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Time, Design and Construction: Learning from Change to Built Landscapes Over Time

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Time, Design and Construction: Learning from Change to Built Landscapes Over Time.

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landscape construction | time | multi-temporal analysis | vulnerability | weak points

This paper discusses landscape construction teaching methods and a research project at the TU-Berlin focusing on change to built landscapes through time. The research is based on the hypothesis that it is possible to optimise design, detailing, construction and maintenance techniques by monitoring and evaluating projects at regular intervals after completion. The processes of change highlight deficiencies in detailing, construction and maintenance. The research project is developing a non-destructive monitoring method to "read" these traces of time and pinpoint frequently occurring points of weakness. A low-threshold anticipatory method will then be developed for use during the design and detailing project phase to optimise future landscape projects in terms of their durability and resilience. The construction teaching methods evolving from this research involve the students in on site analysis and evaluations of built elements. Students examine the root causes of change and reflect on interrelations between design, building materials, technical implementation, maintenance and the processes of context-related change over time. These learning techniques enable integrative learning within the fields of landscape design, urbanism, sociology of space, climatology, construction and maintenance.

Through preparing construction seminars at the TU Berlin many landscape projects in and around the city were periodically studied and recorded. These experiences highlighted the diverse processes of change, and the alarming rate at which they occur. This developed into a DFG funded research project as well as construction teaching techniques which focus on this topic.

The research project entitled "Landscape architecture and the time factor: Construction research on the contextual change of built landscape elements and the development of optimisation strategies" is developing a low-threshold and non-destructive monitoring method for identifying frequently occurring points of weakness and patterns of change through field research. Where the causes are not visible or ambiguous, conventional inspection techniques using technical apparatus and scientific analysis are necessary. "Change" refers to the development of characteristic patina which, when unabated, leads to the destructive processes of decay. Points of weakness are areas that due to their design, construction or particularly exposed position are subject to greater levels of stress. Consequently these are more frequently and rapidly subject to detrimental change than other areas.

The main research goals are to:

- Develop a non-destructive field research method for monitoring built landscapes over time
- Identify and analyse the key causes of change
- Develop an optimisation strategy for landscape details
- Define a method for forecasting change
- Disseminate the research findings to practitioners

FIGURE 1. Examples of change to landscape details over time

FIGURE 2. Change to wooden bench in full shade under a tree canopy over 7 years. Above: Year of completion and 1 year later. Below: 7 years after completion.

In order to obtain uniform and comparable research results in terms of climate, culture and contextual conditions, and to achieve the required design, material and constructional bandwidth, the research focuses upon landscape details (e.g. steps, paths, drainage elements, tree grids, seating and walls) in public or semi-public open spaces in Berlin built between 1990 and 2015. Since reunification, a large number of typologically different projects have been planned and implemented. The current often desolate state of many of these projects reflects the reduced resources of the city, a fact that increasingly applies to cities throughout Europe (BMUB 2015, p. 12, 33, 74).

The processes of change are diverse and interrelated; the following key causes for change have been established:

- Contextual factors: e.g. level of exposure, access and circulation, social environment.
- Design and detailing deficiencies: e.g. form, choice of construction, serviceability, competencies of staff.
- Material deficiencies: e.g. suitability of material for the function and location, material quality.
- Implementation deficiencies: e.g. quality of implementation, construction management, competencies of staff.
- Maintenance and repair deficiencies: e.g. too intensive, extensive or incorrect maintenance, competencies of staff and site management.
- Ageing processes/time: e.g. climate and weathering, cultural change.
- User actions: e.g. intensity of use or misuse by people and/or animals.
- Force majeure: e.g. flooding, fire, storm, riot, strike, natural disaster (cf. Kirkwood 1999, 166-177).

In order to react to these diverse processes of change landscape architects need to continue being involved in developing their built works after completion. Contextual factors and ageing processes remain unpredictable factors that need to be thoroughly deliberated during design and detailing. A major cause of accelerated ageing is financial restraints, resulting in a reduction of specification quality as well as construction, maintenance and repair deficiencies. Change due to human actions throughout the project cycle (e.g. competences of designers, consultants and project managers; skills of construction and maintenance staff; user intensity and behaviour) can be reduced through improved vocational education, continued staff training and improved working practices.

Landscape projects were ideally recorded from their year of completion; subsequent recordings were made each following year. Recordings were also made from older projects which can be evaluated with the aid of reference images from comparable details. To allow for a detailed holistic analysis, the photographic images were taken at three different levels of observation; images showing contextual and spatial interrelationships, images depicting the individual elements, and detailed images zooming in on surfaces. To date, ca. 75,000 photographic detail recordings have been made from ca. 180 projects. The recordings are currently being labelled (e.g. title, location, date, completion date), assigned extensive metadata for the subsequent detailed analysis (context, description, classification, analysis etc.), and stored in a database. The metadata structure has been developed through extensive literature research, comparisons with criteria for international standards, and personal observations.

The database enables a quantitative screening process for the comprehensive data, frequently occurring change and points of weakness can be identified and selected as case studies. Through comparisons between the original state and successive recordings, process-dependent changes become visible. Wettstein (2009: 87-142) defines various discrepancies in project goals, expectations and assessment criteria between landscape architects, construction firms and clients based on interviews with practitioners. We are therefore developing a rigorous qualitative evaluation system based on expert interviews with differing stakeholders and material specialists. An optimisation strategy will then be developed to mitigate weakness and detrimental change.

The research results will form a catalogue of change processes that can be used during the design phase of future projects to forecast change and detect points of weakness by analogy.

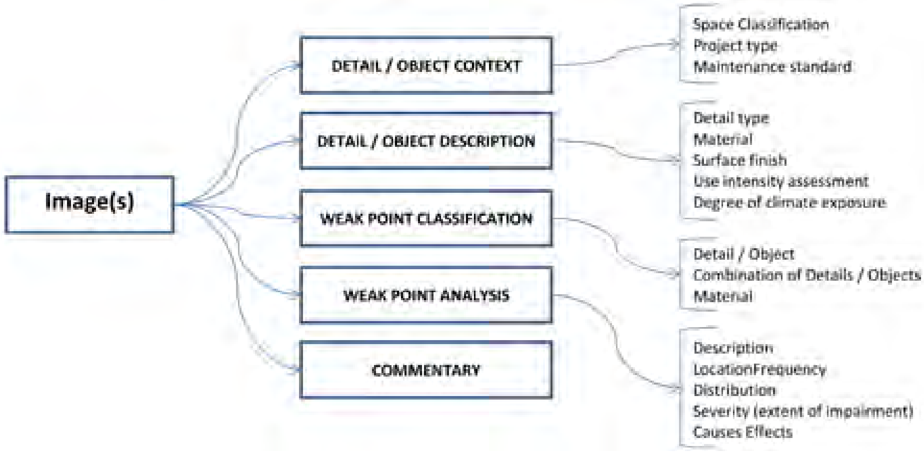

FIGURE 3. Metadata structure for the evaluation database.

FIGURE 4. Excerpt from student field research submission. Girod, M. (2015)

However, due to specific climate and cultural factors the results are not directly transferable to other regions.

"Learning is the process whereby knowledge is created through the transformation of experience" (Kolb 1984, p. 38)

The research project is running hand in hand with teaching, allowing students to focus on the core themes of the investigation (e.g. climate and construction, points of weakness, use and misuse) through seminars, workshops and thesis topics.

Many students initially have a "false" image of built landscape which is propagated by images in landscape architecture publications that frequently portray “perfect” projects with flawless materials, taken at the time of completion. The onsite reality check for students a few months, or years later is often disheartening. Teaching methods developing from this research help to counterbalance this by involving Students in onsite surveys, analysis and evaluations of "real" projects after completion. Students experience built landscape as a dynamic evolving system interacting with the natural environment and patterns of use. The teaching methods follow Kolb´s (1984) "Experiential Learning Cycle" model of learning involving four elements: concrete experience (experience/do), reflective observation (review/discuss), abstract conceptualisation (learn) and testing in new situations (plan/apply). For example, a major assignment within our construction seminar for masters students involves students in small groups analysing landscape projects onsite before formulating a response. The assignment is set as a research question, the object of research being "real" landscape projects. Students examine the current condition in relation to the surrounding context and reflect on interrelations between design, building materials, technical implementation, maintenance and the processes of change over time. Comparisons with images in publications at the time of completion, together with project descriptions or reviews enable the students to identify time bound changes to the built landscape, as well as discrepancies between design intentions and the built reality. Teacher support enables the students to "read" and interpret the traces of wear and tear, weathering and succession in order to determine, for example, patterns of use, misuse or maintenance as well as the causes of change. The students then develop optimisation strategies for deterring weakness and vulnerability in future projects within a classroom learning context. These field learning activities are complemented by a series of lectures and seminars focusing on e.g. detail design, materials, construction detailing and the processes of change. The students produce a variety of texts, photo documentations, diagrams, sketches and technical drawings to present their findings allowing for diverse forms of assessment (see Figure 4). This method offers a more integrative approach to teaching landscape construction. Students confront all facets of a project simultaneously, they need to think, discuss and analyse built landscape before formulating multifaceted submission documents.

These research and associated teaching methods treat built landscape projects as research objects, gaining knowledge for, continued optimisation of design, and detailing and maintenance practices through monitoring and evaluating processes of change over time. They represent an exemplary way to combine the synergistic potentials of teaching, research and professional practice. The field-based learning activities provide students with the opportunity to contextualise their learning experience within an academic framework.

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