

# Digitized Planning Processes in the Revitalization of Buildings by an Interdisciplinary Project Study

## *Empirical Work with Students in Argentina*

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*In the curricula for students of civil engineering and architecture software training courses have been integrated for long, but didactical training concepts with an application in practice including both the constructional and planning aspects are missing. This conference contribution shows the result of a research work carried out to empirically develop a manual for a constructional, digitally supported project work. It comprised the interdisciplinary teaching with a special focus on two examples of buildings in situ. Different types of presentation, picture software and CAD were used from the very beginning of the planning process in order to create a new form of didactics in teaching and learning. The basic local parameters and approaches are documented and analyzed. As a result of the empirical research work presented herein a manual was developed which is useful as a guideline for the digital interdisciplinary project development in the revitalization of buildings. It reflects the experiences gained in this empirical research work and formulates the steps to take to carry out the project.*

*The paper is presented with a 3-D-video projection on the basis of stereoscope pictures.*

**Keywords.** *Digitized planning; revitalization; interdisciplinary project; practical project; manual.*

### **Background of the development of the project**

The topic of the revitalization of buildings having been abandoned for years will become a highly

charged subject in the Argentine region of Santa Fé because there will be a huge demand on the revitalization of buildings in the harbor area due to a dramatic decrease of goods handled. There are only a few buildings from the turn of the centuries



Figure 1  
Macro analysis of the situ:  
3 D-CAD model of the surrounding, panoramic picture, data from Google Earth (70\_kirschner\_fig 1.jpg). The photographs show how the students are visually getting through the most important information for the project group using creatively digital media in a relatively short time. They were using quite different electronic data sources like Google Earth and other picture archives: photographs, panoramic pictures, 3 D-CAD models of the surrounding and street profiles illustrate the environment. Atmospheres and moods are expressed through a smart design of the transparencies shown. The students were given the results of the analysis in the form of a book in PDF-format in order to enable them to proceed with the project design.

in the young city of Santa Fe which are worth to be preserved. They can be saved from destruction only by a reuse which works economically and independently. Within a four weeks short-term teaching we carried out an interdisciplinary seminar with the title "Reuse of masonry buildings in Santa Fe" in cooperation with civil engineering students from the Technical University of Santa Fe and architectural students from the "University of the Litoral". This project work was based on the experimental use of digital media in conjunction with the didactical analysis.

## Project schedule

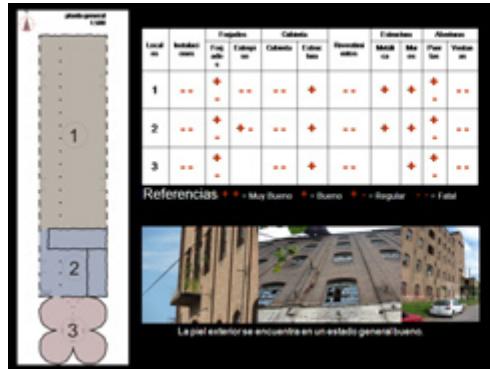
The tight time table of four weeks required a broad preparation and, with regard to the reuse and the design planning in 3D, putting focus points on property valuation and project development. The teaching plan for the first two weeks comprised lectures on revitalization projects in Hamburg, valuation of real estates and historical buildings, modern basics of the design of office buildings and urban living as well as the decay of masonry buildings. At the same time the authors of this paper viewed eight buildings which were due to revitalization and had been previously selected by our Argentine colleagues. Applying rather practical criteria like availability of documentation, size and complexity of the building, general accessibility and other didactical, design-oriented criteria like degree of difficulty, complexity and prospects of reuse two buildings being architecturally valuable were selected: an old

mill in the harbour and a covered market in the city. Both objects are under serious threat of deterioration caused by their being abandoned for years and, thus, numerous building damages. Parallel to the lectures in the first week and as the first part of the students' project work extensive "Macro" and "Micro" analyses were carried out in situ. The results were summarized in a presentation until the beginning of the next week. In the second week in the computer room we were holding CAD lectures on 3 D design using the creation of a model of one of the objects selected. At the end of the second week we issued the students' exercise in the 3 D design. In the third week we were holding lectures on e-learning in creative planning processes and property valuation, respectively.

## Theoretical basics of the project work

Teaching basics comprised the presentations of successfully revitalized projects among which were fallow areas like the "Harbour city (Hafen-city) in Hamburg" as well as historical building complexes like "Falkenried", a former premise of a tram factory. Other topics of teaching were basics of theory of architecture for planning living spaces and offices and basics of the valuation of built-up and non built-up premises as well as buildings being listed or not. On the basis of that the students elaborated detailed macro and micro analyses which were supposed to serve as the fundamentals of the decision to be made on the reuse of the buildings.

Figure 2  
First: Micro analysis of the ex mill: Room book with classification of the equipment; second: description of the building with visualization of the atmosphere



### Creating 3 D models

Already during the preparation it turned out that for none of the objects selected sufficient documentation was available. In the case of the covered market digital 2 D data was found at the University of the Litoral which during the above mentioned CAD seminar could be developed further to a 3 D model. In case of the mill a complete measurement by means of stereoscopy was necessary. One group of students took the task to draw the respective measurement plans and, thankfully, at the same time to model the whole building in 3 D. These digital 2 D and 3 D

AutoCAD data were given to the students for their project design work.

### Design project work

Almost all groups carried out the design work digitally with the 3 D model. There was a wide and quite differentiated range of approach to the design. One group, for example, tried to handle the architectural scope through a colour analysis based on pixel of digital photographs in order to adapt as much as possible the new to the old. Another group chose the constructional detail of a joint between both

Figure 3  
Idea of the project based on color analysis of pixel of digital photographs





*Figure 4*  
 First: Idea of the project based on finding the best detail to connect the new with the old; second: the light, flexible interior in adapted colors of the market hall produces an urban atmosphere. Both designs were striking due to their design concept which was characterized by carefully handling with the old building. Both new designs achieve an urban space effect by submerging themselves under the old structure and by creating new space links and perspectives with the historical atmosphere being preserved. On the outside of the building the reuse is pointed at by reduced means.

the new and the existing buildings as their main topic thus expressing their architectural understanding and their esteem linked to it. A third group got things straight concerning the structure of the house and the distribution of the functions by presenting it graphically with transparencies.

## Design results

In the exercise handout the aim of the design was formulated as the finding and realization of the reuse by preserving the existing structure as far as possible. For the mill it was recommended to as much as possible retain the steel skeleton structure which governs the whole space thus obtaining “house in house” architecture. For the covered market, however, a comparable urban use was recommended as appropriate.

The students developed the following concepts:

- Taking out the core of the building – most extensive preservation of the facades: modern dynamic interior life in a historic case
- Preservation of the ground plan structure and facades – design of new elements as “flying installations” with a high amount of flexibility
- Use of the existing space structure – decent architectural interventions – few innovative experience of space

- Spectacular space scenes by a placative surface texture
- Restructuring of the rooms according to functional criteria in order to achieve a higher use to capacity by reducing the customer’s area – Variation of the outside appearance by light games
- High-contrast architectural ensemble – from the preserved old building to extensions which are transparent and distinct by material
- The building concept is based on an exact analysis of the existing state followed by the creation of a modern space concept under the preservation of the existing atmosphere

## Critics and recommendations emerging from the empirical project work

For both lecturers and students it is difficult to carry out a project work of such an extent as a compact seminar in four weeks whilst the students are also committed to other tasks. Intensive discussions could not take place due to time constraints. Some of the lecture contents could be treated only marginally, had to be left out or could just be issued as written scripts for self-study. During the design period we had to reduce the individual consultation talks. But these would have been necessary to teach how to vary the design process and to accompany

the design process dialectically. Also “interpersonal” barriers had to be overcome in the cooperation between students of architecture and civil engineering although it should be stressed that the students did appreciate the idea of interdisciplinary approach. Therefore, to get to know each other and to work in a team should be trained already at an early phase.

## Drafting a manual

As a result of the empirical research work presented herein a manual was developed which is useful as a guideline for the digital interdisciplinary project development in the revitalization of buildings. It reflects the experiences gained in this empirical research work and formulates the steps necessary to carry out the project. It is divided into the following main subjects:

- I. Basics taught within the interdisciplinary project work
  - Description and interpretation of the revitalization in the international context
  - Training courses to create the capability for cooperation within interdisciplinary groups
- II. Finding the following criteria for the selection of appropriate projects:
  - accessibility
  - trespassing (permits, security aspects when entering the building)
  - architectural documentation
  - possibility of taking measurements of the building, the structure and its damages (destructive and non-destructive, p.e. humidity measurement)
  - checking out the urbanistic situation
  - checking out the possibility of the building being under protection of historic monuments
  - assessment of the real value, the capitalized value and the residual value
- III. Micro-macro analyses of the location of the building

Elaboration of basic information from the macro location analysis according to the following criteria catalogue:

1. Land use in the surrounding
  - Mapping of the industrial/commercial and non-industrial/non-commercial use in the ground floor within a radius of approx. 100-200 m
  - Mapping of the industrial/commercial and non-industrial/non-commercial use in upper floors within a radius of approx. 100-200m
  - Documentation of representative uses by photographs and descriptions
2. Classification related to urban planning of the premises
  - Planning basics in the surroundings, general and detailed development plan etc.
  - Checking out the possibilities of changes in the classification related to urban planning
3. Analysis of the existing development in the surrounding
  - Mapping the storey heights with indications of the roof shape (p. e. gable or eaves parallel to the street) within a radius of approx. 100-200 m
  - Mapping of the existing development with regard to stile, material of the facades as well as structural state within a radius of approx. 100-200 m
  - Documentation of representative buildings by photographs and descriptions.
4. Infrastructure
  - Mapping of the public traffic development  
Mapping of the car traffic development at both short and long distances; availability of private car space
  - Drawings of street profiles photographic documentation of “Public design”
  - Links with railroad long distance traffic and, possibly, waterways

- IV. Elaboration of basic information from the micro location analysis
  - 5. Structural description of the building:
    - Load bearing and detailed structure, installations, energy supply
    - Drawn and written description of building characteristics: Interior and exterior accessibility, space concept – light arrangement
  - 6. Documentation of building damages:
    - Documentation through sketches and photos showing the exact position of the damages in plan and elevation:
    - Facades, walls, load bearing structure, stair case, basement and roof
  - 7. Drafting of a room book
    - Logical numbering of the rooms and mapping it in the plans
    - Tabulated documentation of the interior of all rooms including numbering the rooms: judging the room quality with ++, +; – (very good, good, regular, poor)
    - Documentation of representative rooms with photos
- V. Valuation of the existing real estate and the building using modern international methods:
  - Real value method
  - Discounted Cash Flow or capitalized value method
  - Residual value method, (Ohler, 2007)
- VI. Producing digital plans and models of the existing building
  - Entering 2D –plans
  - Teaching knowledge in 3D CAD design methods
  - Modeling with volumetric bodies
  - Visualization of light and textures
  - Producing highly valuable renderings
  - CAD based design techniques (Kirschner and Kirschner, 2005; Kirschner, 2001)
- VII. Criteria of presentation
  - Aesthetic of plans and models being in line with the design concept

- Structure of the presentation
- Length and quality of information
- Auditorium

In the manual for each of the points mentioned above the differentiated use of media is shown and, at the same time, is visualized with picture examples.

## Conclusion

As a result of the empirical research work presented herein a manual was developed which is useful as a guideline for the digital interdisciplinary project development in the revitalization of buildings. It reflects the experiences gained in this empirical research work and formulates the steps necessary to carry out the project. The manual primarily addresses lecturers and professors working in urban planning, project design and project development. It provides a survey and gives guidance on the digital and interdisciplinary project work. For each of the topics dealt with it illustrates the different technical potentialities according to the know-how of the user in electronic data processing and his or her technical hardware. It is the authors' intention to establish the interdisciplinary project work in higher education in both architecture and civil engineering as an indispensable teaching method. It should be pointed out that especially within the framework of the European Bologna-process the teaching contents and measures are being aligned towards the Bachelor and Master degrees. It is hoped that the manual contributes substantially to implement this teaching method as a compulsory subject. The empirical research work presented in this paper was carried out interdisciplinary groups in Argentina with students there. The experiences gained are transferable to an international level. The steps outlined in the manual are teaching tools for higher education which will be useful not only in Germany but also in many other countries. There may be slight differences in terms of specific classification related to urban planning but surely not as far as the conception and practical realization is concerned.

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