Decoding Kashgar

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***Abstract*—This paper shows the progress of an ongoing digital heritage research focusing on Kashgar, a unique historical city in the westernmost part of China. The project aims to decode intangible heritage with the help of tangible characteristics representing Kashgar architecture. Narrow alleyways of Kashgar accommodate multifunctional usage formed by the local distinctive culture. The presented study follows a 'research through design methodology'. The interpretation of the heritage information is a game design that feeds research. Through an architectural game alternative agglomerations are generated that employ 'design-grammars' developed on the basis of Kashgar's architecture and vivid street life. The study reveals the first step of photogrammetry documentations and aerial views of a specific part of Kashgar's old town, 'Gaotai' (高台 - Kozichiyar Beshi).**

Keywords—Kashgar; photogrammetry; design research; decode

I. INTRODUCTION

In order to decode an urban pattern in a historical city, Kashgar, this project combines working prototypes, theories and methods in a 'research through design' (RtD) approach [1]. In linguistics, 'to decode' means 'to understand the meaning of a word', especially in a foreign language, without being able to encode it but use correctly in a sentence of your own [1]. In semiotics, 'decoding' involves not simply basic recognition and comprehension of what a text 'says' but also the interpretation and evaluation of its meaning with reference to relevant codes. The British sociologist Stuart Hall defines the moment of decoding as 'the moment of reception [or] consumption... by... the reader/hearer/viewer' which is regarded by most theorists as 'closer to a form of "construction"' than to 'the passivity... suggested by the term "reception"' [2].

Our research converts messages coded in Kashgar's brick architecture into an intelligible language that would allow a particular community—the younger generation—to engage in (digital) heritage production. In other words, it seeks an active community engagement in recording, reconstructing and revitalising heritage knowledge and information. It follows an RtD approach where design is taken as a knowledge-creating discipline, i.e. on "designerly mode of knowledge production" [3]. Historical brick architecture is decoded via shape grammar analysis, whereas the projection via game design techniques provides data and feedback for synthesis. Research development is guided through design and vice versa.

II. GAOTAI (高台- KUOZIQIYA BEIXI) IN KASHGAR

This study analyses the historical urban pattern in Kashgar. The authenticity of the old-town has undergone serious changes from its origin due to the new concrete structures replacing old mud-brick houses. The city has been losing its narrow alleys, thus character, that were once a joy to find a way through their complicated visual synchrony. There emerges the objective of this project together with its scope. What is significant in applying shape grammars is testing to see how much they can reinvigorate the whole character of an entity at city scale with limited sources for analysis. The current preservation plan does not allow a small section of the old-town to be demolished, which makes up to only fifteen per cent of the whole site. The fragment of the city is called Gaotai which forms the scope of our research. This small neighbourhood is part of the preservation plan which is identified as an open museum (Fig. 1).

Fig. 1. "Gaotai" (高台) means high platform as is named "Kozichiyar Beshi" (كوزدچه يار شىيەب) in Uyghur. Its traces date back over 2,000 years ago

III. RESEARCH THROUGH DESIGN

As a design research project, Decoding Kashgar is a participatory rather than conservative study. Designing a digital game supported by virtual models that reveals tangible heritage in Kashgar investigates the essence of play-sense in the lifestyle found on the roads of Kashgar Old-Town as intangible heritage. Therefore the progress of the two sides is based on mutual benefit. As diagrammed in Fig. 2, the top part contributes to the 'Design Science' – emphasising the discipline of designing with shape grammars based on the analysis of Kashgar. The emphasis of the bottom part, akin to the 'Rhetorical Inquiry', is the creativity of the designer whose goal is social change through a new argument. When we combine these two via a RtD approach, we arrive at the 'Design Inquiry' as a strategy of design research [4]. Like an hour-clock starting with a wide section on top (Digital Heritage), getting narrower in the middle where an RtD approach is applied to the methodology, and finally it is turned upside-down with references to the Architecture domain.

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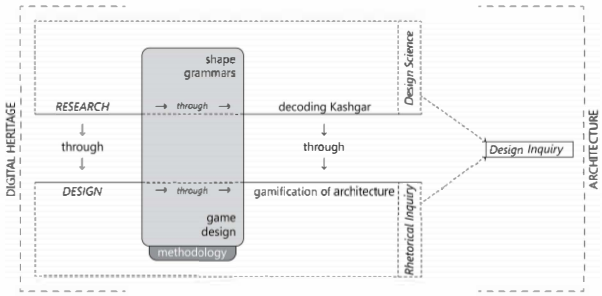

Fig. 2. The Diagram of the Research through Design Methodolgy

As for the game design part, we look at cultural aspects of gaming rather than technically impressive visuals. Salen and Zimmerman draw a framework that employs three primary schemas [5]:

- Rules: organisation of the designed system.
- Play: human experience of that system.
- Culture: larger contexts engaged with and inhabited by the system.

The framework provides insight into not only game design but design in general. These schemas and our design research project tend to overlap as well. Firstly, the Research through Design (RtD) approach follows a system that is explained in Games as Cybernetic Systems, subchapter of 'Rules'. Secondly, gamification through which the data from design and research parts are bridged has similarities with what is discussed in Games as the Play of Pleasure, subchapter of 'Play'. Last but not least, the objective of our study, which is to influence a new culture of 'hustle-and-bustle', is related to the text in Games as Cultural Rhetoric.

IV. Photogrammetry

Apart from photographs that may have nostalgic value years later, the data consists of a photogrammetric model of the *Gaotai* by means of the UAV (Unmanned Aerial Vehicles) technology (Fig. 3). Drawing on the ubiquity of the Kashgar architecture, this part of the research focuses on data harnessed from this typology and on its analysis from the existing architecture and its use as design driver for the next stage.

Fig. 3. Preparing for the aerial shootage over Gaotai.

A digital camera is mounted on the drone that flies while real photos are constantly delivered to the system with geographical information. The data is transferred to digital environment in *Autodesk Recap* – a reality capture and 3D scanning software. The 3D data is then exported to *Autodesk Revit* for initial analysis and extracting useful parts of the data.

Fig. 4. Photogrammetric model of narrow roads in Gaotai (work in progress).

V. Conclusion

The work presented above is a part of a larger RtD project within the context of Kashgar. Digitising heritage information is manifold because two different realms, digital and real, converge here RtD allows for an interesting intersection between analogue and digital heritage. In our study we include gamification elements to offer incentives for the general public to contribute with their own aspects of heritage. Based on Kashgar specific shape grammars of architectural and cultural content users generate a novel representation of their heritage that is then further develop into a virtual museum by using a variety of digital tools that translate actual and generated 3D information into one accessible data mode, which is where the digital value lies in.

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