

## Zukunft Bau

### STRUCTURE / STRUCTURE REPORT

Practice: hospital construction

Guide to interdisciplinary planning and implementation of sustainable hospitals

An interdisciplinary research project at the Technical University of Braunschweig develops solutions for sustainable planning and building organizational structure of hospitals and offers solutions for future planning and settlements of other complex large-scale projects.

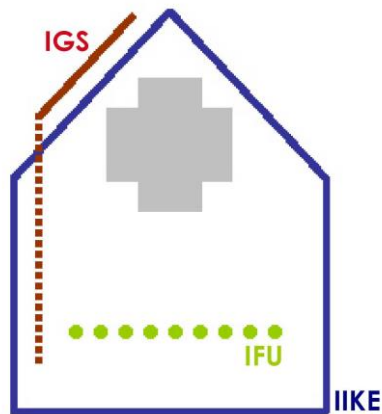


Figure 1: Logo Research Project

## Occasion / output location

The German hospital landscape is known for its medical excellence and his international reputation. More often, however, characterize chronic lack of funds, political bigotry, fierce competition and outdated structures the image of the clinics. For hospitals to plan efficiently in the future, operate and work, that is able to guarantee a high-quality health care, they have to face these challenges.

The hospital building will have a key function. Therefore, many hospital operators are working hard on increasing the efficiency of resources and organizational processes. Do the existing hospital buildings barely more possibility to achieve the necessary increase in efficiency, it is necessary in many cases to adapt the architectural structures. Under the leadership of the Institute for Industrial and Constructive Design (like), Prof. Carsten Roth, an interdisciplinary research team with experts from the fields of civil engineering, process planning and energy design of the TU Braunschweig has taken up this issue and examine the research project "Practice since May 2012: hospital construction "how planning processes are optimized, thus building new structures to deliver more efficient and sustainable.

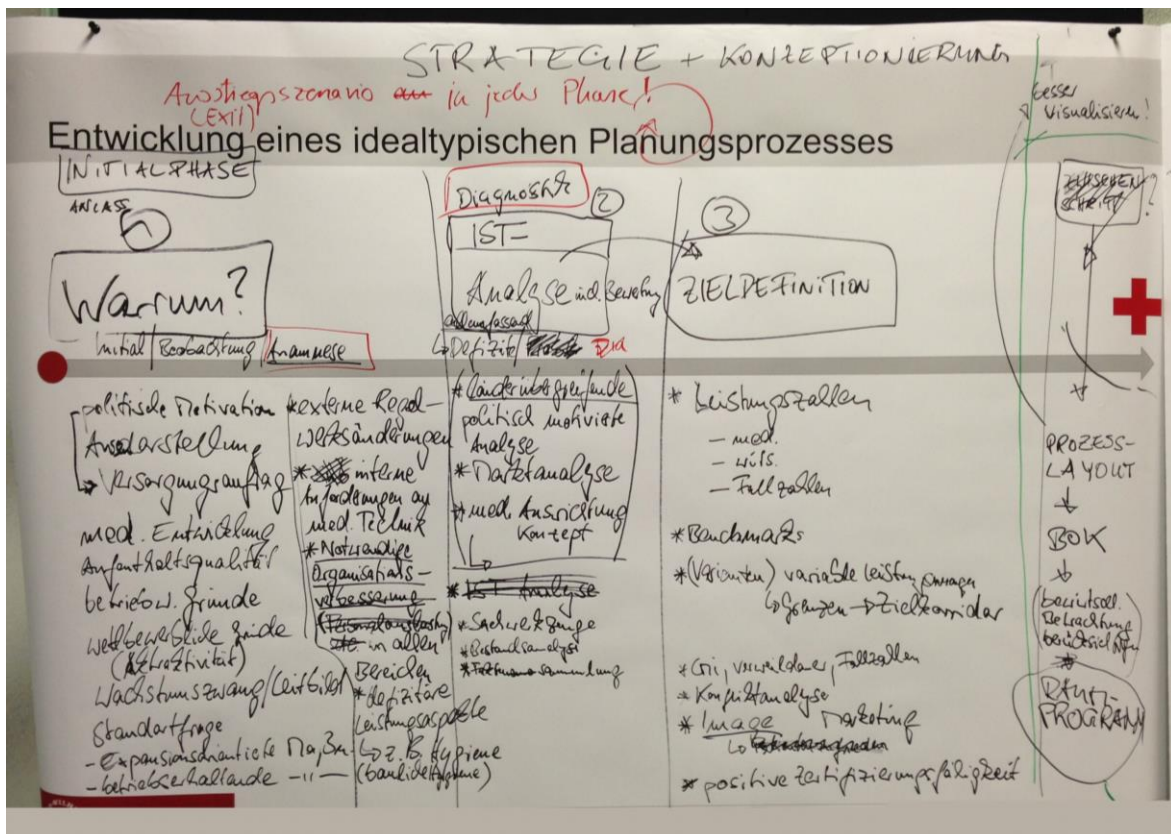


Figure 2A: Research meeting in January 2013, Heart Center Leipzig

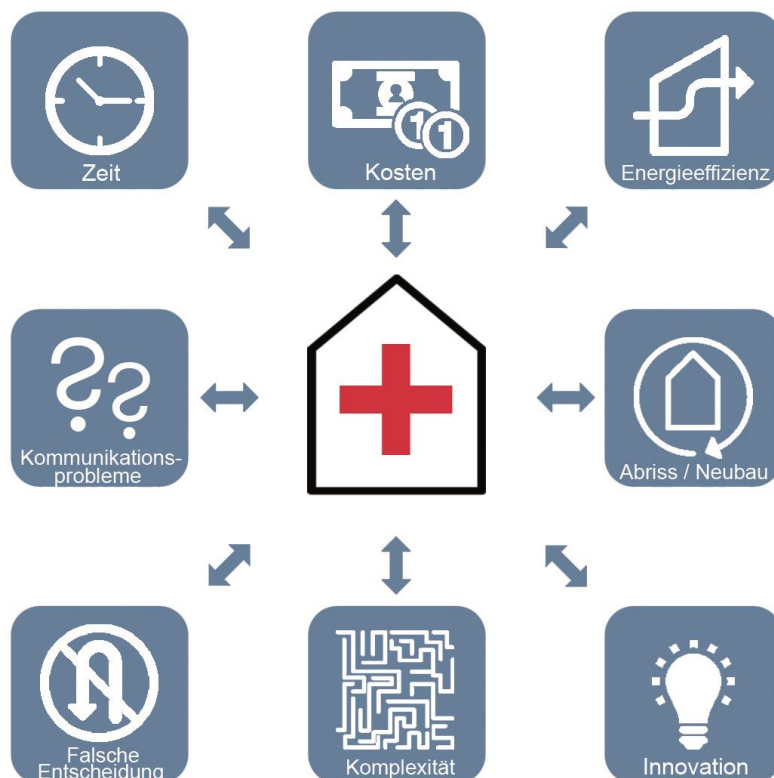
## Subject of the research project

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### Deficits in hospital construction and in the planning process

In preparation for the project start in mid-2012 was developed by the research team in close cooperation with the project partners in workshops (Figure 2: Workshop planning process) investigated the question, what are the future issues in hospital operators and are planners of significance. The following deficiencies in the area of hospital construction and could planning process are identified:

- Innovations in medical technology and new forms of treatment place enormous pressure to change and require adaptable, efficient building structures and processes.
- The effects of a lack of building quality or the opportunities that offer flexible and efficient long-term usable buildings are often recognized too late by hospital operators.
- Hospitals are often planned and operated (demolition rather than renovation) with a short building lifetime. Through this strong agricultural emphasis aspect hospitals often lose sight of its function as a place of healing and work.
- The high cost and time pressure often leads to erroneous decisions of the hospital authority. In the planning process also the expertise of multidisciplinary teams (such as architects, process and energy planners) is integrated too late.
- Hospitals in most cases rigid building, which leads to lack of energy efficiency and can not respond to requirement changes. Due to rising energy costs, the pressure at hospital operators increased to promote savings in this area.



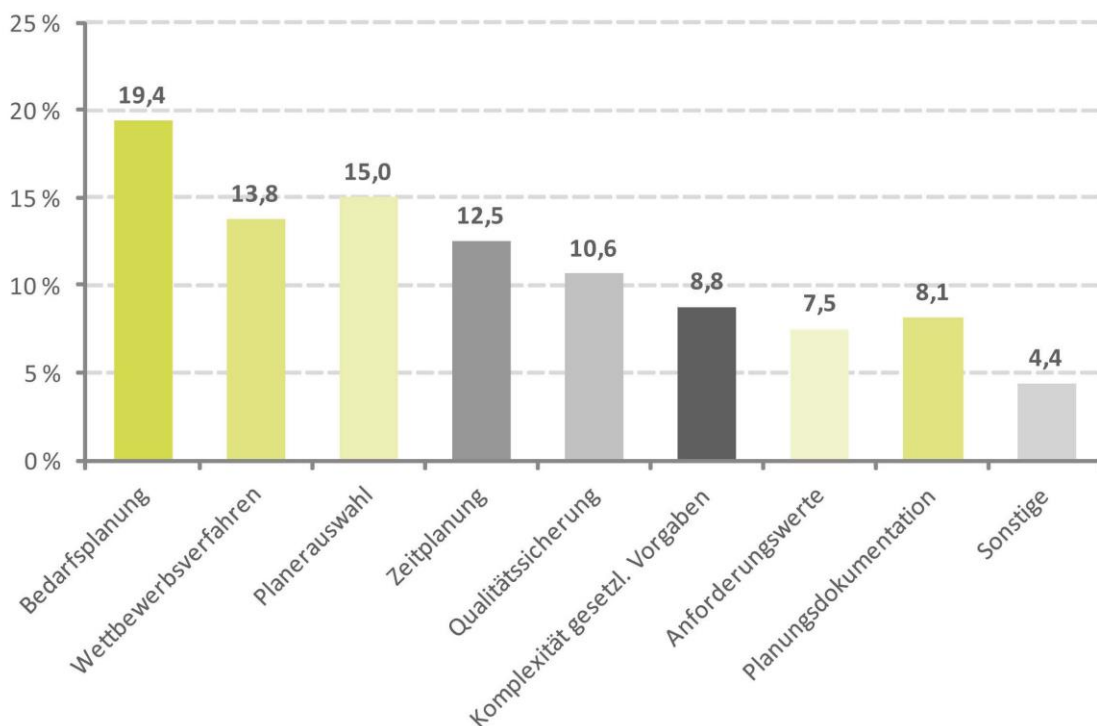
**Figure 3:** Challenges in hospital construction

### Future requirements:

The deficiencies listed above in hospital construction were examined as part of a Germany-wide online survey closer. The aim of the survey was to understand the practical requirements for the hospital construction. During the survey period from August 2012 to

October 2012 over 800 people were interviewed in the areas of process, Buildings and Energy in the hospital. The survey was sent to one of the users of the hospitals (doctors or nurses) and the other to planning experts in the health sector.

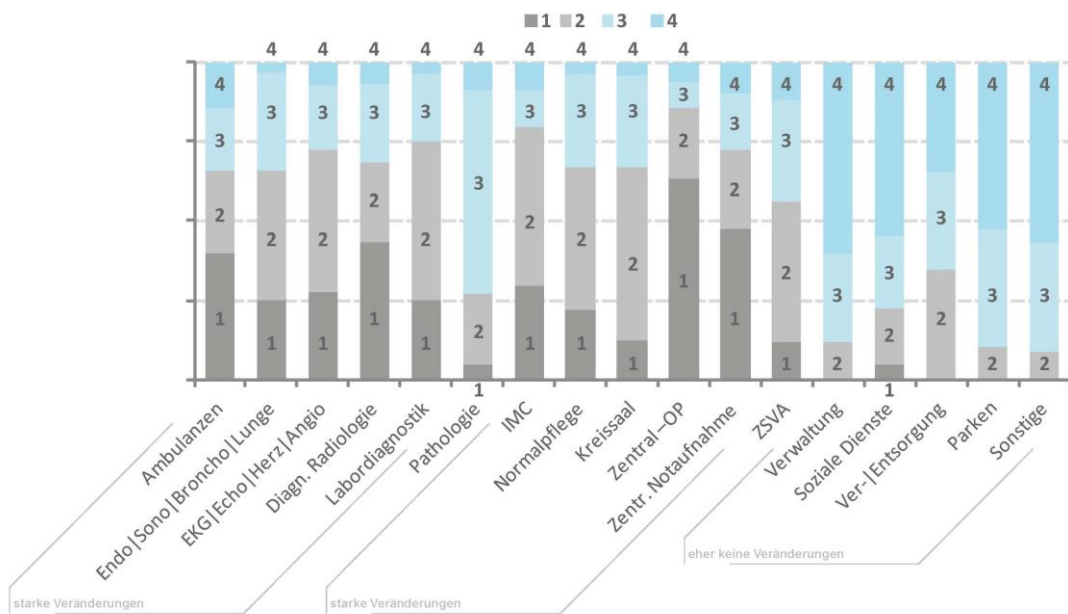
So planning process and building design key future theories could be derived for the hospital construction in the fields. In the planning process, the respondents saw the need for planning as the most important aspect in which the planning should be further optimized. Under MRP is understood in this context, the determination of the methodological requirements of the customer. Also the selection of the requirements just planning team was rated as deficient.



**Figure 4:** Online Survey: What aspect of the planning you would like to improve?

This leads to the conclusion that it is possible both through the development of methods and tools for requirements planning as well as in the cross-section functions of planning, such as project management, raise potential.

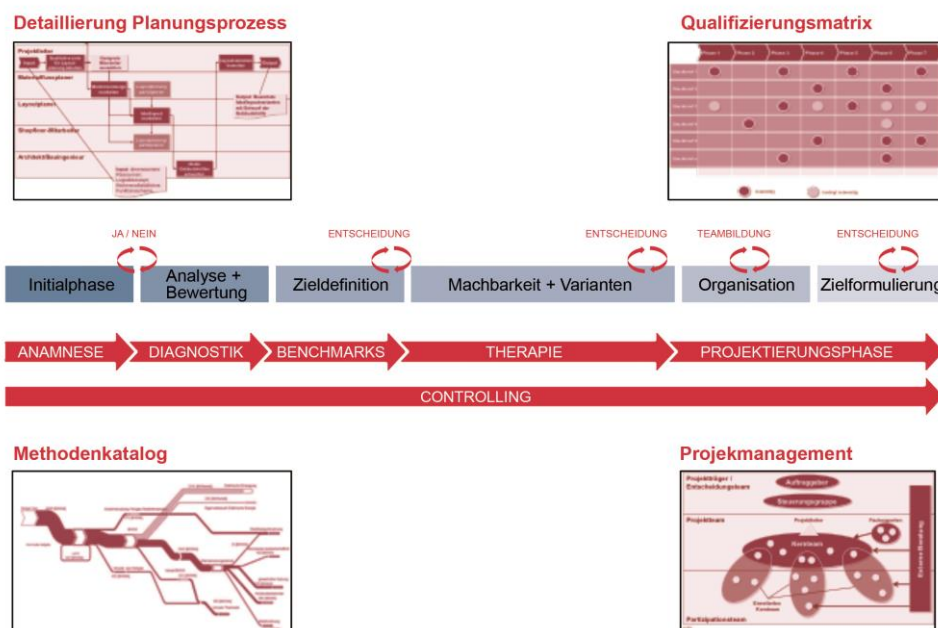
In the area of building designers were interviewed regarding future developments, constraints and potentials from a design point of view. Here were four areas are identified, the future must have a high degree of adaptability according to the respondents. Under mutability is understood in this context, the potential to perform a fast and cost-optimal adaptation of the building structure. These areas include, for example, the central operation theater or the central hospital emergency room.



**Figure 5:** Online Survey: Which area of the building are run through the most changes in the future?

The solution: optimization and quality assurance in strategic planning

The research team has developed the next step together with our research partners a strategic planning process that is used for the achievements of Phase 1 of the HOAI. The necessary strategic planning phases have been developed from the initial stage to the objective formulation in Detaillierungsstufen based on a matrix and supplemented with the necessary information.



**Figure 6:** Planning process for sustainable hospital buildings

Building it was necessary to define how methods and tools of the three disciplines process, energy and construction can support the planning process of obtaining information optimally. For this purpose, an extensive catalog of methods and tools was

created that describes the applicability in practical as well as listing the pros and cons. In order to achieve sustainable goals such as adaptability and sustainability in hospital construction, the efficient and correct use of skills is imperative. To this end, the research team has developed quality requirements of the stakeholders in the planning process that are necessary for the fulfillment of certain activities. The profile of those involved in planning consists of technical, methodological and social skills.

## **Conclusion**

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Stuttgart 21, airport BER, Elbe Philharmonic Hall Hamburg

The work done in the previous phases of work content were checked at various hospital projects. The chronology of the documents and your transfer into the developed planning system (target-actual comparison) were found to be quite out practical. Especially the simplified visualization of defects in the developed matrix convinced all parties involved in the research project.

The findings of the research project have innovative results generated, which has already found its way into the planning activities of the research partners. At the same time however, many ideas for transferability of results to public and private construction projects that have set in the past, the reputation of the German construction industry through significant cost and schedule overruns on major projects on game result.

## **Key Data**

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Short Titel:

Praxis: Krankenhausbau

Flag: SF-10.08.18.7-12.07

Researcher / project management:

University research team:

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Dräger Medical Deutschland GmbH

Katholischer Hospitalverbund Hellweg

Miele & Cie. KG

Architektengruppe Schweitzer & Partner

Rhön-Klinikum AG

Schön Kliniken Verwaltung GmbH  
Städtisches Klinikum Braunschweig gGmbH  
Unity AG

Costs: 439.768,00 €

Share federal grant: 197.568,00 €

Project duration: bis 05/2014

Project duration: 22 Monate

## **Figures:**

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Photo credits each: of Figure 1-6 are the research team

Figure 1: Logo Research Project

Figure 2A: Research meeting in January 2013, Heart Center Leipzig)

Figure 3: Challenges in hospital construction

Figure 4: Online Survey: What aspect of the planning you would like to improve

Figure 5: Online Survey: Which area of the building are run through the most changes in the future?

Figure 6: Planning process for sustainable hospital buildings