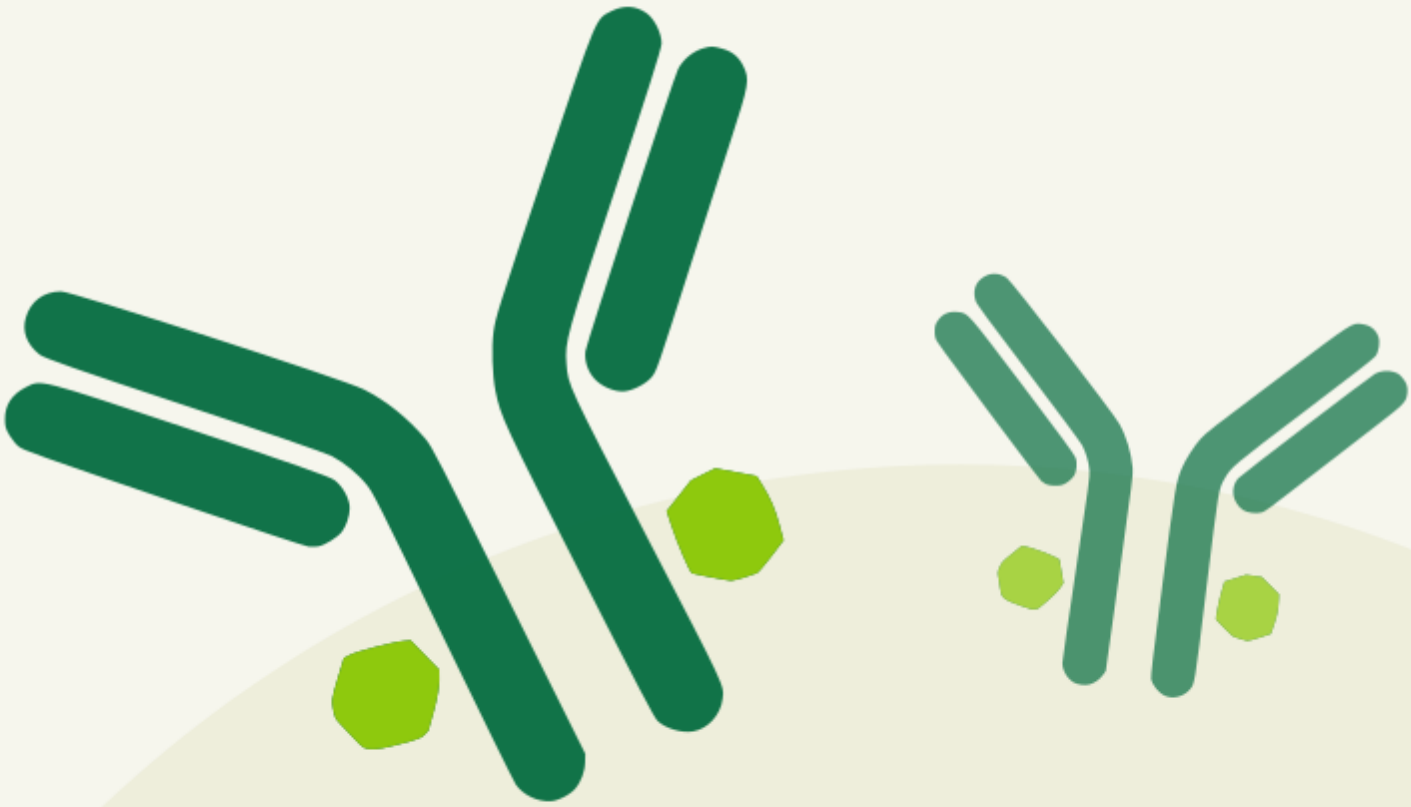

Conceptual Redesign of Hangzhou DAC Biotech's English Website

Dominic Cascino | Paulo Chow | Jose Li | Tsuiyee Ng

WPI

DAC BIOTECH

Conceptual Redesign of Hangzhou DAC Biotech's English Website

An Interactive Qualifying Project
submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
degree of Bachelor of Science

by
Dominic Cascino
Paulo Chow
Jose Li
Tsuiyee Ng

Date:
14 December 2018

Report Submitted to:

Xiaomai Zhou
Vice President of Hangzhou DAC Biotech

Professor Emeritus Robert Kinicki
Professor Wen-Hua Du
Worcester Polytechnic Institute

Abstract

The goal of this project was to work with Hangzhou DAC Biotech in Hangzhou, China to provide informed recommendations for the company's redesigned English website. The project team investigated eight biotech company websites and assessed the company's current English website with a research influenced evaluation. Additionally, the team interviewed company employees, doctors, a Web development professional, and a digital marketing manager. This study revealed that biotech websites emphasize information about the company and its technology. The team recommends a *responsive* redesigned website similar to the team's prototype and the use of a popular content management system for easy website management to create an appealing and usable website for Hangzhou DAC Biotech's website audience.

Executive Summary

Cancer is one of the leading causes of death worldwide. The National Cancer Institute reported 8.2 million cancer-related deaths in 2012 and diagnosed 14.1 million new cases of cancer in the same year (National Cancer Institute, 2018). Particularly in China, cancer is the main cause of death and significantly impacted the country with over 2.8 million deaths in 2015 (Chen et al, 2016). Fortunately, many forms of treatments exist to combat cancer. One type of targeted therapy is an Antibody-Drug Conjugate (ADC). As a new class of biopharmaceutical drug, ADCs 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. According to the project sponsor Dr. Zhou, the company has completed the preclinical phase of its ADC treatment testing and is preparing for clinical trials in the United States (Zhou, personal communication, 2018). As Hangzhou DAC Biotech is expanding to the United States, foreign investors, medical doctors, and other collaborators may work with the company in the future. Hangzhou DAC Biotech wishes to increase its English Web presence to attract future investors and collaborators. The company has both an English and Chinese version of their website and seeks to remake the English version.

Currently, much research literature exists on English audience website appeal and best practices in website design. Additionally, there are studies on how cultural differences like accommodating for language differences impact website design. However, effective design for a biotech company's website is not sufficiently researched.

The goal of this project was to work with Hangzhou DAC Biotech to provide informed recommendations for the company's redesigned English website. The team limits this project of redesigning a website to the scope of recommendations for the website's page layout, content, and website management system. The recommendations for the website's page layout and content identify how Hangzhou DAC Biotech should format the website and arrange the content to be attractive and appealing. The recommendation for the website management system envisions the type of system Hangzhou DAC Biotech should use for easy website management. The team identified the following objectives as the necessary steps to reach the project's goal:

1. Characterize biotech website design
2. Evaluate the current state of Hangzhou DAC Biotech's English website
3. Assess the needs of the Hangzhou DAC Biotech English website audience
4. Identify a website management system for easy website management
5. Develop a prototype website.

To accomplish these objectives, the project team conducted archival research, interviews, interview coding, and a multicriteria evaluation as shown in Figure 0.1. This project evaluated eight biotechnology company websites using a research-supported multicriteria evaluation. The evaluation consists of 56 criteria questions organized in the research-identified categories of *page design, navigation, content,* and *language.* The purpose of the criteria is to create a general description of a biotechnology company website. The team then evaluated Hangzhou DAC Biotech's English website using the same criteria to compare it to the general description and

identify the website's areas of improvement. Following this initial step, the team conducted interviews with six company employees and five stakeholder doctors. From the interview coding of the company employees and stakeholders, the project developed the set of content characteristics that Hangzhou DAC Biotech's future design should include on the company's English website to convey their goals. The team then interviewed a technical project manager from Wakefly, a Web development company, and an experienced website manager to choose a suitable website management system. Additionally, the project team created a prototype website to encompass the findings from the multicriteria evaluation and interviews.

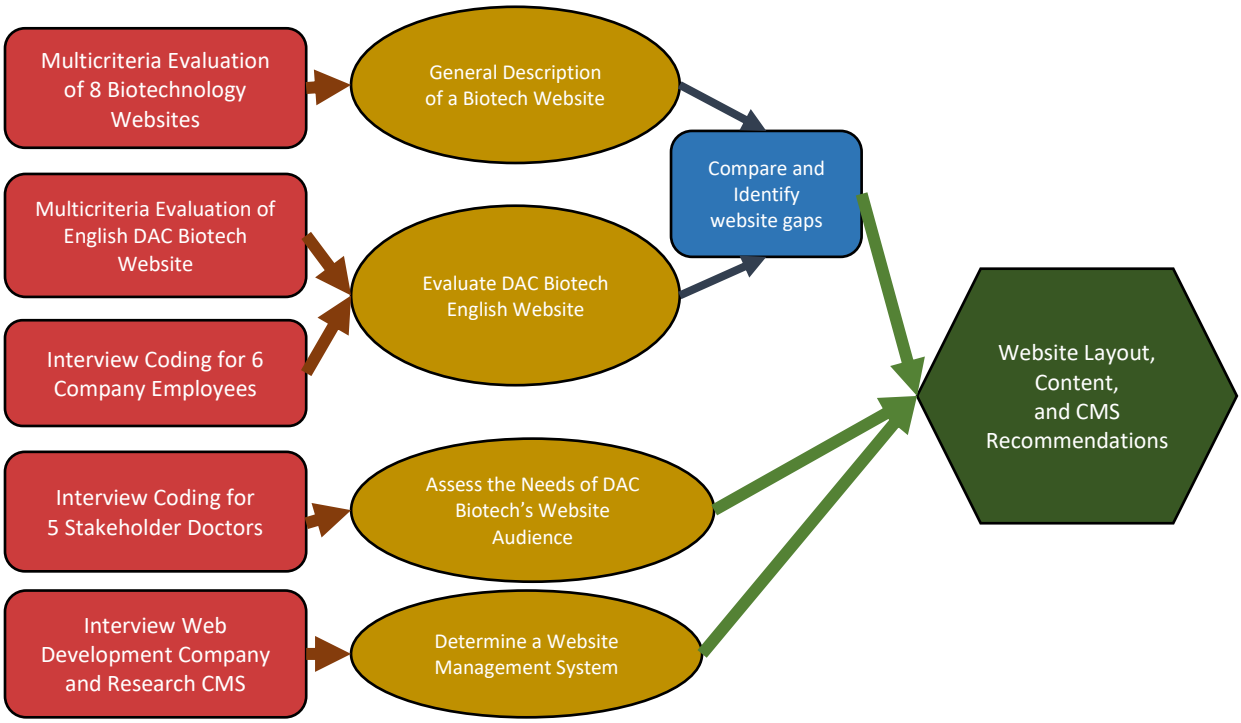

Figure 0.1: A flowchart displaying the project's methods, objectives, and deliverables.

When the team applied the criteria from the multicriteria website evaluation, the criteria revealed common patterns among biotechnology company websites. The team examined the general description and found several characteristics that define a biotech website. The first being that the homepage summarizes key sections of the website. The team found that the most common content sections are the banner, technology, and news section. The banner is an image, video or animation, relating to the company's mission, the most recent news article, or other topics. The technology section introduces the company's products, research, and science. The news section displays the latest company news to update the reader on the company's progress. An additional note is that websites are *responsive* and have a mobile version. A *responsive* website scales and rearranges content based on the browser's window size and ensures that content is viewable on all screen sizes. The websites of biotechnological companies also tend to emphasize the sections *Our Company* and *Our Science*, or similar. The percentage of websites that place the *About Us/Our Company* first and the *Our Science* section second from left to right on the navigation bar is 63%.

The team compared Hangzhou DAC Biotech's English website to the general description to identify the differences, shown in Figure 0.1. One of the major differences this project found was *responsiveness*. The team found all eight evaluated biotech websites as *responsive*. In comparison, the team found that Hangzhou DAC Biotech's website is not *responsive*, as the content does not rescale with a resized browser window. Furthermore, the team found most biotech websites use a different layout to accommodate for character differences in languages. Hangzhou DAC Biotech's website does not have a different page layout for the English website so the direct translation from English to Chinese results in overlapping text. This negatively affects the readability of the website because the layout does not accommodate for character differences.

The team's six interviews of Hangzhou DAC Biotech's employees revealed that website content should focus on promoting the company and their technology. Employees mentioned that images and videos should explain antibody-drug conjugate technology and showcase the company's laboratories and manufacturing process. Additionally, the employees suggested the content be easily readable and simple. This would allow the information to be understood by the general audience and protect the company's sensitive information. When the team asked the employees who they think the website audience is, the most prominent answers were investors, collaborators, job applicants, and doctors, shown below in Figure 0.2.

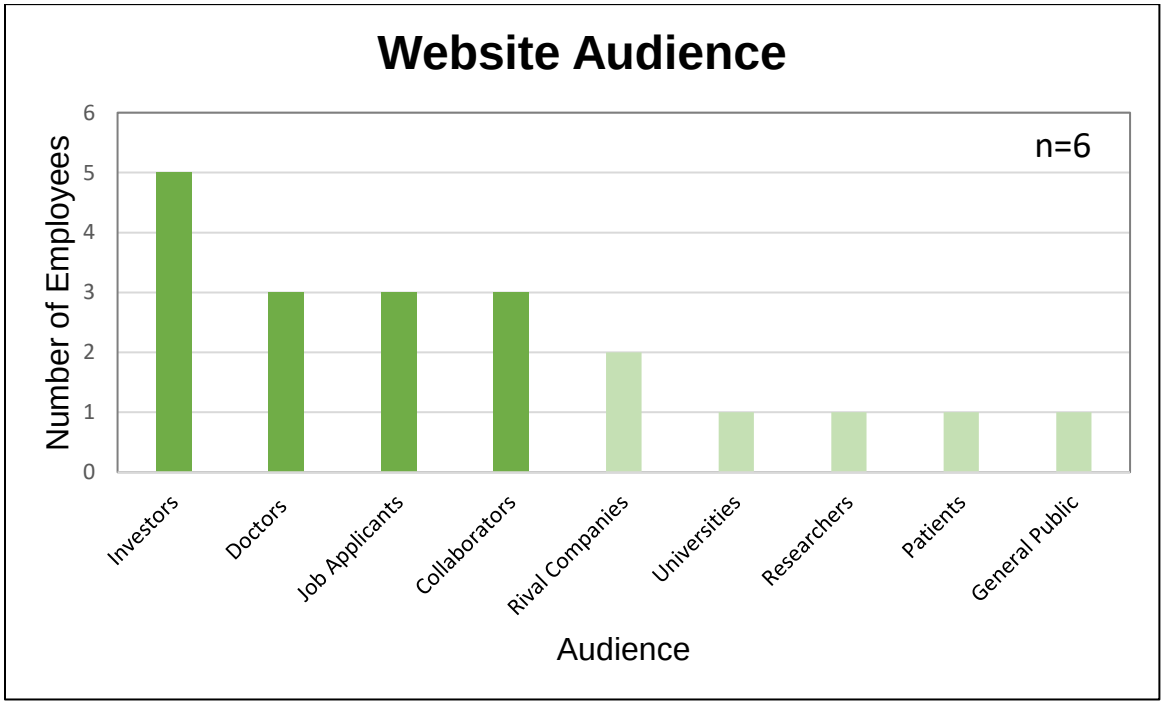

Figure 0.2: The number of times Hangzhou DAC Biotech employees mentioned each website audience.

To assess the needs of Hangzhou DAC Biotech's website audience, the team interviewed five doctors with clinical trial experience from the U.S. After meeting with the project sponsor, the team decided that cancer patients have little impact on the English website and were not capable of determining the companies, business people, or medical university researchers that may view the website. The team coded the answers of each doctor interview to group similar

ideas and create a category for analysis, which resulted in three significant points relevant to this investigation. First, the medical doctors the team sampled do not actively view company websites. Second, doctors use several methods to gather information about research companies other than company websites. Most of the doctors the team interviewed search through databases or other websites and usually receive information from another party. Third, most medical doctors usually search for information about drugs and clinical trials (see Figure 0.3 below). All these points show that the medical doctors the team sampled do not view company websites often because they tend to use other means to search for information about clinical trials and drugs.

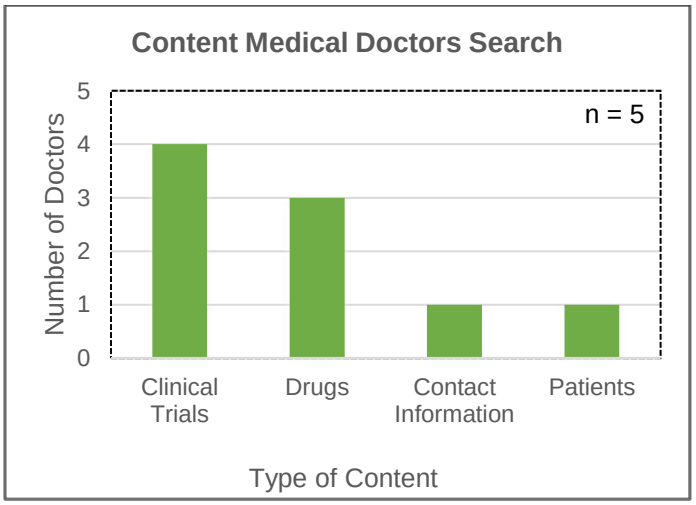

Figure 0.3: The type of content medical doctors seek on a biotechnology website.

The team interviewed Wakefly's technical project manager, who has experience in creating custom applications and CMSs for different industries. This interview led the team to recommend an easily usable website management system. The technical project manager revealed that Content Management Systems (CMS) are the easiest method to manage and publish content on a website. To understand how Hangzhou DAC Biotech updates their website, the team also met with the project sponsor and the current manager of Hangzhou DAC Biotech's website. This meeting revealed that the English website currently uses a CMS to update content. The team was unable to identify the specific CMS. The manager considers the CMS easy to use, though they mentioned the company may use a new CMS if it is user-friendly.

Based on these two interviews, the team focused on researching CMSs. The project team conducted a second interview with a digital marketing manager, who has experience in managing websites for biotech companies. The marketing manager recommended using WordPress due to its ease of use, popularity, large community, and reputation in the industry.

The project yielded recommendations for the website's *navigation*, *content*, and *page design*. For website navigation, the team first recommends using a *fixed navigation bar* at the top of the window containing the sections *Our Company, Our Science, News,* and *Careers* ordered left to right. Additionally, the team recommends the use of a secondary navigation bar that contains sections for specific website audiences such as investors, patients, and healthcare professionals. The secondary navigation bar should also contain a *Careers, News* and *Contact*

section, as well as a search and language option. The project team then recommends Hangzhou DAC Biotech relate the content of the website to the company's ADC technology and company mission. The company should concisely write the information regarding ADC technology, so the public may understand the principles of ADCs. For *page design*, the website should be *responsive* to scale and reorganize content for smaller screens on devices such as mobile phones. Moreover, the team recommends pages be kept consistent through the reuse of company logo colors in the website's color theme. Finally, the team recommends the use of a popular open-source Content Management System for an easily usable website management system.

Hangzhou DAC Biotech should approach a Web development company to choose a CMS, hosting platform, and design for their new English website using the proposed prototype as a guideline, with a sample portion shown below in Figure 0.4. The team hopes the findings and recommendations from this project will serve as a helpful guide for Hangzhou DAC Biotech to create a website that attracts an English audience as they prepare for clinical trials in the U.S.

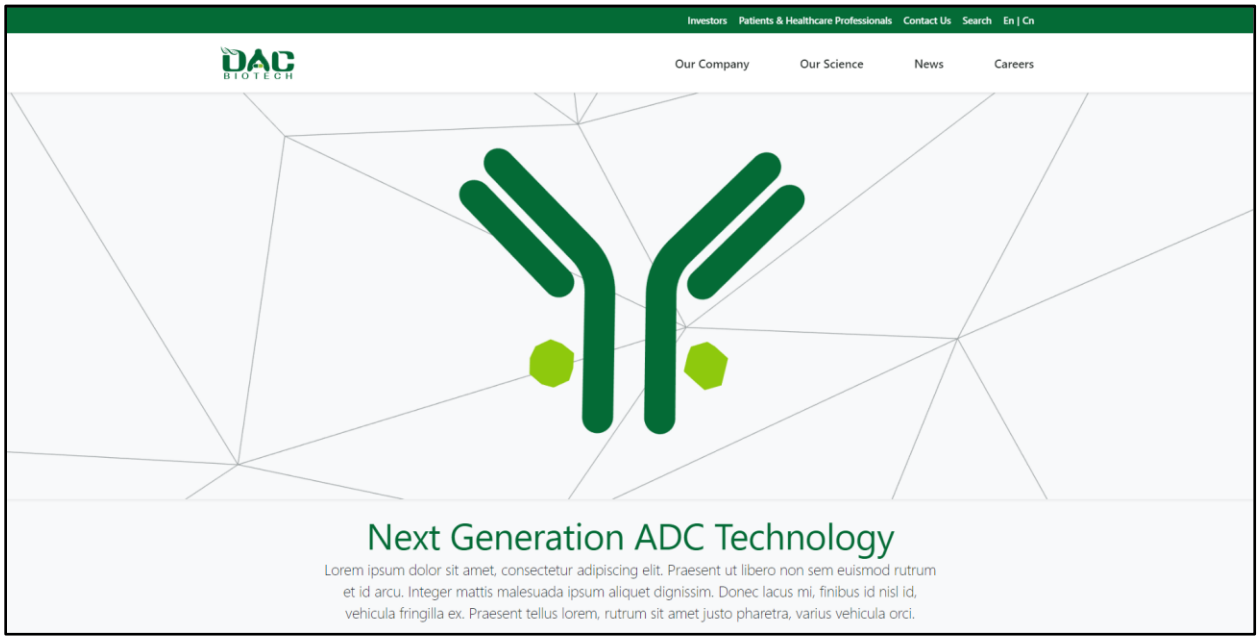

Figure 0.4: A screenshot of a portion of the prototype website's homepage.

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- The five interviewed doctors, for taking their time to share their experience and knowledge on clinical trials.
- Wakefly, who contributed valuable knowledge on the Web development process and website management systems.
- The Digital Marketing Manager, for providing the team with recommendations and sharing their experience on Content Management Systems.
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Authorship

Chapter Section and Title	Primary Author
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4.1 Results from the General Description of Biotechnology Company Websites	Dominic Cascino
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Chapter 1 Introduction

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

Fortunately, many forms of 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). As a new class of biopharmaceutical drug, ADCs 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 his colleagues founded Hangzhou DAC Biotech in 2012 and the company currently has over 70 employees (Zhou, personal communication, 2018). The company has completed the preclinical phase of its ADC treatment testing and is preparing for clinical trials in the United States (Zhou, personal communication, 2018). More than ten investors fund Hangzhou DAC Biotech, with the Chinese pharmaceutical company HuaHai being the leading investor (Zhou, personal communication, 2018). As Hangzhou DAC Biotech is expanding to the United States, foreign investors, medical doctors, and other collaborators may work with the company in the future (Zhou, personal communication, 2018). Hangzhou DAC Biotech wishes to increase its English Web presence to attract future collaborators. The company has both an English and Chinese version of its website and seeks to remake the English version.

Currently, much research literature exists on English audience website appeal and best practices in website design exist (Nielsen, 1999b; Chang, 2011). Additionally, there are studies on how cultural differences impact website design. However, effective design for a biotech company's website is not sufficiently researched.

The goal of this Interactive Qualifying Project (IQP) is to work with Hangzhou DAC Biotech to provide informed recommendations for the company's redesigned English website. The team identified the following objectives as the necessary components to reach the project's goal:

1. Characterize biotech website design
2. Evaluate the current state of Hangzhou DAC Biotech's English website
3. Assess the needs of the Hangzhou DAC Biotech English website audience
4. Identify a website management system for easy website management
5. Develop a prototype website.

This project evaluated eight biotechnology websites using established multi-criteria questions to create a general description of a biotechnology website. The project team compared the general description to Hangzhou DAC Biotech's English website to identify the differences the team's recommendations could address. Additionally, the team interviewed six company employees to understand their perspective on the content and audience of the English website. The team then interviewed five American doctors with clinical trial experience to identify the content doctors look for on medical company websites. Additionally, the project team researched and interviewed a Web development company and website manager to recommend a website management system.

With the results from our research and interviews, the team developed a prototype website for the company. By using Bootstrap, a Web development framework, the team programmed a template for the homepage, directory page, and article page. The prototype reflects the team's research and website evaluation results by incorporating the features of the general description of biotechnology websites into the prototype. Moreover, the team recommends an easily usable website management system based on the interview results with a Web development company and digital marketing manager. The recommendations and prototype explain how the company's English website should look and function to be appealing and easily manageable.

In the following chapters, the team presents a literature review of relevant background information and a methodology for developing recommendations. The final chapter discusses the

results of the website evaluation and interviews to arrive at the team's recommendations for Hangzhou DAC Biotech.

Chapter 2 Background

This chapter provides the necessary context for proposing a redesign of Hangzhou DAC Biotech's English website. The background briefly discusses cancer treatment methods with a short insight on Antibody-Drug Conjugates, as well as the technology, history, and stakeholders of the Hangzhou DAC Biotech company. This chapter continues by exploring the drug approval process in the U.S., importance of websites for companies, Web design principles, and finally cultural differences in website design.

2.1 Antibody-Drug Conjugates: A Cancer Treatment Method

Cancer is among the leading causes of deaths worldwide. The American Cancer Society estimated that there will be 18.1 million new cancer cases in 2018 (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, followed by colorectal and lung cancer. In China, lung cancer is the leading cause of death (Chen et al, 2016). In 2015, data from population registries recorded over 2.8 million cancer-related deaths 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 biotechnology 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. Monoclonal antibody linked to a cytotoxic agent via a chemical linker composes an ADC (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 Interactive Qualifying Project (IQP), Hangzhou DAC Biotech, focuses on the research and development of ADCs as a cancer treatment.

2.2 Hangzhou DAC Biotech

The following section introduces the company Hangzhou DAC Biotech that is planning to redesign their English website. This section discusses the history, technology, and mission of Hangzhou DAC Biotech as well as how the company has reached the point where they need a redesigned English website.

2.2.1 Overview of Hangzhou DAC Biotech

Dr. Xiaomai Zhou and his colleagues founded Hangzhou DAC Biotech in 2012 (Zhou, personal communication, 2018). The company is in the Hangzhou Economic and Technological Development Zone of the Zhejiang Province (Hangzhou DAC Biotech, n.d.). Since its establishment, Hangzhou DAC Biotech has focused on research and development of Antibody-Drug Conjugates (ADCs) for treating cancer (Zhou, personal communication, 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 Hangzhou DAC Biotech plans to develop target multiple myeloma, small cell lung cancer and triple negative breast cancer (Hangzhou DAC Biotech, n.d.).

Hangzhou 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 Hangzhou 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 manages the current website (Zhou, personal communication, 2018).

The current website for Hangzhou DAC Biotech contains information about ADC research as well as general information about the company's departments. Hangzhou DAC Biotech created the website in 2013, with the latest content update in August 2018 (Zhou, personal communication, 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 different 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 homepage (http://www.dacbiotech.com/en/index.aspx)

2.2.2 Stakeholders

As Hangzhou DAC Biotech prepares for clinical trials in the United States, it intends 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, personal communication, 2018). Hangzhou DAC Biotech currently has more than ten investors, with the leading investor being the Chinese pharmaceutical company HuaHai (Zhou, personal communication, 2018). Hangzhou DAC Biotech plans to attract foreign

investors with an English version of the company's website. The company seeks a redesign for their English website since the current English website is not well designed to attract investors.

The company's English website is important for attracting most of these stakeholders by advertising the company's presence, research, and technology. The specific audience of Hangzhou DAC Biotech's website is foreign investors, medical doctors, and cancer patients. Foreign investors, such as other biotechnology or pharmaceutical companies, provide funds for Hangzhou DAC Biotech. Foreign investors may form partnerships with Hangzhou DAC Biotech as part of the clinical trial process. Similar to foreign investors, universities also provide necessary resources, such as technology and staff during the product approval phase. Other than investors and doctors, cancer patients are important stakeholders, as they will participate in clinical trials of Hangzhou DAC Biotech's ADC treatment. An additional stakeholder category is pharmacies. Pharmacies are 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, personal communication, 2018). 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 developed product

Table 2.1: Identified Stakeholders for Hangzhou DAC Biotech

2.3 The Drug Approval Process in the United States

Hangzhou DAC Biotech will need the U.S. Food and Drug Administration (FDA) to approve the distribution of their treatment in the United States. The U.S. drug approval process 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 FDA. Companies file the IND application only after the reports from the preclinical phase consider the drug to be safe (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). Clinical trial sites give participants 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 both FDAs approve the drug, the company plans to start the first phase of clinical trials in both countries (Zhou, personal communication, 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 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, personal communication, 2018).

2.4 The Importance of Websites for Companies

Websites are one of the many methods companies use to advertise their research and technology. Hangzhou DAC Biotech has a Chinese and English website to advertise their company and research. Since the company is planning to start clinical trials in the U.S., they are interested in improving their English website to reach and inform English speakers (Zhou, personal communication, 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 wide 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. For a biotechnology company, a website can attract collaborators to aid in research and facilitate the drug approval process (Zhou, personal communication, 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 communications path 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 for companies to benefit from a website, the website developer must create a well-designed website.

2.5 Web Design Best Practices

A well-designed website follows many guidelines to be attractive and easily usable for website users. Prior research has identified the best practices of Web design. Researchers recommend Web developers follow *Universal Patterns* and many design principles to create a successful website. This section focuses on *Universal Patterns* and common features of websites because they significantly impact a website's usability.

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. Users' previous experiences shape these patterns. When a user interacts with a website, they bring 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. Figure 2.2 shows an example of transferable knowledge reflected in buttons (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 (GUI) 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). The *sign-in page* has become a *Universal Pattern* since, as Duyne states, it utilizes 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

Besides *Universal Patterns*, there are five features of a website that significantly influence its usability. These five features are *page design, content, navigation, language, and download speed* (Palmer, 2002; Nielsen, 1999a).

Page design concerns the visual appearance of individual pages (Nielsen, 1999a). Web designers should cover most of the Web page with content that is of interest to the user (Nielsen, 1999a). According to Nielsen, the content of the website should cover at least half of a page's design to minimize navigation for the user (Nielsen, 1999a). When choosing to separate content with a heavy line or whitespace, the latter provides a faster download speed for the website (Nielsen, 1999a). Whitespace can also guide the user to easily identify and understand the content of a Web page (Nielsen, 1999a). Reusing images such as buttons, arrows, and icons, allows the Web page to download faster and creates a consistent theme across the website (Nielsen, 1999a). *Page design* should focus on simplicity and Web designers should optimize it across a wide range of platforms (Nielsen, 1999a).

Simplicity and optimization are also key for the content of a website. The type and presentation of content may change the user's attitude towards the website. Nielsen suggests developing content by considering how users interact with the Web. Web designers also need to optimize content for an acceptable page download time. When a user moves between pages, the new webpage should load within hundreds of milliseconds (Nielsen, 1999b). The variability of this speed should be low to avoid disappointing the user where an action takes longer than a user has experienced before (Nielsen, 1999a).

Web designers should design content for skimming, as users tend to scan text instead of reading (Nielsen, 1999b). The Web designer can achieve this by using short paragraphs, bulleted lists, emphasis through color text, and subheadings (Nielsen, 1999a). High-end companies should employ professional editors to avoid misspelled words that can confuse the user (Nielsen, 1999a). Nielsen recommends the use of the inverted pyramid principle, meaning Web pages start with a conclusion statement. content designed for rapid reader skimming is optimal for the Web as research has shown that reading from a screen is 25% slower than reading from paper (Nielsen, 1999a). To further ensure legibility, Nielsen suggests using colors with high contrast between the text and background. The website background should be a plain color or a subtle background pattern. Moreover, Web developers should left-justify blocks of text to establish an identifiable starting point for reading.

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 serve to contrast typical media such as images and text (Nielsen, 1999a). For a business, presenting rich product information to the users can positively benefit a website, as the goal of a business website is to maximize the customer's experience (Duyne et al., 2002).

Besides page design and content, the navigation structures enable the user to move around the website. Web designers should make navigation structures easily usable (Duyne et al., 2002). Additionally, Web designers 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 Web designers present 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 read from left to right (Nielsen, 1999a). As for strategies 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 would be dropdown menus that hold many objects inside each menu button. 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 Web developers' designs should lead the user to success as soon as possible (Nielsen, 1999a).

Web developers should also consider language options when developing websites for an international audience. Developers may compensate for language differences by creating another version of the original website, as a translation may not accurately convey content. There are two techniques for a website to compensate for regional differences: *internationalization* and *localization* (Nielsen, 1999a). According to Nielsen, *internationalization* refers to a "design that can be used worldwide" and *localization* refers to "making an adapted version for a specific locale". International websites often use *internationalization* because it is easier to have a widely understood website than multiple versions for every different region (Nielsen, 1999a). In addition, *Internationalization* avoids confusion when non-native speakers visit the website. Non-native speakers may easily misunderstand the content if it uses slang or regional phrases (Nielsen, 1999a). For example, even if two regions spoke the same language, metaphors that are

commonly known in one region may be misunderstood in another region (Nielsen, 1999a). Proper Web design uses plain language to avoid the misunderstanding of content.

Other than website language, regional differences can also impact the page layout and media of the website (Nielsen, 1999a). Changing the layout and content of the website to compensate for cultural differences creates a more appealing website for the intended audience (Nielsen, 1999a). For example, images of subjects with a similar background are more appealing than images with foreign subjects to the website users (Nielsen, 1999a). Overall, Web developers take cultural differences into account to create an appealing website for the website's audience. The project team considered best practices of Web design in the redesign of Hangzhou DAC Biotech's English website.

2.6 Cultural Differences between Chinese and English-Oriented Western Websites

As mentioned previously, website interface design should reflect 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 towards their website visitors have a higher appeal than those that do not (Translate Media, 2016). Therefore, in developing recommendations for effective practice, the team considered cultural differences between English and Chinese websites.

Between English speakers and Chinese speakers, there are distinct variations when appealing to an audience through websites. Since cultural differences are major influential variables, it is important to investigate the aspects of culture that positively manifest website features. When investigating feature discrepancies, website studies often use Hofstede's model of culture. Hofstede's model looks at five distinctive 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). This section examines 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 various features for English and Chinese websites.

A case study on culturally customized Web design elements demonstrated that 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 cultures 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.

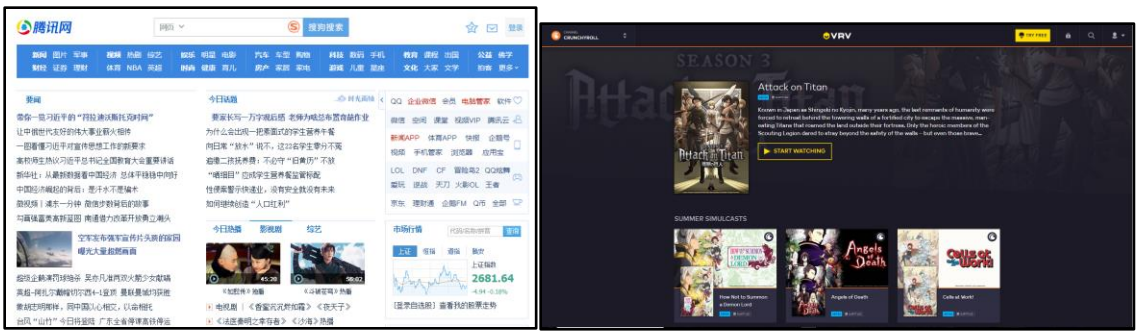

Figure 2.3: Chinese website QQ provides online social games, music, shopping, microblogging, movies, and group and voice chat software (http://www.qq.com/). English website VRV is an online video subscription service (https://vrv.co/).

For masculine and feminine characteristics, the contrast 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 utilize a softer and less explicit approach such as using more female pictures to represent a more feminine society. However, when focusing on Chinese and English websites, studies do not consider either 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 dominance 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, meaning 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). The project's recommendations will take these cultural differences into consideration.

2.7 Summary

This chapter reveals four points that guided the team's 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 methods to assist Hangzhou DAC Biotech in the redesign of its English website.

Chapter 3 Methodology

The international biotechnological company Hangzhou DAC Biotech seeks 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. This chapter includes the following objectives to achieve the goal of this project, shown below in Figure 3.1:

1. Characterize biotech website design
2. Evaluate the current state of Hangzhou DAC Biotech's English website
3. Assess the needs of Hangzhou DAC Biotech's website audience
4. Identify a website management system for easy website management
5. Develop a prototype website.

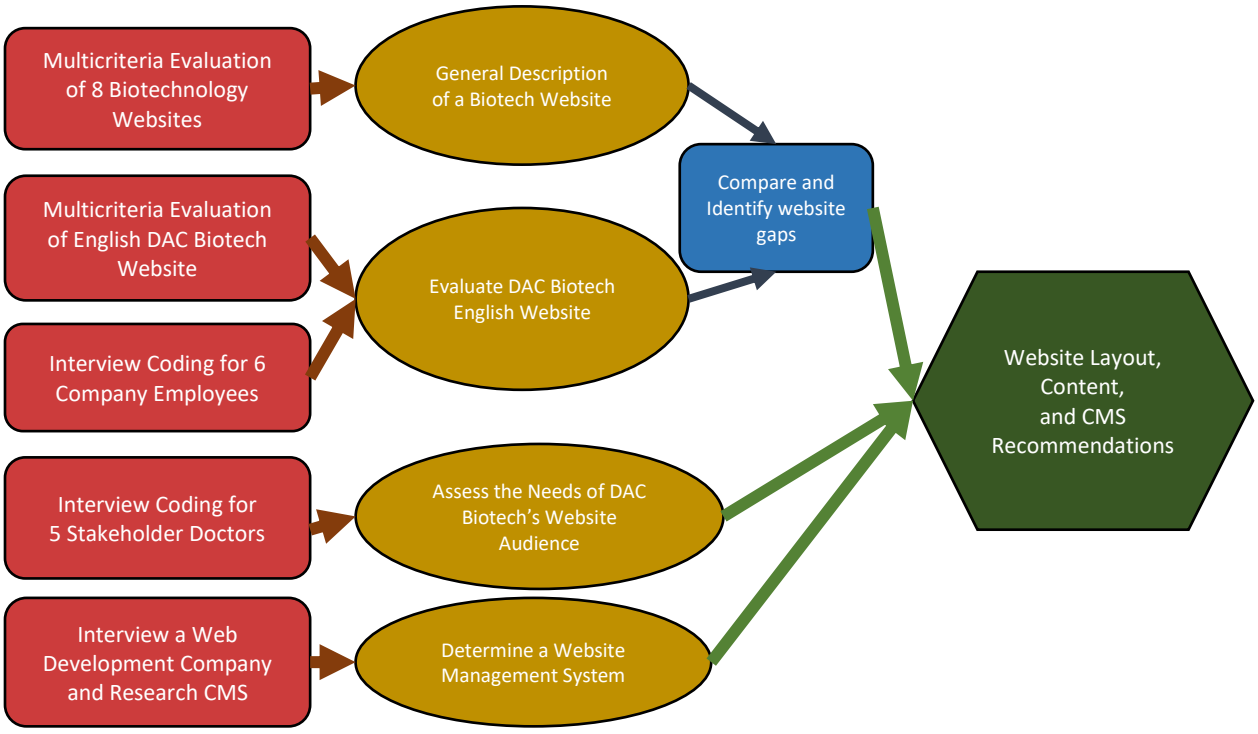

Figure 3.1: A flowchart of the project methods to reach the project goal for Hangzhou DAC Biotech.

3.1 Characterizing Biotech Website Design

To propose recommendations for Hangzhou DAC Biotech's English website, the team characterized the common features and content of biotechnology websites. The team first gathered a list of English biotech websites from a collection of companies given by the sponsor, shown in Table 3.1. This collection of websites includes only biotech companies that work on Antibody-Drug Conjugates (ADCs). The sponsor recommended five out of the eight websites the team evaluated. The sponsor chose five American companies: Seattle Genetics, Immunogen, Immunomedics, Pfizer, and Abbvie for their reputation in ADC technology, listed in Table 3.1. Since the websites Pfizer and Abbvie have multilingual options, the list includes additional websites that target an international audience. The team randomly chose these additional websites from non-American companies: Sanofi, Heidelberg, and Sartorius. The websites of these companies demonstrate the features and layout differences that international companies include in their website for English-speaking audiences.

Biotechnology Company Websites	Origin Country	Chosen By
Seattle Genetics	US	Sponsor
Immunogen	US	Sponsor
Immunomedics	US	Sponsor
Pfizer	US	Sponsor
Abbvie	US	Sponsor
Sanofi	France	IQP Team
Heidelberg	Germany	IQP Team
Sartorius	Germany	IQP Team

Table 3.1: List of biotechnology websites the project reviewed.

The team used multi-criteria evaluation on each website listed in Table 3.1. The main categories for the criteria are *Page Design, Content, Navigation,* and *Language*. The team members created the criteria from previous studies on Web design (Palmer, 2002; Nielsen,

1999a; Nielsen, 1999b). Table 3.2 breaks down the number of criteria questions in each research category.

Category	Number of Criteria
Page Design	13
Content	23
Navigation	14
Language	6
Total	**56**

Table 3.2: Identified categories and number of criteria of the multi-criteria evaluation.

Appendix A details the criteria for the multi-criteria evaluation. The project team created the criteria to be sufficiently general to describe modern website design in general and not specifically targeted for biotech company websites. The multi-criteria evaluation focused the assessment on the English version of the websites to research biotech website design tailored towards an English-speaking audience.

Using the multi-criteria evaluation, the team formed comparable descriptions of each website listed in Table 3.1. The members worked in pairs for the data collection to avoid individual bias and efficiently divide the work. The members reviewed their criteria answer with their partner to prevent a biased answer. Each pair evaluated four websites in an Excel table by answering the criteria questions in categorical order. The team then compiled the criteria and results in one Excel table for assessment of the collected data from the eight websites.

This process determined the generic description of a biotech website by analyzing the results of the multi-criteria evaluation. The team considered the most occurring results of a criterion as the general description. However, since the multi-criteria evaluation includes a small sample size of eight websites, the results of the criteria comparison over the eight websites did not yield a pattern. Criteria questions with evenly divided answers had no pattern. In the case of an unclear pattern, the team based the generic description from Web design research (Palmer, 2002; Nielsen, 1999a; Nielsen, 1999b). The multi-criteria evaluation includes notes of any interesting observations that did not fall within a pattern in an *Observations* section. The purpose

of these observations was to retain design features on the future English website that the general description did not cover.

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

After establishing a general description of a biotechnology website, the team analyzed the current English version of Hangzhou DAC Biotech's website. The first part of this section compares the current English website of Hangzhou DAC Biotech to the general description of a biotech website established in Section 3.1. The team's comparison identified the similarities and differences between the company's English website and general biotech websites. By identifying the differences, the team was able to understand where recommendations for the redesigned website could address the current website's shortcomings. First, the team evaluated Hangzhou DAC Biotech's English website on the same Excel sheet with the same process mentioned in Section 3.1. The team listed the criterion answers of the company's website next to the eight assessed biotech websites, shown in Appendix A. The team then used a separate Excel spreadsheet that listed the generic description of a biotechnology website, the evaluated English version of Hangzhou DAC Biotech's website, and the criteria questions next to each other. Within this spreadsheet, the team identified the similarities and differences between both data sets for each criteria question. With columns listing the similarities and differences, the team can easily identify specific gaps for improvement.

After identifying the areas of improvement for the English website, the team interviewed six company employees at Hangzhou DAC Biotech for recommendations on the English website. The interview involved asking the employees about the company's English website content and who they think would be the website audience (see Appendix B for the interview protocol and questions). The interview questions identified any unaddressed features or missing content in the company's English website. In-depth interviews were the optimal method because each interview provided a detailed explanation of the company's impression of their English website.

On top of the project's plan to interview the employee in charge of the current website, our sponsor recommended five employees from different departments to gather information about the various perspectives and opinions towards the company's English website. Each

employee was from a different department. The project team conducted interviews from the Department of Biology and Antibody Engineering, Department of Medicinal Chemistry, Department of Pharmacology and Pharmacokinetics, Department of Quality Control and Quality Assurance, Department of Human Resources, and an employee from company management. At Hangzhou DAC Biotech, two project members interviewed the employees while the two members took notes. The project members switched roles for every employee. The team conducted 20-minute interviews with each employee in English since most of the interviewees were proficient in speaking English. For the interviewee that did not speak English, the team received help from a company translator. To ensure the translator understood how to translate the questions, the project members reviewed the interview content with them before the interviews. In addition, the team collaborated with the interpreter to translate interview questions on paper to aid the interviewees. Furthermore, the sponsor reviewed the questions to notify the employees ahead of time about the team's questions. The team incorporated the feedback from the interviews into the recommendations for improving Hangzhou DAC Biotech's English website.

Out of the six interviews, one of the team's interviewees was the employee involved in the development of the current website. The purpose of this interview was to understand the prior establishment of the current English website and ask for recommendations for the English website as listed in Appendix C. This interview used a Chinese translator since the interviewee did not speak English. Like the other interviews, the team reviewed the questions with the translator before interviewing the employee. Other than the questions the team asked all the employees, this interview involved asking the employee about their interaction and management of the current website. By conducting interviews, the team gained insight on the type of content the employees want on the website as well as the website management system the Hangzhou DAC Biotech employees prefer.

After the interviews, the project team used a *thematic analysis* to analyze the Hangzhou DAC Biotech employee interviews. For the *thematic analysis*, the team coded the main ideas of each interview and grouped together similar main ideas to create multiple categories. These categories describe the content the employees as a group desire in the website and identify the employee's perceived audience of the website.

3.3 Assess the Needs of the Hangzhou DAC Biotech Website Audience

After interviewing the employees of Hangzhou DAC Biotech, our next objective was to understand the viewers' needs of Hangzhou DAC Biotech's English website. Hangzhou DAC Biotech informed the team of the general categories of potential website viewers. The project team initially planned to contact various stakeholders that are potential website viewers including investors, universities, cancer patients, and medical doctors. After meeting with the sponsor of this project, the team decided to contact only medical doctors. The project team realized cancer patients have little to no impact on the redesign of Hangzhou DAC Biotech's English website. Although investors influence the content and the redesign of the English website, they are difficult to identify given the current state of the company's ADC research and the team was not capable of determining specific companies, business people, or medical university researchers that may view the website. Due to this change, the team members edited the original questions developed during the Pre-Qualifying Project to specifically target medical doctors related to clinical trials or investigational drugs (see Appendix D).

The team interviewed five American medical doctors through one of the team member's connections. This project involved interviewing American doctors to consider what American viewers would look for on a website because Hangzhou DAC Biotech is currently aiming for clinical trials in the U.S. The doctors have experience with the process of bringing drugs to the market. The team asked the doctors about their relations to clinical trials and how they obtained information about investigational drugs or clinical trials through other methods than websites.

After sending five emails and contacting doctors through connections, the team received five replies with each of the doctors agreeing for a phone interview. The project team interviewed five U.S. doctors from the U.S. from different fields: a laryngologist, dementia specialist, and three neurologists. Despite being in different fields, all these doctors have experience in clinical trials and work experience involving patients and research.

The team decided that phone call interviews would be the optimal method of gathering information. This is because the project requires in-depth feedback from the medical doctor's needs regarding the website. For each phone interview, two members talked to the interviewee while the other two members took notes. The team conducted each interview through an international phone call that accommodated for the +13:00 time difference between China and the United States. After interviewing each medical doctor, the team again used *thematic analysis*

to categorize the answers of each doctor and identify the results of these interviews. For the *thematic analysis*, the team coded the main ideas of each interview and grouped similar main ideas together to create categories. From these categories, the team identified the type of content this set of medical doctors would look for on a biotech website done in English.

3.4 Identify a Website Management System for Easy Website Management

The next step in this investigation was to determine a website management system for an easily manageable website. To accomplish this goal, the project team conducted two expert semi-structured interviews. The first interview was with a technical project manager from Wakefly, a U.S.-based Web development company, and the second interview was with a digital marketing manager, who oversees updating websites for biotech companies.

Wakefly is a Web development company that has developed hundreds of websites across multiple content management systems for multiple industries, including biotech companies. The technical project manager has experience in creating custom applications and CMSs for different industries including finance, travel and e-commerce. This interview aimed to discern a professional perspective on website management systems and the current industry standards regarding the process of Website Development. The team used an email to schedule a phone interview with the technical project manager. The phone interview had a duration of 20 minutes with two members conducting the interview and the other two members taking notes. Questions E4 and E5, listed in Appendix F, attempt to understand the process of developing a website while questions E6 and E7 aim to identify a website management system for an easily editable website.

After the interview with the Wakefly employee, the team decided to gather more information on Content Management Systems (CMS). This led to the interview of the digital marketing manager. The manager has experience in different CMS's to manage websites for biotech companies. The manager has also overseen the management of social media accounts, design and content of multiple biotech companies. The interview questions aim to gain a professional perspective on how to update content on a website through a CMS for biotech companies. The team used an email to schedule a phone interview with the manager. Throughout

the 30-minute-long interview, one student asked questions while a second student took written notes, listed in Appendix K.

3.5 Develop a Prototype Website

The team used the results of the website evaluation, the Hangzhou DAC Biotech employee interviews, and doctor interviews to design a prototype of Hangzhou DAC Biotech's redesigned English website. The design of the prototype stems from the outcome of each category of the website evaluation: *page design, content, navigation, and language.* The team used the interviews to determine the type of content company employees would like to showcase on the website as well as the content medical doctors look for on medical company websites. To program the website prototype, the team used Bootstrap to provide an interactive visual aid for the sponsor instead of developing a concept design image of the website. Bootstrap is a *Cascading Style Sheet* (CSS) framework for developing responsive and mobile-first websites. Appendix M provides a definition for CSS as well as other related Web technologies. By using Bootstrap, the project created a visual representation of the general description the team formed from the website evaluation. The project team decided to constrain the prototype of the English website to only page designs and placeholder text. The prototype does not include content due to time issues and need of a professional technical writer to properly prepare the content for DAC Biotech.

After comparing the general description of a biotech company and Hangzhou DAC Biotech's English website and within the third week of the project, the team started working on the prototype of the English website. Initial development focused on page designs of the homepage, the article page, and directory page of the prototype on paper based on the general description of a biotech website. This enabled the team to easily modify the page design of the prototype when needed. After developing the page designs, the next step was to utilize Krita, an open-source digital painting program, to formally design and provide a digital visual representation of the prototype homepage for the sponsor.

After receiving approval and feedback on the homepage design from the sponsor, the team began programming the prototype in HTML and CSS, defined in Appendix M. The project team provided a weekly progress of the prototype to the sponsor. With this schedule, the team received consistent feedback from the sponsor on improving the prototype. By analyzing the

results obtained from the analysis of the company's employee, doctor interviews, and website evaluation, the team identified the sections for the *navigation bar*. Since Hangzhou DAC Biotech changed its logo while the team was creating the prototype, the team redesigned the website prototype, incorporating a new color theme following the company logo colors. Additionally, due to the sponsor's request for an attractive website, the prototype includes an animation of an abstract representation of the ADC drug. The team programmed the animation in JavaScript using the library three.js. Three.js is an easily usable and lightweight JavaScript library for three-dimensional graphics (Cabello, 2018).

Chapter 4 Results and Analysis

This chapter presents the results from the website evaluation process and the interviews. For readers unfamiliar with web design terminology, Appendix M provides definitions of the web design terms this paper employs. The chapter first provides a summary of notable outcomes from the evaluation of biotech company websites, the Hangzhou DAC Biotech's website, and Hangzhou DAC Biotech's employee interviews. The following section presents findings from doctor interviews with the purpose of understanding the needs of the website audience. The chapter closes with results from the Web design company interview and the research on Content Management Systems (CMS).

4.1 Results from the General Description of Biotechnological Company Websites

The first two weeks of the project involved identifying common features of biotech websites to generate a general description of biotech websites. This study evaluated the websites of Seattle Genetics, Immunogen, Immunomedics, Pfizer, AbbVie, Sanofi, Heidelberg, and Sartorius. The process this study used to arrive at conclusions for each criterion, as well as an example, is in Appendix L. The team derived much of the criterion, including their categories, from Web design research (Nielsen, 1999a). Additionally, several criteria were not directly derived from Web design research. An example is the criterion question "Is there a cookie consent notice?" (see Appendix A, pd11). The team created this criterion after noticing the presence of a consent notice on several websites with the intent of identifying potentially common features outside of those found by the application of the pre-established criteria. By assuming the criteria questions influenced by Web design research inherently look for good Web design, the team characterized the most often occurring criteria answers as appropriate Web design for biotechnological company websites. The results of a certain criterion may not be proper design for a biotech website, which is a limitation of the project due to the sample size of websites. A significantly increased sample size of websites would likely increase the validity of the results. The common features the team found by applying the criteria significantly influenced our recommendations for Hangzhou DAC Biotech's website.

First, the team found that the homepage of a given website serves as a summary of the main content sections. Each website in the team's list had a different set of sections on the homepage, but a clear pattern emerged. Using the most often occurring features on each website from the criterion, "What are the main content sections of the homepage?", the team found the most common content sections of the homepage to be the banner, technology, and news section (see Appendix L, c23).

Company Website	SeattleGenetics	Immunogen	Immunomedics	Sanofi
What are the main content sections of the homepage?	Banner with patient image. Learn more about Mission section. Info about clinical trials conducting. Info about company team. News and Highlights. Company Statistics. Twitter posts and link to twitter.	Banner with general video and patient stories. ADC technology. Company Culture. Company History. News.	Banner animation. News and features. Company research. Pipeline. Company Clinical Trials.	Banner with article. Large search bar. Highlights. Insider stories. News. Social Media.

...

...

Heidelberg	Pfizer	Sartorius	AbbVie	General Description
Cards for ADC technology. Services. Portfolio. Contact.	Article on banner. Product search. Information on clinical trials. Articles. News.	Banner. Applications. Products. Service. Company Research. Products Cards. Link to Financial Reports. News. Investors. Career. Company info Cards.	Careers. Press Release. Articles. Our Science. Pipeline. Focus Areas. Careers. Responsibilities. Number Statistics. Patients. Quote from a doctor. Our Company.	**Banner.** **Technology.** **News section.**

Table 4.1: Results from the homepage content criterion (see Appendix L).

The banner is an image, video or animation, relating to the company's mission or a recent news article. The technology section introduces the company's products, research, and science. The news section displays the latest company news to update the reader on the company's progress. Since the homepage summarizes important main sections of the entire website, a well-designed homepage is integral in providing relevant information to the user.

Second, biotech websites are *responsive* and adapt to changes in browser window size. This includes accommodation for small screens on mobile devices such as phones. The definition of *responsiveness* is to automatically resize, hide, shrink, or enlarge a website for visibility of content on desktops, tablets, and phones ("HTML Responsive Web Design", n.d; Appendix M). The criterion, "How does the website deal with page layout when the window is resized?", relates to how the website responds to a change in screen size (see Appendix A, pd3). The team found that every biotech website reviewed collapses the navigation bar sections into a menu icon. The menu icon serves as a togglable button that displays an expanded version of the navigation bar. Besides the navigation bar, the page content resizes with a smaller display. The Web developer may write code that changes image dimensions or swap an image upon a display size change. Additionally, content that the Web developer organizes into rows on a large screen device, may stack vertically on a smaller display. These accommodations for screen size make the website content invariant to device screen size, providing the user with a usable interface across device screen sizes.

Third, the color theme of a company's website reuses the logo colors. To determine the color theme for Hangzhou DAC Biotech's redesigned website, the criteria list included the criterion, "What is the color pallet of the website?" (see Appendix A, pd9). The team originally designed this criteria question to investigate common color themes for biotech websites. The team discovered that websites use the colors from the company logo for the color theme of the website. Reusing the colors of the logo creates a consistency of the color theme. An example of this from SeattleGenetics homepage is below.

Figure 4.1: Example of the reuse of the Seattle Genetics logo colors in the news section of the homepage (http://www.seattlegenetics.com/).

Fourth, websites of biotechnological companies emphasize the sections *Our Company* and *Our Science*, (or sections similarly titled). When the team applied the criteria for the navigation of the website, it revealed the important sections for biotech company websites. The criterion, "What are the main pages of the website on the navigation bar in order from left to right?", focused on the main sections of the navigation bar as well as the order of these sections (see Appendix A, n14). Among the eight biotech company websites reviewed, this investigation determined that the most common sections on the navigation bar in order from left to right are the following:

1. About Us/Our Company
2. Our Science
3. News/Media
4. Careers
5. Investors

This potential layout places emphasis on the *About Us/Our Company* and *Our Science* sections as the viewer will most likely see these sections first. From the websites the team evaluated, 75% placed just the *About Us/Our Company* section first on the navigation bar. Similarly, 100% of the websites placed the *Our Science* section second on the navigation bar. The percentage of websites that place the *About Us/Our Company* combination first and second

respectively is 63%. These two sections are normally on the homepage as well. The team found that 38% of the reviewed websites have information related to the *About Us/Our Company* section on the homepage. Additionally, 63% of the websites display information about the *Our Science* section on the homepage.

Fifth, a secondary navigation bar is present which contains links for audience groups and additional information such as language options. The team used the criterion, "Is a secondary navigation bar present?", and determined that biotech company websites typically have secondary navigation bars (see Appendix L, n12). Specifically, 75% of the evaluated websites use a secondary navigation bar. The secondary navigation bar contains sections for specific audiences such as *Investors, Healthcare Professionals,* and *Patients*. The secondary navigation bar may also contain additional information such as a search option, a language option, *Careers, News* and *Contact*. The method of providing a specific section for an audience quickly conveys appropriate information to the intended audience.

Sixth, biotechnological company websites include information on partnering organizations. These organizations may be other companies in the same field or organizations that aid the company with a given process. The results of the criterion in Appendix L, c17, "Does the website have information about partner organizations?", show 63% of the websites contain information on partnering organizations. This information may be descriptions of the partners, but may also include an invitation for collaboration, as the company Pfizer demonstrates on their website (see Figure 4.2).

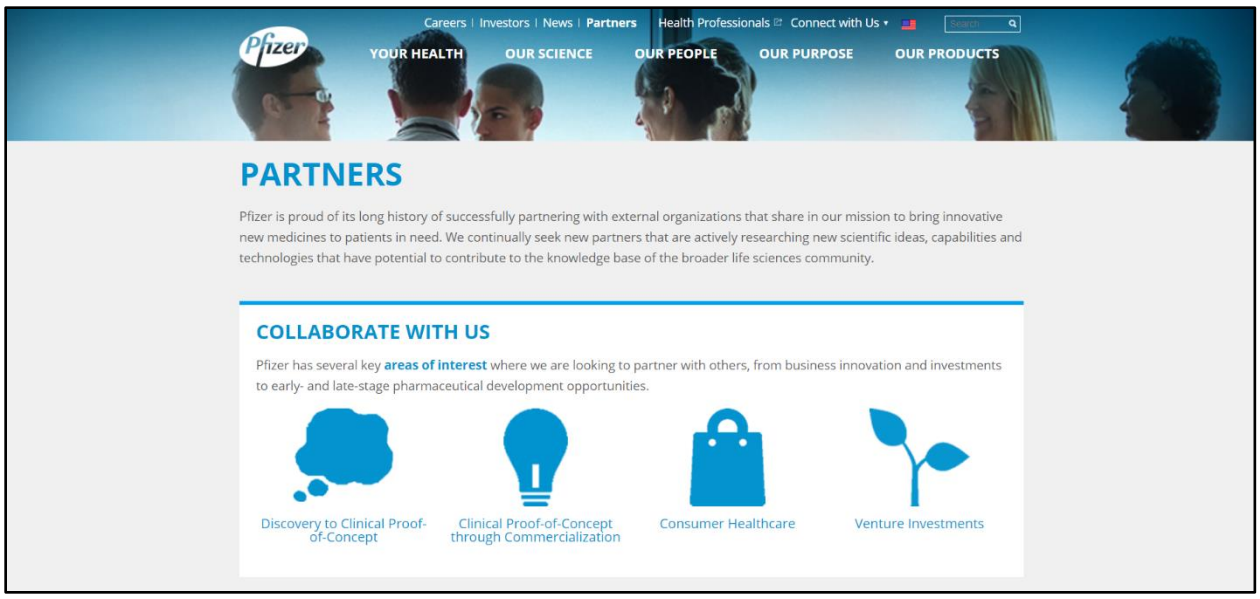

Figure 4.2: The partners section of Pfizer's website (https://www.pfizer.com/partners).

Seventh, the websites typically feature patient experience stories. These may be articles or videos featuring patients and their experience with the company's products. Through the evaluation, the team found that 63% of the websites had some form of patient stories. The team used the criterion, "Does the website feature patient stories?", to determine the presence of patient stories (see Appendix A, c19). As an example, the company Sanofi features a link to a patient story related to diabetes on the company's homepage banner.

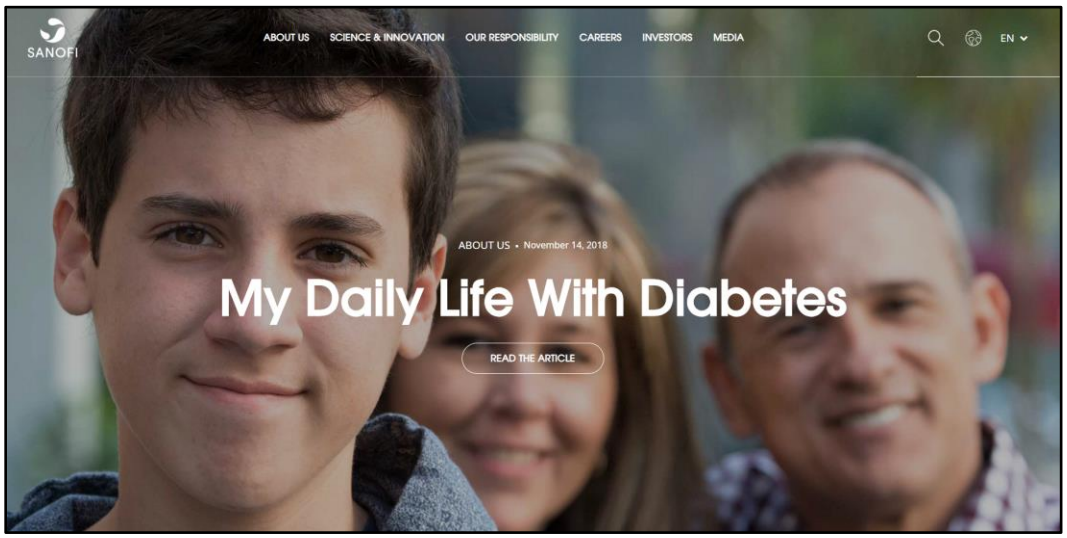

Figure 4.3: Sanofi's homepage banner featuring a patient story (https://www.sanofi.com/).

Eighth, the images, videos, and animations on a biotech website are relevant to the company's technology and mission. Several criteria characterize the content of images and videos on biotech company websites. The team used the criterion, "What are the subjects of the images?", to determine the subjects of images throughout the website (see Appendix A, c10). Some of the images that websites include are the following:

Subject	Number of websites
Researchers	8
Labs	8
Patients	4
Elderly people	3
Families	3
Children	2
Diagrams	2
Groups of people/company teams	2
Executive team	2

Table 4.2: Results from the common subjects of images (see Appendix L).

Similarly, the results from the criterion in Appendix L, c14, "What is the content of videos?", show that 67% of the websites containing videos use them to explain the company's technology. Two out of eight companies manufacturing ADCs had a video informing the reader of the concepts behind ADCs.

4.2 Evaluation of Hangzhou DAC Biotech's English Website Results

Hangzhou DAC Biotech decided their current English website is basic. The team's comparison of multicriteria evaluation results uncovered where Hangzhou DAC Biotech's English website is similar and different from most biotechnology company websites. The team's full comparison between the English website and the general description of biotechnology

websites in Appendix L identified many discrepancies that guided the project's direction while formulating redesign recommendations for the company's English website. The next sub-section mentions a few of the key disparities this process uncovered.

4.2.1 Consistent Page Design Results

The comparison process determined that Hangzhou DAC Biotech's English website and general biotech websites use a consistent theme in *page design*. When identifying how biotech websites use a consistent theme, the general description of biotech websites in Appendix L, pd10 describes biotech websites with *fixed navigation bars* and *footers*, large image *banners* for articles, and *cards* throughout their website (defined in Appendix M). Additionally, they all have a consistent style for buttons and links and color the website based on company logo colors. Similarly, Hangzhou DAC Biotech's website has consistent *page design* when compared to the general description. They have a *static navigation bar* and *footer*, consistent *button* styles, and a website theme consistent with their logo colors. A consistent theme in websites is good *page design* because it helps guide the reader through the website with *universal patterns* (Palmer, 2002).

4.2.2 Responsive Web Design Results

One of the major findings in the comparison between Hangzhou DAC Biotech's English website and the general description of biotech websites is the gap in website usability. When the project team evaluated *responsiveness*, defined in Appendix M, the eight evaluated biotech websites were all *responsive*, shown in Appendix L, pd3. When the project members resized the browser window, the team observed that most biotech websites' *navigation bar* collapse into a menu icon, shown below in the example Figure 4.4. Additionally, the content in rows usually stacks vertically to fit the screen size and layout rescales to the browser window size or the user's mobile device screen.

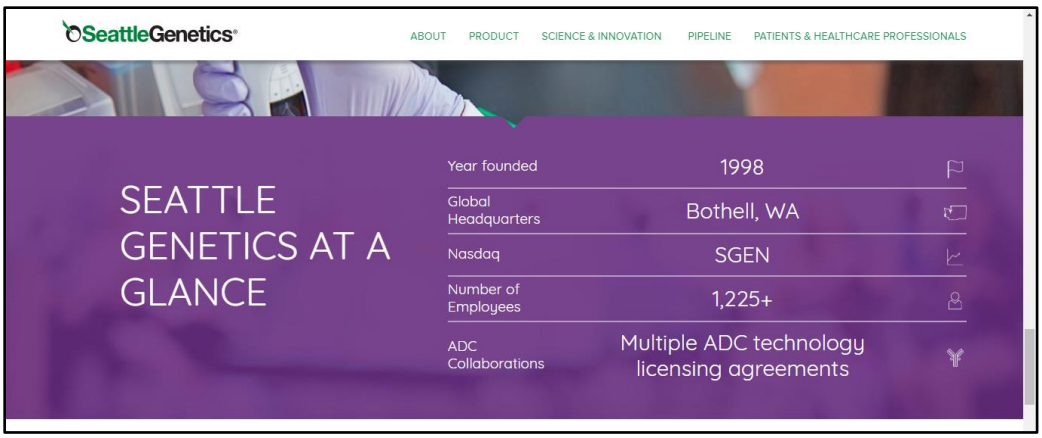

Figure 4.4.a: Seattle Genetics' website when it is fully expanded in a browser has company information horizontally formatted (http://www.seattlegenetics.com/).

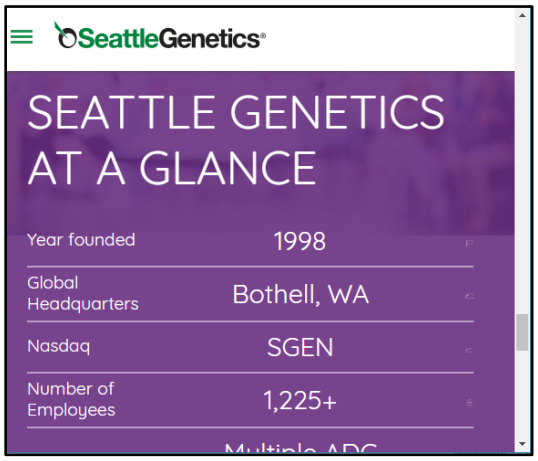

Figure 4.4.b: Seattle Genetics' website is *responsive*, so the *navigation bar* has collapsed into a menu icon and the content is vertically formatted for the window size (http://www.seattlegenetics.com/).

The team evaluated Hangzhou DAC Biotech's English website and found it was not *responsive*. When the team resized the browser window or viewed the website from a mobile device, the website's images, text, and navigation bar did not respond by rescaling or collapsing to the window ratio, as shown in Figure 4.5. Without a *responsive* website, content may be cut-off, making it difficult for the user to navigate and read through the website. *Responsiveness* is important in Web design because it impacts the website usability and influences user experience (Palmer, 2002). The lack of *responsiveness* negatively affects the company's English website's usability.

Figure 4.5.a: Hangzhou DAC Biotech's homepage when the website is fully expanded on a browser window (http://www.dacbiotech.com/en/index.aspx).

Figure 4.5.b: Hangzhou DAC Biotech's English website content does not rescale or collapse when the user resizes the browser, resulting in cut-off images and content (http://www.dacbiotech.com/en/index.aspx).

4.2.3 Concise and Scannable Text Results

Another criterion the team evaluated in *page design* was how companies format website articles to be concise and scannable, described in Appendix A, c2. The team's comparison between Hangzhou DAC Biotech's English website and the general description found that for the website reader Hangzhou DAC Biotech's website articles were less concise and scannable than most biotech websites. A concise and scannable article is an example of good Web design that should help readability (Palmer, 2002). For a concise and scannable article, researchers have determined websites should use a combination of bullet points, subsections, and paragraphs

(Palmer, 2002). From the general description, biotech websites often use a combination of bullet points with subsections to split articles into short paragraphs, listed in Appendix L, c2 and shown below in Figure 4.6.a. 50% of the websites used bullet points and all eight websites used multiple short paragraphs to split content. In contrast, an example of Hangzhou DAC Biotech website in Figure 4.6.b only splits article contents using subsections. The website displays each section of content through one paragraph which makes it difficult for the reader to scan through the text.

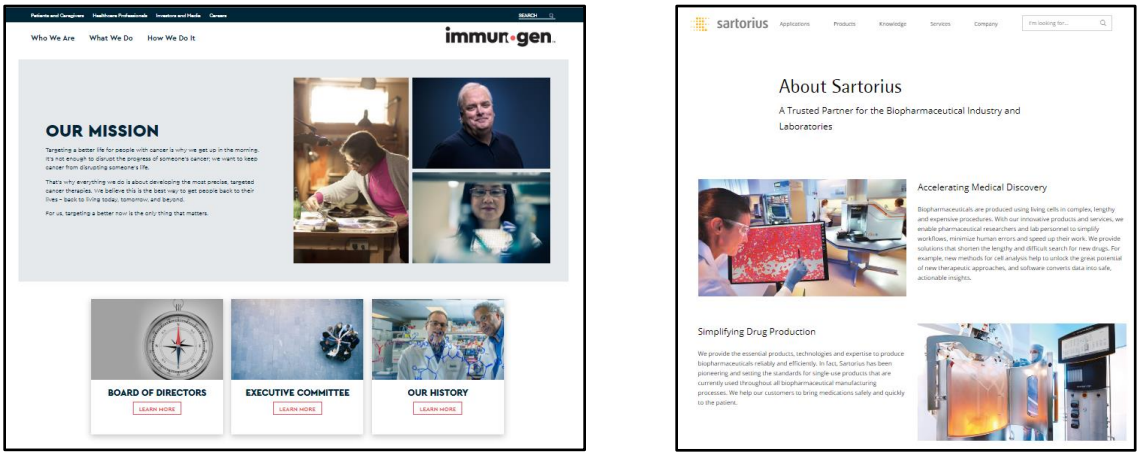

Figure 4.6.a: Immunogen's (left) and Sartorius' (right) websites use multiple paragraphs and different subsection links on their About Us page to be easily readable (https://www.immunogen.com/who-we-are/; https://www.sartorius.com/en/company/about-sartorius-ag).

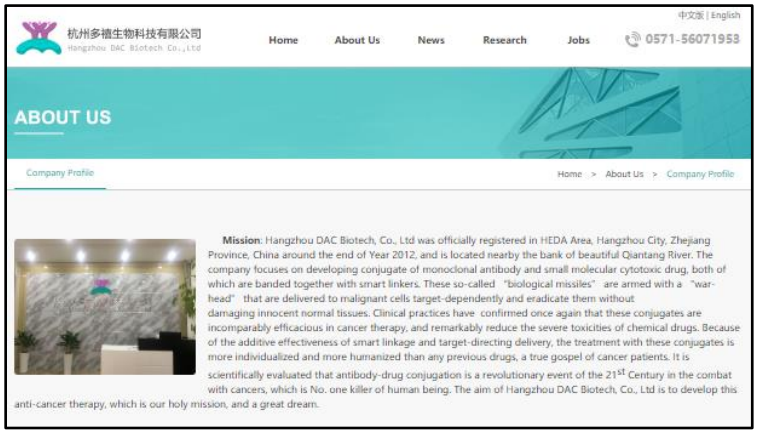

Figure 4.6.b: Hangzhou DAC Biotech's About Us page group their information into a paragraph for each section. (http://www.dacbiotech.com/en/about.aspx).

4.2.4 Language Differences Results

Another result the comparison revealed is the variance between how Hangzhou DAC Biotech's website and biotech websites accommodate for language translations. In the multicriteria evaluation, the team evaluated how biotech websites accommodate for translations since this project involves reaching out to an international audience. According to the general description, most biotech websites use distinct page layouts for different languages, detailed in Appendix L, l4. When comparing the biotech websites' original page to their translated page, the team found that 60% of the evaluated websites with another language use a different layout to accommodate for character count differences. Compared to Hangzhou DAC Biotech's website, the general description of biotech websites accommodates for language differences better. The company's English website translated their Chinese content to English text without changing the page layout. Due to the character count difference between Chinese and English, the direct translation of content yields more English characters than Chinese. The page layout does not compensate for this mapping and causes overlapping content from one section to another. The overflow of text obstructs the readability as Figure 4.7 demonstrates.

Figure 4.7.a: Hangzhou DAC Biotech's Chinese website does not have overlapping text (http://www.dacbiotech.com/index.aspx).

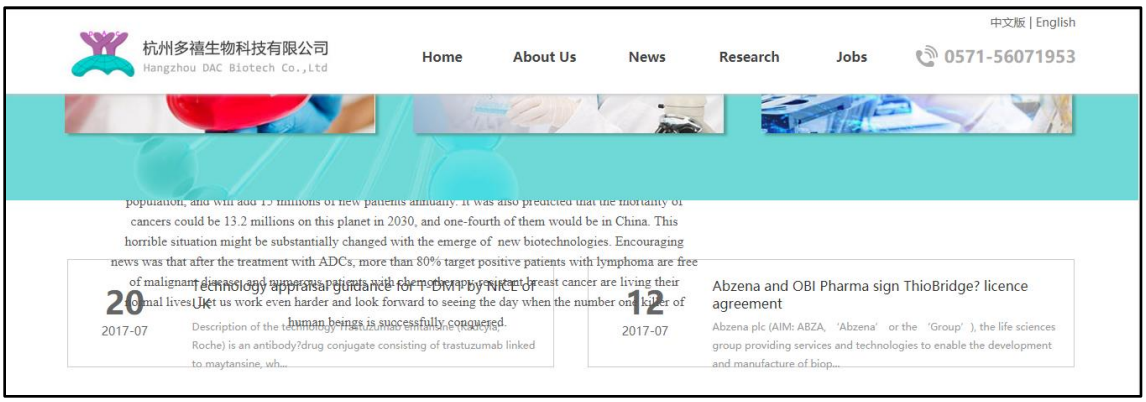

Figure 4.7.b: Hangzhou DAC Biotech's translated English website has a section of cards overlapping the text and News section due to the Chinese and English character difference from translation (http://www.dacbiotech.com/en/index.aspx).

4.3 Hangzhou DAC Biotech Employee Interviews Results

The team conducted six interviews with employees from Hangzhou DAC Biotech. The six employees were from the following departments: Department of Biology and Antibody Engineering, Department of Medicinal Chemistry, Department of Pharmacology and Pharmacokinetics, the Department of Quality Control and Quality Assurance, Company Management, and Department of Human Resources. These interviews focused on identifying missing or essential content in the company's English website as well as identifying the employee's perceived website audience. Using coding, the team grouped similar main ideas together to create a category for the analysis. This coding process produced nine themes or categories that characterize the type of content DAC Biotech employees believe the website should include. Additionally, the team counted how many employees mentioned each category across the six interviews. The coded interviews are in Appendix G and Appendix H. Table 4.3 contains the nine categories with examples of employee main ideas bundled in that category and Figure 4.8 shows the count of the number of employees that discussed an idea within a category.

Category	Main ideas	Frequency
Technology	- General information explaining ADCs - ADC Manufacturing Process - Ongoing Hangzhou DAC Biotech's projects	6
Company	- Mission Statement - Company's History	5

	- Hangzhou DAC Biotech's Accomplishments - Description of each department	
Media	- Video explaining ADC technology - Video showcasing the company - Images of the company's laboratories and departments	5
Patents or Publications	- Hangzhou DAC Biotech is top in the ADC field in China due to its patents	3
Company Secrecy	- Information published should not reveal company's secrets and technology	2
Easily Understood Information	- Text should be scannable and easy to read	2
Jobs	- Benefits offered by the company - Job positions and salary - Display the company culture	2
News	- News about the ADC industry and other rival companies - News about Hangzhou DAC Biotech	2
Investors	- Information about DAC Biotech's Business Deals	1

Table 4.3: A table listing the nine coded categories, main ideas from interviews and frequency of each category.

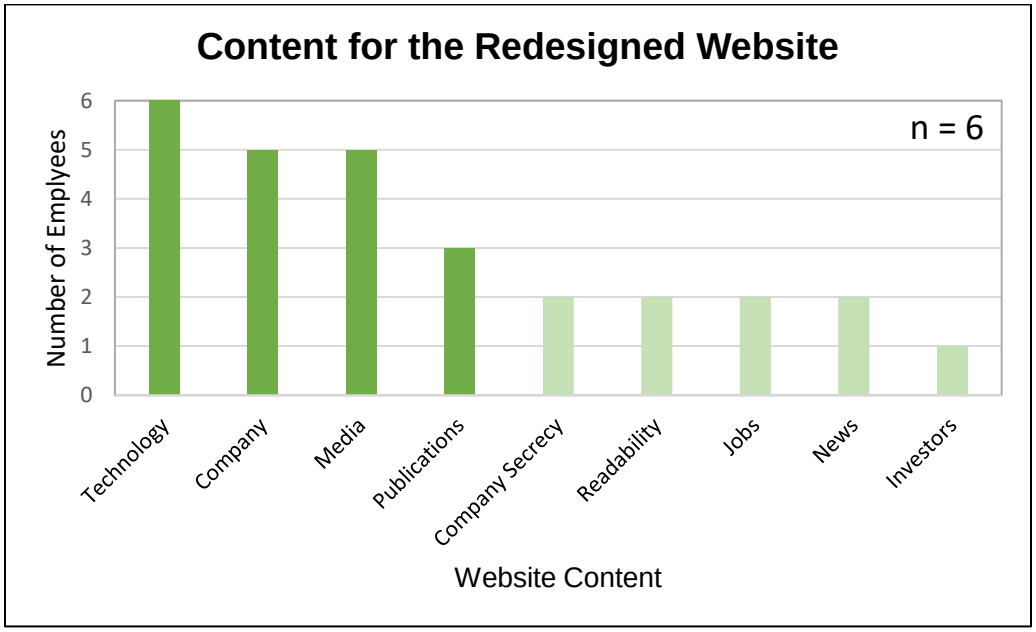

Figure 4.8: Hangzhou DAC Biotech's employees frequently discussed themes regarding website content.

The most prominent categories were Hangzhou DAC Biotech's technology, the company, media, and publications. First, while discussing the need for information about the company's technology or Antibody-Drug Conjugates (ADCs) the interviewees emphasized this information should explain ADCs, how they work, the company's ADC manufacturing process, and Hangzhou DAC Biotech's ongoing projects. Second, five out of six employees suggested that the content should promote different aspects of the company that includes the mission statement, history, departments and accomplishments of the company. Employees believe this information would improve Hangzhou DAC Biotech's name recognition and ability to stand out over their competitors. Third, 83% of the employees explained that the website should use media such as video and images to concisely present information. This media would briefly explain ADC technology as well as display the different departments and laboratories of the company. Lastly, half of the employees stated that Hangzhou DAC Biotech's publications are important to show on the website. Two out of these three employees voiced their concern when including patents on the website since patents can reveal sensitive company information.

4.3.1 Website Audience

The interviewers additionally asked the employees "Who do you think is the audience of the website?". To analyze the responses, the team coded the responses into nine categories. The following graph (Figure 4.9) displays the nine categories and the number of employees who mentioned each category. The analysis revealed the predominant groups to be investors, collaborators, job applicants, and doctors.

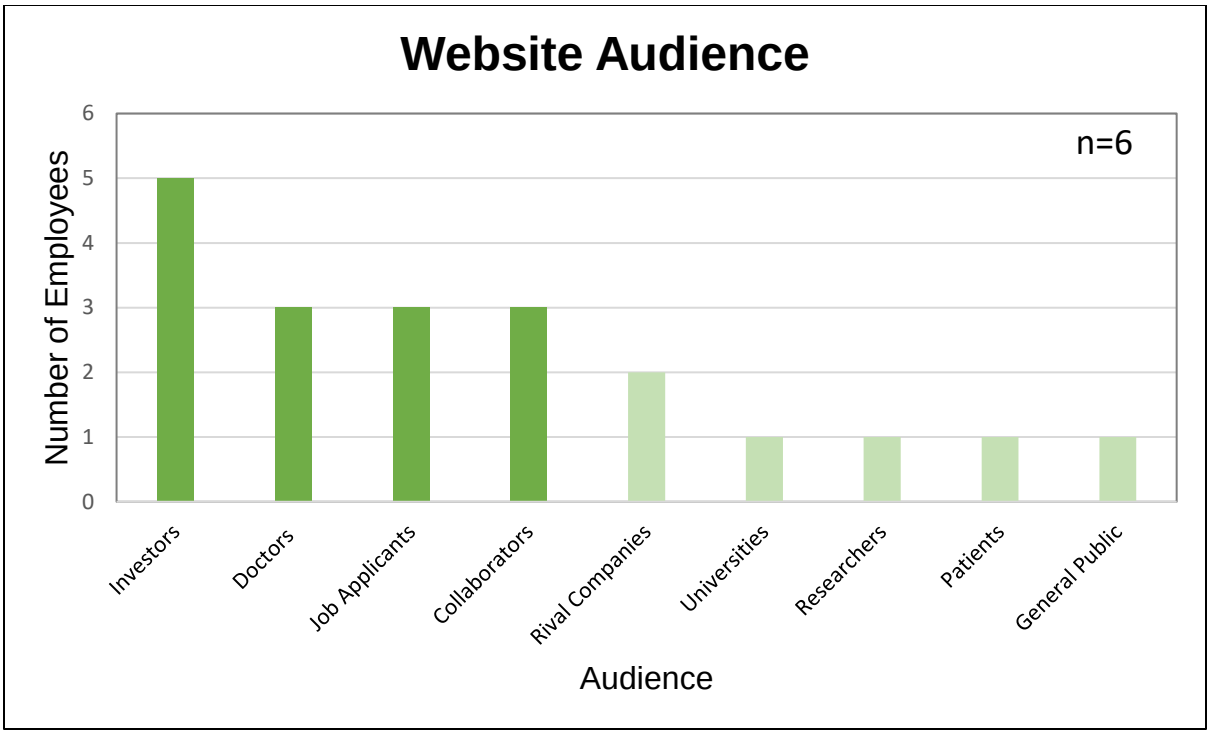

Figure 4.9: The number of times Hangzhou DAC Biotech employees mentioned each website audience.

4.4 Doctor Interviews Results

Throughout the course of this project, the team interviewed five doctors from the U.S. with experience in clinical trials. To analyze the doctor interviews, the team used the same coding technique applied on the Hangzhou DAC Biotech employee interviews. The coded doctor interviews are in Appendix I. The results of the doctor interviews provided three important points relevant to this investigation: the frequency at which a doctor may use company websites, other methods that doctors use to gather information, and the type of content that doctors search for on medical websites.

First, the team interviewed each medical doctor starting with the question, “Have you looked at any websites related to Investigational Drugs or medical equipment?”, regarding their involvement with company websites (see Appendix D).

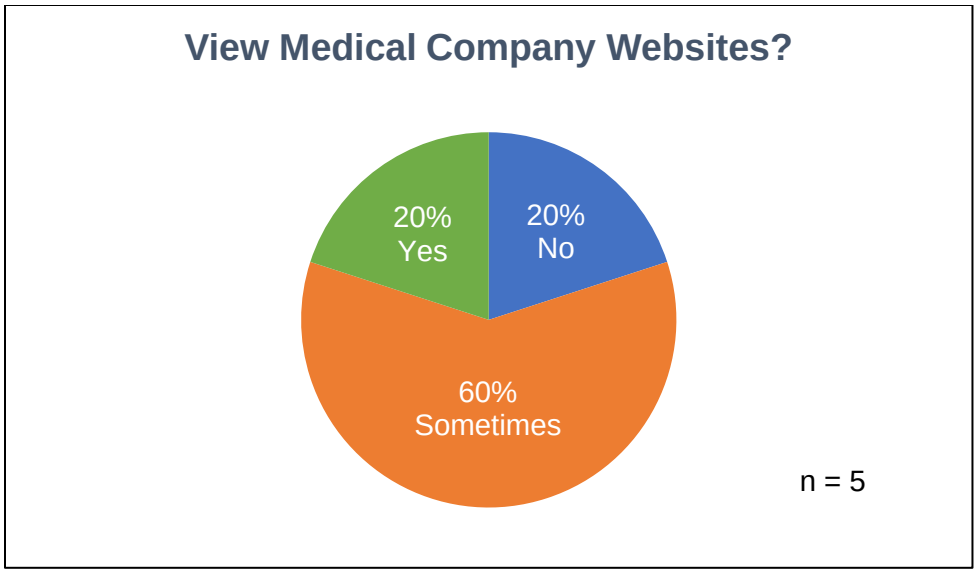

Figure 4.10: The distribution at which each medical doctor use company websites

Figure 4.10 depicts that three out of five medical doctors answered “sometimes” meaning they do not often visit company websites to search for information. The main point is this sampling of medical doctors do not actively view company websites unless they are searching for specific information related to a company.

By assuming that not all medical doctors view company websites, the team included the question, “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?”, regarding other methods doctors use to collect information (see Appendix D). After coding the answers of each doctor interviewed based on this question into categories, the project team identified three additional methods that medical doctors use to gather information besides company websites: visiting other types of websites or databases such as government or organization websites, obtaining information from another party such as colleagues or the doctor’s employer, and attending conferences and meetings. Figure 4.11 shows the responses of the interviewed members of this stakeholder group.

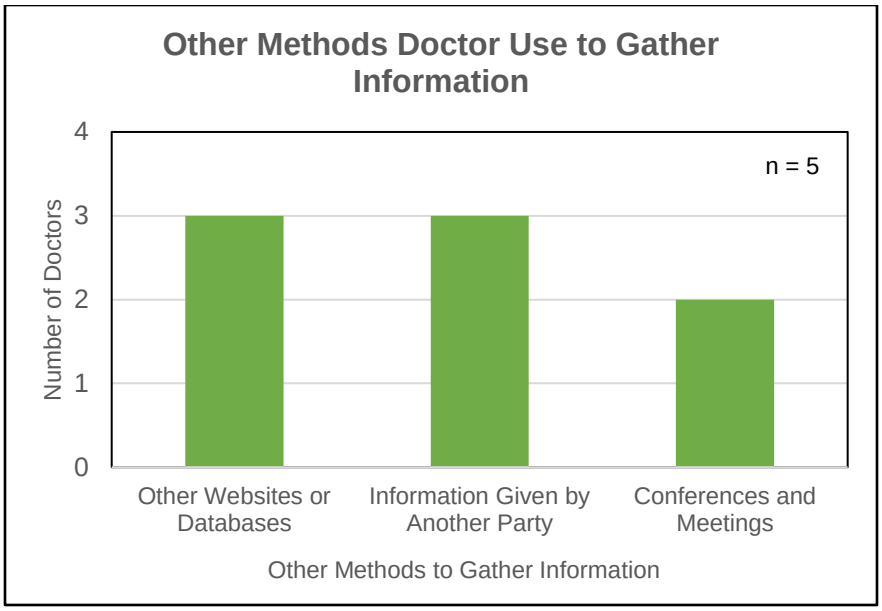

Figure 4.11: Other methods the doctors sampled use to gather information besides company websites.

The methods that most of the medical doctors interviewed use besides company websites are “other websites or databases” and “information given by another party”. Both responses were from three out of five doctors. Most of the doctors the team interviewed use other websites to find specific information, such as clinical trial information on *clinicaltrials.gov*. Medical doctors use databases such as PubMed to find old publications, articles, and data from past medical research. The medical doctors' interest in past medical research puts increased significance on the *News* section. The *News* section could contain recent and old articles related to the company’s research. Additionally, medical doctors usually receive information from the company they work with or other companies they contact.

Since the main objective of the doctor interviews was to assess the needs of the Hangzhou DAC Biotech website audience, the project team included questions on website content within the interviews (see Appendix D). The team classified the answers for these questions from each doctor into four categories: drugs, clinical trials, contact information, and patients. Figure 4.12 below summarizes the type of content the interviewed doctors seek on medical company websites.

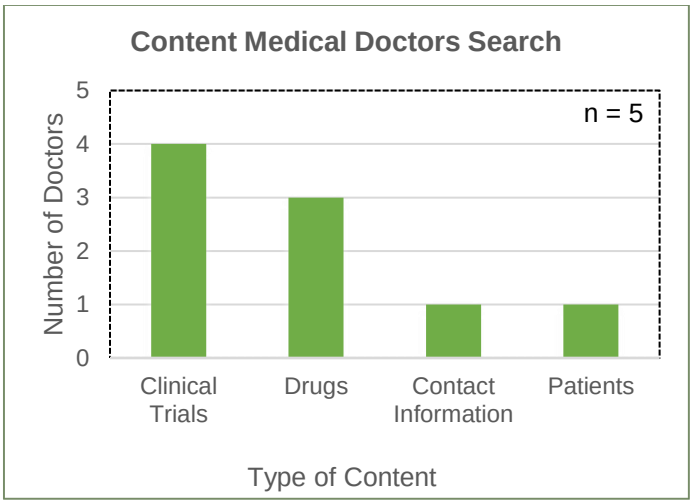

Figure 4.12: The type of content medical doctors seek on a biotechnology website.

The team found the highest search target for medical doctors is clinical trial information followed by drug information. Additionally, the doctor interviews show that medical doctors usually look for information about upcoming investigational drugs, new treatments to cure diseases, and clinical trial programs. This section shows that the medical doctors the team sampled do not view company websites very often because they tend to use other means to search for information about clinical trials and drugs.

4.5 Identifying a Website Management System Results

To determine a website management system for easy website updating, the team conducted two interviews with experts in the field. The first expert interview was a technical project manager from Wakefly, a Web development company. The second interview was with a digital marketing manager, who has overseen updating websites for biotech companies. Additionally, this information gathering phase included a meeting with the sponsor as well as the manager of the Hangzhou DAC Biotech website to understand the current management system. The team acknowledges the information the experts communicated during the interviews may not fully represent the entire scope of website management systems, which is a limitation of the project.

4.5.1 Expert Interview with Wakefly Employee

The team interviewed a technical project manager from Wakefly, a United States based Web development company. Wakefly has developed hundreds of websites using various content management systems for multiple industries, including biotech. The technical project manager has experience in creating custom applications and CMSs for different industries including finance, travel and e-commerce. The interview questions aim to understand the Web development process and gather a professional perspective on website management systems. Appendix E details the interview questions and Appendix J contains the notes of the interview.

Wakefly's technical project manager recommended using a Content Management System (CMS) to easily update a website. A CMS is a software program that allows website managers without previous programming knowledge to create, edit and publish web content (IONOS, 2018). One question the team asked was, "What content management system do you use for clients with a medium sized company that does not have a dedicated team to update and modify the website?". The Wakefly employee emphasized that the frequency of updates does not impact the decision for choosing a CMS and then explained that clients either know what CMS they wish to implement, or clients choose to keep their current CMS. According to the technical project manager, smaller companies tend to prefer open source CMSs while larger companies choose proprietary or licensed CMSs. Open source means that the program code is freely accessible by anyone, which enables users to make changes and adapt the CMS to individual requirements (IONOS, 2018). Licensed or proprietary software means that source code is not available to users (IONOS, 2018). While open source software is available without costs, licensed management systems are usually associated with a paid license (IONOS, 2018). If the client company has no preference, Wakefly researches the following three aspects: the client's budget, expected website traffic, and the client's previous experience with CMSs. Often client companies choose to keep their current CMS since a new CMS would require training personnel.

To finalize the interview, Wakefly's technical project manager concluded that CMSs are similar in ease of use. The Wakefly employee then mentioned WordPress and Drupal as two examples of easy to use CMSs.

4.5.2 Meeting with Hangzhou DAC Biotech Website Manager

After the expert interview with the Wakefly employee, the team proceeded to research open-source Content Management Systems. The team attempted to follow Wakefly's advice for choosing a CMS for Hangzhou DAC Biotech. Wakefly's advice included considering the expected website traffic, company budget, and the company's current CMS. To gather information on website traffic and the current website managing system, the team met with the project sponsor and the Hangzhou DAC Biotech website manager.

During the meeting, the manager informed the team that Hangzhou DAC Biotech's website is currently utilizing a CMS for website management. The team was unable to identify the mentioned CMS and neither the company nor the manager were able to provide further information regarding the CMS. At the end of the meeting, the manager explained that the current CMS is easy to use, though the company could potentially switch to a new CMS depending on its user-friendliness. Afterward, the team asked the project sponsor about the expected traffic for the website. While the sponsor mentioned traffic will be increasing in the future, the sponsor was unable to provide a website traffic amount since the website currently does not have analytics for tracking traffic. Finally, the project team decided to focus on ease of use and open-source CMSs since the team was unable to identify the current website's CMS and website traffic.

4.5.3 Expert Interview with a Digital Marketing Manager

The team interviewed a digital marketing manager with experience using CMSs to manage websites, including the websites of biotech companies. The interview questions aim to gain a professional perspective on how a CMS updates content on a website. Appendix F contains the interview questions and Appendix K contains the notes of this interview.

The manager shared their experience with WordPress, information on custom CMSs, and recommendations for a CMS. According to the manager, WordPress is the most popular CMS in the United States having a significant presence in the CMS industry, as well as, a large community that creates additional extensions and applications for it. The large amount of extensions for WordPress makes it more flexible and customizable than other CMSs. Another discussion point in favor of WordPress was WordPress's ease of use. The manager described

WordPress as user-friendly and intuitive for users without a background in programming. Additionally, menus are neatly labeled and organized, maintaining a consistent format when there are software updates to the CMS.

The manager then described custom CMSs, which are a proprietary solution created for one company or use case (Walker Sands, 2018). The manager stressed that custom CMSs are not as user-friendly as a popular CMSs since a single team of developers builds the CMS. On the contrary, the website manager voiced that custom CMSs can be more specialized toward the company's needs than open-source CMSs. For example, the manager explained that biotech companies have restrictions on the information the company can state and display on the website; therefore, custom CMSs are useful in these cases since they allow for the quick removal of information on the website.

The manager then compared WordPress to custom CMSs. The manager stressed that uploading media is the most difficult aspect of using a CMS, a problem that is especially present in custom CMSs. Additionally, the interviewee mentioned that WordPress formats its interface similar to Microsoft Word, making the editing process intuitive for most users. To conclude, the manager suggested WordPress as their main recommendation for a website management system instead of a custom CMS. While the manager has experience in other CMSs, such as Joomla! and Drupal, the manager prefers WordPress due to its large community, ease of use and reputation in the industry.

Chapter 5 Recommendations and Conclusion

This chapter presents the team's recommendations for Hangzhou DAC Biotech's website. The team based the recommendations on the results from the biotechnical company website evaluation, company interviews, doctor interviews, and website management interviews. This study produced two types of recommendations, namely recommendations for the website design as well as recommendations for a website management platform. This chapter concludes with a summary of recommendations and the future direction for Hangzhou DAC Biotech's website.

5.1 Website Design Recommendations

This study presents recommendations in the categories of *page design*, *content*, *navigation*, and *language*. The website prototype serves as an interactive visual aid for these recommendations. Figure 5.1 shows a screenshot of the prototype.

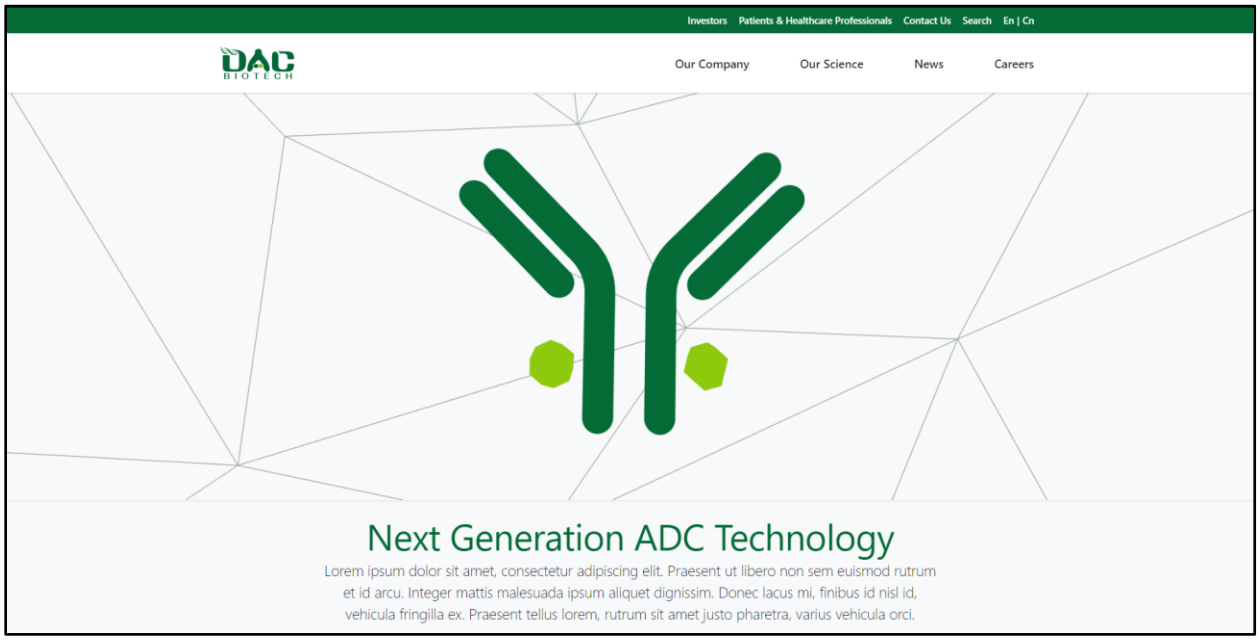

Figure 5.1: A screenshot of a portion of the prototype website's homepage.

For *page design*, the website should be *responsive* to scale and reorganize content for smaller screens on devices such as mobile phones. Each evaluated biotech website was

responsive Web design. The team implemented *responsiveness* into the prototype by using Bootstrap 4, a framework built for mobile-first Web design. Appendix M provides a brief description of Bootstrap 4. Figure 5.2 shows examples of the mobile version of the prototype, in which the navigation bar collapses into a menu icon and expands upon touch.

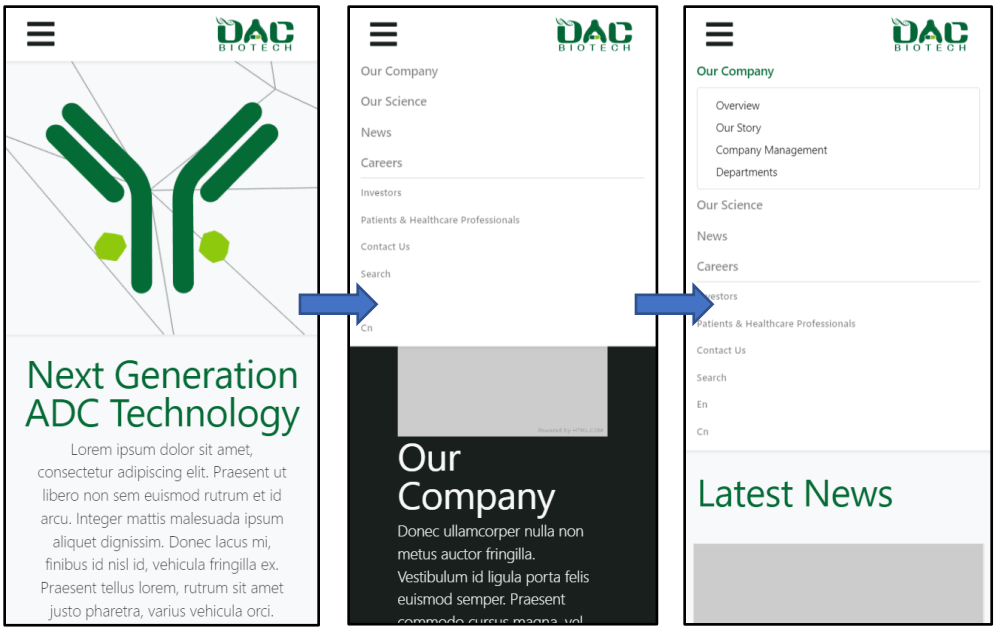

Figure 5.2: Examples of the mobile version of the website prototype.

Additionally, the team recommends *page design* be kept consistent through the reuse of logo colors throughout the website. One of this study's biotech website evaluation findings is that company websites often reuse logo colors in section headings, buttons, and other elements. The prototype uses the two green colors in the DAC Biotech logo in the *navigation bar*, section headings, buttons, and the ADC animation, most of which are shown in Figure 5.1.

The project team recommends the Web developer write website *content* related to Hangzhou DAC Biotech's ADC technology and company mission to aid those with cancer. Based on the results from the Hangzhou DAC Biotech employee interviews as well as results from the website evaluation, Web developers should write information regarding ADC technology in a manner and style to facilitate the public understanding the principles of ADCs. They should format content to be concise and scannable through the use of succinct paragraphs, well organized article sections, and bulleted lists, as found in the website evaluation. Using the

results from the doctor interviews, the team recommends that the website contain information about clinical trials, which could be included in the *News* or *Patients & Healthcare Professionals* sections. Figure 5.3 shows a screenshot of an example article page as a visual aid for these content recommendations.

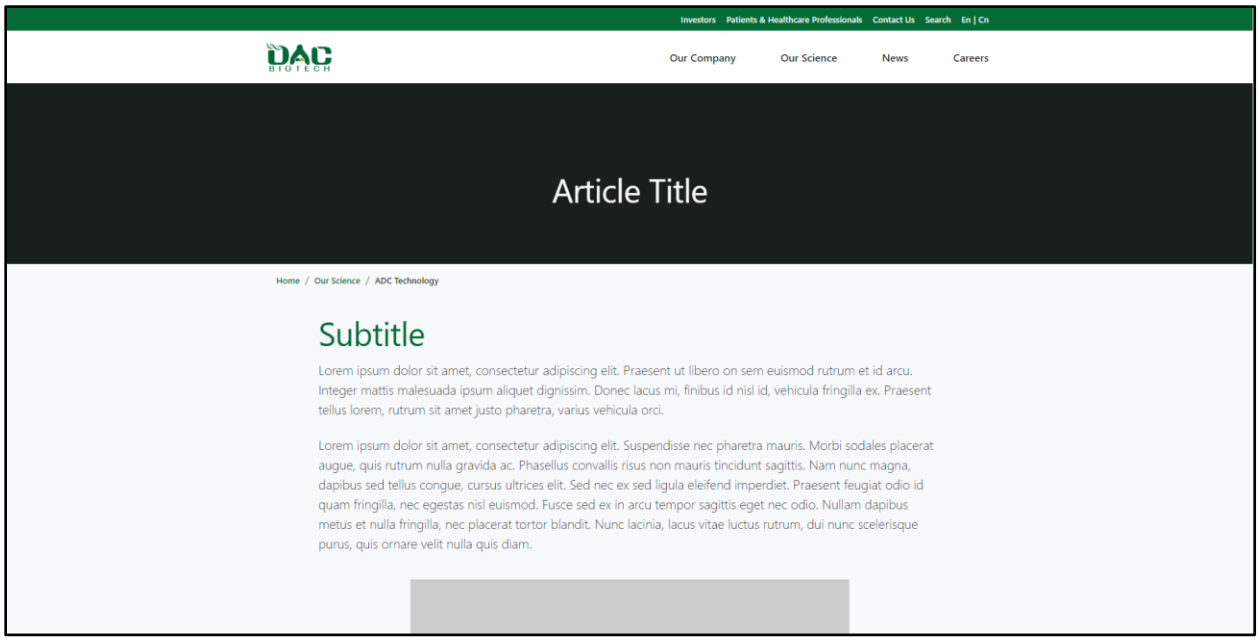

Figure 5.3: A screenshot of an example article page from the prototype website.

Besides text content, the team recommends that the website content include multimedia such as videos and images that relate to the company's technology and mission. The prototype website uses placeholder images for proper size and placement of images on the website. Table 5.1 shows the subjects of images the team found in the website evaluation. The team recommends that images contain these subjects, specifically researchers, labs, and patients.

Subject	Number of websites
Researchers	8
Labs	8
Patients	4
Elderly people	3
Families	3
Children	2
Diagrams	2
Groups of people/company teams	2
Executive team	2

Table 5.1: Results from the common subjects of images (see Appendix L).

For *navigation*, the team first recommends using a *static navigation bar* at the top of each page on the website. Figure 5.4 shows a screenshot of the *navigation bar*.

Figure 5.4: A screenshot of the navigation bar of the prototype.

It should contain the sections *Our Company*, *Our Science*, *News*, and *Careers* ordered left to right, with the sections positioned on the right side of the *navigation bar*. The *News* section is particularly important as the team found that doctors may look for past medical research in this section. Based on the website evaluation, employee interviews, and doctor interviews, the team recommends that the Web developer structure the *navigation bar* subsections similar to Table 5.2.

Section	Subsection(s)
Our Company	Our Story Company Management Departments
Our Science	ADC Technology Pipeline
News	Company News Industry News
Careers	Culture & Benefits Job Positions

Table 5.2: Hierarchy of the navigation bar.

Additionally, the team recommends the use of a secondary *navigation bar* that contains sections for specific website audiences such as *Investors*, *Patients*, and *Healthcare Professionals*. Figure 5.4 shows the secondary *navigation bar* with a green background. The secondary *navigation bar* should contain sections for a search option, a language option, *Careers*, *News* and *Contact*. In Hangzhou DAC Biotech's case, the language option should contain selections for English and Chinese. The next recommendation is to use a page that displays the *navigation bar* subsections when the user clicks the main section as opposed to directly selecting a subsection, as shown below in Figure 5.5. This page should display a banner image related to the main section and display *cards* for each subsection. A *card* is a Bootstrap structure that typically contains an image, a title, a short description, and a button. Figure 5.5 shows three stylized *cards* for navigating to each subsection. Appendix M shows an example of the default Bootstrap *card* style.

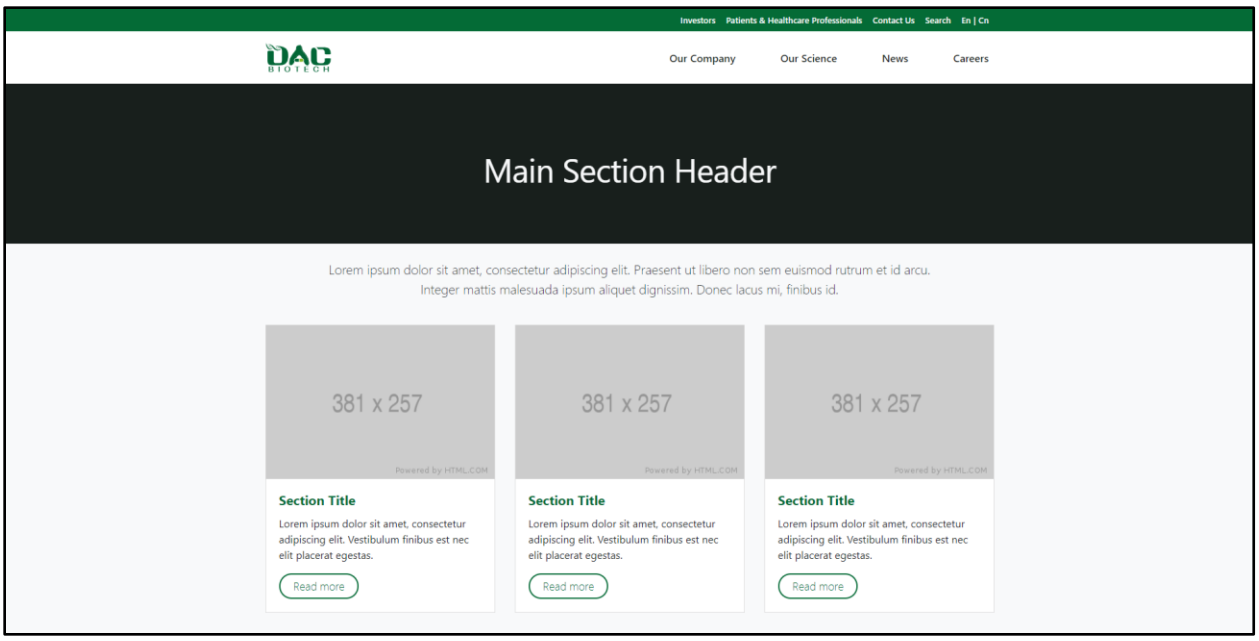

Figure 5.5: An example page displaying subsections of a main section from the navigation bar.

5.2 Website Management Recommendations

The team recommends Hangzhou DAC Biotech to use WordPress, a free to use open-source Content Management System, as their website management system. The team reached this conclusion based on two interviews with experts in the field. The first interview was with an employee from Wakefly. According to the Wakefly employee, a CMS is the easiest method to manage and publish content on a website. The Wakefly employee mentioned that smaller sized companies tend to prefer open-source CMSs. The second interview was with a digital marketing manager. The manager's main recommendation was to use WordPress. The manager emphasized that WordPress is the most popular CMS in the United States. According to the manager, WordPress also has a large community creating applications and extensions that make WordPress more flexible and customizable than other CMSs. Finally, the manager described WordPress as user-friendly and intuitive for people without a background in programming.

5.3 Conclusion and Future Direction

Although people in this technological age expose themselves to websites daily, this project has allowed the team to gain a deeper understanding of the complexity of Web design

behind websites. The project team recommends Hangzhou DAC Biotech approach a Web development company to choose a CMS, hosting platform, and final design for their new English website. With the recommendations and proposed prototype as a guideline, Hangzhou DAC Biotech will have the initial research and design of their English website. The project team will give the sponsor the deliverables and components of the report bundled in an electronic submission on a USB flash drive. If the company works with a Web development company, the Web development company can use the project deliverables to aid in the website development process. The team hopes the findings and recommendations from this project will serve as a helpful guide for Hangzhou DAC Biotech to create a website that attracts an English audience as they prepare for clinical trials in the U.S.

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Appendix A: Website Criteria

The following is the list of criteria questions used for the *multi-criteria evaluation* in Objective 1.

Page Design

pd1. How is content separated? (whitespace, line, image)
pd2. Are the images being reused?
pd3. How does the website deal with page layout when the window is resized?
pd4. Is there a mobile version?
pd5. How many images are on the homepage?
pd6. What types of multimedia other than text and images are on the website?
pd7. What is the resolution and KB size of the homepage banner image?
pd8. Where are the social media links, if present?
pd9. What is the color pallet of the website?
pd10. How is the theme kept consistent across the website? (what stays static, etc.?)
pd11. Is there a cookies consent notice?
pd12. What is the format of the job application within the *Careers* section?
pd13. Does the website use a third-party service for job applications?

Content

c1. Which social media links are present?
c2. How is text formatted to be concise and scannable?
c3. Does article content use an “inverted pyramid” format?
c4. How does the website accommodate for long articles? (Separate pages?)
c5. What is the color contrast between the background and text? (which colors are used?)
c6. Is colored text used for emphasis?
c7. How is the color used to emphasize text?
c8. Is the background an image, a texture, or a plain color?
c9. What is the justification and position of the homepage banner? (left, right, center)

c10. What are the subjects of the images?
c11. How does the website use animation, if present?
c12. Does the website content include videos?
c13. Where are the videos on the website located?
c14. What is the content of videos?
c15. How is the video included on the website? (embedded YouTube, Vimeo, own player)
c16. What does the footer of the website contain?
c17. Does the website have information about partner organizations?
c18. Do website users contribute to the website? (Comments? Forums? Reviews?)
c19. Does the website feature patient stories?
c20. What content is on the *About* page, if present?
c21. What methods of contact are available? (phone number, email?)
c22. Where are the methods of contact located?
c23. What are the main content sections of the homepage?

Navigation

n1. Where is the logo?
n2. Does the logo link to the homepage?
n3. Is the logo on every webpage?
n4. How does the logo stand out?
n5. Does the homepage have a search feature?
n6. How is the navigation implemented? (Are there drop downs, direct links, read more links on the paragraphs)
n7. What is the style of the dropdowns?
n8. How is old content managed if the website has a blog or news section? (delete old articles or store it)
n9. How are structural links used, if present?
n10. Is the navigation bar static?
n11. Where is the main navigation structure (navigation bar) located?
n12. Is a secondary navigation bar present?
n13. Is the secondary navigation bar static, if present?

n14. What are the main pages of the website on the navigation bar in order from left to right?

Language

l1. Where is the language option located?

l2. Is there an option to change language on multiple pages?

l3. Which languages are available?

l4. How does the website deal with the different language options? (only translation or different layout)

l5. How does the website accommodate for character differences with spacing and formatting?

l6. Is the language selected automatically?

Observations

The observations are notes of any specific feature that the team decided was not covered in any of the questions from the established criteria.

Appendix B: Hangzhou DAC Biotech Employee Interview

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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information we collect will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any specific question you feel uncomfortable answering.

Introduction Questions

B1. What is your name?

B2. What department of the company are you from?

B3. What is your job title?

B4. What are your job responsibilities?

Questions: Hangzhou DAC Biotech Employees from Each Department

B5. What type of content do you think should be included in the English website? Should there be any information about scientific publications, drug manufacturing process, or patents?

B6. What is the function of your department and is there any other information related to your department that would be useful for the website content such as procedures or statistics?

B7. Who do you think would be the audience of the English website?

B8. Are there any features you would like on the English website and not on the Chinese website?

B9. What content should be retained from the current English website?

Appendix C: Company Employee from Human Resources Department Interview

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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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information collected will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any questions you feel uncomfortable answering.

Introduction Questions

C1. What is your name?

C2. What department of the company are you from?

C3. What is your job title?

C4. What are your job responsibilities?

Website Questions

C5. The current Hangzhou DAC Biotech website states that the company CENNOO created the current website. Are you able to confirm this?

C6. Did you interact with CENNOO during the creation of the English and Chinese website? Were you involved in designing content and if so, how?

C7. Was anyone else involved with the creation of the English and Chinese website?

C8. Have you been involved with maintaining or updating the current English and/or Chinese website?

   a. Do you use a software system to update content on the website?
   b. Was there priority in updating one language version over the other?
   c. How was the English website translated?

C9. What type of content do you think should be included in the English website?

   a. What should be changed in the English website?

C10. Who do you think would be the audience of the English website?

C11. Are there any features you would like on the English website and not on the Chinese website?

Appendix D: Medical Doctor Interview

Interview Contact Message:

We are a group of engineering students from Worcester Polytechnic Institute (WPI) currently working on our Interactive Qualifying Project (IQP) in Hangzhou, China. The purpose of an IQP is to integrate technical skills with a social science research project. Our project is to redesign the English website for the Chinese biotech company Hangzhou DAC Biotech. Hangzhou DAC Biotech is developing an Antibody-Drug Conjugate (ADC) Investigational Drug, with a planned launch in the United States as well as China. We would like to interview doctors to determine if and how doctors interact with the website for a company developing an Investigational Drug. The interview would be around 15 minutes over phone or Skype. Thank you for your consideration.

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.

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. Our paper will be published on WPI's website and will be publicly available.

Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?

Do we have your permission to use your name in our paper or would you like to remain anonymous?

Introduction Questions

D1. What is your name?

D2. What is your job title?

D3. Are your job responsibilities primarily related to patients or research and how?

D4. How are you involved with Investigational Drugs or medical equipment?

Questions: Assess the Needs of the Website Audience

D5. Have you looked at any websites related to Investigational Drugs or medical equipment?

   a. What information do you typically look for in biotech websites?

      i. Clinical trials

      ii. Contact info

      iii. Product and technology information

      iv. Other (If so, please explain)

D6. 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 E: Web Development Company Employee Interview

Interview Contact Message:

Hello Mr. Tomaski,

This is Jose Li, a computer science junior from Worcester Polytechnic Institute. I spoke with you at the past Fall Career Fair. I'm not sure if you remember, but I mentioned that my project team was working on a web design project with a biotech company.

Our project is to propose recommendations for a redesigned English website for a Chinese biotech company. The company's employees mainly work in biomedical and chemical engineering positions. As such, we would like to investigate the optimal website and content management system to recommend to the company so that the website can be updated by non-technical staff.

Our team would like to conduct an interview an employee at Wakefly to identify possible system recommendations and better understand the web development process. Please let us know if a phone/video interview is possible or if another method is preferred.

Preamble:

Thank you for participating in our project. We are students from Worcester Polytechnic Institute (WPI) working on a research 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, they want to redesign their English version of the website. 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. 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

E1. What is your title at the company?

E2. What are your responsibilities at the company?

E3. 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. How long does it usually take to design a website?

Questions: Determine a website management system

E4. Do you have experience with designing websites for biotech companies?

   a. What are the main features found in a biotech website?

E5. What is your general process when making a website for a client?

E6. What system do you use when a client does not expect to update the website that often?

E7. What are the three content management systems that you recommend?

Other Related Questions

E8. Have you ever designed a website that targets an international audience?

   a. How do you appeal to an international audience?

Appendix F: Digital Marketing Manager Interview

Interview Contact Message:

My team and I are currently in China working on our Interactive Qualifying Project. Our project is to redesign the English website for an international biotech company working on cancer treatments. We would like to interview you to know more about your experience with website management in relation to content management systems (CMS). Are you still able to participate in an interview? If so, are you available this week or early next week for a phone interview?

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 understand the process of updating a website.

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. Our paper will be published on WPI's website and will be publicly available.

Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?

Do we have your permission to use your name in our paper or would you like to remain anonymous?

Introduction Questions

F1. What is your name?

F2. What is your job title?

F3. What are your job responsibilities?

Questions: Content Management

F4. Have you had experience with updating a website using a content management system (CMS)?

F5. What kind of content have you updated?

- a. Articles?
- b. Text?
- c. Images?
- d. Videos?

F6. Is the CMS one of the following?

- a. WordPress
- b. Joomla!
- c. Drupal
- d. Custom
    - i. How was the custom CMS created?
- e. Other

F7. Describe your experience with using the selected CMS.

- a. Is the CMS easy to use for updating the website?

F8. What did you find easy to use with the CMS?

F9. What did you find difficult about using the CMS?

F10. Who is involved in the process of updating a website?

F11. Was there a team involved or did you update the website by yourself?

F12. Who was involved in creating the content for the website?

   a. Editing Team?

   b. IT department?

   c. Marketing Team?

Appendix G: Interview with Company Employees from Each Department

G.1 Employee Interview

Interviewee: Anonymous

Interview Date: 1 Nov 2018 at 2:15 PM (GMT+8)

Interviewers: Dominic Cascino and Jose Li

Location: Hangzhou DAC Biotech Office

Purpose: To understand the perspective of each department in Hangzhou DAC Biotech for the redesigned English website.

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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information we collect will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any specific question you feel uncomfortable answering.

COLOR CODE (Except Question 7)

Patents or Publications

Information about DAC Biotech's Technology or ADCs

Media

COLOR CODE (Only for Question 7 – Website Audience)

Investors

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What department of the company are you from?**

   Molecular Biology.

3. **What is your job title?**

   Employee in the Department of Molecular Biology.

4. **What are your job responsibilities?**

   Construct expression factor to use it for construct the field line [inaudible] proteins.

Questions: Different Department Employees

5. **What type of content do you think should be included in the English website? Should there be any information about scientific publications, drug manufacturing process, or patents?**

They haven't published any scientific publications previously, so no reason to it. Drug manufacturing process is important. It should be published. Patents should be published since they are important to share.

6. **What is the function of your department and is there any other information related to your department that would be useful for the website content such as procedures or statistics?**

   Don't think so since most of the department doesn't do innovations. It's only routinized jobs. No procedures or statistics that are thought to be on the website.

7. **Who do you think would be the audience of the English website?**

   I think investors, but they might not care too much about us since we are a small company. Maybe other companies might not pay attention to Hangzhou DAC Biotech. Their products are still under research.

8. **Are there any features you would like on the English website and not on the Chinese website?**

   I think it should be the same.

9. **Anything that should remain on the English website?**

   Change the photos and take some from the company's lab. The information is good and I like the content in there.

G.2 Employee Interview

Interviewee: Anonymous

Interview Date: 1 Nov 2018 at 2:30 PM (GMT+8)

Interviewers: Dominic Cascino and Jose Li

Location: Hangzhou DAC Biotech Office

Purpose: To understand the perspective of each department in Hangzhou DAC Biotech for the redesigned English website.

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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information we collect will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any specific question you feel uncomfortable answering.

COLOR CODE (Except Question 7)

Patents or Publications

Low level of detail for sensitive technology information

Information should be understood by the general public

Information about the Company

Information about DAC Biotech's Technology or ADCs

Information for Investors

News section

Media

COLOR CODE (Only for Question 7 – Website Audience)

General Public

Job Applicants

Collaborators

Investors

Doctors

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What department of the company are you from?**

   Company management.

3. **What is your job title?**

   Employee in the company management.

4. **What are your job responsibilities?**

   I'm responsible for almost everything: product, responsible of project assignment, as well as the direction of the team, directing R&D, and manufacturing.

Questions: Different Department Employees

5. **What type of content do you think should be included in the English website? Should there be any information about scientific publications, drug manufacturing process, or patents?**

   Make sure not to include too much detail about the content or someone can copy. Some general info for the public commoner like things a commoner would ask. Can show some info, some departments let viewers get to know them better. I am not sure about the content. Some info for partners to know them better. Updated news on ADC area Other company's development. Information about business deals. We have around 10 or less deals per year. Big pharma on small projects. About our publications, not sure if we should publish patents. Patents could give away all the information. General info on ADC. We can show on website some projects we are working on, though not specifics. Display what projects we have done. We had done 24 different projects. We want to let people know who DAC Biotech is, what is DAC Biotech doing in this area., and what other companies are doing. News is fine. We read news from other business. The news can be added on here, also include some industry news. We update the news every time..We can add what other people or companies are doing. Some business deals too. You can put some links on some business deals. Include the title of the news and a few sentences, then the link to redirect to the other website to avoid copyright issues.

6. **What is the function of your department and is there any other information related to your department that would be useful for the website content such as procedures or statistics?**

   Some statistics could be on the website. We can promote some of DAC Biotech's technology, not all of it. Basic information is fine, but not too much in depth to avoid showing all the company's secrets. We want to avoid copycats stealing technology. They could copy our technology or any other info. It's common in China. In China, it's difficult to not get copied, don't want 3-4 years of work to get copied. The process is difficult.

7. **Who do you think would be the audience of the English website?**

   I think everyone is an audience for the website, including people finding jobs, collaborators, business people, investors, and doctors, particularly for clinical trials.

8. **Are there any features you would like on the English website and not on the Chinese website?**

   I have no preference. You can choose whatever you want. I don't want anything very sophisticated or too complicated. It has to be easy to read and get info for people. People will need to know this company is young. I also want some videos on the website. Scannable info, not too much text.

9. **What content should be retained from the current English website?**

   We need a whole redesigned of the English website. I don't like the current website at all. You can do whatever you prefer.

G.3 Employee Interview

Interviewee: Anonymous

Interview Date: 1 Nov 2018 at 2:45 PM (GMT+8)

Interviewers: Paulo Chow and Tsuiyee Ng

Location: Hangzhou DAC Biotech Office

Purpose: To understand the perspective of each department in Hangzhou DAC Biotech for the redesigned English website.

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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information we collect will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any specific question you feel uncomfortable answering.

COLOR CODE (Except Question 7)

Information about the Company

Information about DAC Biotech's Technology or ADCs

Information about Jobs

COLOR CODE (Only for Question 7 – Website Audience)

Collaborators

Investors

Doctors

Patients

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What department of the company are you from?**

   Pharmacology and Clinical Science.

3. **What is your job title?**

   Employee in the Department of Pharmacology and Clinical Science.

4. **What are your job responsibilities?**

   The drug development has three main steps. First, a library of candidates where we screen the library and select them. The first job is to screen the compounds. Second, we lead the compounds into a safety evaluation under good practice regulations. Companies should use other labs that have safety evaluation for drug on monkey or rat and toxicity study. For FDA regulations, there is a secretary evaluation monthly. A document is sent to FDA which will check the document to see if the study has been run well or if something is missing until requirements are met. Then, we run the clinical trials. The director of the Department of Pharmacology and Clinical Science is in charge of all of these steps. So, the clinical trials have three steps: check safety in patients, is the drug effective, and treat patients and get a lot of data.

Questions: Different Department Employees

5. **What type of content do you think should be included in the English website? Should there be any information about scientific publications, drug manufacturing process, or patents?**

   The specific process of the company. What is the ADC process. The company started with three employees with PhDs from America. Immunogen developed the ADC technique. We know what to do with the ADC. We improved the ADC: increased the therapeutic window, decreased the toxicity, and improved the efficacy dose. If the therapeutic window is small, the patients will run close to being harmed by the drug. Our therapeutic window is three or four times larger than TDM1. This is particularly important and very special for the company, okay to put on website. The main point is that we know how to make an ADC, what we already did, what do ADC technology contribute to. Accomplishments of the company. Information that gives reputation to the company. DAC Biotech knows exactly what they want to do: run clincal trials and then gather patients. We already have a product that is more effective than the drugs in the market. Our drug has a therapeutic window dose that patients can take without being bad for them. 3.6 mm is to treat the patients.

6. **What is the function of your department and is there any other information related to your department that would be useful for the website content such as procedures or statistics?**

   The therapeutic window of the dose can be a statistic. Animal study like the monkeys. The highest therapeutic window is HNSTD. We have a non-severe effective dose, under this dose there will be no severe toxicity.

7. **Who do you think would be the audience of the English website?**

   Investors could be an audience, also collaborators, patients, medical doctors, and any collaborative company.

8. **Are there any features you would like on the English website and not on the Chinese website?**

   The population in China to view is very limited. The English website is very important to attract people from Europe and America. We want them to see this company is prospective and focused.

9. **What content should be retained from the current English website?**

   It is not so special. Our focus is too professional, they cannot understand the drug dosage curve.

10. **Is there any other specific content you want to see on the redesigned English website?**

    The job application could be better, showing what kind of medical insurance the company can pay, and information about the salary.

G.4 Employee Interview

Interviewee: Anonymous

Interview Date: 1 Nov 2018 at 3:00 PM (GMT+8)

Interviewers: Paulo Chow and Tsuiyee Ng

Location: Hangzhou DAC Biotech Office

Purpose: To understand the perspective of each department in Hangzhou DAC Biotech for the redesigned English website.

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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information we collect will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any specific question you feel uncomfortable answering.

COLOR CODE (Except Question 7)

Patents or Publications

Low level of detail for sensitive technology information

Information about the Company

Information about DAC Biotech's Technology or ADCs

Information about Jobs

Media

COLOR CODE (Only for Question 7 – Website Audience)

Job Applicants

Rival Biotech Companies

Universities

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What department of the company are you from?**

   Quality Control Department.

3. **What is your job title?**

   Employee in the Quality Control Department.

4. **What are your job responsibilities?**

   The department get products to see if it's good or not or if it is qualified.

Questions: Different Department Employees

5. **What type of content do you think should be included in the English website? Should there be any information about scientific publications, drug manufacturing process, or patents?**

   Patents should not be involved. It should be kept as a secret. The company published some antibody before. Publications and manufacturing process is fine. ADCs research can be fine, but other projects such as the specific project should not be published.

6. **What is the function of your department and is there any other information related to your department that would be useful for the website content such as procedures or statistics?**

   We do many tests to check if drug is good or not. The department do lots of up-to-date methods on quality insurance or control.

7. **Who do you think would be the audience of the English website?**

   The rival companies. University or company interested on their patents or in our product. Employees that could apply for the company. Relationship of our company with other companies. Most international websites usually focus for the relationship with other companies and government. In most European websites, the government checks if the company has enough money and get money from other companies or organizations for research. European websites will tell you where the money comes from. Chinese companies always get money from the government. Companies want to know if DAC Biotech has enough money and how are you getting websites.

8. **What content should be retained from the current English website?**

   You could update pictures from the lab. The quality insurance is not included in the website, even though it's the biggest department. There is no Chinese ADC in the market right now. FDA regulations in China has nothing related to ADC. The Chinese government give them money to school or something else. A thousand people get chosen. The president has many patents and is part of the project. I would like a description of the departments. Our department is a little different, There's no Chinese biotech companies on ADC. The quality control (insurance) in China is new. You can try get information on the patents for the website. FDA regulations in China, no methods have been published in the Chinese book (FDA regulation - like), introduction for the department and their methods. The company has many patents on ADC drugs, get info on patents on the English website. Patents could be published on the website. We are within the top 15 patents (last year) in the area. DAC Biotech is in top 10. Our products have not been sold. Even though the product has not been sold, the composition of the

ADC is top in China. I want to include some company culture on the website. Pictures of the team. They think chinese culture is just work. It should include in the jobs section about the company culture not only about work but also about having fun.

G.5 Employee Interview

Interviewee: Anonymous

Interview Date: 1 Nov 2018 at 3:15 PM (GMT+8)

Interviewers: Paulo Chow and Tsuiyee Ng

Location: Hangzhou DAC Biotech Office

Purpose: To understand the perspective of each department in Hangzhou DAC Biotech for the redesigned English website.

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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information we collect will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any specific question you feel uncomfortable answering.

COLOR CODE (Except Question 7)

Information about the Company

Information about DAC Biotech's Technology or ADCs

Media

COLOR CODE (Only for Question 7 – Website Audience)

Investors

Doctors

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What department of the company are you from?**

   Chemistry Department.

3. **What is your job title?**

   Employee in the Chemistry Department.

4. **What are your job responsibilities?**

   I am involved with lab policy, lab work, and write reports.

Questions: Different Department Employees

5. **What type of content do you think should be included in the English website? Should there be any information about scientific publications, drug manufacturing process, or patents?**

   The website should more interesting, professional, and scientific. We can include some research. More information on what departments do, but we don't want to give too much. Try to balance the content. It's up to Dr. Zhao.

6. **What is the function of your department and is there any other information related to your department that would be useful for the website content such as procedures or statistics?**

   We do some chemical structures, how to make it. We do a lot of stuff. Some of it could be on the website.

7. **Who do you think would be the audience of the English website?**

   Investors are audience. It could be used on conferences and meetings. Doctors might take a look at the website after clinical trials, maybe in the future.

8. **What content should be retained from the current English website?**

   It is generally alright. The frame looks alright. More information on the website. There are some mistakes on the website, try to fix it. You can also put some videos. It should be the same content, different language. I preferred it to be the same.

Appendix H: Interview with Company Employee from Human Resources Department

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Interviewee: Anonymous

Interview Date: 1 Nov 2018 at 2:00 PM (GMT+8)

Interviewers: Dominic Cascino and Jose Li

Location: Hangzhou DAC Biotech Office

Purpose: To understand the perspective of each department in Hangzhou DAC Biotech for the redesigned English website.

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. The goal of this interview is to gather information from Hangzhou DAC Biotech's employees concerning your opinion of the company's English website.

Any information collected will remain anonymous. We will use general company 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. Our paper will be published to the Web and will be publicly available. Participation in this interview is voluntary and you may stop at any time. You may also choose to not answer any questions you feel uncomfortable answering.

COLOR CODE (Except Question 10)

Information should be understood by the general public

Information about the Company

Information about DAC Biotech's Technology or ADCs

News section

Media

COLOR CODE (Only for Question 10 – Website Audience)

Job Applicants

Collaborators

Investors

Researchers

Rival Biotech Companies

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What department of the company are you from?**

   Human Resources Department.

3. **What is your job title?**

   Employee in the Human Resources Department.

4. **What are your job responsibilities?**

   Manage all the different departments.

Website Questions

5. **The current Hangzhou DAC Biotech website states that the company CENNOO created the current website. Are you able to confirm this?**

   No, I did not contact the company. CENNOO created the website in the early stages and couldn't communicate with them.

6. **Did you interact with CENNOO during the creation of the English and Chinese website? Were you involved in designing content and if so, how?**

   No.

7. **Was there anyone else that was involved with the creation of the English and Chinese website?**

   One of the employees led by me and Dr. Zhao was involved with the design of the English website. Dr. Zhao provided the content for the website. The employee was responsible for passing the information to the company. She did not had any other contribution at all.

8. **Have you been involved with maintaining or updating the current English and/or Chinese website?**

   Her department is responsible for the update of the website.

   a. **Do you use a software system to update content on the website?**

      The article is provided by Dr. Zhao and published by our department. We only update with the provided software system. There is an administrative back-end. The article is given to the back-end, which is in charge of publishing the article.

   b. **Was there priority in updating one language version over the other?**

      There is more priority in Chinese. I would like to update both at the same time if possible.

c. How was the English website translated?

The content in the Chinese version was translated to the English version right away. The translated English was provided by Dr. Zhao. Some of the content was omitted. After we write the content in the Chinese version, we translate it into the English version.

9. What type of content do you think should be included in the English website?

Information about the company to display the company on the website. Information about Hangzhou DAC Biotech's products, not too specific but general. Include some research and news about the company.

b. What should be changed?

Put some short videos to display about the company because the pictures don't show the whole process of the company. Video is more active and better for promotion. It can show the process of their research and development and some activities of our employees and maybe some companies that come visit this company. During the process of product, talk about (manufacturing stages) stage 1, stage 2 during every stage…… Put the stage process on the website. Put place for other visitors to get their opinion or ask questions on them. Interact with viewers or customers, if they have questions on the product or order products. This will be beneficial to the company because we need to research some product or medicine. We have several products or stage, maybe other companies are stuck in their process and this company can provide technology to help them. Maybe contact them so that they provide some technology.

10. Who do you think would be the audience of the English website?

I think applicants that would apply for job, rivals that could have same product, companies or someone that may want cooperation, people that look for resources or view for info, investors, and doctors would rarely look at the website. If the medicine is on the market, the doctors might take a look at it. Researchers might look at the website.

11. Are there any features you would like on the English website and not on the Chinese website?

The information I answered in question 9 can be put on the English and not it Chinese because our product is mostly needed by other countries, not in China. Manufacturing stages in the company can be added in English one and not in Chinese one.

Appendix I: Interview with Medical Doctors

I.1 Phone Call Interview

Interviewee: Anonymous

Interview Date: 15 Nov 2018 at 9:00 PM (GMT+8)

Interviewers: Paulo Chow and Tsuiyee Ng

Location: Phone call

Purpose: To assess the needs of the website audience.

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.

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. Our paper will be published on WPI's website and will be publicly available.

Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?

Yes

Do we have your permission to use your name in our paper or would you like to remain anonymous?

Yes (The team made this interview anonymous)

COLOR CODE

Drugs

Clinical Trials

Other Websites or Databases

Information Given by Another Party

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What is your job title?**

   I am a physician and neurologist.

3. **Are your job responsibilities primarily related to patients or research?**

   a. **How?**

      Primarily patients, but I also do some research. I participated in some clinical trials with pharmaceutical companies. The pharmaceutical companies need patient participation. For clinical trials, they contact specialized multiple sclerologists involving investigational drugs. If the patients meet eligibility criteria, they get enrolled in clinical trials.

4. **How are you involved with Investigational Drugs or medical equipment?**

I am the principal investigator for clinical trials and a couple of studies.

Questions: Assess the Needs of the Website Audience

5. **Have you looked at company websites that sell or research Investigational Drugs?**

I do not know how much is there on a website. When I am looking up for a drug, if I get information that there's trials ongoing for a drug .I don't know if the drugs published are investigational, typically everyone wants to keep their studies as a secret until they start the trial. I usually receive email or some information about a company that will organize a trial. They usually give little information until you sign confidentiality agreement. They send protocols, what is the criteria, and more about the drug that they are studying. Everything is sent through email and not redirected to a website. If drug was already tested in stage one or two in the trial, you can find the information by searching for studies previously published.

   a. **What information do you typically look for in these websites?**

      i. **Clinical trials**
      ii. **Contact info**
      iii. **Product and technology information**
      iv. **Other (If so, please explain)**

I typically find in the websites about news released, results of the studies published; it shows the beneficial drug. If I want to find info for my patient, I would search; what I would like to see on the website: information about the website, mechanism on how it works, potential benefits, and how is it different from what it is available in the market. If the company is starting a trial, I would like to have information on what are the sites that the patient can enroll to do the trial, how far in the progress the trial is, do they have any preliminary data, if they do not have it available, if it was something already published , and what are the risks of the drug.

6. **If you do not look at medical company's websites, how do you obtain the information (clinical trials, product information, contact information, etc.) that you look for?**

   If I am looking for a trial, I would go to clinicaltrials.gov. It shows all closed or current trials available. If trial is closed for patient enrollment, it will show it's disclosed but data is not published, it's just analyzing data at that stage or recruiting currently. Clinicaltrials.org you can search for criteria you are looking for and see if there are studies that are currently enrolling or just planning to enroll in the trial.

I.2 Phone Call Interview

Interviewee: Anonymous

Interview Date: 22 Nov 2018 at 9:00 AM (GMT+8)

Interviewers: Dominic Cascino, Paulo Chow, Jose Li, and Tsuiyee Ng

Location: Phone call

Purpose: To assess the needs of the website audience.

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.

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. Our paper will be published on WPI's website and will be publicly available.

Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?
Yes

Do we have your permission to use your name in our paper or would you like to remain anonymous?

I prefer to remain anonymous.

COLOR CODE

Clinical Trials

Information Given by Another Party

Conferences and Meetings

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What is your job title?**

   I do Neurology attendings of medical doctor (specialist in neurology) and I am a doctor with Dementia Specialist.

3. **Are your job responsibilities primarily related to patients or research?**

   b. **How?**

   Both. Part of my work involves in clinic. I have a busy clinic where I see patients. I am involved in several research programs of my field. I am the principal investigator in the clinical trial. I had another responsibility in teaching. I was the head of the neurology clerkship of the university that sends medical students to his clinic. I am still teaching neurology, but currently I am not the clerkship director.

4. **How are you involved with Investigational Drugs or medical equipment?**

   I have a specialty in dementia and Alzheimer. I usually setup sites within my practice. I am the principal investigator for multiple trials. I work with pharmaceutical companies.

They signed me up. I am the principle investigator on my site. Medicine we usually work with involve in Amyloid immunotherapy, injections involving antibodies against Amyloid that accumulates to Alzheimer's disease. It tries to activate the immune system to remove the tract that accumulates in one's brain. I work with several pharmaceutical companies, work with each one to find a better one. A race where each company has to find a better one.

Questions: Assess the Needs of the Website Audience

5. **Have you looked at any websites related to Investigational Drugs or medical equipment?**

   Yes. I look out for options. I have several collaborations with pharmaceutical companies. They send me a lot of information and I check it. I use the Internet to search.

   a. **What information do you typically look for in these websites?**
      i. **Clinical trials**
      ii. **Contact info**
      iii. **Product and technology information**
      iv. **Other (If so, please explain)**

      Not so much contact info. I expect them to look it for me. I basically built research experience over year. Companies have a list of specialists. I do not look for trials. [inaudible] Neurologist New England Society meeting. [inaudible] summarize annual research [inaudible] spend time looking at websites. I look at the different company's trials and pipelines, where the trial is, expectations, detailed info on trials, as a resource to gather info. I do not spend a lot of time on it. It is more for patients and families. The websites often give locations to make registry.

6. **If you do not look at medical company's websites, how do you obtain the information (clinical trials, product information, contact information, etc.) that you look for?**

I mainly go to conferences. They are big resources. I also go to informal meetings in big conferences to learn about companies. I personally do not like to search options on my own. I like them to search it for me. I have worked with pharmaceutical companies that didn't end so well. I am interested on what's going on, what happened to the clinical trials, the company.

I.3 Phone Call Interview

Interviewee: Anonymous

Interview Date: 22 Nov 2018 at 9:15 AM (GMT+8)

Interviewers: Dominic Cascino, Paulo Chow, Jose Li, and Tsuiyee Ng

Location: Phone call

Purpose: To assess the needs of the website audience.

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.

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. Our paper will be published on WPI's website and will be publicly available.

Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?

Yes

Do we have your permission to use your name in our paper or would you like to remain anonymous?

I prefer to remain anonymous.

COLOR CODE

Drugs

Clinical Trials

Patients

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What is your job title?**

   I am a multiple sclerosis specialist and a clinical neurologist.

3. **Are your job responsibilities primarily related to patients or research?**
   a. **How?**

      Primarily patients. I am a clinician. I also work on clinical trials.

4. **How are you involved with Investigational Drugs or medical equipment?**

   Investigational Drugs. I am involve with investigation on pre-clinical trials for new medications for patient care.

Questions: Assess the Needs of the Website Audience

5. **Have you looked at any websites related to Investigational Drugs or medical equipment?**

Yes.

a. **What information do you typically look for in these websites?**
   i. **Clinical trials**
   ii. **Contact info**
   iii. **Product and technology information**
   iv. **Other (If so, please explain)**

   I usually look at the type of clinical trials, level of clinical trials, type of patients they want on the clinical trials, the dedical history of patients , check the inclusion or exclusion [inaudible] drug, if the drug has side effects, how is it administered to patient to the patients (either by IV, pill,...), the mechanism of action of the drug, the frequency needed for treatment. All these are found in website, but some may require extra research.

6. **If you do not look at medical company's websites, how do you obtain the information (clinical trials, product information, contact information, etc.) that you look for?**

   Usually the company approaches me.

7. **Look at any drug or medication not yet on the market?**

   I sometimes look at the medications used on clinical trials (phase 1,2,3 trial) that are still not approved by the FDA.

I.4 Phone Call Interview

Interviewee: Anonymous

Interview Date: 22 Nov 2018 at 9:30 AM (GMT+8)

Interviewers: Dominic Cascino, Paulo Chow, Jose Li, and Tsuiyee Ng

Location: Phone call

Purpose: To assess the needs of the website audience.

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.

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. Our paper will be published on WPI's website and will be publicly available.

Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?

Yes

Do we have your permission to use your name in our paper or would you like to remain anonymous?

I prefer to remain anonymous.

COLOR CODE

Other Websites or Databases

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What is your job title?**

   I am a doctor with specialty movement disorder and a neurologist.

3. **Are your job responsibilities primarily related to patients or research?**

   b. **How?**

   Primarily clinical, but I also research (clinical research). It is not necessarily lab procedure. I apply a certain criteria on patients and go through certain trials to test treatments.

4. **How are you involved with Investigational Drugs or medical equipment?**

   Right now, I am involved in a trial. [inaudible] Split into sponsor and physician initiated. Usually the sponsor, [inaudible] medical equipment and drugs. The physician study phenomenon with scenarios. There is no involvement in medications. I also do some observational studies. Involved in one big sponsor initiative, multi-central study work, hospital & clinics participate.

Questions: Assess the Needs of the Website Audience

5. **Have you looked at any websites related to Investigational Drugs or medical equipment?**

   Usually there's a website for companies that runs clinical trials. The company itself usually has its own website. I do not look at websites. We have a coordinator that interacts with procedure part. Also all the research from the U.S. is hosted into one website called clinicaltrials.gov. It contains all the information about trials.

6. **If you do not look at medical company's websites, how do you obtain the information (clinical trials, product information, contact information, etc.) that you look for?**

   Usually for an ongoing research, I search by institution that conducts clinical trials. I mainly look through clinical trial websites. I also use Google Scholar, PubMed to look for old publications.

I.5 Phone Call Interview

Interviewee: Anonymous

Interview Date: 12 Nov 2018 at 9:00 PM (GMT+8)

Interviewers: Dominic Cascino and Jose Li

Location: Phone call

Purpose: To assess the needs of the website audience.

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.

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Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?

Yes

Do we have your permission to use your name in our paper or would you like to remain anonymous?

Yes (The team made this interview anonymous)

COLOR CODE

Drugs

Clinical Trials

Contact Information

Other Websites or Databases

Information Given by Another Party

Conferences and Meetings

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What is your job title?**

   I am a laryngologist. I am the medical director for the Institute for Voice and Swallowing Disorders at Phelps Memorial Hospital Center.

3. **Are your job responsibilities primarily related to patients or research?**
   a. **How?**

      Primarily patients but I also do research. For patients, I do various projects in between. For research, I do lots of clinical-based research based on data from the patient population. I also work with medical students in projects for their graduation. I work with different companies.

4. **How are you involved with Investigational Drugs or medical equipment?**

I do research on Investigational Drugs but not currently. I have more experience on research to look the efficacy of injectable implant into vocal cords to improve the patient's quality of life and the quality of vocals from the procedure. I am more involved on case-based type projects. Cases are reported to central register online. I am not the primary director of the project. It is website-based [inaudible]. It uploads all vocal parameter in the case study. [inaudible] It improves the vocal quality. Check the materials used for it and check if any patients present history. [inaudible] demographics [inaudible].

Questions: Assess the Needs of the Website Audience

5. **Have you looked at any websites related to Investigational Drugs or medical equipment?**

Not typically, but if there is a specific drug, I google it. I look at various investigational drugs when needed.

b. What information do you typically look for in these websites?

I use websites only if there's a specific drug to look for to check what clinical trials have done or plan on doing (if they do). Find if there's a better way to treat a specific problem. I actively check other treatments if there's time (not actively looking for it).

i. Clinical trials

ii. Contact info

iii. Product and technology information

iv. Other (If so, please explain)

Yes, in the past. Articles about patients or new investigational drugs through emails or conversations. I learn more about certain articles. I spoke to another company about a drug that is not out yet. It's more for

company than person to check if drug is not available. I do not look for a specific website but I receive websites knowing I was doing research. I do not go to website that often for investigational drugs. I only check the website for new medication or new use of it. Most of the information I take out are on pharma sites.

6. **If you do not look at medical company's websites, how do you obtain the information (clinical trials, product information, contact information, etc.) that you look for?**

   The majority of the information is online. I use PubMed to do some literature research. There is also one or two major trades a year. There's lots of small conferences about new medical research. I go to trade part event if they show new drugs. If there is something for what I specifically treat, I might look at it (inquire more). Sometimes the conferences might not showcase a new drug.

7. **Do you think that a doctor related to investigational drugs would look at a research company's website that is currently in the process of FDA investigational drug approval?**

   Yes. I am always looking for something new. If there's a new drug or any specific info about it, I might check the website to know more about the new drug to see what it is, how it is, how it works, or any clinical trials related (if they are doing). Most people might not look at the investigational drug unless they are involved in that field of investigation or research.

Appendix J: Interview with Web Development Company Employee

Interviewee: Wakefly employee

Interview Date: 8 November 2018 at 9:00 PM (GMT+8)

Interviewers: Dominic Cascino and Jose Li

Location: Phone call

Purpose: To understand the industry standard on the web development process and professional perspective on Web management systems

Preamble:

Thank you for participating in our project. We are students from Worcester Polytechnic Institute (WPI) working on a research 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, they want to redesign their English version of the website. 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. 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 title at the company?**

   Technical Project Manager.

2. **What are your responsibilities at the company?**

   I am responsible for a handful of projects and I work with web developers to assure that the projects get delivered on time.

3. **Can you tell us about your company?**

   a. **How many employees does the company have?**

      We have around 40 employees including senior management owners, project managers, developers, and designers.

   b. **What kind of clients does the company have?**

      Our clients include small to medium sized companies and anyone who find our services are a good match for them.

   c. **How long does it usually take to design a website?**

      It depends on the type of project. We usually take four to six months to redesign a website. Around the first two months, we collect information in order to get the design right. We take other two to four months to program the website. The company also does multiyear projects.

Questions: Determine a website management system

4. **Do you have experience with designing websites for biotech companies?**

   Yes.

   a. **What are the main features found in a biotech website?**

      Mostly marketing and product. Other features include quotes, purchasing, consumables, and also a large section for technical resources to make decisions.

5. **What is your general process when making a website for a client?**

   First, the customer comes in and deals with the sales department. The developer and project manager also help make decision if any technical help is needed. We sometimes recommend what platform to use for the website depending on the budget of the client and the amount traffic the client expects for the website, but most companies know what platform to use or they just decide to keep with the one they have. We have two phases to design a website: the design phase and the functional phase. In the design phase, we gather additional requirements and functional specs and make a creative strategy document for the client to show the client what would be the goal for the website. We also take into account what websites the client admires. After we do these, we start designing the website and then we present it to client and design and refine it based on the company's feedback. In the functional phase, we do an internal testing where we test how well the website works and test it on different mobile devices. We also provide a Q/A section to see if the client has any questions on the website. After the website is done, we teach the client on how to edit the content and how to manage the website. The client does its own testing on the website for around one to two weeks and we provide an open communication channel to check if the client wants to change the website a little. We can also help the client to host the website to supply them with backup to the datable, and they can install it to the host. We help the client if they have problems on the website or the client can host the website themselves.

6. **What system do you use when a client does not expect to update the website that often?**

   The updating frequency of the website should not impact on the decision of the platform. It is mostly based on the company's budget and/or preferences of the company. We use an open source CMS for smaller companies and maybe licensed scale for the big ones. Some other companies may have legal sources. It mostly depends on how big is the website.

7. **What are the three content management systems that you recommend?**

   Companies usually know what platform they want to use. For some redesigns, you can upgrade their CMS, but the new version might take forever since it has to be built from ground up. If the client has no preference, we conduct some research on the budget of the company, the current CMS they're using, what is their expected traffic for the website, and if the client used a CMS in the past and if they like it. There's no CMS that is easier than the other one. I can only say that WordPress, Telco (inaudible), and Drupal.

Other Related Questions

8. **Have you ever designed a website that targets an international audience?**

   Yes.

   a. **How do you appeal to an international audience?**

      We designed mostly for global or large clients. We usually collaborate with the offices from the client to make sure that the content is applicable to the website, that the translations are done correctly, and also to double check if the product is deliverable or if it can be supported.

Appendix K: Interview with Digital Marketing Manager

Interviewee: Anonymous

Interview Date: 15 Nov 2018 at 10:00 AM (GMT+8)

Interviewers: Dominic Cascino and Jose Li

Location: Phone call

Purpose: To understand the process of updating a website.

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 understand the process of updating a website.

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. Our paper will be published on WPI's website and will be publicly available.

Any information collected will remain anonymous unless permission is given. We will use numbers and general demographic information to label each interview and your name will not be mentioned in our paper unless permission is given. We may include direct quotations in our paper.

Do we have your permission for us to record this session for personal note-keeping purposes?

Yes

Do we have your permission to use your name in our paper or would you like to remain anonymous?

Yes (The team made this interview anonymous)

Introduction Questions

1. **What is your name?**

   Anonymous.

2. **What is your job title?**

   Digital Marketing Manager.

3. **What are your job responsibilities?**

   I managed the corporate site and all the microsites of the company either for temporary campaign purposes or associated or affiliated with product marketing. I also managed the social media accounts, design, and content. I was in charge of all the designs of the websites and marketing for automation. I programmed the site to respond automatically to the customer and tracks the customer in a customizable way. I compiled customer data into a report that can be used for marketing purposes

Questions: Content Management

4. **Have you had experience with updating a website using a content management system (CMS)?**

   Yes.

5. **What kind of content have you updated?**

   I've updated social media, articles, blogs, any graphics on the page, content on every page and on the menus.

6. **Is the CMS one of the following?**

   I mainly worked with WordPress since it is the most popular in the U.S. It had a consistent formatting even when there is a software update. Everything is neatly labeled

and organized. It contains nice menus that can be customized to fit your needs. For example, if you choose to hover over menus, the mouse hovers over the menu and you can view it quickly. The layout looks nice and sharp and has a clean look. It is very intuitive and user-friendly. I've also worked with Joomla!, Drupal, and a custom CMS. The advantages of a custom CMS is that it can quickly remove information and is good for a highly regulated state because there are a lot of restrictions in communication like what you can show or what you can say, especially in biotech. You need to be able to remove information very quickly, so a custom CMS is very helpful in that regard while WordPress is not designed for highly regulated information. Often on custom CMS there is a quick remove option. But it is often not as good as WordPress because they're just created by one team, so it doesn't have a lot of flexibility. It is also a clunky work area with unlabeled options to open things up or move things around. If you want to upload media, you must upload it to a library. I worked with a CMS created in China a long time ago, can't remember much about it.

7. **For a biotech company, would you recommend a custom CMS, or do you have other recommendations?**

   In America, WordPress is the best recommendation by far. Joomla and a couple of others might come in second or third, but WordPress is my ultimate recommendation over a custom CMS only because WordPress is such a corporate giant and has been in the industry for a while.

8. **What did you find easy to use with the CMS?**

   With the amount of people that have created applications for WordPress, you can do a lot more with WordPress than a custom CMS. Even if you don't know anything about it, it's easy to go and search for WordPress widgets, add it to what you're doing and make it part of the basic format of your website (the backend). You don't need coding experience. It's kind of basic but is valuable because it's easy and everyone can do it.

9. **What did you find difficult about using the CMS?**

   Media is the most difficult whether its WordPress or a customizable CMS (custom CMS is worse) because when uploading media, you must upload the photo of media and

choose the megapixel length to fit within the predetermined length on the website. When you upload the photo to the photo library, you must go into a portal to pull the document into the website space from the media library. You usually end up with an issue. For example, if you are in a different location or using a different browser, the photo will look different even if you had the perfect sized photo. What you see in China won't be what you see in the U.S. Also, the positioning is a problem. Formatting is an issue especially if you have a customizable CMS. WordPress usually does its best to liken the format of its pages a word document like Microsoft for customers that aren't Web developers. With a format like Microsoft Word, it is intuitive for most users.

10. Who is involved in the process of updating a website?

In biotech a couple of years ago, online marketing was not as prevalent in the industry as it is now. Now, it's very normal for big pharmaceutical company to come in and purchase biotech. So now, biotech is getting a lot more resources suddenly. Biotech is gaining a lot of weight in digital marketing so it's safe to say for now a lot of people that do the website updating is just the marketing department. It is usually only one person. The reason for this is because it's very delicate information. Don't want too many "cooks in the kitchen" with the website because if there's more room for human error when something wrong gets posted. Usually only one or two people oversee the website. Should look at the larger companies that are purchased by pharma because they are starting to have a team for updating websites. The company might have an overarching pharma site that says who we are, but individual products usually get their own microsite. Microsites are a long scroll website that is independent of the corporate website. It's still the same server and everything, but to the outsider it looks like a tiny website for one product or clinical trial. It is their portal that is specialized for them. Information is usually never all held in the same place. If it's a very large company, they can usually afford in the digital marketing department one person per product or clinical trial.

11. Was there a team involved or did you update the website by yourself?

Usually only I oversaw the website or maybe another person such as the CEO, but no more than two people.

12. Who was involved in creating the content for the website?

It depends on the budget of the company. If the company has lots of money, then you have a whole marketing department. Within the structure of a marketing department, public relations that are mainly writers create media pictures, contact people, and want to get into magazines or other websites and write articles of them. If you have a small marketing department, you don't have public relations. That's one of the first things companies outsource. It is very expensive and easier to outsource. They would have writing get reviewed through a legal team and a regulatory team. It is absolutely necessary for a biotech company be reviewed by a legal and regulatory team so you often have a review committee. Medical writer writes it, person in charge of website reviews it so it looks good and it has what they need for a website. For example, check word count and images, visuals, and how it is going to be formatted. Then it is given to the legal and regulatory team to check. If it's important, the CEO reviews it and then you send it out. For biotech, it's so complicated, PhDs often do the writing. The CEO usually employs the company's leading scientists to write for the company. Sometimes the founder of the company would write for the company because they are one of the only ones that understand the product and developed it from scratch. It still gets reviewed through the entire process, especially by a lawyer. In terms of other aspects in a marketing team, you have graphics, digital, writing, and sometimes have medical or clinical education person with a medical or clinical background but went into marketing and to manage aspects of writing in a scientific way, and monitor in that way. It is fancy and needs a lot of money to get that type of person because they're more expensive than a regular marketing person majored in biology or medical science.

Appendix L: Website Criteria Results

The following is a sample of a completed row for the website evaluation. The team examined each website and recorded the data from the application of the criterion. The team recorded the most often occurring data as part of the general description of biotechnology websites.

Company Website	SeattleGenetics	Immunogen	Immunomedics	Sanofi
What social media links are present?	LinkedIn. Twitter.	None.	Facebook. Instagram. LinkedIn. Twitter.	Facebook. Google Plus. Instagram. LinkedIn. RSS feed. Twitter. YouTube.

...

...

Heidelberg	Pfizer	Sartorius	AbbVie	General Description
None.	Twitter. Facebook. Instagram. LinkedIn. YouTube.	Facebook. Twitter. YouTube.	Facebook. Twitter. Instagram. LinkedIn. YouTube.	**Facebook.** **LinkedIn.** **Twitter.**

Website Evaluation Spreadsheet with Results:

website_evaluation.xlsx

Appendix M: Website Terminology

Navigation bar: A navigation header placed at the top of the webpage (“Bootstrap Navigation Bar”, n.d).

Fixed navigation bar: A navigation bar that remains visible in a fixed position independent of the page scroll (“Bootstrap Navigation Bar”, n.d).

Hyper Text Markup Language (HTML): The standard markup language for the Web (“What is HTML?”, n.d).

Cascading Style Sheets (CSS): Describes how HTML elements are displayed on a webpage (“What is CSS?”, n.d).

Responsiveness: The method of using HTML and CSS to automatically resize, hide, shrink, or enlarge a website for visibility of content on desktops, tablets, and phones (“HTML Responsive Web Design”, n.d).

Bootstrap: A CSS framework for developing responsive and mobile-first websites (“What is Bootstrap?”, n.d).

Card: (Bootstrap, n.d.)