From Physical Campus Space to a Full-view Figure: University Atlas Compiling Based on 'Information Design' Concept

Ge SONG,[a,b] Xi TANG*,[a,b,c] Feng ZHU[a,b]

[a] *Key Laboratory of Geographic Information Sciences (Ministry of Education), East China Normal University, Shanghai, 200241, China;*
[b] *School of Geographic Sciences, East China Normal University, Shanghai, 200241, China*
[c] *Institute of Cartography, East China Normal University, Shanghai, China*

Abstract: Traditional university maps, taking campus as the principal body, mainly realize the abilities of space localization and navigation. They don't take full advantage of map, such as multi-scale representations and thematic geo-graphical information visualization. And their inherent propaganda functions have not been entirely developed. Therefore, we tried to take East China Normal University (ECNU) located in Shanghai as an example, and integrated various information related to university propaganda need (like spatial patterns, history and culture, landscape ecology, disciplinary constructions, cooperation, social services, development plans and so on). We adopted the frontier knowledge of 'information design' as well as kinds of information graphics and visualization solutions. As a result, we designed and compiled a prototype atlas of 'ECNU Impression' to provide a series of views of ECNU, which practiced a new model of 'narrative campus map'. This innovative propaganda product serves as a supplement to typical shows with official authority, data maturity, scientificity, dimension diversity, and timing integrity. The university atlas will become a usable media for university overall figure shaping.

Keywords: Campus map, University atlas, Infographic, Information design, Propaganda

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* Corresponding author

1. Introduction

Traditional campus maps are mainly about roads, buildings, zonings and landscapes on campus, which provide spatial information services, such as facilities search, wayfinding and navigation.

At present, most campus maps are online electronic maps. There are three kinds: The first is secondary development based on GIS platforms. It mainly products static maps with high accuracy, which can display the locations of objects (buildings, parking lots and so on), other spatial information and thematic data, such as criminal in-formation (Sataloff and Kaufman et al., 2009). The second is based on the API of web maps like Google Map, which can display and switch maps, search information, manage layers and query path (Zoe, 2016). Another is based on computer technology and programming languages to carry out visual management. For example, campus maps, created by FLASH, are realized easily and read well. They occupy small storage space and are loaded fast (CHEN and CHEN et al., 2006). At the same time, electronic campus maps on mobile equipment (such as Android, etc.), based on LBS, have already appeared. For example, Jiang took the characteristics of handheld devices into account and established a model of user's POIs (point of interest). Then they created maps according to the results above and demands of localization as well as put forward a feasible solution to personalized services of the cam-pus map (JIANG and WANG et al., 2012). In addition, 3D campus maps appeared in the wake of 3D computer graphics and GPUs. On 3D maps, users can identify the objects more easily, so that the maps not only can help users determine their locations and find objects, but also can navigate better during moving with the help of 2D maps and GPS receivers (Teddy and Siti et al., 2009). Besides electronic campus maps above, there are drawn campus culture maps and other paper maps existing, which are quite artistic.

In general, with the rapid development of GPS and GIS, most traditional campus maps take campus as the main body. The cartographers always use various technology and programming languages like FLASH to realize the navigation function. And the appearance of campus culture maps has shown that some universities have begun to try to make campus maps as a part of their culture and propaganda.

However, campus maps still have many shortcomings now. First, their spatial scale is too limited. The current campus maps only focus on the 'campus space'. Second, they are only used to locate and navigate by teachers and students. Such maps don't fully explore the inherent propaganda function and expand the connotation of social media. Therefore, it's difficult to become a space-time metaphorical carrier to assist a university to shape its figure and be propagandized successfully.

Therefore, in the trend of form variety and function diversity, we think campus maps should not be limited in the 'traffic map'. It is a new and interesting challenge to integrate the elements of the university figure with maps and explore a new model of 'narrative campus map'. So, we selected East China Normal University (ECNU) located in Shanghai, China as an example. Then we set integration of infographics as the basic concept and let 'information design' guide it. Finally, we designed a prototype atlas of ECNU – 'ECNU Impression'.

2. A new understanding of the university propaganda

As we know, the university propaganda is a systematic project with diverse content. Its target audiences are teachers and students, managements and leaderships, other teaching and research institutions, the public (candidates, alumni) and so on. So, it should be comprehensive to suit the cognitive needs and characteristics of the various audiences. Universities always take official websites, news media (including new media), annual reports, propaganda videos, exchange activities, gifts and so on as the principal propaganda methods. So that the visual senses are largely contrasting in the different media. And it's difficult to make all propaganda products as a series. University propaganda products should be effectively integrated and comprehensive, which help people to completely understand the university. The characteristics of maps are global, general, multi-perspective and multi-scale. So we think that we can integrate maps with the elements of university figure to make campus maps as a part of university figure, like school badges, official websites, official WeChat platforms, propaganda videos and so on.

In the atlas, we selected East China Normal University as the main body. Founded in 1951, East China Normal University is located in Shanghai, China. It's a university with the rich culture and was called 'The Most Beautiful Campus in the Far East'. In the current development period, it's one of ECNU's focus that how to inherit its culture and establish its figure better. For this purpose, ECNU has tried various methods. For example, ECNU has completed a campus map system based on web, an online virtual map and a campus culture map for the 60th anniversary. All these maps, in abundant forms, combine outstanding technology. However, their functions and target audiences remain limited. Therefore, we were trying to expand campus maps to a propaganda method of universities. According to the functions and characteristics of maps, we designed and compiled a university atlas to promote the university's propaganda and cultural development. The atlas can also help shape the university's figure from macro and micro perspectives. Finally, we explored a new model of 'narrative campus map' according to this example.

3. Data and methodology

3.1 Narrative architecture

There have already been many studies about telling stories by maps. Cartographers think that maps and stories are closely related. On the one hand, we can use maps to represent the spatial structures of stories and locate all the elements in the stories, whether they are

fictional or factual. On the other, maps have the same or stronger narrative power than paintings, photos and charts. Absorbing and reflecting the stories, maps can tell different stories to different people. The relationship between maps and stories is often called' Maps Tell Stories' (Caquard and Cart-wright, 2014). At present, storytelling maps have been concerned in both professional and commercial fields. For example, three recent NACIS conferences have the session presentations on this topic. At the same time, Esri also has put forward the concept of 'Story Mapping' for their online map services. While other individuals and organizations also use the concepts like 'Narrative Map' (Mark, 2016). Through the narrative characteristic of maps, we utilize the university atlas to tell the stories of ECNU in various aspects.

The target audiences of the university atlas should be teachers and students, managements and leaderships, other teaching and research institutions, alumni and potential students, etc.. So the contents should be various and comprehensive to tell everyone the stories of ECNU. Data for the atlas was derived from a variety of sources, such as the university archive, the history museum, the official website, the annual reports and other official information. The basic data are about ECNU's spatial pattern (locations, transportations, remote sensing images, campus pat-terns, etc.), history and culture (historical contexts, historical maps, historical buildings, etc.), landscape ecology (travelling routes, landmarks, vegetation), discipline construction (disciplines and institutions, teachers and staff, students, achievements), cooperation and exchanges (cooperative education, education unions, internationalization and globalization, etc.), social services (masters, alumni network, important projects, etc.) and development plans (rules, strategies and opportunities, development aims, etc.) and other information.(Fig.1)
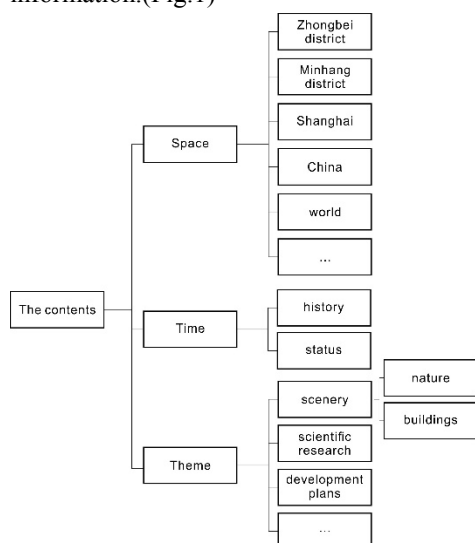

Fig. 1. The contents of the university atlas

According to the basic data above, we reconstruct the logical framework of the atlas to meet users' cognitive needs and achieve the balance between overview and

focus. In the conceptual prototype atlas, we set classic '4W+1H' as the narrative structure. So that the atlas is divided into six chapters ('Where-When-What-Who-How-VIS') and 'What' is subdivided into 'scenes-objects-events'. (Fig.2) In this way, all kinds of data, related to university propaganda, can be linked closely. And there is highlighted and representative information in each chapter, which benefits the university propaganda. As a result, the atlas can tell the stories of ECNU to all target audiences. Whoever you are and whatever you would like to know about the university, the atlas could tell you.
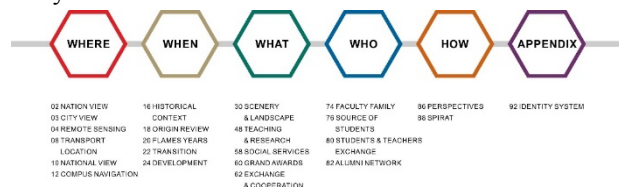

Fig. 2. The narrative structure of the university atlas

3.2 Basic design principles

The color of the cover is red 'ECNU Red', which is the official color of ECNU. The cover is the full view of ECNU from establishment to development. And the main rivers of the two districts (Zhongbei District and Minhang District) are linked to show ECNU's culture and contents and the way to develop into a high-level university. (Fig.3)

Fig. 3. The cover of the university atlas

The layouts of the atlas are content-driven with no fixed pattern. On the facing pages of 530 * 265mm, it flexibly configures visual roles of various elements, as well as breaks the structure law that the layouts are dominated by the maps. It changes the locations and scales of maps according to the different layouts. (Fig.4) For example, 'Where', taking maps as the main body, is about the locations, campus structures and transportations of ECNU (Fig.5). While maps are secondary and regarded as the background of thematic information to show the locations and distribution of relevant information in 'What' (Fig.6).
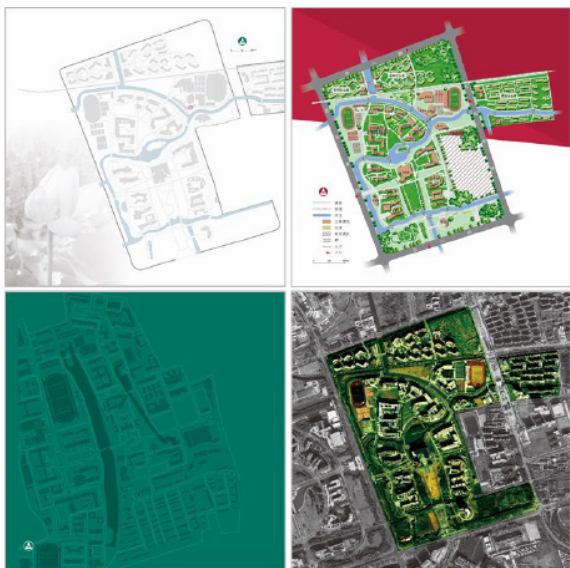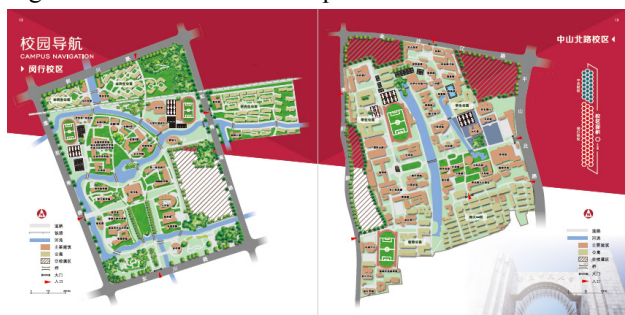
Fig. 4. The different base maps

Fig. 5. Maps are as the main body of the atlas (Where-Campus Navigation)

Fig. 6. Maps are as the secondary elements of the atlas (Where- Campus Navigation)

At the same time, most of the traditional campus maps are only about campus space. We breakthrough the limitation on the space scales and expand the micro-scale campus to multi-hierarchies with the city, country and world scales. For instance, the map shows the distribution of universities in China or Shanghai from a country-scale or city-scale perspective. (Fig.7) As well, we analyze the pattern of international cooperation and exchanges and teachers' exchanges from a world-scale perspective (Fig.8). So we can explore the figure and development of ECNU in the future.
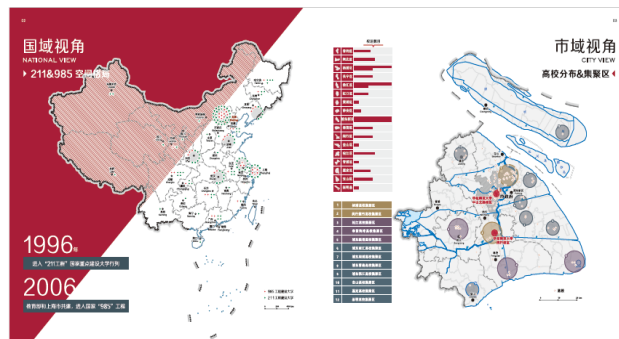

Fig. 7. The location of ECNU from country-scale and city-scale perspectives

Fig. 8. Teachers' exchanges from a world-scale perspective

In addition, according to aggregative semantics, the six chapters are in corresponding colors in accordance with the contents of every chapter. It is convenient to index and distinguish of different thematic maps. For example, as the first chapter of the atlas, 'Where' is in 'ECNU Red', which is the same as the cover. 'When' is in bronze to let people feel the historical characteristics of this chapter. As well, 'What' introduces the environment and landscape of ECNU, so its theme color is green, representing the vitality and nature (Fig.9).

Fig. 9. The flyleaves and theme colors

3.3 Information design and integration

We integrate the frontier knowledge of information design and overcome the limitation on the methods of traditional thematic maps. In the meanwhile, we unite different visualizing methods to design and draw the thematic maps and information graphics in different themes, such as the traditional thematic maps, schematic diagrams, statistical charts, conceptual icons, raster

images, text and so on. We enhance the innovation of these infographics to express proper data in accordance with the characteristics. On multi-scale vector maps as well as remote sensing images, all kinds of topics can be located through typical temporal scales. The attractiveness of the atlas is also in-creasing.

For the qualitative data, location maps are suitable. Based on the principle of association, information is presented in the simple symbols (fixed-point, arrowhead, area, etc.) (Fig.10) or symbolic symbols (Schweikart and Franke et al., 2014), and the complicated information hidden behind these symbols has a concrete bearing on the featured object (Hake et al., 2002; Olbrich et al., 2002). The vegetation distribution is represented by the corresponding sketches in 'What-Scenery and Landscape' (Fig.11). And charts and choropleth maps are implemented to express the quantitative data. To reflect the funding for scientific research, the yellow, green, grey circles are utilized to signify the classification of the funding in 'Who-Teaching and Research' (Fig.12). The number of teacher exchanges around the world is supplied by the size of circles in 'Who-Students and Teachers Exchange' (Fig.13). In addition to the proportional circles, the information is provided by histograms, pie charts, string diagrams and other infographics (Fig.14).

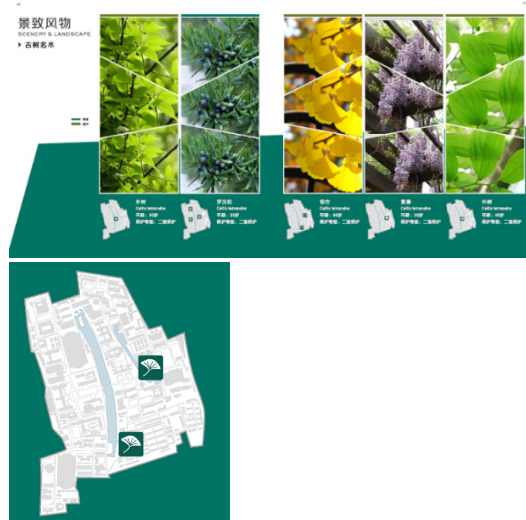Fig. 10. The location maps with simple symbols (fixed-point, arrowhead and area)

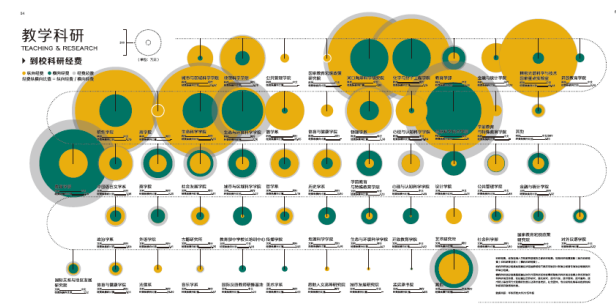Fig. 11. The distribution of trees

Fig. 12. The funding for scientific research

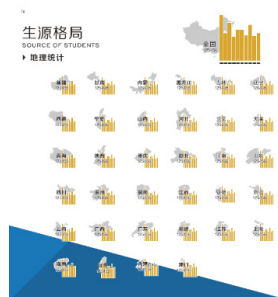Fig. 13. Teachers exchange around the world

Fig. 14. Various infographics in the atlas (histograms, pie charts, string diagrams)

Furthermore, during the process of the infographics design, we should pay attention to information integration to form an integrated and coherent view by analyzing and integrating the multi-source and complex information. It makes information be systematized and well-organized (Diego, C. and Giuseppe D. G. et al., 1998). In 'Who-Source of Students', the number of students is classified by the eight comprehensive economic districts in China and counted by radar charts (Fig.15). And in 'Who Students and Teachers Exchange', the transformative pie charts show the types overseas students and the size of circles shows the number. Integrated information strengthens the capability of infographics in information expressiveness (Fig.16).
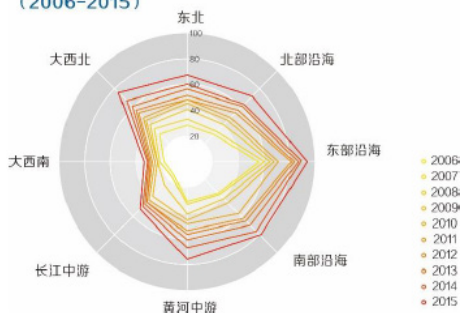

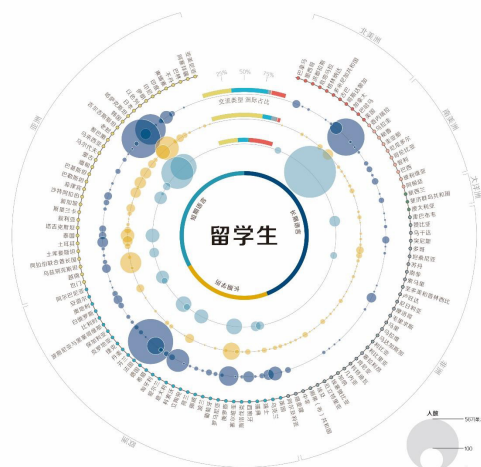Fig. 15. The students of the eight comprehensive economic districts in China

Fig. 16. The statistical chart of overseas students

There also are pictures, text and other decorative elements in the atlas, which enrich the layouts and help readers understand ECNU more intuitively (Fig.17).

Fig. 17. The important projects serving for the nation and the local government

4. Result and discussion

The prototype atlas of East China Normal University – 'ECNU Impression' is on the facing pages of 530 * 265mm and has 93 pages. The hardback, double-sided printed atlas is brilliantly designed and categorized into six chapters ('Where-When-What-Who-How-VIS'). There are nearly 150 various information graphics like maps. In spatial scale, the atlas doesn't limit itself to the campus. It extends the special scales to Shanghai, China and the world by its location in Shanghai, its influence on China and the relationships with other countries. In time scale, the atlas includes the history and status of ECNU. It not only indicates the current situation, but also tells the stories about ECNU history. For the thematic information, the contents, including teaching and research, campus scenery and culture, are in the forms of maps and infographics rather than text. As a result, it is helpful in the university propaganda by meeting the demands of various target audiences.

5. Conclusion

We think the university atlas should not only describe the physical campus space in the form of 'traffic map' to

realize the functions of localization and navigation. The atlas should be part of university propaganda, like school badges, official websites, official WeChat platforms, propaganda videos and so on. Thus, we took ECNU as the ex-ample and discussed how to design and compile a university atlas. Finally, we explored a new model of 'narrative campus map'. Depending on the cognitive demands and characteristics of target audiences, it integrates the frontier knowledge of information design and breaks the limit on the methods of traditional thematic maps. It focuses on information design and information integration. Furthermore, the university atlas is becoming the important part of university propaganda.

Innovation-driven information design of atlases can fully exert the advantages of spatial expression and visual narrative effects, which enrich the information organization mode of "space + topic". The implementation of university atlas compilation extends thematic map applications. Using maps as information communicating platform to meet the university propaganda demands is also an extension of the traditional functions of campus maps, which accomplishes the transformation from the physical space description to a full-view figure shaping. So that, the atlas can be a new visual media for university propaganda and a creative card which helps the public comprehensively cognize the university. This also provides other institutions like universities a new method of propaganda.

Then, it is a question that how to modify and improve the prototype university atlas and finally produce it. Furthermore, we also could explore the medium convergence idea of university atlas and make the medium migration come true.

6. Acknowledgements

7. References

Caquard, S. and W. Cartwright (2014). Narrative Cartography: From Mapping Stories to the Narrative of Maps and Mapping. The Car-tographic Journal, 51 (2): 101 - 106.

Diego, C., Giuseppe D. G., Maurizio L., Daniele N., Riccardo R. (1998). Information integration: Conceptual modeling and reasoning support. Proc. of the 6th Int. Conf. on Cooperative Information Systems (CoopIS-98), 280-291.

Hake, G., Grunreich, D. & L. Meng (2002), Kartographie.

CHEN, L., CHEN, X., ZHAN, W. J. (2006). On the Designing of Campus Electronic Map Based on the Flash Technology. Journal of Pingxiang Collage, 3(3): 29-31.

Mark D. (2016). Storied Maps. Cartographic Perspectives FORTHCOMING(84), 5-21.

Olbrich, G., Quick, M. & J. Schweikart (2002), Desktop mapping-Grundlagen und Praxis in Kartographie und GIS.

Sataloff, G. L. and C. C. Kaufman, et al. (2009). College of Charleston Campus Map. Journal of Maps, 5 (1): 9 - 18.

Schweikart, J. and C. Franke, et al. (2014). Atlas of health infrastructure for the Mbeya Region in Tanzania – Regional atlases as in-formation source using geoinformation systems. Journal of Maps, 10 (4), 620 - 629.

Teddy, M., Siti, A. S., Supiah, S. (2009). 3D Interactive Mobile Navigator Structure and 2D Map in Campus Environment Using GPS. Proceedings of MoMM2009, 401-405.

JIANG, W. Z., WANG, Y.C., LI, X. Y. (2012) Android-based personalized services design of campus map. Experimental Technology and Management, 29(3), 109-111.

Zoe, C. (2016). From query analysis to user information needs: a study of campus map searches. Library Hi Tech, 34(1),104 – 129.