Redesigning the English Website for Hangzhou DAC Biotech

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Redesigning the English Website for Hangzhou DAC Biotech

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2.3 The Drug Approval Process in the United States	Dominic Cascino	All
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Executive Summary

Cancer impacts a large percentage of the world population. The International Agency for Research on Cancer estimate that there will be 18.1 million new cancer cases and 9.6 million deaths by the end of 2018 (Bray et al, 2018). In China, where approximately half of the world population resides, 2.8 million cancer-related deaths occurred in 2015 (Chen et al, 2016). To address this global issue, the field of biotechnology is developing cancer treatments.

Current cancer treatments such as chemotherapy or immunotherapy cause severe side effects (Peters & Brown, 2015). Many biotech companies are working to develop antibody-drug conjugates (ADCs), aiming to improve the current state of cancer treatment methods. Compared to conventional treatment methods that indiscriminately damage cells, ADCs target tumor cells while leaving healthy tissue intact (Peters & Brown, 2015). Biotech companies researching cancer treatments require testing of their technology before they can release their products on the market (Lipsky & Sharp, 2001). To accomplish this, companies go through a clinical trial process, which is a research study performed on human volunteers to test if new treatments are safe and effective (National Institute of Aging, 2017). To gather volunteers, companies need to promote their research and technology. Some companies have websites to promote themselves and their research (Jones, Borgman & Ulusoy, 2015). With a website, companies have the opportunity to establish a web presence and reach out to a wide audience.

The goal of our project is to provide informed recommendations for the redesign of the Hangzhou DAC Biotech's English website. Our objectives are to identify common features of biotech websites, analyze the current state of the company's English website, assess the needs of the company's potential website audience, and determine a Web Development system for easy website management. We will then present our findings and recommendations to the sponsor through a written report and conceptual website designs.

The team will start by gathering a list of biotech websites and analyze them based on the following categories: content, navigation, and general features. After evaluation, the project team intends to compile the similarities and differences between the websites. We plan to use these three categories to evaluate Hangzhou DAC Biotech's English website. Our team will compare

the Hangzhou DAC Biotech website's features to the previously analyzed biotech websites. This will help us identify missing features and areas of improvement. Also, to gain insight on the website development process, the team plans to interview the employee that created the current English website. We then will interview potential website viewers to understand which features they find appealing in biotech websites. We will also research available options for developing a website and interview web development companies for their website development process. The team will then apply a *cost-benefit analysis* to compare our researched methods. Finally, the project team will provide a written report to Hangzhou DAC Biotech including recommendations and a few visual conceptual designs for the English website.

Chapter 1 Introduction

Cancer is one of the leading causes of death worldwide, with 8.2 million cancer related deaths reported in 2012 by the National Cancer Institute. In the same year, 14.1 million new cases of cancer were diagnosed (National Cancer Institute, 2018). The number of new cancer cases per year is expected to increase to 23.6 million by 2030 (National Cancer Institute, 2018). China, in particular, is significantly impacted by cancer deaths. Cancer is the leading cause of death in China, with over 2.8 million deaths in 2015 alone (Chen et al, 2016).

Fortunately, many treatments exist to combat cancer. Depending on the type and severity of a case, patients may receive treatments such as surgery, radiation therapy, chemotherapy, immunotherapy, stem cell transplant, hormone therapy, or targeted therapy (National Cancer Institute, 2017). One new type of targeted therapy is an Antibody-Drug Conjugate (ADC). ADCs are a new class of biopharmaceutical drug that can selectively damage tumor tissues while sparing healthy ones (ADC Review: Journal of Antibody-drug Conjugates, 2016).

Hangzhou DAC Biotech is a Chinese biotechnological company developing ADCs for cancer treatment. Dr. Xiaomai Zhou and colleagues founded DAC Biotech in 2012 and the company currently has over 70 employees (Zhou, 2018). The company has completed the preclinical phase of its ADC treatment and is preparing for human clinical trials in the United States (Zhou, 2018). Over ten investors fund DAC Biotech, with the Chinese pharmaceutical company HuaHai being the leading investor (Zhou, 2018). As DAC Biotech is expanding to the United States, foreign investors, medical doctors, and other collaborators may work with the company in the future (Zhou, 2018). DAC Biotech wishes to increase its English Web presence to attract these collaborators. The company has both an English and Chinese version of its website and seeks to improve the English version. There are discussions in literature of English audience website appeal as well as the best practices in website design (Nielsen, 1999b; Chang, 2011). However, effective design for a Chinese biotech company's English website is not well known.

The goal of this Interactive Qualifying Project is to work with DAC Biotech to provide informed recommendations for the company's redesigned English website. The recommendations aim to identify the features and processes used to create an attractive, content-

rich, and easily editable website. The team has identified the following objectives as the necessary steps to reach the project's goal:

1. Identify common features of biotech websites
2. Understand the current state of Hangzhou DAC Biotech's English website
3. Assess the needs of the Hangzhou DAC Biotech English website audience
4. Determine a Web Development system for easy website management
5. Develop concept designs.

The background chapter presents contextual project information followed by the methods of objective completion in the Methodology chapter.

Chapter 2 Background

This chapter provides necessary context for proposing a redesign of DAC Biotech's English website. We discuss the technology and history of the Hangzhou DAC Biotech company. We also explore Web Design principles, cultural differences in website design, and the importance of websites for companies. The chapter concludes with an analysis of DAC Biotech's stakeholders.

2.1 Antibody-Drug Conjugates: A Cancer Treatment Method

Cancer is among the leading causes of deaths worldwide. In 2018, the American Cancer Society estimated that there will be 18.1 million new cancer cases (Bray et al, 2018). For males, the most common type of cancer is lung cancer, followed by prostate and colorectal cancer. For females, the most common type is breast cancer, also followed by colorectal and lung cancer. In China, lung cancer is the leading cause of death (Chen et al, 2016). In 2015, over 2.8 million deaths were recorded in China (Chen et al, 2016). Since cancer impacts such a large portion of the world population, research on cancer treatment methods is an important aspect in the biotech field.

There are many types of cancer treatments, a few being surgery, radiation, and chemotherapy. Focusing on chemotherapy, this type of cancer treatment uses cytotoxic agents to eradicate tumor tissue (Oliver & Hurvitz, 2017). Cytotoxic agents, meaning substances toxic to cells, inhibit cell division, causing cancer cells to die (Cancer Society of Finland, n.d.). The concern with treatments involving cytotoxic agents is that upon dose escalation, the agents kill both healthy tissue and tumor tissue. Cancer treatments with cytotoxic agents can cause adverse side effects such as hair loss, nausea, and diarrhea (Peters & Brown, 2015; Cancer Society of Finland, n.d.).

Antibody-Drug Conjugates (ADCs) are a new type of biopharmaceutical drug that aims to reduce the side effects of chemotherapy. An ADC is composed of a monoclonal antibody linked to a cytotoxic agent via a chemical linker. (ADC Review: Journal of Antibody-drug Conjugates, 2016). Monoclonal antibodies are a class of antibody produced by a single cell or an identical cell line (Genetech Inc, 2015). The monoclonal antibody component allows the ADC to

selectively deliver the cytotoxic agent to tumor cells, preventing damage to healthy tissue (Peters & Brown, 2015). The sponsor for this IQP, Hangzhou DAC Biotech, focuses on the research and development of ADCs as a cancer treatment.

2.2 Hangzhou DAC Biotech

2.2.1 Overview of Hangzhou DAC Biotech

Dr. Xiaomai Zhou and colleagues founded Hangzhou DAC Biotech in 2012 (Zhou, 2018). The medium-sized company is located in the Hangzhou Economic and Technological Development Zone of the Zhejiang Province (Hangzhou DAC Biotech, n.d.). Since its establishment, DAC Biotech has focused on the research and development of Antibody-Drug Conjugates (ADCs) for treating cancer (Zhou, 2018). The company is currently developing several ADC drugs, one being DX126-262 (Hangzhou DAC Biotech, n.d.). This ADC intends to treat breast cancer, gastric cancer and partial cholangiocarcinoma, which is bile duct cancer in the liver (Hangzhou DAC Biotech, n.d.). Additional drugs that DAC Biotech plans to develop aim to treat multiple myeloma, small cell lung cancer and triple negative breast cancer (Hangzhou DAC Biotech, n.d.).

DAC Biotech's core technical team includes five doctors who studied in America, 33 doctors from China and more than 20 bachelor's degree professional technicians (Hangzhou DAC Biotech, n.d.). Several employees have previous experience in the clinical launch of the ADC Kadcyla (T-DMI) drug to treat breast cancer (Hangzhou DAC Biotech, n.d.). Although DAC Biotech contains several research and development departments for its technology of focus, it does not have a team responsible for the company website. According to Dr. Zhou, a single employee with experience in web development created the current website (Zhou, 2018).

The current website for Hangzhou DAC Biotech contains information about ADC research as well as general information about the company's departments. DAC Biotech created the website in 2013, with the last content update being in August 2018 (Zhou, 2018). The website is available in both a Chinese and English version. The two versions are identical in layout but differ in content to accommodate the target audience's cultural differences. Content variation between the versions includes images, less detailed information in the English version,

and minor translation problems. Figure 2.1 displays the home page from the English version of Hangzhou DAC Biotech's website.

Figure 2.1: Current Hangzhou DAC Biotech Company English website (http://www.dacbiotech.com/en/index.aspx)

2.2.2 Stakeholders

As Hangzhou DAC Biotech prepares for clinical trials in the United States, it aims to attract future collaborators and customers. The company's stakeholders include domestic investors, foreign investors, medical doctors, cancer patients, universities, pharmacies, and other collaborators (Zhou, 2018). Hangzhou DAC Biotech currently has more than ten investors, with the leading investor being the Chinese pharmaceutical company HuaHai (Zhou, 2018). DAC Biotech aims to attract foreign investors as well, hence the need for a redesigned English website.

The company's English website is important for attracting most of these stakeholders by advertising their presence, research, and technology. The specific audience of DAC Biotech's website is foreign investors, medical doctors, and cancer patients. Foreign investors such as other biotech or pharmaceutical companies provide funds for Hangzhou DAC Biotech. In addition to this contribution, foreign investors may form partnerships with Hangzhou DAC Biotech as part of the process. Similar to foreign investors, universities also provide necessary resources, such as technology and staff during the product approval phase. Cancer patients are additional

stakeholders, as they will participate in clinical trials of DAC Biotech's ADC treatment. An additional stakeholder category is pharmacies. Pharmacies are considered indirect stakeholders due to the lack of involvement in the English website and the drug approval process. After establishing the clinical trials and testing the ADCs in the U.S., medical doctors will provide a prescription for pharmacies to sell these drugs in the market (Zhou, 2018).

2.3 The Drug Approval Process in the United States

Hangzhou DAC Biotech's treatment will need approval to be distributed in the United States. The drug approval process in the U.S. is among the most demanding processes in the world (Kashyap, Gupta & Raghunandan, 2013). The first step for approval is the preclinical phase, which can take three to four years to complete (Lipsky & Sharp, 2001). The goal of the preclinical phase is to find a suitable compound for drug development (Lipsky & Sharp, 2001). This step involves target disease research, computer simulation, and compound testing (Lipsky & Sharp, 2001). Animal testing begins after the company selects a compound. Companies test on animals before humans to prove the compound is not toxic at effective doses and does not produce chromosomal damage (Lipsky & Sharp, 2001).

The second phase for drug approval is to file the *Investigational New Drug* (IND) application for submission to the Food and Drug Administration (FDA). Companies file the IND application only after the drug has been deemed safe during the preclinical phase (Kashyap et al., 2013). The purpose of the IND application is to begin clinical trials on humans (Kashyap et al., 2013). The application includes manufacturing data, animal testing results, reasoning for testing on humans, and a plan for clinical trials (Lipsky & Sharp, 2001).

Clinical trials in humans begin after a successful IND submission (Lipsky & Sharp, 2001). Lipsky and Sharp (2001) identify three distinct phases during clinical trials. The first phase of clinical trials involves 20-100 people with the goal of determining drug safety (Lipsky & Sharp, 2001). Participants are given low doses of the drug with the dose increasing gradually during the trial (Lipsky & Sharp, 2001). The second phase of clinical trials involves 100 to 300 people and focuses on determining dose size, dose interval, and the method of drug delivery. Drugs in this phase can fail due to ineffectiveness, undesirable side effects, or general safety issues. The third phase of clinical trials takes place in a population of thousands and seeks to confirm the results from previous phases (Lipsky & Sharp, 2001). Hangzhou DAC Biotech is

currently in the process of preparing materials for the China FDA and U.S. FDA IND applications. If the drug is approved, they plan to start the first phase of clinical trials in both countries (Zhou, 2018).

If a drug successfully completes human clinical trials, the manufacturer can file the *New Drug Application* (NDA) (Kashyap et al., 2013). The NDA is the application to sell the drug in the United States (Kashyap et al., 2013). The NDA includes all information regarding the preclinical and clinical phases (Lipsky & Sharp, 2001). After submission of the NDA, the FDA completes a review and approves of or denies the NDA application. During this application process, the company has to attract potential volunteers for clinical trials. Hangzhou DAC Biotech relies on presentations at international conferences, directly talking to foreign investors, publications, and their website to advertise their company (Zhou, 2018).

2.4 The Importance of Websites for Companies

Websites are one of the many methods companies could use to advertise their research and technology. Hangzhou DAC Biotech has a Chinese and English website to advertise their company and research. Since they are planning to start clinical trials in the U.S., they are interested in improving their English website to reach and inform English speakers (Zhou, 2018).

Looking at prior studies, small businesses identify the positive impacts of company websites (Jones, Borgman & Ulusoy, 2015). One of the main benefits of having a website is the increase in online presence. Living in a technological era, social media is one of the most widely used mediums to communicate across the globe (Willis, 2017). Companies utilizing websites for advertisement have an increase in brand awareness and customers since websites reach a wider audience (Jones et al., 2015). For example, Jones and colleagues found that businesses in Maine with websites are more successful at attracting an audience compared to businesses without websites, as websites can reach people across the globe. For a biotech company, a website can attract collaborators to aid in research and facilitate the drug approval process (Zhou, 2018). Other than company presence, websites also have a positive impact on the relationship between the company and its customers (Jones et al., 2015). Websites provide users an easy way to contact the company. Since it is convenient for both parties, user engagement increases, which strengthens the relationship between the company and its customers (Jones et al., 2015). Although in order for companies to benefit from a website, the website must be well designed.

2.5 Web Design Best Practices

2.5.1 Universal Patterns

One of the most important concepts to keep in mind when designing a user interface such as a website is the concept of *Universal Patterns*. *Universal Patterns* are Web Design elements and interfaces found on most websites. User's previous experiences shape these patterns. When a user interacts with a website, they are taking with them their previous knowledge and intuition of the world (Duyne, Landay & Hong, 2002). Intuitive interfaces on the Web reflect this concept, such as software buttons. Using the knowledge of physical buttons that users already have, clickable areas of a website can leverage this knowledge by adding shading for a three-dimensional effect. An example of transferable knowledge reflected in buttons is seen in Figure 2.2 (Duyne, 2002; Nahmias, 2012).

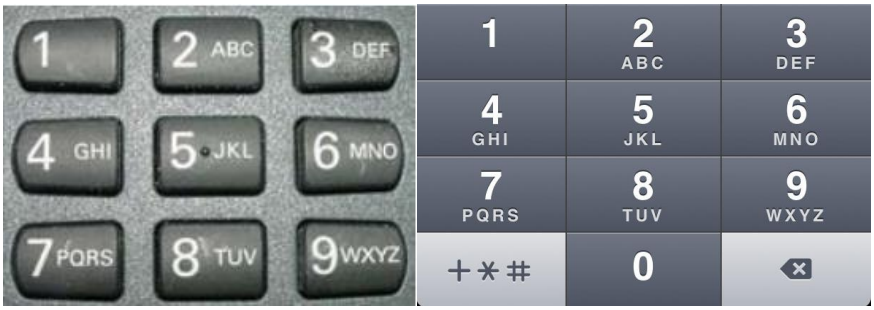

Figure 2.2: Example of buttons and three-dimensional shading on software buttons (Duyne et al., 2002; Nahmias, 2012)

This shows that usage of Graphical User Interface (GUIs) features such as buttons and clickable areas have become a type of transferable knowledge. This type of knowledge not only applies to physically inspired interfaces but to software interfaces across websites. Familiar examples are *sign-in pages* and *shopping cart checkouts* (Duyne et al., 2002). Taking the *sign-in page* into consideration, the reason it has become a *Universal Pattern* is as Duyne states, *Universal Patterns* provide the benefit of utilizing the experience that users have already developed and learned (Duyne et al., 2002). The principle of *Universal Patterns* is to design a website that looks and functions like existing websites, since the user is expecting a similar experience across websites.

2.5.2 Design Principles and Common Features of Websites

According to Palmer, there are five aspects of a website that significantly influence its success. These five features are *download speed, navigation, content, interactivity,* and *responsiveness* (Palmer, 2002). The first three features are the focus of this section. Palmer defines *download speed* as speed of access and website display rate, *navigation* as the organization, arrangement, layout, and sequencing, and *content* as the amount and variety of product information.

Among the most important of these is the download time of a website page. When a user moves between pages, the new webpage should load within sub-second speeds (Nielsen, 1999b). The variability of this speed should be low since users will be disappointed if an action takes longer than a user has experienced before (Nielsen, 1999a).

Once a webpage loads, the navigation structures allow the user to move around the website. The Web Designer should make the navigation structures valuable and usable (Duyne et al., 2002). Additionally, they should create the website such that the structure is easily understood. This enables the user to be aware of where the current page is on a website, how they got to the page, and where they can go (Nielsen, 1999b). The user's understanding of this depends on how the Web Designer presents navigational information. Nielsen states that this understanding comes from showing the page location relative to the Web as a whole and relative to the website's structure (Nielsen, 1999a). The most important aspect of a navigation structure is to include the website logo in a consistent location on every page (Nielsen, 1999a). This logo should also serve as a link to the homepage of the website (Nielsen, 1999a). The location of this logo is preferably on the top left corner for languages that are read from left to right (Nielsen, 1999a). As for ways to implement navigation, Nielsen points out that aggregation and summarization are two methods that reduce clutter. Aggregation is the method of showing a single object that holds a collection of objects (Nielsen, 1999a). An example of this would be dropdown menus, that hold many objects inside of one. Like aggregation, summarization is the method of representing a large amount of information with a reduced amount of information (Nielsen, 1999a). An example of this may be a small image with a title to represent a large article on another page.

A type of structure that enables easy user comprehension is a process funnel. Process funnels are a sequence of pages with a specific end goal (Duyne et al., 2002). An example of this

may be the checkout process or a sign-up sequence. The design element to follow when including a process funnel on a website is to minimize the possibility for the user to accidentally exit the process funnel (Duyne et al., 2002). According to Nielsen, users on a website are goal driven, and it is best to lead the user to success as soon as possible (Nielsen, 1999a).

Content is particularly important, as the type and presentation of content can change the user's attitude towards the website. Nielsen suggests optimizing content by considering how users interact with the Web. Aim to design content for skimming, as users tend to scan text instead of reading (Nielsen, 1999b). This can be achieved with short paragraphs, bulleted lists, and subheadings (Nielsen, 1999a). Skimmable content works well because research has shown reading from a screen is 25% slower than reading from paper (Nielsen, 1999a).

Related to content, media richness is also an important factor in website design. As Palmer notes, "Media richness refers to a medium's relative ability to convey information." (Palmer, 2002). As a medium, the Web can contain text as well as multimedia (Palmer, 2002). Multimedia includes animation, video, and audio, which serves to contrast typical media such as images and text (Nielsen, 1999a). For a business, presenting rich product information to the users could positively benefit a website, as the goal of a business website is to maximize the customer's experience (Duyne et al., 2002). The project team will consider the best practices in Web Design in the redesign of DAC Biotech's English website.

2.6 Cultural Differences between Chinese and English-Oriented Western Websites

Website interface design reflects cultural differences between Chinese and English speakers (Gevorgyan & Manucharova, 2009). Cultural differences are pertinent to this project because the English website for the Chinese company needs to be culturally-oriented to appeal to an American audience. Research shows that websites that are culturally-oriented to the audience have a higher appeal than those that do not (Translate Media, 2016). Therefore, in developing recommendations for effective practice, our team takes into consideration cultural differences between English and Chinese websites.

Between English speakers and Chinese speakers, there are distinct differences when appealing to an audience through websites. Since cultural differences are major influential variables, it is important for us to investigate what aspects of culture positively manifest website

features. When investigating feature differences, website studies often use Hofstede's model of culture. Hofstede's model looks at five different characteristics of culture to explain cross-cultural behaviors and features: *individualism versus collectivism, uncertainty avoidance, masculinity versus femininity, power difference,* and *long-term and short-term orientation* (Chang, 2011). We examine Hofstede's model because it is the most widely-used theoretical framework for explaining cultural variances in websites (Chang, 2011). Additionally, previous case studies identify certain characteristics that create different features for English and Chinese websites.

In a case study towards culturally customized Web Design elements, American users favor *individualism-oriented websites* while Chinese users favor *collectivism-oriented websites* (Gevorgyan & Manucharova, 2009). In China, people generally grow to have a sense of collectivism (Andreas, 2009). As a collectivist society, their priority is to act in the interest of the group (such as family or work groups). In contrast, Americans grow up with a prioritized sense of individualism and their priority is to act in the interest of the individual. Researchers tested how users react between individualistic and collectivist design features and found that Chinese speakers reacted positively to collectivist features such as group memberships and public forums designed for a public audience. Conversely, English speakers reacted positively to individualist-oriented features such as elements that focus on user privacy and one-to-one contact (Gevorgyan & Manucharova, 2009).

In another study investigating *uncertainty avoidance,* Chinese websites scored higher than English websites (Chang, 2011). *Uncertainty avoidance* is a social group's tolerance for uncertainty and avoidance of uncertain features. High uncertainty avoidance countries tend to seek authoritative figures for guidance, which websites reflect through content that lacks ambiguity. Additional Web features such as added colors, customer assistance, and guidance videos demonstrate a higher uncertainty. This explains why many Chinese websites look very busy in comparison to English websites. They have a large amount of content on one page to reduce the uncertainty of clicking on a link that leads to an unknown page. Some common examples of this comparison are on Chinese websites such as the Tencent QQ movie website and the English website VRV, seen below in Figure 2.3 (Rajeck, 2016). Many Chinese websites are multipurpose in comparison to English language websites to reduce the amount of clicking between pages. This results in more links and images clustered on a Chinese website compared to an English website.

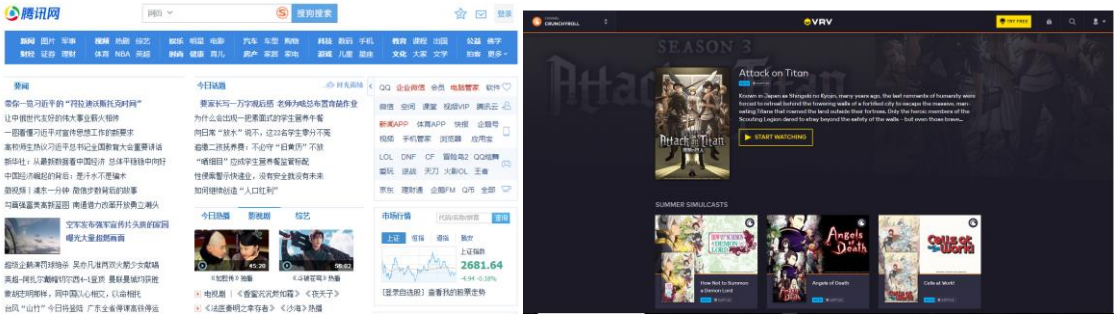

Figure 2.3: Chinese website QQ provides online social games, music, shopping, microblogging, movies, and group and voice chat software (http://www.qq.com/). English website VRV is an online video subscription service (https://vrv.co/).

For masculine and feminine characteristics, the differences between Chinese websites and English websites do not vary drastically. The definition of *masculine* and *feminine websites* originates from gender-based roles. A research report that focuses on the differences between culturally different websites defines masculinity as competitive, assertive, and tough (Chang, 2011). Websites that are more masculine focus more on economic performance than their female counterparts. When looking at masculine websites, they tend to appeal to the customer through a hard-sell approach. For example, they use money and assets such as financial reports and social status to represent their business (Wang, Lou, Wang, & Guo, 2015). As for feminine websites, they will go for a softer and less explicit approach such as using more female pictures to represent a more feminine society. Though when studying Chinese and English websites, neither of the two are deemed to be more masculine or feminine (Chang, 2011).

When looking at the other two characteristics, *power dominance,* and *long-term and short-term orientation*, results of studies show there is also no significant difference between English websites and Chinese websites. *Power dominance* describes a culture's power hierarchy. In high-power distance cultures, people are more acceptive of large power differences between classes, like monarchies, than low-power cultures such as democracies. Websites reflect power dominance when content includes media that emphasizes high authority figures, such photos of senior faculty instead of junior staff members. As for long-term and short-term orientation, Web content also reflects this type of characteristic. Long-term oriented cultures focus more on the future, so their Web Design contains more practical content. Short-term oriented cultures focus more on the present so content closer to instant-gratification is often present (Translate Media,

2016). Out of the five dimensions, only individualism versus collectivism and uncertainty avoidance remain applicable (Chang, 2011). Therefore, in order to take into consideration cultural differences, our recommendations may reflect similar differences of the English website from the company's Chinese website.

2.7 Review of Stakeholders

As the team is gathering technical and cultural research, we will also consider the stakeholders of this project while redesigning the English version of the company's website. The following table, Table 2.1, lists the stakeholders that are relevant to Hangzhou DAC Biotech.

Stakeholder	Involvement
Investors	● Provide funds for the company's resources ● Potential partner companies ● Website users
Medical Doctors	● Work on clinical trials ● Website users
Cancer Patients	● Volunteers for clinical trials ● Website users
Universities	● Provide technology and staff to facilitate company's clinical trial ● Joint research with the company ● Website users
Pharmacies	● Sell the dopednd product

Table 2.1: Identified Stakeholders for Hangzhou DAC Biotech

2.8 Summary

This chapter reveals four points that will guide our work in China. First, information regarding Hangzhou DAC Biotech and its ADC technology influences the content of the website redesign. Second, understanding the clinical trial process identifies the stakeholders who would look at the website. Third, information on Web Design demonstrates that websites with good usability excel in areas such as content, navigability, and the use of universal patterns. Finally, information about cultural differences shows that cultures have varying preferences regarding Web Design. The next chapter discusses our proposed methods to assist Hangzhou DAC Biotech in the redesign of its English website.

Chapter 3 Methodology

The international biotechnological company Hangzhou DAC Biotech needs a redesigned English website, as they are preparing for clinical trials in the U.S. The goal of this project is to work with Hangzhou DAC Biotech to provide informed recommendations for the company's redesign of their English website. We have developed the following objectives to achieve our goal:

1. Identify common features of biotech websites
2. Evaluate the current state of Hangzhou DAC Biotech's English website
3. Assess the needs of Hangzhou DAC Biotech's website audience
4. Determine a Web development system for easy website management
5. Develop concept designs.

3.1 Identify Common Features of Biotech Websites

To propose recommendations for Hangzhou DAC Biotech's English website, the team must characterize the common features of biotech websites. We will first generate a list of reputable English biotech websites. This list will contain ten to twenty websites of reputable companies. The interviews that the team plans to conduct in sections 3.3 and 3.4 may lead to additions to this list.

We will then use *multi-criteria evaluation* on each website in the list. The main categories we plan to observe are content, navigation, and general features, as studies on Web Design often mention these categories (Palmer, 2002; Nielsen, 1999a; Nielsen, 1999b; Duyne et al., 2002). The criteria will also include an investigation of the download speed and total size of the home page of each website to determine the efficiency of the rate of download. The efficiency of the rate of download is important because high efficiency is the result of content that is well optimized for the Web. Appendix A details the *multi-criteria evaluation* and is subject to change. The team will compile the evaluation and results as a table for analysis. After evaluating the biotech websites, we will use the results of the *multi-criteria evaluation* to form a general description of a biotech website. If applicable, the team will consider the most often found results of a particular criteria as the general description of that criteria.

3.2 Evaluate the Current State of Hangzhou DAC Biotech's English Website

After identifying the common features from the set of biotech websites, the team will focus on the current state of the Hangzhou DAC Biotech's English website. First, we will analyze DAC Biotech's current website with the same *multi-criteria evaluation* mentioned in Section 3.1. This process creates a comparison between DAC Biotech's website and the general description of a biotech website found in section 3.1. The team will use the comparison as a starting point for revisions to the website.

Since the purpose of the criteria evaluation is to characterize the features of biotech websites, it is not specifically designed to evaluate the current state of DAC Biotech's website. Therefore, the team will identify areas of improvement outside of the scope of the criteria evaluation. Web Design usability research will support these improvements and will follow the categories of navigation, content, and download speed (Palmer, 2002; Nielsen, 1999a; Nielsen, 1999b; Duyne et al., 2002).

Once the team has identified the features and areas of improvement, we will interview the employee in charge of updating the English website with the questions listed on Appendix E. We will assess the process and systems the company used to create Hangzhou DAC Biotech's current website. The team expects to gain a detailed understanding of the website's current situation by consulting with the employee.

3.3 Assess the Needs of the Hangzhou DAC Biotech Website Audience

After identifying the common features of biotech websites, our next objective is to understand the viewers' needs of Hangzhou DAC Biotech's English website. Hangzhou DAC Biotech has already informed the team of the general categories of potential website viewers. The team plans to interview samples of potential website viewers from Boston, the intended area of clinical trials in the U.S. (Zhou, 2018). We will interview stakeholders such as medical doctors, cancer patients, and universities whom DAC Biotech assumes to view the English website. The team has decided that video calls and face-to-face interviews would be the optimal methods of gathering information. This is because the project requires in-depth feedback from the audience's needs regarding the website. Each interview will start with a team member

introducing the project. We will then have the remaining team members ask the interview questions in Appendix C. The goal of these interviews is to help us conduct a *needs assessment* for each shareholder group of the redesigned website.

3.4 Determine a Web Development System for Easy Website Management

Our sponsor seeks an easily manageable website. To accomplish this goal, we will research available options for developing a website and interview U.S.-based Web Development companies. First, we will use a *cost-benefit analysis* to determine the advantages and disadvantages of each option. With this analysis, we aim to compare the ease of management and customizability of each Web Development system. Secondly, we plan to interview companies that focus on Web Development. Companies such as “Bop Design” and “Wakefly” have experience developing websites for biotech companies. These interviews will provide us with a professional perspective on web development systems. The interviews will also inform us about the current industry standards regarding the process of website development. The first set of questions, listed in Appendix D, aims to understand the process of designing an easily editable website. To improve understanding of the process, the team will use a *process analysis* with a step by step breakdown of the company’s process. If the company has experience designing websites for an international audience, we will ask additional questions about this topic. The remaining set of questions will focus on the company’s criteria when choosing the web development system, especially for medium-sized company clients. By gathering this information, we will better inform our recommendations on the redesign of Hangzhou DAC Biotech’s website.

3.5 Develop Concept Designs

After gathering and analyzing the data from prior objectives, the team will compile the results to form recommendations for the English website. Our team’s recommendations within our IQP report will contain effective practices we find will be beneficial for Hangzhou DAC Biotech’s English website. The report will consist of the categories we used to analyze websites. We will recommend improvements in different areas such as content, navigation, design. The

team also intends to recommend a content management system because it is important to have an easily editable website. With an easily editable website, the company can readily update the website's content. In parallel with our report, our team also intends to draft concept designs of the website as a visual aid for the sponsor. We will use illustration software to create the concept designs of the redesigned English website. The sponsor will then review and edit the drafts until we finalize the designs. After the team accomplishes this, the company can then decide their plan of action for the website.

Chapter 4 Conclusion

Hangzhou DAC Biotech is a biotech company that conducts research on ADCs. They plan to perform clinical trials in China and in the U.S. To showcase their research to a foreign audience, they would like a redesign of their English website. With an appealing and effective English website, the company aims to establish a web presence to promote the company to a wider audience including future investors. Our project focuses on providing recommendations for a redesign of the current English website.

The team plans to identify common features of biotech websites, analyze the current state of the company's English website, assess the needs of the company's potential website audience, and determine a Web Development system for easy website management. We will then present our recommendations and concept designs to the sponsor. We hope that our recommendations will provide a helpful guide to the company and look forward to collaborating with Hangzhou DAC Biotech.

References

ADC Review: Journal of Antibody-drug Conjugates. (2016, January 12). What are antibody-drug conjugates or ADCs? Retrieved from https://adcreview.com/adc-university/adcs-101/antibody-drug-conjugates-adcs/

Andreas, J. (2009). Rise of the red engineers: The Cultural Revolution and the origins of China's new class. *Stanford, CA: Stanford University Press.*

Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R., Torre, L., & Jemal, A. (2018, September 12). Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians.*, (0).

Cancer Society of Finland. (n.d.). Cytotoxic drugs or cytostatics. Retrieved from https://www.allaboutcancer.fi/treatment-and-rehabilitation/cytostatics/

Chang, H. (2011, June). Multinationals on the web: Cultural similarities and differences in english-language and chinese-language website designs. *Journal of the American Society for Information Science and Technology*, 62(6), 1105–1117.

Chen, W., Zheng, R., Baade, P., Zhang, S., Zeng, H., Bray, F., Jemal, A., et al. (2016). Cancer statistics in China, 2015. *CA: A Cancer Journal for Clinicians*., 66(2), 115–132.

Duyne, D. K. V., Landay, J., & Hong, J. I. (2002). The design of sites: Patterns, principles, and processes for crafting a customer-centered web experience. *Addison-Wesley Longman Publishing Co., Inc.*

Gevorgyan, G., & Manucharova, N. (2009). Does culturally adapted online communication work? A study of american and chinese internet users' attitudes and preferences toward

culturally customized web design elements. *Journal of Computer-Mediated Communication*, 14(2), 393-413.

Hangzhou DAC Biotech (n.d.). Retrieved October 9, 2018, from http://www.dacbiotech.com/about.aspx

Kashyap, U. N., Gupta, V., & Raghunandan, H. V. (2013). Comparison of drug approval process in United States & Europe. *Journal of Pharmaceutical Sciences and Research*, *5*(6), 131.

Lipsky, M. S., & Sharp, L. K. (2001). From idea to market: the drug approval process. *The Journal of the American Board of Family Practice*, 14(5), 362-367.

Nahmias, G. (2012, July 19). Phone: numeric keyboard for text input. Retrieved from https://stackoverflow.com/questions/6178556/phone-numeric-keyboard-for-text-input

National Cancer Institute. (2018, September). Cancer statistics. Retrieved from https://www.cancer.gov/about-cancer/understanding/statistics

National Cancer Institute. (2018, September). Types of cancer treatment. Retrieved from https://www.cancer.gov/about-cancer/treatment/types

National Institute of Aging. (2017, May 10). What are clinical trials and studies?. Retrieved from https://www.nia.nih.gov/health/what-are-clinical-trials-and-studies

Nielsen, J. (1999a). Designing web usability: The practice of simplicity. *New Riders Publishing*.

Nielsen, J. (1999b). User interface directions for the web. *Communications of the ACM*, 42(1), 65-72.

Palmer, J. W. (2002). Website usability, design, and performance metrics. *Information Systems Research*, 13(2), 151-167.

Peters, C., & Brown, S. (2015). Antibody-drug conjugates as novel anti-cancer chemotherapeutics. *Bioscience Reports.*, 35(4), 1.

Rajeck, J. (2016, February 4). Why do chinese websites look so busy? Retrieved from https://econsultancy.com/blog/67466-why-do-chinese-websites-look-so-busy.

Translate Media. (2015, February 13). How cultural relativism affects web design. Retrieved from https://www.translatemedia.com/translation-blog/cultural-relativism-affects-web-design/

Wang, V., Lou, H., Wang, Y., & Guo, C. (2015, September 14). Differences in organizational web site design across cultures. *Asia Pacific Journal of Marketing and Logistics*, 27(4), 582–599.

Willis, A. (2017, September 1). 6 ways social media changed the way we communicate. Retrieved from http://circaedu.com/hemj/how-social-media-changed-the-way-we-communicate/

Appendix A: Website Criteria

We will use a *multi-criteria evaluation* on each website. The main categories we plan to observe are content, navigation, and general features, as studies on Web Design often mention these categories (Palmer, 2002; Nielsen, 1999a; Nielsen, 1999b; Duyne et al., 2002). Our *multi-criteria evaluation* is subject to change.

Download Speed

We will observe the download speed of each site's home page through Google Chrome's developer tools. Specifically, the Network panel of the developer tools shows the total load time of the page in milliseconds or seconds as well as the size of the page in kilobytes (KB). We will take a ratio of the size of the home page and the load time to observe the KBps of the page. The speeds will depend on the network speed and the route to the website's server. To obtain comparable results, we will also perform these tests on the same network.

Navigation

1. Logo in the top left?
2. Consistent navigation structure?
3. Use of aggregation examples?
4. Use of summarization examples?
5. Main navigation structure location?
6. What are the main pages of the website on the navigation bar?
7. Is the structure of the website easily understood?
8. Type of navigation. Words? Pictures with links? Drop down menu?

Content

1. List the types of media on the website
2. Amount of text?
3. Can the content be conveyed quickly to the user?
4. Is important information communicated quickly?
5. Product/Technology information?

6. Does the website include videos?
7. Size of the most prominent image on the website?
8. What is the subject of images?
9. How do the images relate to the text media?
10. Does content scale to device screen size? (responsiveness)
11. What does the footer of the website contain?
12. Does the website have information about partner companies?
13. Does the website have information about organizations?
14. Is information about rewards or reviews present?
15. Does the website have a favicon?
16. What is the main point that the home page communicates?
17. What content is on the ‘about’ page if present?

General

1. What is the domain name of the website?
2. Compare the company name, domain name, and title
3. What is the color pallet of the website?
4. Does the website have a comprehensive theme?
5. Is there a mobile version?
6. Is there a desktop version?
7. How similar is the website across browsers? Chrome, Firefox, Opera, Internet Explorer
8. What universal patterns does the website use?
9. Are social media links present?

Appendix B: Consultants

Preamble:

Thank you for participating in our project. We are Worcester Polytechnic Institute (WPI) students working on a partial graduation requirement: the Interactive Qualifying Project. Our project involves working with a Chinese biotech company that is planning to start clinical trials of their research in the U.S. To advertise their technology as well as attract volunteers for clinical trials, companies use websites to promote themselves. The goal of this interview is to gain an understanding of the clinical trial process.

Any information collected will remain anonymous. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper. Only the information collected from this interview will be included in our report. Participation in this interview is voluntary and you may stop any time. You may also choose to not answer any questions you feel uncomfortable answering.

Would it be okay for us to record this session for personal note-keeping purposes?

Introduction Questions

1. What company do you work for and how long have you worked there?
2. What is your job title?
3. What are your job responsibilities?
4. Who are the customers of your company?

Background Section 3: Introducing Medical Products to the Market

1. What is the process of taking a medical product to market?
2. What can you tell us about your experience with clinical trials?
3. (If applicable) Can you tell us about your experience with the product approval process when targeting international markets?
4. Do you have any recommendations for other contacts that may be helpful for our project?

Appendix C: Stakeholders: Doctors, Patients, Universities & Organizations

Preamble:

Thank you for participating in our project. We are Worcester Polytechnic Institute (WPI) students working on a partial graduation requirement: the Interactive Qualifying Project. Our project involves working with a Chinese biotech company that is planning to start clinical trials of their research in the U.S. To advertise their technology as well as attract volunteers for clinical trials, companies use websites to promote themselves. The goal of this interview is to assess the needs of the website audience.

Any information collected will remain anonymous. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper. Only the information collected from this interview will be included in our report. Participation in this interview is voluntary and you may stop any time. You may also choose to not answer any questions you feel uncomfortable answering.

Would it be okay for us to record this session for personal note-keeping purposes?

*This anonymity will not include professionals and the organizations. We will instead ask them for permission to mention their name and opinions on our paper.

Introduction Questions

1. What is your name and field?
2. (If applicable) What is your job title?
3. (If applicable) What are your job responsibilities?
4. How are you involved with biotech companies?
    a. Which companies?
    b. How did you first find out about those companies?

Questions: Assess the Needs of the Website Audience

1. Have you had to look at a biotech company's website?

a. What is the purpose of visiting the website? (What information are you looking for?)
    i. What information do you typically look for in biotech websites?
        1. Clinical trials
        2. Contact info
        3. Product and technology information
        4. Other (If so, please explain)
b. What do like about biotech websites?
c. What do you dislike about biotech websites?

2. If you do not look at a biotech company's website, how do you obtain the information (clinical trials, product information, contact information, etc.) needed?

Appendix D: Web Development Company

Preamble:

Thank you for participating in our project. We are Worcester Polytechnic Institute (WPI) students working on a partial graduation requirement: the Interactive Qualifying Project. Our project involves working with a Chinese biotech company that is planning to start clinical trials of their research in the U.S. To advertise their technology as well as attract volunteers for clinical trials, companies use websites to promote themselves. The goal of this interview is to inform us about the current industry standards regarding the process of website development.

Any information collected will remain anonymous. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper. Only the information collected from this interview will be included in our report. Participation in this interview is voluntary and you may stop any time. You may also choose to not answer any questions you feel uncomfortable answering.

Would it be okay for us to record this session for personal note-keeping purposes?

*This anonymity will not include professionals and the organizations. We will instead ask them for permission to mention their name and opinions on our paper.

Introduction Questions

1. What is your title at the company?
2. What are your responsibilities at the company?
3. Can you tell us about your company?
    a. How many employees does the company have?
    b. What kind of clients does the company have?
    c. What types of websites does your company typically make?
    d. How long does it usually take to design a website?
        i. What factors affect the time it takes to design a website?

Questions: Determine Web Development System for Easy Website Management

1. Do you have experience with designing websites for Biotech companies?
    a. What are the main features found in a biotech website?

2. What is your general process when making a website for a client?
    a. What is your criteria to decide what web development system you use for each project?
    b. What tools or web development methods you use when developing each project?
3. How do you ensure that the website meets the client's needs?
    a. How do you design for the client's target audience?
4. What system do you use when a client does not expect to update the website that often (monthly)?
5. What content management system do you use for clients with a medium sized company (<100 people) that does not have a dedicated team to update and modify the website?

Other Related Questions

1. Have you ever designed a website that targets an international audience?
    a. Do different cultures prefer or have different inclination towards design or features?
    b. How do you deal with these cultural differences, if any?
    c. How do you investigate what is appealing your specific audience?

Appendix E: Hangzhou DAC Biotech Web Designer Employee

Thank you for participating in our project. We are Worcester Polytechnic Institute (WPI) students working on a partial graduation requirement: the Interactive Qualifying Project. Our project involves working with a Chinese biotech company that is planning to start clinical trials of their research in the U.S. To advertise their technology as well as attract volunteers for clinical trials, companies use websites to promote themselves. The goal of this interview is to gain a detailed understanding of the current website.

Any information collected will remain anonymous. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper. Only the information collected from this interview will be included in our report. Participation in this interview is voluntary and you may stop any time. You may also choose to not answer any questions you feel uncomfortable answering.

Introduction Questions

1. What is your job title and how long have you worked for Hangzhou DAC Biotech?
2. What are your job responsibilities?
3. What is your experience with creating websites?

Questions: Evaluate the Current State of Hangzhou DAC Biotech's English Website

1. Are you the person mainly in charge of updating the website?
    a. Are there others involved with updating and editing the website?
    b. How often do you plan to update the website?
2. What was the process you used to create the current DAC Biotech website?
    a. Did you create both the Chinese and English version?
3. What web development system did you use to develop the website?
4. What are your opinions about the current state of the website?
5. What do you think would make a website easily editable? Are there any preferences towards systems if you know any?

    a. What is your opinion on content management systems?
6. If there are any, are there any specific areas you can identify to be improved?