

Interactive Interior Design of Private Hospital Spaces

Doaa Daher Ibrahim¹, Rajae Saadi Lafta²

¹Design department, college of fine arts, Baghdad university, doaa.abd2104m@cofarts.uobaghdad.edu.iq

²Design department, college of fine arts, Baghdad university, rajae.lafta@cofarts.uobaghdad.edu.iq

Abstract

This study aims to investigate the effectiveness of interactive design of waiting rooms in private hospitals, both functionally and aesthetically. The study raises the question of whether interactive design plays an effective role in the interior design of hospital waiting rooms and their mechanisms of operation. The study uses a descriptive design for private waiting rooms in Al-Ahly International Hospital in Baghdad. Results showed that adopting interactive design provides the highest level solutions for unexpected future situations, such as fires, electrical protection, and power outages in the model. Results also showed that adopting interactive design achieved the basic function of the space, which is waiting, but it was not achieved in terms of isolation from other hospital spaces and the external environment. Finally, interactive furniture was not achieved because no interactive furniture elements were employed within the spaces.

Keywords: Comfort, Interactive, interior design, private hospital, spaces.

1- INTRODUCTION

Interactive space design contributes to the comfort of individuals within waiting room spaces. It helps to reduce

boredom and monotony. The use of interactive design is one of the best treatments within waiting rooms. They are specifically designed to discover user needs within the space by employing sensory sensors to create smart spaces with dynamic responsiveness. The above raises the question of whether interactive design plays an effective role in the interior design of waiting rooms in hospitals, both functionally and aesthetically.

2- BACKGROUND

This study tries to check the impact of adopting interactive design under three dimensions. These dimensions aimed to achieve conform for patients and visitors who wait at the waiting room. There are several factors with an interactive design intellectual vision in the design of waiting rooms for hospitals, namely: comfort, safety and security, and entertainment. Users' comfort in the waiting halls is associated with the material conditions transmitted by the senses and the mind to the users of the space in order to achieve satisfaction for the auditors in an appropriate environment. Finally. Comfort in the design of the interior spaces of the emergency lobbies is divided into main types, namely: thermal comfort, visual comfort, and acoustic comfort.

3- OBJECTIVE OF THE WORK

1. The research aims to convince engineering departments, scientific institutions, and other relevant stakeholders involved in the implementation of engineering designs and projects in the field of interior space design.
2. The current research aims to identify interactive methods in the interior design of waiting rooms in private hospitals.

4- LITERATURE REVIEW

Interaction

Interaction is a process that involves a series of interconnected actions between two or more interacting subjects. Interaction is a two-way behavior that involves mutual response, relationship, and shared change. In the context of interacting subjects, these subjects become constantly changing or variable during the interaction (Jaskiewicz, 2013). In this study, interactive design involves interaction through digital technologies and smart systems that have the ability to infer and respond to user needs without requiring any effort from them.

Hospital

Hospital environments differ from other public buildings and require conditions, specifications, and standards that should be considered in the design principles of hospitals in general (Abdullah, 2008). In practice, hospitals are among the most important buildings that must be prioritized in national development due to their significant importance for all members of society and the provision of necessary care and treatments for various patient conditions.

Interaction in internal space design

Interaction in interior design refers to the idea of communication between humans and the surrounding environment. There is always an influencer and an influenced, action and reaction between the elements to create a relationship that affects the goal of making spaces more efficient, comfortable, and responsive (Jaskiewicz, 2013).

Levels of interactive design in private hospitals

Studies indicate that interaction in design emerges at various levels in private hospitals: The first level is between the designer and the design process. In this stage, the designer can find the necessary solutions to provide interactive spaces that meet users' desires, provide them with comfortable environments, and more comfortable waiting areas in hospitals. The second level is between the user and the design process. This stage involves a physical interaction between the user and the space, how well they adapt and

respond to it, and their sense of harmony with the space (Mohamed, 2014).

Interaction in the design of private hospitals

The objectives of employing interaction in private hospital design can be identified as follows:

- 1- Providing a fixed and ideal solution based on the assumption that future positions in hospitals are certain and expected to occur at a certain point in time.
- 2- Using designs that keep up with the developments of the era, adopting innovation, transformation, and continuous change.
- 3- Including the necessary treatments for interactive designs, such as spatial adaptation, movement, and control that allow for more control over changing conditions and control of the building's design environment.
- 4- Using movement in interactive design as an important part that gives the interior design of hospitals new and unique characteristics to create a changing environment, responsive building components, and interactive spaces.
- 5- Providing good opportunities to save energy based on technological developments and reducing reliance on non-renewable energy sources and relying on renewable energy resources (Fenwick, 2011). Accordingly, it can be observed that the aim of interactive design is to meet the requirements of expected and unexpected changing conditions that traditional designs cannot address.

Factors of interaction in hospital design

It tries to achieve the following:

Comfort in waiting rooms in hospitals

A comfortable environment plays a crucial role in enhancing the comfort and interaction of visitors, which can be according to Ghaleb and Al-Madini (2009) achieved through the following :

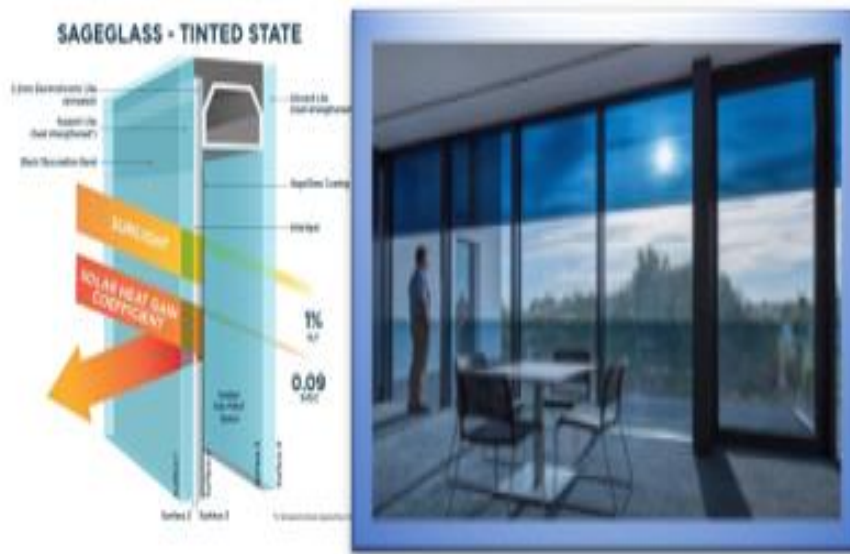
Thermal comfort

It is a state of thermal balance between humans and the indoor environment. It is the first type of comfort for humans that must be provided in waiting rooms. Psychological factors that vary with the environment, culture, and social background of individuals are involved in determining thermal comfort. Interactive buildings allow users to program spaces according to their desires and needs for temperature, humidity, sound insulation, and required ventilation type (Ayoub et al., 2018).

Visual comfort

Visual comfort is achieved by relying on natural lighting and artificial illumination. Here, the designer's role comes in providing lighting that integrates natural and artificial light to conserve energy and works interactively through sensors to meet users' needs for light quantity, type, self-operating on/off, reducing glare, and reducing the level of lighting intensity that causes eye fatigue (Muhammad, 2007). One solution is to use smart glass or smart windows, which are electrically convertible glass that changes the light transmission properties. It allows users to control the amount of light by changing from transparent glass to semi-transparent glass while partially blocking the view while maintaining light. This is shown in Figure 1

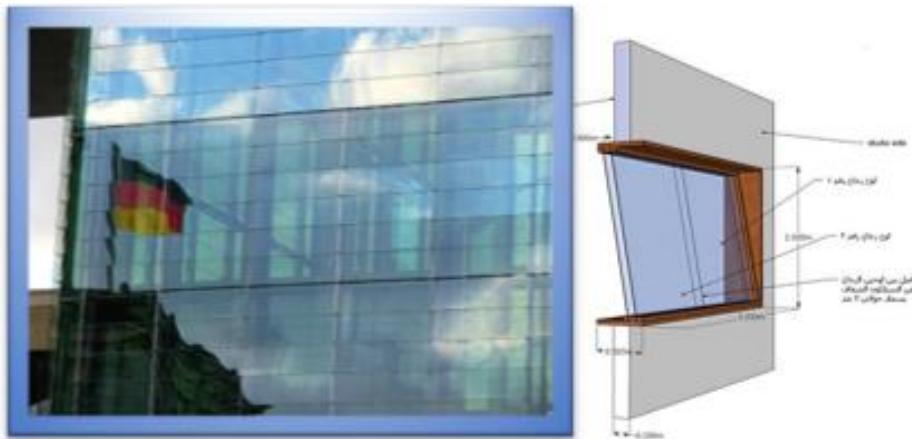
Figure 1. Interactive glass



Acoustic comfort

The outer envelope of the building and its facades is the most important element for isolating the internal spaces from the environment of the external surroundings and providing acoustic comfort. Acoustic comfort can be defined as providing an appropriate auditory environment that helps a person spend his time without disturbance or noise. Noise in buildings is reduced by using insulating materials such as double glazing, which works to protect from external noise (Ayoub et al., 2018) as shown in Figure 2.

Figure 2. Double glazing <https://engineering4trade.com>



It is noticeable that the comfort of people inside the spaces is based on isolating the spaces from the outside, and this isolation is done with self-interactive techniques that deal with the situations according to the desires of the users and depending on the situation surrounding the space.

Safety and Security

With the spread of the term interactive or smart buildings, a number of equipment that aim to achieve security and safety within the smart building have spread (Mohamed, 2011). The advantages that these buildings provide to increase safety and security requirements indicate the extent of the ability of these buildings to interact. For example detecting smoke and fire, early warning units, self-control units for air conditioning in emergencies as well as access control systems. With the spread of epidemics, smart buildings are required to provide

self-sterilization equipment or use antimicrobial surfaces, and the use of fire-resistant glass prevents flame transmission between spaces, the protection lasts for a period ranging between 45-120 minutes (Al-Mashhadani, 2010).

Entertainment

These applications include sculptures, water fountains, and walls that have adopted the concept of interaction as a sensitive and important element that works to entertain the user and prevent them from feeling bored inside the waiting spaces. For example, the concept of interaction can be adopted with regard to presenting and displaying medical educational clips in entertaining images) Al-Majid, 2017). Although these applications enable users to benefit from developing the minds of people in the waiting rooms and spending time in collaborative and interactive ways. Moreover, the exploitation of such applications in different spaces enhances their presence among users and gives them more depth and a greater impact on users (Fouad, 2012), as displayed in Figure 3.

Figure 3. Entertainment <https://engineering4trade.com>



Furnishing waiting rooms in private hospitals

Furniture is an important element from a functional point of view by achieving comfort. Aesthetically, furniture enriches and decorates the interior space and provides sensory pleasure to its occupants, as well as being evidence of the human presence inside the space (Al-Azzawi, 2008).

Furniture

Furniture is an important element that serves our bodies by achieving comfort, enriches the interior space, aesthetically decorates it. Furniture provides sensual pleasure as well as being evidence of human presence within the space, and it achieves its function when it meets the desires of users in terms of comfort and convenience (Al-Baldawi, 2005).

Waiting rooms in hospitals require a special type of furniture such as practical chairs that are designed to suit different categories of users and are suitable for frequent daily use. Furniture can also be used to provide users with pleasure, comfort, and space utilization, such as:

Interactive furniture

The interactive furniture is considered as a dynamic system and responds manually, digitally, or sensory according to the user's movement for a functional purpose to give the space a dynamic and changing dimension. Interactive furniture is one which interacts with the human body and need through the application of smart system and technology. There are many applications of interactive furniture in interior design, and we can review some of them:

Interactive Table

The table interacts with people by simply touching according to a smart system consisting of a red beam and a projector connected to the computer of the main controller of the interactive system of the table (Yahya, 2018), as in Figure 4.

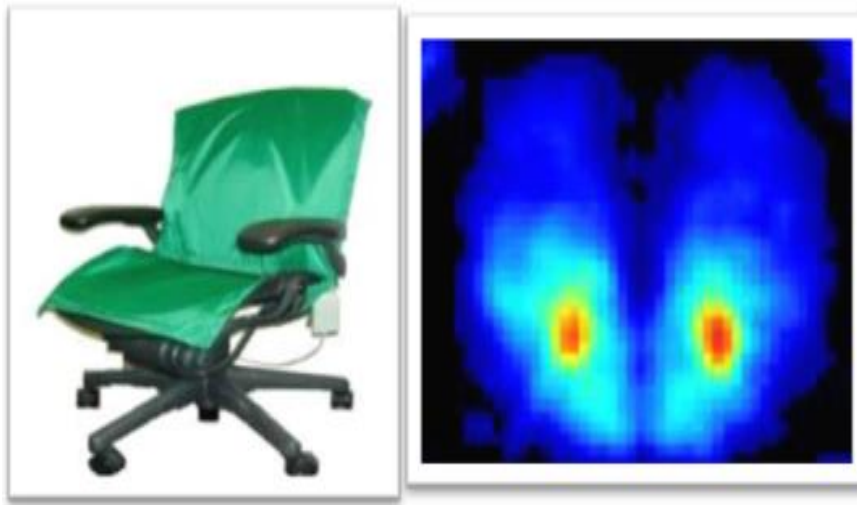
Figure 4. Smart table <https://m.globalsources.co>



Interactive chairs

Bad sitting causes physical problems and can be avoided by choosing interactive chairs that interact with the human body and its desires. Interactive chair is programmed in a way that makes it keep multiple sizes for different people, and it has the ability to adapt to the shape and size of the user, and it also issues an alarm if the user sits in an incorrect position so that the user pays attention to the way he sits. This is done by distributing sensors in a layer of the seat and back of the chair, as in Figure 5. Technology is to identify the person sitting on the chair, and this is done with high accuracy.

Figure 5. Interactive chair. <https://www.bing.com>



Built-in Furniture

It is a type of furniture designed for multiple uses and functions to meet the desires of its users. It also works to provide spaces within small spaces, in order to reduce crowding of furniture. We find that one of the desired goals of the built-in-furniture is the ability to spend fun and enjoyable time in a limited and small space, Figure 6.

Figure 6. Built-in-Furniture <https://www.google.com/search>



Colors

The psychological effects is divided into two parts: the first is direct effects that appear directly, such as fun, sadness, and joy. The other section is represented by indirect effects, which are variable effects according to people and their source is due to emotional associations and objective and non-objective impressions Automatically generated thematic. Colors affect the space users from a psychological point of view. For example, cold colors give a sense of comfort and relaxation, and hot colors give a sense of vitality and warmth. The most important influencing factors achieved by color in interior design can be summarized according to Muhammad (2007) as follows:

Physiological effect: Color effects the optic nerve, and then it has effect on brain areas related to physical or emotional functions.

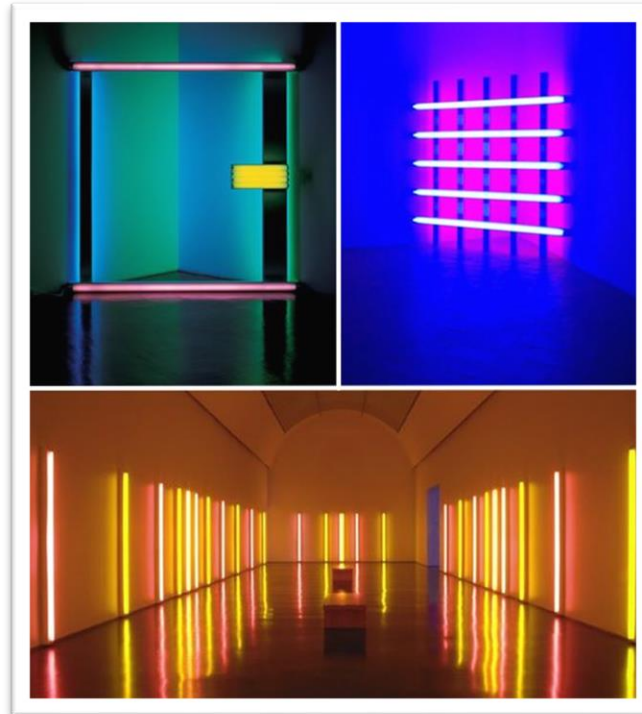
Attracting attention: It is the main function of colors, and it is done through a group of color effects that interact in the general shape of the design (contrast and gradation in color).

Psychological effect: the fact that color contributes to psychological emotions and the formation of reactions of space users.

Lighting

Lighting is one of the most important elements of attraction, excitement, or relaxation in the interior spaces through modern technical methods used by the designer to achieve the required function (Jassim, 2007). Designers should also take into account the development of strategies to control both daylight and artificial lighting (Cuttle, 2008). User can change the color of the space or the shape of space through the lighting used as in Figure 7. This was made possible by using modern technical methods of lighting called led lighting.

Figure 7. Color effect <https://www.bing.com>



Theoretical framework indicators

- 1- The possibility of interactive design is based on the creation of spaces that have the ability to respond dynamically to changes in the surrounding environment. This depends on the changing usage patterns of the user in an effective and ideal manner through distinguished capabilities in adaptation, flexibility, reorganization of the structure, changing of shape and other capabilities in order to prepare smart internal spaces.
- 2- There are several factors with an interactive design intellectual vision in the design of waiting rooms for hospitals, namely: comfort, safety and security, and entertainment.
- 3- Users' comfort in the waiting halls is associated with the material conditions transmitted by the senses and the mind to the users of the space in order to achieve satisfaction for the auditors in an appropriate environment

4- Comfort in the design of the interior spaces of the emergency lobbies is divided into main types, namely: thermal comfort, visual comfort, and acoustic comfort.

5- The use of multi-use furniture and accessories that interact with users provides pleasure, comfort and exploitation, in addition to the exploitation of spaces such as:

A- Interactive furniture (interactive chairs and interactive tables)

B- Built-in- Furniture.

6- Colors affect the users of the space from a psychological point of view. Cold colors, for example, give a sense of comfort and relaxation, and hot colors give a sense of vitality and warmth.

5- MATERIAL AND METHODOLOGY

Research design

Descriptive design was obtained to analyze the impact of interactive methods in the interior design of private hospital lobbies in order to achieve adaptation for its occupants. The study took place on waiting rooms in private hospitals in Baghdad, Rusafa, Al-Waziriyah from 1993-2019.

Research sample

Al-Ahly International Hospital, Baghdad/Al-Waziriyah will be the study sample. The results of the chosen purposive sample will be circulated to all private hospitals in Baghdad.

Description and analysis of the first model

International National Hospital / Waiting Rooms

Overview

The International National Hospital is one of the private hospitals, established in 2016, located in Baghdad/Al-Rusafa, Al-Waziriya area. It serves all individuals, ages, special and emergency cases. The hospital has the best modern medical and laboratory equipment. All hospital departments are connected to a computer network that reduces effort and

time and saves patients from using papers and lack of fluidity in movement. The patient is smoothly sequenced inside the hospital as soon as he enters, Figures 8.

Figures 8a. Facade of the National International Hospital



Figures 8b. Facade of the National International Hospital



Figures 8c. Facade of the National International Hospital



Model analysis

Interactive design objectives

The interactive fixed solutions provided their highest levels of providing solutions for unexpected future situations regarding fires, electrical protection, and sudden power outages. Interactive and sensory devices were installed in the waiting rooms that work automatically according to sound, heat, or light levels and emit sounds in case of any malfunction within the space. This contributed to an increase in the required efficiency level in hospital waiting rooms, as the availability of these supplies is an actual and effective necessity at the level of interactive design systems and in line with the physiological balance of space occupants, Figure 8a-c. The interior space of the model includes a set of balanced formations and configurations with modern developments.

We notice the availability of relatively interactive modern facilities such as the electric stairs that are located in the middle of the waiting and reception hall and work electronically equipped with sensors that detect people approaching, Figure 8b. We also notice the use of modern materials that lack interactive design, as the hidden lighting in the waiting room for the model came in a modern way and kept up with modern developments but lacked interactive design, Figure 8c. The aesthetic aspect of the model's design lies in the selected furniture and color harmony in drawing a clear picture that enriches the evaluation regarding waiting rooms. We notice the proportionality of furniture sizes with the size of the space with the lighting selected for the model. The designer's ability to collect vocabulary within a specific design fabric, which carries a specific ideological direction, is enhanced by showing the quality of waiting for this interior space, Figure 8c. This is evident in the secondary ceilings, which are characterized by being the most attractive and interactive part with lighting due to the reflections it provides and the visual spaciousness of the interior space.

Interactive design factors

Comfort was relatively achieved within the waiting rooms' interior space in terms of fulfilling the primary function of waiting, but not in terms of being isolated from other hospital spaces and the external environment. The space is not independent in itself, and its location is not properly directed. It is located near inquiries and the emergency room. Also, the location of the waiting room under the stairs may cause disturbances due to the sounds emitted by the electric stairs, as shown in Figure 8b. The proximity of the waiting area to the external door and inquiries does not provide acoustic comfort for visitors and does not make them feel comfortable in the waiting rooms. The location of the entrance door inside the interior space had a negative role in achieving comfort for waiting room users due to the noise it causes. As for lighting, it was balanced, relying on industrial lighting and natural lighting to illuminate the interior space. Natural lighting was effective and achieved its performance aspects due to the size of the door openings and the use of

corridors that provided space capacity and a suitable atmosphere for users, as shown in Figure 8c. Industrial lighting was sufficiently provided for clear vision without causing glare or discomfort. Safety systems in the waiting room are at achieved advanced levels in terms of safety and security regarding fire protection systems, electrical protection, and other risks. The model's ceilings included early warning sensors for detecting fires that operate automatically at specific temperatures, achieving the highest level of safety and security, as shown in Figure 8c. Likewise, entertainment was relatively achieved by using water fountains in the wall of the inquiries entrance and waiting room as a form of entertainment due to their interactive lighting with varying colors, as shown in Figure 8c.

Furnishing of waiting rooms in private hospitals

Furnishing elements in private hospital waiting rooms achieved varying values in terms of aesthetics, function, and adaptability to user requirements. The chairs used in waiting rooms provided moderate comfort during the waiting period due to their more fluid design, back and armrest support, and comfortable seat height ranging from 35-45 cm above the floor level, suitable for the primary function of the space, which is waiting. The materials used were of high quality for continuous cleaning and sterilization, with leather being the primary material used. The furniture organization mechanisms adopted the U shape method, as shown in Figure 8 b-c. However, the furniture achieved low values in terms of aesthetics related to the nature of contemporary and smart interactive developments for furniture uses. The model lacked interactive furniture in waiting rooms, such as interactive seats or tables, which are necessary for waiting rooms. The light colors used enhanced spatial openness and gave space to the room, as shown in Figure 8 c. The choice of colors achieved harmony between ceiling, floor, and furniture colors. The level of industrial lighting distribution was good overall and not disturbing or dazzling for space users. However, it would be preferable to use interactive lighting to reduce energy waste and its ability to close during natural light presence in the spaces.

6- RESULTS AND DISCUSSION

The analysis of the current research procedures resulted in a set of summarized results according to the analysis axes, which included the research procedures as follows:

1. Design interactive objectives

1- Providing an ideal and stable solution for future situations: Interactive stable solutions were achieved. They provide the highest levels in providing solutions for unexpected future situations, such as fires, electrical protection, and power outages in the model.

2. Using elements that keep up with modern developments: Modern elements were present in the model, including a balanced set of formations and structures that keep up with modern developments. We notice the availability of relatively interactive modern technologies, such as electrical stairs. However, the model lacked display screens and entertainment.

3- The aesthetic aspect of the model's design lies in the selected furniture and color harmony. The model creates a clear image that enriches the evaluation regarding waiting rooms. We notice the proportionality of furniture sizes with space size and the lighting selected for the model.

2. Design interactive factors

1- Comfort within the waiting rooms in the interior space was achieved to a relatively extent in the model. It was achieved for the basic function of the space, which is waiting, but it was not achieved in terms of isolation from other hospital spaces and the external environment.

2- Safety systems in the waiting room of the model was achieved to high levels in achieving the safety and security aspect regarding the fire system and electrical protection.

3- Entertainment was relatively achieved as water fountains were used in the model.

3. Furnishing in private hospital waiting rooms

Furniture, colors and lighting

1- The furniture was achieved varying values in terms of aesthetics, function, and adaptability to user requirements. However, interactive furniture was not achieved, as no interactive furniture elements were employed within the spaces.

2- The color choices achieved harmony and proportionality between the ceiling, floor, and furniture colors in the model according to the selected colors within the spaces.

3- The lighting was achieved at high levels due to the use of comprehensive lighting for the spaces.

7- CONCLUSION

The concept of design interaction is based on communication between humans and the surrounding environment. There is always an influencer and an influenced, an action and a reaction between eras to create a cohesive relationship that can have a positive or negative impact. The possibility of interactive spaces provides comfort requirements through the existence of integrated sensing systems in hospital walls to monitor movements and interactions within them by users.

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