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## Owner-Requested Changes in the Design and Construction of Government Healthcare Facilities

Rachel C. Okada<sup>a</sup>, April E. Simons<sup>a\*</sup>, Anoop Sattineni<sup>a</sup>

<sup>a</sup> 118 M. Miller Gorrie Center, Auburn University, Auburn, Alabama, USA, 36849

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### Abstract

In the inherently dynamic industry of healthcare design and construction, organizations are continually working to achieve balance between customer demands and the need to manage cost, schedule, and quality. Owner-requested changes throughout the design and construction process can lead to budget and schedule overruns as well as increased uncertainty for the project delivery team. Effective strategies for the management of these changes can be used by project teams to reduce the number of changes during construction. The aim of this paper is to develop a multi-pronged approach to the management of owner-requested changes through the analysis of a relevant case study project. A review of existing literature showed that extensive research has been done on the cause and effect of project change, however, none focused solely on owner-requested changes. To expand the current knowledge base, a case study method was used to collect information on challenges and potential strategies for the management of these changes. A quantitative analysis examined project data in order to understand how owner-requested changes impacted and shaped the construction of the case study project. An in-depth qualitative analysis built on the project data through semi-structured interviews with project stakeholders. The themes identified in the data formed the framework for the compilation of lessons learned and best practices offered by the interview participants. It is hoped that these strategies will be utilized by future project teams to effectively prevent or mitigate owner-requested changes. The results of the analysis underscore the significant challenges involved in the design and construction of healthcare facility projects. Extended timeframes for project delivery, constant changes in technology, stringent regulations, and the sheer complexity of the building typology make healthcare projects among the most complex and logistically challenging projects built today.

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\* Corresponding author. Tel.: +1-334-844-4518; fax: +1-334-844-5386.  
*E-mail address:* [ellisap@auburn.edu](mailto:ellisap@auburn.edu)

## 1. Introduction

The world of healthcare is one of constant change, where evolving technology and advancement in patient care drive the need for state-of-the-art facilities delivered in short order. Advances in medical equipment in particular have motivated the industry to seek innovative solutions to the incorporation of technology in the delivery of modern healthcare facilities [1]. Healthcare projects often deal with dynamic external forces such as market changes, stringent regulation, and a range of stakeholders, all which add variability to the process. This is the environment where project planners, architects, managers, and constructors work to build the healthcare facilities of the future. Throughout the design and construction process, project teams must be particularly in tune with the changing needs of the owner to ensure that the facility is an effective solution for the end user. It is important that the team work closely with the owner upfront to ensure the necessary requirements are incorporated prior to the start of construction. Project change is a major cause of uncertainty for the project delivery team and can lead to cost and time overruns when not managed properly. Effective strategies for the management of owner-requested changes during the design and construction process improve the team's ability to prevent or mitigate these changes before they affect the budget or schedule. This research will utilize the examination of a relevant case study project to contribute to the existing body of knowledge on change management, specifically concerning owner-requested changes.

Long before a patient, doctor, or nurse steps in the door of a new facility, the project delivery team is assembled to bring a new project from concept to construction. The project delivery team is the heart of the design and construction process and can materialize in many forms depending on the project phase, contract type, and owner preference [2]. One of the project stakeholders is the owner, who is responsible for the proper execution of the project. The owner or their representative often plays an important role in the project development as it progresses from planning through construction completion and occupancy. It is rare that a project would be brought to fruition without any owner input, however, the level of involvement and consideration given to owner requests and feedback vary from case to case. In some cases, the owner will be an integral part of the team, and in other cases, they may be involved only at certain project milestones.

As a project progresses from planning to design and construction, changes are an inevitable part of the process [3]. These changes are often based on requests, feedback, and input from the owner, user groups, and project delivery team. Early in the planning and design process, changes happen rapidly as the project concept is molded into a more definite form. At this point, changes are easily accommodated and the tools used for space planning and conceptual design are purposefully flexible. As the design progresses and more effort is put into drafting, modeling, and calculations, changes become more difficult to accommodate. The cost of a change continues to increase as the project timeline reaches 100% design and continues through construction completion. Therefore, the cost of making a major change to the design of a building near construction completion is both complex and extraordinarily costly [4].

A significant change to the project will likely effect a modification to the contractual terms of the agreement between stakeholders. As such, each change must be given careful consideration. As part of the evaluation of the change, the root cause is identified and noted for the record. Each organization has a different method for categorizing changes and the categorization of changes has been the focus of previous research. A change that occurs during the construction phase will most often fit into one of the following broad categories: unforeseen conditions, design errors and omissions, and owner-requested changes [5]. The cause of the change is important because it will determine the liability for the change, i.e. who pays the bill. The scope of this research focuses specifically on the impacts of owner-requested changes. The evaluation of changes resulting from other causes such as unknown conditions or design errors and omissions is beyond the scope of this research. The impact of owner-requested changes has become a problem for many organizations that are caught between the financial and time restraints of construction and a desire to please the customer [6]. Owner-requested changes in healthcare projects arise for a variety of reasons. One prime example is changes to the medical equipment and systems that are central to the function of the facility. Advances in healthcare technology are moving at a rapid pace, often much faster than the project delivery timeline, and the result is a project team that is chasing a moving target [7]. Other reasons to initiate a change include new leadership, mission requirements, or policy. Regardless of the drive behind the change, each change request received from the owner

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