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A SURVEY OF BLUEBLUE INFORMATION DESIGN'S PROJECT EXAMPLES, DESIGN METHODOLOGIES, AND TOOLS IN THE FIELD OF INFORMATION VISUALIZATION

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Abstract:

The aim of this thesis is to provide an in-depth study of case studies of Blue Blue Information Design's projects in the field of data visualisation, as well as the infographics design methodologies and tools employed when dealing with large amounts of data. By analysing actual projects, the researcher explores how information design firms can improve data communication through innovative data visualisation tools and the best practices adopted when dealing with large-scale data.Using case studies, non-participant observation, and interviews, this study focuses on the experiences and innovative approaches of commercial design firms.BlueBlue Design demonstrates excellence in information design through a systematic and structured design process, user-centred approach, innovative visual solutions, data-driven decision-making, and multimedia integration. Their emphasis on collaboration and communication with clients and teams ensures that design solutions meet expectations during the course of a project, reflecting efficient and close internal and external collaboration.

Keywords:

Information Design Company; Information Chart Design; Business Design

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Introduction

Data visualization plays a crucial role in today's information age, helping people better understand and interpret massive datasets (Cairo A, 2019). The practices of information design companies in this field are significant for advancing data-driven decision-making and communication (Ding, Y. L., 2019). As a powerful tool, data visualization aids in transforming abstract data into understandable forms, facilitating decision-making and communication (Gongbrich, E. H., 2022). The role of information design companies in this field is increasingly prominent, providing more intuitive and powerful means of interpreting data through innovative chart designs and data presentations (Ji, J., 2011).

BlueBlue Design is a professional and in-depth interface design company that offers effective UI interface design, BS interface design, CS interface design, iPad interface design, and information design for outstanding enterprises both domestically and internationally. Founded in 2011 by a team from Tsinghua University, the company specializes in software and internet user interface design and development. BlueBlue Design excels in enterprise information management, monitoring, big data software UI/UE consulting, and design development services. Rooted in user interface design, the company is committed to continuous learning and improvement.

Research Background

With the proliferation of big data and the sharp increase in information volume, effectively transforming complex data into intuitive and understandable forms has become an urgent need for business decision-making and public understanding (M. Lima, 2023). Information design companies, through their unique design perspectives and innovative approaches, not only enhance the effectiveness of data communication but also create more impactful data experiences for clients (Meng, X. H., 2019).

However, despite the rich practical experience of information design companies in data visualization, there is currently a lack of in-depth research to systematically understand the specific chart design methods and tools they adopt when dealing with large-scale data (Naito, C., & Glaser, J., 2011). The background of this study aims to fill this research gap by conducting an in-depth investigation into project cases of information design companies, revealing best practices and innovations in design companies, providing a strong reference for future data visualization design.

The choice of BlueBlue Information Design Company as the object of in-depth case study is based on its high reputation, strong innovation capabilities, and multiple successful cases in the field of data visualization.

Research Objectives

The main objectives of this study are:

- To conduct an in-depth analysis of BlueBlue Information Design Company's project cases in the field of data visualization.

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- To investigate the information chart design methods and primary design tools adopted by BlueBlue Information Design Company when dealing with large-scale data.
- To provide insights into best practices for data visualization design.

Literature Review

Previous research has extensively reviewed and surveyed the field of information visualization, focusing on project case studies, design methods, and tool investigations similar to those undertaken by BlueBlue Design Company. The literature has covered various aspects:

1. Project Case Studies in Information Visualization: Prior research has delved into in-depth studies of information visualization projects across different domains, including but not limited to business, healthcare, education, etc. These case studies encompass a range of design challenges and solutions, offering valuable insights and benchmarks for BlueBlue Design Company's projects.

2. Design Methods and Processes: Literature has covered a variety of information design methods and processes, ranging from traditional human-computer interaction design to the latest user experience design. Researchers focus on analyzing project requirements and user needs during the design phase, as well as emphasizing hierarchy and visual clarity in information design. These methodological overviews provide guidance for BlueBlue in selecting best practices for information visualization projects.

3. Tool Investigations: Previous literature reviews have explored a multitude of information visualization tools, including charts, graphics, icons, and interactive visualization tools. Researchers have assessed the strengths and weaknesses of these tools, providing recommendations on how to choose and integrate them to enhance information communication. This information is beneficial for BlueBlue Design Company in making informed decisions about tool selection and optimization.

4. User-Centered Design: Prior research underscores the importance of user-centered design methods. By deeply understanding user needs and behaviors, and engaging in detailed discussions with clients, researchers highlight the critical nature of user experience. This offers guidance to BlueBlue in ensuring that design solutions align with end-user expectations.

These reviews and literature surveys furnish BlueBlue Design Company with a comprehensive background and theoretical foundation in the field of information visualization, specifically regarding project case studies, design methods, and tool investigations. By summarizing past research, a better understanding of industry trends, successful practices, and future directions is gained, providing robust support and guidance for the company's projects.

Research Methodology

Case Study

Case study is commonly used to gain a comprehensive understanding of a phenomenon in a real context. Based on actual cases, case study involves detailed investigation, observation, and interviews to collect data from multiple perspectives, allowing an in-depth understanding and revelation of the complexity of issues, phenomena, or events. This method has broad applications in various disciplines and research fields (Ye, P., & Duan, J., 2021).

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The following are the steps involved in case study:

1. Case Selection: The researcher first selects cases closely related to the research question. The chosen cases are typically representative and provide rich information.

2. Data Collection: Data is collected through various means, such as document analysis.

3. Data Analysis: The collected data is analyzed, including organization, classification, and interpretation. The goal of analysis is to deeply understand the case and answer the research question.

4. Results Presentation: The results of the study are presented, typically including the background of the case, collected data, and analysis and interpretation of the data.

The value of case study lies in providing a profound understanding of complex phenomena, allowing researchers to explore issues in real contexts and gain insights into practical experiences and decision-making (Xiang, W., 2023).

Non-participant Observation

Non-participant observation is a method of observing participants' natural environments to understand their behaviors, interactions, and workflows (Qi, F., 2013). In this study, researchers conduct non-participant observation through the following steps:

- Selecting Observation Targets: Specific projects of the information design company are chosen to ensure a clear and specific focus of the observation.

- Observation Preparation: Before on-site observation, the researchers gather information about BlueBlue Design Company's background, project types, and design processes through the company's website and preliminary investigations to better understand the observation targets.

- On-site Observation: Observation is conducted in the company's work environment, documenting team members' work processes, communication methods, and decision-making processes in data visualization projects.

- Data Recording: Results of the observation are recorded using notes, photography, etc., including the dynamics of the project, team collaboration, and design decisions.

Interview

Interviews are an effective way to gain deeper insights and subjective experiences. By directly communicating with practitioners from the information design company, researchers can collect more specific and detailed information (Wang, S, 2017).

- Selection of Interviewees: Key team members involved in data visualization projects, including designers, project managers, and other relevant personnel, are selected for interviews.

- Interview Preparation: An interview outline is developed, focusing on aspects such as project goals, chart design processes, challenges, and solutions.

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- Conducting Interviews: Semi-structured interviews are conducted, guiding interviewees to share their experiences, perspectives, and key decisions in projects.

- Data Recording: Key points, concepts, and recommendations from the interviews are recorded to support subsequent analysis.

Interview Questions

1. What do you consider the biggest challenge in chart design for information design companies when dealing with large-scale data? How do you address these challenges?

2. As a project manager at the information design company, what chart design tools do you most commonly use in data visualization projects, and why choose these tools?

3. In actual projects at the information design company, how is data visualization design integrated with User Experience (UX) design and user research? How does this integration impact project success?

4. Please share a significant success case in data visualization projects at the information design company and explain why you consider it successful.

5. In the chart design process, what do you consider the most important design principles? How are these principles manifested in actual projects?

Samples

- Manager: Yuyan, Male, 49 years old, Master's degree, Senior Project Manager.** Graduated from Tsinghua University in 1997. Proficient in client communication, identifying technical risks, technology selection, and problem-solving. Leads development work for front-end and programmers, maintains good communication with clients, and possesses profound technical expertise.

- User Experience Director: Yanyan, Female, 50 years old, Ph.D., Associate Professor. Graduated from Tsinghua University in 1999. As an experienced user experience researcher, Yanyan has established evaluation criteria, researched the evaluation process and methods, and written various reports for design evaluation work.

- Design Director: Huahua, Female, 41 years old, Bachelor's degree, Associate Professor. Graduated from the Academy of Arts and Design, Tsinghua University. Conducted postgraduate studies at the Chinese University of Hong Kong School of Business, focusing on product innovation and service design. Worked in advertising, public relations, and IT software industries. Enthusiastic about design, with expertise in interface design, user experience, user research, and interaction design.

- Project Manager/Visual Designer: Yiren, Male, 25 years old. Proficient in mobile interface and software visual design. Quick learner, passionate about interface design, diligent, enthusiastic, excellent communication skills, and project coordination ability.

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- User Experience Designer: Xiaowu, Male, 36 years old. Strong abilities in user research and market analysis. Rich knowledge and unique insights into social forms and lifestyles of Chinese users.

- Interaction Design Designer: Shanshan, Female, 35 years old. Rich experience and understanding of interface and user interaction design for software and e-commerce websites. Highly sensitive to interaction design trends.

- Programmer: Shuguang, Male, 37 years old. Proficient in C#.NET, HTML5, and MFC software development and skin implementation.

- User Experience Designer: Zhaolong, Male, 25 years old. Unique insights into interface design, diligent and experienced in design and front-end technologies.

- User Experience Designer: Hehe, Female, 26 years old. Versatile in general design and front-end integration, comprehensive skills, strong communication, and diligent.

- Front-End Engineer: Shiqi, Male, 24 years old. Experienced in JavaScript, JS, jQuery, WPF, and other front-end and programming integration.

- Senior Graphic Designer: Chunchun, Female, 26 years old. Unique insights into interface design, diligent, and serious.

- Project Manager/Visual Designer: Shasha, Female, 36 years old. Passionate about design, with a strong design and hand-drawing foundation, and project management experience. Strong communication and coordination abilities. Deep interest in interface design, user experience, user research, and interaction design.

- Programmer: Xiaobo, Male, 33 years old. Proficient in C++, code compilation, and other software development and skin implementation.

- Programmer: Xiaojun, Male, 34 years old. Proficient in C++, QT, and other software development and skin implementation.

- Administrative Assistant: Huayan, Female, 35 years old, Business Assistant.

Data Integration and Analysis

Through case studies, non-participant observation, interviews, and collected data, integrate and analyze the data. Use qualitative analysis methods to transform research results into meaningful insights and draw conclusions about the information design company's data visualization practices. Through these comprehensive research methods, this study will provide a comprehensive and profound insight into understanding the practices of information design companies in the field of data visualization.

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Findings and Discussion

Project Cases at BlueBlue Company

Project Introduction 1 - Shuhui Timespace Company

Shuhui Timespace Company has been dedicated to products in the field of land and resources since its inception. All of the company's products revolve around land and resource-related solutions, making it a seasoned expert in the industry. In recent years, the company has experienced substantial growth, attracting significant contracts and increasingly stringent requirements for its products. Consequently, for the first time, the company entrusted the design of its critically important products, to be showcased at an upcoming exhibition, to an external design firm.

Upon the successful completion of this project and mutual appreciation between the client and BlueBlue Design, they continued their partnership by signing agreements for the comprehensive design of three additional projects.

With a shared goal of making software products stand out at the exhibition and garnering full attention, the project encountered evolving requirements, increased research and development demands, and heightened design complexities. However, these challenges did not deter the teams. They completed the overall design in the first month, followed by two months of intensive work involving on-site collaboration. Our front-end engineers were practically on-site every day, ensuring the seamless implementation of front-end production and close coordination with the programming engineers. Knowledge was freely exchanged, and everyone pitched in to get the job done efficiently. Late nights and weekends were not exceptions, as both teams exhibited exceptional dedication and enthusiasm. The project's success hinged on equal dialogue, mutual understanding, active listening, rapid design iterations, and on-site coordination.

Figure 1: Shuhui Timespace Company's Information Design

Many software companies, driven by cost-saving considerations or habitual practices, tend to focus solely on designing typical pages, often overlooking the overall coherence of the software's user interaction and experience. In this collaboration, a holistic approach was adopted, encompassing all necessary pages in a comprehensive package. This approach allowed the product manager to plan pages more effectively and comprehensively.

The large screen showcased at the exhibition was a 4K high-resolution touch-sensitive display, primarily intended for presentation to the leadership of the Ministry of Land and Resources. It displayed real-time, authoritative national data, creating a sense of urgency. The project

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demanded novel ways of presenting big data and dynamic effects, instilling a sense of technology. The information hierarchy was rich and innovative, featuring realistic remote sensing image data and sophisticated, novel approaches to presenting big data, leaving visitors impressed and intrigued.

Project Introduction 2 - Pan-Asia High-Tech PV Power Plant Control System Interface Design

Pan-Asia High-Tech (Beijing) Technology Co., Ltd. (hereinafter referred to as "Pan-Asia High-Tech") is a technology company founded on real-time monitoring and high-precision numerical calculations. Since its establishment, it has formed a technical team consisting primarily of doctoral and master's degree holders and integrated resources from universities such as North China Electric Power University. Leveraging years of work experience in the power system, the company has been dedicated to helping clients solve real-time monitoring, big data, power station technology operation and maintenance, data mining, power prediction and control, fault diagnosis, and other issues in the wind and photovoltaic energy fields.

In the initial design phase, BlueBlue Design used a questionnaire survey to ascertain the client's style preferences and interacted with the client to discuss page interaction logic and optimization methods. Once the interaction approach was determined, they moved on to the visual design stage, allowing for quick direction confirmation and significant time savings. In terms of visual design, BlueBlue Design experimented with incorporating 2.5D icons into the interface design to create a more intuitive representation of product functionality and usage scenarios, providing design solutions for the PV power plant user interface.

The PV power plant control system is used to monitor the operational data of various distributed PV power plants, systems, and equipment, allowing for remote control of systems and devices. The product is positioned to provide visual, professional services for equipment remote monitoring, equipment control, equipment alarms, data statistics, decision support, etc., for distributed PV power plants and remote centralized control centers.

The system primarily targets on-site operators of PV power plants, central control center operators, and other authorized remote personnel. The usage scenario is relatively singular. The target users possess strong professional background knowledge, are familiar with on-site hardware equipment, and have high requirements for system specialization and convenience. They are generally aged between 20 and 40 and are proficient in computer operations.

The overall design style adopts a minimalist approach, incorporating emotional design principles, scenario-based design thinking, and three-dimensional visual expression techniques to provide users with efficient, convenient, professional, and intuitive system interfaces. Throughout the design process, emphasis was placed on presenting information itself, prioritizing functionality, minimizing unnecessary visual distractions and redundant information, and creating an industrial control system that is professional, user-friendly, and engaging.

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Figure 2: System Interface Design

Focusing on Data Presentation, Clarifying Visual Focus

Identifying Issues:

The initial prototype for the product was provided by the client. After a team review and analysis, it was discovered that there were issues with the clarity of data presentation on the homepage, inappropriate chart selections, and an inability to accurately reflect data types. Subsequently, communication with the client and user interviews were conducted to corroborate these issues and unearth deeper shortcomings, leading to considerations for optimization.

Resolving Issues:

User interviews revealed that there was indeed redundant information in the prototype interface that users did not pay attention to, while core data such as "power generation information," "emission information," and "power information" were not adequately highlighted. The BlueBlue team optimized the page based on the collected information, focusing on the following aspects:

1. Highlighting Core Data - The content area of the page uses a combination of icons and text to display core data that users are interested in, eliminating redundant data such as "installed capacity," "latitude and longitude," and "installation angle" found in the prototype, thereby emphasizing user visual focus.
2. Clarifying Data Content and Representing Data Appropriately - Each data chart corresponds to its own attributes and value. The team added module titles to each data module, optimized data representation, used bar charts for comparison, and introduced innovative visual designs. Trend lines were used to indicate trends and enhance page guidance and indicators.
3. Innovative Visual Presentation - Significant changes were made to the inverter view interface, with a focus on real-time data information throughout the front and back end processes. A "scene-based design principle" was employed, creating a 3D icon-based

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representation of the "photovoltaic panel-inverter-AC combiner box" power generation diagram. Unrelated data were presented using icons and text on the right side of the page. This innovative visual presentation method made complex data more intuitive and clear, highlighting the product's professionalism, user-friendliness, and value.

Scenario-Based Design

Industrial control systems, due to their unique professionalism and usage scenarios, require a large number of graphic elements as auxiliary displays. BlueBlue Design incorporated scenario-based design and emotional design into the system design from the beginning, representing design elements in a three-dimensional format to simulate real industrial scenarios. This approach made users feel enlightened when using the system, reducing their initial fear and cognitive burden, improving operational efficiency and information retrieval, and contributing BlueBlue's intelligence to the industry's development.

Information Chart Design Methods

BlueBlue Designer: When it comes to visualization, we cannot ignore big data because visualization is an effective means of addressing the challenges posed by big data. Nowadays, everyone is talking about big data, but having big data doesn't mean just having data or having a large amount of data. The purpose of data visualization is to present data in an intuitive way. It transforms complex data that would take hours or even longer to synthesize into easily understandable indicators. By balancing calculations using addition, subtraction, multiplication, division, and various formulas, differences between two sets of data can be visually represented through colors, lengths, and sizes in charts. Data visualization is a powerful tool for conveying complex information. Our brains can more effectively grasp and retain information through visualizing data, leaving a more profound impression. However, weak data visualization can have a negative impact. Incorrect representations can disrupt data communication, lead to complete misunderstandings, and misguide users. Therefore, it is important to present data from multiple perspectives, not just a singular viewpoint.

Experience is crucial for data visualization design. You need to engage in various projects, understand different types of data, and learn from mistakes. Here are some experiences and tips that designers can share:

1. Start with Real Problems:
   To become an excellent data visualization engineer, you must start with real problems. Practicing with sample datasets is easy, but the real challenge lies in how to handle messy, complex, and unstructured data in actual projects. Start with real projects, even small ones. This will provide you with practical experience, helping you understand the subtle differences in real data.

2. Understand Your Audience:
   Data visualization is not just about creating visually appealing charts but effectively conveying information. To do this, you must understand your audience. Who will use your visualization? What are their needs and preferences? Customize your design based on your audience to ensure the information is accessible and useful to them.

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3. Learn from Mistakes:
   Don't be afraid to make mistakes. In fact, mistakes are valuable learning experiences in data visualization. When the visualization you create doesn't achieve the expected results or confuses users, take some time to analyze the reasons for the mistakes and how to improve. Every mistake is an opportunity for the designer to grow.

4. Collaborate with Domain Experts:
   Data visualization often involves data from different domains, such as finance, healthcare, or marketing. Collaborating with domain experts can provide valuable insights and knowledge specific to that domain, enhancing your design. Conversations with experts can better help you understand the data and its context.

5. Keep Tools and Techniques Updated:
   The field of data visualization is constantly evolving, with new tools and technologies emerging. Stay informed about the latest trends and tools in the industry. Try using different tools to find the ones that best suit your needs. Learning new tools can give you a competitive advantage.

6. Practice, Practice, Practice:
   Like any other skill, data visualization also requires practice. Create a portfolio that showcases your abilities. Challenge yourself with different types of data and visualization techniques. The more you practice, the more proficient you will become.

7. Seek Feedback:
   Don't work in isolation. Seek feedback from colleagues, mentors, and users. They can provide valuable insights and point out areas for improvement. Constructive feedback is an essential part of the design process.

8. Attend Workshops and Conferences:
   Consider attending workshops, conferences, and seminars related to data visualization. These events are excellent opportunities to learn from experts, connect with professionals in the field, and stay updated on industry trends.

9. Learn from Others:
   Study the works of experienced data visualization designers and experts. Analyze their designs, understand their choices and techniques. There are many books, online courses, and resources to help you learn from others.

10. Keep it Simple:
    Remember, simplicity is often the key to effective data visualization. Avoid clutter and unnecessary complexity. Focus on presenting core information in a clear and concise manner.

In conclusion, to become an excellent data visualization engineer, you need to combine theoretical knowledge, practical experience, and a willingness to learn and adapt. Start with real projects, understand your audience, learn from mistakes, collaborate with domain experts, and accumulate experience through practice.

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1. D3.js: A powerful JavaScript library based on data-driven document manipulation. D3 seamlessly combines powerful visualization components with data-driven DOM manipulation methods.

Evaluation: Strong SVG manipulation capabilities, easy mapping of data to SVG attributes, integrated data processing, layout algorithms, and graphic computation tools. However, its API is low-level, with lower reusability and a steep learning curve.

ECharts: An enterprise-level charting library from Baidu's data visualization team. It's a pure JavaScript library that runs smoothly on both PCs and mobile devices, compatible with most modern browsers.

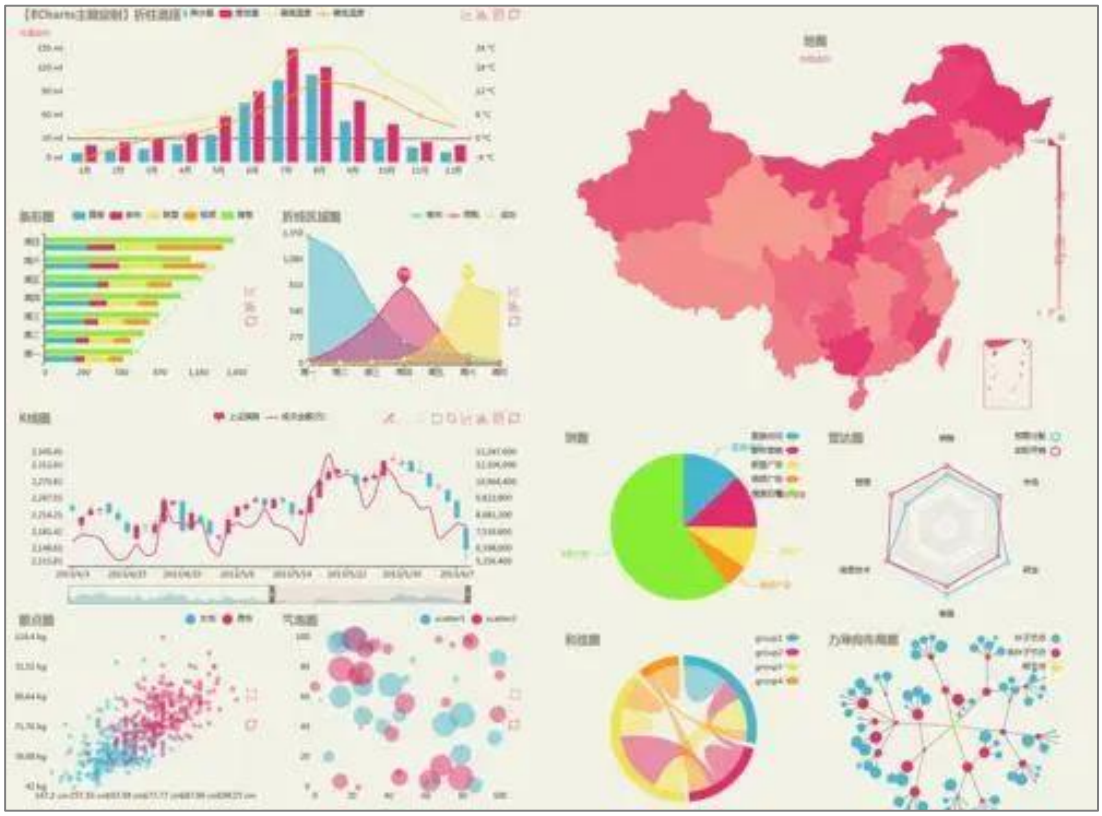

Figure 3: ECharts

Evaluation: Rich chart types, covering common statistical charts, and a configuration-driven approach with three-level personalized chart style management. However, it's not as flexible as graph grammar-based libraries like Vega for some complex relational charts.

2. FineReport: A pure Java web reporting software that combines data display (reports) and data entry (forms) functions. It allows easy design of complex Chinese-style reports with simple drag-and-drop operations.

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Figure 4: FineReport

Evaluation: It can connect directly to databases and easily customize various complex report formats. Its interface is similar to Excel, and it's suitable for creating fixed-format weekly or monthly reports. It supports multiple databases.

4. Tableau: Tableau is a user-friendly business intelligence tool that doesn't require users to write custom code. It offers complete analytics capabilities in addition to monitoring information.

Evaluation: Globally recognized BI tool, but pricing can be high (around $6,000 per year per user). Customization without additional cost can be challenging with foreign products, and after-sales support can be problematic.

5. FineBI: Similar to Tableau, FineBI is a business intelligence tool that emphasizes exploratory data analysis through visualization. It's user-friendly and offers a rich library of visualizations.

In summary, data visualization engineers need a solid technical foundation, a highly sensitive data mindset, and proficiency with their preferred visualization tools. It's a comprehensive role that requires expertise in principles, technologies, and tools.

Conclusion

Conclusions of Study

Design Process and Methods: Through observing the workflow of BlueBlue Design company, it is evident that the company employs a systematic and organized approach to information design. They start by thoroughly analyzing project requirements and goals, conducting comprehensive user research. In the design phase, they emphasize the hierarchy of information and clarity in visual communication.

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User-Centric Design: The design company emphasizes the importance of user-centric design. They guide information design by deeply understanding user needs and behaviors. From observations, they engage in detailed discussions with clients and utilize user insights to optimize the comprehensibility and user experience of information charts.

Innovative Visual Solutions: The design company showcases innovative solutions in the field of information design. They leverage various visualization tools and technologies such as charts, graphics, and icons to convey complex information in an intuitive and understandable manner. They emphasize a balance between aesthetics and functionality to achieve effective information communication while providing a pleasant visual experience.

Data-Driven Decision-Making: The design company places importance on data in information design. They employ data analysis and visualization technologies to support the decision-making process and effectively convey data insights. According to observations, they use statistical charts, trend analysis, and interactive visualization tools to provide clients with data-driven decision support.

Multimedia Integration: In information design, the company demonstrates the ability to integrate multimedia elements. They use images, animations, and videos to convey information in a rich and engaging manner. Observations show that they seamlessly integrate various multimedia elements in the design process to provide a more comprehensive information delivery effect.

Collaboration and Communication: Observations indicate that the design company values collaboration and communication with clients and team members. They maintain close contact with clients throughout the entire project process to ensure that the design solutions meet expectations. Additionally, their internal communication and collaboration are highly efficient and tight, ensuring the successful delivery of projects.

Research Contributions

The main contributions of this research include:

- Providing an in-depth understanding of the practices of information design companies in data visualization projects, offering practical experience sharing and guidance for the industry.
- Revealing the information chart design methods adopted by commercial companies, contributing to the advancement of best practices in data visualization design.
- Offering a case analysis for the relevant research field, providing a reference framework and methods for future similar studies.

Recommendations for Future Research

Based on the findings of this research, future studies could explore the following directions:

- In-depth exploration of differences among information design companies in different industries: Further understand the commonalities and differences in data visualization design among information design companies in different industries.
- Explore the impact of emerging technologies on data visualization design: Investigate how emerging technologies such as artificial intelligence and augmented reality are changing the data visualization practices of information design companies.

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- Track design trends and tool updates: Continuously monitor emerging trends and tools adopted by information design companies in chart design to keep the research at the forefront.

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