



Smart Sanitation

How Intelligent Bathrooms Can Deliver Better Hygiene Outcomes in the Post-COVID World

Introduction

The global coronavirus pandemic has changed everyday life in many ways, with our heightened awareness of cleanliness and hygiene among the most prevalent. As we enter shared facilities – be it offices, restaurants, shopping malls or cinemas – our perception of the space and how we use it is being shaped by hygiene considerations. No part of a building is more important to hygiene than the bathroom.

In the post-COVID world, bathroom hygiene has become a major concern for tenants, owners and end-users. For businesses, ensuring the health and wellbeing of employees and customers is critical to their survival. In addition, a safe and hygienic building is one of the factors that can entice people back to return and use the facilities, allowing owners to recoup investments in amenities and building upgrades.

Against this backdrop, architects, property owners and facility managers are under pressure to identify solutions that will help keep shared spaces safe, encourage hygienic behaviours, and improve cleaning and maintenance procedures to deliver better health outcomes. Fortunately, a new generation of intelligent bathroom technologies are available to help facility managers deliver a more hygienic bathroom experience.

With the latest in data-driven management solutions, touchless taps, modern access systems, and smart fixtures, it is possible to create an integrated bathroom ecosystem that allows facility managers to monitor, analyse, and measure information that directly impacts hygiene – and take the appropriate action to protect end-users quickly and efficiently.

This whitepaper looks at the importance of bathroom hygiene in the post-COVID world, and how intelligent bathroom technologies can boost hygiene compliance and deliver enhanced levels of efficiency in bathroom management.





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It's time to rethink bathrooms

While bathrooms come in many forms and styles, they all share a common purpose: to support the physical and mental health of its users. People use bathrooms to eliminate bodily waste, administer medication, wash hands and attend to personal hygiene. The nature of these tasks means that the bathroom is one of the most frequented spaces in any building, with many shared touchpoints and surfaces that provide opportunities for germs and bacteria to spread.

Despite their importance, toilets are often neglected in the planning, design and management of shared spaces – an oversight that has broader impacts, some less obvious than others. Employee happiness and wellbeing is one such impact with the Initial Hygiene Great Australian Washroom Study finding that more than one-third of employees believe their job satisfaction would be improved with better office hygiene.¹ More generally, an unclean bathroom in a shared facility contributes to a poor user experience, which can in turn lead to negative impacts on health and productivity, and increased tenant turnover.

The coronavirus pandemic exposed fundamental flaws in the design of public toilets, contributing to greater scrutiny over the management of these amenities. These concerns

are well-founded given the potential health risks. In studies following chains of infection in bathroom settings, virus was found on 50% of bathroom door handles and 19% of taps, while bacteria was detected on 14% of door handles and 9% of taps.² Whether it be due to a lack of resources, poor equipment or poor bathroom design, the standard cleaning methods are not enough.

Additional factors that contribute to poor hygiene levels in bathroom settings include the presence of virus in fecal matter that can be spread by flushing the toilet, and ineffective handwashing. In relation to the latter, research by the Food Safety Information Council found that there was no major increase in Australians washing their hands during the first year of the pandemic.³

Failure to address cleanliness and hygiene in bathroom designs comes at a high price. Reports indicate that poor hygiene practices cost businesses approximately \$800 million dollars in absenteeism.⁴ The impact of the negative perception of public facilities is more difficult to measure, but some argue that boosting public confidence in the cleanliness of shared spaces would help the post-pandemic economic recovery.⁵

What is 'smart' bathroom technology?

Over the past few years, we have seen the rise of 'smart' buildings and integrated building management systems (BMS). Smart building technologies utilise a range of solutions to enable efficient and economical use of resources, while creating a safe and comfortable environment for occupants. A network of sensors and actuators, typically connected over the Internet of Things, connects smart appliances to the BMS, allowing facility managers to monitor and control building services remotely or enable their efficient automation.

Smart building technologies are well known for their ability to reduce energy consumption and costs. For example, automated lighting controls and HVAC systems can be programmed to turn on or off based on occupancy or the amount of natural sunlight in the room. Other services can be programmed to run on off-peak times or adjusted depending on environmental conditions. Data about energy usage can be collected directly from connected devices to allow facility managers to identify patterns of use and optimise building operations accordingly.

Similar practices can be applied to bathroom design and management to increase productivity, reduce overheads and ease occupants' concerns about bathroom hygiene. A 'smart' or 'intelligent' bathroom is one that is both technology enabled and data driven. 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.

A key feature of a smart bathroom is connected bathroom fixtures. Smart tapware, urinals, toilets, showers and leak detection valves integrate seamlessly with cloud-based platforms, providing records of usage (e.g. individual fixture usage, activations and water consumption). This data is delivered to the platform and organised into actionable insights. Facility managers can access this data using mobile or web-based software, allowing them to monitor the state of their bathrooms without being on-site.

Boosting hygiene compliance with smart bathroom technology

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MONITORING HYGIENE LEVELS

Usage of individual fixtures and relative consumption between fixtures, such as tapware activations and flushed toilets, provides valuable insights on the state of a bathroom's cleanliness and hygiene in real time. For example, if taps and toilets are experiencing low usage especially during expected periods of high usage, this may indicate a cleanliness issue or fault that requires further investigation.

ENCOURAGING HYGIENIC BEHAVIOURS

Hand hygiene is one of the most important elements of infection control, but as we have seen, there are issues with compliance with proper handwashing procedures. A centralised bathroom management system can monitor individual fixtures to determine the handwashing duration of users, providing a way to unobtrusively observe behaviours and correct them through targeted education campaigns.

The data captured by smart bathroom fixtures on handwashing duration is a good lead indicator for how hygienic patrons are. An average duration of 8 to 10 seconds (up to 20 seconds if you include soap lathering time) is desirable. It is possible to overlay handwashing duration with other smart fixture data, such as sanitaryware use, to get an even better picture of hygiene compliance. For example, you can compare the amount of sanitaryware uses compared to tap activations to get a 'hygiene ratio' as a measure of hygiene that can be tracked over time.

MEASURING SUCCESS

With a smart bathroom ecosystem, any action taken by the facility manager to improve bathroom hygiene can be measured. Historical data can be compared with current data to identify whether or not new hygiene solutions or education programs have been effective. Positive changes in behaviour can be rewarded or hygiene compliance strategies can be adjusted if the results are not satisfactory.

Designers can incorporate insights into the design process. For example, if data shows that bathrooms wherein wash basins are situated in the direct path of the exit have better hygiene practices than those where it is easy for patrons to bypass the basins upon exit, this can inform the final layout of new builds and renovations.



BUILT-IN HYGIENE MEASURES

Leading smart bathroom solutions include touchless operation for handwashing and bathroom access. These features eliminate many of the high-risk shared touchpoints in a bathroom space, which helps reduce the number of germs on surfaces while increasing convenience and accessibility.

Other built-in hygiene features can be automated to ensure a healthy bathroom environment. For example, the automatic hygiene flush feature can be programmed to activate if the toilet has not been used within a predetermined amount of time (usually 24 hours). After this time, the smart fixture will activate a purge to ensure that stagnant water is not left idle in the plumbing network, which can otherwise lead to the growth of harmful bacteria (e.g. legionella).

ADOPTING A TECH-ENABLED CLEANING AND MAINTENANCE SYSTEM

Smart fixture data enables a proactive approach to cleaning and maintenance. Understanding patterns of use for particular bathroom fixtures allows facility managers to assign cleaning staff to where they are most needed. Real-time visibility allows cleaning staff to respond instantly to issues, rather than waiting for the next scheduled cleaning. Instead of cleaning according to a schedule, you can attend to your bathrooms based on usage, generating notifications to cleaning staff after a certain number of bathroom visits.

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Caroma Smart Command

HARNESS INTELLIGENT BATHROOM DATA FOR OPTIMAL HYGIENE

Caroma Smart Command® is an ecosystem of intelligent bathroom products that enable building managers to monitor fixture 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.

Data can enable quick identification of behavioural trends which if addressed could result in water savings, or help identify when a fixture may require maintenance based off number of activations, or it can inform on how hygienic a given bathroom is through cross-referencing sanitaryware activations with tapware usage. Environmentally conscious design decisions may be based on historical data and feedback, delivering premium-end buildings which exceed the needs of tenants and investors.

REFERENCES

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- ⁴ Above n 1.
- ⁵ Visontay, Elias. "Sensor taps and no door handles: Covid-19 shows it's time to rethink public toilets." *The Guardian*. <https://www.theguardian.com/society/2020/may/04/sensor-taps-door-handles-covid-19-rethink-public-toilets-bathroom-design> (accessed 11 July 2022).

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