Title:	**Improving the Value of Buildings Through a Smart Lobby Approach**
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Subjects:	Architectural/Design Vertical Transportation
Keywords:	Human Scale Interior Design Office Performance Based Design Vertical Transportation
Publication Date:	2016
Original Publication:	Cities to Megacities: Shaping Dense Vertical Urbanism
Paper Type:	1. Book chapter/Part chapter 2. Journal paper 3. **Conference proceeding** 4. Unpublished conference paper 5. Magazine article 6. Unpublished

Improving the Value of Buildings Through a Smart Lobby Approach | 通过智能大堂方案提升楼宇价值

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Abstract | 摘要

Office lobby environments provide the first impression of a building and reflect the values associated with tenants' brands. The need to maximize space efficiency, facilitate collaborative working, and counter competition from newer facilities is increasing the pressure to modernize existing office lobby environments. Optimizing people flow and user experience in offices requires a holistic assessment of overall building use – how people move horizontally and vertically, how the building functions, and how people use the available space. This assessment data can then be analyzed to develop solutions that significantly improve the building's operational performance. This paper presents a smart lobby approach that aims to create a seamless, enjoyable, and fluent experience for end users by combining expert knowledge of the individual complex and operational aspects of a building.

Keywords: Interior Design, Office, Performance Based Design, Renovation, Vertical Transportation

办公楼的大堂环境是建筑给人留下的第一印象，反映租户的品牌价值。空间效率最大化和设施协同运作的需求，以及新建办公楼带来的竞争，使得对现有办公楼大堂改造的压力越发紧迫。为了让办公楼的客流和用户体验达到最优，我们需要对建筑的使用进行全面评估——用户如何水平或垂直的在楼宇内部移动，办公楼如何运作，以及人们如何使用可利用的空间。这些评估数据经过分析后，可用于开发解决方案，显著提升建筑的运营表现。本论文提出了一种智能大堂方案，通过结合建筑中复杂个体行为方面的专业知识，为用户提供无缝，愉悦，顺畅的客流体验。

关键词：室内设计、办公楼、性能设计、建筑翻新、垂直交通

Introduction

The digital revolution is transforming buildings into smart environments that feature a variety of intelligent processes and technologies. The main purpose of these solutions is to enhance the operational functions of the building and create a facility that is safe, comfortable, and productive for its users (VTT, 2015). Optimized people flow is one of the key elements in creating a unified user experience for occupants and visitors. In smart buildings, solutions must be integrated and, more importantly, their joint effect on people flow must be considered in the building design (Virtanen, 2015). If this does not happen, the smart building will not be able to serve its intended purpose.

This paper presents a Smart Lobby approach that improves the value of buildings by linking unified user experience to optimized people flow (Figure 1). It focuses on existing office lobby environments requiring renovation or modernization. In such cases, people flow planning and building design should be based on the building's current use and traffic. The Smart Lobby approach provides solutions for measuring and monitoring the traffic,

引言

数字化革命正将建筑打造成配备各种智能方案和技术的智能空间。这些解决方案的主要作用在于提升建筑的运作功能，并为用户创造安全、舒适、高效的环境（VTT，2015年）。优化的客流是为住户和访客创造统一用户体验的关键要素之一。在智能建筑中，须将各种解决方案整合为一个整体，更重要的是，在建筑设计时须充分考虑这个整体对客流的作用（Virtanen，2015年）。否则，智能建筑将无法达到其预期的标准。

本文提出了一种智能大堂方案，通过将统一的用户体验与优化的客流联系起来，提升建筑价值（图1）。该方案主要适用于需要翻修或更新改造的办公楼大堂。在这种情况下，应当根据建筑当前的使用情况和用户路径进行客流规划和建筑设计。智能大堂方案为测量和监控用户路径提供了解决方案，同时为决策提供了数据和分析基础。这种方法不仅能够提升用户体验，还能为建筑业主和物业管理者等其他利益相关者带来切实的益处。

用户体验是指终端用户与一家公司——包括其服务和产品——之间的全方位互动。智能大堂方案是一项全面的服务，在结合

Figure 1. The Smart Lobby approach improves the value of buildings. (Source: KONE Corporation)
图1. 通过智能大堂方案提升建筑价值。（来源：通力集团）

which in turn enable data and analytics-based decision making. This approach not only improves the user experience, but also provides concrete benefits for other relevant stakeholders such as building owners and property managers.

User experience refers to all aspects of the end user's interaction with a company, its services and products. The Smart Lobby approach is a holistic service that takes customer and end user needs into consideration and provides support during the building modernization process. A unified user experience for end users is created on the basis of a thorough building survey and assessment, the office concepts of tenants, the building users, and the business goals set by the owner. This insightful study simplifies decision making and the lobby redesign process, and supports optimized people flow. Through the Smart Lobby approach, lobbies are transformed into lively spaces that welcome visitors, operate effectively, and provide building users with a smooth path of travel. This approach also cuts costs for building owners as it eliminates misinterpretations and incorrect assumptions from the design process that would otherwise result in necessary adjustments after the modernized lobby is opened.

The paper will begin by discussing why a building may need modernizing and when this typically occurs during its lifetime. This sets the expectations for the Smart Lobby approach. This discussion is followed by a

description of the elements of a unified user experience and optimized people flow. The paper then closes with a discussion of the benefits of the Smart Lobby approach and conclusions.

Modernization Needs and Triggers

To secure a return on their investments, office property owners need to continuously maintain their buildings' competitiveness to retain existing tenants and attract new ones. This is a constant challenge as tenants' needs and efficiency requirements change over time. There is also a need to keep up with the technological developments related to smart office buildings.

The key workplace trends are increased focus on wellbeing, an aging workforce, increased collaboration needs, and communication technology developments (2015 Trends in the Workplace, 2015). New building development projects are increasingly responding to these needs, for example with more efficient space utilization, flexible layout solutions, and certified spaces to support the growth path and brand image of tenants.

These trends, together with the draw of attractive set-ups in newer offices, may lead to a tenant changing location; at the very least they increase the pressure on building owners to provide existing tenants with better service. These are the most common

客户和终端用户需求的基础上，为建筑的更新改造提供支持。要建立统一的用户体验，需要对建筑进行全面的调查和评估，理解租户和用户的办公理念，以及业主的业务目标。这种深入的研究能够简化决策和重新设计大堂的流程，并有助于优化客流。智能大堂方案能够将大堂转变为焕发活力的空间，舒适惬意，高效运转，为用户提供顺畅的行动路径。同时，此方案也为建筑业主降低成本，因为它在设计过程中就消除了各种误解和错误的假设，避免在大堂改造完成后再作调整。

本文将首先探讨建筑需要更新改造的可能原因，及其在建筑生命周期中出现的典型阶段。这为智能大堂方案的实施设置了前提条件。然后，介绍统一的用户体验和最优化客流中的关键元素。最后，探讨智能大堂方案的价值，并得出结论。

更新改造需求和触发因素

为保证投资回报，办公楼业主需要不断维护建筑的竞争力，以留住现有租户，并吸引新的租户。这是一项持续的挑战——随着时间的推移，租户的需求和对效率的要求都在发生变化。此外，业主还需要紧跟智能办公楼的技术发展潮流。

工作场所发展的主要趋势更加强调健康、劳动力老龄化、更频繁和紧密的协作以及通信技术的发展这些方面（《2015年工作场所趋势》，2015年）。新的建筑开发项目为应对这些需求，积极地采取了多项行动，如通过更加高效的空间利用、灵活的

triggers to improve the building through renovation (Figure 2). The other triggers for renovation are changes in the tenants' needs, such as transformation to a different office concept or visitor-management process, and new demands on building performance linked to a change in property ownership where the new owner has assumed a higher building population in their valuation model. Another trigger for renovation is an increased number of unplanned service breakdowns in the building's technical systems causing dissatisfaction among tenants. In the best-case scenario, the trigger is a well-planned, scheduled building upgrade.

As the need for renovation may arise suddenly – for example, if the main tenants decide to leave or if their needs have changed – or as the result of a planned upgrade, the depth and scope of the renovation will also vary. For the property owner, the challenge is to find the right balance between the magnitude of the renovation, including the duration and the investment required, and the intended benefits. Thus, the approach and alternatives should be scalable and modular. In all of the above cases, it is of the utmost importance to carefully plan the renovation in advance.

Unified User Experience

The physical environment is read like we read a human face. When entering an office building, a person's first impression is important. Whether that person is visiting the building for the first time or is an employee who works there every day, their first impression has impact on their mood and wellbeing, as well as their perception of the company they work for or are visiting. The form, functionality, and finish of a space reflect the culture, behaviors, and priorities of the company. Most companies want to be seen as attractive, and visitors already form an opinion about the company in the building lobby. It is therefore important to have a lobby solution

Customer life cycle
- Tenant leaving / new tenant
- Needs of tenant changes
- Changes in ownership
- Building facelift needed
- Asset management planning

Building life cycle
- Building refurbishment
- HVAC renovation
- Building functions changing
- Regulatory demands

Figure 2. Typical triggers for modernization. (Source: KONE Corporation)
图2. 更新改造的典型触发因素。（来源：通力集团）

that ensures a pleasant experience for every user group, by providing a seamless and intuitive path of travel to their destination.

The user experience in a building environment is made up of multiple aspects, including the interior design, functionality, aesthetics, ergonomics, integrated building systems, sound and smell, brand features, and ambiance. The Smart Lobby approach combines practical functions, technologies, and visual design with an understanding of end user behavior and lobby-usage data in a single coherent solution. For instance, the different office concepts of the building's tenants have an effect on the lobby. Companies with a free-seating desk policy have different traffic patterns to those with fixed desks on specific floors. As ways of working change, the boundaries between different functions in buildings are also less clear than before. There are recreational areas inside offices, and business meetings are held in coffee shops. As a result, the request for multi-purpose spaces has dramatically increased, and this trend is also reflected in office lobbies (Figure 3).

布局方案和认证空间以支持租户的发展和品牌形象经营。

这些趋势，以及新办公楼更具吸引力的配置，可能会导致租户更换办公场所；至少，这增加了现有建筑业主们的压力，促使他们为现有租户提供更好的服务。这些都是触发业主通过翻新来改进建筑的最常见因素（图2）。触发翻新的其它因素包括租户需求变化，如办公理念的转变或访客管理流程的改变，以及建筑所有权变更带来的对建筑性能的新需求，如新业主在估值模型中假设了更高的建筑人口。另一种因素是建筑技术系统出现意外故障的次数增加，引起租户不满。最好的情况是，触发因素是经过周密计划、有安排的建筑升级。

翻新可能是突然出现的需求——比如主要租户都决定离开或者他们的需求发生了变化，也可能是计划好的建筑升级，不同情况下翻新的程度和范围都将有所不同。对业主而言，挑战在于如何平衡翻新工程的各个方面，包括持续时间、所需投资和预期效果，以确定合适的工程规模。因此，翻新方法和方案应当是模块化的，并具可扩展性。在上述所有情况下，最重要的一点是，进行翻修之前必须做好精心的规划。
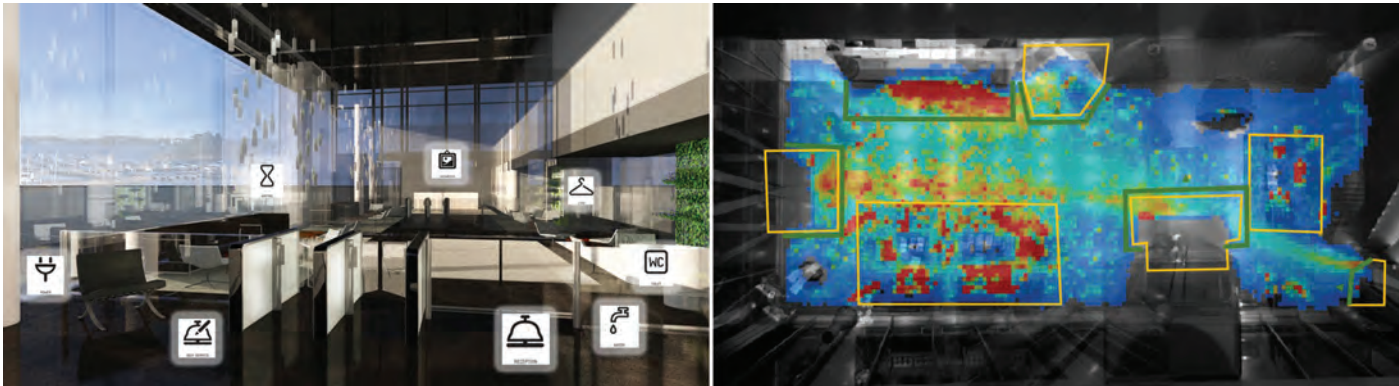

Figure 3. Lobby functions and heat map. (Source: KONE Corporation)
图3. 大堂功能和热点图。（来源：通力集团）

Figure 4. The different user groups in buildings. (Source: KONE Corporation)
图4. 建筑内不同的用户群组。（来源：通力集团）

In order to be able to create a unified user experience in a building, it is important to understand all user groups and their daily tasks and traffic patterns. These groups include the daily office occupants, people delivering goods and parcels, VIPs, people with restricted mobility, service-provider personnel, and one-off or frequent visitors (Figure 4). The routes and flow of people and goods should be studied carefully, identifying the most commonly used entrances, dwell times, bottlenecks, and crossflows, as well as sight lines and actions taken by end users, such as finding a bathroom or parking a bike (Figure 5). With this approach, the route and experience of an investor arriving for a meeting or a deliveryman with a package is planned based on their roles. This provides key insights for redesigning the lobby.

Accessibility is a key issue that must be addressed in the redesign process of office buildings. For millions of people with disabilities, access to buildings and

统一的用户体验

实体环境就像人的脸——进入一栋办公楼时，建筑给人留下的第一印象至关重要。无论是初次进入这栋建筑的访客，还是每天在此工作的员工，第一印象都会影响他们的情绪，以及对自己工作或将要访问的公司的看法。空间的形式、功能和装饰体现了一家公司的文化、行为模式和优先关注的事项。大多数公司都希望给人留下深刻的积极印象，而访客对公司的看法通常早在办公楼大堂里就已形成。因此，一个能够愉悦各个用户群体的大堂解决方案显得至关重要，例如为用户提供前往目的地无缝且直观的通行路径。

建筑环境中的用户体验由多个方面组成，包括室内设计、功能性、美观性、人体工程学、综合建筑系统、声音和气味、品牌特征和环境氛围。智能大堂方案通过对终端用户行为的理解和大堂使用数据的分析，将实用功能、技术和视觉设计整合在一个单一清晰的解决方案中。举例来说，建筑租户不同的办公理念会对

大堂产生影响。办公桌自由摆放的公司和办公桌固定摆放的公司拥有不同的客流模式。随着工作方式的演变，建筑内不同功能之间的界限也越来越模糊。办公室内设有休闲区域，而商务会议也能在咖啡厅举行。因此，对于多功能空间的需求急剧增加，而这种趋势也同样反映在办公楼大堂（图3）。

要在建筑内创造统一的用户体验，了解所有用户群组、他们的日常活动和客流模式至关重要。这些群组包括日常办公租户、货物运送和快递人员、VIP、行动困难人群、服务人员以及单次或频繁访客（图4）。对于人员和货物的移动路径和流动应当进行仔细研究，找出最常用的入口、停留时间、客流停滞点和客流交叉口，以及终端用户的视线和行动——如寻找卫生间或停放自行车（图5）。通过这种方法，我们可以根据不同用户群组的角色（前来参加会议的投资人或递送包裹的快递员）规划相应的用户路径和体验。这为大堂的重新设计提供了重要的依据。
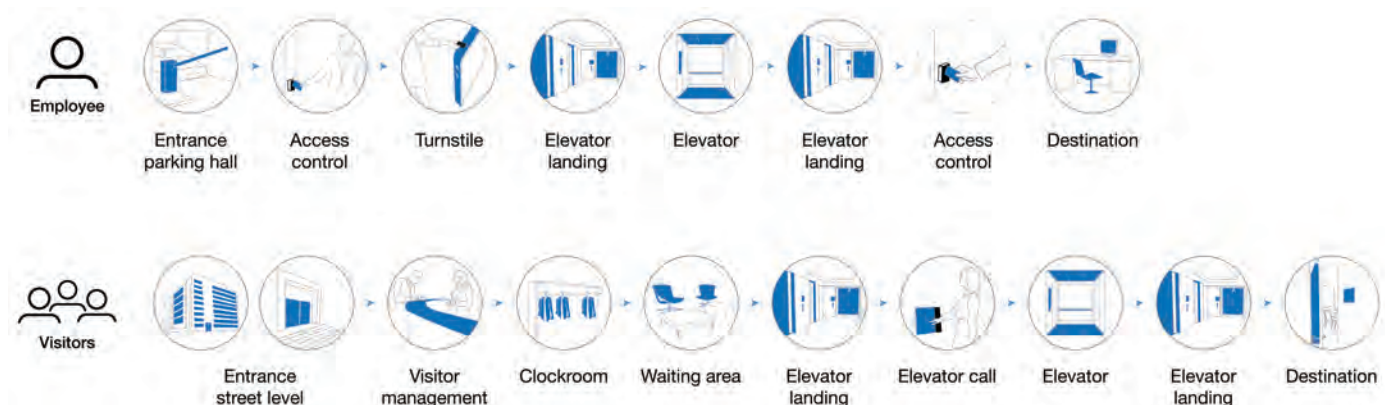

Figure 5. Potential user paths in buildings. (Source: KONE Corporation)
图5. 建筑内潜在的用户路径。（来源：通力集团）

public outdoor areas is only possible with help from a third party. In the Smart Lobby approach, accessibility and safety are carefully considered in order to make arriving at the building and moving around within it smooth for anyone with restricted mobility.

Aesthetics plays an important role in office lobbies. Materials, lighting, furniture, and layout – together with details such as infographics and even the receptionists' outfits – are the basis of a building's aesthetics and profile. Fluent lobby services are highly appreciated as occupants and visitors value their time. Easy and effective visitor management systems, intuitive guidance, and the availability of building information are key elements of lobbies (Figure 6). Visitors

无障碍通行是办公楼重新设计过程中必须考虑的一个重要问题。数百万的行动困难人群只有在第三方的帮助下才能出入建筑和户外公共区域。智能大堂方案充分考虑了无障碍通行和安全问题，以保证行动困难人群能够顺畅的进入建筑并在建筑内部通行。

美观性在办公楼大堂中发挥着重要的作用。建材、光线、家具和布局，以及信息图表甚至前台工作人员的服装等细节构成了建筑美观性和格调的基础。住户和访客都很重视自己的时间，因此，流畅的大堂服务备受关注。轻松高效的访客管理系统、直观的方位指引和容易获取的建筑信息是大堂的关键元素（图6）。访客应当能够直观地找到卫生间和衣帽间的位置，并且能够连接建筑的无线网络。前台服务

提供的一杯咖啡和一个微笑能够进一步完善用户体验。

为确保更新改造期间与完工后用户体验的独特性和统一性，智能大堂方案在规划阶段即与客户及终端用户紧密合作。了解客户和他们的流程，以及建筑的运营情况是规划智能大堂方案的核心。方案充分考虑所有的客户交互、支持资料以及沟通渠道，以保证它们能够同时满足客户和终端用户的需求。智能大堂方案克服了不同建筑系统的复杂性，为建筑运营商提供了简单明晰的解决方案。从建筑的初始评估和结果分析，到设计阶段、安装工作和后续服务，客户在整个过程中只需与一家供应商合作。
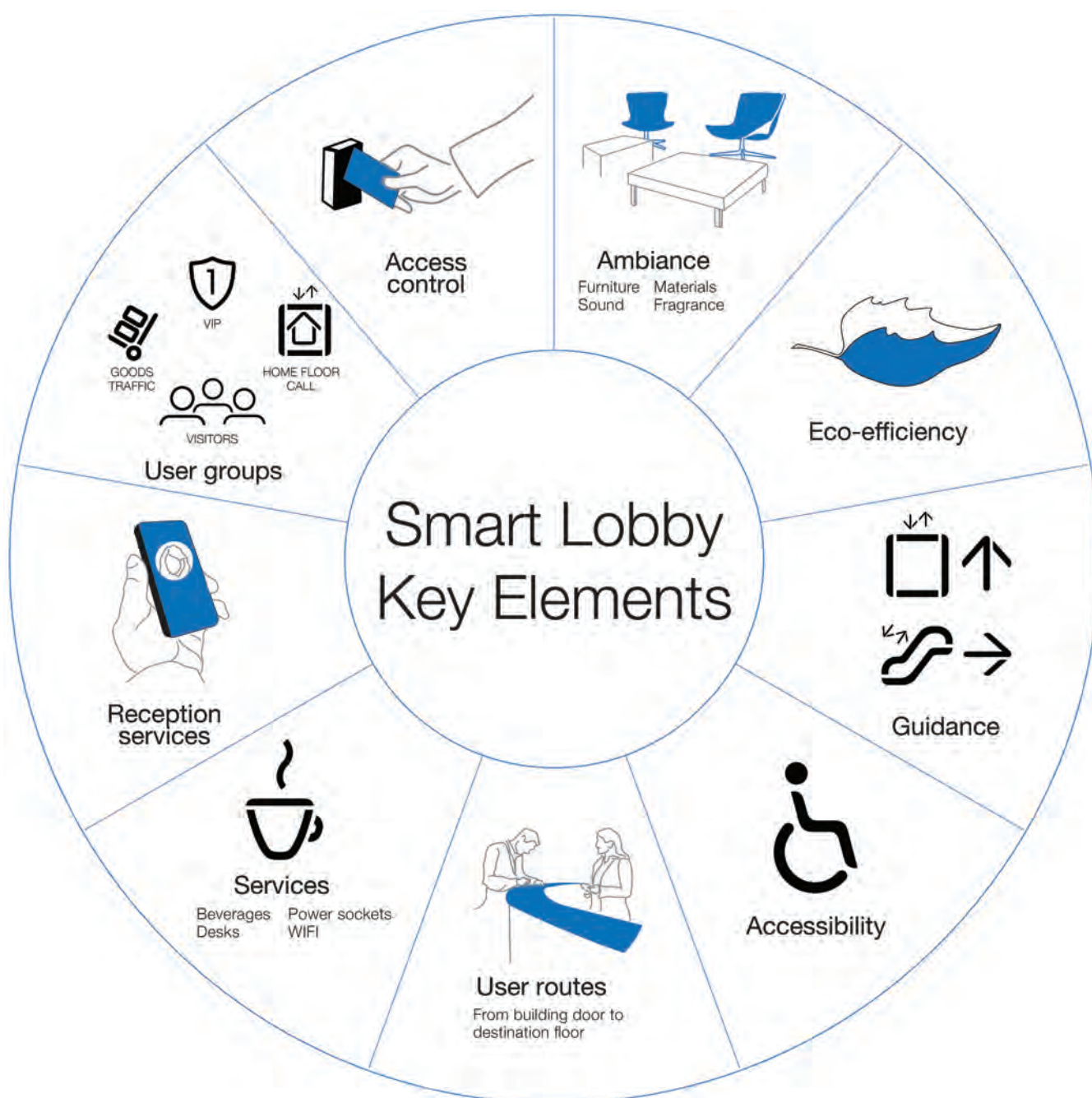

Figure 6. The key elements of building lobbies. (Source: KONE Corporation)
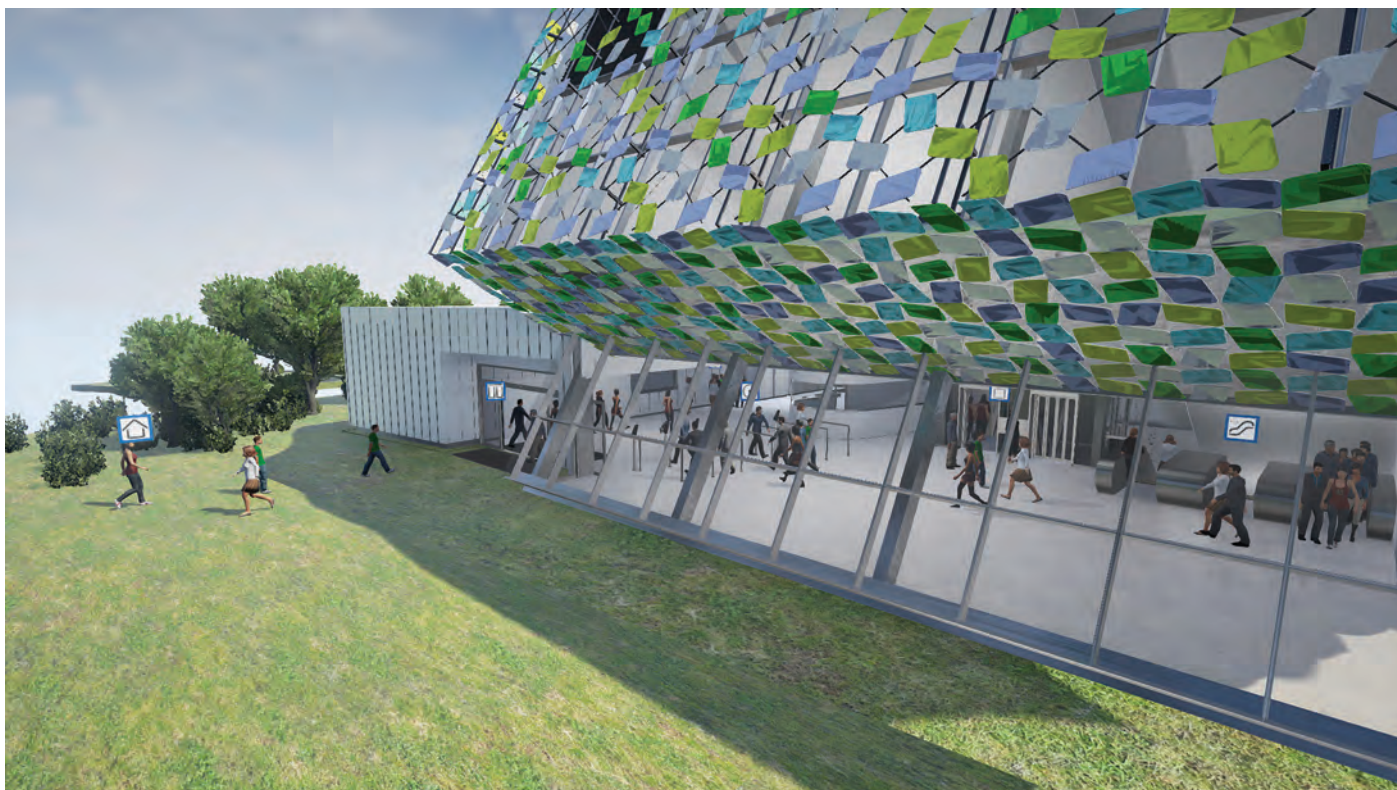图6. 建筑大堂的关键元素。（来源：通力集团）

Figure 7. A snapshot from a simulation. The blue squares mark hotspots such as front doors, escalators and elevators. (Source: KONE Corporation)
图7. 模拟工具截图。蓝色方块代表客流热点区：如主入口，扶梯与电梯。（来源：通力集团）

should be able to intuitively identify the lavatory and cloakroom locations and connect to the building's Wi-Fi network. A cup of coffee and a smile from the receptionist completes the experience.

The Smart Lobby approach is created in collaboration with customers and end users in order to ensure that the user experience both during and after the modernization process is unique and unified. Understanding the customer and their processes, as well as the operations of the building, is at the core of the approach. All customer interactions, support materials, and communications are carefully thought through to ensure that they serve the needs of both the customer and the end users. The Smart Lobby approach provides simplicity for building operators among the complexity of different building systems. The customer has a single contact point for the entire process, from the initial assessment of the building and analysis of the results, to the design phase, installation work, and ongoing service.

Optimized People Flow

The overall people flow experience in a building depends on the usability and efficiency of all the devices and hotspots on the journey from the front door through the lobby all the way to the final destination. Hence, optimized people flow is the result

of people flow planning where the journey as a whole is considered rather than just the individual devices and hotspots separately. For example, excellent individual elevator and turnstile performance does not necessarily translate into an excellent people flow experience, especially in a complex space with several possible user paths.

People flow is analyzed and planned based on several different parameters. The most important is probably the total journey time, which can be defined as the time spent traveling from the front door to the final destination. Total journey time can be divided into vertical and horizontal dimensions. The core element of the vertical dimension in any high-rise building is the elevators. Their performance is typically studied based on waiting time and time to destination (Siikonen, 2016). For horizontal traffic, there are parameters such as usage of space, dwell time, and crossflows or paths. Horizontal traffic can be analyzed and illustrated using a heat map (Figure 3). This type of analysis helps to identify hotspots and potential problems like traffic bottlenecks.

At the core of the Smart Lobby approach is a state-of-the-art people flow simulation tool (Figure 7), which is used to study the people flow of different lobby configurations. The key components affecting people flow in the lobby are turnstiles and call-giving and signalization devices. Turnstiles have a big impact on people flow since end users

优化客流

建筑的总体客流体验取决于从大门到大堂直至最终目的地的通行过程中，所有设备和热点区域的可用性和效率。因此，优化的客流是对客流进行规划的结果——我们必须整体考虑一段行程，而非分开单独考虑各个设施和热点区域。举例来说，单部电梯和闸机分别的优异性能并不一定能带来优异的客流体验，特别是在拥有多条用户路径的复杂空间内。

客流的分析和规划基于几个不同参数。其中最重要的参数应该是总行程时长，可以被定义为从大门到最终目的地所花费的时间。总行程时间可分为垂直和水平行程两个维度。任何高层建筑内垂直行程的核心元素都是电梯。对电梯性能的研究通常基于等待时间以及抵达目的地所需的时间（Siikonen，2016年）。水平行程的参数包括空间利用、停留时间以及客流交汇或路径。水平行程可用热图来分析和说明（图3）。这种分析有助于识别客流热点区和交通瓶颈等潜在问题。

智能大堂方案的核心是一个先进的客流模拟工具（图7），用于研究不同配置的大堂内的客流。影响大堂客流的关键部分包括闸机、呼梯设备和信号装置。闸机对客流具有很大的影响——通常终端用户必须通过闸机后，才能进入建筑的电梯。因此，该模拟工具可用于定义闸机的数量和位置，确保它们具备充分的客流处理能力，且处于最佳位置以实现高效的客流和门禁管理。举例来说，电梯与闸机之间的距离应当足够远，以便为乘客提供足够的

typically have to pass through them, for example to access the building's elevators. The simulation tool can be used to define the number and location of the turnstiles so that they have enough capacity to handle the traffic and that they are optimally located to provide efficient people flow and access control. For example, the distance between the elevators and turnstiles should be long enough to allow enough space for waiting passengers, but not so long that passengers cannot easily find their way to the elevators. This applies also to other call-giving and signalization devices such as touchscreen operating panels. To further optimize the total journey time and user experience, the turnstiles can be configured to provide an automatic destination or home-floor call based on the information stored on users' access cards. The simulation tool can also be used to define an intuitive positioning and visual design for guidance signs, as well as to study how users actually experience the space and the journey (Figure 8).

One major advantage of the simulation tool is that any future changes in, for example, the building's population can be easily taken into account. In addition to defining the optimal configuration, the tool can also be used to define the optimal modernization process – i.e., the phases in which the elevators should be modernized in order to minimize the impact on people flow. The results of the planning phase consist of analysis reports, including various performance tables and graphs, and 3D videos visualizing the people flow in the lobby during, for example, a peak traffic period.

One of the key simulation inputs is the process that describes how passengers arrive at and move around within buildings. It has been shown, for example, that in office buildings people often arrive alone in the

morning but move around in groups during lunchtime (Alexandris, 1977; Kuusinen et al., 2012). Another important input is the traffic profile, where an arrival intensity and traffic pattern is defined for each simulation interval (Figure 9). The intensity defines how many passengers of the total building population move around within the building during a given time interval, while the traffic pattern defines the traffic component of each passenger in that interval. Typically, each passenger belongs to the incoming, outgoing, or interfloor traffic component. Behavior-related phenomena such as preferred routes and passenger groups emerge as a result of the intelligent models and algorithms built into the simulation tool.

New buildings are simulated and planned based on the assumed population and existing general traffic patterns and profiles. There are general profiles for different types of buildings. However, in a modernization project it is important to know what the actual traffic profile in the building is. If the simulated traffic does not match the real building traffic profile, then the current elevator and people flow performance cannot be accurately determined, making it difficult to propose appropriate corrective actions – such as upgrading specific equipment – and define the optimal modernization schedule. In addition, it is important to know the actual values for elevator parameters such as speed, acceleration, and jerk. These parameters all affect the planning results, and if the simulated values do not correspond to the actual values, the proposed corrective actions may not be valid.

The Smart Lobby approach includes intelligent sensors and devices that can be used to measure the actual building traffic profile and elevator parameters (Batey and Kontturi, 2016), as well as the horizontal

候梯空间；但距离也不能过远，以至乘客无法轻松找到通往电梯的路径。该工具同样适用于其他的呼梯设备和信号装置，如触摸式操纵面板。为进一步优化总行程时间和用户体验，可对闸机进行设置，根据用户门禁卡上存储的信息，闸机能提供自动的目的楼层或基站楼层呼梯。该模拟工具还可用于为指示标识定义直观的位置和视觉设计，以及研究用户对空间和行程的实际体验（图8）。

该模拟工具的主要优势在于可轻松的将建筑未来的任何变化考虑在内，如建筑内人口的变化。除定义最优配置外，该工具还可用于定义最佳的更新改造流程，例如，确定电梯更新改造最佳阶段以最大限度降低其对客流的影响。规划阶段的结论由多个分析报告组成，通过各种性能图表以及三维视频，形象地展示如高峰期时段内大堂的客流情况。

模拟带来的一个关键信息是对乘客如何抵达以及在建筑内外移动过程的描述。举例来说，分析显示，在办公楼内，早上人们通常独自抵达办公楼，午餐时间则以群组为单位在建筑内移动（Alexandris，1997年；Kuusinen等，2012年）。另一重要信息是交通流量分布，即为每一段模拟间隔时间定义抵达客流密度和交通流量模式（图9）。客流密度用于定义在建筑总人口中，给定的间隔时间内，建筑中正在移动的乘客数量，而交通流量模式则用于定义每位乘客在该间隔时间内的交通模式。通常情况下，每位乘客的交通模式都可被定义为进入电梯、离开电梯或在楼层之间。该模拟工具中内置了智能模块和算法，能够生成如最佳路线和用户群组等行为现象统计结果。

新建筑根据假定人口和已有的通用交通流量模式和分布进行模拟和规划。不同的建筑类型拥有对应的通用交通流量分布模式。但在更新改造项目中，了解建筑的实际流量分布十分重要。若模拟交通流量与建筑的实际交通流量分布情况不匹配，则无法精确判定现有电梯和客流的情况，导致难以提出合适的纠正措施——如升级特定的设备，且难以确定最佳的更新改造时间计划。此外，了解速度、加速度和加速度变化率等电梯参数的实际数值也很重要。这些参数都会影响规划效果，如果模拟数值与实际数值不匹配，所提出的纠正措施可能无效。

智能大堂方案包含智能传感器和设备，用于测量建筑的实际交通流量分布和电梯参数（Batey和Kontturi，2016年）以及大堂和大门入口等其他重要流量热点区域的水平流量。这些设备可以临时安装，以数据为基础建立对大堂客流的认知——例如确定不同入口的使用率，并收集准确的数据用于分析和规划。或者，这些传感器可以永久性地安装在用户路径上，持续监测

Figure 8. Defining optimal guidance placement using the simulation tool. (Source: KONE Corporation)
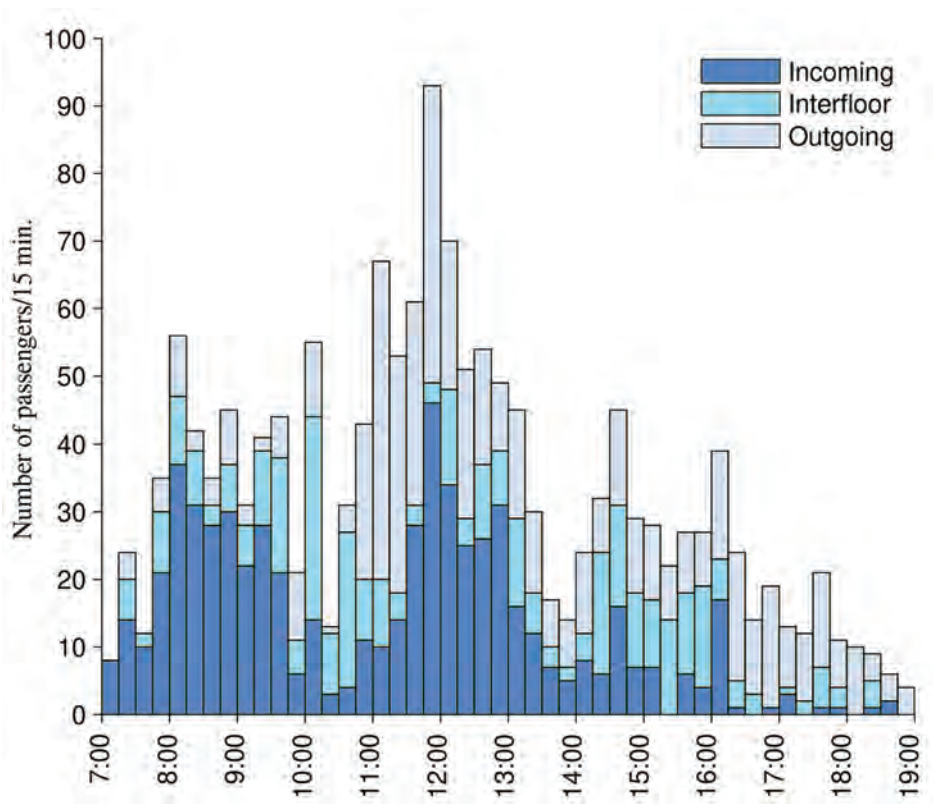图8. 使用模拟工具定义最优指引布局。（来源：通力集团）

Figure 9. Vertical traffic profile of a multi-tenant office building clearly showing the morning peak and lunch peak periods. (Source: KONE Corporation)
图9. 多租户办公楼的垂直交通模式明确地显示出早午客流高峰期。（来源：通力集团）

traffic in the lobby and other important traffic hotspots such as the front entrance. These devices can be installed temporarily to establish a data-driven understanding of the people flow in the lobby – for example, to determine the popularity of different front doors – and to collect accurate data for analysis and planning. Alternatively, these sensors can be permanently located along the user paths to allow continuous monitoring of how the flows develop over time and determine if interventions are needed.

Benefits of the Smart Lobby Approach

The Smart Lobby approach provides many benefits for the different stakeholders in a modernization project. The most important stakeholders are the tenants because they are the main reason for a building to exist. A unified user experience linked to optimized people flow planning results in satisfied tenants. Optimized people flow reduces the time spent traveling to the final destination, which in turn increases productivity. Increased tenant satisfaction helps building owners retain existing tenants and attract new ones. In addition, building owners benefit from improved usage of available space. Free space can be used to provide temporary working stations or relaxation areas, or even rented to a third-party service provider such as a coffee shop to increase tenant satisfaction and

wellbeing, as well as profitability. A modern and efficient building will also be able to command higher rents. The monitoring and analytics solutions used in the Smart Lobby approach provide historical people flow data that can be used to understand patterns and changes. They support building owners, property managers, and architects in people flow planning and design decisions.

The Smart Lobby approach only achieves its full potential when the planning, devices, and services are provided by the same company. While committing to only one provider may be a concern for building owners, it has significant benefits. For example, the one-stop-shop approach simplifies communication and operation, increases transparency of things like costs, and provides a clear interface for ongoing support. In addition, when all the devices come from the same manufacturer they are designed to work together seamlessly, making them easier to integrate and maintain.

The Smart Lobby approach is divided into modules that the customer can select from based on their specific modernization needs. In some cases the needs are limited to elevators; in other cases the whole lobby area requires a facelift. In the former, it may be sufficient to perform a light assessment that includes the mechanical condition and performance of the elevators and make a rough estimate of the building population

不同时段的交通流量情况，并以此决定是否需要进行调整。

智能大堂方案的价值

在更新改造项目中，智能大堂方案可以为不同的利益相关者带来诸多好处。租户作为建筑存在的主要原因，是最重要的利益相关者。与优化的客流规划相结合的统一用户体验，能提高租户满意度。优化的客流缩短用户到达目的地所花费时间，即提升整体效率。租户满意度的提高有助于建筑业主留住现有租户，并吸引新租户。此外，建筑业主还能受益于租售空间利用率的提高。空闲空间可用于提供临时工作站或休息区，还可租给咖啡厅等第三方服务提供商，以提升租户的满意度和幸福感，同时为业主赚取利润。一座现代又高效的建筑可以提出更高的租金标准。智能大堂方案中使用的监测和分析解决方案能够提供历史客流数据，这些数据可用于了解交通流量模式和变化。它们为建筑业主、物业管理者和建筑师在客流规划和设计决策的过程中提供依据。

只有在规划、设备和服务均由同一家公司提供的情况下，智能大堂方案才能发挥出最大的潜力。虽然仅选择一家供应商对建筑业主来说可能有所顾虑，但这种做法能带来显著的好处。举例来说，一站式方案能简化沟通和运营，增加成本等方面的透明度，并保持服务和支持的连贯性。此外，当所有设备均来自同一制造商时，这些设备已被设计为无缝协作的整体，集成和维护工作更加轻松。

智能大堂方案分为多个模块，客户可根据具体的更新改造方法有选择的使用。有些情况下，改造需求可能仅限于电梯；而在其他情况下，整个大堂区域都可能需要改头换面。在前一种情况下，只需对电梯的机械状况和性能等进行简单评估，并对更新改造前后的建筑人口进行粗略估计。基于这些初步评估，可以确定是否需要进行更全面的评估，包括建筑实际交通流量分布情况的测量、分析和设计、电梯性能、大门和大堂区域的使用率和客流路径，以及建材和其他设计元素。在要求更高的情况下，通常需要进行这样的全面评估。进行全面评估后，客户可以确定是否需要安装传感器，以便充分利用该方案的好处，获取不间断的数据收集、监控和分析服务。

结论

随着人们对健康和劳动力老龄化的日渐重视，对紧密协作和更高效率的追求，建筑正在通过各种数字化服务转变为智能空

before and after modernization. Based on this initial assessment, it may be decided that a more comprehensive assessment is required, involving the measurement, analysis, and design of the actual building traffic profile, elevator performance, usage of front doors and lobby areas, and people flow paths, as well as materials and other design elements. Such a comprehensive assessment is typically required in more demanding cases. Following the comprehensive assessment, the customer can decide whether to keep the sensors in place in order to take full advantage of non-stop data collection, monitoring, and analytics services.

Conclusions

With the increased focus on wellbeing and the aging workforce, as well as increased collaboration needs and efficiency requirements, buildings are transforming into intelligent environments with many digitalized services. While new office buildings are increasingly responding to these trends, it becomes more difficult for existing buildings and their owners to retain and attract new tenants. Modernization, particularly of the lobby, is a relatively quick and cost-effective way for building owners to keep up with the competition.

This paper presents a Smart Lobby approach that links unified user experience with optimized people flow in order to increase building value. A unified user experience is created by combining practical functions, technologies, and visual design with an understanding of end user behavior and lobby-usage data in a single coherent solution. This includes identifying different tenants and their office concepts, as well as different user groups and their daily tasks and traffic patterns. Aesthetic elements such as materials and lighting also play an important part in this approach, as does accessibility, which is carefully assessed to allow easy movement for people with restricted mobility. The approach is created in close collaboration with customers to ensure that it fulfills their needs and those of their end users.

The Smart Lobby approach includes advanced people flow analysis, planning, and monitoring solutions to optimize people flow in the lobby. Optimization is primarily based on a cutting-edge people flow simulation tool that is used to analyze and plan different lobby configurations – including the number and location of turnstiles, call-giving devices, and guidance signage – and to define the optimal modernization process. The approach also takes advantage of intelligent sensors to measure and monitor the actual people flow in the building and the performance of the elevators. The optimal path to modernization can be determined by decisions based on data and facts rather than guesswork and estimations, and building owners can find the right balance between the extensiveness of the renovation, the duration, the investment required, and the intended benefits. Hence, the Smart Lobby approach takes into account all relevant stakeholders providing ease, effectiveness, and efficiency to end users and customers throughout the entire building lifecycle.

间。在新办公楼积极响应这些趋势的同时，对现有建筑业而言，想要留住现有租户并吸引新租户正变得越来越困难。要保持竞争力，建筑的更新改造，特别是针对大堂的更新改造是一种相对快速且经济实惠的方法。

本文提出了一种智能大堂方案，通过将统一的用户体验与优化客流联系起来，提升建筑价值。通过对终端用户行为的理解和大堂使用数据的分析，将实用功能、技术和视觉设计整合在一个单一清晰的解决方案中，从而创造统一的用户体验。这包括识别不同租户及其办公理念，了解不同的用户群组以及他们的日常任务和交通流量模式。在此方案中，建材和光线等美学元素也发挥着重要作用，无障碍通道也是如此——通过仔细评估，可让行动困难的人群在建筑内外轻松地移动。该方案的建立和实施需要与客户紧密合作，以确保能够同时满足客户及其终端用户的需求。

智能大堂方案包含先进的客流分析、规划和监控解决方案，以优化大堂内的客流。优化主要依托一种顶尖的客流模拟工具，用于分析和规划不同的大堂配置——包括闸机的数量和位置、电梯呼梯装置和指示标识，并定义最佳的更新改造流程。该方法还利用智能传感器测量与监测建筑内的实际客流和电梯性能。最佳的更新改造方案是基于数据和实际情况作出的决策，而非猜测和估计，建筑业主可以在翻新范围、持续时间、所需投资与预期效果之间找到合适的平衡点。因此，智能大堂方案充分考虑了所有利益相关方的需求，能够在建筑的整个生命周期内为终端用户和客户提供轻松有效的高效解决方案。

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