semiotic inspection as described in chapter 2. The approach is inductive, as it strives to work out the relevant variables, which might have influenced the user ratings, according to the data. The following chapters summarize the findings and try to give some answers on the reasons of the rating.

4 Results

4.1 Settings Icon

What does the sign stand for?. The object is the settings dialog, which enables the user to adjust or fine tune the system according to his needs in some way.

How is the sign represented?. The object is represented by gears. The old icon features three overlapping gear wheels in front of a perforated metal plate in grey colors. The new icon keeps the colors, but utilizes a kind of finer "clockwork" gear and discards the perforated metal background texture.

Why is this expression indicative?. The iconicity of a mechanical gear-wheel as representation for "System settings" or "Preferences" is a widely used metaphor borrowed from the analog age, when it was possible to open a machine to tune it. The color scheme gray as well as the perforated metal background texture of the old icon suggests a garage, or a place to tune something mechanical. The new icon keeps the grey palette and uses a more detailed and finer gear-wheel, which suggests 'precision', but is not 100% indicative for the 'mechanical tuning' metaphor.

4.2 Safari Icon

What does the sign stand for?. The denoted object is the iOS webbrowser, which enables the user to navigate through the world wide web.

How is the sign represented?. The sign is represented by compass with a red-white needle pointing to northeast. The old version uses a 3D needle and a windrose with N,E,S,W characters for the directions. Additionally there's a semitransparent layer with a finer scale and a worldmap as background. The new version is reduced to three elements, which are the needle and the finer outer scale inside a blue circle. The needle is 2D and the red is bright contrasted against the blue background gradient.

Why is this expression indicative?. This sign uses the metaphor of "navigating through the world" (wide web). The iconicity can be regarded as generalized since it is used for the safari browser on other OS as well. Even if a user never got to know Safari, the background layer of the blue world map might suggest the www connection. A comparison with the icons of other famous web browsers suggests a generalizability of the blue color.

4.3 Camera Icon

What does the sign stand for?. The sign represents the function of taking pictures or videos with the smartphone.

How is the sign represented?. The old sign used the frontal view of a detailed camera lens with lens flare and reflection. The new icon uses the iconic shape of an oldschool SLR camera with a little orange dot.

Why is this expression indicative?. The lens is skeuomorphic, giving the user a hint that this app does something with a lens. The iconic choice of an complete camera suggests an emphasis on taking pictures but not videos.

4.4 Game Center Icon

What does the sign stand for?. The icon represents the game center, a social media application around the idea of gaming on iOS and OSX.

How is the sign represented?. The old sign uses 4 clear symbols of different games with a background texture that supports the context of each game. The new sign is represented by 4 transparent balloons or soap bubbles of different size and bright color on a white background.

Why is this expression indicative?. The old icons expression stated clearly that this app is about gaming, it could also be interpreted as collection of games. The new icon

is hardly indicative without knowing the interface of the app, which resembles the circles. The chosen colors might represent the idea of playfulness.

4.5 App Store Icon

What does the sign stand for?. The sign represents the app that enables the user to buy, load and update new software through the internet.

How is the sign represented?. The sign is represented by a pencil, a brush and a ruler resembling the letter 'A', inside a circle on blue background. The elements in the old icon are smaller and the background is textured with a kind of ray effect. Beside bigger elements, the new icon features a brush shape that is easier to recognize as a brush.

Why is this expression indicative?. The different visible tools first indicate that this app is about creation. The form in which the tools are arranged can also suggest a builders emblem by resembling a divider on top of a ruler. Another possible indicative meaning would be that the tools resemble the letter A for "Appstore".

4.6 Clock Icon

What does the sign stand for?. The icon represents an app that assembles functions to work with time.

How is the sign represented?. The icon is represented by an analog clock, looking like a station clock. The old icon used triangular shaped clock hands, while the new one uses straight lines. The hand that shows the seconds is red in both cases. The old icon used skeuomorphism with a glossy surface, while the new one is flat. Both icons are interactively showing the current time.

Why is this expression indicative?. A clock is the instrument to measure time. The animated hands of the clock, with the red clock hand moving smoothly without being obtrusive, is thus a suitable metaphor to represent the idea of "Time" and time-based functions.

4.7 Phone Icon

What does the sign stand for?. The icon signifies the call function of the smartphone, as well as supporting functions like contacts and recent calls.

How is the sign represented?. The sign is represented by the symbol of a telephone receiver on a green background. The old icons background is glossy with diagonal green stripes, while the new background is a simple gradient. The telephone receiver of the new icon is bigger and more curved.

Why is this expression indicative?. The symbol of the diagonal telephone receiver inherits the meaning of "calling". The telephone receiver itself creates the context of calling, while the diagonal position of the symbol is indicative for the device to be ready for call, because this is how a person would hold the receiver upon calling. The same symbol in a horizontal position would have different meaning.

4.8 Maps Icon

What does the sign stand for?. The sign represents the map and navigation functions.

How is the sign represented?. The sign is represented by a map view. The old icon features roads in different sizes, a highway sign and a red needle pin. The new icon shows roads in the same size, a highway sign, a position mark, areas in different colors and a navigation line.

Why is this expression indicative?. The expression is indicative for the meanings ‘map’ and ‘navigation’, because it uses iconic elements of an electronic street map. Even if a user isn’t familiar with the American sign for highways, there is enough information to grasp the context of maps and navigation.

5 Discussion

This chapter discusses the results above, raising the questions why either the new or old icon got better scores, in order to identify consistent variables of successful and unsuccessful icon design changes.

5.1 Unsuccessful Icons

Settings icon. The new icon features a different kind of gear-wheel, with angular cogs instead of blunt cogs. Blunt cogs are more generalizable, while angular cogs require the knowledge of precision mechanics like inside a clockwork. The generalizability of the gear-wheel is reduced and it doesn’t seem to support the intended metaphor of tuning anymore. The missing background texture reduces the recognition of the visual metaphor "garage context".

Safari icon. The information contained in the new icon is reduced to three elements, circle, scale and needle. Since the wind rose and the directions are missing, the user needs to know the connection of a magnetic red/white needle to a compass and the intended meaning of navigation. The precision scale instead of wind rose suggests the meaning ‘precision’ but not ‘navigation’. The red color is much brighter than in the old icon. Here the red/blue contrast creates a pattern that forces the eye to constantly accommodate. This color contrast seems indeed the worst choice. The attention of

humans is foremost guided by luminance contrast. In this way the old icon is balanced, while in the new icon the red and outer white luminance catches the attention. Thus it stands out together with the calendar, the photos and the game center icon.

Camera icon. The depiction of a single lens in the old icon is more generalizable for photo/video than the analog camera symbol in the new icon. With this symbol the new icon suggests an emphasis on photo, such that the user might ask himself if he's still able to record videos with this app. The icon of the Facetime app utilizes the iconic shape of a video camera. If both icons are arranged side by side this might be indeed confusing for novice users.

Game Center icon. The old icon held enough information to instantly grasp the context of gaming. The new icon lacks that information. Additionally this icon is drawn in a skeuomorphism style, which renders the whole iOS7 System icon set inconsistent. With the white surrounding background it stands out from the other icons, getting more attention. This raises the importance of the app, which might not reflect the opinion of the end-users.

5.2 Successful Icons

App Store icon. The information contained in the icon did not change in the new version. Instead the symbols are now easier to recognize, which could explain why the new icon is favored over the old one.

Clock icon. Both icons contain the same amount of information. The new clock is slightly bigger and the clock hands don't reach into the numbers like in the old one. The dismissed glossy effect isn't really missing, since it didn't add relevant information to the icon. Overall this is a good example for a successful transformation from skeuomorphism to flat design, without losing information.

Phone icon. The symbol on the new icon is bigger and looks more elegant. Both icons contain the same amount of information. There is no additional information from the textured background in the old icon.

Maps icon. The new icon is less visually complex, but contains more information than the old icon. The different sized streets in the old icon didn't give additional informational depth, whereas the colored areas and the navigation line in the new icon support the intended meaning.

5.3 Summary

The results for the unsuccessful icons show, that they have issues concerning the loss of information, which help to identify the meaning of the icon. A simple count of

meaningful elements in these icons can reveal that. With this it can be concluded that a simplification as aspired by flat design, implies the risk of losing meaningful information. Vice versa it can be said that all icons were successful, which didn't lose information through the process of simplification. This is especially the case when there is a strong meaningful symbol in the icon and the old background textures, shadows and 3D effects don't carry any additional contextual clues. The best rated icon is the maps icon, which became simpler, but at the same time was enriched with more meaningful elements. So a rule of thumb for porting icons to iOS7 flat design is that it implies more precision and focus in case of the semantics.

Another variable which has to be taken into account is the generalizability of the icons elements. This is also a question of the target group. Working with representations, which cannot be decoded by the target group will inevitably result in poor Usability. This was the case for the settings icon and the game center icon.

6 Conclusion

In this work we showed how to identify design issues with the use of the semiotic inspection method. The method was applied on iOS6 icons that were ported to iOS7, going through a major design change from skeuomorphic to flat design. We found that especially flat design affords a more careful focus on the semantics of the used elements, since communication channels like background textures, shadows and 3D effects vanish. As the user is able to change the background of the OS, icon labels can be rendered useless due to visual clutter or contrast issues. Especially for these cases icons should be meaningful enough to support the user. Both systems, iOS6 and iOS7 are for the most part consistently designed and examples of state of the art user-friendly interfaces.

There is no need to discuss, which design approach is better for the UX either flat design or skeuomorphism. Instead the discussion should focus on the semantics of an interface. Simplification is great if you don't lose information and after all flat doesn't necessarily imply non-skeumorphic elements.

References

1. Danesi, M.: Messages, Signs, and Meanings: A Basic Textbook in Semiotics and Communication Theory, 3rd edn. Canadian Scholars' Press, Toronto (2004)
2. De Souza, C.S.: The semiotic engineering of human–computer interaction. MIT Press, Cambridge (2005)
3. De Souza, C.S., Leitão, C.F., Prates, R.O., Silva, E.: The Semiotic Inspection Method. Anais do VII Simpósio Brasileiro sobre Fatores Humanos em Sistemas Computacionais. In: IHC 2006, Natal (2006)
4. De Souza, C.S., Leitão, C.F.: Semiotic Engineering Methods for Scientific Research in HCI. Morgan & Claypool, San Francisco (2009)
5. Nadin, M.: User interface - a semiotic paradigm, Battelle Memorial Institute, Human Factors Society, Southern Ohio Chapter, Columbus (April 1986)
6. Norman, D.A.: The design of future things. Basic Books, New York (2007)

7. Nöth, W.: Handbook of Semiotics. Indiana University Press, Bloomington (1990)
8. Ogden, C.K., Richards, I.A.: The Meaning of Meaning. Routledge & Kegan Paul, London (1923)
9. Peirce, C.S.: Collected Writings (8 Vols.) (Ed. Charles Hartshorne, Paul Weiss & Arthur W Burks). Harvard University Press, Cambridge (1931-1958)
10. Stamper, R.K., et al.: Semiotic Methods for Enterprise Design and IT Applications. In: Proceedings of the 7th International Workshop on Organisational Semiotics (2004)
11. Basalla, G.: The Evolution of Technology. In: Basalla, W. (ed.) Cambridge Studies in the History of Science, p. S. 107. Cambridge University Press, Cambridge (1988)