

Time-Dimensional View Models of Conversion-oriented Web Design

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Abstract—Conversion is one of the key factors of e-commerce, that facilitates visiting users into designated actions. In Web design, there are many aspects to consider in order to leverage conversion possibilities. Analyzing the best practices of conversion-oriented Web design, the author proposes a three-stage view of convertibility. The author examines the best practices of Web design from the viewpoint of conversion.

Keywords—Conversion, web design, e-commerce, conversion psychology, user behavior

I. INTRODUCTION

As the Internet has proliferated, it has become more and more important to convert customers on the Internet. E-commerce consists of two parts: Web traffics and conversion. However, merchants have a tendency to overemphasize the former, Web traffic, and underestimate the latter, conversion.

In order to maximize sales on the Internet, it is important for merchants to leverage the both factors, Web traffic and conversion. Conversion is one of the less-explored areas of research in e-commerce. Conversion is neither coercion nor seduction, but rather, it is facilitation. It is difficult to facilitate reluctant users into action. However, much of poor Web design today fails to leverage users' internal interests and motivations into action.

Persuasive technology is a framework that uses persuasion and social influence in conjunction with technology to pursue business consequences. This concept was coined by Fogg in the 1990's at Stanford University and has been leveraged in the PC Internet and the mobile Internet. It is used to facilitate conversion.

In this paper, the author summarizes the best practices of conversion in e-commerce, highlights the psychological aspects of e-commerce conversion. This analysis leads to the identification of the time-dimensional process of conversion. E-commerce conversion consists of not only of purchases, but includes other areas like mail magazine subscriptions and other registrations that lead to the future purchases.

II. BACKGROUND

A. Purpose of Research

The aim of this research is to identify a methodology of Web design that facilitates efficient conversion.

B. Related Works

Web optimization has attracted strong industrial interest [1] [2]. Some focused landing page optimization with attention to improved conversion rate utilizing navigation flow [3].

There are several studies on conversion. First, there is research on the factors that impact conversion. Manomuth empirically confirmed of the minimal cognitive processing theory in e-commerce [4]. Kuan et al. showed the importance of system usability in conversion [5].

Lin et al. empirically examined the relationship between in-session stickiness and conversion [6]. Zhao et al. presented an improved conversion rate using recommendations based on a purchase-interval model [7]. Sumita et al. discussed the impact of mobile access on information search completion time and the conversion rate [8].

Halpern proposed non-verbal communication in Web design from the viewpoint of conversion-oriented psychology [9]. He provided insightful suggestions with respect to a non-verbal communication view of Web design and conversion.

Second, there is research on the factors that improve prediction. Montgomery et al. discussed an improved prediction of conversion using path analysis [10]. Yuan et al. presented a machine-learning model of eBay listing conversion [11].

Third, there is research on the analytical model of conversion. Kanich et al. empirically analyzed the spam value proposition [12].

Conversion requires credibility and engagement. With respect to engagement, Saito discussed Gamenics theory, which was coined from the massive engagement techniques learned from experience gained through designing Nintendo video games [13] (Section 23.1).

And, regarding credibility, Fogg presented a theory that describes how people assess the credibility of Web sites from his four years of research [14].

The non-verbal communication aspect of Web design has not been well explored in past research. The originality of this paper lies in its examination of the flow-based persuasion involved in conversion within the realm of e-commerce.

III. METHODS

Conversion is used in a wide range of domains such as economy, law, religion, computing, and marketing. In this

$$\text{Effectiveness} = \text{Web traffic} * \text{Conversion ratio}$$

Fig. 1. Effectiveness of Web design

paper, the author uses this term as a marketing term, as used in relation to conversion rate. Conversion in this paper means guidance that facilitates Web visitors to take a desired action upon visiting a website. Conversion-oriented Web design is a field of psychology that leverages and facilitates conversion. On the Internet, application of conversion-oriented Web design leads to Web design that is leveraged by conversion-psychology.

Advances in information and communication technology have brought about a situation where Internet users are no different from real-world users. Beyond the deployment of technology, it is crucial to focus on the psychological transitions of users toward conversion.

IV. OBSERVATION

A. Factorization

The effectiveness of e-commerce marketing is shown in Fig 1. It is a multiplication of Web traffic and the conversion ratio (per traffic).

Compared to the first factor, Web traffics, the second factor, the conversion ratio, is under-evaluated in many real-world e-commerce sites. It is easy to pay for Web traffic with the rise of reward advertising on the Internet. On the other hand, improvement of the conversion ratio is time-consuming work. Over a span of time, Web design has become a layered accumulation of different tweaks, which results in messy and confusing design. Functional reviews have been done before, however, a review from the viewpoint of conversion is an uncommon industrial practice.

B. Best Practices of Web Conversion

Conversion is the process of guiding a Web visitor to a designated action through the influence of a Web service. Designated actions include purchasing, registering, inquiring, applying, and other activities initiated by a visiting user.

Conversion-oriented Web design consists of the best practices of industrial Web design that focus on improving conversion. Conversion is a fundamentally persuasive process. Therefore, conversion psychology consists of design rules for creating persuasive Web pages. The author examines the best practices of the Web industry.

The four positive aspects are: first view, completion of reading, selection, and time to know who. "First view" provides the basic impression. "Selection" provides filtering, which leads to customization that matches the potential user's needs. "Completion of reading" provides a read-through of a piece of information where a user makes a landing. "Time to know who" provides a connection between a visitor and a service provider, which facilitates future encouragement.

The two negative aspects are lost targets at top page, and being overwhelmed. "Lost targets at top view" is the failure

TABLE I
DESIGN RULES OF CONVERSION-PSYCHOLOGY-BASED WEB DESIGN

Scene	Description
Top page	The top page is important for catching the attention of a user as a landing page. Without this attention, it is a challenge to perform a visiting user to a designated action.
Completion of reading	In many cases, a majority of visiting users will find that the content is not useful. Completion of reading suggests the possibly positive attitude of a visiting user. It also suggests that a common user state at the completion of reading is wondering what he/she can do next.
Lost targets at top page	In many cases, the content available on the top page cannot enclose visiting users. Many will leave, but some users will make an attempt to find more interesting articles within the site.
Time to know who	In many cases, a visiting user would like to get information about who runs the website. Connection is an important step toward conversion.
Selection	Before conversion, selection is the important process. In many cases, there is too much unnecessary information and too little interesting information for a visiting user.
Being overwhelmed	Being overwhelmed is not a good state for a visiting user. In many cases, they will leave the site. However, there is one exception through which a website can take advantage of the state of being overwhelmed, and that is facilitating email address registration.

to guide the user to a piece of landing information. "Being overwhelmed" is the state where the user is presented with too much information to choose from.

The perspectives of Web designers and visiting users are different. Therefore, it is useful to view Web design from the psychological viewpoint of visiting users.

The design rules of conversion-psychology-based Web design are depicted in Table I.

The top page is the most frequently visited page. At the same time, it should be noted that the users complete some article and return to the top page. The top page has different meanings when viewed as a landing page versus when viewed as the returning point. If a user returns to the top page, then it is likely that the user has a more positive attitude toward the page. Otherwise the user would have gone to another page or elsewhere.

Another conversion point is the end of an article. If a user finishes reading a whole article, then it is likely that the user is more positive about the web site. As stated above, otherwise the user would have gone to another page or elsewhere. It is an excellent place for a service provider to make some specific request.

One more conversion point that is frequently neglected is the profile page. If a user wants to know more about who constructed the website, it is likely that the user has a positive feeling toward the content of the website.

Frequent neglect of important conversion points comes from the neglect of the importance of the inter-page attitude-building of a user.

Examples of loss of convertibility in Web design are depicted in Table II.

TABLE II
EXAMPLES OF LOSS OF CONVERTIBILITY IN WEB DESIGN

Factor	Description
No integral design for conversion	Font, style, size, color, indentation and other formatting features should be used consistently in order to guide users. In particular, the color of normal text and the color of conversion links should be different in order to emphasize conversion.
Readability of leading part	As common in newspapers, it is important to increase readability of the first few sentences. Short and simple lines are easier to read with more blank space. If a user starts to read the leading part, then the probability of completing an article is higher.
Too many to choose	Presenting too many choices, too many products, too many courses, too many options, etc. discourages a user. Selecting one item among many requires mental effort that is annoying to a user.
Inconsistency from long life time of web	Over time, the various visual cues toward conversion like color and text come diverse without the clear guidance of consistency.
Too many distractions	There are too many distractions, and it is difficult to choose between distractions. Too many choices regarding navigation, advertisement, special messages provide another layer of distraction to Web design. It is important to establish the top priority or goal of each page and stick to the optimization of the goal.

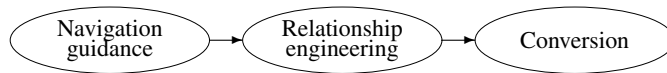


Fig. 2. Short-term conversion phase model

V. TIME-DIMENSIONAL VIEWS OF WEB CONVERSION

A. Time-dimensional Factors

The findings described above lead to the awareness of different time dimensional factors that exist in conversion. Examples are depicted in Table III.

In order to maximize conversion, it is important to build a bird-eye's view of Web design that keeps multiple aspects of conversion in mind.

A short-term conversion model is depicted in Fig. 2. First, a user needs to receive navigation guidance in order to reach one of the designated conversion points. Navigation guidance accomplishes both the identifying user needs and the elimination of obstacles to usability.

Second, relationship engineering provides credibility and trust. Consistency, integrity, hospitality, uniqueness, and professionalism create good relationships.

Third, there is a conversion point. The point should provide minimum distraction, concentrating the momentum of conversion that results from the previous two steps. Conversion should maximize benefits and minimize of risks. Benefits and risks differ from user to user, however. the previous navigation guidance can be used to identify particular user characteristics when deploying a customized conversion.

A long-term conversion phase model is depicted in Fig. 3. First, it is important to figure out who a visiting user is. Every conversion must identify the user's needs. Each user has a different motivation, mood, and set of requirements. Without having some clues, it is difficult to accomplish conversion because conversion is a kind of matching process between

TABLE III
DIFFERENT TIME DIMENSIONAL FACTORS IN CONVERSION

Factor	Example	Description
Short-time dimensional (seconds order)	Aesthetics of top page	Visual aesthetics provides clues for visitors including the impression of professionalism.
	Consistency	Consistency provides support for readability and less distraction. Consistent formats, fonts, writing styles provide reinforcement of positive impressions.
	Usability (traceability)	Consistency of headings, leads, navigation links, and transition styles provides improved traceability, which strengthens user trust. Fewer irritations and distractions provide relative comfort compared to competitor sites.
	Readability of headings and leads	Readability of the lead parts of information encourages further reading.
	Visual effects (color, photo, and graphics)	Visual effects impact user's perception. Sometimes, excessive use of effects leads to distraction and confusion. Appropriate use of visual effects leverages the positive attitude of a user.
Medium-time dimensional (minutes order)	Readability	Readability of an entire article leads to the further formation of trust and positive attitude.
	Self-action	Self-actions tend to strengthen engagement. It is a trade-off between the number of self-actions and the costs of user interfaces. So, a balance between them is needed.
	Feeling a connection	When a user consumes part of information that seems useful, there is a tendency for the user to seek trust-building materials such as a profile. The profile page is an important stepping stone for building "connection". Building a feeling of connection is as important in e-commerce as it is in face-to-face commerce.
Long time dimensional (days, weeks, months order)	Liking	People want to purchase where they like. Liking can be rooted in finding similarities and identifying special deals.
	Requirements	Over a long span of time, users increase their engagement when they feel their own requirements are understood and accepted.
	Experience	Engagement is built on a sequence of building up positive experience, especially, when it is tailored to a user's need. It is best to take every opportunity to receive a user's input regarding his/her own needs.
	Quality of content	In the long-run, quality of content is the major factor once a user is engaged with the service.



Fig. 3. Long-term conversion phase model

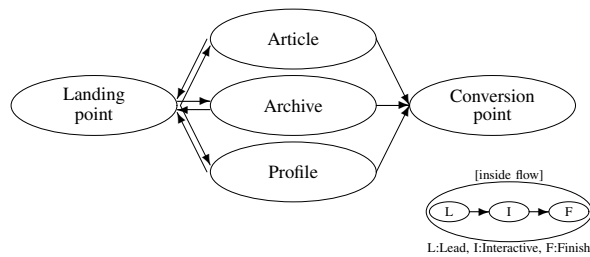


Fig. 4. Conversion flow diagram

things that are needed and things that can be provided. In this phase, user segmentation should be done for future conversion.

Second, it is important to facilitate engagement. Without building trust, it is difficult to make a smooth conversion. The most common threat to e-commerce is “deceit.” When a user is serious about any type of conversion, it is crucial for the user to know who he/she is dealing with. Many merchants in e-commerce believe that e-commerce is something mechanical in the virtual world. On the contrary, it is a one-to-one human interaction as technology advances. A sense of human connection provides the basis for future frictionless conversion. Personal connection, liking, credibility, and trust are the important building blocks of future conversion.

Third, is conversion. The obstacles toward conversion should be removed. At the same time, conversion should be a happy match-up between provider and customer.

B. Flow Diagram View Model

A flow diagram view model for Web conversion is depicted in Fig. 4.

This is a conceptual framework, therefore some links are omitted. For example, the landing point can directly lead a user to the final conversion point if possible. Articles, archive, and profiles can have direct links to each other.

In many cases, today’s Web depends on search engine optimization. The top page or designated landing pages serve as the landing point. The roles of the landing point are to segment incoming users, to create the first impression, and to link to conversion points if it is the user’s second visit.

When a user finds some matches that offer possible fulfillment of his/her needs, the user navigates to an article. When a user cannot find any match, but still has some interest in the landing page the user navigates to the archive. The archive should be segmented into customized needs/solutions in order to provide a classification of incoming users. At the same time, each segment of the archive should have a summary of the best articles in the past in order to provide quality appeal to new users.

When a user performs an explicit exploration of a human connection, the user navigates to a profile page. The profile page should explicitly emphasize excellence in a specialized field. When a special offer, such as a subscription to quality content, is in effect, this page is a good place to ask the user to convert to such a subscription.

Finally, the conversion points are provided. Until this point, enough segmentation, trust building, information briefing, and

social proof has been provided to form a good basis for conversion. At the conversion point, maximum usability to conversion, claims to maximize possible user benefits and to minimize risks are provided to guide the conversion.

The bottom-right inner view provides an inner view of each component in the main diagram. Each component has a three-step internal structure, starting from a lead, through interactivity, and then completing a finish. “Lead” is the part that catches the attention and provides an easy path to further content. “Interactivity” is the part where each user forms a positive attitude through a cumulative series of “yes” steps. When a “yes” is replaced with multiple choices, it serves as a filtering and segmentation process. “Finish” is the part where the user finishes reading. At the completion of reading, the user naturally comes to think about what he/she will do next. This period of thinking about what to do next is a beautiful opportunity to ask something simple.

VI. DISCUSSION

A. Advantages of the Proposed Approach

The proposed approach provides a time-dimensional view of Web conversion.

During Web navigations, it is important to focus on the transitions in user cognition with respect to navigations as well as to Web usability. Except for the main goal, conversion, tasks should be as effortless as possible. At the same time, the Web design needs to address possible attitude changes during user navigation. Navigation, reading, and selection have an impact on user perception and attitude.

The main advantage of the proposed approach exists in its focus on time-dimensional factors. For example, convertibility in each navigation step.

A comparison with the existing approaches is depicted in Table IV.

It is advantageous to expand the design scope from designing inside of each page to a holistic design that focuses on the mutual influence of Web content and user actions.

B. Limitations

This research is descriptive and qualitative. Quantitative analysis of conversion in each design is beyond the scope of this paper.

Quantitative verification in real-world cases requires future study.

Quantitative analysis of the contribution of each factor, inter-factor analysis and cross-cultural analysis are not covered in this paper.

The effectiveness in terms of general service engineering is a topic for future study.

VII. CONCLUSION

Conversion is one of the most important goals in Web design. However, the best practices for Web conversion still remain at a stage of random trial-and-error heuristics. In order to develop a systematic framework for conversion, the author analyzed the best practices of Web conversion.

TABLE IV
COMPARISON WITH THE EXISTING APPROACHES

Approach	Comparison
Minimal cognitive processing theory [4]	The minimal cognitive processing theory focuses on the elimination of unnecessary burdens of use. The proposed approach focuses on cognitive transition in the dimension of time.
Prominence-Interpretation theory [14]	Fogg explained the credibility of the Web from a combination of prominence and interpretation. In this model, medium-term and long-term relationships are implicitly explained in context in each interpretation. The proposed method explains inter-personal relationships in an explicit manner.
Gamenics theory (Chapter 23.1 of [13])	Saito coined the term "Gamenics" in order to apply engagement techniques that originate from games. There are some similarities in focusing in time-dimensional factors. The difference lies in its highlighting of content-based rhythms and tempos, whereas the proposed approach highlights user-initiated interactions.
In-session stickiness [6]	This approach focuses on the stay time. The proposed approach is different in its taking into consideration of path-based cognitive transitions including the semantics of content.
Interval-based conversion [7]	This approach focuses on time-interval-based recommendations. The proposed approach takes a time-dimensional approach using path-based cognitive transitions including the semantics of content.

The author proposes a time-dimensional view of Web conversion that covers the short-term, medium-term and long-term processes of Web conversion.

The proposed approach focuses on the initiation and completion of user actions in order to assess and increase the likelihood of conversion. This adds an improvement to conversion using additional influence on the user in addition to the minimum usability burden for the user. The proposed diagram provides clues for improving conversion using possible positive attitudes of the user. Conversion is facilitated through multiple stages. Each Web page has its own unique purpose in the staged process of conversion. The diagram-based model provides building blocks for conversion-oriented Web design.

The proposed layered view model provides clues regarding persuasive influence for a wide range of service engineering such as social experience design for Internet services.

Persuasive technology has significant potential within the service engineering to influence people's behavior on the Internet. The proposed stage-based building-up approach provides an important basis for improving a wide range of service engineering designs.

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