

Evaluating Change

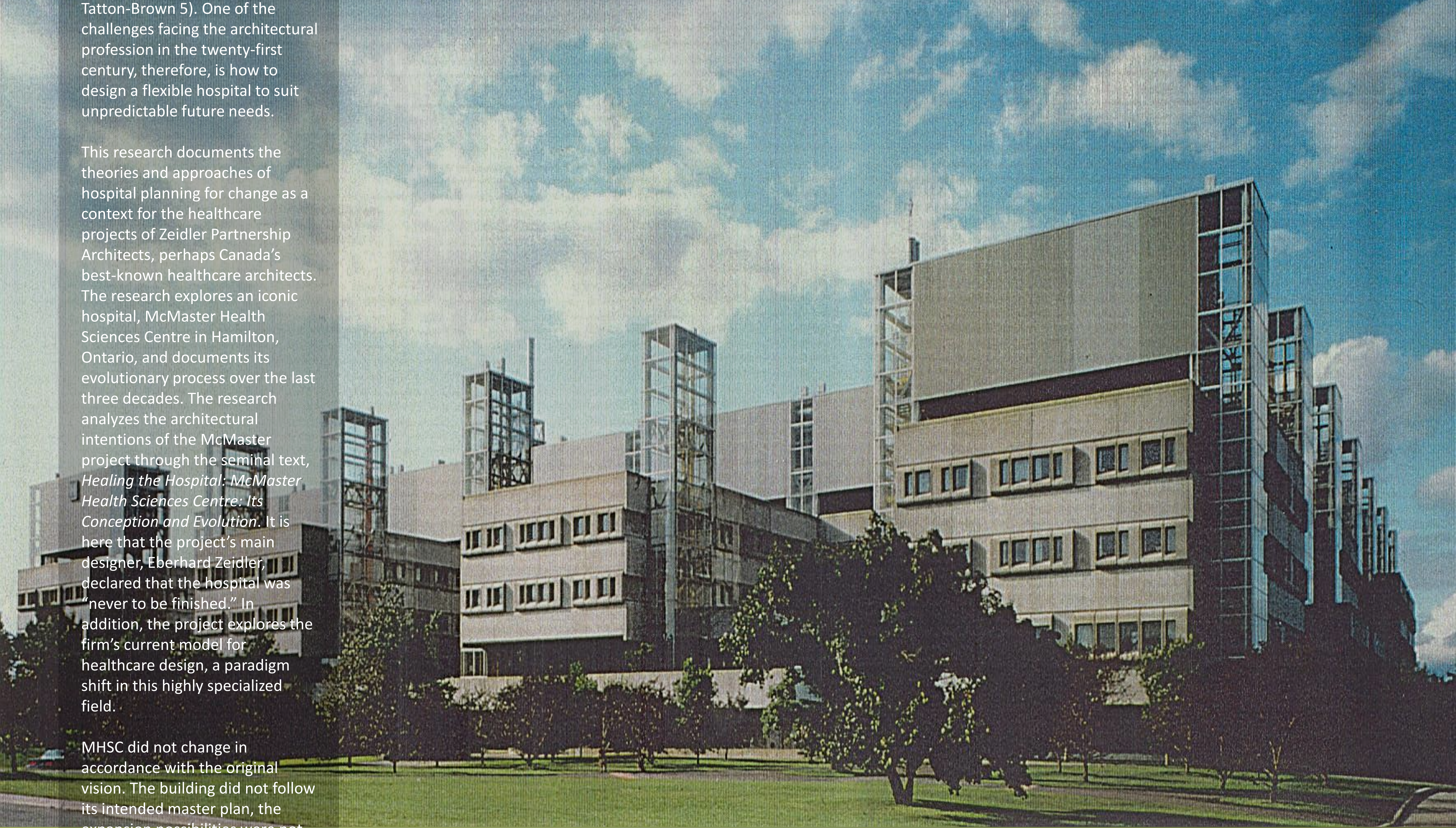
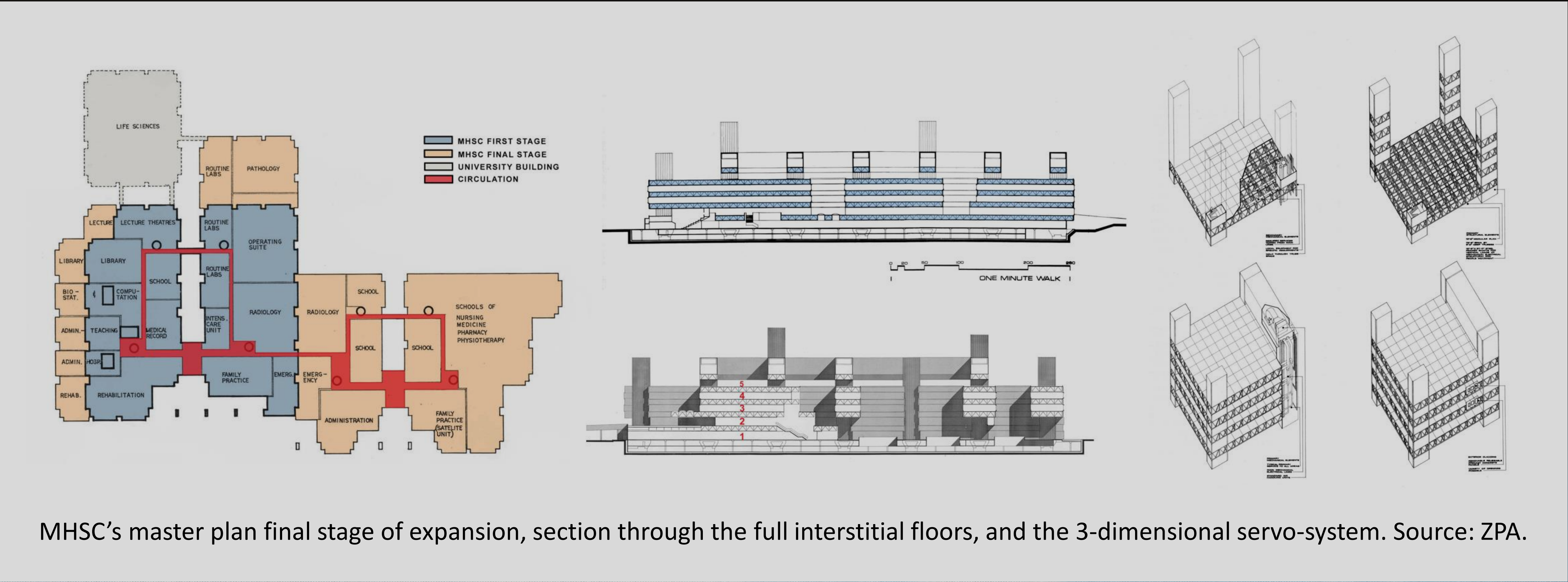
McMaster Health Sciences Centre, Hamilton, Ontario, Canada

Architectural change was a major feature of the twentieth-century hospital. The rapid speed of medical research, in all fields, has necessitated changes in the typical hospital environment, sometimes in cycles of as few as five or ten years. This is remarkable, given that most hospital structures were typically designed to last 50 to 100 years (Zeidler 7). Since the process of design and construction is both long and expensive, planners have faced the challenge that many new hospitals are out of date the moment they open (James and Tatton-Brown 5). One of the challenges facing the architectural profession in the twenty-first century, therefore, is how to design a flexible hospital to suit unpredictable future needs.

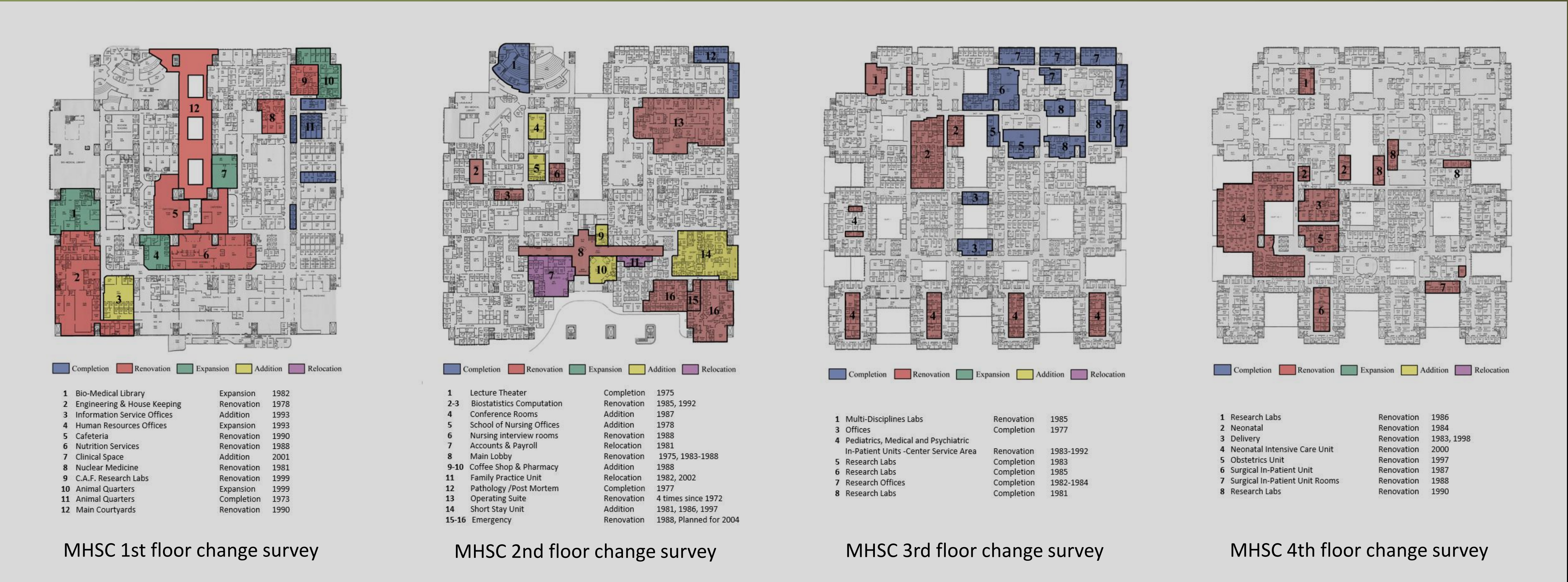
This research documents the theories and approaches of hospital planning for change as a context for the healthcare projects of Zeidler Partnership Architects, perhaps Canada's best-known healthcare architects. The research explores an iconic hospital, McMaster Health Sciences Centre in Hamilton, Ontario, and documents its evolutionary process over the last three decades. The research analyzes the architectural intentions of the McMaster project through the seminal text, *Healing the Hospital: McMaster Health Sciences Centre: Its Conception and Evolution*. It is here that the project's main designer, Eberhard Zeidler, declared that the hospital was "never to be finished." In addition, the project explores the firm's current model for healthcare design, a paradigm shift in this highly specialized field.

MHSC did not change in accordance with the original vision. The building did not follow its intended master plan, the expansion possibilities were not fulfilled and the interior redevelopment was limited in scope. In this way, the vision that had intended to create an "infinitely" flexible and dynamic structure resulted in a static monument. Still, the importance of this project cannot be underestimated. MHSC is now an icon in the history of the modern high-tech hospital. Its bold design, which continues to raise many tough questions, denies any compromise in the expression of its utopian concept. It has stimulated the transition toward the post-modern hospital.

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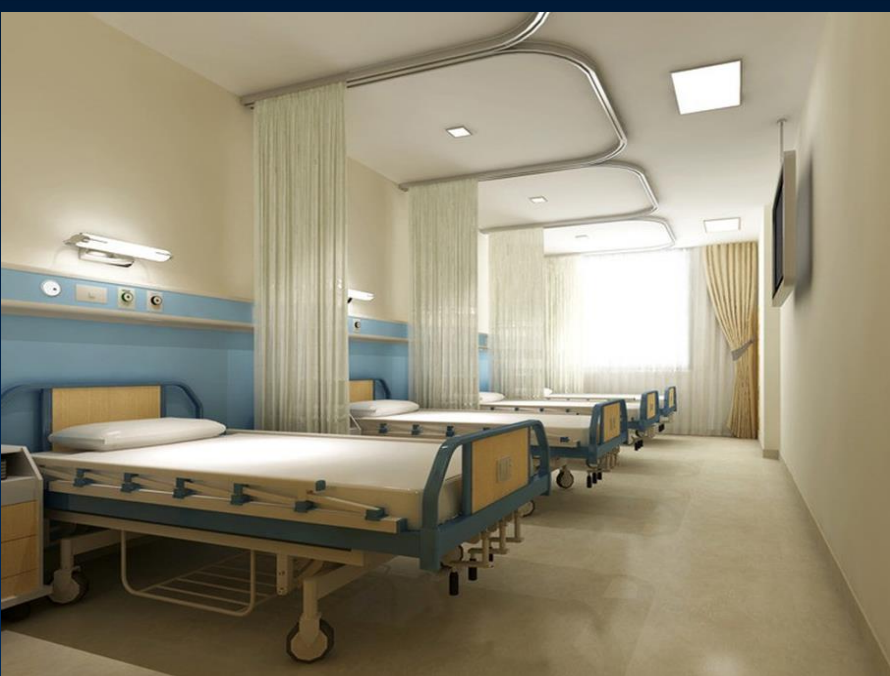
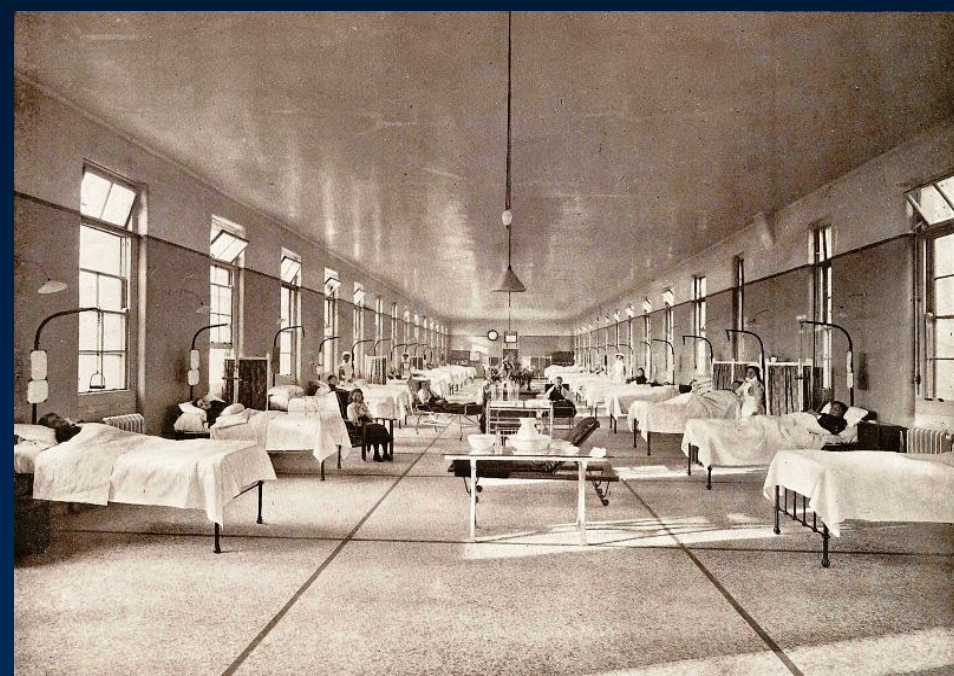
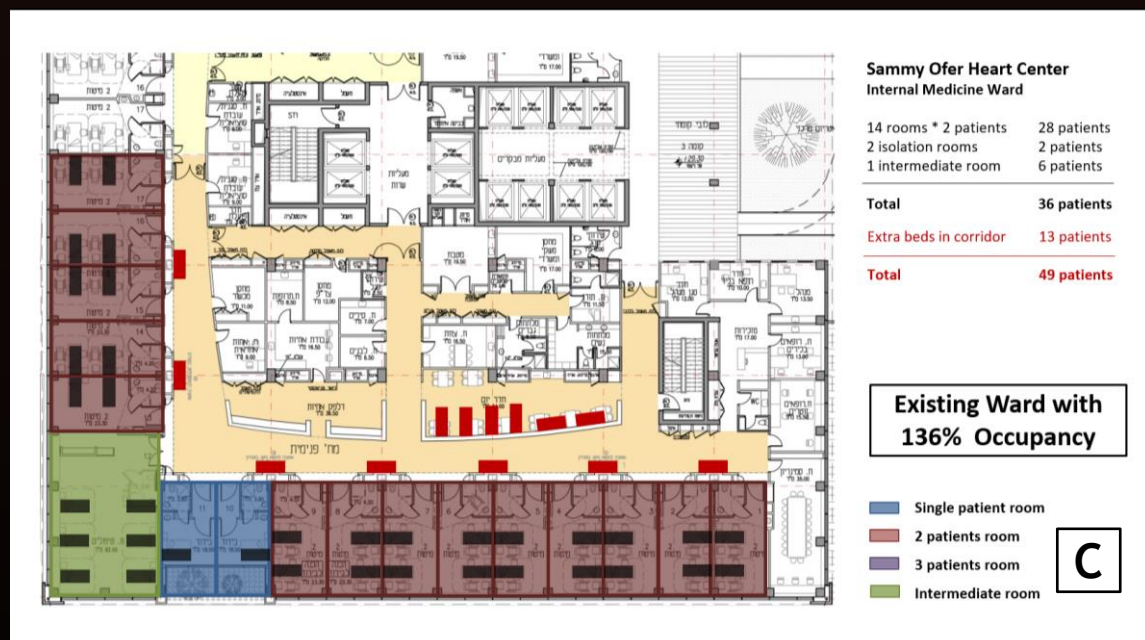
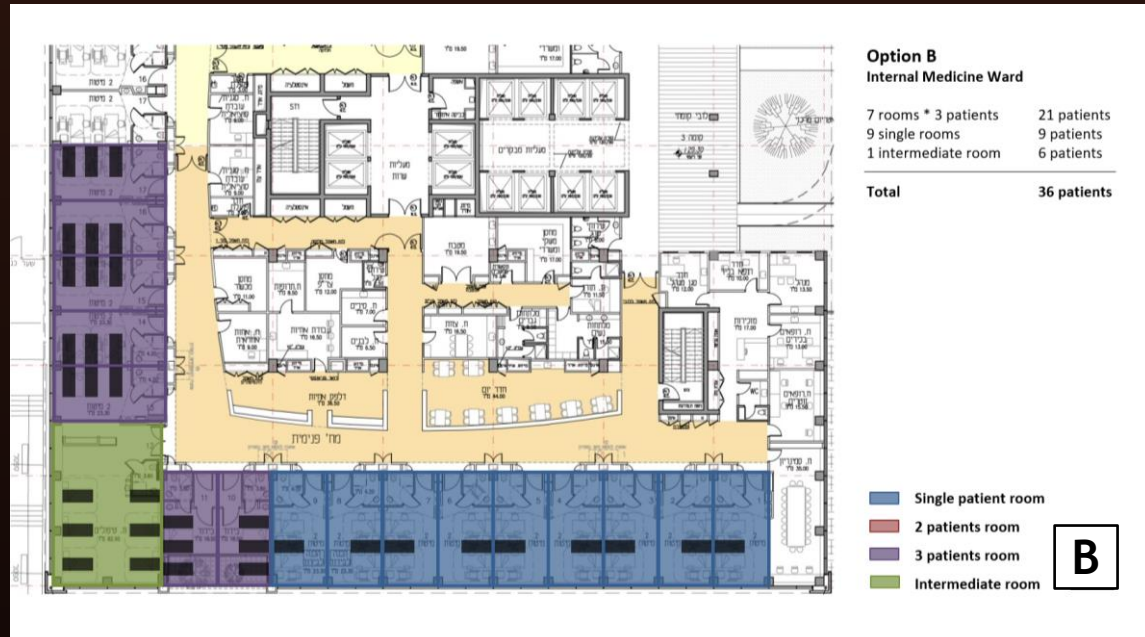
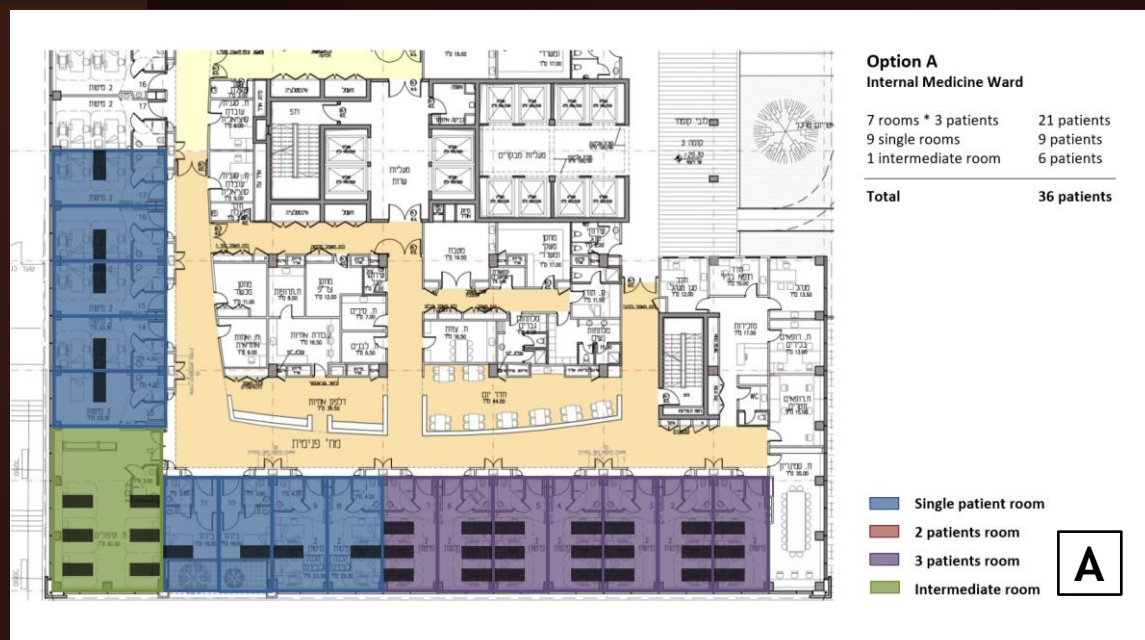
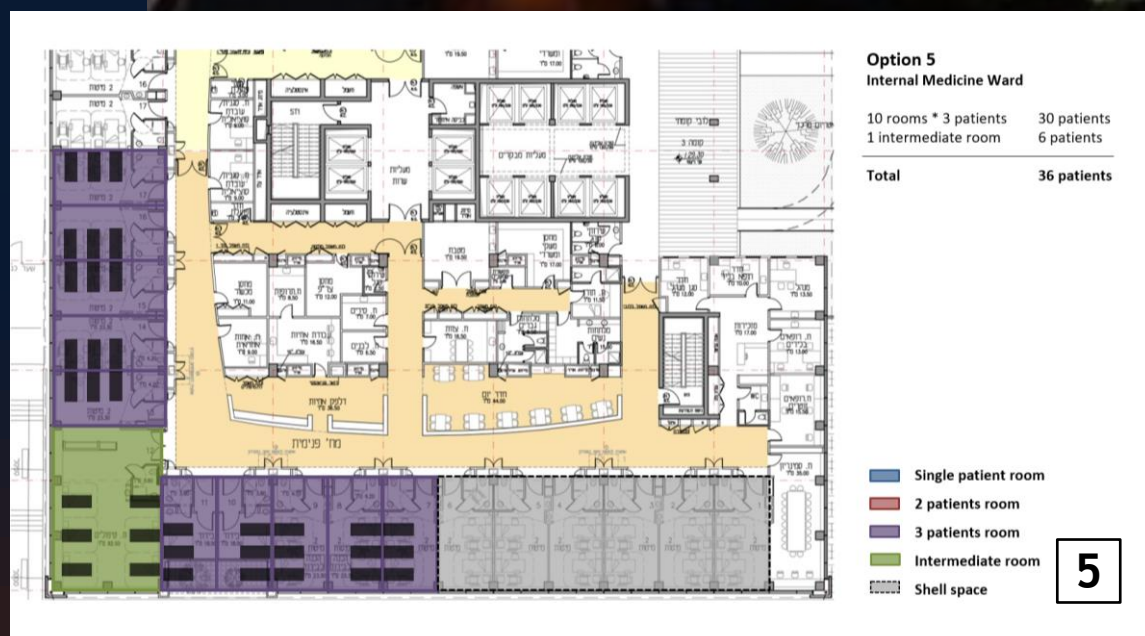
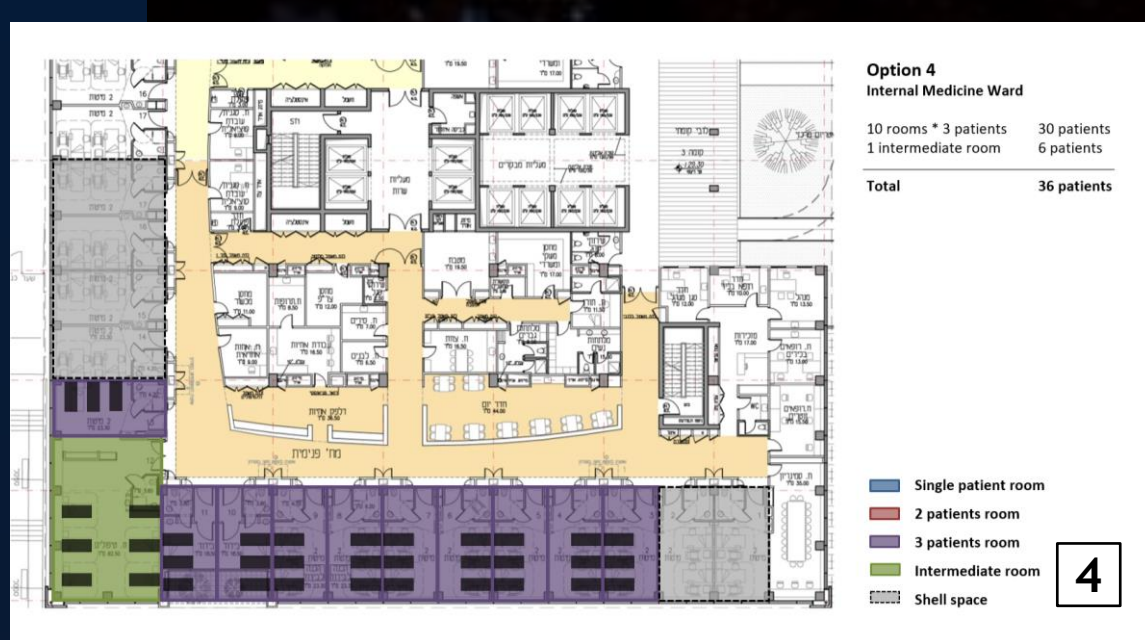
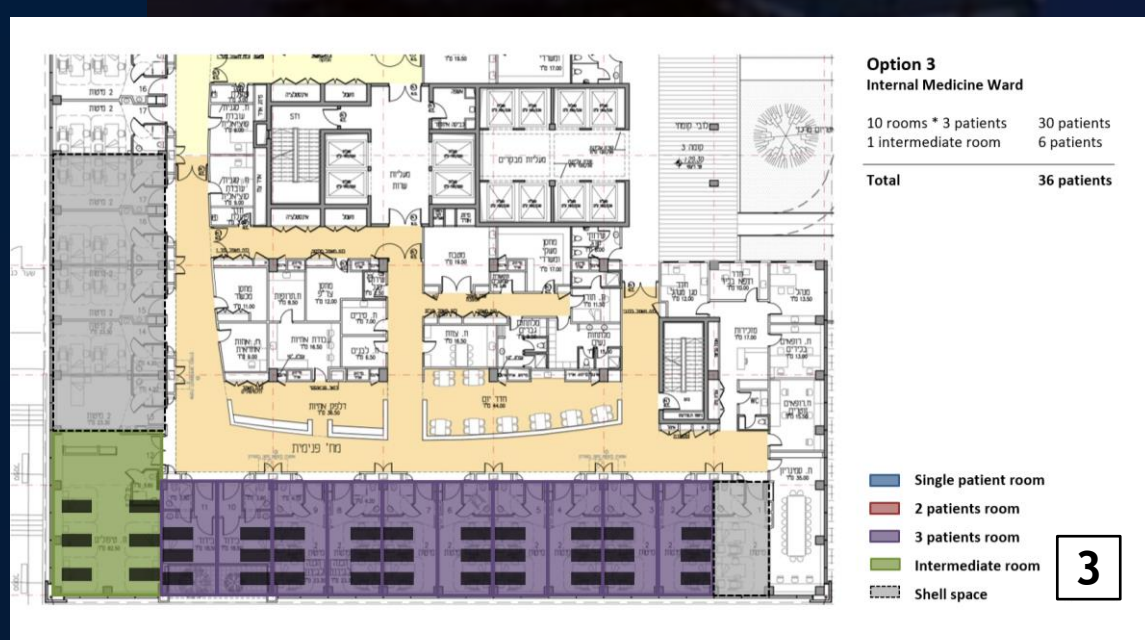
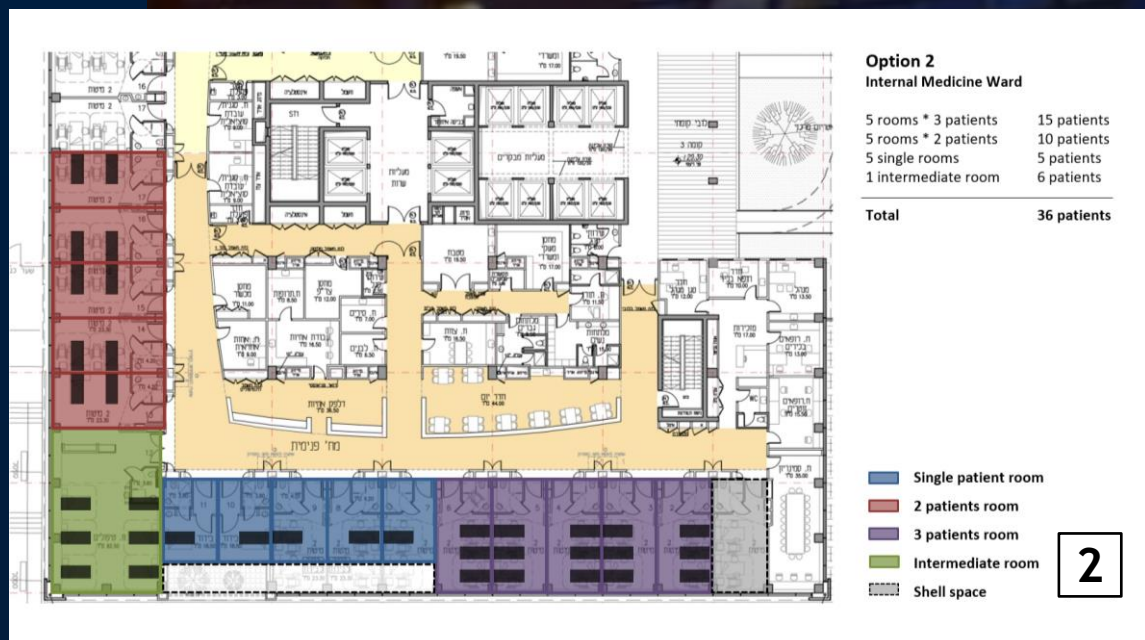
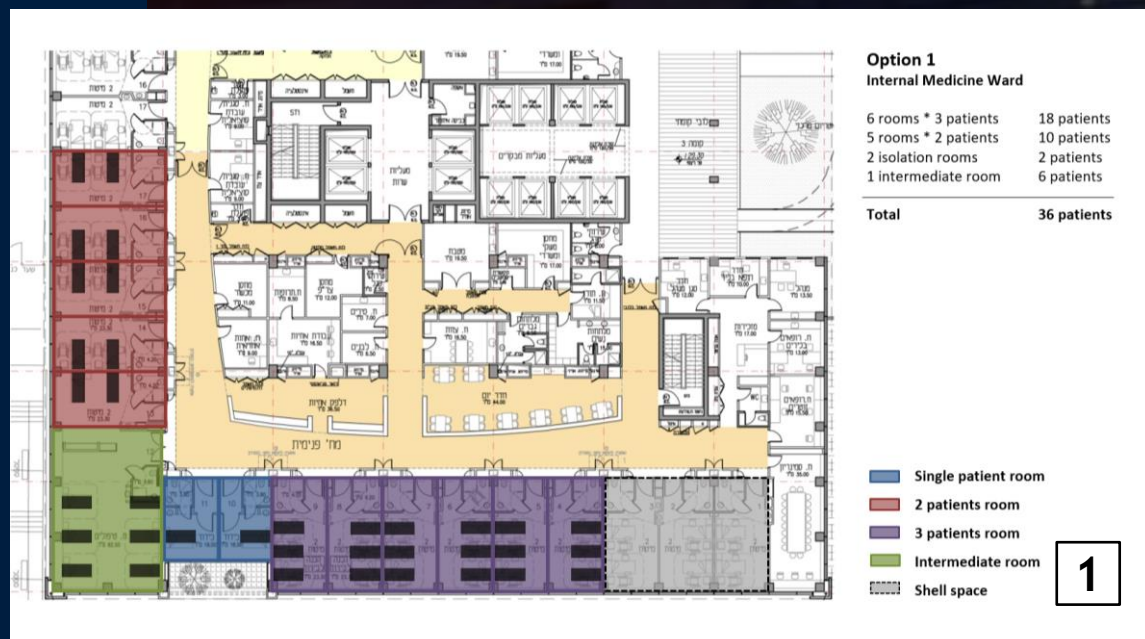
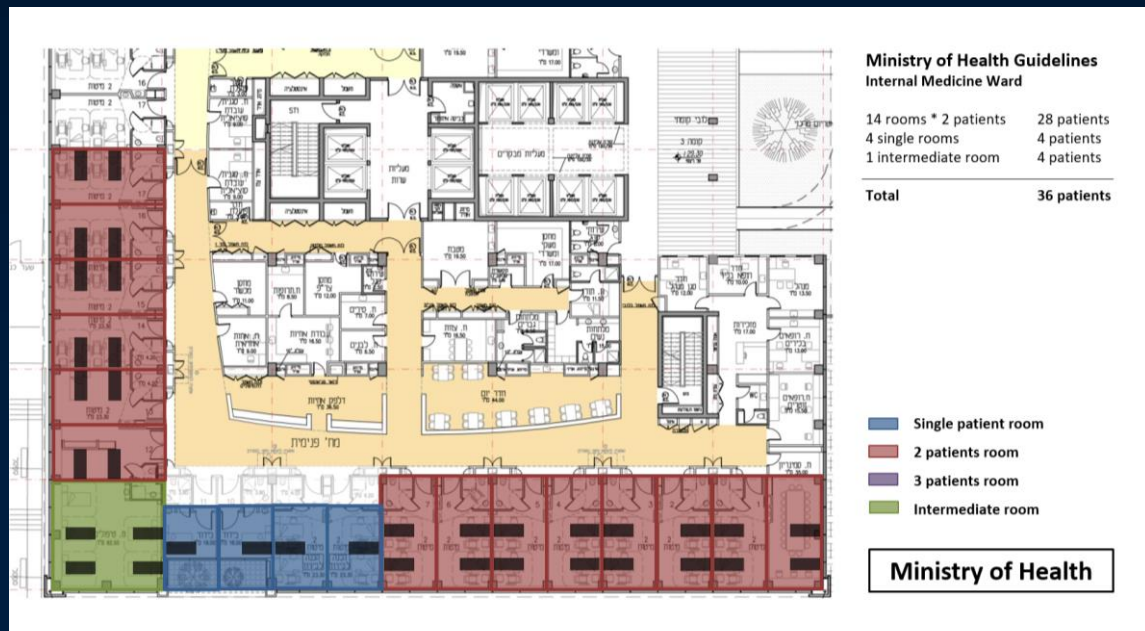
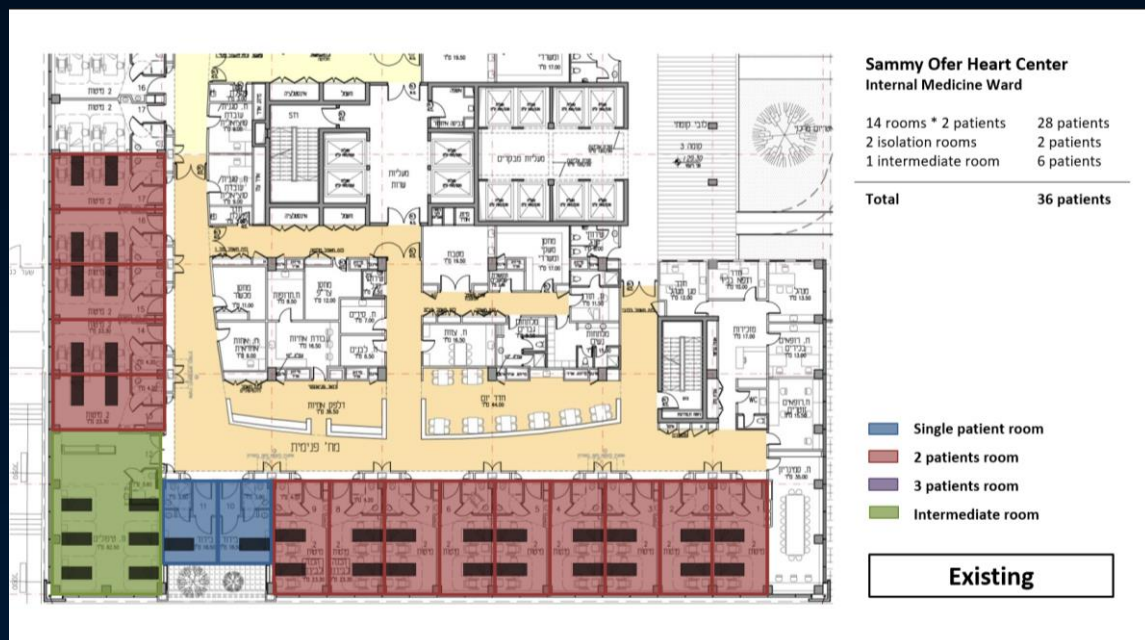
McMaster Health Sciences Centre, Hamilton, Ontario, Canada Zeidler Partnership Architects, 1972



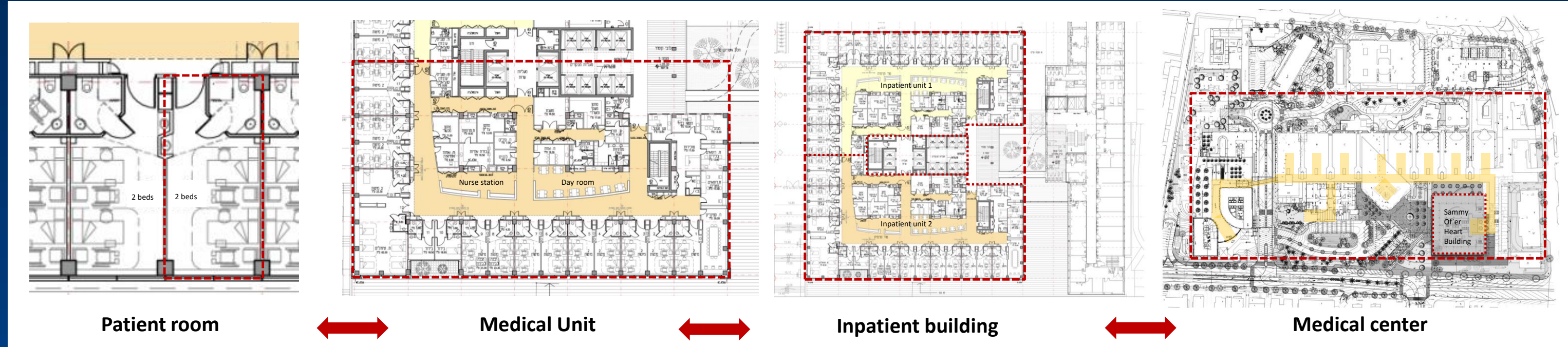
Evaluating Change

Design Options of Patient room Configuration in a Medical Unit

Design Options for different patient rooms configuration



The shift from "Nightingale" multi-patient open ward to private single-patient rooms



The Correlations between the design of a patient room to the design of the medical unit, building and medical center



The Sammy Ofer Heart Building, Sourasky Tel Aviv Medical Center Sharon Architects & Ranni Ziss Architects, 2012

Hospitals are in constant change as advances in all areas of healthcare - scientific, operational, technological, and social - necessitate frequent changes in the hospital environment. One of the most significant change in hospitals in recent decades, which reflects advances in healthcare, is the transformation of patient rooms. The basic component of the modern hospital has shifted from multi-patient to single-patient rooms; transforming the concept of the "Nightingale" open ward to private rooms in inpatient units.

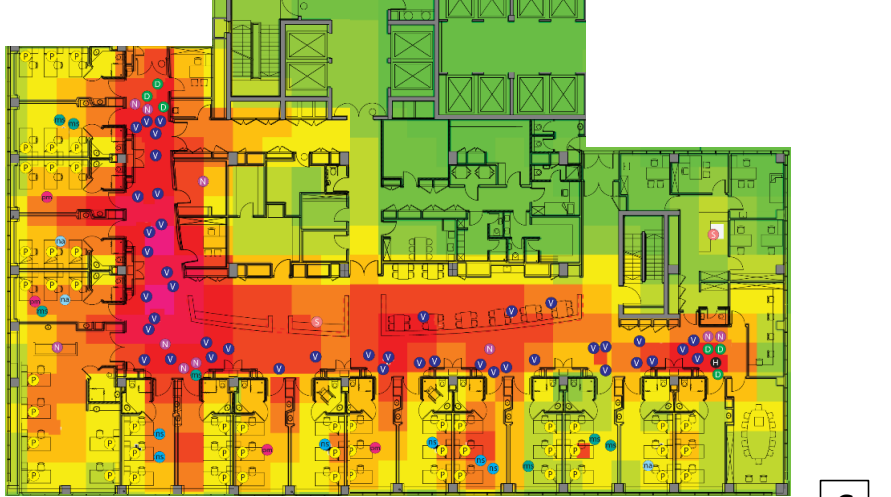
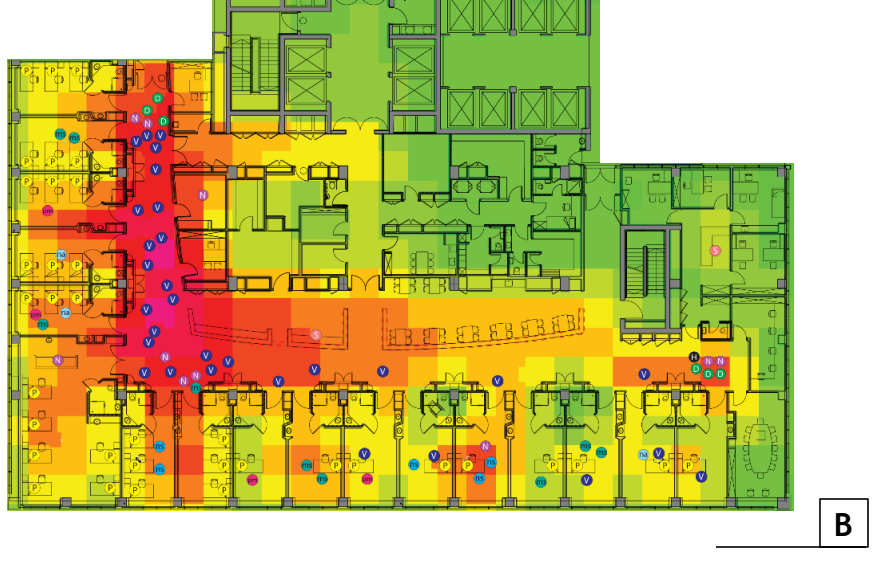
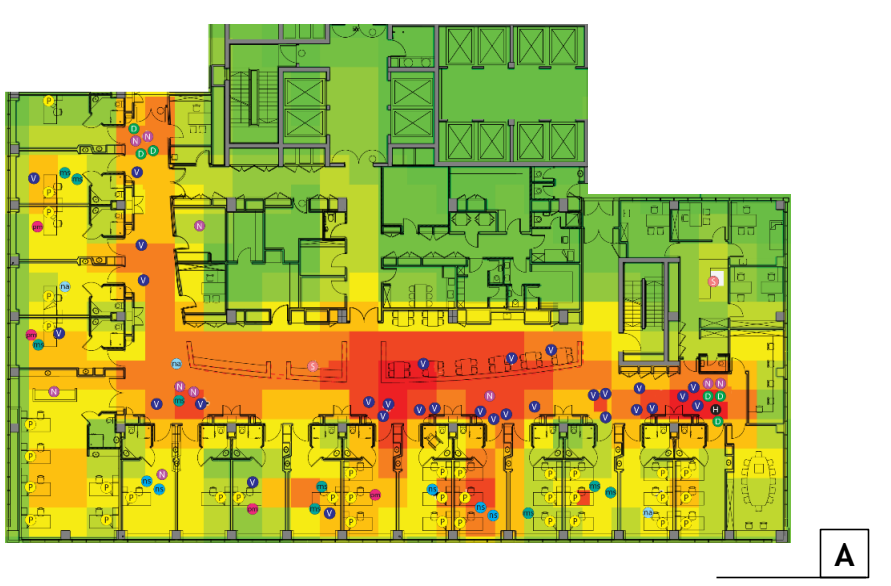
While following the change in patient room standards in hospitals in the United States and Europe, Israeli hospitals have been striving to deal with high rates of over-occupancy in the winter, lack of medical personnel, and insufficient funding. Accordingly, the current recommendation of the Israel Ministry of Health is to design inpatient units with a variety of patient room types - single, semi-private, and multi-patient rooms - with an option to add an extra bed to most rooms in case of high occupancy rates.

Although many studies have evaluated the advantages and disadvantages of single-patient rooms versus multi-patient rooms (i.e. infection rates, length of stay, medical errors, sense of isolation and patient safety), only a few have evaluated the correlation of the patient room configuration with the overall design and performance of the inpatient unit.

A case study of the Sammy Ofer Heart Building at the Tel Aviv Medical Center, Israel, demonstrates the need to evaluate current inpatient unit layout of patient rooms (following the Israel Ministry of Health guidelines) and to compare it to future options for configuring change. This evaluation method, based on a literature review, observation and expert interviews, consists of analyzing the Form, Function and the Use of the medical unit. Simulating 'what-if' scenarios, such as over-occupancy rates or new medical procedures, illustrates how each design option could support future change.

The results suggest that different configurations of patient rooms in a medical unit afford different opportunities and limitations for space flexibility, process efficiency, and user satisfaction. This method of evaluating future scenarios could promote design optimization, collaboration among inter-disciplinary members of the project team and enhance knowledgeable decision-making during the design process and throughout the life-cycle of the hospital.

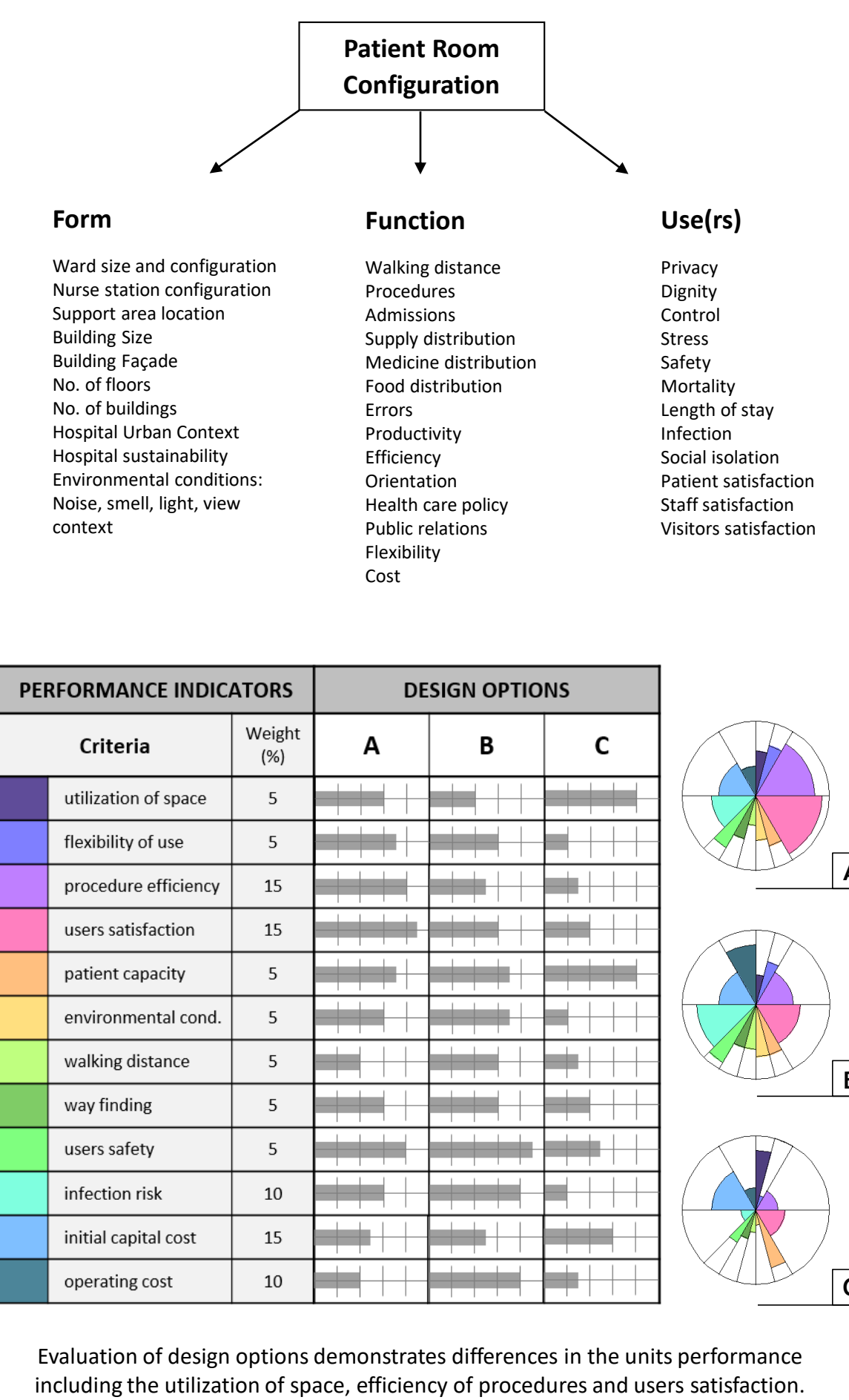
This research was funded by the European Research Council (ERC) Grant no 340753, and by the Azrieli Foundation. The Technion Architecture Research Team includes: Kartikeya Date, Michal Gath Morad, Lusi Morhayim, Davide Schaumann, Hadas Sopher, Einat Zinger



Analysis of the medical unit performance - Density and Noise during patient check (using human behavior simulation)



Analysis of interactions between staff, patients and visitors in the units corridor (using human behavior simulation)



Evaluating Change

Evaluating Design Options of a Family-Centered Inpatient Unit

Current hospital designs reflect the transition from medical focus to a patient and family-centered models of care. Following concepts of pediatric units, adult inpatient medical units are designed to provide designated spaces for the constant presence of visitors and family members.

Evidence-based design (EBD) emphasizes the advantages of single-patient rooms and communal areas for patient and families' relaxation and recreation. While recognizing the family as a source of support and partnership for the treatment of patients, especially in face of the increase in patient intake and the decrease in medical personnel, the presence of family members often interrupts staff work and impacts the unit's performance.

A case study of the Sammy Ofer Heart Building at the Tel Aviv Medical Center in Israel demonstrates the debate about the design implementation of family-centered models of care. The hospital medical units, all semi-private rooms, were designed with a central open dayroom to enhance patient movement, to foster social interaction, and to provide space for the families and visitors outside of the patient rooms. The resistance of some of the medical units' management to design a special area for the families in the center of the unit, due to concern for interruptions to the nurses, resulted in a different design layout, moving the dayroom outside of the unit itself.

A comparative evaluation of the two medical units illustrates the consequences of these different design decisions. The research presents a simulation method to analyze and evaluate architectural design options. A digital model was developed to integrate the units' spatial environment, its procedures, and users including patients, staff and family members. Based on observations and interviews in the existing inpatient units, patterns of behavior were defined and implemented in the simulation model.

The results, illustrated by spatial data maps, visualize the dynamic use of the space and the influence of the dayroom's location on the units' density, visibility, noise levels, people flow, walking distances, and potential for interactions between staff and patient family members. A comparative evaluation of the two design options demonstrates the correlations between the design and the desired model of family-centered care in the inpatient unit.

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Option A: inpatient unit with no day-room



Option B: inpatient unit with central day-room



The Sammy Ofer Heart Building, Sourasky Tel Aviv Medical Center Sharon Architects & Ranni Ziss Architects, 2012

