The Information Architecture for Website Design

An Empirical Study of B to C E-commerce Websites in China

Jin Nie[1], Huiling Hao[2]

School of Information Management, Whuhan University, 430072, Hubei, P.R.China
1 jinnie@whu.edu.cn
2 haohuiling0223@163.com

Abstract：Information Architecture is an important part of web page design, which includes page layout, classification, navigation system and search system. Effective information architecture enables E-commerce website to attract more visitors and customers. For E-commerce websites navigating consumers successfully is the key to keep the sales records. The paper applied the information architecture theory to analyze two B to C E-commerce websites in China and discussed the improvement for future webpage design.

1 Introduction

With the fast growing of E-commerce transactions in China, Chinese E-commerce websites have been developing rapidly. Online shopping and transactions become part of people's daily live. Since the primary goal of E-commerce site is to connect users to products, the basic requirement of website is to help consumer locate the items they want and begin the ordering process online. This is the major difference between online shopping and traditional on site shopping. The information provided on the websites and its arrangement will directly affect customers' shopping decisions.

The traditional merchandise distribution strategy in store has been changed to the information layout strategy of merchandise online. Regular counter displaying of goods and services are replaced by product pictures or some multi-media navigation systems [1]. For online stores the effective marketing strategy is to provide sufficient goods or service information on web and direct consumers to the merchandise they need. Here implementing information architecture in the website design will be an efficient method to structure information so people can find it and use it successfully.

The following of the paper will present the main theory of IA, and apply the theory to analyze two online stores website interface construction. The research method is to search the same merchandise on two websites, and compare the process

and results of the search. We evaluated the navigation and searching procedures with the IA theory. Based on our finding provide some improvement suggestion for each online stores website arrangements.

2 Theories of website information architecture

Information Architecture is: "First：individual who organizes the patterns inherent in data, making the complex clear; Second: a person who creates the structure or map of information which allows others to find their personal paths to knowledge." This is the definition by Richard Saul Wurman who was first person coined the term. Wurman views architecture as the science and art of creating an "instruction for organized space [2]." It involves the design of organization, labeling, navigation, and search systems to help people find and manage information more successfully. Information architecture is the term used to describe the structure of a system, i.e the way information is grouped, the navigation methods and terminology used within the system [3]. Originally, the theory is applied in the architecture of text information. Due to the rapid rise of the Internet, network information has been growing explosively. When people face massive information, they also have difficulties on how to choose and get effective information. At this point, information architecture emerged.

On the web, IA is a combination of organizing a site's content into categories and creating an interface to support those categories [4]. It composed with the following parts [5]:

(1) Organization system. Divide information in different categories and based on the characteristics of the content, targeting customers with diversified interests. According to Wurman[6][7], there are five ways to organizing information: Location(organize information on the characteristics of location), Alphabet(organize information according to their alphabetical order), Timeline(organize information chronologically), Category(organize information by different categories) and Hierarchy(organize information according to a hierarchical relationship (eg. importance)).

(2) Labeling system. Create a unified labeling program for each specific group of contents of information.

(3) Navigation system. Set up the web browser to help users map out the information the need.

(4) Search system. Help people develop retrieval expression matching related documents to meet users' information requirements.

The goal of information architecture is to achieve the best searching results through web construction. IA is characterized by its practice; not by its research [8]. In the following part of the paper we are going to apply the theory to analyze two E-commerce websites in China and discuss the feature design and future improvements needed for each site.

3 The Searching Case

The sequence of shopping for most people is: first, decide what commodity to buy; second, set the price; third, decide the quality and function of the merchandise. For online shopping the website should present the feature and function of each product

clearly and accurately to help consumers search them on the net. We chose MP3 as the merchandise for searching study. Other specific product requirements are: price not higher than RMB500; Color screen with multimedia function; volume no less than 1GB. The selected websites are D1 convenience website (http://www.d1.com.cn) and Yixun website (http://www.icson.com). There are three kinds of strategies to be implemented in information contents arrangement: navigation layout, classification and search engine layout. We focused on the three kinds of layout study of the two websites. For each search we use the same computer operation system, same network speed, the exactly same individual to conduct the search activities. We also count the time on each searching practice and based on the searching speed to find out the right MP3 product to conduct our analysis. We finish our search in November 2006.

3.1 Search plan 1 -- navigation bar

The navigation part is usually on the top of the websites. It can provide direct access to each kind of product by linking with catalog. Using navigations will help users to narrow down the scope of commodity they are looking for.
(1)D1 convenience website (http://www.d1.com.cn)
    Click navigation link to the digital product area, there are several search bars in the linked webpage. For different digital products (MP3, MP4, mobile storage, computer accessories, digital accessories, etc.), we use different search methods and options, as is shown in figure 1. Users can choose MP3 by different options (by price, by time, etc.). 40 results returned on the website and in which 37 meet the requirements.

Fig. 4. Search bar of mp3 in D1
(2)Yixun website(http://www.icson.com)
"MP3"→return 90 goods in 10 pages→look through one by one→succeed

3.2 Search plan 2 –classification directory

The search program of organization system is to search through the list of the commodities by classification.

(1) D1 convenience website (http://www.d1.com.cn)

Digital products → digital music → MP3 player → linked to the page of plan 1(navigation bar)

(2)Yixun website(http://www.icson.com)

Digital video and music device → MP3 player → linked to the page of plan 1(navigation bar)

3.3 Search plan 3—search engine

The search engine inside the website can be used to search for a specific product. Key in the key words of the merchandise, the searching result will be pop up on the screen.

(1) D1 convenience website (http://www.d1.com.cn)

Run full text search using different combinations of key words "MP3, video, 1G" and results are:

①enter "MP3" → 1452 results automatically classified into 8 types → digital products → succeed

②enter "MP3, video" → 44 digitals, 7 books → succeed

③enter "MP3, 1G" → 64 MP3, 6 MP4 → succeed

④enter "MP3, 1G, video" → 2 MP4 → too expensive

The user has found that some MP4 have the same function as MP3 which have been put into different classes. What cause this problem?

(2) Yixun website(http://www.icson.com)

Repeat the same steps as in D1, but only when entering "MP3" the searching result will pop up.

Another problem appears. "iPOD Monopoly" (iPOD is a kind of MP3 which is produced by a company named APPLE) is in the directory of "MP3". "MP3 player" and "iPOD Monopoly" belong to two different categories. So if user clicks "MP3 player", there will be no information about iPOD. But if keyword "MP3" is directly entered in the search engine, information about iPOD will be chosen.

4 Analysis of the cases with the theory

After series of tests, the effect of IA in these websites can be figured out. Most of the search processes succeeded, but some spent much time while some are efficient. And there are still some failed cases. Table 1 presents the searching result we recorded in November 2006.

Table 1. The search results comparison

Website	D1 Convenience Website	Yixun Website
Navigation bar	yes	yes
Main category	yes	yes
Sub category	yes	no
Main search engine	yes	yes
Sub search engine	yes	no

Order of goods	yes	yes
Search plan1-navigation bar	Succeed, 30sec	Succeed, 2min
Search plan2-classification directory	Turn to plan 1	Turn to plan 1
Search plan3-search engine	3 succeed (less than 1min), one fail	1 succeed(1.5 mins) , 3 fail

As is shown on the table, both of them have navigation layout, classification layout and search engine layout. But the quality of those designs directly leads to the results. D1 has several advantages: first, the amount of successful cases is larger; second, D1 spent much less time in all examples; third, design of D1is more meticulous with series of main systems and sub systems.

(1) Directory

Implementing IA theory there are different ways to organizing information. Both websites apply taxonomy which is proper with the characteristics of products. Taxonomy agrees with people's general logical thinking habit. Meanwhile, when search target is not clear or keywords are inaccurate, application of this method can improve search efficiency.

But when user hit the navigation bars or the classification links in Yixun, he has reached the bottom of the category level. There is no further search directory available. In the theory of organization system design, the depth and breadth of classification should be adequate and poised. The level of product directory in Yixun is so superficial that users can not continue to narrow the scope of search. They have to browse a large quantity of mixed information, spending a lot of time on unrelated commodities.

(2) Classification and label

The critical part of organization system is taxonomy. Scientific organization and labeling systems will increase the efficiency of users' search. Each label should represent one kind of information to help users understand the classification of information. So the labels on the websites will directly influence the extent of users' understanding of information.

①Yixun separates "iPOD" from other MP3s and creates different labels. This is not an accurate way of sorting information which is classified by neither brand nor function. The two labels may cause users' misunderstanding of iPOD and MP3. In our cases users do not care about the brand of MP3s, as long as the products meet with the requirements about price, volume and video. However, Yixun's design will directly separate information from iPOD when users start navigation. Therefore, the rate of recall is not assured.

②Ambiguous labels of MP3 and MP4. User's goal is to search for a MP3, so it is obvious that user only search goods under the MP3 directory. But when keywords "MP3" are used to search goods, results contain MP4 which belong to another sort, but fully meet with the requirements. The reason why MP4 are searched out is that MP4 is the upgraded product of MP3 which embodied all the functions that MP3 has, so when full-text retrieval is done, some describes of MP4 include keywords "MP3" and these products are selected out.

The root of this error is the discrepancy between user's knowledge structures and websites'. Each user's knowledge structure is different, so does their understanding of MP3 and MP4. Some users will treat one product as MP3 while another may regard it as MP4. If the websites only organize and label the information according to their own understanding, conflicts of concept understanding will appear.

(3) Search engine

Search engine provides users with a search scheme different from classification or navigation. It is one of the important tools of search system that can help users quikly find things which have specific descriptions and cannot be displayed in navigations or directories. Search engine can satisfy user's special search requirements.

①User enters the same combinations of keywords into the search engines in the homepages of the two websites. All these plans in D1succeed within 1minute, but only one has results in Yixun(table 1).

②When user has implemented the search command in the homepage of D1, the results will be automatically classified for user to narrow the search scope. But Yixun shows only one page and user cannot eliminate or abstract the information.

③D1 supplied different sub search engines based on different types of goods. In our case, user can limit all kinds of functions of MP3 (price, volume, FM, brand, etc.) at one time without narrowing the scope step by step. To search for other products, such as jewelry, there is another sub search engine (including price, material, brand, type, etc.). Yixun dose not have anymore search engines except for the one in homepage.

Yixun's search system is too simple. First, the keywords dictionary is not rich, and search function is not efficient. When entered more than one keyword, Yixun can not find the location of the goods. That is not because Yixun does not have this product but its search system is too simple that the brief combination of keywords can not be recognized. Second, the design of the search engine can not move further, so it dose not have the function to filter information based on results of last step.

(4) Targeting and navigation bars

E-commerce websites must be designed focusing on the requirements and tastes of users [9]. D1 has better consideration on different levels of users' demands. It devises the navigation bars from two different aspects to make comprehensive classification. The first is the previously mentioned navigation bar classified according to the function; the second is another navigation bar in accordance with different types of users whose demands for goods will be different. These goods are typed based on gender, age, occupation and season (Christmas Day, Children's Day, New Year and other special plate, etc.). Two classifications methods may fit users' different search habits.

5 Suggestions

Based on the analysis, we generated the following suggestions:

(1) If the definition of two products is hard to distinguish, organized them into the same category, create unified retrieval formula and increase the limited indicators for each good. This will avoid missing in search. For the two websites we should put MP3 and MP4 into the same classification catalog, using unified logo "MP3 and MP4". Adding the keywords of commodity's description into catalog, not only volume, price, and also whether supporting video format, whether there are affiliated functions (such as photo browser, text browser, etc.)

(2) Enhancing the sub-directories for each kind of product. In the general directory "MP3" should be one of the sub directories based on the performance of MP3 (Brand, volume, etc.). Sub-directory can help user narrow down the types of goods in their search. For example, when all MP3s with volume bigger than 1G are listed, user can also limit price selection in current search, and people can find the products satisfy both obtain conditions. The sub-directory level should be suitable

which is neither too shallow nor too deep. Cognitive psychologists Miller said that the symbols amount or the block size which people can preserve and deal effectively with in a short memory is 5-9, generally limited to 7. So the depth should be ensured that users will not be forced to click more than 4.5 layers to reach the target information [10].

(3) The list of commodities should be arranged in a user friendly way, not in random order. Random array will make user feel that information is fragmented and lose the interest to go on. So whenever results are returned, products should be automatically put in order according to some manner such as time, price and so on. For example, search results are listed with the order that prices from high to low. The arrangement will not influence the normal operation, but make the results more acceptable. In addition, the website should provide other ranking methods for customers to make the selections.

(4) The design of the directory should be extensible. Both websites we studied in this paper are small and medium-sized E-commerce websites. For small and medium sized business websites possess relatively less commodities, so it is not necessary to classify the goods into more detail. Sometimes, too exhaustive categories will bring about reverse effects. But considering the amount of goods will increase in the future, the designers must make sure that the structure can adjust to changes. By the time not only the quantity of commodities increases, but also the frame of commodity classification changes. So the information structure should be designed to facilitate the expansion and modifications from the very beginning. For example, now MP4 products have not become prevail in the market and are very alike with MP3, so gathering them into one catalog is more helpful for users. With the technology development, MP4's functions become more powerful, and the differences between them are gradually obvious. At that time, we should consider whether or not to separate them into two category lists.

(5) Search engine is a very powerful tool in the search process. But as for the theory of search system, designers should be careful when making decision on whether the website really needs a search engine [11]. There are two things need to be thought ahead: Dose the website have enough contents and will the search engine divert resources from more useful navigation systems? Yixun is a small website which has relatively less information. Navigation and organization system are effective enough to help users make quick selection. Search engine may not fit in this situation. In addition, plan 3 has indicated that the current search engine in Yixun is not efficient and replacing it with navigation and organization system may increase efficiency.

(6) Future work. The research result may be not accurate as we predicted since the research was based on two websites and the testing time is limited. We need to conduct further detailed research on a more broad data collection and analysis basis.

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