New Approaches in Commercial Bathroom Planning

Delivering Better Outcomes with Data-Driven Design

CAROMA

Introduction

Data is the driving force of modern design.

There is a growing amount of pressure on architects to use data-driven strategies. Clients have witnessed how analytics have changed other facets of their businesses and are seeing the potential of applying the same methods to optimise the built environment.

Some people might argue that architecture is unique because it is more creative, but there is also a practical aspect that requires careful consideration. While aesthetics remain a top priority, increasing demands for sustainability, comfort and hygiene has created the need to measure building performance in meaningful ways in real-time.

Commercial bathroom designs in particular tend to emphasise aesthetics and movement through the space, while omitting placement choices and design elements that support more sustainable outcomes and promote hygiene. Planning typically focuses on budget, materials and products. Integrating data-driven lessons and testing to improve future iterations of bathrooms is the next design frontier.

With access to bathroom usage data, architects and designers can optimise layouts and encourage tenants to spread usage of bathroom facilities evenly across products, help achieve sustainability, maximise product maintenance lifecycles, and elevate tenant satisfaction levels. Below we look at the role of data-driven design in creating the commercial bathrooms of the future.

Too frequently, we rely on “best practices” that may be the result of outdated knowledge, despite the fact that building users’ needs and preferences are constantly evolving. Data can help us understand what people really want from various building configurations.

Why data-driven design is the future

The potential of data-driven design has long been recognised in the design community. Refining and using data on a variety of subjects, such as air quality, sun light, and movement, has the potential to significantly improve design for everyone as a whole. Faster decision-making, better building construction, and more comfortable living conditions are all possible.

However, when faced with a fresh design challenge, architects are prone to turning to tried-and-true solutions. Whether due to a lack of data or a lack of expertise in data analysis, architectural decisions are often based on individual tastes shaped by subjective experiences. Too frequently, we rely on "best practices" that may be the result of outdated knowledge, despite the fact that building users' needs and preferences are constantly evolving.

With today's technological advancements, designers can take a more sophisticated approach, studying the relationship between users and spaces in real-time using sensors, internet-connected furniture and fixtures, and data analytics. For instance, Zaha Hadid Architects used a collection of sensors to track air quality, temperature, humidity, light, and a variety of other parameters within their own office.[1] This data allowed the designers to gauge how employees navigate their workplace to find the spaces that work best for them.[2] In another example, furniture manufacturer Steelcase recently developed a digital and physical infrastructure that helps organisations use their space more effectively.[3] The system utilises connected sensors, signage, and furniture to provide space availability data on a proprietary app down to the minute.[4]

Additionally, increased availability of data on building performance has encouraged designers to pay more attention to energy efficiency issues. Building Management Systems (BMS), which regulate several sub-systems including lighting and heating, ventilation, and air conditioning (HVAC), are used to manage buildings. There is a flood of building energy data due to the introduction of BMSs and integration with smart meters, and the availability and widespread installation of environmental sensors. Applications utilising this data include demand response, locating appliance faults, and improving HVAC scheduling.[5]

The role of data in future bathroom planning

Most commercial bathroom solutions do not offer user data to aid in optimising future bathroom layouts. The post-COVID environment has seen the growing popularity of touchless products, with the most advanced solutions enabling a Bluetooth® connection to be made with the tap via smartphone. However, connection to these Bluetooth devices via a mobile device is typically a one-to-one connection, which can make wider bathroom usage analysis time consuming.

For years now, homeowners and electricity providers have used smart meters, together with in-home displays and connected devices, to provide monitoring and data analytics to help optimise energy use. Smart technology is now entering the privacy of the bathroom with products designed to make spaces cleaner, healthier, and less complicated. Solutions such as Caroma Smart Command® sew together an ecosystem of bathroom technologies, devices and applications into a comprehensive system for on-demand bathroom management and insight.

A key feature of these new smart bathroom solutions are connected bathroom fixtures – smart tapware, urinals, toilets, showers and leak detection valves – that integrate seamlessly with cloud-based platforms, providing records of usage right down to individual fixture usage, activations and water consumption. The Caroma Smart Command platform receives this data and organises it into useful insights. Facility managers can access this data utilising mobile or web-based tools to remotely monitor the condition of their restrooms.

In commercial bathroom planning, this information can also be used as the foundation of an iterative, data-led and user-centric design approach. Architects and designers can enhance the experience for current (and future) users by using collected data on user behaviours. Integrated smart bathrooms can deliver powerful data on everything from space utilisation to traffic patterns; from there designers can learn about what worked, and what didn’t, and apply those insights into future designs. From a sustainability perspective, they can run simulations to forecast future energy and water use and pinpoint opportunities for development. The possibilities are endless.

How data can optimise future bathroom designs

DESIGNING INTUITIVE LAYOUTS

Understanding patterns of use for particular fixtures within bathrooms can lead to actionable insights into how the space is actually used. For example, if taps and toilets are experiencing low usage especially during expected periods of high usage, it may indicate an issue with privacy, cleanliness or accessibility. This insight can help drive design decisions, such as utilising cubicles for urinals to make them safer and more discrete to prospective users, optimising the placement and quantity of toilets and urinals, and adjusting the position of handwashing facilities within users' route out of the space.

ENCOURAGING HYGIENIC BEHAVIOURS

A smart bathroom ecosystem can be used to measure any steps the facility manager takes to improve bathroom hygiene. Data from the past and the present can be compared to determine the effectiveness of any new hygiene solutions or educational initiatives. Designers can then use these insights to inform their future planning work. For instance, data that shows bathrooms with wash basins in the direct exit path have better hygiene practices than bathrooms with wash basins that are easy for customers to bypass when leaving allows designers to determine the best placement of handwashing facilities within the space.

IMPROVING SUSTAINABILITY AND ENERGY EFFICIENCY

Interconnected bathroom fixtures provide opportunities to collect real-time usage data right down to the product level, which can help you better encourage users to adopt more sustainable behaviours. For example, urinal usage data throughout a building may indicate that urinals placed before toilet cubicles are used more frequently than those placed elsewhere. This gives designers the opportunity to adjust future layouts to encourage urinal use. As a urinal typically consumes 3.7L less water than a standard toilet for each flush, this informed design approach could result in significant water savings over the life of the building.

OPTIMISING MAINTENANCE AND OPERATIONS

By utilising the data and control capabilities of smart fixtures, proactive maintenance methods that lower operational costs can replace current reactive maintenance strategies. Smart fixtures know how frequently they have been used, when they are approaching a service milestone, and what needs to be checked in order to prolong their useful lives. From a planning perspective, this capability allows designers to adjust layouts to encourage more even distribution of usage across fixtures, allowing scheduled batch maintenance or the swapping of low-use fixtures with high-use fixtures to spread the load out when the bathroom is in operation.

Caroma Smart Command

UNLOCKING THE POWER OF DATA

Caroma Smart Command® is an ecosystem of intelligent bathroom products that enable building managers to monitor water use in real-time and make smarter decisions that reduce maintenance costs, while improving hygiene and up time. An innovative range of tapware, urinals, toilets, showers and leak detection valves integrate seamlessly with Caroma Smart Command and incorporate touch-free technology for a more efficient bathroom design that requires less cleaning and maintenance.

Every Caroma Smart Command fixture tracks activation data, which when coupled with flow rates and flush volume calculations, provides water consumption patterns from bathroom fixtures on the Caroma Smart Command Cloud. This secure data can be accessed via browser on any connected device and can be simultaneously streamed to BMS to incorporate with other systems. Direct local connections to fixtures are facilitated via Bluetooth and mobile app. This information empowers the building or facility manager to make informed decisions and monitor the impact in real-time, driving efficiencies such as cleaning and maintenance resourcing.

Architects not only require access to building information management analytics to track usage, but they also need assistance with being able to analyse and articulate this into usable findings to help with future toilet, tapware, basins and shower layouts. The expert team at Caroma Smart Command can work with you to create bespoke surveys to analyse your data sets.

Caroma Smart Command data can show:

- Which fixtures are frequented more often, enabling optimised maintenance programs and efficient running of the building.
- Observations of how users move through a given commercial bathroom space can aid in the design and layout of future projects.
- How to leverage signage to encourage consistent use of half flush and encourage/reinforce positive hygiene behaviours.
- When to swap urinals for toilets in men's bathrooms to tap into water savings.
- Look at how to swap tapware around to spread usage and minimise maintenance requirements.
- The use of dividers and/or cubicles for urinals to encourage use and feelings of safety.

REFERENCES

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2 Ibid.

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5 Batra, Nipun, Amarjeet Singh, Pushpendra Singh, Haimonti Dutta, Venkatesh Sarangan and Mani Srivastava. “Data Driven Energy Efficiency in Buildings.” Research Gate. https://www.researchgate.net/publication/262029496_Data_Driven_Energy_Efficiency_in_Buildings (accessed 20 December 2022).

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